

335EX



335 Express **OWNER ASSISTANCE MANUAL**

Revised 2014



335EX SPECIFICATIONS

LENGTH:	32'6"	(9.9m)
LENGTH W/PULPIT:	34'6"	(10.5m)
BEAM:	11'2"	(3.4m)
DRAFT (boat only):	25"	(63.5cm)
BOAT WEIGHT:	12900lbs	(5851kg)
WEIGHT CAPACITY:	7650lbs	(3470kg)
PERSON CAPACITY:	14	
PERSON WEIGHT:	2310lbs	(1048kg)
FUEL CAPACITY:	280gal	(1059.92L)
TRANSOM HEIGHT:	Twin-30"	
MAX POWER:	700hp	(525kw)
COCKPIT DEPTH:	29"	(73.7cm)
COCKPIT AREA:	115sq/ft	(10.7m²)
APPROX LENGTH ON TRAILER:	40'	(12.1m)
BRIDGE CLEARANCE:		
W/HARDTOP	10'6"	(3.2m)
FLOTATION:	UNSINKABLE	
HULL DEADRISE:	21°	

CE

12 PERSONS OR 1766kg

525kw MAX POWER

B RATING



Dear EdgeWater 335EX Owner:

Congratulations on purchasing one of the finest small boats ever built. It has been constructed with care from the finest available materials. At EdgeWater we take great pride in the quality and craftsmanship that goes into each boat, large or small. We believe you'll have many years of enjoyment from your new EdgeWater and thank you for entrusting your leisure time to one of our fine products.

This manual has been assembled to help you learn more about your new boat and increase your enjoyment of it. Your EdgeWater has been built for a "Lifetime on the Water".

Boat safe and boat smart, we wish you many years of boating pleasure.

Sincerely,

A handwritten signature in black ink, appearing to read "P. Truslow". The signature is stylized with a large, bold "P" and "T", and a cursive "r" and "uslow".

Peter Truslow
President
EdgeWater Powerboats



Service Information

Please fill out the information below completely. It will help us in assisting you in the event your EdgeWater needs service.

Customer Name _____

Address _____

City _____ State _____ Zip _____

Phone _____ Cell _____ Business _____

E-mail Address _____

Dealer Name _____

Address _____

City _____ State _____ Zip _____

Phone _____ Fax _____

Purchase Date _____ Engine Make/Model _____

Delivery Date _____ Engine Serial # _____

Hull Number __DMA_____ Ignition Key # _____

EdgeWater Power Boats, LLC. reserves the right to make alterations in the standard and optional equipment without incurring obligation to those boats already having been built. Every effort has been made to ensure that the information in this manual accurately describes vessels being built at the date of printing.

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1/General Information

1.1 General

Your EdgeWater 335EX is a semi-custom offshore fishing vessel that is designed to be powered by dual outboard engines.

1.2 Owner / Operator Responsibilities

Registration

Registering your boat is important to you. Federal Law requires that all powered, undocumented vessels be registered in their state of principal use. Contact the appropriate agency in your local state to obtain specific registration information.

Reporting Boating Accidents

All boating accidents must be reported to the proper authorities in the state which the accident occurred. If someone dies or disappears as a result of the recreational boating accident, it must be reported immediately, with a formal report being made within 48 hours. If there is damage of more than \$500, or if the boat is completely lost, a formal report must be made within 10 days.

Questions regarding accidents may be directed to the Boating Safety Hotline, 800-368-5647.

Education

Whether or not you are an experienced boater, attending a Boating Education Course can be beneficial. If you are inexperienced, it is the best, safest way to begin your life on the water. If you are an experienced boater, it's always good to sharpen your skills.

Required Equipment

The U.S. Coast Guard requires certain equipment on each boat. In addition, they also set minimum equipment and safety standards. For more detailed requirement information, obtain "Federal Requirements And Safety Tips For Recreational Boats", by contacting the Boating Safety Hotline, 800-368-5647.



Some states and local agencies require equipment that is not required by the U.S. Coast Guard. Your local agency or dealer can provide specific information regarding these non-standard requirements.

2/Helm Control Systems

2.1 General

The helm station is the control center for the boat. The main control systems are the engine throttle and shift controls, the steering system, and the trim tab controls. These provide the operator the ability to control speed, direction, boat trim, and attitude. Each manufacturer provides manuals on the operation and use of their systems.

2.2 Steering System

General

The manual which comes with your steering system provides specific information on your steering system.

The standard hydraulic steering system has two main components: a helm assembly and hydraulic cylinder. Turning the helm, which pumps fluid in the hydraulic hoses, activates the hydraulic cylinder and causes the motor to turn. The helm acts as both pump and reservoir. Please see diagram in the manual's appendix for a visual representation of this system. An option of dual cylinders connected by a tie-bar is also available for easier steering capabilities.

While running at slow speeds, most boats tend to wander slightly back and forth. Keeping the wheel in the center without overcompensating for the slight wandering will prevent over steering and reduce the tendency to wander.

Steering System Maintenance

Routine system inspection should occur regularly. Cables, hoses, linkage and helm assemblies should be inspected for wear, corrosion, cracking, or deterioration. Cleaning and light grease should be applied to all exposed metal parts and other damaged or deteriorated parts should be replaced as soon as possible

2.3 Engine Throttle and Shift Controls

Refer to the engine manual supplied with your engine for specific information on your controls. The ones depicted are those supplied by Yamaha.

There are three major components of the engine throttle and shift controls: handles, throttle cable, shift cable. Throttle and shift cables are push-pull and are connected to the fuel system (carburetor or fuel injection) and the other to the shift rod linkage. By moving the handles forward and back, the operator engages the cables thus controlling the amount of fuel being used and the gear selector for forward, neutral and reverse. Careful use of the controls provides smooth, responsive and safe operation.



Do not bring the throttle back abruptly to stop the boat unless it is an emergency. Allow time for the engine RPM to come down to idle before shifting to reverse or severe gearbox damage could occur. PLEASE REFER TO YOUR ENGINE OWNER'S MANUAL FOR FURTHER OPERATIONAL PROCEDURES FOR YOUR OUTBOARD.

Engine Stop Switch

This device is designed to prevent the operator falling overboard while the engine remains running. The engine stop switch lanyard should always be worn by the operator, while the boat is in motion. Pulling the lanyard from the control will stop the engine. If the engine will not crank properly, the lanyard may not be properly attached to the engine stop switch.



Do not use the engine stop switch to stop the boat unless it is an emergency as it may impair your ability to quickly re-start the engine.
****NOTE** Each ignition key has a 3 digit number stamped on it. Please record this number for future reference on the service information page in the front of this manual.**

3/Propulsion System

3.1 General

Your new EdgeWater 335 EX is designed to be powered by dual outboard motors only. Most 2-cycle outboards currently use an automatic system to mix the oil with the gasoline before the engine uses it. If equipped with 2-cycle engines, there will be oil tanks located on the center line behind the aft deck access doors and oil fills will be located on the motorwell side of the aft deck. Make sure the oil tanks always have a sufficient amount of the recommended 2-cycle oil for your cruise, plus some reserve. 4-cycle engines require oil be maintained in the crankcase. Always check the crankcase oil level before each day's run.



Always follow the manufacturer's recommendations and use only the recommended oil types.



Don't attempt to service your outboards or any of their components unless you are thoroughly familiar with its operation and dangers. Many of the moving part components are exposed and can pose an extreme danger to anyone unfamiliar with their operation. Always leave the servicing to a qualified technician.

Each manufacturer provides manuals designed to assist you in the proper operation and maintenance of your new engine(s). Follow their guidance and schedules for proper operation of your new engine(s). With a modern outboard there is little to do as long as proper maintenance is performed, in accordance with the manufacturer's recommendations. If the boat is to be kept in saltwater for an extended period, electrolysis and marine growth can become a problem. When leaving your boat in salt water overnight or for an extended period, tilt the engine(s) as high out of the water as possible. This will decrease the possibility of marine growth on the outside of the engine(s), as well as reduce the potential of marine growth compromising the cooling water inlets in the lower unit(s), which can cause overheating.



Do not paint your outboard's lower units with paints designed for boat hulls. Some can cause severe damage to your engine. Check with your engine manufacturer to get their recommendation.

Do not attempt control adjustments unless you are very familiar with their function, operation and adjustment. Failure to properly adjust the system components can adversely affect your boat's performance and safety. Mis-adjustment can also cause severe control, engine or lower unit damage.



Please return all warranty cards for boat, engines and other related items. This will assist you in the event you have a warranty problem.

3.2 Engine Cooling System

Most outboard engines are cooled by water taken in through ports in the lower part of the drive section. Make sure these ports are free of debris or other items that might cause the flow to be restricted. Maintain a routine vigilance to see that the visual inspection streams have a steady flow of water. If they do not, shut down the engine to see if they are clogged or if there is a more serious problem. Be especially watchful if you have gone through an area of vegetation or shallow water as the intake ports can become clogged with weeds, dirt or other debris.



Do not run your outboards without water coming into the lower unit. The water pump impellers can be damaged in only seconds of this type of operation.

3.3 Propellers

A turning propeller moves the boat through the water, forward or backward. They should always be clean and free from nicks or dings, which can adversely affect performance. Your dealer can assist you in the proper selection of a propeller for your boat. This selection is based on the horsepower of the engine and its relationship to the size and weight of the boat.

Propeller sizes are determined by two numbers, which appear on different propellers at various locations. They are listed in sequence, for example 13 x 17. The first number is the diameter of the propeller and the second is the pitch. Pitch is the theoretical distance the propeller moves through the water with each complete revolution. The larger the number the greater the theoretical movement. It also follows that the larger the number the greater horsepower is required to turn it. With a load which is "normal", or usual for your boating activities, the engine should be able to reach its maximum operating RPM range at wide open throttle (WOT). With a light load on smooth water, the engine should reach its manufacturer's rated maximum operating RPM at wide open throttle (WOT) and maximum trim. If it does not, you may have a propeller which has too much pitch. If it goes beyond the maximum recommended RPM range, you may have too little pitch. Neither condition is good for the engine. You will get shorter engine life and poorer performance than your boat and motor were designed to provide.



If your boat came from the factory with a propeller selected by EdgeWater, it should already be optimized for the performance of your boat. Before changing the pitch or diameter of your propeller, always check with your dealer to determine how the changes will affect your boat and engine performance. Certain modifications such as bottom paint or options that affect weight balance and/or wind resistance may lower peak rpm. Always check with your dealer first if optimum rpm can not be attained.

3.4 Engine Power Tilt and Trim

The power tilt and trim system on your outboard(s) provides the ability to optimize the running angle of your EdgeWater 335 EX to allow for load and sea conditions. Moving the outboard lower unit toward the transom is generally referred to as trimming “in”, while moving the outboard lower unit away from the transom is referred to trimming “out”. It is generally best to have the engine(s) trimmed in for acceleration from displacement to planning mode. This brings the bow down and requires less fuel and effort on the engine’s part to plane off the hull.

The first 20° of movement aft of the transom is referred to as trim and is the area generally used to operate the boat while on plane. The area beyond the first 20° is referred to as tilt and is usually reserved for operating in shallow water or pulling up on a beach.

While running under normal conditions, the bow should be in a 3° to 5° up angle to maximize the hull’s ride and performance. When sea conditions are rougher than normal, bringing the bow slightly down may improve the ride and will also allow the boat to remain on plane at a lower speed.



Watch the hoses and cables on your engines as they are tilted to their full tilt position. They may become caught and damaged if the engines are in the wrong position.

3.5 Engine Instrumentation

The following is presented to familiarize you with the instruments, which may be on your boat. Every boat is not equipped with full instrumentation.



All factory installed Yamaha engines include Yamaha’s digital multifunction tachometer and speedometer. Refer to your engine operators manual for use details.

Tachometer

The tachometer displays the number of revolutions per minute (RPM) the engine is turning. There is a designed operation RPM range for the engine. Become familiar with the operating range of your engine and its operating characteristics. The tachometers designed to aid the boater to assure the engine performs within that designed range. The tachometer can be used to better understand the performance of your engine and your EdgeWater 335 EX. By monitoring your tachometer as you operate your EdgeWater, you will find RPM ranges that work better in certain sea and load conditions. Be alert the tachometer operation may provide an early indication of difficulty, before it becomes irreversible.

Speedometer

The speedometer indicates the boat speed in miles per hour. Some types work using a spinning wheel to determine the boat speed. Their accuracy can vary from the actual over the bottom speed due to many factors. Other boat speedometers calculate the speed by amount of pressure the moving water forces into a “pitot” tube. These gauges should only be used as indicators of approximate speed and not used as absolute speed indicators. NOTE: All F350’s and digital F250 engines utilize an external GPS input for speed display that must be connected by your dealer.

Temperature Gauge

This is designed to monitor the operating temperature of your engine's cooling system. A sudden rise from the normal should be investigated to determine if there is an obstruction in the cooling system.

Water Pressure Gauge

This gauge measures pressure in the engine cooling system. If the pressure changes from the norm it could indicate a complete or partial blockage in the system or a water pump problem. If this does not return to normal, your dealer should check it to make sure the cooling system is operating properly. NOTE: Factory rigged boats are not equipped with water pressure gauges.

Fuel Gauge

This gauge indicates the amount of fuel in the fuel tank. It is always prudent to follow the "rule of thirds", one-third of the tank to get the destination, one-third to return, and one-third in reserve. NOTE: It is important to "calibrate" your fuel gauge during your first initial boat trip. Record the fuel reading prior to fill up and how many gallons to top off the tank at each fill-up. Make sure the boat is floating the the same position. By subtracting the amount to top off from total fuel capacity you can calculate gallons remaining in the tank for 3/4, 1/2, and 1/4 gauge readings.



This gauge is a measure of relative fuel supply and is not a calibrated instrument!

Voltmeter

This meter displays the voltage for the battery and charging system.

Hour Meter

The hour meter keeps a record of operating time and is very useful for scheduling maintenance.

Engine Alarms

Most outboards are equipped with several audible engine alarms. Your engine owner's manual will familiarize you with these and their sometimes-distinctive sounds.



Warning: If an engine alarm sounds, shut down the engine until the source of the problem is determined.

Compass



The compass assists in determining your location by indicating your position relative to magnetic north. For accuracy, your compass may need to be adjusted to take into account specifics of your boat and geographic location. Please refer to the material provided with your compass for "compensation".

Instrument Maintenance

Your instrument faces should be periodically cleaned to keep them free of salt and atmospheric debris. The ignition switches should be periodically sprayed with a contact cleaner/lubricant to keep them free of corrosion and dirt.

4/ Fuel System

4.1 General

All fuel systems and components on your EdgeWater 335 EX have been checked and each fuel tank has been pressure tested. This inspection and pressure testing assure that your fuel system is leak proof and safe. It is the purchaser's responsibility to maintain the fuel system in a safe manner. Make periodic inspections to determine the system is still safe and free from leaks. Special care should be taken when inspecting joints and connections to make sure they have not loosened with vibration.

The EdgeWater fuel system has been designed to meet or exceed the requirements of the U.S. Coast Guard, the National Marine Manufacturers Association, and the American Boat and Yacht Council, which were in effect at the time of your boat's manufacture.



If any odor of gasoline is detected, immediately shut off all engines and electrical devices until the source and condition of the odor has been determined and eliminated. Have a fire extinguisher at the ready until the condition has been resolved.

4.2 Fuel Fill

There are three fuel fills located on the port and starboard sides of the boat labeled "GAS" or "DIESEL". The two "GAS" fills located on the starboard side are for each of the 145 gallon tanks located under the cockpit floor. The forward fill is for the port tank, and the aft fill is for the starboard tank. There are no selector valves in this fuel system, as each tank supplies its corresponding engine directly. The "DIESEL" fill is located on the port side and is for the generator 20 gallon fuel tank. This tanks inspection hatch is behind the center backrest cushion in the aft cabin berth. The generator uses a two line fuel supply and return system. Both valves located on the fuel tank must be in the open position for the generator to operate.

4.3 Fuel Vent

This vent is located and incorporated into the fuel fill cap. This vent allows air to escape from the tank and thus allows fuel to enter. Make sure this vent is kept free from debris.

4.4 Fueling

Your Edgewater 335EX is equipped with three built-in fuel tanks. These consist of two 145 gallon gasoline tanks under the cockpit floor and one 20 gallon diesel tank for the generator under the aft cabin floor. Before fueling you should follow these procedures:

- Make sure all switches are off and all cigarettes are extinguished.

- Know the location of the fire extinguisher in case of an emergency.
- Remove the fuel fill cap.
- Place the nozzle firm against the side of the opening to prevent static discharge
- Begin fueling.
- When the tank is full, stop fueling.
- Remove the fuel nozzle.
- Install the fuel cap.
- Check the area for fuel odors.



Warning: If fuel odors are detected, do not start the engines! Check to make certain there are no leaks or system problems before starting the engines.



Warning: Do not fill the fuel tank while the engines are running. Do not allow smoking or open flames within 50 ft. of the fueling area. Fuel is very flammable. To prevent damage to the engines, use only fuels without harsh additives or alcohol. Refer to your engine owner's manual for specific fuel requirements.

4.5 Fuel System Maintenance

Regularly inspect the fuel system components. All lines, fittings, and bulbs should be flexible and not corroded. If fittings or other components are found to be cracked, they should be replaced at once. If you use your boat infrequently or do not use it for an extended period of time, a fuel conditioner should be added to a full tank of fuel to prevent fuel deterioration and damage to the fuel system.

4.6 Fuel Filters

Fuel filters are installed in the aft mechanical locker. These are fuel/water separator type of filters and are designed to prevent water from entering your engine. The fuel filter element is a spin-off type element. At a minimum, this element should be replaced at the beginning of every boating season. Always carry a filter wrench and spare filter of the type supplied on your boat.



5/Electrical Systems

5.1 General

Your 335EX is equipped with both 12 volt DC and 115 volt/60Hz (or 220 volt/50Hz) AC electrical systems. The 12 volt DC system is supplied by four (4) lead acid batteries located in the aft mechanical locker. Two batteries are dedicated "HOUSE" for boat systems and one for each engine. Each is connected to an automatic battery isolator with a manual parallel function. The isolator allows the boat system to be utilized while the engines are off without depleting either of the engine batteries. The isolator also connects all the batteries together when either engine is running to provide charging. The manual parallel switch is located at the helm main breaker panel and will connect all four batteries together for an emergency start if the cranking batteries will not start the engine. Press and hold the parallel switch for 15-20 seconds, start the engine, then

release the switch. If one engine will start but not the other, start the engine first then follow the parallel procedure.

The AC electrical system power is provided through either shore power or the on board diesel generator. While dockside the shore power cable may be connected to a 50 amp service.

Ensure all circuit breakers are in the off position before connecting the shore power cable.

The main AC electrical panel located at the cabin entry door allows only one power source to be selected at a time. Ensure that the reverse polarity indicator is not illuminated before switching on any branch circuits.

5.2 Panel Switches

There are multiple electrical panels located throughout your 335EX.

The 12 volt **DC main switch/breaker panel** is located behind a door in the port/aft corner of the cockpit. This panel has battery cutoff switches for starboard engine, port engine, house and the generator. When these battery switches are turned to the "OFF" position, all DC power to the boat is disconnected EXCEPT for the unswitched circuits. These include the automatic bilge pumps, shower sump pump and stereo memory. Main circuit breakers for the helm branch panel, unswitched circuits, electronics, power steering pump, anchor windlass and four accessory circuits are located on the lower portion of this panel.

At the helm is the 12 volt **DC branch circuit breaker panel** with digital voltmeters and a 12 volt receptacle. This panel also has integrated fuse holders for any electronics the boat may have installed as well as the battery parallel switch and windlass main power switch. The windlass up/down switch on the upper dash will not work if this switch is in the off position. All DC branch circuit breakers are located on the lower portion of this panel and are of the "push to reset" type.

The two **console switch panels** located on the upper portion of the console control (from port to starboard) the horn, navigation lights, overhead cockpit lights (4 color), forward speaker light, deck courtesy lights (blue), fuel tank level selector, accessory, aft bilge pump, forward bilge pump, windshield power vent, sunroof (optional) and anchor windlass. The backlighting for these switches will come on when the navigation lights are turned on.

There is also a **cockpit switch panel** located at the port prep/livewell area to control the fixbox pumpout, aft livewell pump, fwd livewell pump, raw water washdown pump, fresh water pump, deck lights (blue), aft spreader lights, locker lights, livewell lights, underwater lights (optional), and the adjustable overhead work lights. The circuit breaker protection for these circuits is located on the branch panel at the helm.

The 120 volt (or 220 volt) **AC main breaker panel and the generator control panel** are located at the cabin entry door. The AC main panel has a digital voltmeter, main breakers and branch circuit breakers for all AC circuits.

5.3 Electrical System Maintenance

At the beginning and end of each season the exposed electrical components of the switch panel should be sprayed with a non-conductive rust/corrosion inhibiting spray. Light bulb connections and running light connections should be covered with a non-water soluble lubricant. Care must be taken not to get grease on the glass portion of the lights as it will cause them to overheat and burn out. Inspect all wiring for breaks, loose terminals and sound insulation. Replace worn or

deteriorated components. Check the electrolyte level in the batteries regularly and fill with distilled water, as necessary. **DO NOT OVERFILL.**

6/Raw Water & Freshwater Systems

6.1 General

Your boat is equipped with a freshwater system, the components are a freshwater tank, distribution lines, a shower head assembly, sink/shower faucet and a pump. The standard raw water system consists of a high speed pick-up, located on the transom, a pump and one or more livewells and washdowns.

6.2 Livewell Operation

The livewell is filled by a low maintenance centrifugal pump installed in the bilge. The pump is controlled by the livewell switch on the control panel. To operate properly, the valve inside the livewell must be adjusted to provide an even flow in and out of the livewell. Too much and it will be more than the drain can handle, too little and the water will not get the proper circulation. The valve should be turned counterclockwise to open and clockwise to close. There is a strainer attached to the overboard drain to regulate the height of the water level. The livewell drains through a hose connected to a thru hull fitting on the port side of the boat. To completely drain the livewell, remove the bottom plug and allow the water to drain overboard. A diagram of the raw water system is included with this manual.

6.3 High Pressure Washdown

The washdown system is comprised of a diaphragm pump, mounted in the port side of the aft mechanical locker and a washdown fitting to attach a hose. The pump is controlled by the washdown switch on the control panel. The diaphragm pump is fed through the same thru hull and high speed pickup as the livewell pump. The washdown hose outlet is located forward under the port gunnel board. With an attached hose, this system can be used to wash debris from the boat. The switch should be turned on immediately prior to use and turned off when not in use. When activated, the pump's pressure switch will automatically control the pump. It is normal for the pump to cycle on and off in response to flow rates and water demand.



Always turn off the high pressure washdown pump switch when leaving the boat unattended.

6.4 Freshwater System

The freshwater system is comprised of the following components. The 40 gallon holding tank is located below the cockpit fishbox and is filled at the port side deck fill labeled "WATER". The high pressure pump, inline filter and water heater are all located in the cockpit mechanical locker on the aft starboard side. Fresh water is supplied to outlets, faucets or showers in the starboard aft

sink, starboard cockpit washdown, head sink and toilet, galley sink and the anchor washdown. The freshwater switch on the **cockpit switch panel** and when activated the pumps internal pressure system will automatically control the pumps operation. The pump will usually cycle until the entire system is pressurized then shut off until there is a water demand.



Always turn off the freshwater pump switch when leaving the boat unattended.

The freshwater pump must be switched on if the water heater is used. Failure to supply water to the water heater will cause the heating element to be damaged.

6.5 Raw Water System Maintenance

The following checks should be made periodically to assure your system operates properly:

- Periodically spray pumps with a protective silicone solvent to reduce corrosion.
- Periodically check in-line filter to remove any collected debris.
- Fishboxes and livewells should be drained and cleaned after each use.
- Periodically check hoses and connections for signs of deterioration.

7/Drainage System

7.1 General

All water drains from your EdgeWater 335EX by gravity. Your boat is self-bailing at rest. It is important to check drains frequently to make sure they are clear and free flowing. Review the schematic in the Appendix and become familiar with the location of each thru-hull drain.

7.2 Drain System Maintenance

Essential tasks must be done periodically to maintain your boat's ability to drain in adverse conditions.

- ☐ Clean cockpit drains to remove debris or other foreign objects which could prevent boat from draining properly.
- ☐ Check bilge areas, aft and console, for debris and foreign material, which can cause automatic switches to malfunction.
- ☐ Flush drains to keep free flowing and clean.

7.3 Cockpit Drains

Your EdgeWater 335 EX drains aft through four cockpit drains located at the aft deck area. The deck is designed to take water and drain it overboard. The drains should be checked periodically to make sure they are clear running and free from debris. When washing the boat down after use, use a hose nozzle with a high pressure stream to make sure they are free running.

7.4 Transom Bilge

Your EdgeWater 335 EX has a hull bilge where the raw water pump and automatic bilge pump are located. The bilge pump is designed with an internal float so that it automatically turns on if the water in the sump rises, or it may also be activated by a momentary switch on the panel. This pump should be periodically checked to make sure it is working properly and that the drain screen is clear. To check the pump, squeeze the pump sides and lift it from the base, which is fastened to the hull. The screen will be easily seen and if there is debris, it may be cleaned and replaced. Replace the pump assembly and check its operation by turning on the momentary switch on the helm switch panel. There is also a second “Emergency” bilge pump that activates automatically if water rises over 3” in the bilge cavity.

When the boat is out of the water it may be drained by a thru hull drain located at the bottom of the transom. This drain has a brass plug that may be removed with a ½” wrench. This plug should be periodically checked for tightness.



Note: The bilge sump area should be checked for oil before operating the bilge pump. The discharge of oil from a bilge area is illegal and is subject to a fine. The Federal Water Pollution Control Act prohibits the discharge of oil or oily waste into or upon the navigable waters of the United States or the waters of the contiguous zone if such discharge causes a film or sheen upon, or a discoloration of the surface of the water, or causes a sludge or emulsion beneath the surface of the water. Violators are subject to a penalty of \$10,000.

7.5 Locker Drains

On the 335 EX there is a forward anchor locker which drains directly through the hull. The cockpit in floor fishbox drains only through the use of the electrical fishbox pumpouts. This pump is controlled by the “fishbox pumpout” switch on the cockpit panel.

7.6 Cabin Bilge

Located under the aft cabin floor panel are the cabin bilge pump and the shower sump pump. To access these pumps simply pull up the removable floor panel located at the bottom of the cabin steps. Both pumps have integral float switches for automatic operation as well as manual operation from the helm for the bilge pump. Periodic maintenance of these pumps should include visual inspection and cleaning of the screens to prevent blockage as well as testing the operation. The shower sump may be tested by pouring water into the drain located in the back corner of the head compartment. The bilge pump may be tested by placing two fingers over the test pads on the float switch.

8/Safety Equipment

8.1 Required Safety Equipment

Contact the U.S. Coast Guard Boating Safety Hotline at 1-800-368-5647, or 1-202-267-1070 to obtain a pamphlet on the latest required and suggested safety equipment. The Coast Guard Auxiliary also offers “Courtesy Examinations” to help ensure your boat is properly equipped.

The following is a list of required safety equipment to be aboard your boat. This may be modified from time to time and it is suggested that you contact the U.S. Coast Guard Boating Safety Hotline at 800-368-5647 or pick up a copy of the latest “Federal Requirements and Safety Tips of Recreational Boats” pamphlet.

☐ **Personal Floatation Devices (PFD's)**

These must bear a tag that they have been approved by the U.S. Coast Guard and must be in serviceable condition. They must also be of the appropriate size for the wearer, i.e. for children there must be children's life vests on board. Many states now require children to wear PFD's at all times. You should check with your state to determine the proper requirements. You should maintain at least one Type I, II, or III PFD for each person on board, plus one throwable device, a ring or boat cushion, Type IV.

• **Visual Distress Signals**

These are now required in virtually all waters of the United States. If in doubt, please check with the U.S. Coast Guard Boating Safety Hotline at 1-800-368-5647 for a specific answer.

• **Pyrotechnic Visual Distress Signals**

These must be U.S. Coast Guard approved, be in a serviceable condition, and be readily accessible. They each have a service life date and are not counted beyond this date. These types include both hand held flares and aerial flares.

• **Sound Signaling Device**

You must have an efficient means of making a proper sound signal in the event of distress or poor visibility. This may be a horn, whistle, or bell.

• **Navigation Lights**

These come with your EdgeWater and meet U.S. Coast Guard requirements. It is important that you periodically check to make sure they are in working order. It is very important these be checked prior to any cruise which will keep you on the water after dark.

• **Fire Extinguisher**

A fire extinguisher is standard on all EdgeWater boats. These require regular inspection to make certain they are ready for use. Questions may be directed to the U.S. Coast Guard Boating Safety Hotline at 1-800-368-5647, or 1-202-267-1070. You should, as part of routine boat maintenance, check to make sure your extinguisher is still operable.



Never discharge your fire extinguisher to see if it still works. This will cause it to lose pressure. If it is accidentally discharged or if it is used on a fire, replace it immediately.

8.2 Suggested Safety Equipment - Inshore

Suggested safety equipment, over and above the required equipment is:

☐ First aid kit and manual

☐ Boat hook

☐ Tool kit

☐ An adequate number and size of line should be on the boat. Bow lines should be at least 1/3 longer than the boat's length and stern lines at least as long as the boat. When operating in areas

with unusually high tidal range, this should be lengthened. The minimum size line for a small boat is 3/8" diameter 3 strand nylon. Refer to one of the listed references in the Appendix for a complete discussion on line size relative to boat length.

- ☐ Waterproof flashlight, with good batteries
- ☐ Spare batteries
- ☐ Spare boat keys
- ☐ Binoculars
- ☐ Tow line. This should be a minimum of 50' long with at least one size increase over the boat's mooring lines.
- ☐ Day/Night visual distress signals
- ☐ Local charts and compass
- ☐ Properly sized anchor and line
- ☐ Fenders of the proper size



Always carry water, even for a 10 minute cruise.

8.3 Suggested Safety Equipment – Offshore

In addition to the required equipment, and the suggested inshore equipment, there is additional equipment which is prudent to have when venturing offshore. No matter what the conditions at the start of the trip, the situation can change rapidly and all your equipment and skill can be required to safely bring your crew home to safety.

- ☐ VHF radio
- ☐ A supplemental, portable VHF is also a good back-up
- ☐ Sunscreen
- ☐ Spare propeller and the knowledge of how to properly change it, if required
- ☐ Extra clothing for changeable weather conditions
- ☐ Spare anchor with sufficient line for the water depth
- ☐ Mirror
- ☐ Charts

9/Safe Operation

9.1 Pre-Cruise Check List

- ☐ Check provisions. Make sure you have plenty of water in the event you have a problem and are delayed.
- ☐ Check the weather forecast. Avoid sea conditions that are beyond the experience of yourself and your crew.
- ☐ Do you have the correct safety gear aboard and is it in good working order?
- ☐ Make sure all fire extinguishers are in good working order.
- ☐ It is advisable to carry jackets or foul weather gear in the event of adverse weather conditions.

Your EdgeWater 335 EX is equipped with a maximum capacity rating plate permanently affixed to the helm area of your boat. It will provide information regarding the maximum number of people

you can safely have aboard, the maximum amount of weight the boat can safely carry, and the maximum horsepower your boat was designed to handle.



Do Not Overload your boat.

Before Starting the Engine

- ☐ Determine if the trip can be safely made by checking the weather.
- ☐ Are all the proper boat and personal documents on board?
- ☐ Check operational equipment, such as running lights and horns to make sure they are on board, and operable.
- ☐ Make sure there are enough provisions for the cruise.
- ☐ Leave a float plan with someone who can notify authorities in the event you do not return in the allotted time.
- ☐ Double check the fuel and engine oil levels.
- ☐ Set the battery switches to "ON".
- ☐ Check the emergency stop lanyard to see if it is properly attached, and that the shift lever is in the neutral position.



Remember the rule of thirds: 1/3 out, 1/3 back, and 1/3 in reserve.

After Starting the Engine

- Upon initial start-up, make sure to follow the manufacturer's recommendations for engine break-in
- Check to be sure there is a tell-tale water stream exiting the engine.
- ☐ Check the gauges to determine if everything is nominal.
- ☐ Check to make sure everything is secure and properly stowed away; remember the boat's movement is dynamic and anything that is loose will become a hazard at the worst possible time.
- ☐ Have a great time on the water



Remember that the captain is responsible for the safety of the crew and passengers and for his/her boat's wake damage.



Never operate the boat while under the influence of alcohol!

- ☐ Make sure someone else on-board knows how to operate the boat in the event you are injured and unable to operate the boat.



If you are operating the boat for the first time, make sure you follow the engine manufacturer's break-in recommendations. This will assure proper break-in and reduce the possibility of engine problems.

9.2 Basic Rules of the Road

The following is not intended to be a comprehensive course in seamanship and rules of the road, but instead an introduction. It is strongly recommended that a boating safety course be taken from your local Coast Guard Auxiliary or local Department of Natural Resources. There are also many good reference books in your local library as well as numerous sites on the internet.



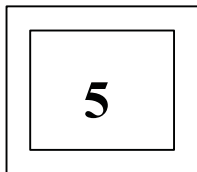
Remember, paddle boats, sailboats and other vessels (such as barges) which are unable to maneuver, always have the right of way over powerboats. Sail boats, when under power, are considered motor boats. However, always boat defensively.

Aids to Navigation

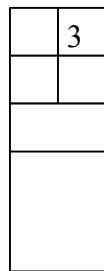
Along the coast lines and in navigable inland waters, aids to navigation have been placed by the U.S. Coast Guard. These have been placed for the boating public's safety. Please become familiar with them and learn to use them to make your boating safer and more fun.

Federal Waterways Marking System Aids

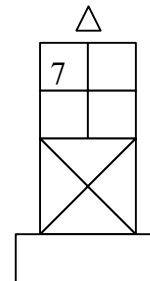
Lateral Aids as seen from Seaward (portside green)



Daymark

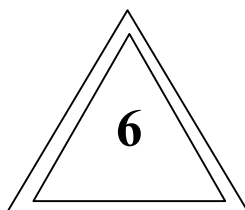


Can Buoy

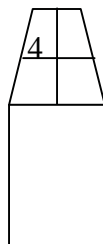


Lighted Buoy
(green light)

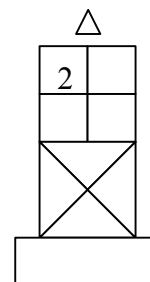
Lateral Aids as seen from Seaward (starboard side red)



Daymark



Nun Buoy



Lighted Buoy
(red light)

9.3 Safe Operation

Getting Underway

After clearing the dock, make sure the power trim (if so equipped) is trimmed down. (This will bring the boat up on plane more quickly and easily.) Give the engine sufficient throttle to bring it to plane briskly, then back down to the cruising speed of your choice, based on the sea conditions and your planned activity.

- ☐ After coming on plane, raise the trim to a point where the engine is level with or slightly above the plane of the water. This is usually with the bow at about 3° to 5° above level. This will provide the smoothest, most economical operation.
- ☐ Keep a constant vigil for other boats and watercraft and be prepared to give way, or slow down, if necessary. (We suggest you enroll in a boating safety course offered by the U.S. Power Squadron or the Coast Guard Auxiliary.)
- ☐ When coming off plane, allow the engine to come back to an idle speed until the boat slows down.
- ☐ Shift to the neutral position.



Never allow anyone to sit on the gunwale while the boat is moving!

While underway keep a constant vigil for other craft that may be approaching, the gauges on your boat, location of passengers and the general sound and feel of your craft. Often, a change in the way the engine sounds or the boat feels will presage a problem. Your early attention may prevent a more serious problem.



If you should strike an underwater object, bring the throttle to neutral and stop the engine. Inspect the lower unit for damage. If none is apparent, proceed as before but heighten your awareness of the engine and its operation to make sure a problem has not gone undetected.

9.4 Towing or Being Towed

Sooner or later you will have the misfortune of having to be towed in or needing to tow someone back to a safe landing. It is important that this be done properly so that a difficult situation does not become worse. This comes under a longstanding, unwritten law of the sea that one boater will aid another in time of distress. The 1971 Boating Safety Act grants protection to those assisting others at sea as "Good Samaritans" and absolves them of civil liability rising from the aid being provided.

When being towed, it is best to have a line passed from the tow boat to the one being towed, assuming the towing boat has a line of adequate size and length. The tow boat should also tow the disabled vessel from as close to amidships as possible. This reduces the tendency to yaw. If possible, the towing boat should use a bridle attached to the two stern ski tow eyes. The vessel being towed should attach the tow line to the bow eye that holds the boat onto the trailer. This provides an optimal tow position and a strong tow point. Have the occupants of the boat being towed sit aft of amidships, but not all in the stern. Attention should be given so the boat remains balanced and on an even keel. Some boats tow better with the engine tilted out of the water, others need the engine to act as a rudder to be able to maintain a straight line. Start with the engine tilted. If that does not work well lower the engine until it is about perpendicular.



You should never attempt to plane off the boat being towed.

9.5 Stopping the Boat

Gradually bring the controls back to the low forward position and allow the boat to gradually slow down. After the boat has dropped into the displacement mode, shift to the neutral position. If you have been running the boat hard for some time, allow the engine to idle for several minutes to gradually cool down. After docking and securing the boat, raise the trim tabs to the fully upright position and turn off the ignition.

9.6 Docking

Safe docking keeps your boat from being damaged and is an indicator of a capable and knowledgeable captain. There are many docking maneuvers, which will be done while boating; only the basics will be discussed here. Several constants to always use as guides while docking:

Perform docking at idle or no wake speeds. Always try to come into wind or current, whichever is stronger. This allows you to use the natural forces on your boat to act as a natural brake. The skipper is free to use the boat's power to control speed and direction.

The approach to the dock should be at roughly a 45° angle, when possible. This approach angle allows the captain to bring the bow close to the dock, and then to use reverse, while turning the wheel toward the dock, to bring the boat to a safe, controlled stop.

Never approach a dock on plane. Even after reducing engine speed, the wake will push the boat uncontrollably into the dock.

9.7 After Operation

☐ Refill the fuel tank and engine oil, if yours is a two-cycle engine. A full fuel tank is less subject to condensation and therefore, less fuel problems. If you will be leaving the boat for an extended period, use a good fuel stabilizer. Each engine manufacturer makes their own and proper use will avoid many fuel related and lay-up problems. Remember, always follow the manufacturer's recommendation.

☐ If the boat is to be left in the water, make sure it is secure and free to properly accommodate any tide.

☐ Turn off all electronics and leave the battery switch in the off position. Remember, the bilge pump will operate properly even with the battery switches turned off. On a comforting note, your EdgeWater 335EX is fully self bailing and unsinkable. Proper precautions, however, are always prudent.

9.8 Trailering Your Boat



Note: If you have doubts or questions about your tow vehicle or towing, contact your dealer.



Before going on the highway, make sure your tow vehicle and trailer meet the local regulations for trailers and towing in your state.



Before leaving the driveway make sure the lights on the trailer are operating properly. If necessary, get a second person to make sure of the operation.

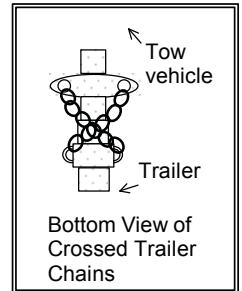


At least once a season, check and repair/replace the trailer wheel bearings.

The trailer should be adequately sized for your boat. Allow about 10% above the maximum boat weight for trailer capacity.

Make sure your vehicle is properly equipped to handle the load. This includes engine, hitch, frame, brakes, transmission cooler, and vehicle capacity.

Securely attached the boat trailer to the vehicle hitch, hook the safety chains and and cross them under the hitch and check the lights to ensure they are hooked up and working.



If you are new to trailering your boat, it is best to practice before actually getting in a situation where you are not sure of your ability. If possible use a trailer without a boat to practice with as you can see the trailer's movement without the boat. Also, your vision will not be impaired by the boat's presence.

When going forward, remember that your trailer turns inside the tow vehicle, therefore the tow vehicle must start the turn slightly later than without the trailer. This allow the trailer to turn inside the tow vehicle radius without leaving the roadway.

When backing, remember, the bottom of the steering wheel will move in the direction the trailer will ultimately go. Backing consists of two parts, breaking the trailer by turning the vehicle's backward motion in the opposite direction from the ultimate trailer direction, then following the trailer toward the correct direction with the tow vehicle. It is prudent to go to a large paved area with little traffic to practice these maneuvers before attempting them on the boat ramp.



Remember to check to see if the tow ball is the same size as the trailer coupler. Never use a different size.

9.9 Launching Your Boat

When you arrive at the ramp, prepare your boat before getting in the ramp line.

- ☐ Make sure the hull plug is in place.
- ☐ Place a line on the bow and stern cleats to be at the dock ready.
- ☐ Have fenders out and on the proper side.
- ☐ Raise the engine so it will not be damaged during launching.
- ☐ Make sure the engine battery switches are in the "on" positions, and the boat key is in the ignition.
- ☐ Remove any tie-down straps.
- ☐ If someone is with you, hand them the free end of the bow line and have them follow the trailer as you enter the ramp.
- ☐ Back the boat into the water until it barely floats. Remove the winch line. The boat should now come free with a gentle tug on the bow line.
- ☐ Lower the engine, pump the fuel bulb until firm and crank the engine.
- ☐ Let it idle for a few minutes to warm up before getting under way.

9.10 Retrieving Your Boat

There are several ways to retrieve your boat. The method described herein requires two persons.

- ☐ Drop someone off to back the trailer into the water, or do it yourself. If doing it yourself, make sure you make it easy and safe to exit the boat after it is loaded onto the trailer.
- ☐ Back the trailer into the water until the bunks are completely submerged, or until the middle roller is just touching the water. (This depth should provide enough to float the boat until the last minute and yet provide enough resistance from the trailer to stop the boat short of the winch stand.)
- ☐ Drive the boat onto the middle of the trailer. This is assuming it is a trailer designed for drive on. Speed should not be over one or two knots. Fast enough to maintain steerage but slow enough to be easily controlled.
- ☐ Once the boat has touched the trailer, a little forward throttle should secure the boat on the trailer and allow you to put the engine in neutral and have the winch line attached to the bow eye. The boat should now be easily winched onto the last several feet of the trailer.



When properly done, this method is easy, safe and will not harm boat ramps by powering away the soil from the base of the ramp.

10/Routine Maintenance

10.1 Exterior Hull and Deck

Fiberglass

When you remove the boat from the water, clean it as soon as possible. Dirt, debris and grime will come off easier while it is still wet. Use a brush and biodegradable boat cleanser. Stubborn areas may be cleaned with a non-abrasive cleaner. Harsh abrasives and chemical cleaners are not recommended as they can damage the gelcoat, shorten its life, and make it more susceptible to stains. When used in saltwater, the boat should be washed after each use. NOTE** Do not use any cleaners containing ammonia or with extremely high or low PH levels as this will effect condition of gelcoat.

The hull should be waxed periodically, at least once a year, with a high quality wax. This will keep it shiny looking and help prevent chalking and aging. The wax will also make it easier to keep clean by closing the pores that trap the grime.



If the boat is to be kept in freshwater or saltwater for an extended period, a proper barrier coat and bottom paint must be applied to prevent possible Gel Coat blistering.



Do not wax non-skid areas. It could make them slippery and increase the possibility of injury.

Stainless Steel Hardware

The stainless steel hardware of your boat should be cleaned and washed after each boat use, especially in salt or polluted water. While it is “stainless” it is not “stain-proof”. If it is not cleaned,

it can develop surface rust stains. It can be protected with a high quality automotive or boat wax. It can also be protected with a commercial metal cleaner and protectant.

Anodized Aluminum

The aluminum can be maintained with a regular washing with soap and water. Otherwise it can develop a surface corrosion, which can penetrate the anodizing and attack the aluminum underneath. If badly scratched, it can be repaired with an aluminum or silver paint.

Chrome Hardware

Use a good metal polish and protect with wax. This should be done every couple of months or as soon as you notice any finish deterioration.

Plexiglas

Do not use products with ammonia on your Plexiglas windscreen. It can mar the surface and reduce its transparency. A mild soap and water or non-ammonia cleaner will work well. In addition to ammonia, cleaners should not be used which contain solvents, acetone, or alcohol.

Upholstery

Soap and water should be periodically used to clean the vinyl. Vinyl protector products can make the seats slippery, which may not be desirable. When cleaning the vinyl, be gentle. Do not use cleaners that contain ammonia, acetone, strong solvents, or powdered abrasive cleaners. They can damage and shorten the vinyl's life.

Sump Area

Your EdgeWater has a bilge area in the after part of the boat. This can be maintained well by periodically using a boat bilge cleaner. Follow the directions carefully.

10.2 Engine

If you have a new engine with a built-in flushing device, the engine may be flushed without cranking. If the engine does not have a built-in flush device, one may be purchased to fit.

To flush the engine, after connecting a water hose to the proper connection, turn on the water. Put the engine control in the idle position and crank the engine. Only let it run a couple of minutes. The gear case is water-cooled and is not designed to run out of the water for extended periods.



Do not crank the engine without water running. Water acts as a coolant and also a lubricant for the water pump.



Do not rev the engine when flushing; idle speed is sufficient!

The exterior of the engines will respond well to a good quality wax. This should be re-applied every several months as the marine environment is a very harsh one and the constant sun exposure will deteriorate your motor's finish. Consult the engine manufacturer's owner's manual for specific instructions. In areas where there is a conflict between this manual and the engine manufacturer's manual, the engine owner's manual will take precedence.

11/ Exterior Equipment

11.1 Anchor Locker

The anchor locker on your new EdgeWater 335 EX has been designed for a danforth style anchor. On the 335 EX the anchor locker is located forward on the starboard side. Before using the anchor for an extended period or overnight, make sure the free end of the anchor line is attached to the boat's anchor tie-down bracket, which is bolted underneath to the cleat forward of the locker.



Remember, your anchor line should be a minimum of 7 times the depth in which you routinely operate.



Your EdgeWater 335EX should have a minimum of 150 to 200 feet of ½" three strand nylon line. If you routinely venture offshore, remember the 7 times depth rule. This may sound like a lot but if your engine fails in 100 feet of water, maintaining your position will be very important to being recovered.

11.2 Boarding Ladder

Your EdgeWater 335EX is equipped with a removable boarding ladder mounted in the motorwell area of the boat and there are important steps to remember for safe use of this useful feature:

- ☐ Always shut down the engine if persons will be using the ladder. Do not just settle for the engine being in neutral.
- ☐ Make sure the ladder has been properly stowed before getting underway.

11.3 Trim Tabs

The trim tabs on your EdgeWater 335 EX can assist the captain in maintaining trim and level running attitude. When used in conjunction with the engine trim, a great deal of flexibility is available to the operator. On the EdgeWater hull, the tabs are most useful to affect lateral trim. The best results for lateral trim are usually achieved by using only one tab. For example, if the boat is loaded heavier to the port side, lowering the port trim tab will elevate that side and assist the boat in running trim and level. This is important for seaworthiness and fuel consumption. A hull is usually more efficient when running level and with the bow 3 to 5 degrees above level. Tabs

can also be useful when running into a heavy wind which is blowing from the side. If the boat tends to turn into the side blowing wind, elevating the tab on the windward side will elevate that side and assist the boat in running level.

12/Seasonal Maintenance

12.1 Engine

Refer to your engine manual for any specific information pertaining to your engine. For the fuel system, add a fuel stabilizer to a full fuel tank as per the stabilizer's instructions. Run the engine for a minimum of 10 minutes to allow the fuel stabilizer to reach the engine.

- ☐ Wax the engine exterior.
- ☐ Remove the engine cowl and spray the engine's powerhead with a non-conductive lubricant spray. Do not spray directly on joints that are lubricated with grease as some lubricant sprays may dissolve grease.
- ☐ Grease all external zert fittings on the engine and steering system. Use a grease that is consistent with engine manufacturer's recommendations.
- ☐ Change the engine lower unit lubricant. This will remove contaminants that may have built up throughout the boating season. This is also a good time to check for lower unit seal problems. If there is a leak, have it repaired by your dealer.
- ☐ Remove the propeller and grease the propeller shaft. Inspect the shaft and propeller for unusual wear or signs of deterioration.

12.2 Hull

- Wax the entire boat. The hull will maintain its factory delivered luster much longer if waxed at least once a season. The inside of the boat, which is subject to the sun's direct rays, will also respond well to a good coat of marine wax.

DO NOT wax the non-skid surfaces.

- ☐ Remove the hull plug so the sump area can breathe.

12.3 Storage

- ☐ It is best to store the boat inside, however if inside storage is not available, use the following guidelines in order of preference
- ☐ Under awning with no boat cover
- ☐ Outside under a boat cover. (Boat cover should allow ample ventilation and be removed periodically to allow moisture to disipate avoiding mildew growth and staining.

12.4 Trailer

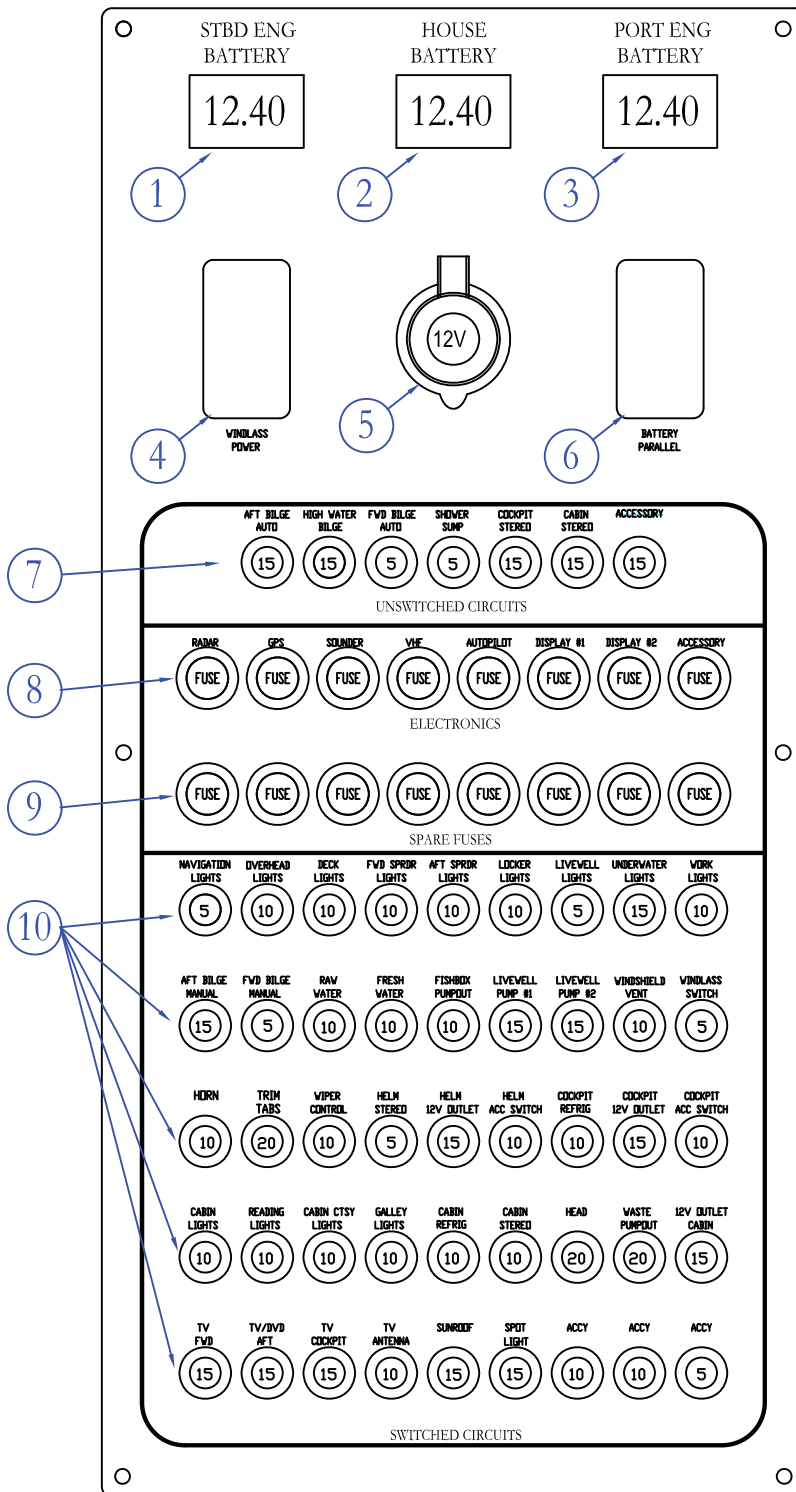
- ☐ Check the wheel bearings for water. Clean and repack/replace as necessary.

- ☐ Check the tires for proper inflation.
- ☐ Try to store the boat and trailer with the bow slightly elevated so it will drain.
- ☐ If possible, cover the boat so that the sun will not deteriorate and tree sap and other environmental hazards will not damage the deck or upholstery. If covered, make sure to let air circulate so mildew will not build up. If in a high snow or rain area, make sure to properly support the cover to sustain and shed the load.

Appendix

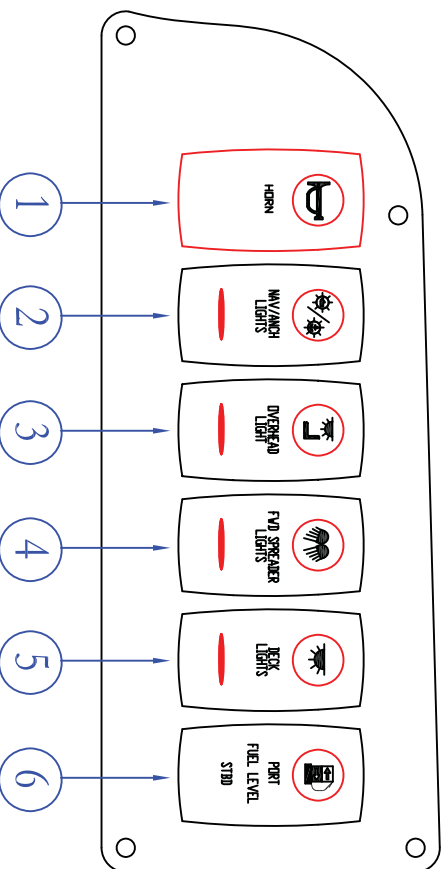
335 EX

335EX CONSOLE MAIN PANEL



- 1 STARBOARD ENGINE BATTERY LEVEL METER
- 2 HOUSE BATTERY LEVEL METER
- 3 PORT ENGINE BATTERY LEVEL METER
- 4 WINDLASS POWER MASTER SWITCH - TURN ON ONLY WHEN READY TO USE ANCHOR WINDLASS
- 5 15 AMP 12 VOLT DC OUTLET
- 6 EMERGENCY BATTERY PARALLEL SWITCH - USE TO CONNECT ALL BATTERIES FOR EMERGENCY POWER
- 7 UNSWITCHED CIRCUIT BREAKERS - REMAIN POWERED WHEN BATTERY SWITCHES ARE TURNED OFF
- 8 ELECTRONICS FUSE HOLDERS
- 9 ELECTRONICS SPARE FUSE HOLDERS
- 10 SWITCHED CIRCUIT BREAKERS - POWER OFF WHEN HOUSE BATTERY SWITCH IS TURNED OFF

335EX CONSOLE SWITCH PANELS



1 HORN SWITCH - CONTROLS ELECTRONIC HORN ON THE FRONT OF THE HARDTOP

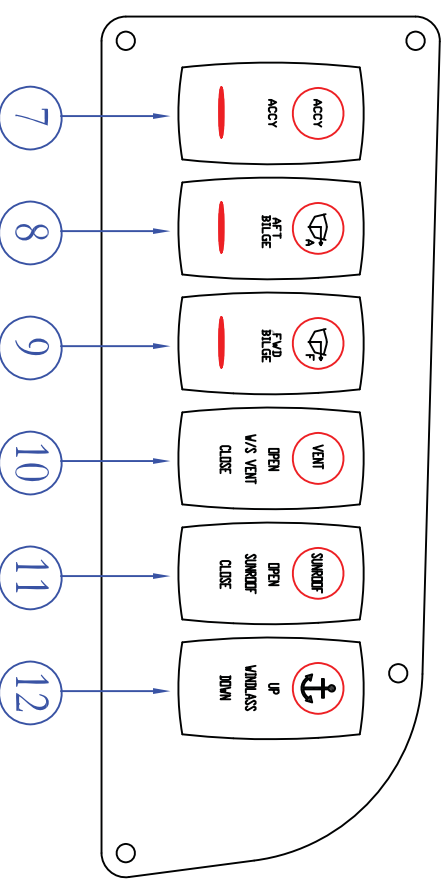
2 NAVIGATION LIGHTS SWITCH - CENTER POSITION IS OFF
PUSH UP FOR RUNNING, DOWN FOR ANCHOR

3 OVERHEAD LIGHTS SWITCH - FOUR AVAILABLE COLORS
TO CHANGE COLOR, TOGGLE SWITCH OFF AND ON. AFTER
2 SECONDS, LIGHT WILL COME ON IN THE COLOR LEFT ON

4 FORWARD HARDTOP SPREADER LIGHT SWITCH - CONTROLS
HIGH INTENSITY LIGHT ON THE FRONT OF THE HARDTOP

5 DECK COURTESY LIGHT SWITCH - CONTROLS COCKPIT
INDIRECT LIGHTING (BLUE ONLY)

6 FUEL LEVEL GAUGE SELECTOR SWITCH - TOGGLES BETWEEN
THE PORT AND STBD ENGINE FUEL TANK LEVELS



7 ACCESSORY SWITCH - NOT CONNECTED FROM THE FACTORY
USE FOR ANY ADDITION CIRCUIT UP TO 10 AMPS

8 AFT BILGE PUMP MANUAL SWITCH - MANUAL ACTIVATION OF
AFT BILGE PUMP

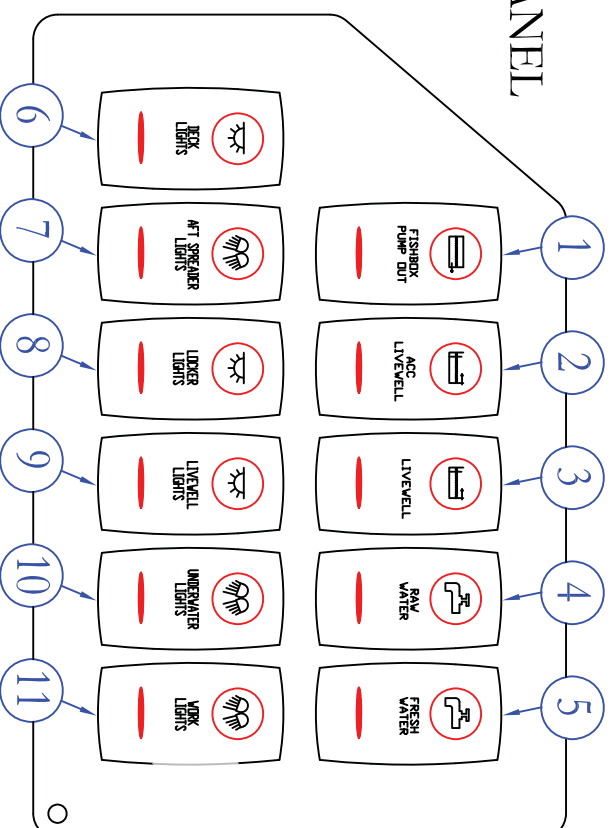
9 FORWARD BILGE PUMP MANUAL SWITCH - MANUAL ACTIVATION
OF FORWARD BILGE PUMP

10 WINDSHIELD VENT WINDOW SWITCH - OPEN AND CLOSE CENTER
WINDSHIELD VENT

11 SUNROOF SWITCH - OPEN AND CLOSE OPTIONAL HARTOP
SUNROOF PANEL

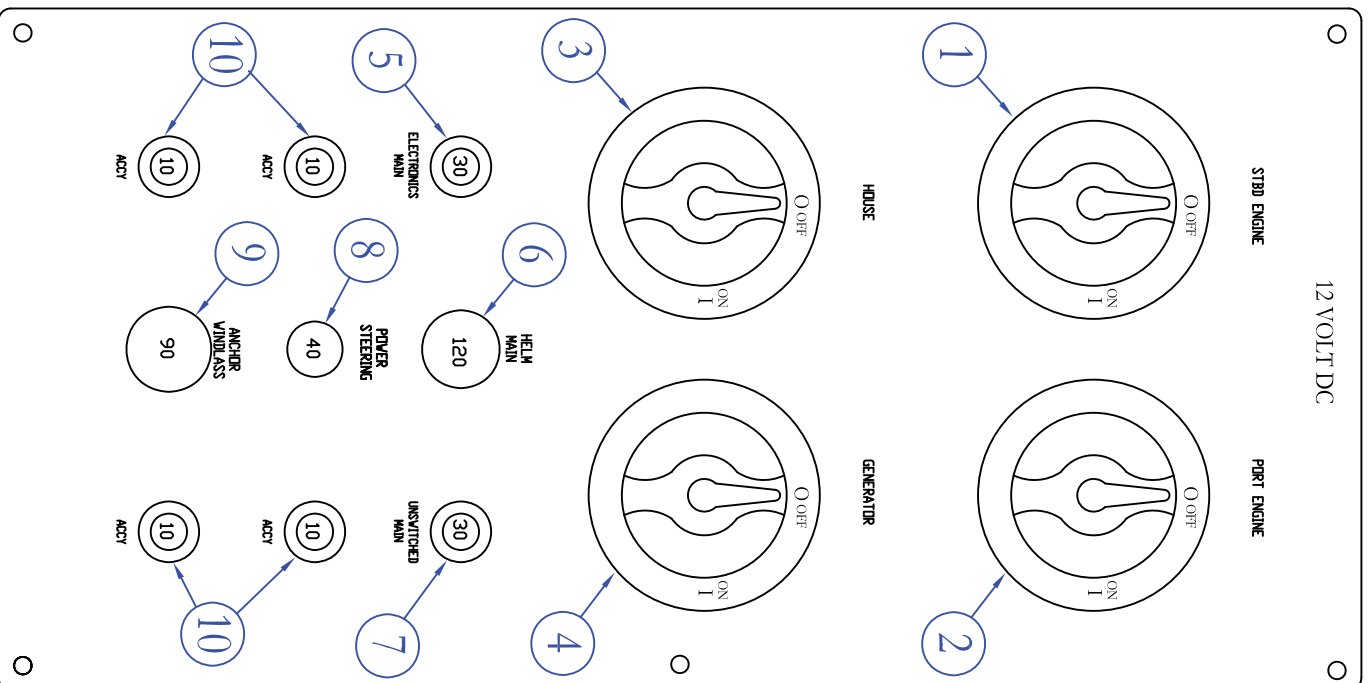
12 ANCHOR WINDLASS SWITCH - PUSH UP TO RAISE ANCHOR,
PUSH DOWN TO LOWER ANCHOR

335EX COCKPIT SWITCH PANEL



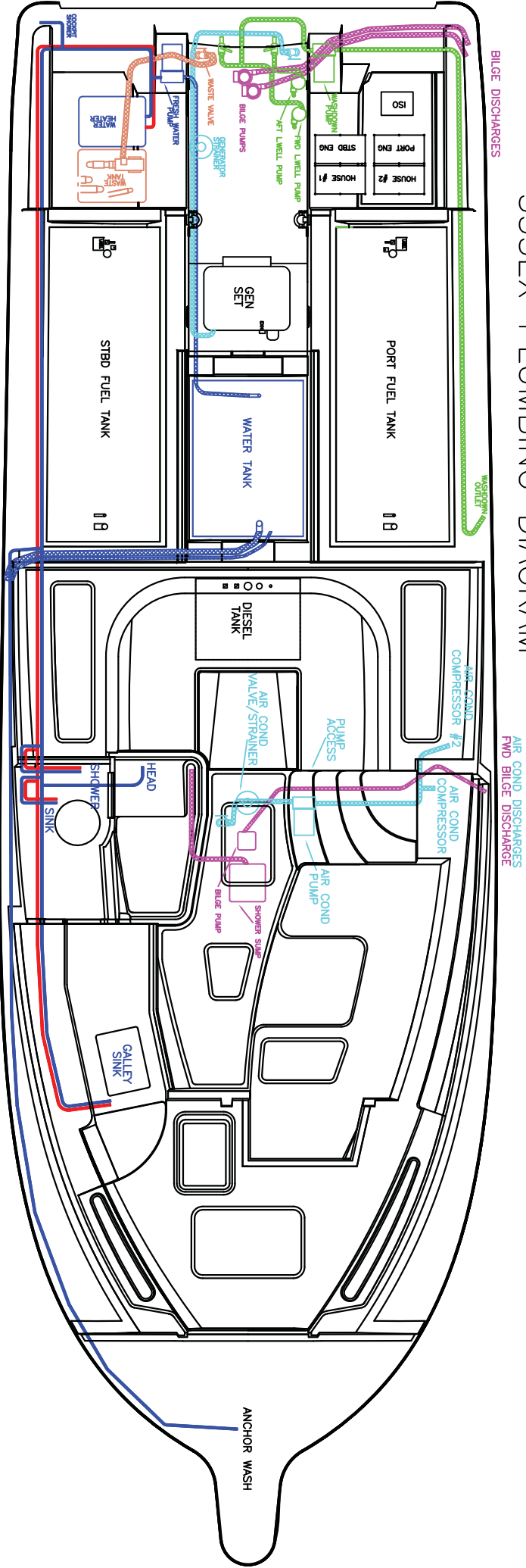
- 1 FISHBOX PUMPOUT SWITCH - CONTROLS IN FLOOR FISHBOX DISCHARGE DIAPHRAM PUMP
- 2 ACC LIVEWELL - CONTROLS THE PUMP FOR THE LIVEWELL ON THE AFT PORT SIDE OF THE COCKPIT
- 3 LIVEWELL - CONTROLS THE PUMP FOR THE MAIN LIVEWELL AT THE PORT PREP STATION
- 4 RAW WATER - CONTROLS THE RAW WATER WASHDOWN PUMP
- 5 FRESH WATER - CONTROLS THE FRESH WATER SYSTEM PUMP NORMALLY LEFT ON WHEN BOAT IS IN USE
- 6 DECK COURTESY LIGHT SWITCH - CONTROLS COCKPIT INDIRECT LIGHTING (BLUE ONLY)
- 7 AFT HARDTOP SPREADER LIGHT SWITCH - CONTROLS HIGH INTENSITY LIGHTS ON THE BACK OF THE HARDTOP
- 8 LOCKER LIGHT SWITCH - CONTROLS LIGHTS INSIDE COCKPIT LOCKERS
- 9 LIVEWELL LIGHT SWITCH - CONTROLS LIGHTS IN BOTH LIVEWELLS
- 10 UNDERWATER LIGHT SWITCH - CONTROLS OPTIONAL TRANSOM MOUNTED LED UNDERWATER LIGHTS
- 11 WORK LIGHT SWITCH - CONTROLS ADJUSTABLE LIGHTS OVER THE COCKPIT PREP STATIONS

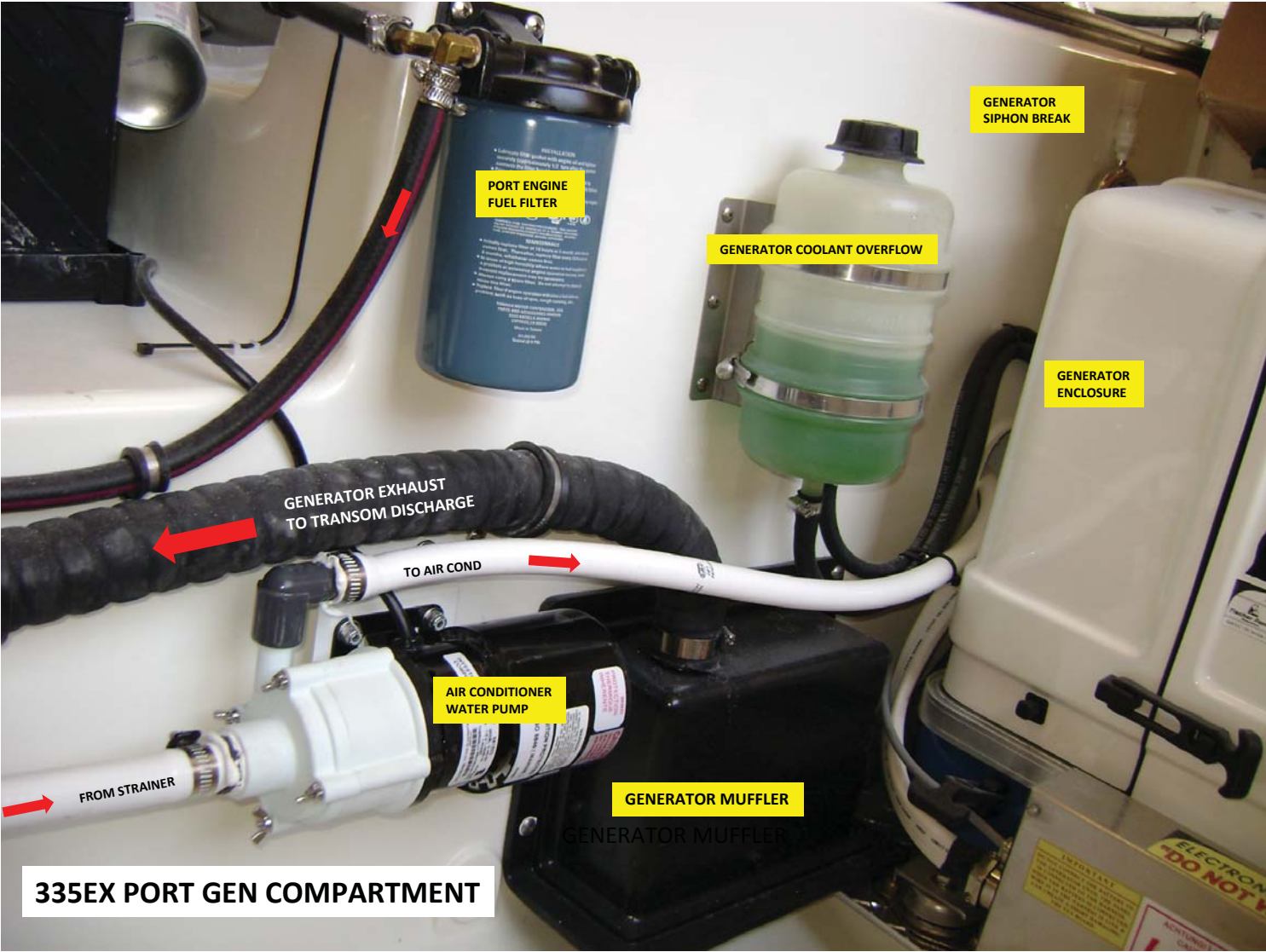
335EX COCKPIT BATTERY SWITCH PANEL

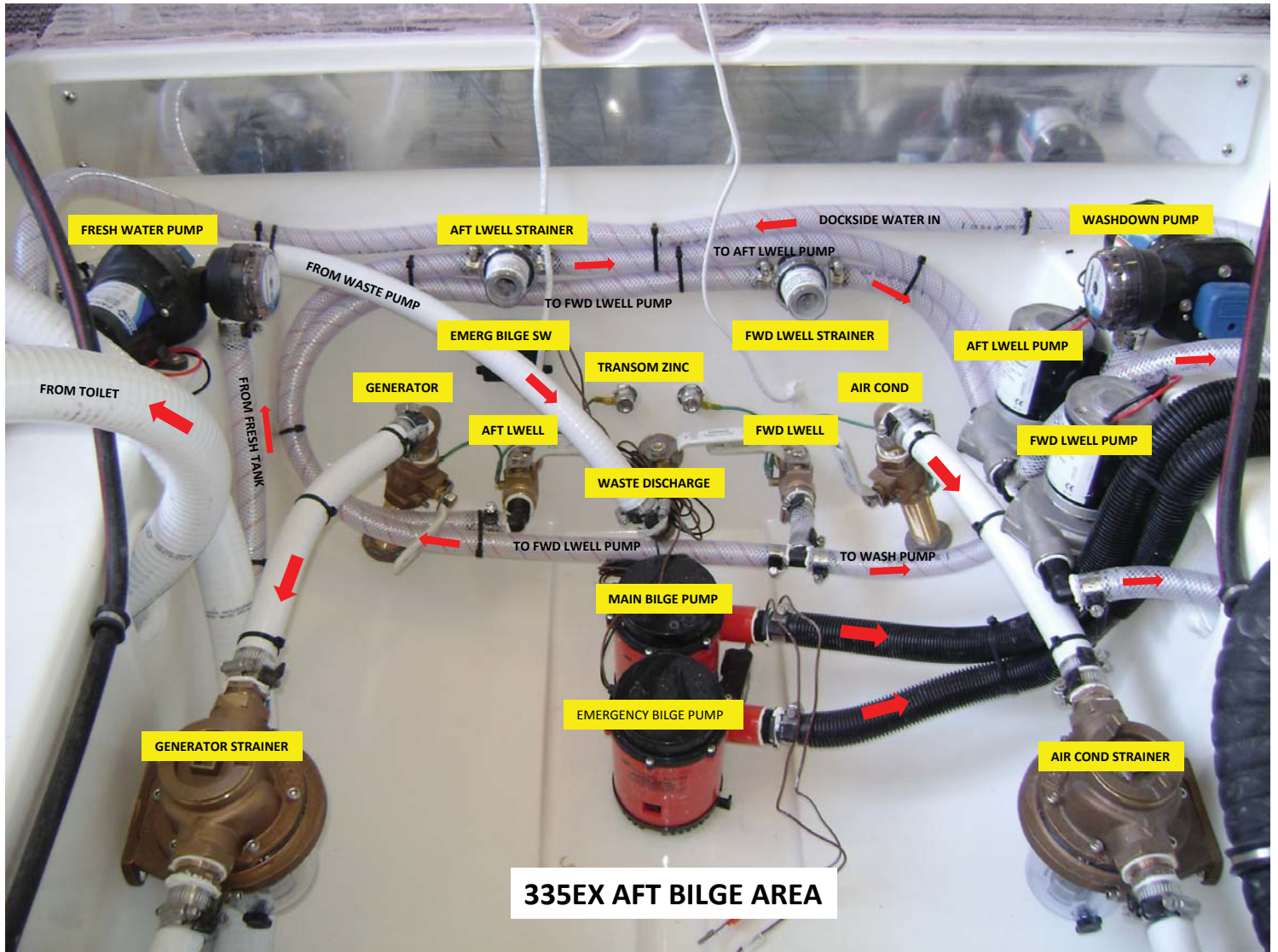


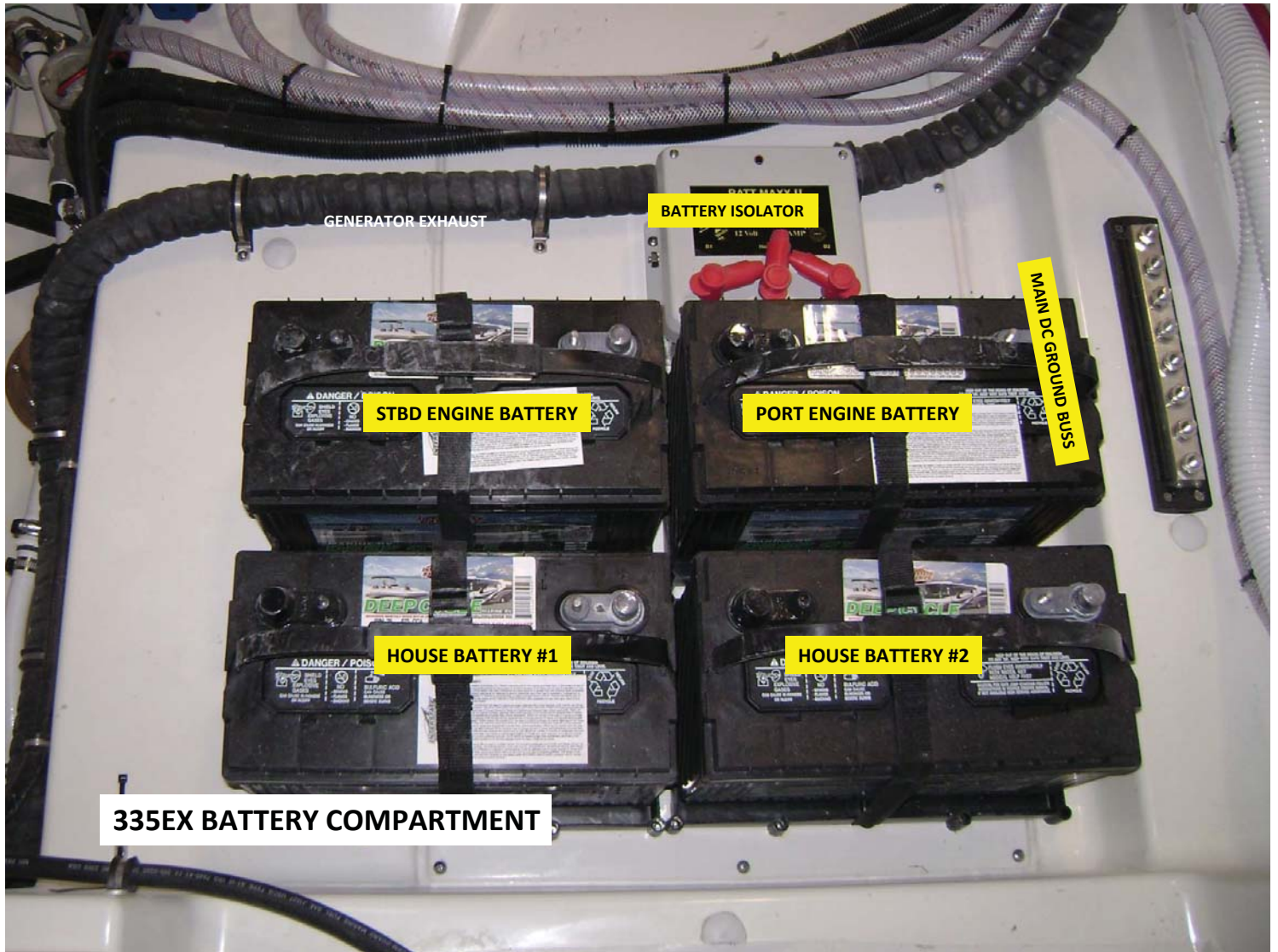
- 1 STARBOARD ENGINE BATTERY SWITCH
- 2 PORT ENGINE BATTERY SWITCH
- 3 HOUSE BATTERY SWITCH
- 4 GENERATOR BATTERY SWITCH
- 5 ELECTRONICS CIRCUIT BREAKER (30 AMP)
- 6 HELM MAIN CIRCUIT BREAKER (120 AMP)
- 7 UNSWITCHED CIRCUIT BREAKER (30 AMP)
- 8 POWER STERLING CIRCUIT BREAKER (40 AMP)
- 9 ANCHOR WINDLASS CIRCUIT BREAKER (90 AMP)
- 10 ACCESSORY CIRCUIT BREAKERS (10 AMP)

335EX PLUMBING DIAGRAM









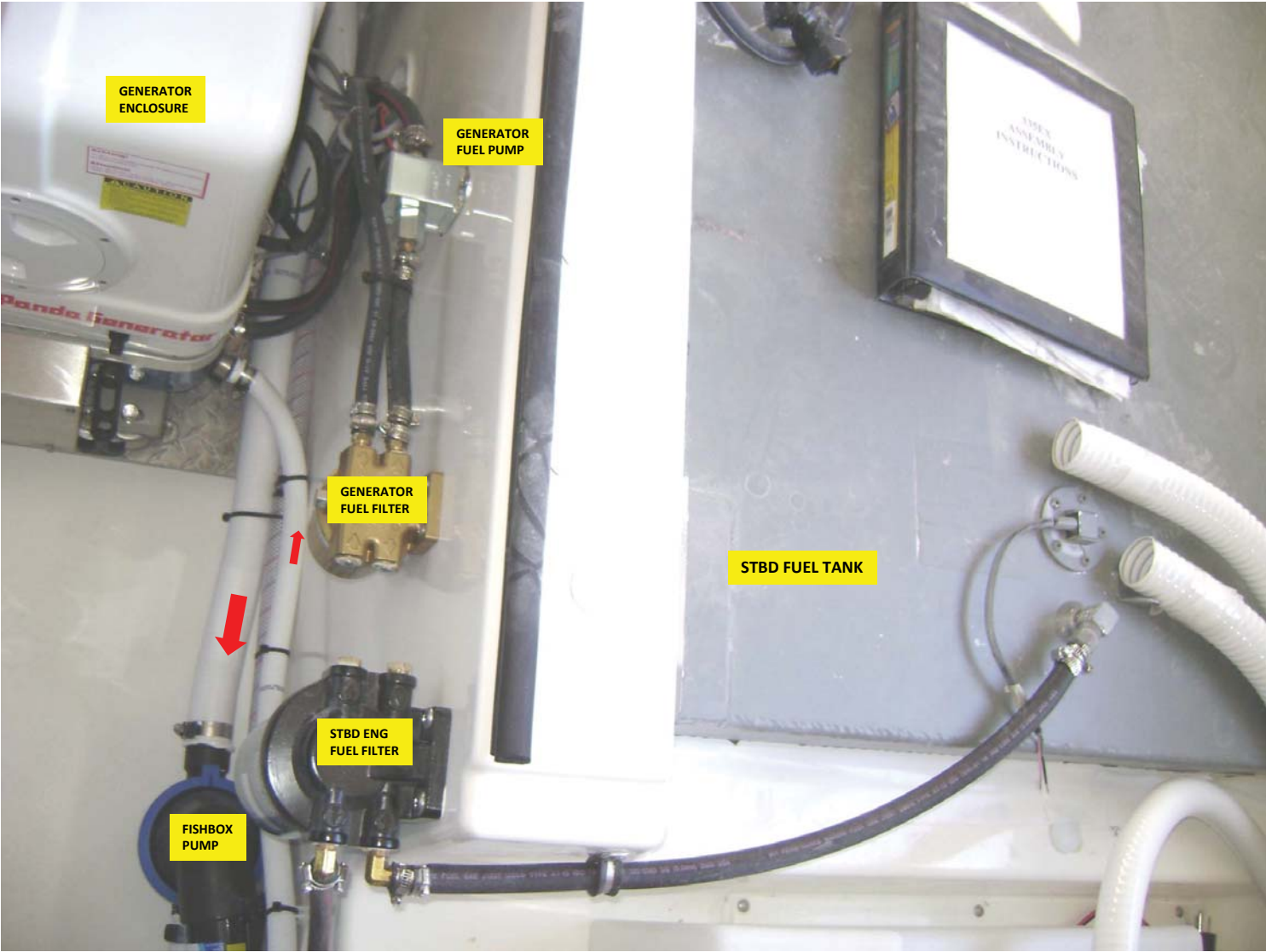
335EX BATTERY COMPARTMENT

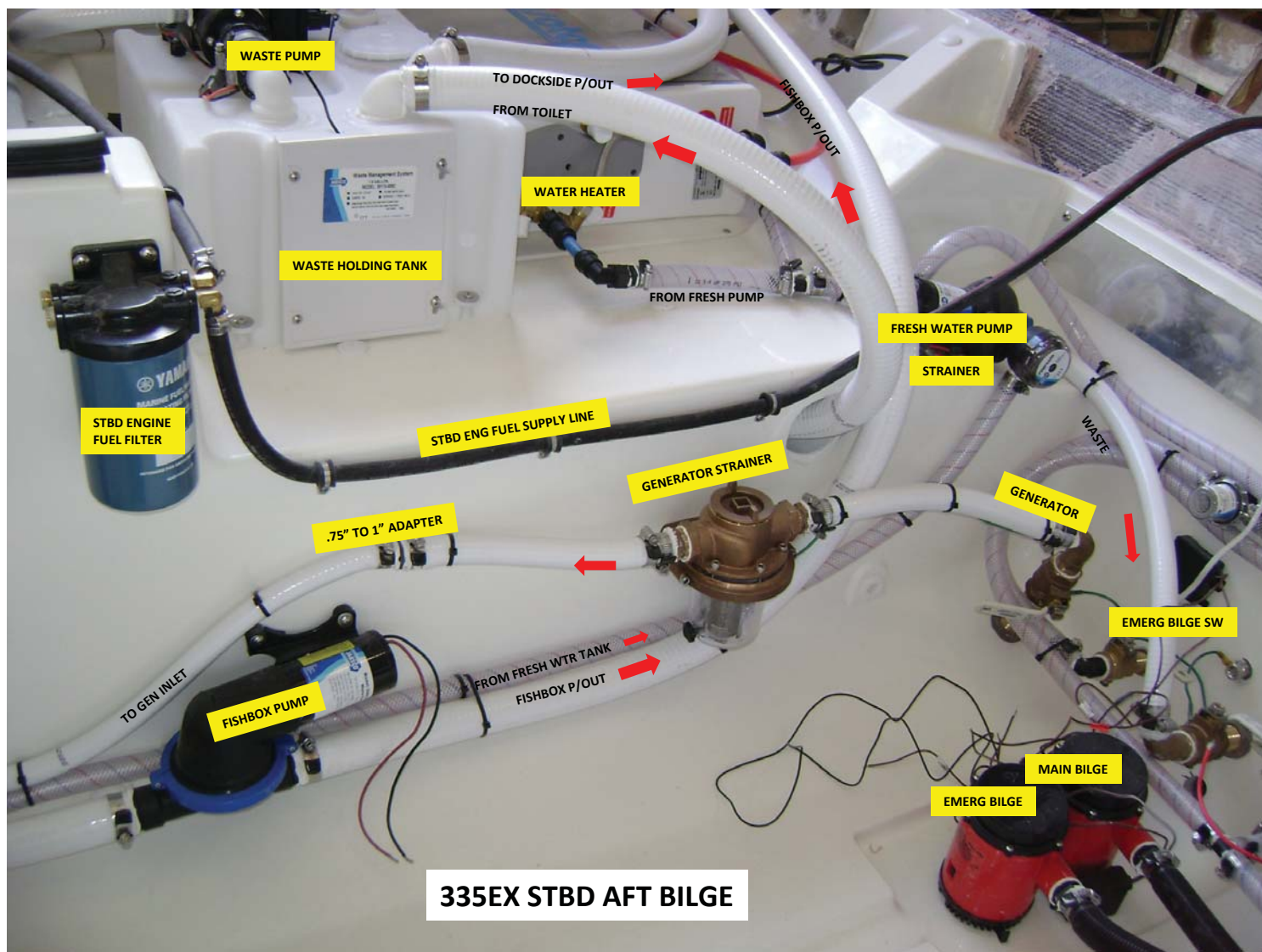


335EX STBD THRU-HULLS



335EX STBD THRU-HULLS







335EX PORT THRU-HULLS



LWELL DRAIN AND
OPT. COCKPIT AC DISCHARGE

EMER
BILGE

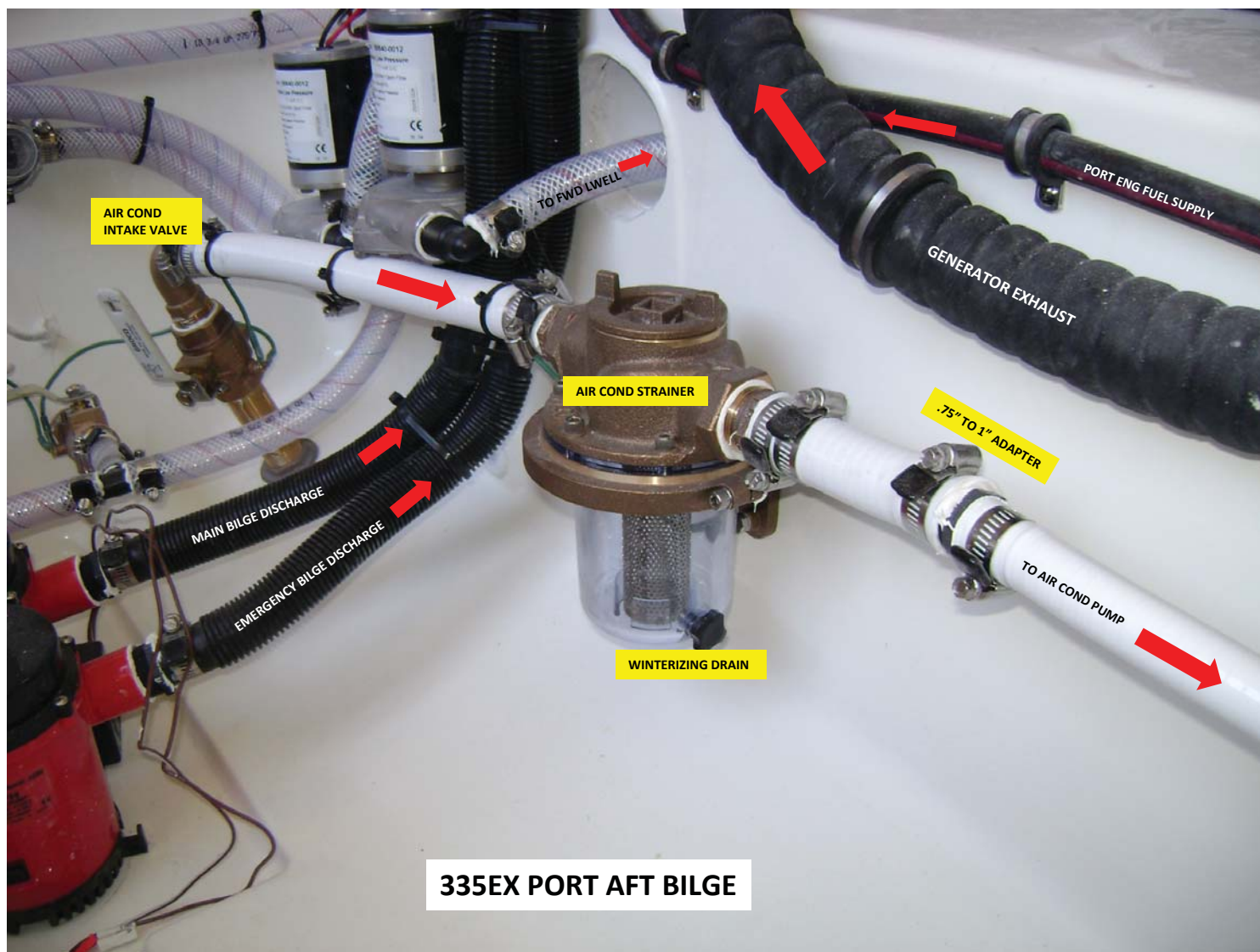
MAIN
BILGE

DECK
DRAINS

LWELL
DRAIN

GENERATOR
EXHAUST

335EX PORT THRU-HULLS



HYDRAULIC STEERING SELECTION GUIDE 2008



Boating safety is everyone's responsibility.

As a boater, you are responsible for having all required safety equipment, for operating your boat safely and for ensuring the safety of those on board your vessel as well as those sharing the waterways. Boaters exercising courtesy and common sense will not create a hazard, threat, stress or an irritant to themselves, to others, to the environment, or to wildlife.

1. Wear an approved Personal Flotation Device (PFD)
2. **Read your owner's manual.**
3. Attach engine stop switch securely to your body or PFD.
4. Respect the speed limits and other boating restrictions.
5. Be cautious and courteous.
6. Navigate with care.
7. Understand the behaviour characteristics of your vessel that might result from unexpected manoeuvres, such as sudden deceleration, high-speed obstacle avoidance, and other speed related issues.
8. It is good boating practice to rinse down your boat and exposed steering equipment with clean, fresh water after each use.
DO NOT use corrosive materials on SeaStar products.

Become informed and stay informed!

"Take an accredited boating safety course"

Notice to Boat Manufacturer or Installer

Throughout this publication, Warnings and Cautions (accompanied by the International Hazard Symbol ) are used to alert the manufacturer or installer to special instructions concerning a particular service or operation that may be hazardous if performed incorrectly or carelessly.

Observe Them Carefully!

These "safety alerts" alone, cannot eliminate the hazards that they signal. Strict compliance to these special instructions when performing the installation and maintenance plus "common sense" operation are major accident prevention measures.

 DANGER	 WARNING	 CAUTION	NOTICE
Immediate hazards which WILL result in severe personal injury or death.	Hazards or unsafe practices which COULD result in severe personal injury or death.	Hazards or unsafe practices which COULD result in minor injury or product or property damage.	Information which is important to proper installation or maintenance, but is not hazard-related.

NOTICE

Help protect your boating environment by ensuring that all used oil is disposed of properly.

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BayStar and SeaStar Hydraulic Steering Systems

The BayStar Hydraulic Steering System is designed to add safety, reliability and comfort to single station outboard powered boats to a maximum 150HP (Total). The SeaStar Hydraulic Steering System is designed to provide that extra margin of muscle when needed. The SeaStar system easily handles Outboards, Sterndrive and Inboard boats.

System selection, installation and service is substantially simplified with just three major components — helm, cylinder and tube or hose. SeaStar has a comprehensive range of available cylinders to handle the variety of Outboard, Sterndrive and Inboard steering applications. These are suitable for both pleasure and commercial applications. Extra steering stations and/or autopilots are easily added.

SeaStar hydraulic steering is a total commitment to quality, performance and simplicity.

BayStar & SeaStar, the hydraulic steering systems that are;

Easy to install...

- Only three components: helm, cylinder & tube or hose
- Compact and attractive helm design
- Variety of helm mounting configurations
- Simple tube/hose fitting connections
- Clear, complete installation instructions

Easy to fill and purge...

- Engineered bleed fittings on the cylinders
- A helm and lock valve design that enhances air removal
- A no-mess filler device
- A filling and purging time of normally less than 30 minutes
- Easy to check for proper installation
- Easy purging check via filler device
- No searching for difficult-to-find air leaks

Easy to turn...

- Anti-friction piston points

Designed to provide many years of service...

- Precision built
- Heavy-duty bearings instead of bushings
- No corrosive materials exposed to marine environment
- Field replaceable helm and cylinder shaft seals
- A no-hassle warranty — 2 years for pleasure use
— 1 year for commercial use (SeaStar)

BayStar and SeaStar! Simply the best!

Teleflex Hydraulic Steering

Our manual hydraulic steering systems are simple and efficient. The basic system consists of three main components;

1) the helm pump, 2) the cylinder, and 3) the hose or tubing required to connect the cylinder to the helm pump.

These basic components are necessary in all applications. However as the system variables increase (ie: multiple engines, rudders, steering stations and autopilots), additional components may be required.

1. The Helm Unit.

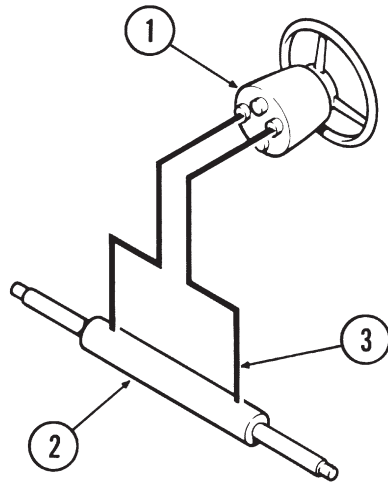
The helm pump is an axial piston pump specifically designed for manual steering. It has a built-in lock valve to prevent the steering load from feeding back to the driver. The lock valve will not allow the rudder or drive unit to move until you move it with the steering wheel. The lock valve section of the helm also includes a relief valve. This relief valve provides over-pressure protection for mechanical components and hydraulic hoses and fittings.

2. The Cylinder.

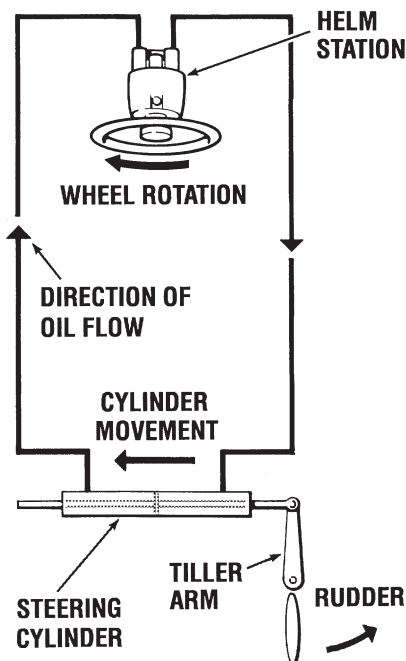
The most important differences between the variety of steering systems available is the cylinder selection. Both BayStar and SeaStar systems have a cylinder for most steering applications.

3. Hoses and Tubes.

Required to provide a path for the fluid to flow under pressure from the helm pump to the cylinder.



The System: How it works



The system is a two-line system. This makes operation very simple.

- 1) The steering wheel, which is attached to the helm pump, is rotated in the desired direction (ie: a turn to starboard or clockwise rotation).
- 2) Oil is pumped out the corresponding port from the rear of the helm into the starboard line and then into the cylinder.
- 3) This causes the cylinder rod, which is attached to the vessels rudder or drive unit, to move (ie: rod moves to port) thus causing the vessel to alter course.
- 4) Oil displaced from the opposite end (ie: the port end) of the cylinder flows (ie: into the port line) back to the helm pump.
- 5) For steering in the opposite direction, simply turn the helm the other way.
- 6) When no course corrections are required, the integral lock valve holds the rudder or drive unit stationary.

Selecting the System

The objective is to match the steering system to the requirements of the vessel. This depends on four things;

- 1) hull type (ie: planing or displacement),
- 2) type of propulsion system in the vessel (ie: inboard, outboard, sterndrive, etc.),
- 3) the number of engines or rudders,
- 4) the total power of the engines (ie: Horsepower).

Once the system and cylinder has been selected, the size of the helm pump is pre-determined. SeaStar systems also allow the following options to be specified;

- 1) the number of steering stations,
- 2) helm configuration (ie: standard or tilt helm),
- 3) additional features such as autopilots.

Notes on Steering Response versus Steering effort

Steering wheel effort is directly proportional to the number of wheel turns lock to lock.

The number of wheel turns lock to lock is dependent on three things;

- 1) the volume of the cylinder,
- 2) the displacement of the helm pump,
- 3) the allowable movement of the rudder or drive unit.

Less wheel turns lock to lock results in more steering effort. More wheel turns lock to lock results in less steering effort. However, additional factors that can influence steering effort are;

- 1) vessel speed,
- 2) rudder size,
- 3) unusual propeller selections,
- 4) hull type (ie: displacement, planing, etc.), and
- 5) improperly aligned counter balance skeg.

System Selection Worksheet

How can we help?

We have provided the following check list to assist you in choosing your Hydraulic Steering System. We invite you to make notes on this page as required.

☒ as appropriate.

- ☐ **OUTBOARD—Single up to 150HP UNDER 55mph**
 - ☐ Most economical system to meet my steering needsPage 1-1
 - ☐ Economical to meet my needs, PLUS less effort at the steering wheel than above.....Page 3-1, 3-9
 - ☐ Power Assist – 'Automotive' Style, Feel and ComfortPage 2-1, 3-1, 3-9
- ☐ **OUTBOARD—Multiple up to 150HP combined total**
 - ☐ Most economical system to meet my steering needsPage 1-1
 - ☐ Economical to meet my needs, PLUS less effort at the steering wheel than above.....Page 3-1, 3-9
 - ☐ Power Assist – 'Automotive' Style, Feel and ComfortPage 2-1, 3-1, 3-9
- ☐ **OUTBOARD—Single 150HP – 350HP UNDER 65mph**
 - ☐ Most economical system to meet my steering needsPage 3-1, 3-2
 - ☐ Power Assist – 'Automotive' Style, Feel and ComfortPage 2-1, 3-1, 3-2
- ☐ **OUTBOARD—Single 150HP – 350HP OVER 65mph**
 - ☐ Most economical system to meet basic steering needsPage 3-1, 3-9
 - ☐ Recommended for Steering Comfort and 'Automotive' Style and Feel.....Page 2-1, 3-1, 3-9
- ☐ **OUTBOARD—Multiple over 150HP
(including Catamaran and Liquid Tiebars)**
 - ☐ Most economical system to meet basic steering needsPage 3-1, 3-2
 - ☐ Recommended for Steering Comfort and 'Automotive' Style and Feel.....Page 2-1, 3-1, 3-2
- ☐ **STERNDRIVE—Single and Twin**
 - ☐ Most economical system to meet my steering needsPage 4-1
 - ☐ Power Assist – 'Automotive' Style, Feel and ComfortPage 2-1, 4-1
- ☐ **INBOARD—Single and Twin**
 - ☐ Most economical system to meet my steering needsPage 5-1
 - ☐ Power Assist – 'Automotive' Style, Feel and ComfortPage 2-1, 5-1
 - ☐ Power Steering SystemPage 7-1

My Steering Components

Helm Model #..... Cylinder Model #.....

Hose/Tube Other

Autopilot Equipped ☐ Yes ☐ No Date Purchased.....

Boat: Make..... Model Length

Engine: Make..... H.P. Quantity

OUTBOARD STEERING

BayStar™ hydraulic steering is brought to you by the manufacturers of SeaStar®, the most trusted name in pleasure boat steering. BayStar allows you to install all of the safety, reliability and comfort of hydraulic steering onto your boats rated up to **MAX. 150HP (Total)**. Combine this with the superior Teleflex Canada Limited Partnership design team, rigid ISO quality control and teamed with the finest materials and precision manufacturing—BayStar continues the tradition bringing comfort and safety to boating.

The BayStar steering system consists of a super low friction helm for smooth comfortable steering, a balanced cylinder—featuring a compact design that fits most splashwells. For your convenience two lengths of 20' cut to fit tubing are supplied (2 x 20' length), two bottles of hydraulic steering fluid, and one fill tube for easy fill and purge.

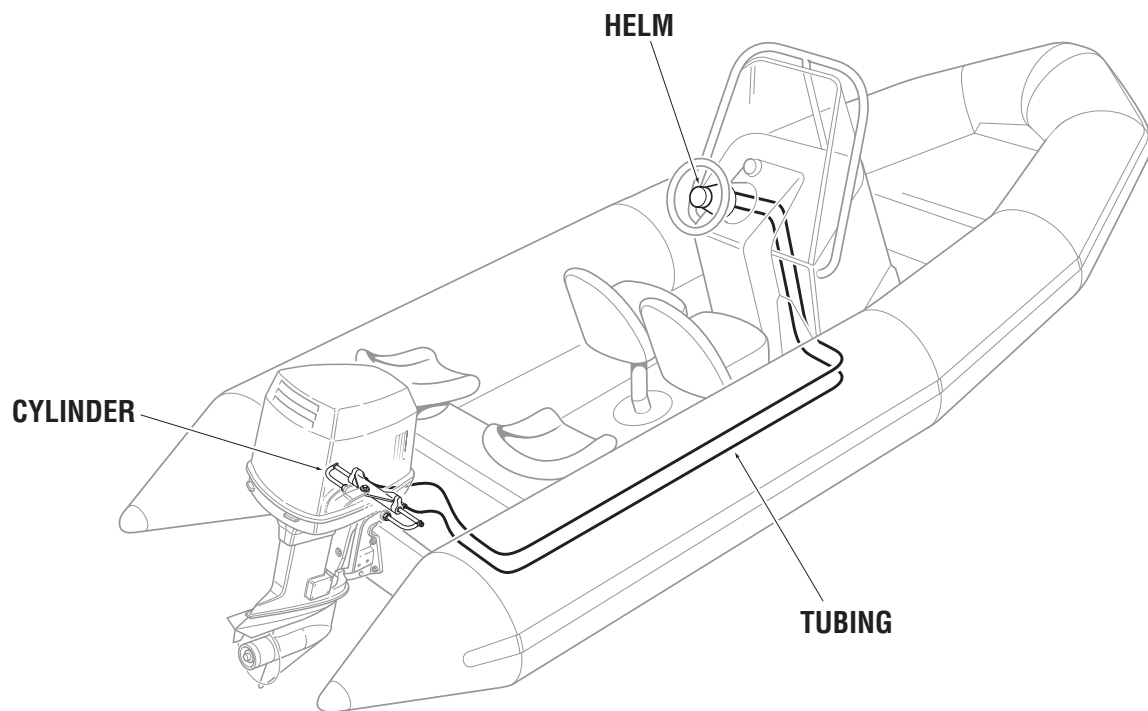
⚠ CAUTION

BayStar is ONLY applicable for single station steering.

DO NOT use BayStar on smaller HP outboard engines that use wing nut type transom mount clamping screws.

NOTICE

Tilt Helm HH4315 is available separately. Currently not available in kit form.

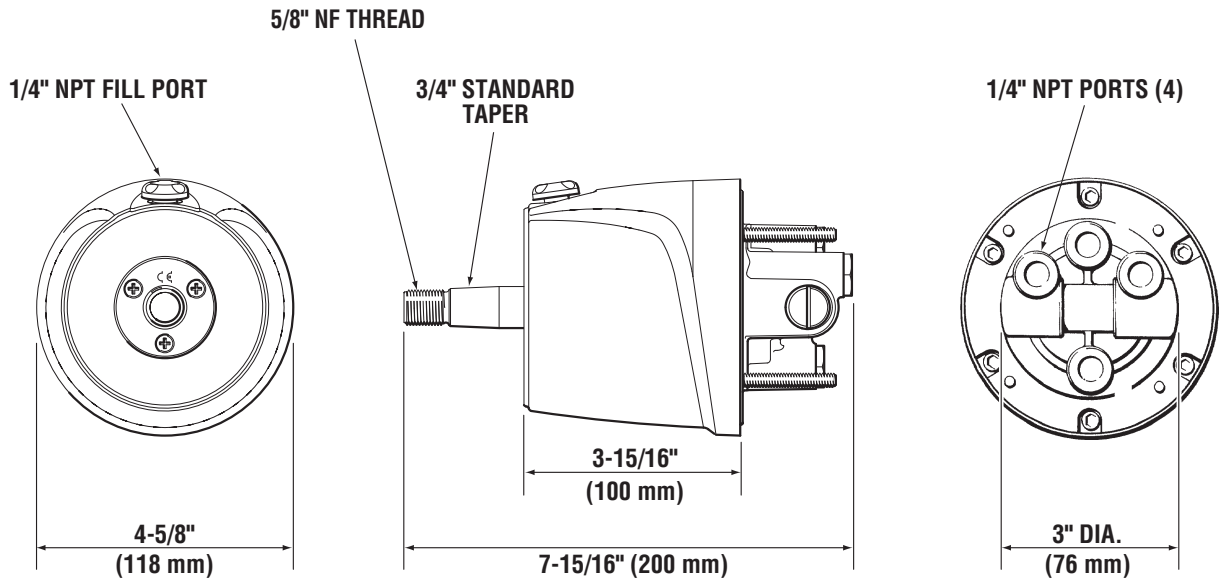


Typical BayStar Installation

Three easy steps to select your BayStar System:

- 1) Check helm dimension. Both the Standard and Tilt helms require a 3" (76mm) cut-out hole in the dash.

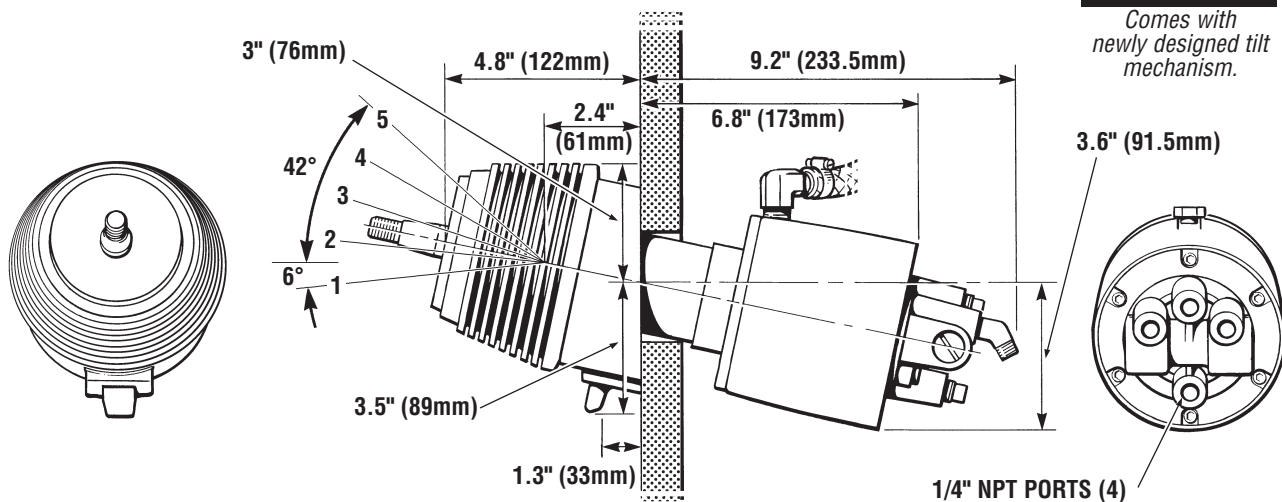
STANDARD HELM PART# HH4314



TILT HELM PART# HH4315

NOTICE

Comes with newly designed tilt mechanism.



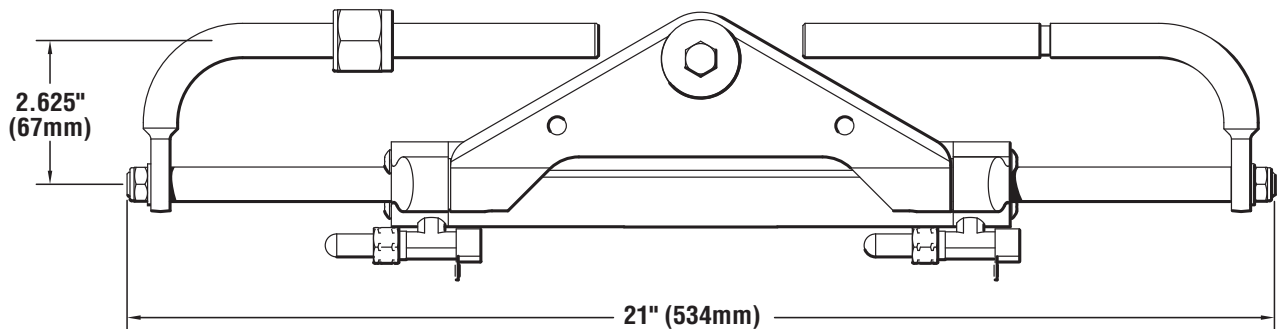
1/4" NPT PORTS (4)

- 2) Check the BayStar cylinder dimensions through the full trim/tilt range of the engine.

IS THE SPLASHWELL WIDE ENOUGH?

The HC4645H/47H/48H /58H require a 21" (534mm) Splashwell width.

BAYSTAR CYLINDER PART# HC4645H/47H/48/H58H



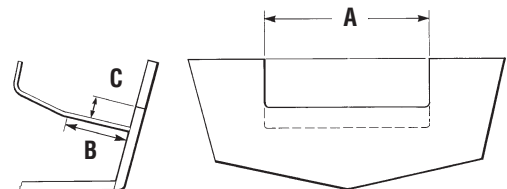
- 3) Is there enough room in the splashwell for full engine tilt?
Find the dimensions (A, B & C) of your splashwell. Check them against the minimum splashwell dimensions for full engine tilt for your engine and cylinder.

MOTOR WELL DIMENSIONS required for BayStar front mount outboard steering systems

CYLINDER MODEL NO.	# OF ENGINES	A	B	C	MIN. ENGINE CENTER DISTANCE
HC4645H/47H/48H/58H	1	21" (534mm)	6" (153mm)	5" (127mm)	N/A
	2	Twin engine applications not available at this time			

NOTES:

- i) Ensure there is no interference between the BayStar cylinder rod and the splashwell boot or engine controls & cables.
- ii) Dimensional restrictions also apply to external motor mount brackets.
- iii) Ensure dimension 'A' maintained through full trim/tilt range.
- iv) Maximum transom thickness 3" (76mm).
- v) **Engines less than 70HP may require up to an additional 1" (25mm) of splashwell clearance.**



BayStar Steering Kits PID# HK4200A, HK4230A



NOTICE

HC4645H compact cylinder is included in both BayStar Steering Kits. If your engine requires the use of a cylinder other than HC4645H or HC4658H (refer to application guide on page 1-5) then purchase of a replacement Pivot Plate (noted on page 1-5) will be required.

BayStar Steering kits come complete with everything needed for an install, (some engines require spacer kits and/or cylinder plate change, see application chart on *page 1-5*) the compact cylinder does not require the engine manufacturer drag link for connection. For your convenience two lengths of 20' cut to fit tubing are supplied with the HK4200A and two lengths of 30' cut to fit tubing are supplied with the HK4230A kit.

BayStar Steering Kit (HK4200A)

Includes:

- 1 x BayStar helm pump (HH4314)
- 1 x BayStar Cylinder (HC4645H)
- 1 x BayStar Tubing kit (HT4420H, comes with two 20' hoses)
- 2 x Hydraulic Steering Fluid (HA5430)
- 1 x Filler Kit (HA5438)

BayStar Steering Kit (HK4230A)

includes:

- 1 x BayStar helm pump (HH4314)
- 1 x BayStar Cylinder (HC4645H)
- 1 x BayStar Tubing kit (HT4430H, comes with two 30' hoses)
- 2 x Hydraulic Steering Fluid (HA5430)
- 1 x Filler Kit (HA5438)

NOTICE

HC4600 and HC4600H are no longer being made by Teleflex Canada, all seal kits and spare parts will be made available. If purchase of a new HC4600 or HC4600H is required, please purchase BayStar Compact Cylinder part# HC4645H/47H/48H/58H as per the application chart on page 1-5. If the cylinder that you are replacing does not include the letter H after the part number, you will need to reuse the fittings out of your old cylinder and/or purchase fitting kit # HF4201 (includes 2 of the old style bleed fittings).

BayStar Outboard Compact Application Guide

(BayStar Compact Cylinders HC4645/47/48/58)

BayStar™

OUTBOARD—FRONT MOUNT

MFG	YEAR	MODEL	CYLINDER	NOTES
FORCE	1985–DATE	90–150 HP	HC4645H	
HONDA	1992–DATE	30–90 HP	HC4645H	
	1998–DATE	115–130 HP	HC4647H	
	2001–DATE	150 HP	HC4645H	
	2003–DATE	BF135 HP	HC4645H	
JOHNSON/ EVINRUDE	1977–1989	65–150 HP	HC4648H	
	1991–DATE	40–150 HP	HC4645H	
NOTICE Johnson 115 HP 2-stroke engines, required the pivot plate to be flipped. See note #4 below	1997–DATE	115 HP FICHT	HC4658H	4
	1997–DATE	75–150 HP FICHT	HC4645H	
	1998–DATE	40–140 HP 4-Stroke	HC4658H	1, 4
MERCURY/ MARINER	1984–DATE	75–150 HP	HC4645H	
NISSAN	1990–DATE	120–140 HP	HC4645H	
SUZUKI	1986–DATE	150 HP	HC4645H	
	1996 ONLY	115–140 HP	N/A	
	1987–2002	115–140 HP	HC4645H	1
	1990–2000	90–100 HP	HC4645H	
	1998–DATE	40–70 4-Stroke	HC4645H	1
	2001–DATE	115–140 HP 4-Stroke	HC4658H	1, 4
TOHATSU	1990–DATE	140–140 HP	HC4645H	
YAMAHA	1998–DATE	40–50 HP	HC4645H	2
	1998–DATE	60 HP	HC4645H	3
	1986–DATE	70–90 HP	HC4645H	1
	1997–DATE	80–150 HP 4-Stroke	HC4645H	
	2000–DATE	25–60 HP 4-Stroke	HC4648H	1
YANMAR	1990–DATE	27–36 HP	HC4645H	

1. Requires Spacer kit part # HO5090

2. Engine clamp brackets must be cut or ground, and the engine through bolted onto the transom, or interference will occur, restricting engine trim and tilt.

3. Steering hook Yamaha Part # 63D-48511-00-4D must be installed

4. Cylinder HC4645 may be used in these applications. The pivot plate will need to be flipped before installation. Instructions provided with Owner's Manual.

The above engine applications are current through the revision date shown. For up-to-date engine applications go to: www.seastarsteering.com

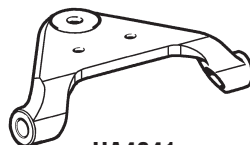
REVISION DATE: MAR. 10TH 2006

NOTICE

HC4645H compact cylinder is included in the BayStar Steering kits. If your engine requires the use of a cylinder other than HC4645H or HC4658H then please refer to the figure below for additional replacement pivot plate.



HA4640
Use with cylinder HC4645H



HA4641
Use with cylinder HC4647H



HA4642
Use with cylinder HC4648H



HA4643
Use with cylinder HC4658H

SeaStar^{PA}TM

POWER ASSIST



SeaStar Power Assist Pilot shown, available Summer, 2008.

The Marine Industry is continually introducing heavier outboard engines, higher horse power engines, more aggressive propellers, bigger/faster boats...

Boat operators are asking for increased comfort and lighter steering loads... These were the driving forces behind the design of SeaStar and SeaStar PRO Power Assist.

This new and innovative product is highly recommended on any 200HP and above outboard application to give your boat the same, easy steering you are accustomed to in your car. Power Assist is also recommended for the following;

- Twin and Triple engine applications
- Bass Boats
- Power Catamarans
- Inboard powered cruisers without engine driven power assist.

How the System Works

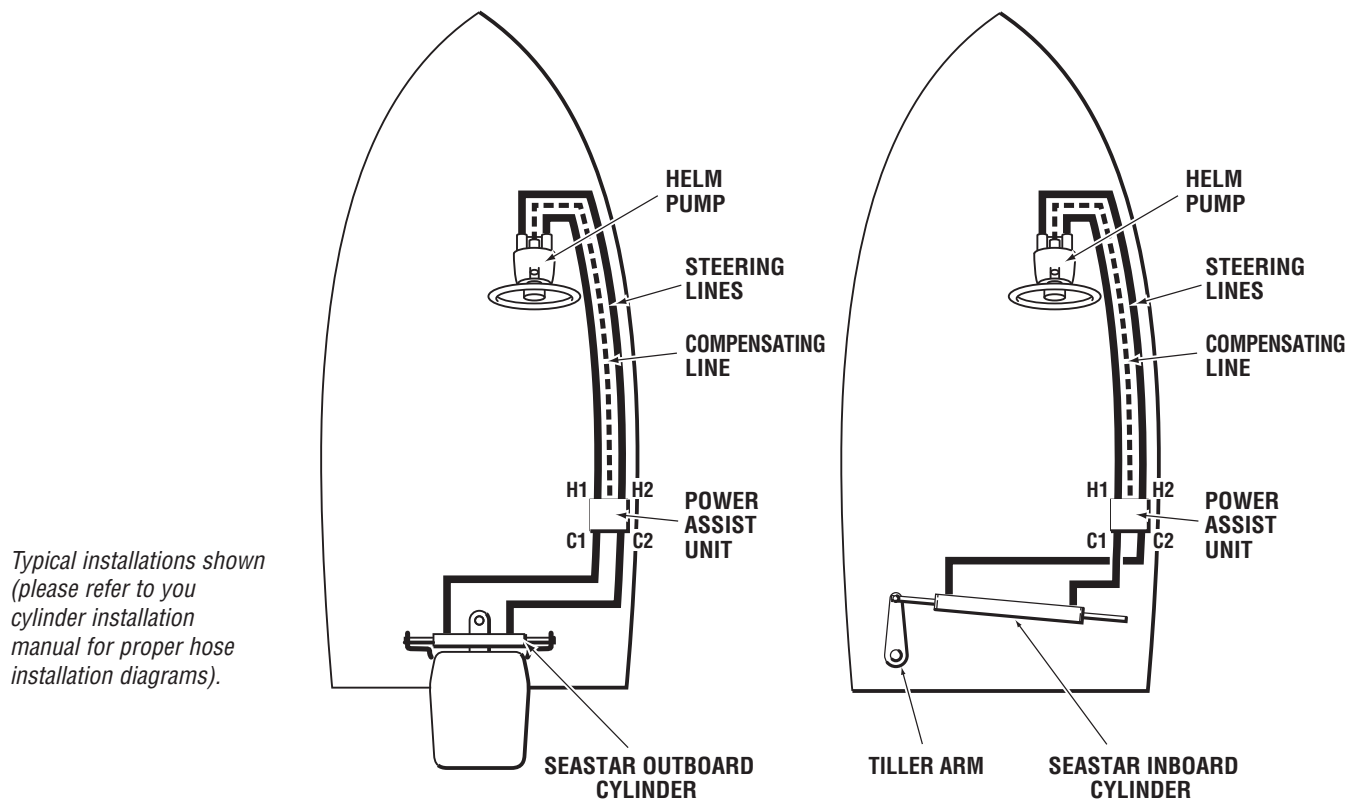
SeaStar P/A (Power Assist) steering uses an electronically controlled hydraulic pump to provide "Power" for your SeaStar Hydraulic Steering system.

The SeaStar P/A system is comprised of two circuits: a hand operated manual system, which is the control element, and a hydraulic power pump, which is the working element.

The manual system consists of a helm pump with internal relief and check valves, as well as a built in reservoir. Two steering lines and a compensating line which provide a routing for fluid to transmit through the system, and a steering cylinder which moves the steering device on the boat from side to side.

The power system, is an electronically controlled hydraulic pump that boosts the fluid being sent from the helm pump to the steering cylinder (this will result in much easier effort at the wheel—even when under heavy loads). A compensating line connects the P/A unit to the helm pump, allowing the P/A unit to share fluid with the helm reservoir.

The SeaStar P/A is compatible with multiple steering stations, and with the use of an autopilot. In the event of a P/A power loss or failure the hydraulic system will automatically revert to a manual hydraulic system.



Typical installations shown
(please refer to your
cylinder installation
manual for proper hose
installation diagrams).

SeaStar P/A Compatibility Chart

The P/A is designed for use in recreational marine applications in conjunction with SeaStar Hydraulic Steering. Optimal performance will be obtained when used with SeaStar 1.4, 1.7 and 2.0 cu in (1000psi) helm pumps, or, 2.0 cu in (1500 psi) SeaStar P/A PRO Hydraulic Steering.

NOTICE

SeaStar nylon tube may ONLY be used for the compensating line. DO NOT use SeaStar Nylon tube to plumb any other portion of the steering system.

NOTICE

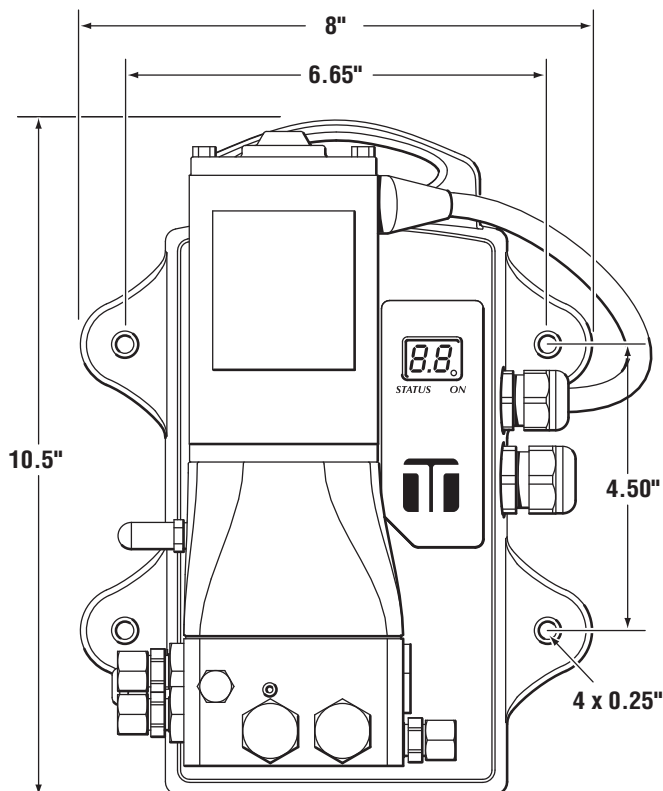
Plan ahead. There MUST be at least 4' (feet) of hose between the helm pump and power assist, or the power assist and the steering cylinder.

NOTICE

Use ONLY Teleflex products with the P/A unit as with ALL Teleflex systems. Failure to do so may void your warranty.

SeaStar P/A PRO is NOT to be used with SeaStar Hydraulic Steering, performance will be compromised. ONLY use P/A PRO with a SeaStar PRO Hydraulic steering system and ensure that SeaStar PRO (1500 psi) hose is used to plumb the entire system. (Nylon tubing may be used for the compensating/return line ONLY.

Specifications



SEASTAR P/A 12VOLT, SEASTAR PRO P/A, 12 VOLT

- 12 Volts
- 1000 psi MAX System peak pressure (500 psi working load) SeaStar Standard
- 1500 psi MAX System peak pressure (500 psi working load) SeaStar Pro
- MAX Current Draw (at 1000psi) 55 amps
- Purple ignition wire MAX. current draw = 1 amp
- Typical current draw:
Single outboard ~ 3 amps, average
Twin Rudder inboard ~ 8 amps, average

SEASTAR P/A 24 VOLT. (SEASTAR PRO P/A IS NOT AVAILABLE IN 24 VOLT POWER).

- 24 Volts
- 1000 psi MAX., System peak pressure (500psi working load)
- MAX Current Draw (at 1000psi) 25 amps
- Purple ignition wire MAX. current draw = 1 amp
- Typical current draw:
Single outboard ~ 1.5 amps, average
Twin Rudder inboard ~ 4 amps, average

WARNING

DO NOT exceed peak operating pressure.
1000psi – Standard,
1500psi – Pro.

OUTBOARD STEERING

SeaStar Outboard Hydraulic Steering offers three models of steering cylinders to suit most applications. The standard and most commonly used model is the Front Mount Steering Cylinder HC5345/47/48/58. The Side Mount Cylinder HC5370 and the Splashwell Mount Cylinder HC5380. Before ordering it is necessary to determine the best possible application for your boat, taking into account the hull design, speed and usage of the boat. Keep in mind that engines today have become larger, more powerful and heavier than in the past. Teleflex encourages you to use the tables noted below and select your system accordingly.

Selecting the outboard steering system best suited for your boat:

- 1) Using the table below, select your design of boat as per speed, hull design and horsepower.
- 2) Using the Application chart on page 3-5 choose the proper cylinder and tiebar equipment as per your outboard engine. If your engine is not noted, contact Teleflex or your Distributor for details.
- 3) Proceed to page 10-1 for details on fitting kits and particular equipment that will be needed to add a second station and/or and autopilot.

TYPICAL BOAT DESIGNS

- 1 INFLATABLE:** Boats manufacture from waterproofed fabric which are inflated with air in order to achieve their shape. The bottom of the hull may be made of fabric and/or fiberglass. They typically have narrow transoms. Boats may be single and/or dual engine, and is generally slower than 40 mp/h
- 2 CRUISER:** Cuddy/express/bridge cruiser primarily designed for cruising. It has overnight accommodations. Typically rigged with two steering stations. Boats may be single and/or dual engine, and is generally slower than 45 mp/h
- 3 RUNABOUT:** Intended for day boating. Typically a single engine, but, can be a dual engine boat. This includes tournament Ski boats and performance outboards. Boat speeds are generally slower than 60 mp/h
- 4 FISH "N" SKI:** Single engine boat designed for day fishing or skiing in protected waters. Boats speeds are generally slower than 40 mp/h
- 5 FISH BOAT:** Boat primarily designed and equipped for offshore fishing. May be rigged with a second station and may have single and/or dual outboards. Speeds are generally slower than 50 mp/h
- 6 CENTER CONSOLE:** Boats with the control station located on the center line of the boat. Designed specifically for fishing, may be single and/or dual engine(s). Boat speeds are generally slower than 65 mp/h.
- 7 BASS BOAT:** Single engine designed specifically for fishing in protected waters and has a flat bottomed hull. Generally performance orientated and speeds in excess of 60 mp/h.
- 8 PONTOON:** Twin or triple hull boats. Single and dual engine capable. Generally speeds to not exceed 60 mp/h. Note: High steering loads when equipped with engines over 115 HP.
- 9 CATAMARAN:** Twin hull vessels. Typically twin engine boats where the use of a mechanical tiebar is not possible. Speeds to not exceed 60 mp/h
- 10 COMMERCIAL/WORK/RESCUE/RACE/:** Any of the above noted boats but used in a more severe environment. Take special care when selecting a system for these boats to ensure that you have both comfortable and safe steering.

SEASTAR FRONT MOUNT OUTBOARD STEERING SYSTEM

Part# HC5345, HC5347, HC5348, HC5358

Features

- Independent engine tilt for twin engine installations.
- Easy steering.
- 5 turns lock to lock steering response.

Applications

- General purpose system.
- Single and multiple engine capability.
- Total power to 700 HP.
- Typical applications include center console fishboats and cruisers.

How to select a front mount outboard steering system

- 1) From the order guide on page 3-3 select the system configuration based on:
 - a) the number of engines, and
 - b) the total power of engine(s) to be installed.
- 2) From the application guides on page 3-5 to page 3-7, confirm that the Front Mount cylinder will fit your specific make, model and year of engine. Select the adapter kit for single engines or the tie bar kit for dual engines.”
- 3) From the order guide select the appropriate helms and accessory hardware for each steering station.
- 4) From the order guide select the fitting and hose kits required for the installation.
- 5) Confirm that there is sufficient space available in the splashwell and dash areas for the steering components.

CAUTION

Not recommended for use in installations where;

- a) chopper, cleaver or surface piercing propellers are used,
- b) the engine is highly elevated on the transom,
- c) engine trim tabs have been removed,
- d) the boat speed exceeds 75 mph (120 km/h), or
- e) the power exceeds the maximum Coast Guard or M.O.T. recommendations for the boat.

HC5345



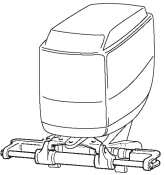
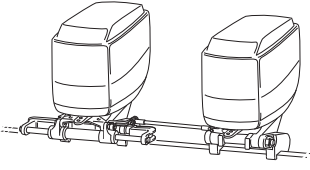
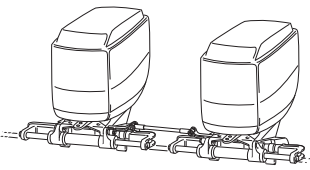
Order Guide

SeaStar®

OUTBOARD-FRONT MOUNT

NOTICE

Front Mount Cylinder part# HC5345 is included in the SeaStar Outboard Steering Kits HK6400/63XX and HK7400/73XX. If your engine requires the use of a cylinder other than the HC5345 (see application guides on pages 3-5 through 3-6) you will need to purchase the individual components (helm, cylinder, hoses, etc.) separately.

ENGINE/ CYLINDER CONFIGURATION	DESCRIPTION	QTY REQ	MODEL	PART NUMBER	REF. PAGE #
SINGLE ENGINE (SINGLE CYLINDER) APPLICATIONS UP TO 350 HP MAX NUMBER OF TURNS 5 	CYLINDER	1	FRONT MOUNT	† HC5345	
	HELM	1	* SEASTAR I- STANDARD	HH5271	9-6
	HOSE KIT	1	OUTBOARD HOSE	‡ HO51__	10-2
	OIL	3	SEASTAR OIL	HA5430	11-1
	FOR EXTRA STEERING STATION ADD:				
	HELM	1	* SEASTAR I- STANDARD	HH5271	9-6
	FITTING KIT	1	ADD A STATION	HF5501	10-10
	HOSE KIT	1	OUTBOARD HOSE	‡ HO51__	10-2
	OIL	1	SEASTAR OIL	HA5430	11-1
	† Refer to Application Guides on page 3-5 to page 3-7 for correct cylinder ‡ Refer to on page 10-2 for measuring hose distance				
DUAL ENGINE (SINGLE CYLINDER) NON-COUNTER ROTATING APPLICATIONS UP TO 450 HP MAX COUNTER ROTATING ENGINE APPLICATIONS UP TO 600 HP MAX NUMBER OF TURNS 5 	CYLINDER	1	FRONT MOUNT	† HC5345	
	TIE BAR KIT	1		HO60__	
	HELM	1	* SEASTAR I- STANDARD	HH5271	9-6
	HOSE KIT	1	OUTBOARD HOSE	‡ HO51__	10-2
	OIL	3	SEASTAR OIL	HA5430	11-1
	FOR EXTRA STEERING STATION ADD:				
	HELM	1	* SEASTAR I- STANDARD	HH5271	9-6
	FITTING KIT	1	ADD A STATION	HF5501	10-10
	HOSE KIT	1	OUTBOARD HOSE	‡ HO51__	10-2
	OIL	1	SEASTAR OIL	HA5430	11-1
	† Refer to Application Guides on page 3-5 to page 3-7 for correct cylinder ‡ Refer to on page 10-2 for measuring hose distance				
DUAL ENGINE (DUAL CYLINDERS) NON-COUNTER ROTATING APPLICATIONS UP TO 600 HP MAX ALL COUNTER ROTATING ENGINE APPLICATIONS UP TO 700 HP MAX NUMBER OF TURNS 6.5 	CYLINDER	2	FRONT MOUNT	† HC5345	
	TIE BAR KIT	1		HO60__	
	HELM	1	** SEASTAR II- STANDARD	HH5272	9-6
	HOSE KIT	1	OUTBOARD HOSE	‡ HO51__	10-2
	HOSE KIT	1	OUTBOARD HOSE	‡ HO51__	10-2
	HOSE KIT	1	OUTBOARD HOSE	‡ HO51__	10-2
	FITTING KIT	1	TEE FITTINGS	HF5530	10-1
	OIL	3	SEASTAR OIL	HA5430	11-1
	FOR EXTRA STEERING STATION ADD:				
	HELM	1	** SEASTAR II- STANDARD	HH5272	9-6
	FITTING KIT	1	ADD A STATION	HF5501	10-10
	HOSE KIT	1	OUTBOARD HOSE	‡ HO51__	10-2
	OIL	1	SEASTAR OIL	HA5430	11-1
	† Refer to Application Guides on page 3-5 to page 3-7 for correct cylinder ‡ Refer to on page 10-2 for measuring hose distance				
OPTIONAL EQUIPMENT	BACK PLATE KIT		(FOR STANDARD HELMS)	HA5418	9-3
	20 DEGREE WEDGE		(FOR STANDARD HELMS)	HA5419	9-3
	AUTOPILOT FITTING KIT		(FOR ALL HELMS)	HF5501	10-10
	* TILT HELM- SEASTAR I			HH5741	9-7
	REAR MOUNT HELM- SEASTAR I			HH5261	9-7
	** TILT HELM- SEASTAR II			HH5742	9-7
	REAR MOUNT HELM- SEASTAR II			HH5262	9-7
	POWER ASSIST STEERING			PA1200	2-1

300HP + Outboard Installation Recommendations

With the introduction of heavier, higher horsepower engines producing more torque, Teleflex Marine has updated its recommendations across various applications (single and multiple engines, different hull types, etc.) Please read carefully to ensure that your current steering system provides the best comfort versus performance available.

ENGINE	SEASTAR FRONT MOUNT (Normal Use)	SEASTAR FRONT MOUNT (Aggressive Use - See Note 1)	HYNAUTIC K-6 (Normal Use ONLY)
SINGLE ENGINE	SINGLE CYLINDER 350 HP Max 75 MPH Max HC53xx Cylinder (See Note 2)	SINGLE CYLINDER 350 HP Max HC63xx Pro Cylinder (See Notes 2 & 3)	SINGLE CYLINDER 300 HP Max 55 MPH Max
DUAL ENGINE NON COUNTER ROTATING	SINGLE CYLINDER 450 HP Max 55 MPH Max HC53xx Cylinder HO60xx Tie Bar	SINGLE CYLINDER Not Recommended	SINGLE CYLINDER 400 HP Max 55 MPH Max
	DUAL CYLINDER 600 HP Max 55 MPH Max HC53xx Cylinders HO60xx Tie Bar	DUAL CYLINDER 700 HP Max HC67xx Cylinders (See Notes 2 & 4) HO67xx Tie Bar	DUAL CYLINDER 500 HP Max 55 MPH Max
DUAL ENGINE COUNTER ROTATING	SINGLE CYLINDER 600 HP Max 55 MPH Max HC53xx Cylinder HO60xx Tie Bar	SINGLE CYLINDER Not Recommended	SINGLE CYLINDER 500 HP Max 55 MPH Max
	DUAL CYLINDER 600 HP Max 55 MPH Max HC53xx Cylinders HO60XX Tie Bar	DUAL CYLINDER 700 HP Max HC67xx Cylinders (See Notes 2 & 4) HO67xx Tie Bar	DUAL CYLINDER 500 HP Max 55 MPH Max
TRIPLE ENGINE ONE WITH COUNTER ROTATING	DUAL CYLINDER 900 HP Max 55 MPH Max HC53xx Cylinders HO60xx Tie Bar	DUAL CYLINDER 1050 HP Max HC67xx Cylinders (See Notes 2 & 4) HO67xx Tie Bars HA67xx Center Engine (See Note 2) Bracket Kit	NOT RECOMMENDED
	TRIPLE CYLINDER 900 HP Max 55 MPH Max HC53xx Cylinders HO60xx Tie Bar	TRIPLE CYLINDER 1050 HP Max HC67xx Cylinders (See Notes 2 & 4) HO67xx Tie Bars	NOT RECOMMENDED
1 Teleflex has specific steering equipment for boats that are driven aggressively, used in severe conditions or with more than 300 HP per engine. 2 ALL ENGINES over 300 HP and all boats that are driven aggressively must use a high strength tiller bolt, kit part # HA5822. All front mount cylinders built after June 15, 2007 will have this high strength bolt included in the box. High strength tiller bolts can be identified by the marking "TFX -ARP" on the head of the bolt (refer to NOTICE page 3-5). 3 HC63xx PRO Cylinders are designed for all those critical high speed, single outboard engine boats, such as Bass, Flats combo Race/Ski and other performance orientated boats capable of speeds in excess of 65 mph. For optimal performance, the use of SeaStar PRO Kevlar Steering Hoses is recommended. 4 HC67xx Tournament cylinders are designed for use with high powered fishing/sport boats. If your application calls for dual or triple outboard engines, is capable of speeds exceeding 55 mp/h and runs in open water, Tournament Cylinders should be used.			

Single Engine Application Guide

SeaStar

OUTBOARD—FRONT MOUNT

Prior to selecting a cylinder from this application guide, please refer to page 3-4 to ensure that you are selecting the correct cylinder for your engine/boat.

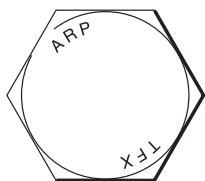
NOTICE

NOTICE

Front Mount Cylinder part# HC5345 is included in the SeaStar Outboard Steering Kits HK6400/63XX and HK7400/73XX. If your engine requires the use of a cylinder other than the HC5345 (see application guides on this page through 3-6) you will need to purchase the individual components (helm, cylinder, hoses, etc.) separately.

NOTICE

High Strength Tiller bolt, part# HA5822. ALL cylinders shipped after June 15th, 2007 will have this bolt included in the cylinder package.



CAUTION

SeaStar PRO Helms require the use of SeaStar PRO (1500 psi) Kevlar steering hoses.

Is your Splashwell wide enough? Check page 3-11 for space requirements.

MFG	YEAR	MODEL	CYL	NOTES
FORCE	1985-DATE	90-150 HP	HC5345	
HONDA	1996-DATE	75-90HP	HC5345	See Note 1
	1998-DATE	115-130HP	HC5347	
	1998-DATE	30-50HP	HC5345	
	2001-DATE	135-225HP 4-Stroke	HC5345	
	2003-DATE	BF135HP	HC5345	
JOHNSON/ EVINRUDE	1977-1990	65-300HP	HC5348	Inc. ETech See Note 1 See Note 1
	1988-1997	250-300HP V8	HC5342	
	1991-DATE	40-250HP	HC5345	
	1996-DATE	75-250HP Ficht	HC5345	
	1998-DATE	40-140HP 4-Stroke	HC5358	
	2000-DATE	115HP Ficht	HC5358	
	2002-DATE	200-225HP 4-Stroke	HC5345	
	2005-DATE	E250 DPX Vindicator	HC5348	
MERCURY	1984-1994	2.4/2.5HP EFI	HC5345	See Note 2
	1989-DATE	75-300HP	HC5345	
	1996-DATE	75-225HP 4-Stroke	HC5345	See Note 1 See Note 3
	1998-DATE	30-60HP	HC5345	
	2003-DATE	250-300HP XS	HC6345	
NISSAN	1990-DATE	90-140HP	HC5345	
SUZUKI	1986-DATE	100HP	HC5345	NOT 1996 See Note 1 See Note 1
	1986-2002	115-140HP	HC5345	
	1986-DATE	150-300HP 2 & 4-Stroke	HC5345	
	1996 ONLY	115-140HP	HC5348	
	1998-DATE	40-140HP 4-Stroke	HC5358	
	2003-DATE	90HP 4-Stroke	HC5358	
US MARINE	1996-DATE	90-120HP	HC5345	
YAMAHA	1990-2003	40-90HP	HC5345	See Note 5 See Note 5 See Note 1 See Note 4
	1986-DATE	100-250HP 2-Stroke	HC5345	
	1997-DATE	80-225HP 4-Stroke	HC5345	
	2000-DATE	150-250 HPDI	HC5345	
	2002-DATE	300 HPDI	HC5358	
	2003-DATE	25-60 HP 4-Stroke	HC5348	
	2007-DATE	350 HP	HC5345	
YANMAR	1994-DATE	90-120HP	HC5345	

1. Requires Spacer Kit# HO5090.
2. May Require Extensive Cowling Modifications.
3. **MUST** use High Strength Tiller bolt, part # HA5822. Refer to the NOTICE on this page identifying the high strength bolt.

4. Optional cylinder part # HC5358. Slight interference may occur when using the HC5358, with the engine in the full tilt position.
5. Cylinder part # HC5358 may also be used in these single engine applications.

The above engine applications are current through the revision date shown. For up-to-date engine applications go to: www.seastarsteerng.com

REVISION DATE: MAR. 24th 2008

Twin Engine Application Guide

Prior to selecting a cylinder from this application guide, please refer to page 3-4 to ensure that you are selecting the correct cylinder for your engine/boat.

NOTICE

Is your Splashwell wide enough? Check page 3-11 for space requirements.

MFG	YEAR	MODEL	CYL	TIE BAR KITS		NOTES
				TWIN x 1	TWIN x 2	
FORCE	1985-DATE	90-150 HP	HC5345	HO5008A	HO5008A	
HONDA	1996-DATE	75-90HP	HC5345	HO6001	HO6002	See Note 3
	1998-DATE	115-130HP	HC5347	HO5063	HO5064	See Note 5
	1998-DATE	30-50HP	HC5345	HO6001	HO6002	See Note 2
	2001-DATE	150HP 4-Stroke	HC5345	N/A	HO6002	See Note 7
	2001-DATE	225HP 4-Stroke	HC5345	HO6001	HO6002	
	2003-DATE	BF135HP	HC5345	HO6003	HO6002	
JOHNSON/ EVINRUDE	1977-1990	65-300HP	HC5348	HO6003	HO6002	
	1988-1997	250-300HP V8	HC5342	HO5001A	HO5030	See Note 5
	1991-DATE	40-250HP	HC5345	HO6003	HO6002	<i>Inc. ETech Engines.</i>
	1996-DATE	75-250HP Ficht	HC5345	HO6003	HO6002	
	1998-DATE	40-140HP 4-Stroke	HC5358	HO6003	HO6002	See Note 2
	2000-DATE	115HP FICHT	HC5358	HO6003	HO6002	See Note 2
	2002-DATE	200-225HP 4-Stroke	HC5345	HO6003	HO6002	
	2005-DATE	E250 DPX Vindicator	HC5348	HO6003	HO6002	
MERCURY	1984-1994	2.4/2.5HP EFI	HC5345	HO6001	HO6002	See Note 4
	1989-DATE	75-300HP	HC5345	HO6001	HO6002	See Note 3
	1996-DATE	75-200HP 2 & 4-Stroke	HC5345	HO6001	HO6002	
	1998-DATE	30-60HP	HC5345	HO6001	HO6002	See Note 2
	2002-DATE	225HP 4-Stroke	HC5358	HO6001	HO6002	See Note 1
	2003-DATE	250-300HP XS	HC5345	N/A	HO6002	See Note 6
NISSAN	1990-DATE	90-140HP	HC5345	HO6001	HO6002	
SUZUKI	1986-DATE	100HP	HC5345	HO6003	HO6002	
	1986-2002	115-140HP	HC5345	HO6001	HO6002	NOT 1996
	1986-DATE	150-300HP 2 & 4-Stroke	HC5345	HO6003	HO6002	
	1996 ONLY	115-140HP	HC5348	HO6001	HO6002	
	1998-DATE	40-140HP 4-Stroke	HC5358	HO6003	HO6002	See Note 2
	2003-DATE	90HP 4-Stroke	HC5358	HO6003	HO6002	See Note 2
US MARINE	1996-DATE	90-120HP	HC5345	HO6001	HO6002	
YAMAHA	1990-DATE	40-90HP	HC5345	HO6003	HO6002	
	1986-DATE	100-250HP 2-Stroke	HC5345	HO6001	HO6002	
	1997-DATE	80-225HP 4-Stroke	HC5358	HO6001	HO6002	See Note 1
	2000-DATE	150-250 HPDI	HC5358	HO6001	HO6002	See Note 1
	2002-DATE	300 HPDI	HC5358	HO6001	HO6002	
	2003-DATE	25-60HP 4-Stroke	HC5348	HO6003	HO6002	See Note 2
	2006-DATE	350HP	<i>MUST Use Tournament Cylinders. Refer to Page 3-8</i>			
YANMAR	1994-DATE	90-120HP	HC5345	HO6001	HO6002	

1. HC5345 is optional for **SINGLE ENGINE ONLY** applications. **DO NOT** use HC5345 for twin engine applications as operational interference may occur.

2. Requires Kit HO5090

3. Minimum Engine Center = 27"

4. May Require Extensive Cowling Modifications

5. HO5030 and HO5064 comes without Tie Bar

6. One cylinder per engine. Must use Mercury supplied tiller bolt for installation.

7. Interference will occur when using a single HC5345 cylinder and HO6003 tiebar when installed in the aft hole on the steering arm. Options include, a) install tiebar into most forward hole (this will limit steering articulation), b) purchase K-6 Cylinder, and tiebar kit part # HO5009. There will be no interference when using twin HC5345 cylinders.

The above engine applications are current through the revision date shown. For up-to-date engine applications go to: www.seastarsteering.com

REVISION DATE: NOV. 23rd 2007

Triple Engine Application Guide

SeaStar

OUTBOARD—FRONT MOUNT

Prior to selecting a cylinder from this application guide, please refer to page 3-4 to ensure that you are selecting the correct cylinder for your engine/boat.

⚠ WARNING

Use of incorrect components on a high speed/performance boat, may lead to bending and breaking of components resulting in steering failure causing property damage and/or personal injury.

NOTICE

Tournament Tiebar Cylinder should be used on ALL Tournament/High Speed (60 Mph and above) multi-engine boats. Please refer to page 3-8.

MFG	YEAR	MODEL	CYL	PORT TO DRIVE CYL	STARBOARD TO DRIVE CYL	NOTES
FORCE	1995-DATE	90-120HP	HC5345	HO6001	HO6002	See Note 4
HONDA	1996-DATE	75-90HP	HC5345	HO6001	HO6002	See Note 2, 4
	2001-DATE	135-225HP 4-Stroke	HC5345	HO6003	HO6002	See Note 4
MERCURY	1989-DATE	75-275HP	HC5345	HO5081		See Note 4
	2003-DATE	250-300HP XS	HC5345	HO6002	HO6002	See Note 3, 4
JOHNSON/ EVINRUDE	1991-DATE	90-175HP	HC5345	HO5080		See Note 4
	1991-DATE	250-300HP	HC5345	HO6001	HO6002	See Note 4
	1991-DATE	200-225HP	HC5345	HO6003	HO6002	See Note 4
	1991-DATE	90-225HP Ficht	HC5345	HO5080		See Note 2, 4
	1998-DATE	65-70HP 4-Stroke	HC5345	HO6003	HO6002	See Note 1, 4
	2005-DATE	E250 DPX Vindicator	HC5348	HO6003	HO6002	See Note 4
SUZUKI	1986-DATE	150-200HP 2 & 4-Stroke	HC5345	HO6003	HO6002	See Note 4
	1986-DATE	115-140HP	HC5345	HO6003	HO6002	See Note 4
	1998-DATE	65-70HP 4-Stroke	HC5345	HO6001	HO6002	See Note 1, 4
	2001-DATE	250-300HP	HC5345	HO6001	HO6002	See Note 4
YAMAHA	1990-DATE	100-200HP	HC5345	HO6001	HO6002	See Note 4
	1990-DATE	225-250HP 4-Stroke	HC5358	HO5080		See Note 4
	1998-DATE	80-100HP 4-Stroke	HC5358	HO6001	HO6002	See Note 4
	2001-DATE	150-300HP HPDI	HC5358	HO6001	HO6002	See Note 4
	2006-DATE	350HP	<i>MUST Use Tournament Cylinders. Refer to Page 3-8</i>			See Note 3

1. Requires Kit HO5090

2. Minimum Engine Center = 29"

3. One cylinder required per engine. MUST use high strength tiller bolt part # HA5822.

4. For high performance/speed applications, please refer to the Caution noted at the bottom of this page.

The above engine applications are current through the revision date shown. For up-to-date engine applications go to: www.seastarsteerng.com

REVISION DATE: SEPT. 4th 2007

NOTICE

A minimum of two cylinders will be required to operate a triple engine installation with the exception of Mercury XS engines which MUST use one cylinder per engine.

NOTICE

Is your Splashwell wide enough? Check page 3-11 for space requirements.

Tournament Series Tiebar Cylinders

NOTICE

Maximum engine centers for:
Single cylinder = 41"
Twin cylinders = 32-1/8"

With the power and speed increasing for performance orientated fishing boats, Teleflex Marine felt it prudent to set up a dedicated application for these types of boats. If your application calls for a dual or triple Outboard Engine configuration, is capable of speeds exceeding 55mph and runs in open water, please refer to the Tournament Tiebar Cylinders to achieve performance, durability and safety.



MAKE	YEAR	TWIN ENGINE CYLINDERS	TRIPLE ENGINE CYLINDERS *Note
HONDA All models	200–250HP	HC6750 (s) x 1 HC6751 (p) x 1 Tiebar HO6700 x 1	HC6750 (s) x 1 HC6751 (p) x 1 HC6752 (c) x 1 2 x HO6700 tiebar kits required for triples.
EVINRUDE Salt/Fresh/DI engines	200–300HP	HC6753 (s) x 1 HC6754 (p) x 1 Tiebar HO6700 x 1	HC6753 (s) x 1 HC6754 (p) x 1 HC6755 (c) x 1 2 x HO6700 tiebar kits required for triples.
MERCURY Verado N/A	200–300HP	HC6750 (s) x 1 HC6751 (p) x 1 Tiebar HO6700 x 1	HC6750 (s) x 1 HC6751 (p) x 1 HC6752 (c) x 1 2 x HO6700 tie bar kits required for triples.
	250–300HP XS (One cylinder per engine required.)	HC6750 (s) x 1 HC6751 (p) x 1 Tiebar HO6700 x 1	HC6750 (s) x 1 HC6751 (p) x 1 HC6752 (c) x 1 2 x HO6700 tiebar kits required for triples.
SUZUKI All models	200–300HP 2 and 4 stroke	HC6750 (s) x 1 HC6751 (p) x 1 Tiebar HO6700 x 1	HC6750 (s) x 1 HC6751 (p) x 1 HC6752 (c) x 1 2 x HO6700 tiebar kits required for triples.
YAMAHA All models	200–300HP	HC6753 (s) x 1 HC6754 (p) x 1 Tiebar HO6700 x 1	HC6753 (s) x 1 HC6754 (p) x 1 HC6755 (c) x 1 2 x HO6700 tiebar kits required for triples.
	350HP	HC6750 (s) x 1 HC6751 (p) x 1 Tiebar HO6700 x 1	HC6750 (s) x 1 HC6751 (p) x 1 HC6752 (c) x 1 2 x HO6700 tiebar kits required for triples.

REVISION DATE: NOV. 22nd 2007

NOTICE

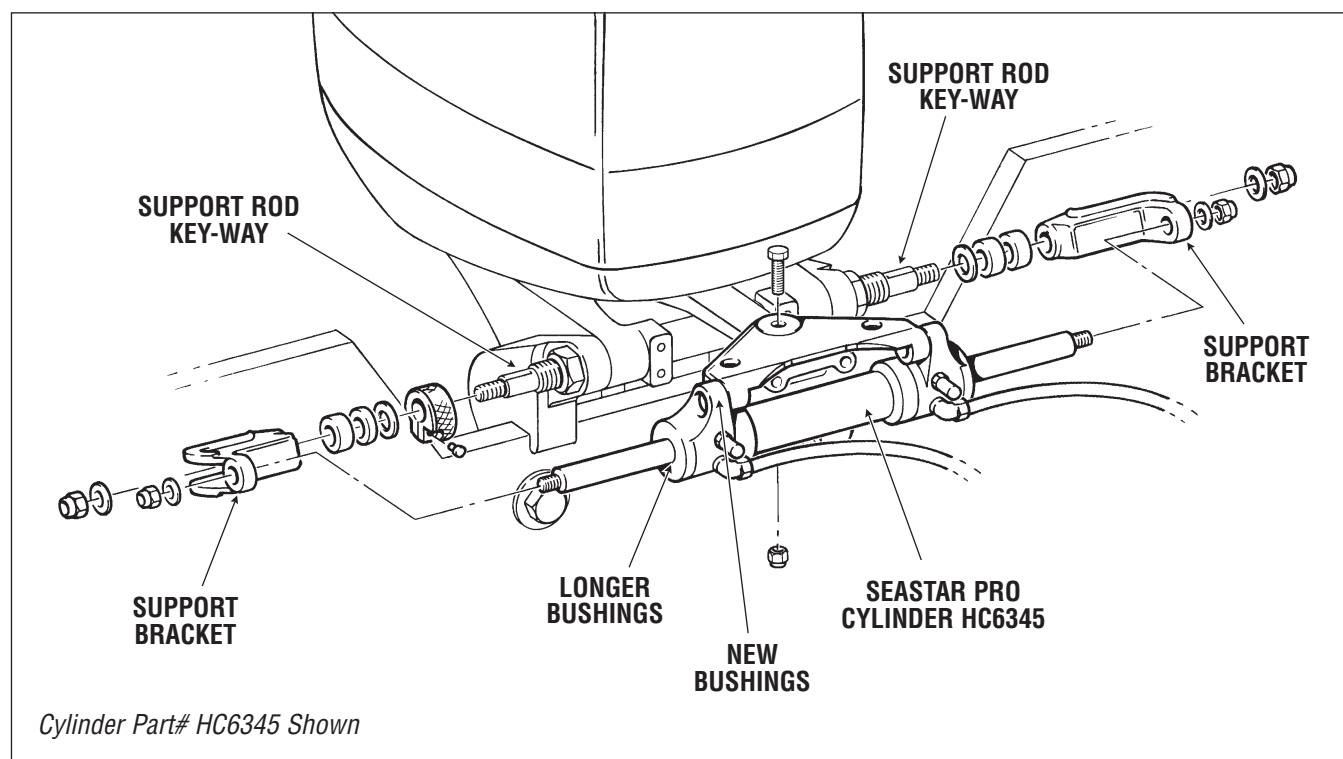
* All triple engine applications, excluding the Mercury XS line, may use a twin cylinder set up with the additional purchase of a "center engine bracket kit, part # HA6701.

SeaStar Pro Steering Systems

SeaStar®

OUTBOARD-FRONT MOUNT

SeaStar PRO Outboard Steering systems are suited for all those critical high speed, single powered outboard boats, like Bass, Flats, combo Race/Ski and other performance orientated boats capable of speeds in excess of 65mph. Before ordering it is necessary to determine the proper cylinder and helm pump for your application. Using the table on page 3-10, choose the correct cylinder as per your outboard engine. All SeaStar PRO systems require the use of a SeaStar PRO helm and SeaStar PRO (1500psi) reinforced Kevlar hoses ONLY!



⚠ WARNING

SeaStar PRO Helm systems require the use of SeaStar PRO (1500 psi) reinforced Kevlar Hoses ONLY.

Helm Pumps

SeaStar PRO Steering systems have the option to install a standard front mounting helm, both traditional and sport tilt as well as rear mount helm pumps. Please refer to page 9-1 for style and page 9-5 for PRO Helm part numbers.

⚠ CAUTION

SeaStar PRO Helms require the use of SeaStar PRO (1500 psi) Kevlar steering hoses

SeaStar Pro Application Guide

NOTICE

Is your Splashwell wide enough? Check page 3-11 for space requirements.

MFG	YEAR	MODEL	CYL	NOTES
FORCE	1985-DATE	90-150HP	HC6345	
HONDA	1996-DATE	150-300HP	HC6345	
JOHNSON/ EVINRUDE	1977-1990 2002-DATE 2003-DATE 2005-DATE	150-300HP 150-250HP 4-Stroke 150-300HP ETech E250HP Vindicator	N/A HC6345 HC6345 N/A	Contact Teleflex Contact Teleflex
MERCURY	1989-DATE	150-300 2-Stroke, 4-Stroke and XS Engines	HC6345	XS engine requires mercury supplied tiller bolt on install
SUZUKI	1986-DATE	150-250 HP 2 and 4-Stroke	HC6345	
YAMAHA	1986-DATE 2002-DATE	150-250HP 2 and 4-Stroke 300 HPDI	HC6345 HC6358	

REVISION DATE: FEB. 10TH 2006

NOTICE

SeaStar PRO Steering Systems can not be used with an unbalanced steering cylinder.

Cylinder Installation and General Dimensions

⚠ WARNING

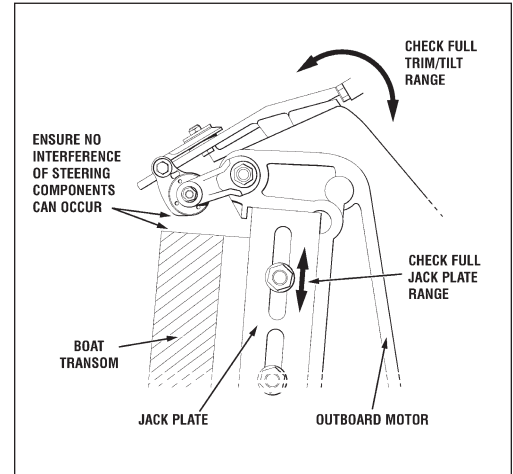
Operational interference of the steering cylinder/cylinder fittings and jackplates/transom/splashwell can occur under certain conditions. Check installation thoroughly throughout the full range of Motor Tilt, Jack Height and Trim before making final installation.

If interference does occur, contact:

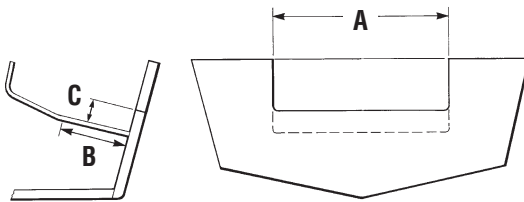
Teleflex Canada Limited Partnership for additional information/options.

Telephone: **604-270-6899** Fax: **604-279-2202**

If interference is not eliminated total steering loss can occur, causing property damage and/or personal injury.



Motor Well dimensions required for front mount outboard steering systems

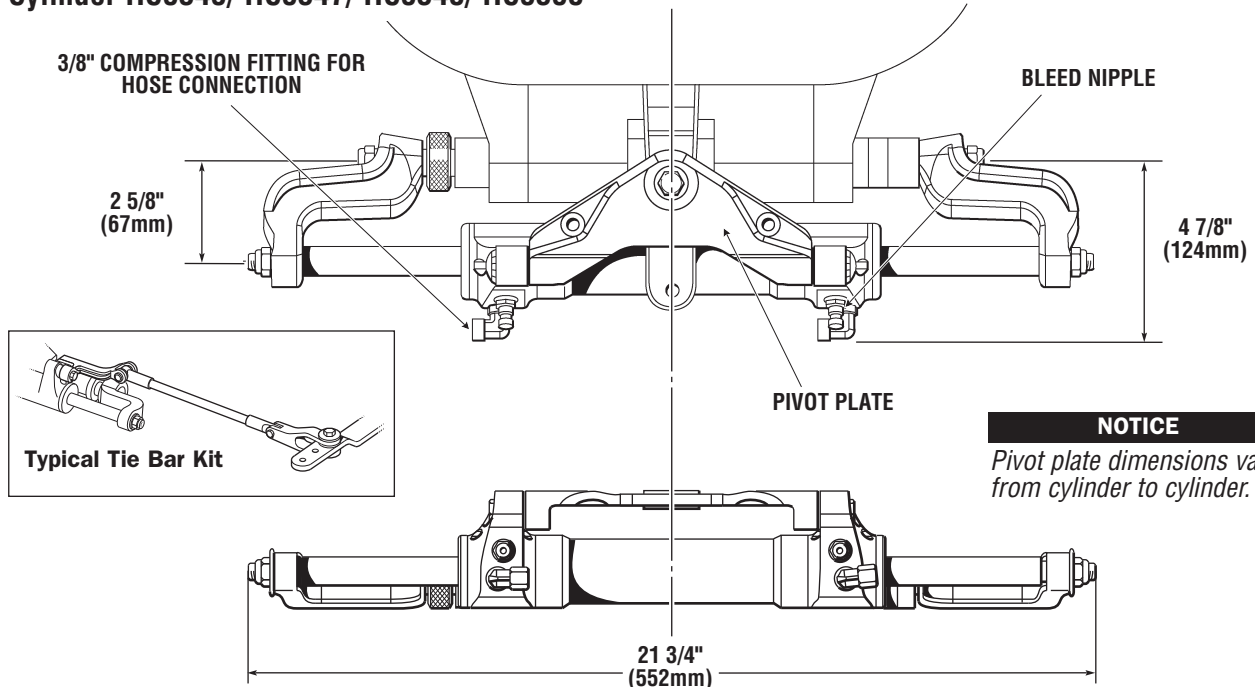


# OF ENGINES	A	B	C	MIN. ENGINE CENTER DISTANCE
1	22" (559mm)	6" (152mm)	5" (127mm)	N/A
2	49" (1244mm)	6" (152mm)	5" (127mm)	26" (660mm)

NOTES

- Dimensional restrictions also apply to external motor mount brackets.
- Maximum engine center distance for twin engine applications is 36" (914mm) using the standard tiebar. Dimension 'A' would have to be increased proportional to the tiebar length.
- Minimum engine center distance is 26" unless engine manufacturer recommendation is greater.

Cylinder HC5345/ HC5347/ HC5348/ HC5358



NOTICE

Pivot plate dimensions vary from cylinder to cylinder.

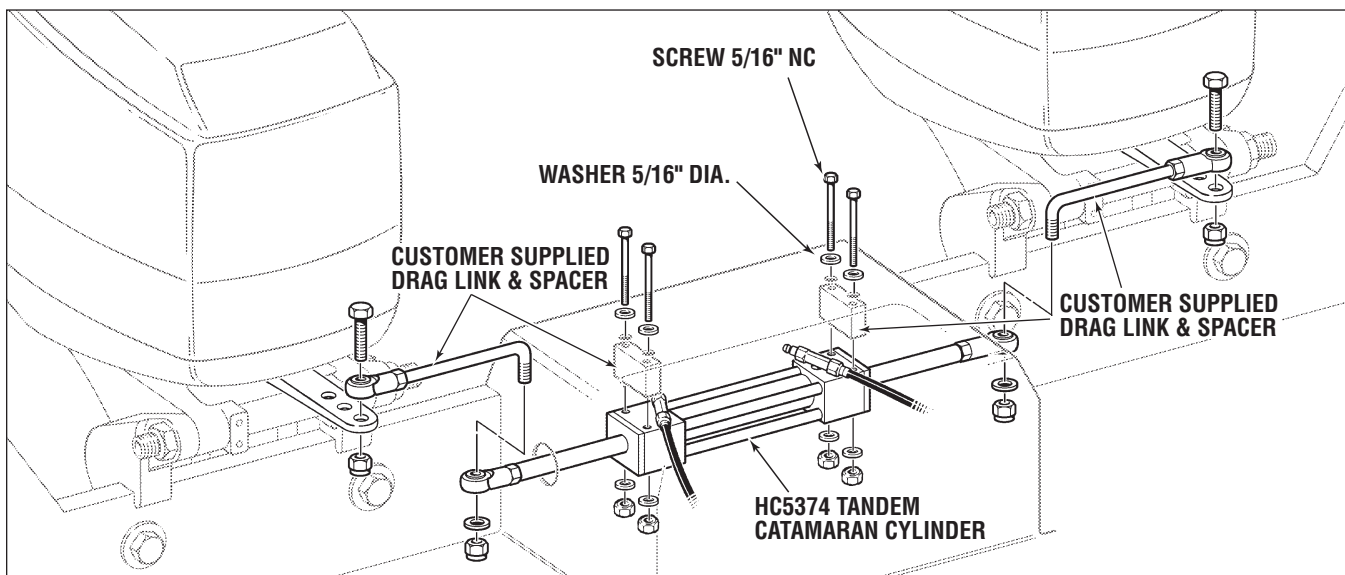
Outboard-Catamaran

Horsepower Limitations

ENGINE CONFIGURATIONS	MAXIMUM HORSEPOWER	CYLINDER	RECOMMENDED HELM PUMP	NO. OF STEERING WHEEL TURNS
NON COUNTER-ROTATING	UP TO 450HP	HC5343 HC5374	HH5271 HH5272	5 5.5
COUNTER-ROTATING	UP TO 600HP	HC5343 HC5374	HH5271 HH5272	5 5.5

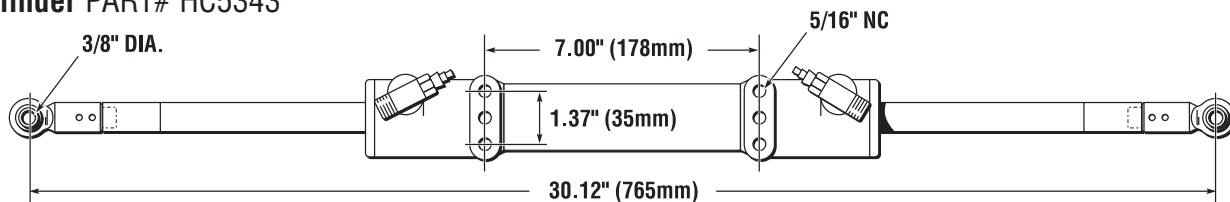
To establish whether or not this cylinder is suitable for your application, the following points should be considered:

1. Fore and aft alignment of cylinder. If not mounted in line, motors will have a different turning radius.
2. Distance between motors.
3. Distance of travel in tilt arc.
4. Horizontal alignment of cylinder.

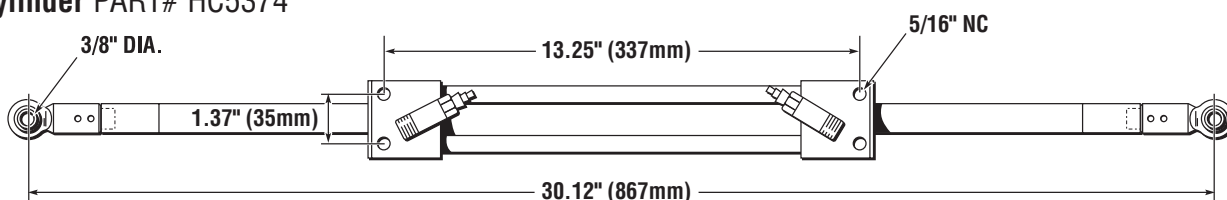


Cylinder Part# HC5374 Shown

Cylinder PART# HC5343



Cylinder PART# HC5374



SEASTAR SIDE MOUNT OUTBOARD STEERING SYSTEM

Part# HC5370

Features

- Ease of installation.
- Alternative to Front Mount Cylinder.
- Unbalanced cylinder with 4.8/5.7 turns lock to lock.
- Suitable for installation in shallow splashwells.
- Suitable for use on engines fitted with power steering.

Applications

- All engines with threaded tilt (steering) tubes complying with ABYC P17/ABYC P21/NMEA/BIA standards for mechanical steering.
- Cylinder attaches to the engine tilt tube as per ABYC/NMEA/BIA standard.
- Single and multiple outboard engine installations.
- Total power to 600 HP in counter rotating application. (see order guide)
- Typical applications include center console fishboats and cruisers.

How to select a side mount outboard steering system

WARNING

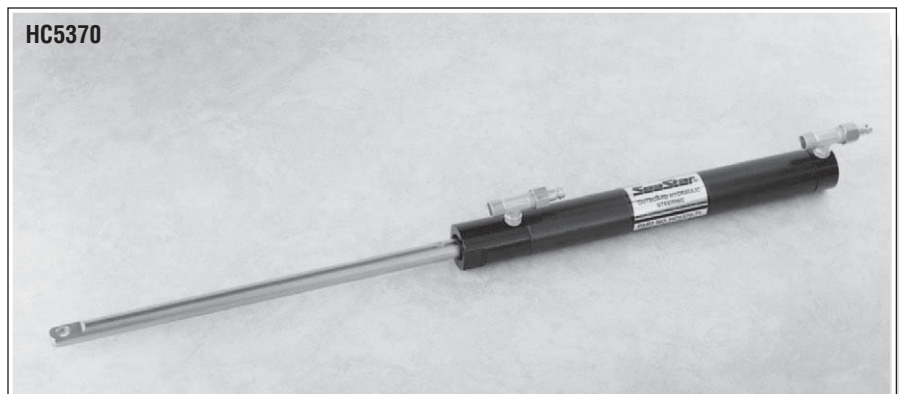
**Not for use with SeaStar-Pro
Helm Pumps.**

- 1) From the order guide on page 3-14 select the system configuration based on;
 - a) the number of engines, and
 - b) the total power of engine(s) to be installed.
- 2) From the order guide select the cylinder(s) and tie bar kits required.
- 3) From the order guide select the appropriate helms and accessory hardware for each steering station.
- 4) From the order guide select the fitting and hose kits required for the installation.
- 5) Confirm that there is sufficient space available in the splashwell and dash areas for the steering components.

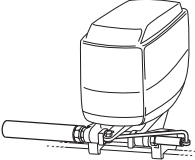
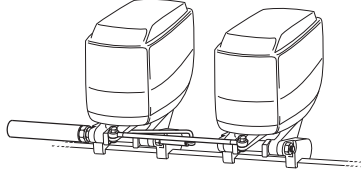
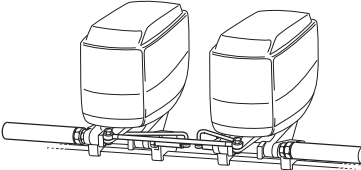
NOTICE

*Not recommended for use in
installations where;*

- a) chopper, cleaver, or surfacing
piercing propellers are used,*
- b) the engine is highly elevated
on the transom,*
- c) engine trim tabs have been
removed,*
- d) the boat speed exceeds
75 mph (120 km/h), or*
- e) the power exceeds maximum
Coast Guard or M.O.T.
recommendations for the boat.*



Order Guide

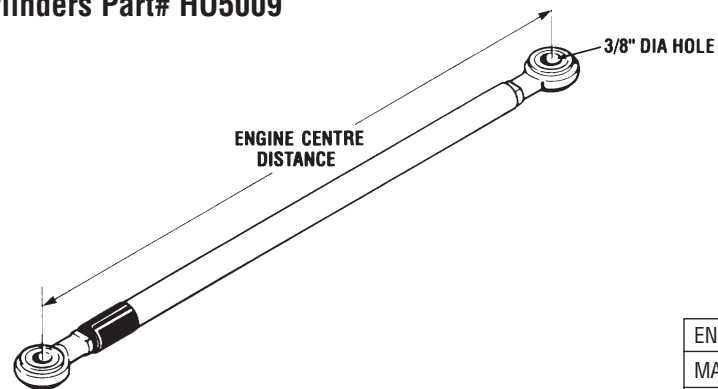
ENGINE/ CYLINDER CONFIGURATION	DESCRIPTION	QTY REQ	MODEL	PART NUMBER	REF. PAGE #
SINGLE ENGINE (SINGLE CYLINDER) APPLICATIONS UP TO 300 HP MAX NUMBER OF TURNS 4.8/5.7 	CYLINDER	1	SIDE MOUNT	HC5370	
	HELM	1	* SEASTAR I- STANDARD	HH5271	9-6
	HOSE KIT	1	OUTBOARD HOSE	HO51__	10-2
	OIL	3	SEASTAR OIL	HA5430	11-1
	FOR EXTRA STEERING STATIONS ADD:				
	HELM	1	* SEASTAR I- STANDARD	HH5271	9-6
	FITTING KIT	1	ADD A STATION	HF5501	10-10
	HOSE KIT	1	OUTBOARD HOSE	HO51__	10-2
	OIL	1	SEASTAR OIL	HA5430	11-1
DUAL ENGINE (SINGLE CYLINDER) NON-COUNTER ROTATING APPLICATIONS UP TO 300 HP MAX COUNTER ROTATING ENGINE APPLICATIONS UP TO 600 HP MAX NUMBER OF TURNS 4.8/5.7 	CYLINDER	1	SIDE MOUNT	HC5370	
	TIE BAR KIT	1	TIE BAR ONLY	HO5009	
	HELM	1	* SEASTAR I- STANDARD	HH5271	9-6
	HOSE KIT	1	OUTBOARD HOSE	HO51__	10-2
	OIL	3	SEASTAR OIL	HA5430	11-1
	FOR EXTRA STEERING STATIONS ADD:				
	HELM	1	* SEASTAR I- STANDARD	HH5271	9-6
	FITTING KIT	1	ADD A STATION	HF5501	10-10
	HOSE KIT	1	OUTBOARD HOSE	HO51__	10-2
	OIL	1	SEASTAR OIL	HA5430	11-1
DUAL ENGINE (DUAL CYLINDERS) NON-COUNTER ROTATING APPLICATIONS UP TO 600 HP MAX ALL COUNTER ROTATING ENGINE APPLICATIONS NUMBER OF TURNS 7.5 	CYLINDER	2	SIDE MOUNT	HC5370	
	TIE BAR KIT	1	TIE BAR ONLY	HO5009	
	HELM	1	** SEASTAR II- STANDARD	HH5272	9-6
	HOSE KIT	1	OUTBOARD HOSE	HO51__	10-2
	HOSE KIT	1	OUTBOARD HOSE	HO51__	10-2
	HOSE KIT	1	OUTBOARD HOSE	HO51__	10-2
	FITTING KIT	1	TEE FITTINGS	HF5530	10-1
	OIL	3	SEASTAR OIL	HA5430	11-1
	FOR EXTRA STEERING STATIONS ADD:				
	HELM	1	** SEASTAR II- STANDARD	HH5272	9-6
OPTIONAL EQUIPMENT	BACK PLATE KIT		(FOR STANDARD HELMS)	HA5418	9-3
	20 DEGREE WEDGE		(FOR STANDARD HELMS)	HA5419	9-3
	AUTOPILOT FITTING KIT		(FOR ALL HELMS)	HF5501	10-10
	* TILT HELM- SEASTAR I			HH5741	9-7
	REAR MOUNT HELM- SEASTAR I			HH5261	9-7
	** TILT HELM- SEASTAR II			HH5742	9-7
	REAR MOUNT HELM- SEASTAR II			HH5262	9-7
	POWER ASSIST STEERING			PA1200	2-1

General Dimensions

SeaStar

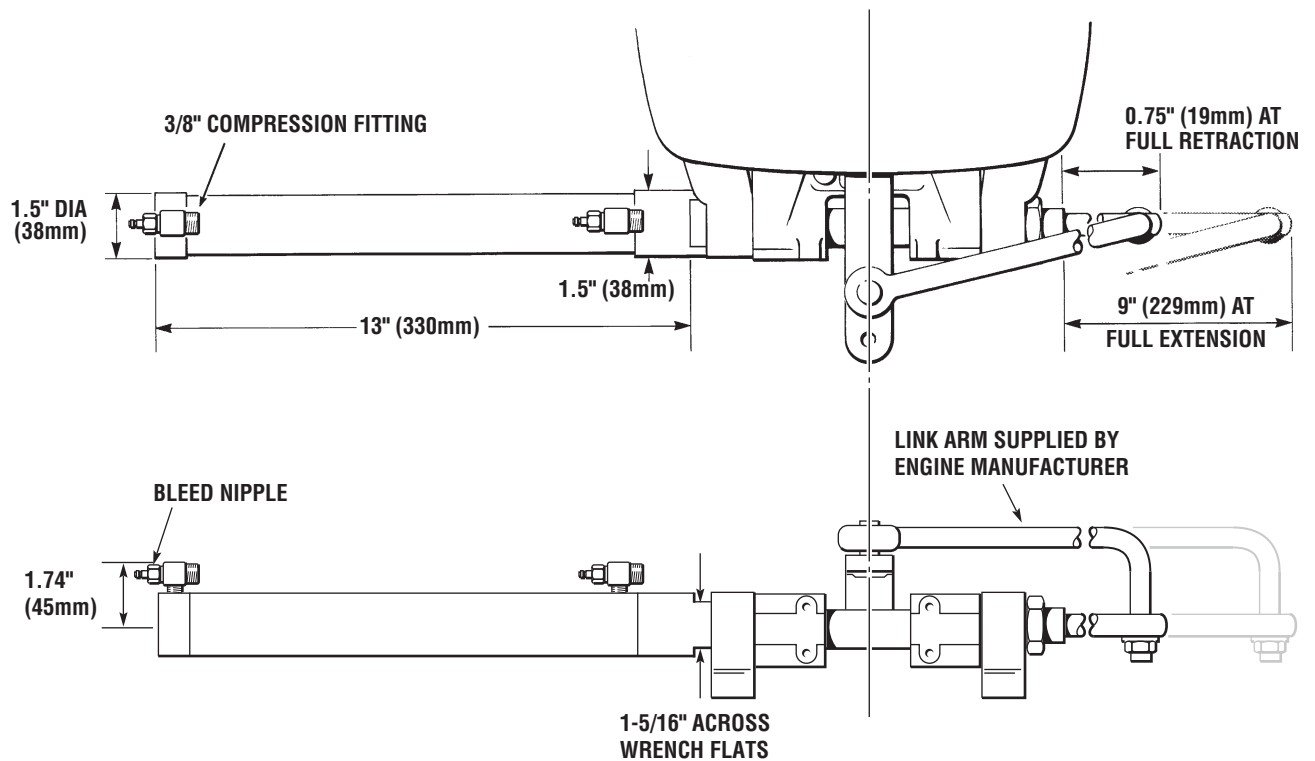
OUTBOARD-SIDE MOUNT

Tie Bar for Side Mount Cylinders Part# H05009



ENGINE CENTRE DISTANCE	
MAXIMUM:	36" (914mm)
MINIMUM:	26" (660mm)

PART# HC5370



SEASTAR SPLASHWELL MOUNT OUTBOARD STEERING SYSTEM

Part# HC5380

NOTICE

Not for use with SeaStar Pro Helms.

Features

- Light duty alternative to front & side mount cylinders.
- Unbalanced cylinder with 5.5/6.5 turns lock to lock.
- Fits engines with/without support (steering) tube.

Applications

- Single & multiple engine capability.
- Total power to 600 HP in counter rotating application. (see order guide)
- Transom or hull mounted cylinder.
- Speeds to 60mph maximum (97km/h).

How to select a splashwell mount outboard steering system

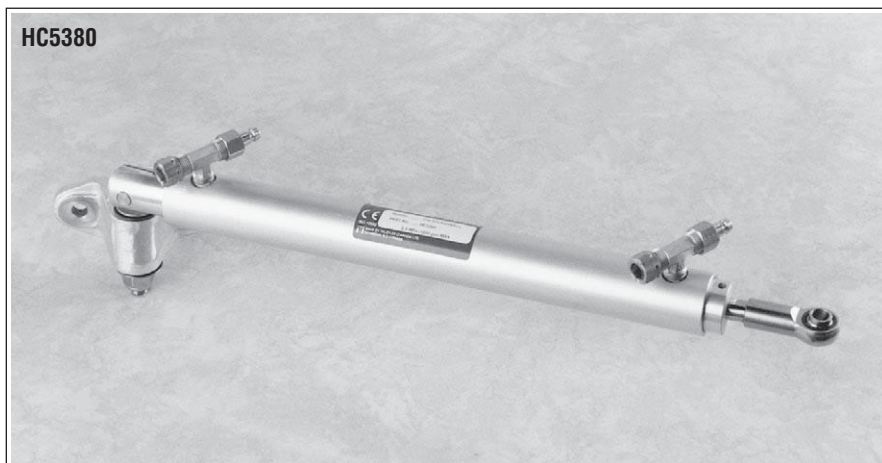
- 1) From the order guide on page 3-17 select the system configuration based on;
 - a) the number of engines, and
 - b) the total power of engine(s) to be installed.
- 2) Select the cylinder and tie bar kit required.
- 3) From the order guide select the appropriate helms and accessory hardware for each steering station.
- 4) From the order guide select the fitting and hose kits required. You will have to determine the configuration, length, number of hose and fitting kits required for the installation (refer to page 10-2).
- 5) Confirm that there is sufficient space available in the splashwell and dash areas for the steering components.

NOTICE

Not recommended for use in installations where;

- a) chopper, cleaver or surfacing piercing propellers are used,
- b) the engine is highly elevated on the transom,
- c) engine trim tabs have been removed,
- d) the boat speed exceeds 60mph (97km/h), or
- e) the power exceeds maximum Coast Guard or M.O.T. recommendations for the boat.

HC5380

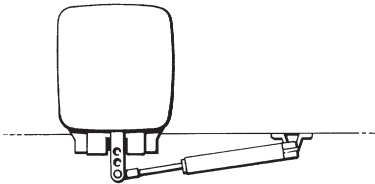
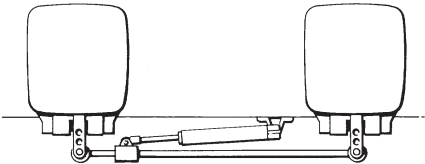


Order Guide

SeaStar

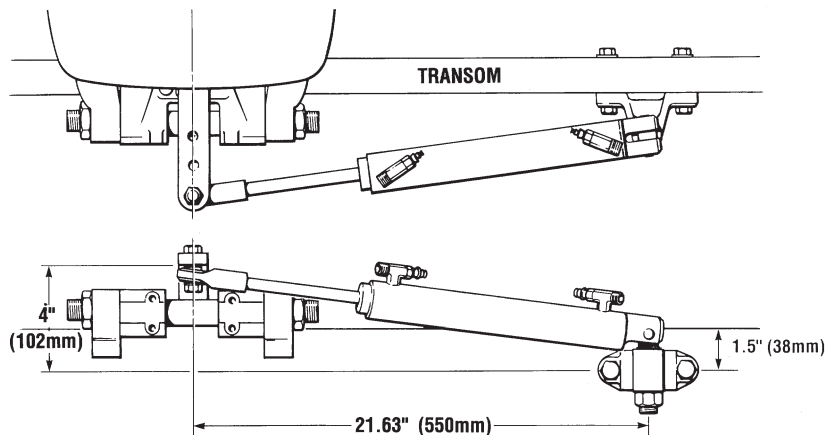
OUTBOARD-SPLASHWELL MOUNT

The splashwell mount cylinder (part no. HC5380) can be used on all engines complying with ABYC P17/NMEA/BIA standards provided they have a threaded attachment hole (3/8" – 24 UNF thread) in the steering arm. Not suitable for use on engines fitted with factory power steering.

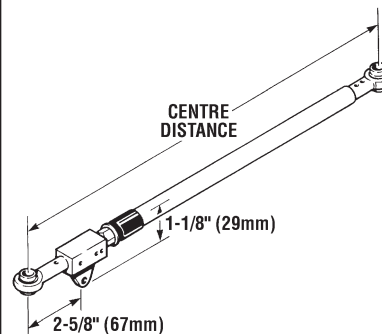
ENGINE/ CYLINDER CONFIGURATION	DESCRIPTION	QTY REQ	MODEL	PART NUMBER	REF. PAGE #
SINGLE ENGINE (SINGLE CYLINDER) APPLICATIONS UP TO 300 HP MAX NUMBER OF TURNS 5.5/6.5 	CYLINDER	1	SPLASHWELL	HC5380	
	HELM	1	* SEASTAR I- STANDARD	HH5271	9-6
	HOSE KIT	1	OUTBOARD HOSE	H051_ _	10-2
	OIL	3	SEASTAR OIL	HA5430	11-1
	FOR EXTRA STEERING STATIONS ADD:				
	HELM	1	* SEASTAR I- STANDARD	HH5271	9-6
	FITTING KIT	1	ADD A STATION	HF5501	10-10
	HOSE KIT	1	OUTBOARD HOSE	H051_ _	10-2
	OIL	1	SEASTAR OIL	HA5430	11-1
DUAL ENGINE (SINGLE CYLINDER) NON-COUNTER ROTATING APPLICATIONS UP TO 300 HP MAX COUNTER ROTATING ENGINE APPLICATIONS UP TO 600 HP MAX NUMBER OF TURNS 5.6/6.5 	CYLINDER	1	SPLASHWELL	HC5380	
	TIE BAR KIT	1	SPLASHWELL		
				MOUNT TIE BAR H05010	
	HELM	1	* SEASTAR I- STANDARD	HH5271	9-6
	HOSE KIT	1	OUTBOARD HOSE	H051_ _	10-2
	OIL	3	SEASTAR OIL	HA5430	11-1
	FOR EXTRA STEERING STATIONS ADD:				
	HELM	1	* SEASTAR I- STANDARD	HH5271	9-6
	FITTING KIT	1	ADD A STATION	HF5501	10-10
	HOSE KIT	1	OUTBOARD HOSE	H051_ _	10-2
	OIL	1	SEASTAR OIL	HA5430	11-1
OPTIONAL EQUIPMENT	BACK PLATE KIT		(FOR STANDARD HELMS)	HA5418	9-3
	20 DEGREE WEDGE		(FOR STANDARD HELMS)	HA5419	9-3
	AUTOPILOT FITTING KIT		(FOR ALL HELMS)	HF5501	10-10
	* TILT HELM- SEASTAR I			HH5741	9-7
	REAR MOUNT HELM- SEASTAR I			HH5261	9-7
	POWER ASSIST STEERING			PA1200	2-1

General Dimensions

Mounting Configuration



Tie Bar Kit# H05010

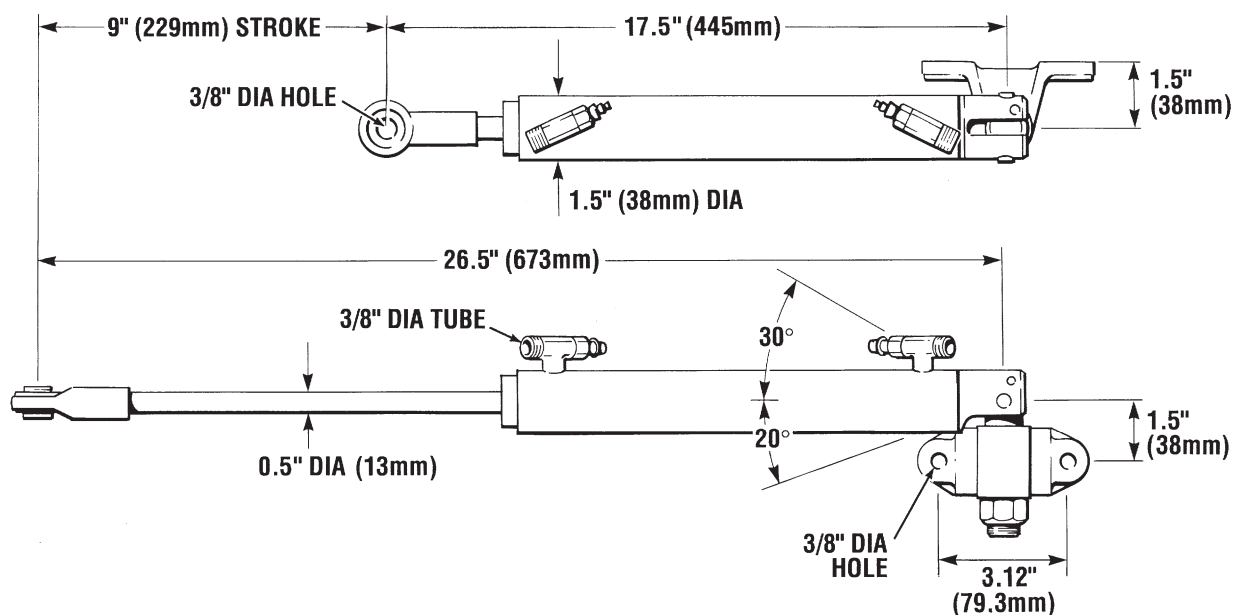


36" (914mm)	MAXIMUM ENGINE CENTRE DISTANCE
26" (660mm)	MINIMUM ENGINE CENTRE DISTANCE

PART# HC5380

NOTICE

DO NOT use a PRO Helm pump with this, or any other unbalanced steering cylinder.



Features

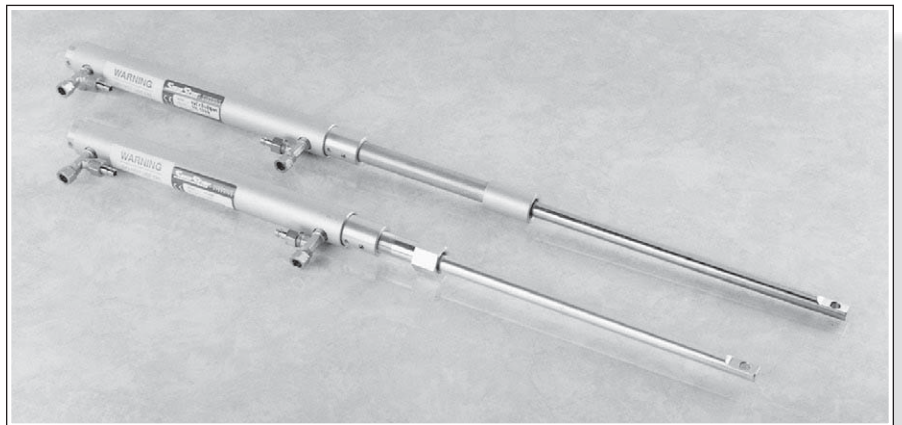
- Easy installation.
- Simple autopilot interface.
- Simple multiple steering station connection.

Applications

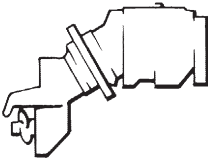
- Fits most power and non-power assist sterndrives.
- Single and multiple drives.

How to select a steering system for a stern drive

- 1) From the order guide on page 4-2 select the drive configuration based on the number of drives.
- 2) From the application guide on page 4-3 confirm that a cylinder is available for your specific make, model and year of drive unit. Select the cylinder that is appropriate for the drive.
- 3) From the order guide select the appropriate helm and accessory hardware. Note that two helm pumps of different displacements are available for power steered sterndrives. The displacement of the helm affects the number of turns lock to lock. Select the helm displacement on the basis of the desired steering response.
- 4) Select the appropriate tube or hose and fitting kits.
- 5) Confirm that sufficient space is available in the dash and engine compartments for the equipment.



Order Guide

SYSTEM CONFIGURATION	COMPONENT DESCRIPTION	QTY REQ	MODEL	PART #	PAGE REF #
SINGLE & DUAL STERNDRIVE (For dual sterndrive applications use engine manufactures supplied tie bar.) 	CYLINDER	1	SEE APPLICATION GUIDE		
	HELM	1	* SEASTAR I STANDARD (SEE NOTE 1)	HH5271	9-6
			** SEASTAR II-STANDARD (SEE NOTE 2)	HH5272	9-6
	OIL	3	SEASTAR OIL	HA5430	11-1
	TUBE/HOSE		SEE NOTE 3		10-6
	FOR EXTRA STEERING STATION ADD:				
	HELM	1	* SEASTAR I STANDARD (SEE NOTE 1)	HH5271	9-6
			** SEASTAR II-STANDARD (SEE NOTE 2)	HH5272	9-6
	FITTING KIT	1	ADD A STATION		
			- FOR SEASTAR I HELMS	HF5502	10-11
			- FOR SEASTAR II HELMS	HF5501	10-10
OPTIONAL EQUIPMENT	OIL	1	SEASTAR OIL		11-1
	EXTRA TUBE/HOSE		SEE NOTE 3		10-6
	BACK PLATE KIT		(FOR STANDARD HELMS)	HA5418	9-3
	20 DEGREE WEDGE KIT		(FOR STANDARD HELMS)	HA5419	9-3
	AUTOPILOT FITTING KIT		(FOR ALL HELMS)	HF5502	10-11
	* TILT HELM-SEASTAR I			HH5741	9-7
	REAR MOUNT HELM-SEASTAR I			HH5261	9-7
	** TILT HELM-SEASTAR II			HH5742	9-7
	REAR MOUNT HELM-SEASTAR I			HH5262	9-7
	POWER ASSIST STEERING			PA1200	2-1

1. Seastar I helms are the standard recommendation for both non-power and power steered applications.
2. Seastar II helms can be specified for power steered applications where faster steering response is desired. Review the application chart on page 4-3 for recommendations.
3. * **For Seastar I systems:** use 3/8" dia nylon tubing ref part No. HT5_ _ (Refer to page 10-6)

- * **For Seastar II systems:** Use the following option **A** or **B**
- A)** Outboard hose:
Hoses must be ordered in standard lengths. They cannot be cut to length. (Refer to page 10-2)
- B)** Copper tube:
3/8" diameter copper tube and hose kit part No. HF5508 (Refer to page 10-6)
4. For dual stern drives – use the tie bar supplied by the engine manufacturer.

NOTICE

These recommendations apply to factory stock stern drives only. Modified installations may require a higher capacity steering system. If in doubt, contact our technical service for assistance.

Application Guide



STERNDRIIVE STEERING

ENGINE MANUFACTURER	STEERING CONFIGURATION	ENGINE/DRIVE DESCRIPTION	YEAR	CYLINDER DESCRIPTION		NUMBER TURNS LOCK TO LOCK		NOTES
				MODEL No.	PART No.	SEASTAR I HELM	SEASTAR II HELM	
BMW	NON POWER ASSIST	ALL	TO DATE	BA125-8EMV	HC5330	4.9	N/A	1
	POWER ASSIST	ALL	TO DATE	125-8EM	HC5328	4.9/5.8	3.4/4.1	2
MERCRUISER	NON POWER ASSIST	MERCRUISER 1 ALPHA I BRAVO I BRAVO II BRAVO III	1983 & PRIOR 1984 TO DATE 1984 TO DATE 1984 TO DATE 1984 TO DATE	BA125-8EMV BA135-7EM BA135-7EM BA135-7EM BA135-7EM	HC5330 HC5332 HC5332 HC5332 HC5332	4.9 5.0 5.0 5.0 5.0	N/A 3.5 3.5 3.5 3.5	1,7 1,5,6,7 1,5,6,7 1,5,6,7 1,5,6,7
	POWER ASSIST	MERCRUISER I ALPHA I BRAVO I BRAVO II BRAVO III	1983 & PRIOR 1984 TO DATE 1984 TO DATE 1984 TO DATE 1984 TO DATE	125-8EM 125-8EM 125-8EM 125-8EM 125-8EM	HC5328 HC5328 HC5328 HC5328 HC5328	4.9/5.8 4.9/5.8 4.9/5.8 4.9/5.8 4.9/5.8	3.4/4.1 3.4/4.1 3.4/4.1 3.4/4.1 3.4/4.1	2 2 2 2 2,8
OMC	NON POWER ASSIST	400/800 SERIES COBRA KING COBRA	1985 & PRIOR 1986 TO DATE 1986 TO DATE	N/A BA150-7EM BA150-7EM	N/A HC5326 HC5326	N/A 6.0 6.0	N/A N/A N/A	1,4 1,4
	POWER ASSIST	400/800 SERIES COBRA KING COBRA	1985 & PRIOR 1986 TO DATE 1986 TO DATE	N/A 125-8EM 125-8EM	N/A HC5328 HC5328	N/A 4.9/5.8 4.9/5.8	N/A 3.4/4.1 3.4/4.1	2 2
VOLVO	NON POWER ASSIST	275 280 290 DIESEL	TO DATE TO DATE TO DATE TO DATE	BA150-7ATM BA135-7EM BA135-7EM BA135-7EM	HC5314 HC5332 HC5332 HC5332	6.0 5.0 5.0 5.0	N/A 3.5 3.5 3.5	1,7 1,5,6,7 1,5,6,7 1,5,6,7
	POWER ASSIST	275 280 290 DIESEL 32, DIESEL 41-42, DIESEL DPS & SX	TO DATE TO DATE TO DATE TO DATE 1997 TO DATE 1992 TO DATE 1996 TO DATE	N/A 125-8EM 125-8EM 125-8VEM 92-VPS 92-VPS 92-VPS	N/A HC5328 HC5328 HC5329 HC5331 HC5331 HC5331	N/A 4.8/5.8 4.8/5.8 4.9/5.8 4.8/5.5 4.8/5.8 4.8/5.5	N/A 3.4/4.1 3.4/4.1 3.4/4.1 3.4/4.1 3.4/4.1 3.4/4.1	2 2 2 2 2 2 2
YAMAHA	NON POWER ASSIST	ALL	1989 TO DATE	N/A	N/A	N/A	N/A	
	POWER ASSIST	ALL	1989 TO 1992	125-8EM	HC5328	4.9/5.8	3.4/4.1	2

1. Balanced system – ie: the number of turns lock to lock is equal port to starboard or vice-versa.
2. Unbalanced system – ie: the number of turns lock to lock is not equal port to starboard or vice-versa.
3. Requires additional clevis supplied by engine manufacturer. Reference Quicksilver part No. B98735A1. Refer to diagram on page 4-4.

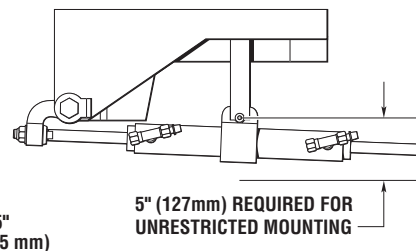
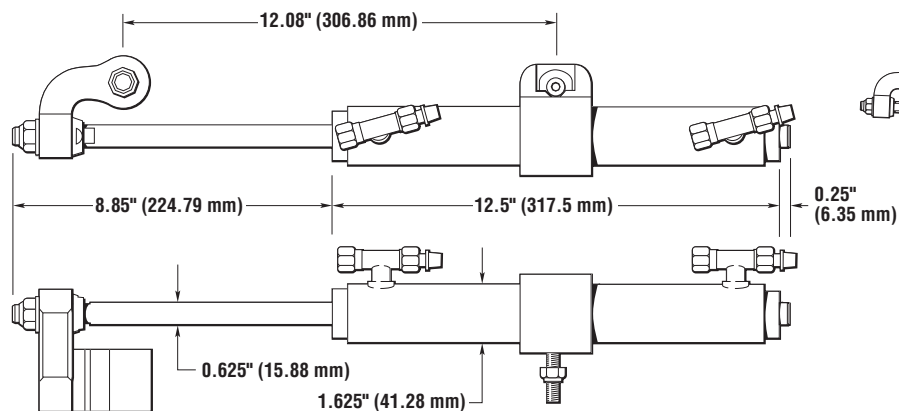
4. Requires cylinder rod end adapter HA5424 supplied by Teleflex Canada Limited Partnership. Refer to diagram on page 4-4.
5. **HC5332 replaces HC5326 as of January 2000.** If installing HC5326 additional clevis supplied by engine manufacturer required (part number B98735A1).

6. **The installation of the HC5332 sterndrive cylinder requires the use of SeaStar Outboard hose only. DO NOT use 3/8" copper or nylon tube.**
7. If engine outdrive is NOT equipped with a torque tab on the underside of the lower leg one must be installed to reduce prop torque.
8. Yanmar Engines using the Bravo III drives require the use of cylinder HC5326.

REVISION DATE: JANUARY 12TH 2004

General Dimensions

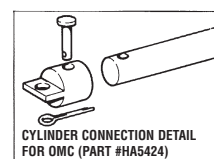
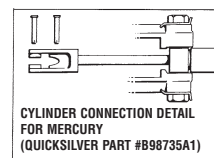
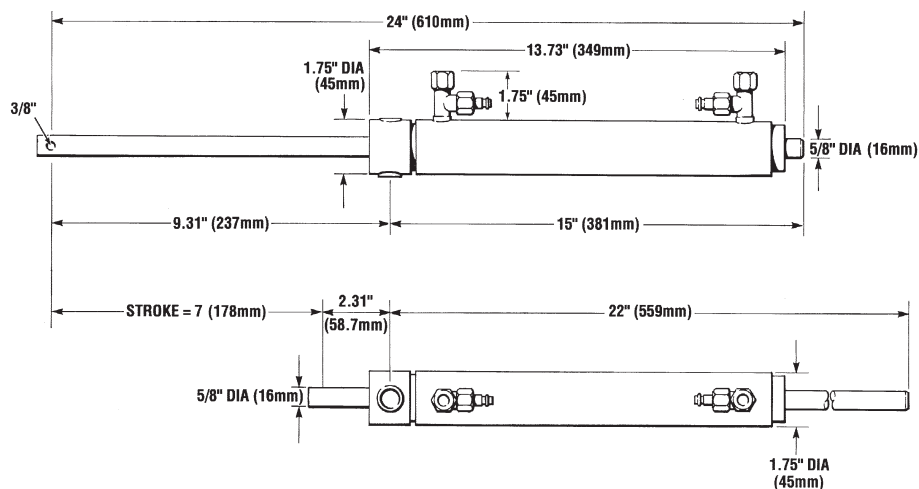
HC5332 135-7EM



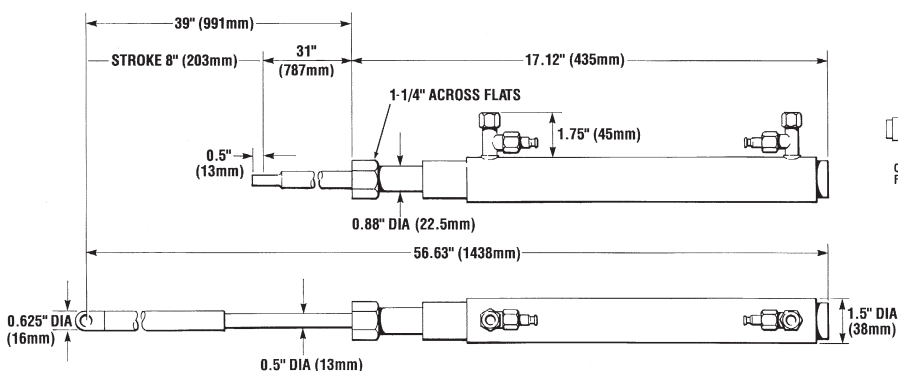
NOTICE

If engine outdrive is NOT equipped with a torque tab on the underside of the lower leg, one must be installed to reduce prop torque.

HC5326 BA150-7EM

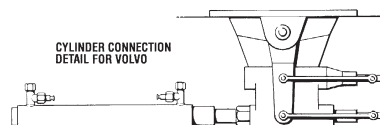
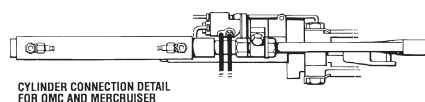


HC5328 125-8EM



NOTICE

DO NOT use a PRO Helm pump with this, or any other unbalanced steering cylinder.

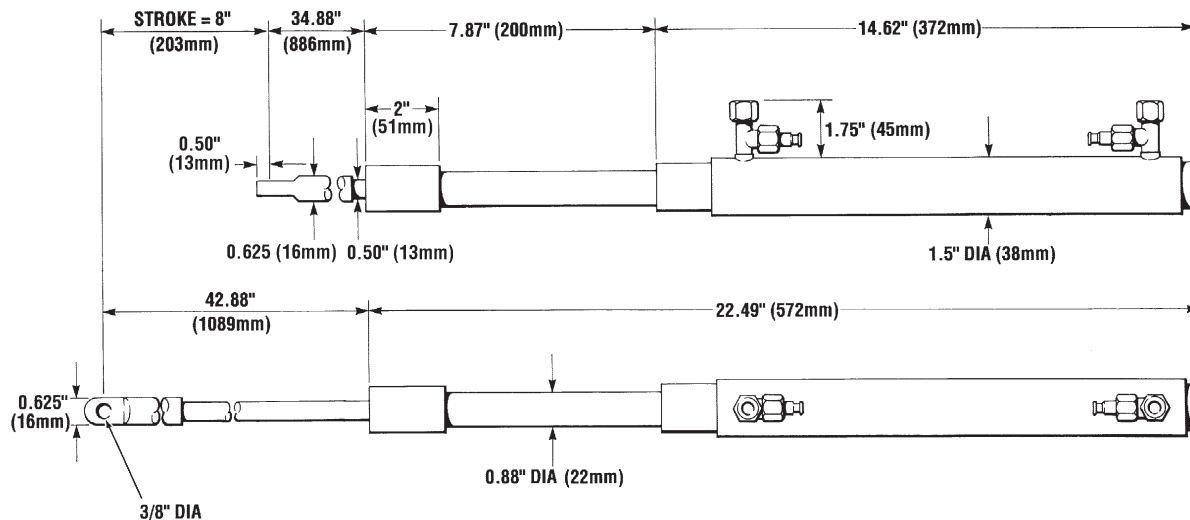


General Dimensions

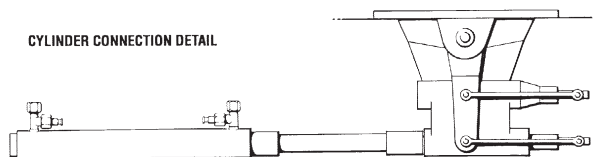
SeaStar®

STERNDRIIVE STEERING

HC5329 125-8VEM



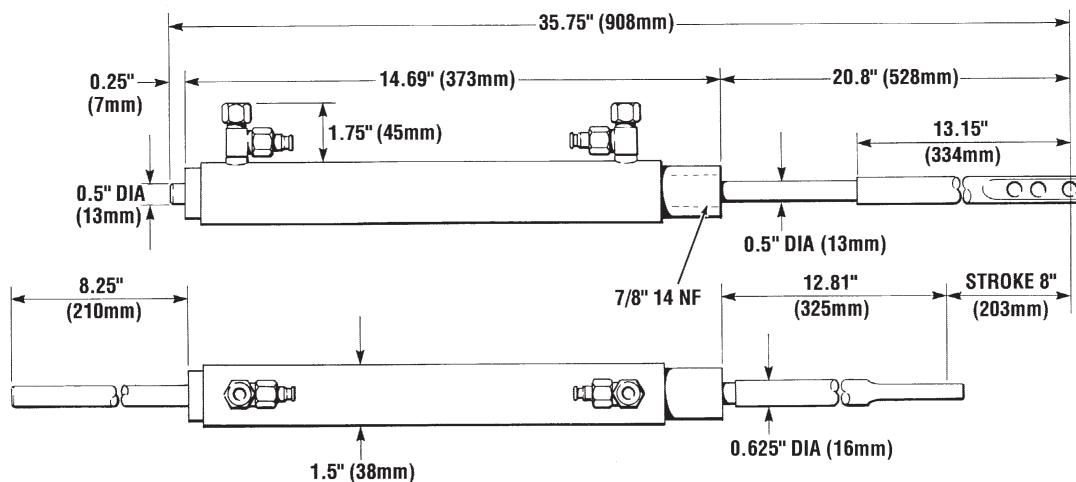
CYLINDER CONNECTION DETAIL



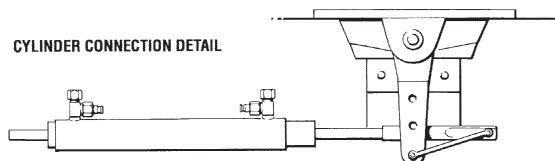
NOTICE

DO NOT use a PRO Helm pump with this, or any other unbalanced steering cylinder.

HC5330 BA125-8EMV

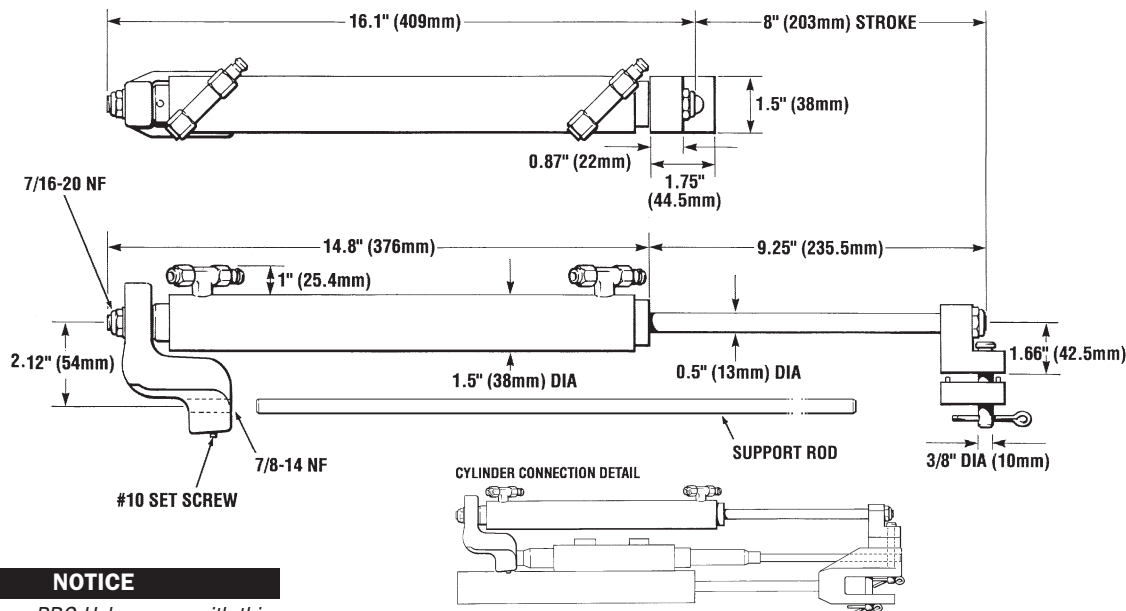


CYLINDER CONNECTION DETAIL



General Dimensions

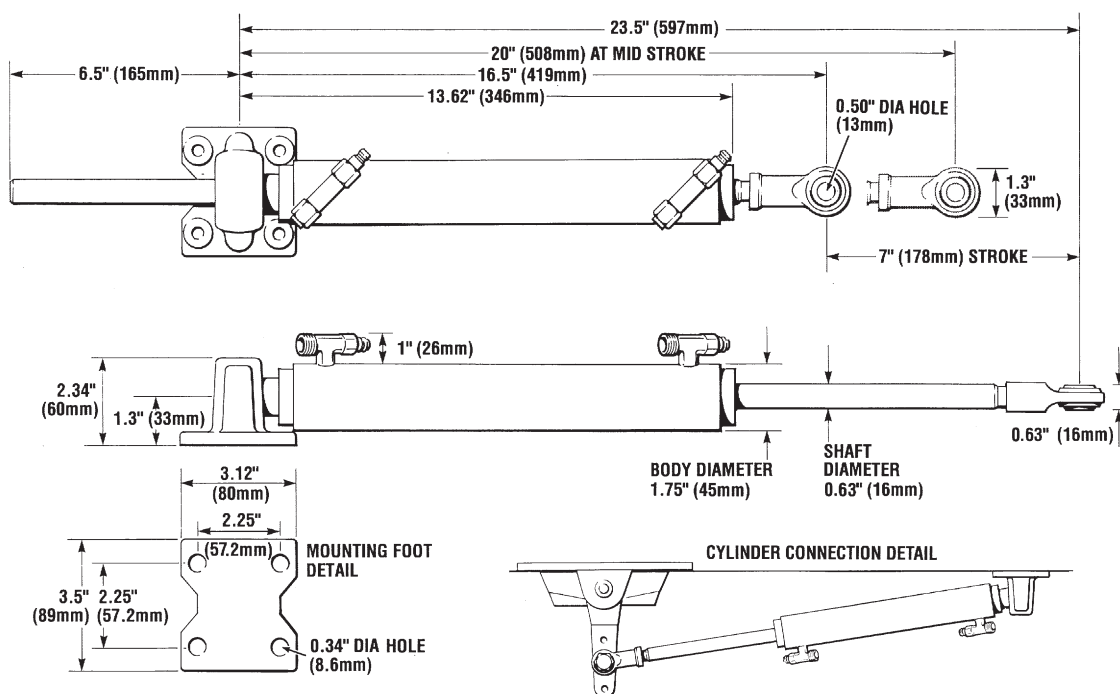
HC5331 92-VPS



NOTICE

DO NOT use a PRO Helm pump with this, or any other unbalanced steering cylinder.

HC5314 BA150-7ATM



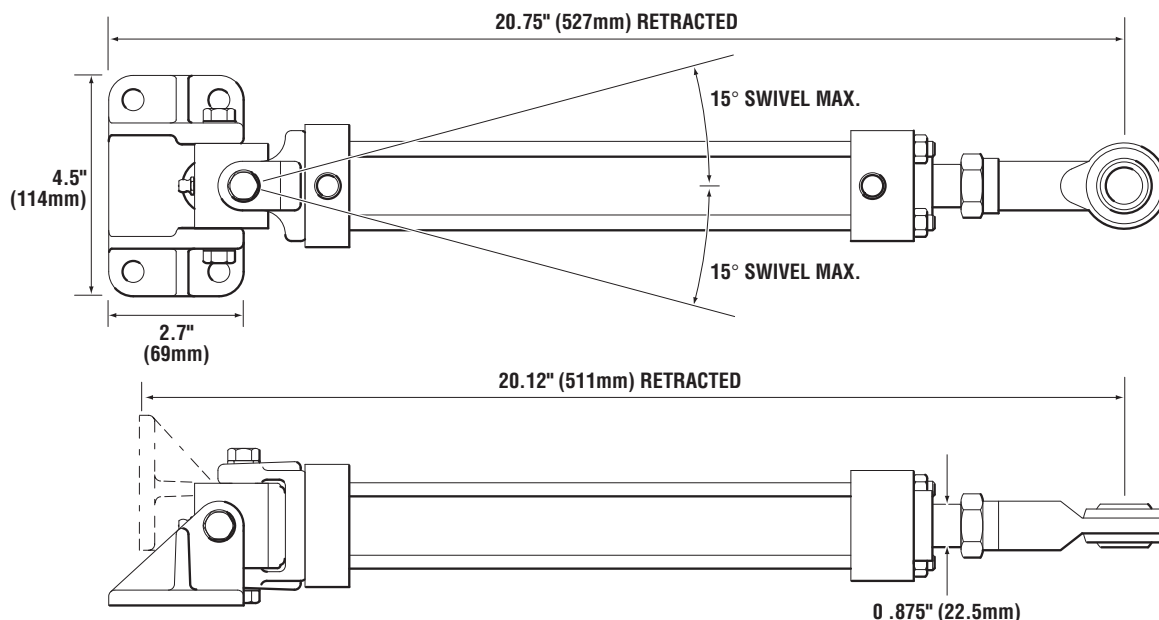
Performance I/O and Outboard Cylinders

The K-5-B cylinder was designed for inboard/outboard boats requiring external cylinders of substantial size and strength. The K-5 cylinders are nickel plated for aesthetics and protection against the elements. This cylinder does not include the wing plates or hardware required for mounting to the outdrive. Porting is through two through-transom 1/4" NPT ports located at the mounting end of the cylinder.

NOTICE

Due to the large volume of the K-5-B Cylinders, it is suggested that only Capilano and/or Hynautic H-40 series helms be used to retain a comfortable yet reasonable amount of wheel turns from hard over to hard over.

K-5-B



BORE	STROKE	DISP EXT.	DISP RET.
1.5" (38mm)	9" (229mm)	15.9cu in	10.5cu in

NOTICE

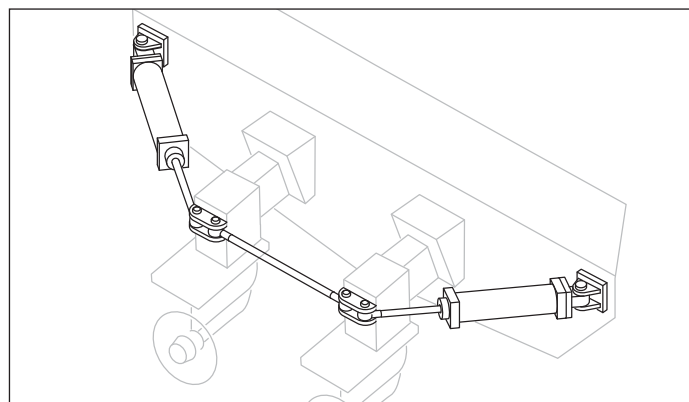
K-5 Cylinders are UN-balanced Cylinders, unequal amount of fluid on either side of the piston.

NOTICE

DO NOT use a PRO Helm pump with this, or any other unbalanced steering cylinder.

NOTICE

Teleflex does NOT make connecting hardware to attach this cylinder to the out drive.

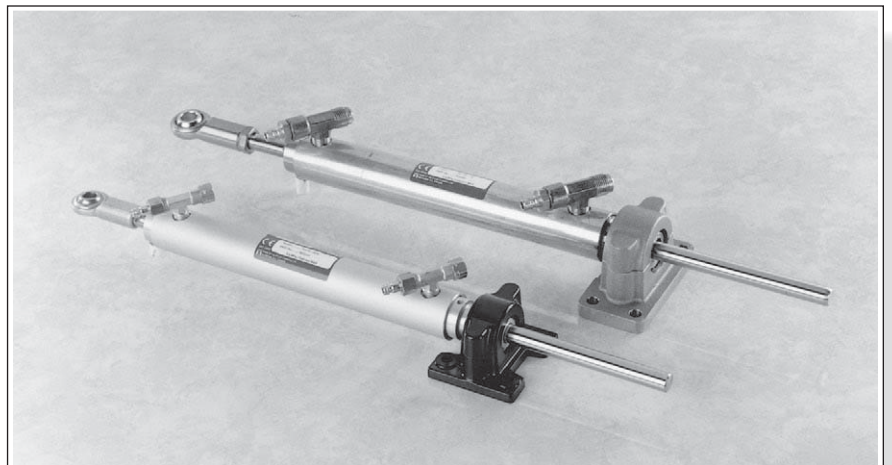


Features

- Regular duty aluminum cylinders.
- Heavy duty brass cylinders.
- Easy installation for single and dual rudder vessels.
- Cylinders supplied with bleeder fittings.
- Two axis articulation.
- Easy autopilot interface.

Four steps to select a steering system for an inboard powered boat

- 1) From the Application Guide on page 5-2 select the System Number appropriate for the vessel based on;
 - a) hull type - displacement or planing,
 - b) length of vessel,
 - c) number of rudders, and
 - d) usage of vessel.
- 2) From the Order Guide on page 5-2 select the appropriate helms and accessory hardware for each steering station.
- 3) From the Order Guide select the fitting and hose kits required for the installation.
- 4) Confirm that you have sufficient space available in;
 - a) the area the cylinder is to be mounted, and
 - b) the dash area for the steering components.



Application Guide

NOTICE

Want automotive type steering? Refer to page 2-1 for Power Assist Details.

BOAT LENGTH UP TO	PLANING HULL				DISPLACEMENT HULL				SAIL	
	SINGLE ENGINE		TWIN ENGINE		SINGLE ENGINE		TWIN ENGINE		SINGLE ENGINE	
	PLEASURE	WORK	PLEASURE	WORK	PLEASURE	WORK	PLEASURE	WORK	PLEASURE	WORK
26FT (8m)	1	4	1	4	2	4	2	4	4	4
32FT (10m)	2	4	1	4	3	4	3	4	4	4
38FT (11.5m)	3	5	2	5	5	5	3	5	4	5
44FT (13.5m)	5	-	3	5	-	-	5	-	5	-
50FT (15m)	-	-	5	-	-	-	-	-	-	-

a) Displacement Hull - maximum hull speed does not normally exceed 18 knots.
b) Planing Hull - maximum hull speed normally exceeds 18 knots.

ORDER GUIDE

COMPONENT DESCRIPTION	QTY REQ	MODEL	PART #	PAGE REF
1 4 TURNS LOCK TO LOCK				
HELM	1	* SEASTAR I- STANDARD	HH5271	9-6
CYLINDER	1	BA125 - 7ATM	HC5312-2	
OIL	3	SEASTAR OIL	HA5430	11-1
TUBE	1	3/8" DIA NYLON (NOTE 1 & 3)	HT5_ _	10-6
FOR EXTRA STEERING STATION ADD:				
HELM	1	* SEASTAR I- STANDARD	HH5271	9-6
FITTING KIT	1	ADD A STATION	HF5502	10-11
OIL	1	SEASTAR	HA5430	11-1
EXTRA TUBE		3/8" DIA NYLON (NOTE 1 & 3)		10-6

COMPONENT DESCRIPTION	QTY REQ	MODEL	PART #	PAGE REF
4 4-1/4 TURNS LOCK TO LOCK				
HELM	1	** SEASTAR II- STANDARD	HH5272	9-6
CYLINDER	1	BA150 - 7TM	HC5318	
OIL	3	SEASTAR OIL	HA5430	11-1
HOSE KIT	1	HOSE KIT	HF5508	10-12
COPPER TUBE		3/8" DIA.(NOTE 2 & 3)		10-6
FOR EXTRA STEERING STATION ADD:				
HELM	1	** SEASTAR II- STANDARD	HH5272	9-6
FITTING KIT	1	ADD A STATION	HF5502	10-11
OIL	1	SEASTAR	HA5430	11-1
EXTRA TUBE		AS ABOVE (NOTE 2 & 3)		10-6

2 5 TURNS LOCK TO LOCK				
HELM	1	* SEASTAR I- STANDARD	HH5271	9-6
CYLINDER	1	BA135 - 7ATM	HC5313	
OIL	3	SEASTAR OIL	HA5430	11-1
TUBE	1	3/8" DIA NYLON (NOTE 1 & 3)	HT5_ _	10-6
FOR EXTRA STEERING STATION ADD:				
HELM	1	* SEASTAR I- STANDARD	HH5271	9-6
FITTING KIT	1	ADD A STATION	HF5502	10-11
OIL	1	SEASTAR	HA5430	11-1
EXTRA TUBE		3/8" DIA NYLON (NOTE 1 & 3)		10-6

5 5-1/2 TURNS LOCK TO LOCK				
HELM	1	** SEASTAR II- STANDARD	HH5272	9-6
CYLINDER	1	BA175 - 7TM	HC5319	
OIL	3	SEASTAR OIL	HA5430	11-1
HOSE KIT	1	HOSE KIT	HF5508	10-12
COPPER TUBE		3/8" DIA.(NOTE 2 & 3)		10-6
FOR EXTRA STEERING STATION ADD:				
HELM	1	** SEASTAR II- STANDARD	HH5272	9-6
10-11 OIL	1	SEASTAR	HA5430	11-1
EXTRA TUBE		AS ABOVE (NOTE 2 & 3)		10-6

3 6 TURNS LOCK TO LOCK				
HELM	1	* SEASTAR I- STANDARD	HH5271	9-6
CYLINDER	1	BA150 - 7ATM	HC5314	
OIL	3	SEASTAR OIL	HA5430	11-1
TUBE	1	3/8" DIA NYLON (NOTE 1 & 3)	HT5_ _	10-6
FOR EXTRA STEERING STATION ADD:				
HELM	1	* SEASTAR I- STANDARD	HH5271	9-6
FITTING KIT	1	ADD A STATION	HF5502	10-11
OIL	1	SEASTAR	HA5430	11-1
EXTRA TUBE		3/8" DIA NYLON (NOTE 1 & 3)		10-6

OPTIONAL EQUIPMENT			
BACK PLATE KIT (FOR STANDARD HELMS)	HA5418	9-3	
20 DEGREE WEDGE KIT (FOR STANDARD HELMS)	HA5419	9-3	
AUTOPILOT FITTING KIT (FOR ALL HELMS)	HF5502	10-11	
* TILT HELM-SEASTAR I	HH5741	9-7	
REAR MOUNT HELM-SEASTAR I	HH5261	9-7	
** TILT HELM-SEASTAR I	HH5742	9-7	
REAR MOUNT HELM-SEASTAR I	HH5262	9-7	
POWER ASSIST STEERING	PA1200	2-1	

1. For systems 1, 2 & 3 - nylon tubing (3/8" dia.) is the standard requirement for plumbing the system. Copper tubing (3/8" dia.) can be substituted but Fitting Kit HF5507 is required. (Refer to page 10-12).

2. For systems 4 & 5 - copper tubing (3/8" dia.) is the standard requirement for plumbing the system. Fitting Kit HF5508 is required. (Refer to page 10-12).

3. For systems 1, 2, 3, 4, & 5 Seastar outboard hose can be substituted for nylon or copper tube. These hoses must be ordered in standard lengths. They cannot be cut to length. (Refer to page 10-2).

NOTICE

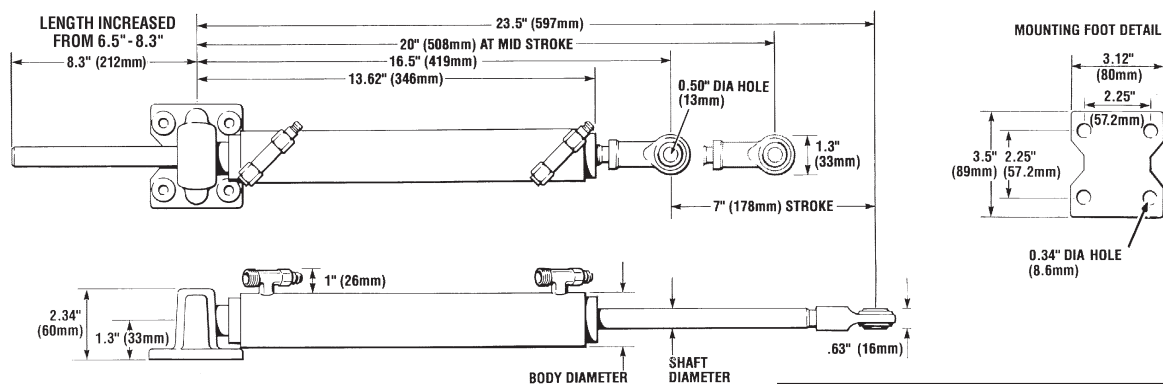
If your vessel is beyond system 1 to 5, please go to page 7-1 for SeaStar Power Steering Systems.

General Dimensions–SeaStar

SeaStar®

INBOARD STEERING

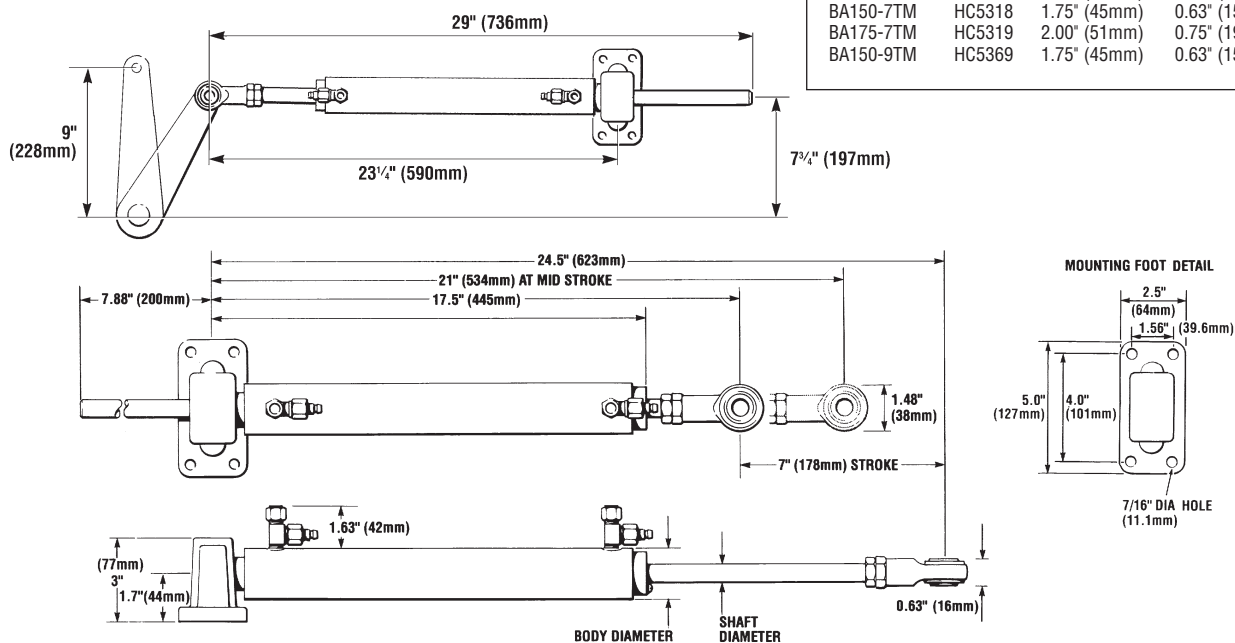
ATM CYLINDERS (ALUMINUM): HC5312-2/ HC5313/ HC5314



CYLINDER DIMENSIONS SPECIFIC TO MODEL

CYLINDER MODEL	PART #	BODY DIAMETER	SHAFT DIAMETER
BA125-7ATM	HC5312	1.38" (35mm)	0.50" (12.7mm)
BA135-7ATM	HC5313	1.50" (38mm)	0.63" (15.9mm)
BA150-7ATM	HC5314	1.75" (45mm)	0.63" (15.9mm)
BA150-7TM	HC5318	1.75" (45mm)	0.63" (15.9mm)
BA175-7TM	HC5319	2.00" (51mm)	0.75" (19.1mm)
BA150-9TM	HC5369	1.75" (45mm)	0.63" (15.9mm)

TM CYLINDERS (BRASS): HC5318/ HC5319/HC5369

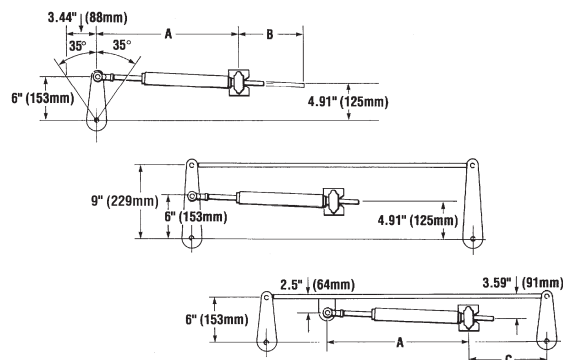


CYLINDER MOUNTING CONFIGURATIONS

MOUNTING CONFIGURATION DIMENSIONS

CYLINDER MODEL	PART #	A	B	C
BA125-7ATM	HC5312	20" (508)	6.5" (165)	8.5" (216)
BA135-7ATM	HC5313	20" (508)	6.5" (165)	8.5" (216)
BA150-7ATM	HC5314	20" (508)	6.5" (165)	8.5" (216)
BA150-7TM	HC5318	21" (534)	8" (204)	10" (254)
BA175-7TM	HC5319	21" (534)	8" (204)	10" (254)
BA150-9TM	HC5369	21" (534)	8" (204)	10" (254)

Figures in parenthesis are in millimetres

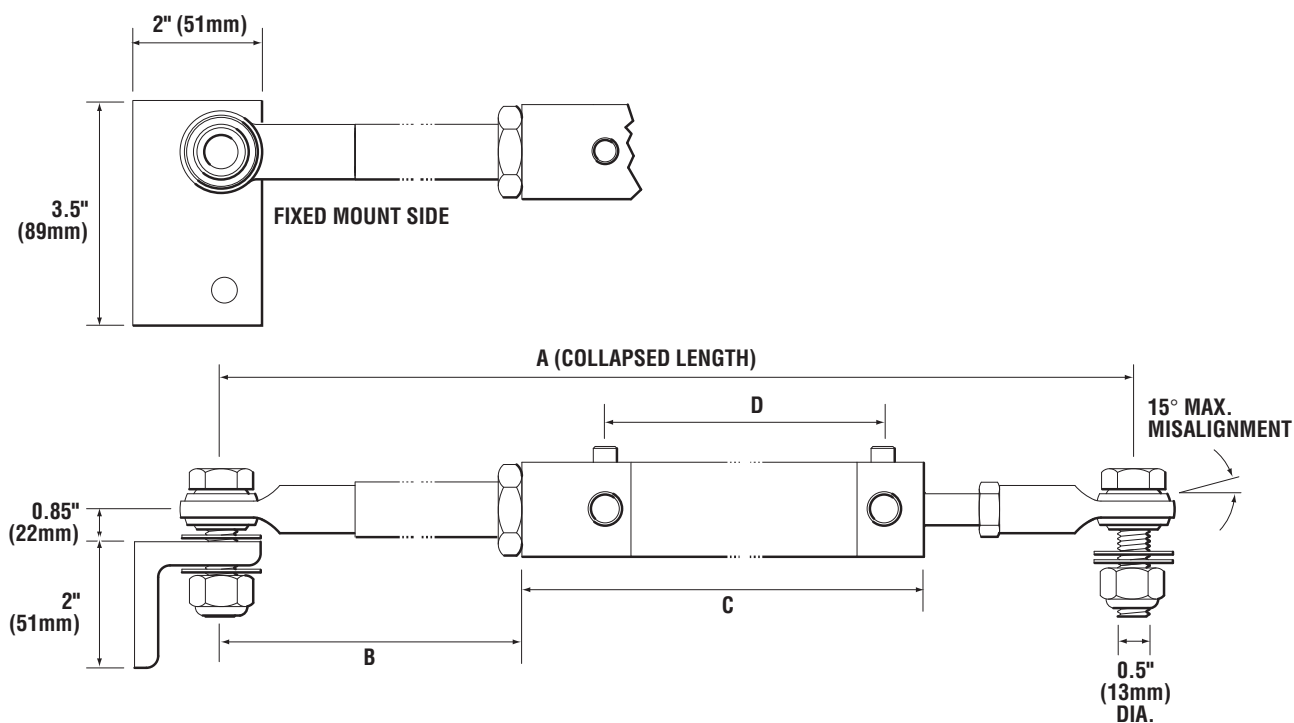


General Dimensions–Hynautic

Universal Mount Cylinders K-18/K-19

The K-18 and K-19 balanced cylinders are double rod ended, each end held in place with internal wire ties. Every cylinder is equipped with a swivel joint at each end. One provides for a fixed mount attachment point at the end of the housing to protect the moving rod. The other swivel joint, located at the rod end, allows for free movement of the cylinder without binding when attached to the rudder arm.

K-18 & K-19



CYL MODEL	A	B	C	DIMENSIONS D	BORE	STROKE	DISP
K-18	24.5" (662mm)	9.31" (237mm)	11.75" (299mm)	9.875" (251mm)	1.25" (32mm)	7" (178mm)	7cu in
K-19	28.5" (724mm)	11.31" (287mm)	13.75" (350mm)	11.875" (302mm)	1.25" (32mm)	9" (229mm)	9cu in

Above cylinders can be used on the following boats:

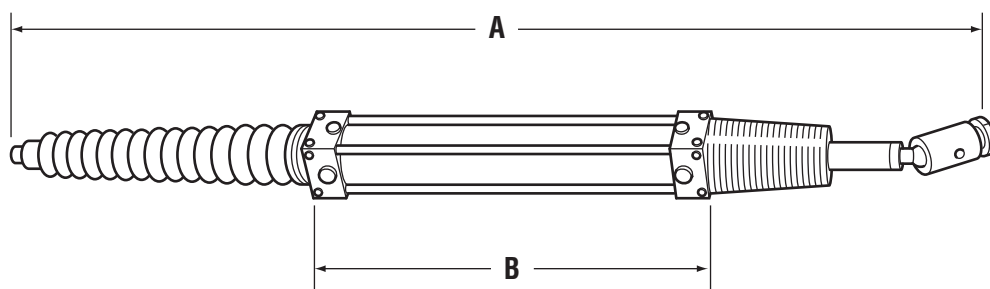
K-18 = ALL System #1 as noted on page 5-2.

K-19 = ALL Systems #1 through #3 as noted on page 5-2.

Fixed Mount and Pivot Mount models: K-22, K-27 and K-31

These Brass cylinders are for larger boats up to approximately 70 ft. Tubes, ends, and external rods are brass: cylinder rods are 17-4 stainless steel: mounts are manganese bronze. There are two different types of mounting packages for Brass cylinders: fixed mount and pivot mount.

K-22 & K-27

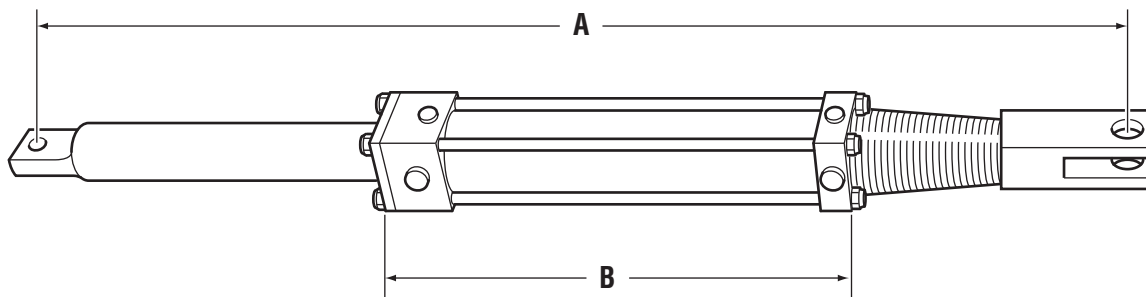


CYL MODEL	DIMENSIONS		BORE	STROKE	DISP
	A	B			
K-22	*34.12" (867mm)	13.25" (337mm)	1.5" (38mm)	10" (254mm)	13.20cu in
K-27	*36.75" (934mm)	13.25" (337mm)	1.5" (38mm)	10" (254mm)	13.20cu in

**Dimensions are with the cylinder rod centered.*

For use in Systems #3 through #4 as noted on page 5-2.

K-31



CYL MODEL	DIMENSIONS		BORE	STROKE	DISP
	A	B			
K-31	*38.37" (975mm)	14.12" (359mm)	2.0" (51mm)	10" (254mm)	25.5cu in

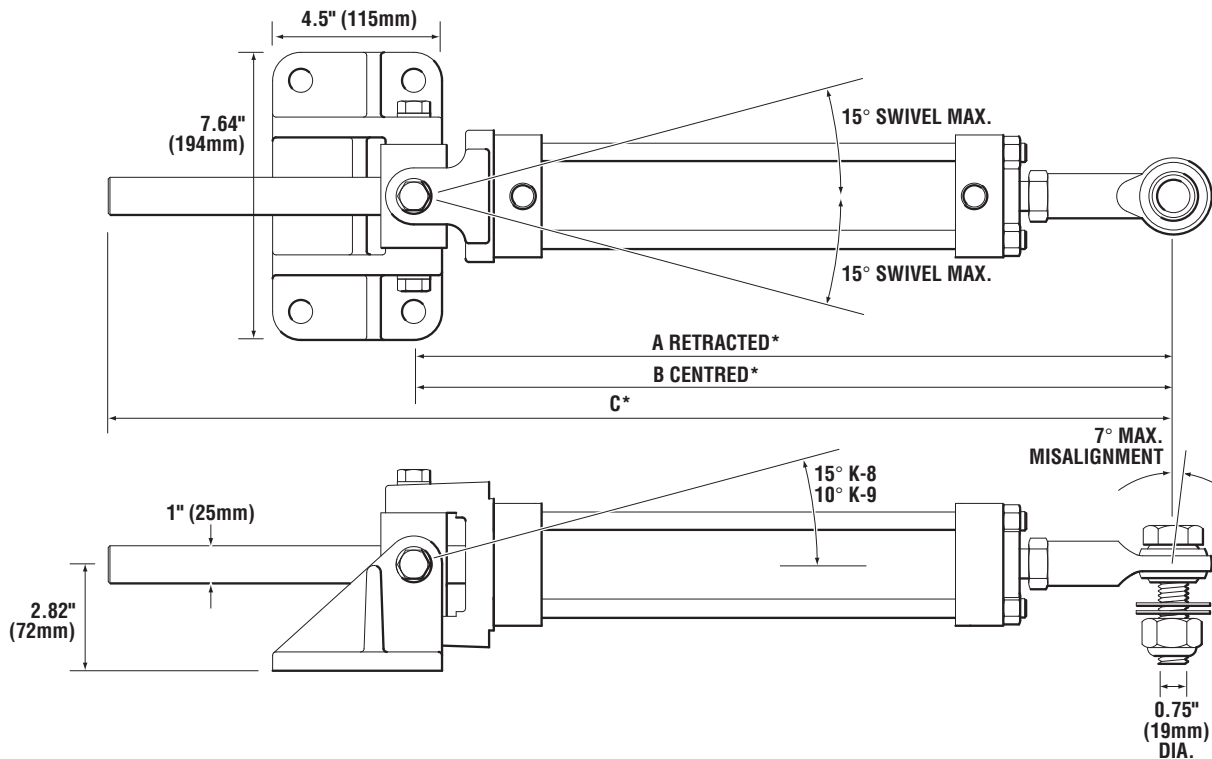
**Dimensions are with the cylinder rod centered.*

For use in System #5 as noted on page 5-2.

Large I/B Cylinders K-8/K-9

The K-8 and K-9 cylinders are double rod end, tie rod constructed hydraulic cylinders. Each has a universal mount, which allows two planes of pivot freedom. Each cylinder is equipped with a stainless steel ball joint. Porting is through two 1/4" NPT ports at each end of the cylinder.

K-8 & K-9



CYL MODEL	A*	B*	DIMENSIONS C*	BORE	STROKE	DISP
K-8	19.74" (502mm)	24.47" (622mm)	27.92" (710mm)	2.5" (64mm)	9.5" (242mm)	39.2cu in
K-9	24.74" (629mm)	31.99" 813(mm)	37.92" (962mm)	2.5" (64mm)	14.5" (369mm)	59.8cu in

* Clevis option increases length by 0.44" (12mm)



HYNAUTIC 3-LINE INBOARD STEERING

Introduction

SeaStar offers rugged 3-line Hynautic Heavy Duty steering systems for most work and pleasure vessels up to 70 feet.

Heavy Duty helms combine one or two bi-directional axial piston pumps with pilot check and make-up check valving. The result is a unit which prevents rudder feedback, is very efficient (even at low RPM), and is immediately adaptable to multi-station use.

A wide choice of helm displacements and cylinder configurations make it easy to spec a system which can handle a variety of large boat performance requirements and accommodate most user preferences.

Features

- Low friction heavy duty hydraulic steering.
- Helm/cylinder combinations for most inboards. Marine grade materials.
- Heavy duty helms available in three displacements, to accommodate most applications and user preferences.
- Helms available with 1" straight shaft or 3/4" tapered. Mount facing any direction.
- Quick air purge relief valve.
- Fluid fill at remote reservoir.
- Heavy duty brass cylinders. Two-axis articulation. Easy installation for single or dual rudder vessels.
- Meets or exceeds applicable standards.
- Accepts most steering wheels.

How to Spec a System

- 1 From the application guide select components appropriate for the vessel based on:
 - a) hull type—displacement or planing
 - b) length of vessel, and
 - d) number of steering wheel turns desired
- 2 Select the fitting and hose kits required, based on type of plumbing (1/2" or 5/8" tubing or hose) and based on number of steering stations.
- 3 Confirm that there is sufficient space available in the dash and engine compartment(s) for the steering components. Refer to helm and cylinder dimensions on page 9-8 and page 5-4.

Components

H-21	Hynautic 2.75 cu. in. helm (1" straight shaft) or
H-25	Hynautic 2.75 cu. in. helm (3/4" tapered shaft) or
H-42	Hynautic 4.0 cu. in. helm (1" straight shaft) or
H-42-02	Hynautic 4.0 cu. in. helm (3/4" tapered shaft) or
H-41	Hynautic 5.5 cu. in. helm (1" straight shaft) or
H-41-02	Hynautic 5.5 cu. in. helm (3/4" tapered shaft) or (See application guide page 6-3.)
HF-10	H-20 Fittings Kit for Main Station
HF-21	H-40 Fittings Kit for Main Station
HC53__ or K-__	Inboard Cylinder (See application guide page 6-3. 1 or 2 required.)
R06	Reservoir - Standard (2 quart)
MSV-21	Relief Valve (950 PSI)
MSVF-07	Relief Fittings (1150 & 1175-21-1)
MSVF-13	Relief Fittings (1175-42-1 & up)
1/2" or 5/8" OD Copper Tubing	(See application guide page 6-3.)
HF5590	Fitting Kit (for 1/2" Copper Tubing) or
HF5592	Fitting Kit (for 5/8" Copper Tubing) (See application guide page 6-3. These fitting kits are for one steering station, purchase add-a-station kit for 2nd station.)
HA5731	Hose Kit for Copper Tubing (2 hoses) Contains two 18" (.45m) hoses for single-cylinder installations.
HA5440	SeaStar Oil (1 Gallon) (Other fittings may be required. Contact Teleflex Canada.)

Options

K-31	Pivot Mount Inboard Cylinder (K-31 can be used in place of HC5378 or HC5379, see application chart page 6-3 for details.)
HA5732	Dual Cylinder Hose 2' (.6m)
HA5733	Dual Cylinder Hose 3' (.9m)
HA5734	Dual Cylinder Hose 4' (1.2m)
HA5735	Dual Cylinder Hose 5' (1.5m)
HA5736	Dual Cylinder Hose 6' (1.8m) These hoses are sold individually (four are required for dual cylinder installations).
R07	Reservoir (2 quart, with hand pump)
R11	Reservoir (1 quart, with hand pump)
R12	Reservoir (2 quart)
MSV-19	Relief Valve (500 PSI)
RV-55	Reservelvalve (500 PSI, top read, 3/8)
RV-55P	Reservelvalve (500 PSI, top read, 3/8, w/pump)
RV-57	Reservelvalve (500 PSI, top read, 5/16, w/pump)
RV-60	Reservelvalve (950 PSI, top read, 5/16)
RV-67	Reservelvalve (950 PSI, frt.read, 5/16, w/pump)
HF-11	H-20 Fittings Kit for Second Station
HF-22	H-40 Fittings Kit for Second Station

Hynautic 3-Line Inboard Steering Application Guide

VESSEL SIZE	HELM PUMP	WHEEL TURNS	CYLINDER MODEL	TUBING DIAMETER		MAX HP or AREA
				CYL. TO FARTHEST HELM		
				<40'	>40'	
Planing Hulls:						
35–50' (11–15m)	H-21 or H-25	5.0	HC5350 or HC5356	1/2"	5/8"	450 HP
40–50' (12–15m)	H-21 or H-25	6.8	HC5351 or HC5357	1/2"	5/8"	750 HP
40–50' (12–15m)	H-42	4.7	HC5351 or HC5357	1/2"	5/8"	750 HP
45–60' (14–18m)	H-42	7.4	HC5378 or HC5379	1/2"	5/8"	950 HP
45–60' (14–18m)	H-41	5.4	HC5378 or HC5379	1/2"	5/8"	950 HP
55–65' (17–20m)	H-41	5.4	HC5378 or HC5379	1/2"	5/8"	1200 HP
To 70' (To 21m)	H-41	10.8	2 x HC5378 or HC5379	1/2"	5/8"	1500 HP
To 70' (To 21m)	H-41	14.2	2 x K-8	1/2"	5/8"	1500 HP
Displacement Hulls—Tug Boats, Net Haulers:						
To 30' (To 9m)	H-21 or H-25	5.0	HC5350 or HC5356	1/2"	5/8"	200 HP
30–35' (9–11m)	H-21 or H-25	6.8	HC5351 or HC5357	1/2"	5/8"	250 HP
30–35' (9–11m)	H-42	4.7	HC5351 or HC5357	1/2"	5/8"	250 HP
26–40' (8–12m)	H-42	7.4	HC5378 or HC5379	1/2"	5/8"	400 HP
26–40' (8–12m)	H-41	5.4	HC5378 or HC5379	1/2"	5/8"	400 HP
30–45' (9–14m)	H-41	5.4	HC5378 or HC5379	1/2"	5/8"	150 HP
To 50' (To 15m)	H-41	10.8	2 x HC5378 or HC5379	1/2"	5/8"	500 HP
To 50' (To 15m)	H-41	14.2	2 x K-8	1/2"	5/8"	500 HP
To 50' (To 15m)	H-41	20.0	2 x K-9	1/2"	5/8"	500 HP
Displacement Hulls—Work and Pleasure Boats:						
To 40' (To 12m)	H-21 or H-25	5.0	HC5350 or HC5356	1/2"	5/8"	300 HP
40–45' (12–14m)	H-21 or H-25	6.8	HC5351 or HC5357	1/2"	5/8"	350 HP
40–45' (12–14m)	H-42	4.7	HC5351 or HC5357	1/2"	5/8"	350 HP
40–55' (12–17m)	H-42	7.4	HC5378 or HC5379	1/2"	5/8"	500 HP
40–55' (12–17m)	H-41	5.4	HC5378 or HC5379	1/2"	5/8"	500 HP
45–65' (14–20m)	H-41	5.4	HC5378 or HC5379	1/2"	5/8"	650 HP
To 75' (To 32m)	H-41	10.8	2 x HC5378 or HC5379	1/2"	5/8"	750 HP
To 75' (To 32m)	H-41	14.2	2 x K-8	1/2"	5/8"	750 HP
Sail Boats—Skeg Rudder:						
To 40' (To 12m)	H-21 or H-25	5.0	HC5350 or HC5356	1/2"	5/8"	9' (.9m)
40–45' (12–14m)	H-21 or H-25	6.8	HC5351 or HC5357	1/2"	5/8"	10' (1m)
40–45' (12–14m)	H-42	4.7	HC5351 or HC5357	1/2"	5/8"	10' (1m)
40–52' (12–16m)	H-42	7.4	HC5378 or HC5379	1/2"	5/8"	17' (1.6m)
40–52' (12–16m)	H-41	5.4	HC5378 or HC5379	1/2"	5/8"	17' (1.6m)
50–60' (15–18m)	H-41	5.4	HC5378 or HC5379	1/2"	5/8"	18' (1.7m)
To 65' (To 20m)	H-41	10.8	2 x HC5378 or HC5379	1/2"	5/8"	20' (1.9m)
To 65' (To 20m)	H-41	14.2	2 x K-8	1/2"	5/8"	20' (1.9m)
Sail Boats—Spade Rudder:						
To 40' (To 12m)	H-21 or H-25	5.0	HC5350 or HC5356	1/2"	5/8"	7' (.6m)
40–45' (12–14m)	H-21 or H-25	6.8	HC5351 or HC5357	1/2"	5/8"	8' (.7m)
40–45' (12–14m)	H-42	4.7	HC5351 or HC5357	1/2"	5/8"	8' (.7m)
35–46' (11–14m)	H-42	7.4	HC5378 or HC5379	1/2"	5/8"	15' (1.4m)
35–46' (11–14m)	H-41	5.4	HC5378 or HC5379	1/2"	5/8"	15' (1.4m)
40–50' (12–15m)	H-41	5.4	HC5378 or HC5379	1/2"	5/8"	15.5' (1.4m)
To 60' (To 18m)	H-41	10.8	2 x HC5378 or HC5379	1/2"	5/8"	16.5' (1.5m)
To 60' (To 18m)	H-41	14.2	2 x K-8	1/2"	5/8"	16.5' (1.5m)

Helm Options

Four helms are offered in 3 displacements, as noted in the chart at right. The H-21 helm has a 1" straight wheel shaft; H-25 has a 3/4" tapered shaft. The H-42 and H-41 helms both have a 1" straight wheel shaft.

HELM PART#	DISPLACEMENT RANGE	RELIEF VALVE SETTING
H-21	2.75 cu.in.	950 psi (66Bar)
H-25	2.75 cu.in.	950 psi (66Bar)
H-42	4.00 cu.in.	950 psi (66Bar)
H-41	5.50 cu.in.	950 psi (66Bar)

Tubing/Hose Options

Use soft refrigeration type copper tubing for optimum performance. For tube-to-cylinder flex hoses, select a hydraulic hose rated for 1000 PSI (70 bar) working pressure, and with a very low volumetric expansion rating.

HELM TYPE	DISTANCE—CYLINDER TO FURTHEST HELM	
	40 FEET OR LESS	MORE THAN 40 FEET
All	1/2" O.D. Copper Tubing	5/8" O.D. Copper Tubing

Cylinder Options

Cylinders are made from brass & stainless steel. Available with stainless rod & ball joint (TMB models) or stainless rod & bronze clevis (TMC models.) Cylinders with ball joints have 2-axis articulation.

The K-31 is an optional pivot mount cylinder which can be used in the systems numbered "8a" and "8b" on the opposite page. With this cylinder, the number of wheel turns becomes 6.4 (using the H-42 helm) or 4.6 (H-41 helm).

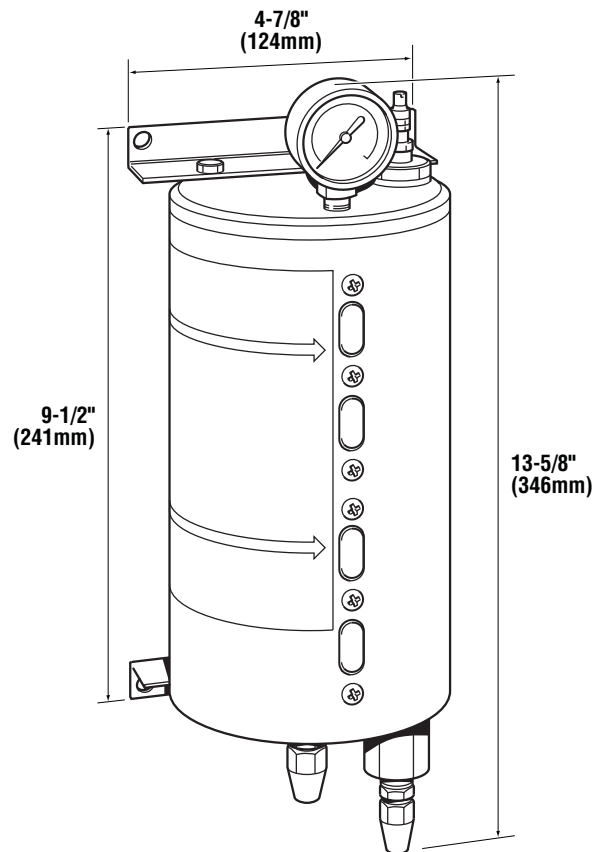
MODEL	PART#	DESCRIPTION / MODEL / ROD END CONFIG
7" Stroke:	HC5350	Cylinder BA175-7TMB (Rod End Ball Joint)
	HC5356	Cylinder BA175-7TMC (Rod End Clevis)
	HC5351	Cylinder BA200-7TMB (Rod End Ball Joint)
	HC5357	Cylinder BA200-7TMC (Rod End Clevis)
9.5" Stroke:	K-8	Hynautic Cylinder, 2.5" (Rod End Ball Joint)
11" Stroke:	HC5378	Cylinder BA200-11TMB (Rod End Ball Joint)
	HC5379	Cylinder BA200-11TMC (Rod End Ball Clevis)

NOTICE

The application guide on page 6-3 should be used with discretion. The chart is only a guide to selecting a steering system. A steering system manufacturer cannot anticipate all the variables in boat-rudder design that affect the steering loads. It is the final responsibility of the boat builder/designer to specify maximum expected steering loads. If the required information is not available, please see the Displacement and Planning Hull data sheets on page 10-21 and page 10-22. These sheets after being completely filled out can be faxed to Teleflex Technical Support at 604-279-2202.

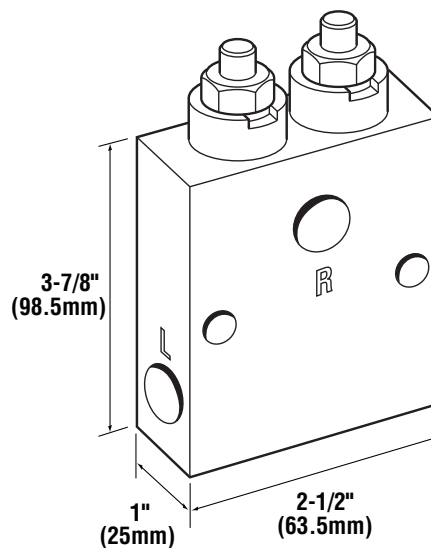
Reservoir Part# R-06

Capacity = 2 quarts.



Relief Valve Part# MSV-21

Relief Pressure factory set to 950psi.



Hynautic Seal Kits

Helms

SEAL KIT#	DESCRIPTION
HS-01	H-20 Series Helms, 1978 and earlier
HS-02	H-20 and H-30 Series Helms, 1979 and later
HS-03	H-40 Series Helms, 1978 and earlier
HS-04	H-40 Series Helms, 1979 and later
HS-05	H-50 Series Helms
HS-06	H-60 Series Helms
HS-08	H-80 Series Helms, before date code 8000
HS-09	H-80 Series Helms, after date code 8000
HS-10	H-100 and H-200 Series Helm Pumps

Cylinders

SEAL KIT#	DESCRIPTION
KS-01	K-11 thru K-17
KS-02	K-18 thru K-20
KS-03	K-02, H1010 (old style)
KS-04	K-21 thru K-29 (prior to Aug. 1983)
KS-05	K-31 thru K-33
KS-06	K-21 thru K-29 (after Aug. 1983)
KS-07	K-10
KS-08	K-07
KS-09	K-08, K-09 (prior to April 15, 1994)
KS-11	K-01, PSK-10
KS-12	K-02
KS-13	K-03, K-04, PSK-11, PSK-12 (prior to April 15, 1994)
KS-14	K-51
KS-15	K-05
KS-17	K-03, K-04, PSK-11, PSK-12 (after April 15, 1994)
KS-18	K-08, K-09 (after April 15, 1994)
KS-19	K-06 Models

Reservoirs

SEAL KIT#	DESCRIPTION
RS-01	R-04, R-10, R-13, R-14

Crossover Hynautic to SeaStar Steering

To review Advisory Notices, please view on line at www.seastarsteering.com or contact Teleflex Canada Limited Partnership directly at 604-270-6899.

Cylinders	HYNAUTIC CYLINDER	REPLACED WITH SEASTAR PART#	ADVISORY NOTICE#
	K-51	HC5314HY	764626
	K-1-B/C	HC5369HY/HYC	764624
	K-2-B/C	HC5373HY/HYC	764625
	K-3-B/C	HC5802HY/HYC	764615
	K-4-B/C	HC5378HY/HYC	764616
	K-10	HC5345HY	764612
	K-11, K-11S, K-12	HC5380HY	764613
	K-13, K-14	HC5370HY	764614

Helm Cross Over H-800 Series	HYNAUTIC#	SEASTAR#	ADVISORY NOTICE#
	H-816	HH5271	764622
	H-820	HH5273	764622
	H-824	HH5272	764622

BH-800 Series	HYNAUTIC#	SEASTAR#	ADVISORY NOTICE#
	BH-816	HH5779	764617 Hose MUST be replaced
	BH-820	HH5770	764617 Hose MUST be replaced
	BH-824	HH5772	764617 Hose MUST be replaced

H-100 Series	HYNAUTIC#	SEASTAR#	ADVISORY NOTICE#
	H-116	HH5260	764618
	H-120	HH5261	764618
	H-124	HH5262	764618

H-200 Series	HYNAUTIC#	SEASTAR#	ADVISORY NOTICE#
	BH-216	HH5741	764619
	BH-220	HH5743	764619
	BH-224	HH5742	764619

H-300 Series	HYNAUTIC#	SEASTAR#	ADVISORY NOTICE#
	H-316	HH5271	764621
	H-320	HH5273	764621
	H-324	HH5272	764621

H-50 Series	HYNAUTIC#	SEASTAR#	ADVISORY NOTICE#
	BH-50	HH5273	764623
	BH-51	HH5272	764623
	BH-52	HH5271	764623

Hydraulic Kits	HYNAUTIC#	SEASTAR#	ADVISORY NOTICE#
	KF-100	H05035 Single H05038A Single	764633
	All Hynautic Hose/Tube	H051XX Hose HT5XXX Tube	764632
	All Hynautic Steering Kits	Misc. SeaStar Items	764631
	All Hynautic Hose/Tube	SeaStar Power Steering System	764630

Syten Hydraulic Steering (Obsolete).

NOTICE

The Syten components were produced up until late 1984 when they were replaced by the SeaStar Steering systems. Teleflex Canada Limited Partnership no longer stocks any replacement parts, fittings or seal kits for this steering system or any component of this system.

NOTICE

Replacing or upgrading from a Syten inboard steering system to SeaStar Components.

Helms: The Syten helm pump should be replaced with the current model SeaStar Helm Pump HH5271 and Back mount kit HA5418. This should be done at each helm station.

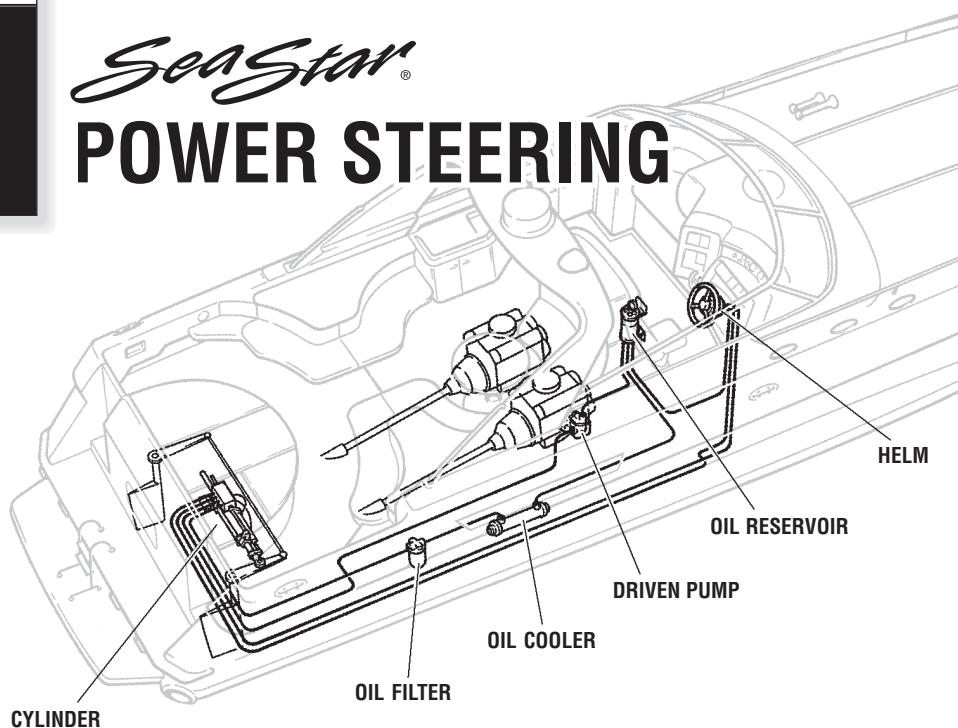
Tube: The 5/16 nylon tube and fittings are obsolete and must be replaced with SeaStar 3/8" nylon extruded tube for all inboard applications.

Uniflow Valve: U-10 or Model 50: Obsolete, no replacement parts are available.

Cylinder: Adapter HA5425 is required for the conversion from a Syten steering cylinder to a current SeaStar Steering cylinder.

Recommendations made in this publication are guidelines based on average acceptance of steering effort.

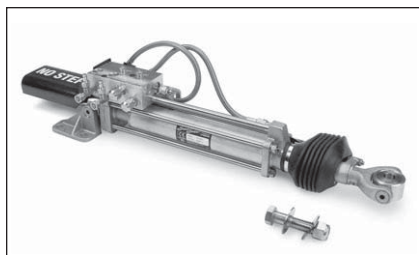
SeaStar® POWER STEERING



Features:

- Effortless steering from docking to top speed
- Responsive steering 3-1/2, turns lock to lock (or to suit)
- Automatic manual back up steering
- Simplified installation
- Multiple steering stations
- Easy autopilot interface

How it works:



SeaStar hydraulic power steering uses the ship's engine(s) to provide the "power" for the steering system, via an engine or electric motor driven hydraulic pump.

A manual hydraulic steering system, consisting of a standard SeaStar helm and a hydraulic steering cylinder, (fitted with an integral servo cylinder and a power steering valve) supplies the "control" portion of the steering system.

Under normal conditions, with engines running, a hydraulic oil supply is in a stand-by mode, ready to be directed to the steering cylinder as dictated by the steering wheel, servo cylinder and power steering valve. Turning the steering wheel left or right makes the system go from stand-by into operating mode and move the steering cylinder accordingly.

In the event of a power source failure, hydraulic oil, from the steering helm, is automatically diverted directly into the servo and steering cylinder, providing the helmsman with manual back-up steering.

An engine room mounted oil reservoir allows easy system fill and assists the in-line oil cooler in cooling the hydraulic oil. An in-line oil filter helps to protect the steering system components against contaminants.

Hose, Tube and Hydraulic Fluid:

Recommend 100R1 for power circuit, 5/16"ID hose or tube for manual circuit.
*If using 1/4"ID tube, runs should be short and SeaStar oil must be used.

System designed to use SeaStar oil (Mil spec H5606) or Dexron II (ATF) if using 1250V or 1275V helms.

Cylinder Selection Guide:

* All boats over 70' should have steering loads reviewed by factory.

CYLINDER PART NUMBER	DISPLACEMENT HULLS (standard)	DISPLACEMENT HULLS (heavy duty)	PLANING HULLS
SINGLE 9" x 1 CYLINDER (HC5801-2)	UP TO50' (15m)	UP TO40' (12m)	UP TO65' (20m)
TWIN 9" x 2 CYLINDER (HC5802)	UP TO75' (22m)	UP TO55' (17m)	UP TO85' (26m)
SINGLE 11" x 1 CYLINDER (HC5803-2)	UP TO60' (18m)	UP TO50' (15m)	UP TO75' (23m)
TWIN 11" x 2 CYLINDER (HC5804)	UP TO85' (26m)	UP TO60' (18m)	UP TO100' (31m)
*SINGLE 9" x 2.5 CYLINDER (HC5805)	UP TO100' (31m)	UP TO70' (22m)	UP TO110' (34m)
*TWIN 9" x 2.5 CYLINDER (HC5806)	UP TO110' (34m)	UP TO80' (25m)	UP TO120' (37m)

* Larger 2.5" cylinder bore than HC5801-2 and HC5802.

Technical Data:

CYLINDER PART NUMBER	DISPLACEMENT	BORE	STROKE	OUTPUT FORCE	MAX. TORQUE (35° from centre)
SINGLE 9" CYLINDER (HC5801-2)	21.25 in ³ (348cc)	2.0" (51mm)	9" (229mm)	2946 lbf _f (13,090 N)	18,900 in-lbs (2130 Nm)
SINGLE 11" CYLINDER (HC5803-2)	26.00 in ³ (426cc)	2.0" (51mm)	11" (280mm)	2946 lbf _f (13,090 N)	23,140 in-lbs (2610 Nm)
TWIN 9" CYLINDER (HC5802)	42.50 in ³ (697cc)	2.0" (51mm)	9" (229mm)	5892 lbf _f (26,190 N)	37,800 in-lbs (4260 Nm)
TWIN 11" CYLINDER (HC5804)	52.00 in ³ (853cc)	2.0" (51mm)	11" (280mm)	5892 lbf _f (26,190 N)	46,280 in-lbs (5220 Nm)
SINGLE 9" CYLINDER (HC5805)	37.11 in ³ (608cc)	2.5" (64mm)	9" (229mm)	5154 lbf _f (22,926 N)	33,065 in-lbs (3736 Nm)
TWIN 9" CYLINDER (HC5806)	74.33 in ³ (1216cc)	2.5" (64mm)	9" (229mm)	10,308 lbf _f (45,852 N)	66,130 in-lbs (7472 Nm)

Basic System Selection Guide:

Power Steering Cylinders

Part #

9" (228mm) strokeHC5801-2

See table above for correct cylinder selection

11" (279mm) strokeHC5803-2

See table above for correct cylinder selection

9" (228mm) strokeHC5805

See table above for correct cylinder selection

Add-On Cylinders

9" (228mm) strokeHC5802

See table above for correct cylinder selection

11" (279mm) strokeHC5804

See table above for correct cylinder selection

9" (228mm) strokeHC5806

See table above for correct cylinder selection

Steering Helms (For 3-1/2 Turn System)

Part #

SSI Helm, Standard Mount.....HH5271

SSI Helm, Rear MountHH5261

SSI Helm, TiltHH5741

SSI Helm, Rear Mount, 1" ShaftHH5281

Power Steering Pumps

Outlet Check Power PumpHP5820

Press Relief Twin Pump.....HP5822

R.H. Rotation, Belt Drive.....HP5830

L.H. Rotation, Belt DriveHP5831

R.H. Rotation, Keyed Shaft, Direct DriveHP5832

R.H. Rotation, Keyed Shaft, Direct DriveHP5833

R.H. Rotation, Direct Drive, Heavy DutyHP5835

R.H. Rotation, 9 Tooth

Splined Shaft, Direct DriveHP5837

R.H. Rotation, 11 Tooth

Splined Shaft, Direct DriveHP5838

R.H. Rotation, Direct Drive,

No Flow Control.....HP5836

R.H. Rotation, 9 Tooth

Splined Shaft, Direct DriveHP5839

L.H. Rotation, 11 Tooth

Splined Shaft, Direct DriveHP5840

L.H. Rotation, Direct Drive.....HP5841

L.H. Rotation, 11 Tooth

Splined Shaft, Direct DriveHP5842

L.H. Rotation, 9 Tooth

Splined Shaft, Direct DriveHP5843

R.H. Rotation, 6 Tooth

B Flange, Direct DriveHP5844

L.H. Direct Drive, 9 Tooth

Splined ShaftHP5845

R.H. Direct Drive, 9 Tooth

Splined ShaftHP5846

R.H. Direct Drive, 11 Tooth

Splined ShaftHP5847

R.H. Keyed ShaftHP5848

L.H. Direct Drive, 11 Tooth

Splined ShaftHP5849

L.H. Keyed Shaft.....HP5850

L.H. direct drive, 13 Tooth

Splined ShaftHP5852

Oil Reservoir, Cooler & Filter

Oil ReservoirHP5810

Oil Cooler, 2.25 Kw, 1" water lines.....HP5825

Oil Cooler, 6.25 Kw, 2" water lines.....HP5826

Oil FilterHP5815

Miscellaneous

Outlet Check Valve (Power Pump).....HP5820

Auto Flow Control (Twin Pump)HP5821

Crossover Pressure ReliefHP5822

System Pressure Gauge KitHA5821

Adapter Kit, Twin Disk #5050HA5823

Adapter Kit, Twin Disk #5061HA5824

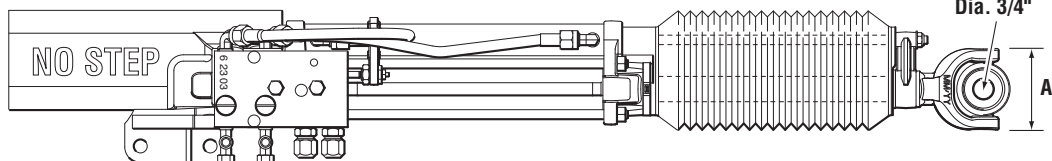
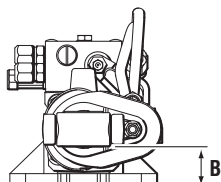
Adapter Kit, MAN to V10 PumpHA5827

SeaStar Oil, 1 liter.....HA5430

SeaStar Oil, 4 liter.....HA5440

Pressure Relief Valve, (1250psi setting).....*HP5818

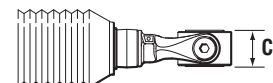
* Required in a system where the Power pump does NOT have a built in pressure relief valve. ALL SeaStar Power Pumps have built in Pressure Relief Valves.



A = 3.20"

B = 1.43"

C = 1.41"



HYNAUTIC TRIM TABS

Introduction

The effort required to keep large pleasure yachts and commercial boats trim and level is usually too great for most fiberglass nylon trim cylinders, even when used in multiple combinations. This is especially true when backing down hard.

Based on an understanding of these forces, Hynautic offers a heavy duty brass trim cylinder powerful enough to move and maintain the position of even the largest trim planes.

And, this patented product is more durable because it resists corrosion by eliminating all external hoses, isolating dissimilar metals, and protecting vital seals.

Coupled with a Hynautic 12 volt or 24 volt pump the cylinder will extend quickly enough to make an immediate difference in the trim of your yacht or work boat.

Applications

The Hynautic cruiser trim system is designed for yachts and commercial vessels. One brass trim cylinder provides a force equal to approximately 2.5 times that of the typical nylon cylinders.

Therefore, a Hynautic TCS-1-02 trim system, which includes separate port and starboard cylinder/pump assemblies is effective for most yachts to 65 feet using properly reinforced stainless planes. When more hydraulic muscle is needed, two cylinders per tab may be pressurized from a single pump as in the TCS-2-01 system.

Similarly, Hynautic can supply a system as complex as four cylinders moving a single trim plane from a single power pump source.

Because of the diversity of tab shapes and materials, the design is left to the builder and not included in the basic system.

Features

Double acting brass cylinder with a patented porting design:

All plumbing is left inside the transom. No external plumbing fittings to be damaged or corroded. The patented, double wall cylinders are pressurized in each direction which means they work equally as well at either holding the plane down against a force from below or preventing it from being pushed down from a force from above.

Simple, effective marine power pumps:

Available in 12 or 24 volt, and easy to install and purge. The use of marine rated relays and switches adds to the product's durability.

A design mechanics can appreciate:

The cylinder is designed to be disassembled from outside the boat without removing the complete assembly from the transom. Where dissimilar metals might come in contact, they are separated by a neutral material to reduce the effects of electrolytic corrosion.

Designed to be filled with Dextron III Automatic Transmission Fluid or equivalent.

Order Guide

NOTICE

Pressure and plate dimensional requirements are to be calculated by your Naval Architect.

TCS-1-01 TAB CYLINDER SYS, 24 VOLT:

Control switch	1 ea	TC-03
Tab cyl. - cruiser	2 ea	TK-01
Power pump	2 ea	TP-01
Manual	1 ea	182037
Hose - 2ft.	4 ea	207402

TCS-1-02 TAB CYLINDER SYS, 12 VOLT:

Control switch	1 ea	TC-03
Tab cyl. - cruiser	2 ea	TK-01
Power pump	2 ea	TP-02
Manual	1 ea	182038
Hose - 2ft.	4 ea	207402

TCS-2-02 TAB CYLINDER SYS, 12 VOLT:

Control switch	1 ea	TC-03
Tab cyl. - cruiser	4 ea	TK-01
Power pump	2 ea	TP-02
Manual	1 ea	182038
Hose - 2ft.	4 ea	207402

OPTIONAL PUMP:

Pump 24V DC (110cu. in./minute)	TP-03
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Cylinder Specification

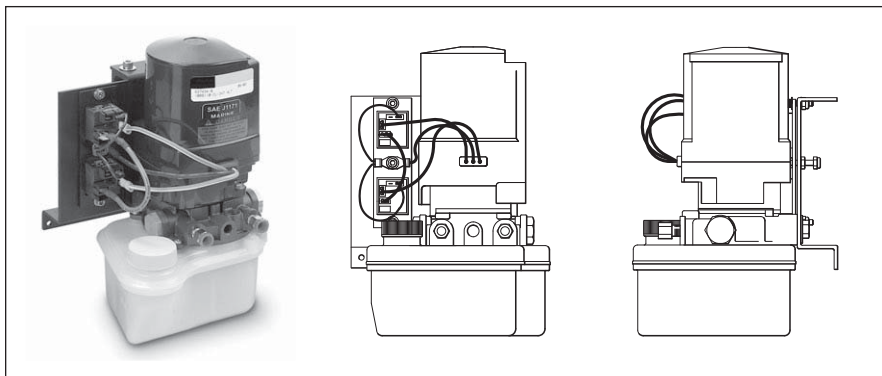
Stroke = 4"

Displacement = 5.94 cu in.

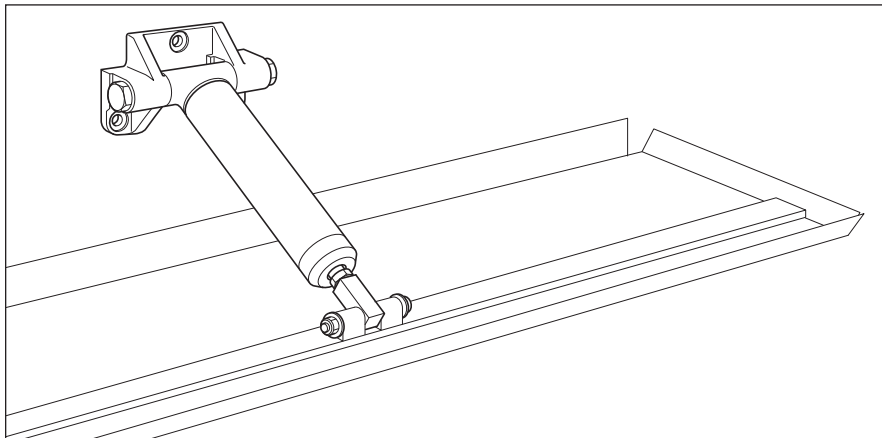
Force = 2230 ft lb @ rated pressure

Model	Displacement (in. 3/min)	Motor
TP-02	57	12V
TP-01	80	24V
TP-03	110	24V

Optional Pump Part# TP-03

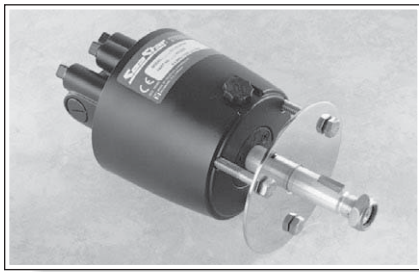
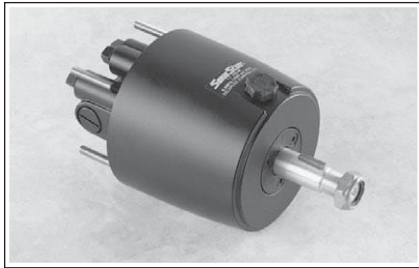


Tab Cylinder Part# TK-01



SeaStar® HELMS

The SeaStar helm pump is the heart of the hydraulic steering system. SeaStar helm pumps are the product of many years of research and experience by the world's foremost builder of manual hydraulic steering systems. Our efforts have resulted in a design which represents the ultimate in efficiency, safety and reliability, yet is easy to install and maintain. Superior design, teamed with the finest materials, precision manufacturing and rigid quality control all add up to an outstanding product which is certain to set industry standards for years to come.



Standard helm features

- Compact, stylish design.
- Available in 1.7, 2.0 and 2.4 cubic inch displacements.
- Convenient front of dash fill.
- Small 3.0" hole cutout on dash.
- Can be retrofitted into old SeaStar 4.5" hole cutout.
- Complete with elbow fittings.

Rear mount helm features (CONTACT YOUR LOCAL DISTRIBUTOR FOR AVAILABILITY)

- Behind dash mounting configuration.
- Available in 1.4, 1.7 and 2.4 cubic inch displacements.
- Top of dash fill point.
- Complete with elbow fittings.

Sport Tilt helm features

- 5 wheel positions allow adjustment to most comfortable steering position.
- 48 degree tilt range (12 down - 36 up).
- Available in 1.7, 2.0 and 2.4 cubic inch displacements.
- Remote fill point.
- Complete with elbow fittings.
- Comes with newly designed tilt mechanism.

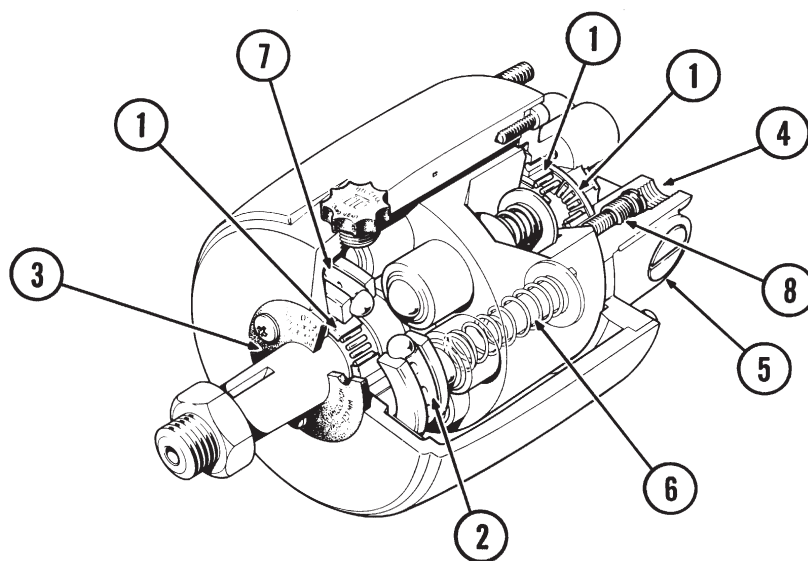
Traditional Tilt helm features

- 5 wheel positions allow adjustment to most comfortable steering position.
- 48 degree tilt range (18 down - 30 up).
- Available in 1.7, 2.0 and 2.4 cubic inch displacements.
- Convenient front of dash fill.
- Complete with elbow fittings.

Features of SeaStar Helm Pumps

Features

- 1 Helm rotor supported by three roller bearings.
- 2 Ball bearing piston race.
- 3 Field replaceable shaft seal.
- 4 1/4" NPT ports.
- 5 Built-in lock valve for positive rudder lock.
- 6 Patented bleed tubes.
- 7 Internal air pocket eliminates oil expansion overflow.
- 8 Integral relief valve.

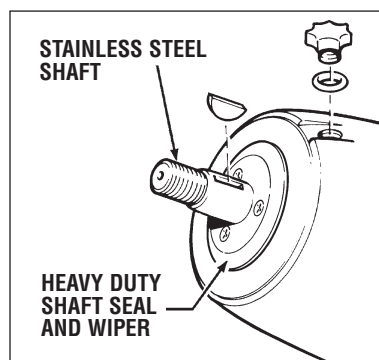


Commercial Helms

Part# HH5217, HH5224

NOTICE

For Commercial Use ONLY.



Specifically designed to be used on smaller fishing vessels involved in the Lobster and Crabbing Industries. The Commercial Helm Pumps are designed with a stainless steel shaft and heavy duty shaft seal and wiper. This new shaft and seal help protect the Helm Pump from the abrasive effects of sediment that is brought on board by the operator handling Traps or Pots.

Accessories

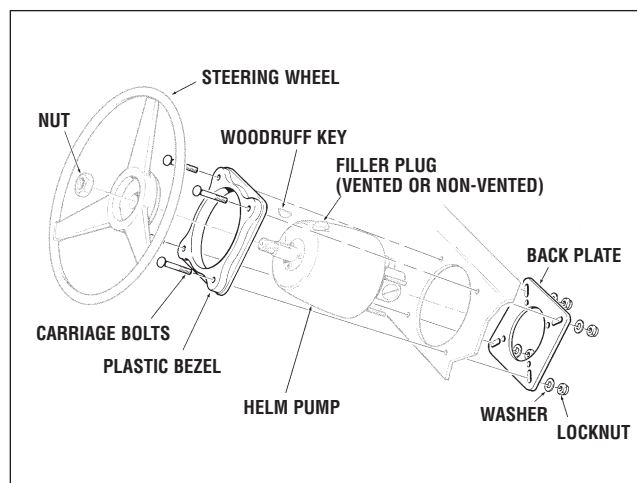
SeaStar®

HELMS

Backplate Kit (part # HA5418)

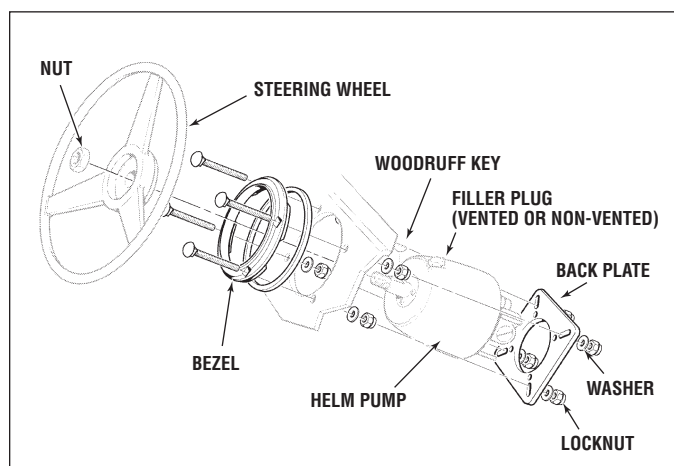
- a) Used to retrofit a new SeaStar standard helm in the old 4.5" (115mm) diameter hole, or
- b) reduce the helm protrusion from the dash by the thickness of the dash, or
- c) retrofit new SEASTAR standard helm into hole cutouts for mechanical and hydraulic steering as per chart.

STEERING MANUFACTURER	HELM MODEL TYPE	SYSTEM	BACKPLATE KIT REQ
TELEFLEX	SAFE-T	MECHANICAL	YES
	BIG-T	MECHANICAL	YES
	ROTARY	MECHANICAL	NO
	RACK AND PINION	MECHANICAL	NO
	SYTEN	HYDRAULIC	YES
MORSE	ROTARY	MECHANICAL	NO
	RACK AND PINION	MECHANICAL	NO
HYNAUTIC	H-50 SERIES	HYDRAULIC	YES
	H-60 SERIES	HYDRAULIC	YES
	H-80 SERIES	HYDRAULIC	YES
	H-300 SERIES	HYDRAULIC	YES



Round Bezel (part # HA5417)

Reduces the distance the helm protrudes from the front of the dash to 3.75" (93mm).

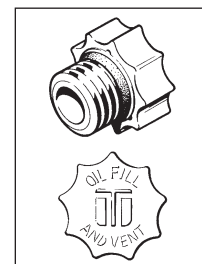


Vent Plug (part # HA5431)

Supplied with SeaStar Helm Pump

Must Be used with Helm Pump on all single steering station systems.

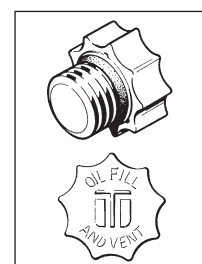
Must be used on uppermost Helm Pump on multi steering station systems.



Non-Vent Plug (part # HA5432)

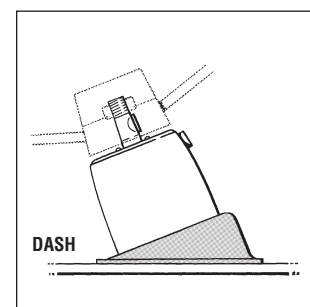
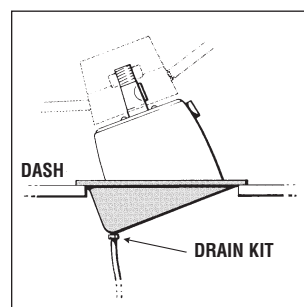
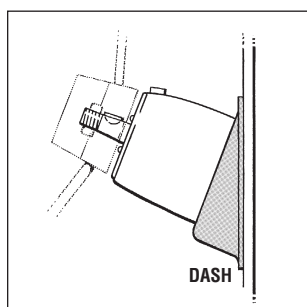
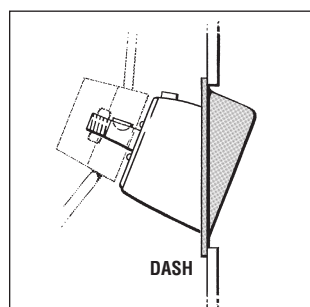
Must be used on all Helm Pumps other than uppermost Helm Pump on multi steering station systems.

This Non-Vent Plug is supplied with additional Fitting Kit No. HF5501 & HF5502



20° Wedge (part # HA5419 & HA5408 c/w Drain kit)

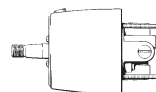
This kit is designed to mount the helm at a 20° angle to the mounting surface. 4 possible mounting configurations are available.



▲ For this configuration use **HA5408**

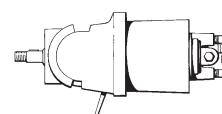
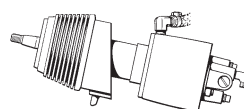
SeaStar Helm – Order Guide

SeaStar Standard Mount



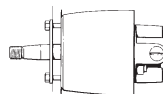
PART NUMBER	HELM DESCRIPTION	DISPLACEMENT CU. IN./REV (CC/REV)		RELIEF VALVE SETTING PSI (BAR)		NOTES
HH5269	STANDARD MOUNT	1.4	(23.0)	1000	(70)	
HH5271	STANDARD MOUNT	1.7	(27.8)	1000	(70)	
HH5761	STANDARD MOUNT FULL FEEDBACK	1.7	(27.8)	1000	(70)	2
HH5217	STD. MOUNT, COMMERCIAL	1.7	(27.8)	1000	(70)	3
HH5273	STANDARD MOUNT	2.0	(33.0)	1000	(70)	
HH5760	STANDARD MOUNT FULL FEEDBACK	2.0	(33.0)	1000	(70)	2
HH5272	STANDARD MOUNT	2.4	(39.3)	1000	(70)	
HH5762	STANDARD MOUNT FULL FEEDBACK	2.4	(39.3)	1000	(70)	2
HH5224	STD. MOUNT, COMMERCIAL	2.4	(39.3)	1000	(70)	3

SeaStar Tilt Mount



HH5744	TRADITIONAL TILT	1.4	(23.0)	1000	(70)	
HH6193	SPORT TILT	1.4	(23.0)	1000	(70)	
HH5741	TRADITIONAL TILT	1.7	(27.8)	1000	(70)	
HH6191	SPORT TILT	1.7	(27.8)	1000	(70)	
HH6291	SPORT TILT (Spline Shaft)	1.7	(27.8)	1000	(70)	
HH5743	TRADITIONAL TILT	2.0	(33.0)	1000	(70)	
HH6145	SPORT TILT	2.0	(33.0)	1000	(70)	
HH5742	TRADITIONAL TILT	2.4	(39.3)	1000	(70)	
HH6192	SPORT TILT	2.4	(39.3)	1000	(70)	
HH6292	SPORT TILT (Spline Shaft)	2.4	(39.3)	1000	(70)	

SeaStar Rear Mount



HH5260	REAR MOUNT	1.4	(23.0)	1000	(70)	
HH5279	REAR MOUNT 1" STRAIGHT SHAFT	1.4	(23.0)	1000	(70)	
HH5280	REAR MOUNT 1" TAPERED SHAFT	1.4	(23.0)	1000	(70)	
HH5231	REAR MOUNT FULL FEEDBACK	1.4	(23.0)	1000	(70)	
HH5261	REAR MOUNT	1.7	(27.8)	1000	(70)	
HH5281	REAR MOUNT 1" TAPERED SHAFT	1.7	(27.8)	1000	(70)	
HH5262	REAR MOUNT	2.4	(39.3)	1000	(70)	
HH5282	REAR MOUNT 1" TAPERED SHAFT	2.4	(39.3)	1000	(70)	

NOTES

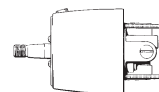
1. SeaStar PRO helms cannot be used with an unbalanced cylinder. SeaStar reinforced Kevlar Outboard style hoses MUST be used with ALL SeaStar PRO helms.
2. No "Check Valves" are installed into these helm pumps. These are intended for use in a single steering station application ONLY. Not for use in multiple steering stations and/or in conjunction with autopilot.
3. Commercial helms use a stainless steel shaft and a better sealing top plate for use in extreme conditions and or commercial type applications.

SeaStar PRO Helm – Order Guide

SeaStar

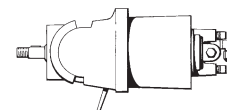
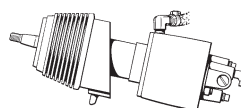
HELMS

SeaStar PRO Standard Mount



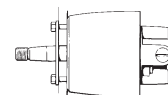
PART NUMBER	HELM DESCRIPTION	DISPLACEMENT CU. IN./REV (CC/REV)		RELIEF VALVE SETTING PSI (BAR)		NOTES
HH5779	STANDARD MOUNT	1.7	(27.8)	1500	(103)	1
HH5218	STD. MOUNT, COMMERCIAL	1.7	(27.8)	1500	(103)	1, 3
HH5770	STANDARD MOUNT	2.0	(33.0)	1500	(103)	1
HH5772	STANDARD MOUNT	2.4	(39.3)	1500	(103)	1

SeaStar PRO Traditional and Sport Tilt Mount



HH5775	TRADITIONAL TILT	1.4	(23.0)	1500	(103)	1
HH5773	TRADITIONAL TILT	1.7	(27.8)	1500	(103)	1
HH6189	SPORT TILT	1.7	(27.8)	1500	(103)	1
HH5774	TRADITIONAL TILT	2.0	(33.0)	1500	(103)	1
HH6190	SPORT TILT	2.0	(33.0)	1500	(103)	1
HH6188	SPORT TILT	2.4	(39.3)	1500	(103)	1

SeaStar PRO Rear Mount



HH5778	REAR MOUNT	1.7	(27.8)	1500	(103)	1
HH5771	REAR MOUNT	2.0	(33.0)	1500	(103)	1

NOTES

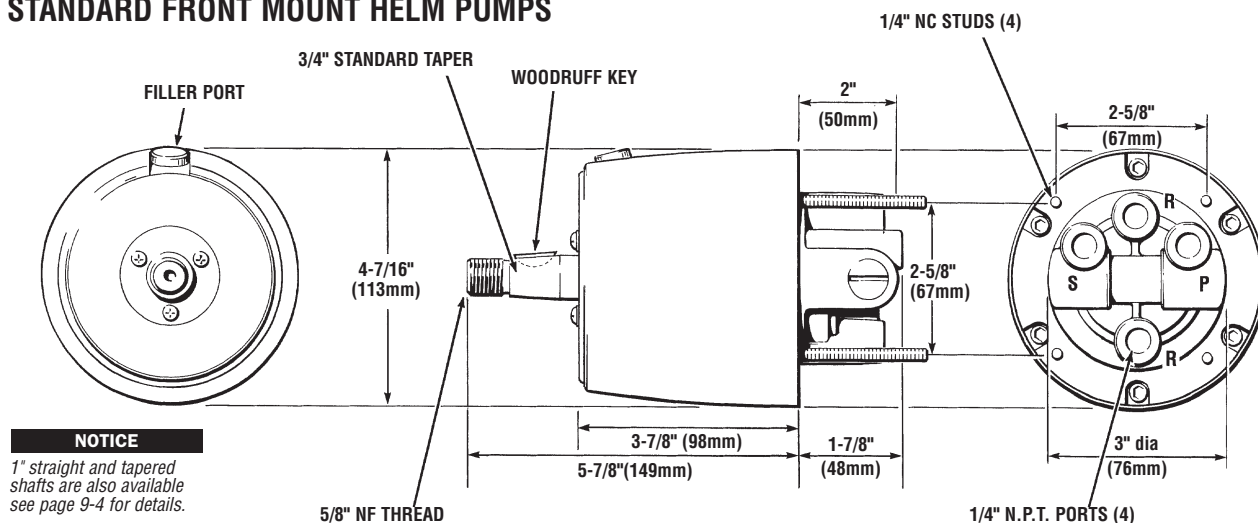
1. SeaStar PRO helms cannot be used with an unbalanced cylinder. SeaStar reinforced Kevlar Outboard style hoses MUST be used with ALL SeaStar PRO helms.
2. No "Check Valves" are installed into these helm pumps. These are intended for use in a single steering station application ONLY. Not for use in multiple steering stations and/or in conjunction with autopilot.
3. Commercial helms use a stainless steel shaft and a better sealing top plate for use in extreme conditions and or commercial type applications.

Standard/Rear Mount Helm Dimensions

NOTICE

ALL SeaStar helm pumps can be mounted horizontally to vertically and anywhere in between. In ALL cases the filler port must be in the uppermost position.

STANDARD FRONT MOUNT HELM PUMPS



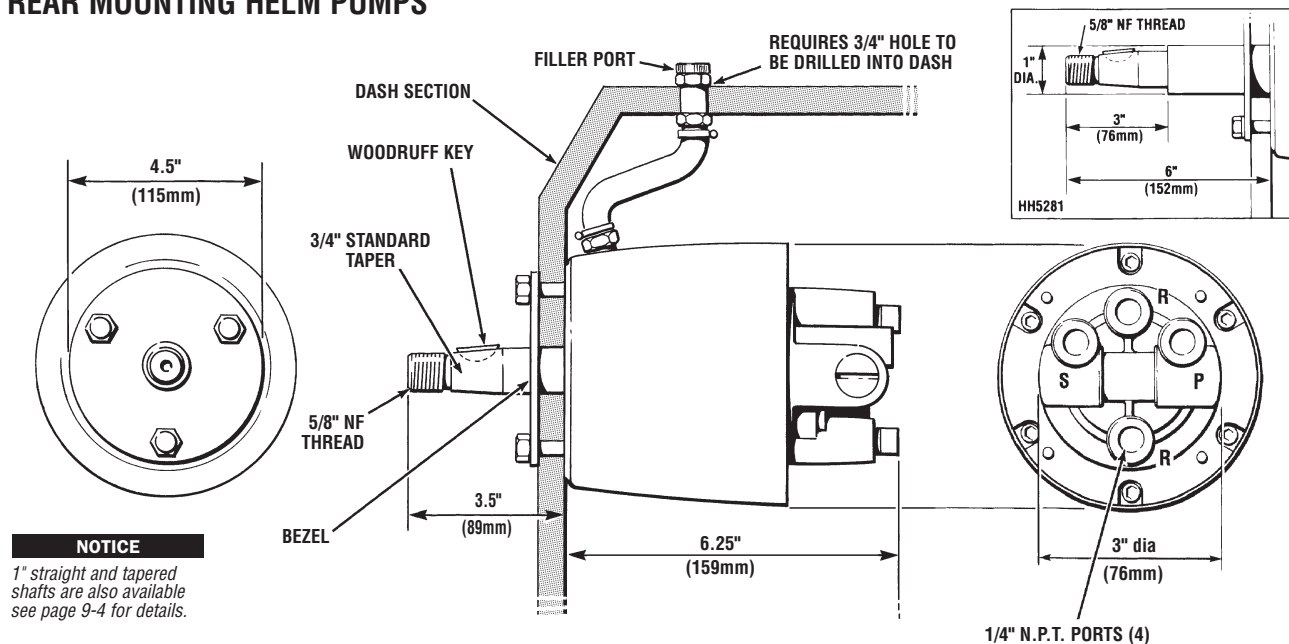
NOTICE

1" straight and tapered shafts are also available see page 9-4 for details.

NOTICE

Max. steering wheel diameter 28" (711mm).

REAR MOUNTING HELM PUMPS



NOTICE

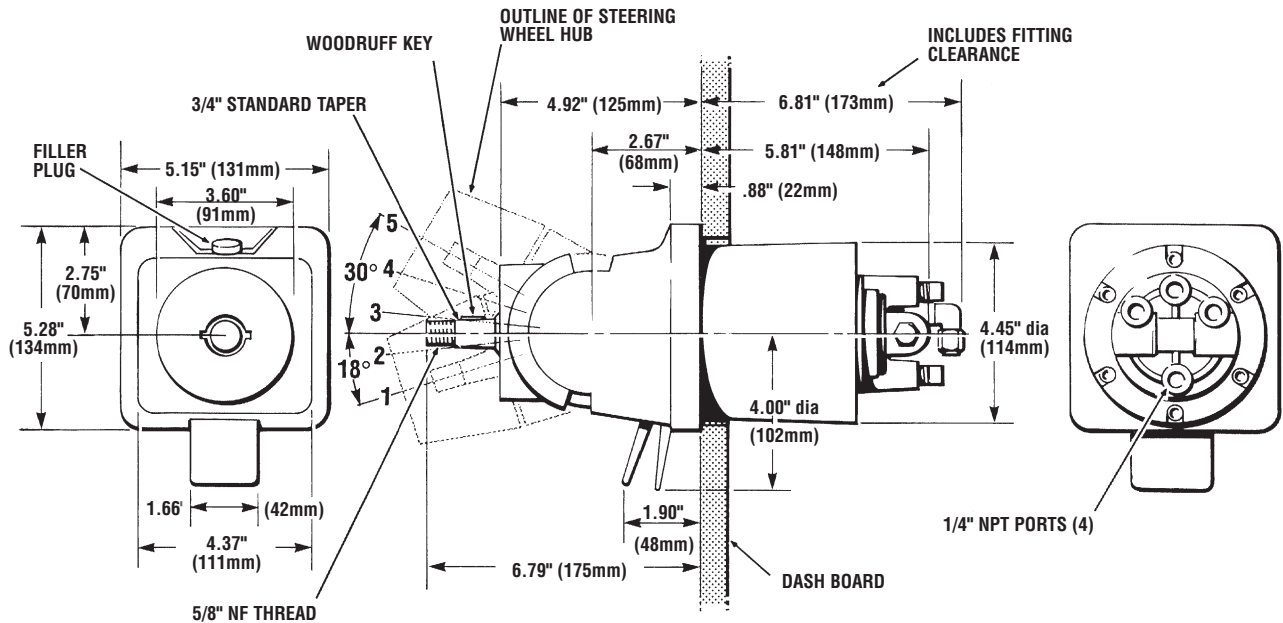
1" straight and tapered shafts are also available see page 9-4 for details.

NOTICE

Max. steering wheel diameter 28" (711mm). Min. dash thickness 1" (25.5mm), Max. dash thickness 1.5" (38mm).

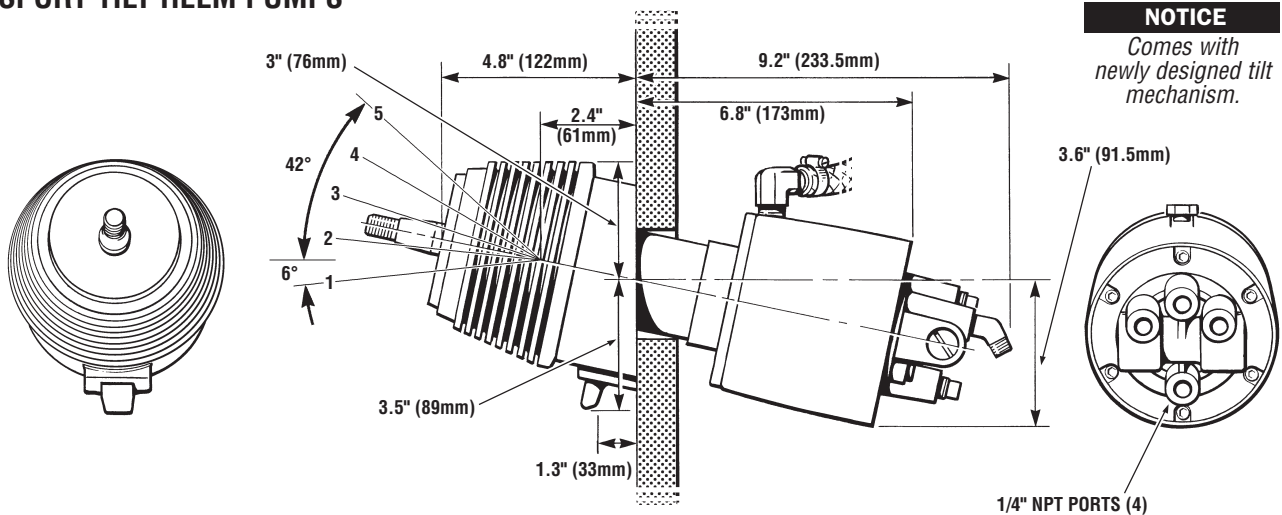
Tilt/Sport Tilt Helm Dimensions

TRADITIONAL STYLE TILT HELM PUMPS



NOTICE Max. steering wheel diameter 20" (508mm)

SPORT TILT HELM PUMPS



NOTICE

Comes with newly designed tilt mechanism.

NOTICE Max. steering wheel diameter 20" (508mm)

NOTICE

Remote fill and vent kit (included with helm pump) requires a 3/4" hole to be drilled into the dash board and above the helm pump. Please refer to page 10-19, HA5450 for details.

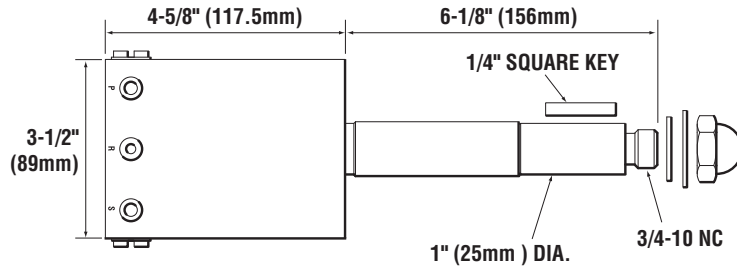
Hynautic Helm Pumps

Heavy Duty Helm Pump H-20 Series

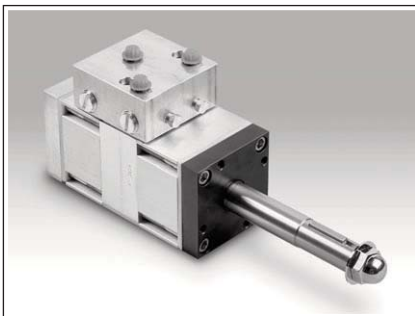


HELM		DISPL	SHAFT STYLE DIA. & TYPE	KEYWAY	INTEGRAL VALVING
20 Series	H-21	2.75cu in	1 Straight	1/4" Square	Yes
	H-25	2.75cu in	3/4", 1"/ft Tapered	#9 Woodruff	Yes
	H-26	2.00cu in	3/4", 1"/ft Tapered	#9 Woodruff	Yes

H-21

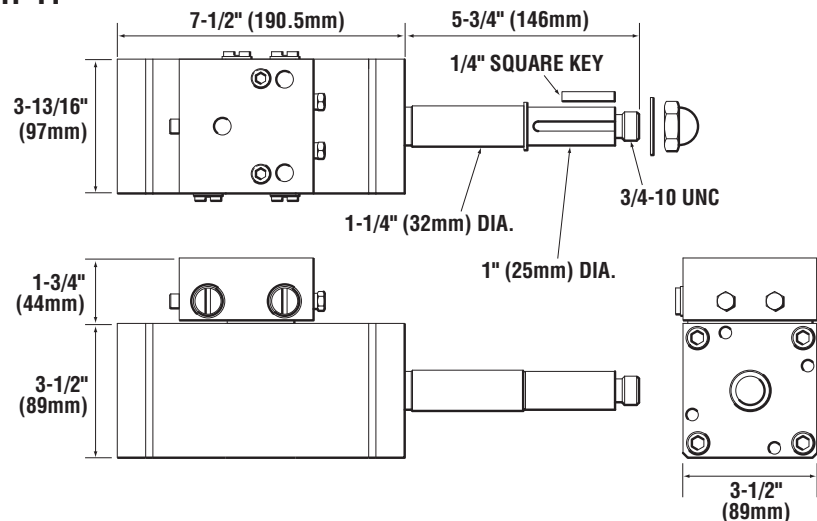


Heavy Duty Helm Pump H-40 Series



HELM		DISPL	SHAFT STYLE DIA. & TYPE	KEYWAY	INTEGRAL VALVING
40 Series	H-41	5.50cu in	1 Straight	1/4" Square	Yes
	H-41-2	5.50cu in	3/4", 1"/ft Tapered	#9 Woodruff	Yes
	H-42	4.00cu in	1 Straight	1/4" Square	Yes
	H-42-02	4.00cu in	3/4", 1"/ft Tapered	#9 Woodruff	Yes

H-41



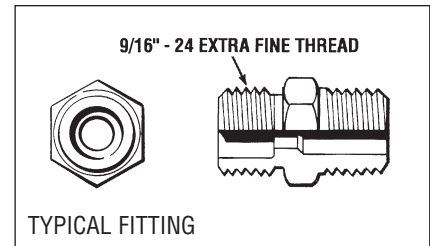
NOTICE

If using a Hynautic H-20 or H-40 series helm pump, use of a Hynautic Reservoir and Relief Valve, see page 6-4 for details. Fitting kits sold separately for both H-20 and H-40 series, please see page 6-2 for which fitting kit is to be used."

HOSE, TUBING, FITTINGS, ACCESSORIES AND TOOLS

Fittings

All SeaStar Manual Hydraulic steering systems utilize the same style of fittings for all applications. These are 3/8" compression fittings which utilize a 9/16"-24 extra fine thread.



Tubing/Hose

The tubing or hose requirements depend on the type of steering system being considered. Please double check the application in which you are using as in some cases Nylon or copper tube is not to be used.

⚠ WARNING
DO NOT CUT OUTBOARD HYDRAULIC HOSE.

APPLICATION	TUBING/HOSE REQUIREMENTS	PAGE #
OUTBOARDS, INBOARDS, SEASTAR POWER ASSIST, or STERNDRIVE CYLINDER# HC5332	OUTBOARD HOSE	10-2– 10-4
STERNDRIVES, SEADRIVES, INBOARDS, SSI	3/8" DIA. NYLON or COPPER TUBE	10-6– 10-8
CAUTION: DO NOT USE NYLON TUBING IN OUTBOARD AND/OR POWER ASSIST STEERING APPLICATIONS.		

General Considerations

⚠ WARNING
DO NOT use extruded nylon tubing with SeaStar Outboard cylinder, HC5332 stern drive cylinders and/or SeaStar Power Assist Applications.

In most hydraulic steering installations the cylinder body moves as the motor, outdrive or tiller arm is articulated. Provide sufficient hose length to allow full-uninterrupted steering motion including trim and tilt. If your splashwell is rated for a dual engine application or you are mounting the engines on a gill bracket you must provide enough steering hose to rig either twin or single engines. Inboard or Sterndrive steering installations that use 3/8" copper or extruded nylon tube must have a swaged hydraulic hose kit (HF5508) between the steering cylinder and the rigid tube to provide a flexible connection.

SEASTAR OUTBOARD HOSE

WARNING

SeaStar PRO Helm systems require the use of SeaStar PRO (1500 psi) reinforced Kevlar Hoses ONLY.

SeaStar Outboard hoses are available in kit's (includes two hoses) ranging in length from 2' – 30'. Hydraulic Hose must be protected from chaffing and any possible contact or interference with assembly screws or sharp edges of any type.

The Hydraulic hoses should be secured along the routing path wherever possible and should not be allowed to hang free in any area where they could become a safety hazard. Teleflex Canada Limited Partnership recommends the use of a rigging tube, PVC piping or conduit for the safe secure installation of hydraulic hoses. Do not install hoses in such a way that they may become exposed to high heat areas such as engine components (i.e.; manifold or exhaust components) or highly corrosive areas such as battery fumes or electrical connections.

Continuous kinking, chaffing, rubbing or twisting may eventually weaken hose(s) to a point where it could rupture from normal steering pressure causing loss of steering, resulting in personal or property damage. Visually inspect all hoses and fittings for wear and or damage as part of your regular annual maintenance. Replace any hose or components suspect of excessive wear.

Measuring Hose Lengths

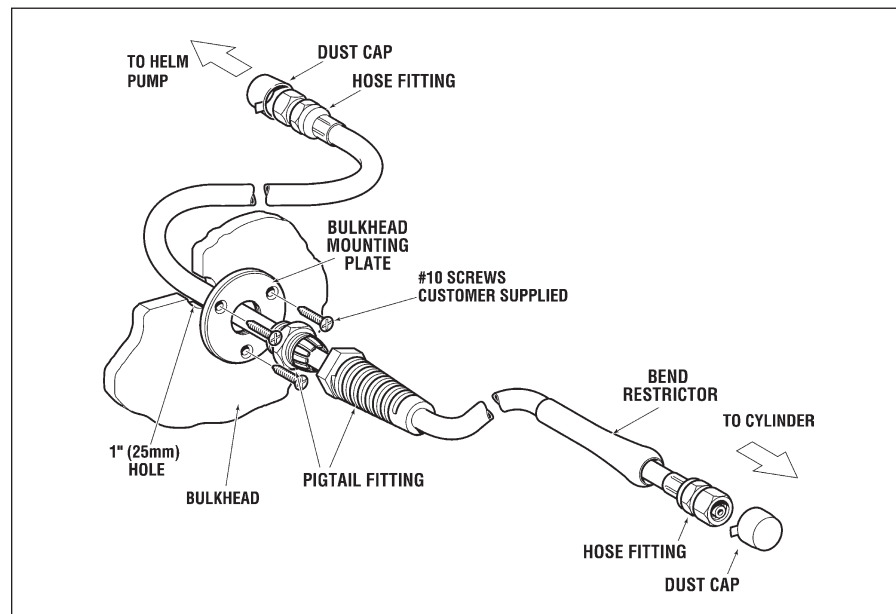
NOTICE

Correct hose length is crucial to the operation of your SeaStar steering system, please be sure that you take all the following measurements correctly to avoid damage to the steering hose.

- 1 Measure from the center of the steering wheel to the Starboard side wall.
- 2 Measure from the Starboard side wall to the transom.
- 3 Measure from the transom into the center of the engines (if this is a twin engine twin cylinder application please measure to the center of the Port side engine.)
- 4 Add up the above three measurements, round up to the nearest even number, then add two feet. This is the length of hose required for your application.

Bulkhead Hose Kit

For the cleanest Installation.



Available SeaStar Hose Kits: How to order

NOTICE

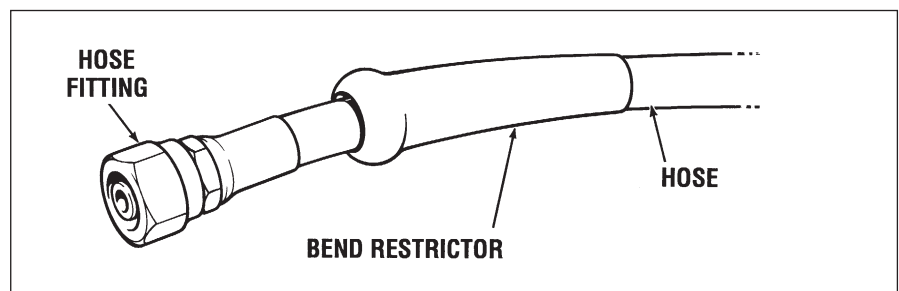
Outboard hoses are supplied with pre-attached hose fittings on both ends.

In order to prevent hose kinking, bend restrictors are supplied on one end of each hose in the kit. The end of the hose with the bend restrictor is to be attached to the cylinder.

Each part number contains two hoses of equal length.

PART NUMBER	KIT DESCRIPTION
* H051XX	SeaStar Standard Outboard Hose Kit (2 hoses)
* H057XX	SeaStar Pro Hose Kit (2 hoses)
** H081XX	SeaStar Bulkhead Hose Kit, Standard (2 hoses)
** H082XX	SeaStar Bulkhead Hose Kit, Pro (2 hoses)

- * SeaStar Standard and Pro Hose Kits are available in lengths from 2' – 30'. 40' Hose Kits are available by special order only.
- ** SeaStar Standard and Pro Bulkhead Hose Kits are available in lengths from 12' – 30'. 40' Hose Kits are available by special order only.



Standard Hose Kit

To determine the required hose lengths for outboard steering installations.

From the illustrations on the following pages (figures A through I), select the situation which best suits your application and note the:

- a) cylinder location,
- b) number of cylinders,
- c) type of cylinders,
- d) number of steering stations, and
- e) the number of hose and fitting kits required.

Single Station System

- 1) From the illustration that suits your application note the number of hose and fitting kits required.
- 2) Measure along the intended path of the hose routing for each of the required hose kits.
- 3) Round up the measurement to the next even digit and add 2 feet (0.6m). This is the length of hose kit required.
- 4) Order hose kit(s) part no. H051_ _ . The last two digits correspond to the length of hose kit.

NOTICE

- a) Measure from center of the cylinder(s) and helm(s)
- b) Some installations require more than 1 hose kit and additional fitting kits (see parts list for each figure).
- c) Minimum bend radius for outboard hose is 2-1/2" (6 cm).
- d) Outboard cylinders move. They are subject to engine trim & tilt. Enough slack must be left in the hoses to prevent kinking.

⚠ CAUTION

DO NOT cut the hose. This will destroy the hose. Once cut there is no means to field swage fittings to the ends of the hose.

Single Station

Figure A: HC5345
Single Front Mount Cylinder
Note: cylinder body moves

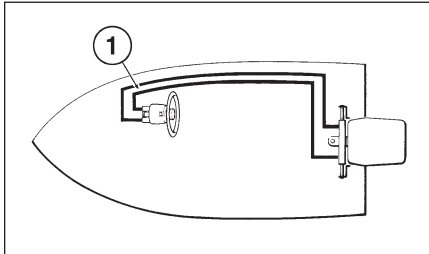


Figure B: HC5370
Single Side Mount Cylinder
Note: cylinder body stationary

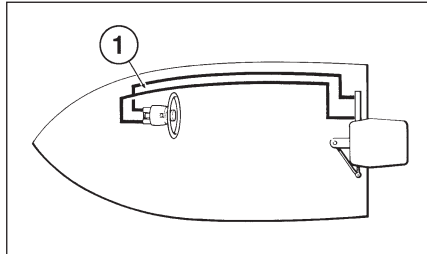


Figure C: HC5380
Single Splashwell Mount Cylinder
Note: cylinder body stationary

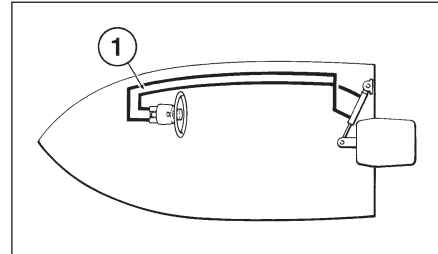


Figure D: HC5345
Dual Front Mount Cylinders
Note: cylinder body moves

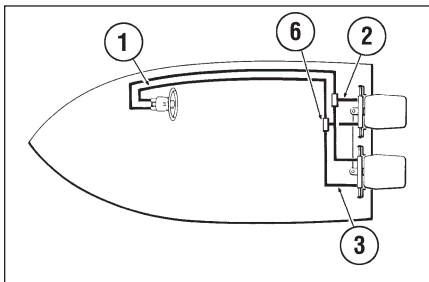


Figure E: HC5370
Dual Side Mount Cylinders
Note: cylinder body stationary

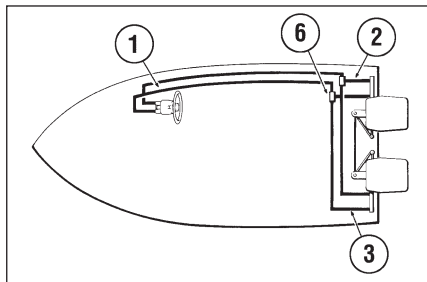


Figure F: HC535
Single Front Mount Cylinder
c/w bulkhead fittings
Note: cylinder body moves

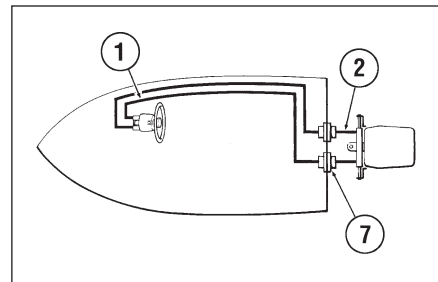


Figure G: HC5370
Single Side Mount Cylinder
c/w bulkhead fittings
Note: cylinder body stationary

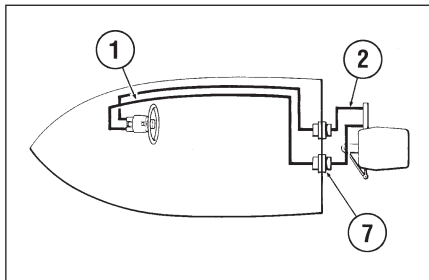


Figure H: HC5345
Dual Front Mount Cylinders
c/w bulkhead fittings

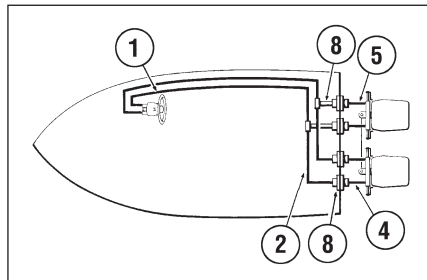
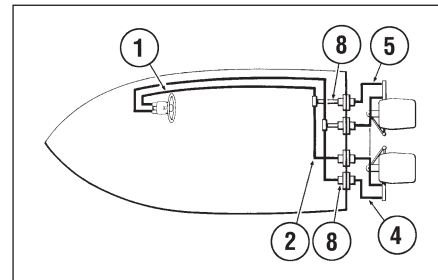


Figure I: HC5370
Dual Side Mount Cylinders
c/w bulkhead fittings



ITEM	PART #	QTY	DESCRIPTION
1	H051__	1	Hose Kit
2	H051__	1	Hose Kit
3	H051__	1	Hose Kit
4	H051__	2	Hose Kit
5	H051__	2	Hose Kit
6	HF5530	1	Tee Fitting (3 per Kit)

ITEM	PART #	QTY	DESCRIPTION
7			Bulkhead Fitting Kit (2 fittings per Kit)
	HF5512	1	3/4" Thick Bulkhead
	HF5513	1	3" Thick Bulkhead
8			Bulkhead Fitting Kit (4 fittings per Kit)
	HF5514	1	3/4" Thick Bulkhead
	HF5515	1	3" Thick Bulkhead

Additional Stations or Autopilot Integration

Additional Steering Station or Autopilot Power pack

- 1) Determine the location of the 2nd station or power pack.
- 2) Measure along the intended path of the hose routing from the upper helm pump to the 2nd station or autopilot power pack.
- 3) Round up the measurement to the next even digit. This is the length of hose kit required.
- 4) Order hose kit(s) part number H051_ _ the last two digits correspond to the length of hose.

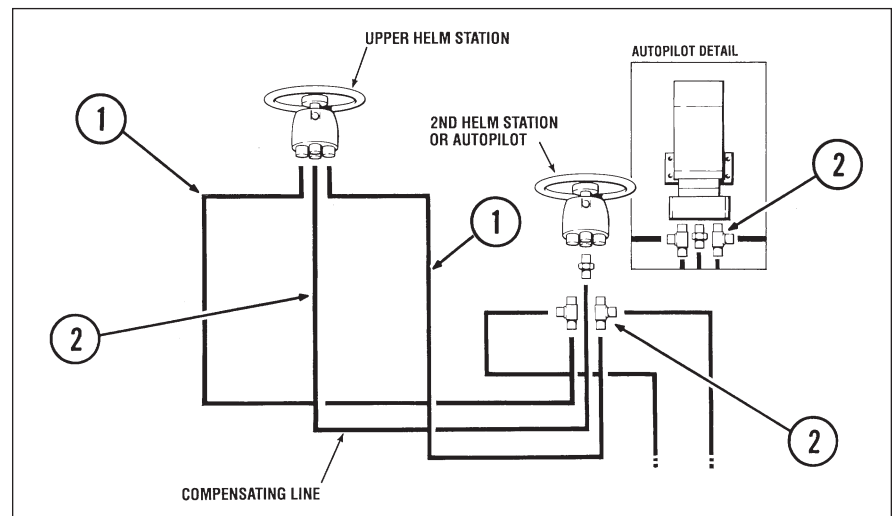
Note:

- a) **All hoses should be routed with a gradual rise so that air will not be trapped in the lower station.**
- b) Some installations require more than 1 hose kit and additional fitting kits.
- c) Minimum bend radius for outboard hose is 2-1/2" (6 cm).
- d) A compensating line is required between helm stations or the helm and autopilot power pack.

Figure J

2nd Steering Station or
Autopilot Power Pack
Installation

⚠ WARNING
DO NOT CUT HYDRAULIC HOSE.



Parts list

For Figure J

ITEM #	DESCRIPTION	PART NUMBER	QUANTITY REQUIRED	REF PAGE #
1	HOSE KIT	H051_ _	1	
2	FITTING KIT*	HF5501	1	10-10

* Includes 25' of 3/8" dia. Nylon tubing to be used for the compensating line ONLY.

SEASTAR INBOARD/STERNDRIVE TUBING

Two types of tubing materials are available for plumbing Inboards and Sterndrives.

- 1) SeaStar 3/8" outside diameter nylon tubing
- 2) 3/8" outside diameter copper refrigeration tubing

Nylon Tubing

NOTICE

SeaStar 3/8" extruded nylon is NOT recommended for use in systems with SeaStar 2.4 or SeaStar PRO helm pumps. It is also not to be used in systems where total tubing runs exceed 100', in these cases SeaStar Outboard hoses and/or 3/8" copper tubing must be used.

SeaStar 3/8" outside diameter nylon tubing is recommended for;

- a) Inboard,
- b) Sterndrive, and
- c) Seadrive steering systems with SeaStar I (1.7 cubic inch/rev displacement) helms only.

SeaStar 3/8" outside diameter nylon tubing is available in the following lengths:

LENGTH FEET	(METERS)	TUBING PART #'S
25'	(7.6m)	HT5092
50'	(15.2m)	HT5095
75'	(22.8m)	HT5097
100'	(30.5m)	HT5100
1000'	(305.0m)	HT5101

⚠ WARNING

SeaStar PRO Helm systems require the use of SeaStar PRO (1500 psi) reinforced Kevlar Hoses ONLY.

Copper Tubing

3/8" outside diameter copper tubing is recommended for;

- a) inboard,
- b) sterndrive, and
- c) seadrive steering systems with SeaStar II (2.4 cubic inch/rev displacement) helms only, or where the length of tubing run exceeds 100 feet (30.5m).

Additional SeaStar hose kit part number HF5508 is required to connect the tubing to the cylinder.

3/8" copper tubing should be obtained through a local vendor based on the following tubing specifications.

Specification for copper tubing:

Soft annealed copper tubing, Type 'L' produced under ASTM D-280.

To determine the required length of tubing for single and dual configurations:

From the illustrations (figures A through E), select the situation which best suits your application and note;

- a) the type of drive system, and
- b) the number of steering stations.

Single Station

SeaStar®

TUBING

- 1) From the illustration which best suits your application note the number of lengths of tubing and fitting kits required.
- 2) Measure along the intended path of tube routing for each of the tubing runs.
- 3) Determine if 3/8" nylon tube can be used or if copper tubing is required based on lengths of tubing runs required.
- 4) Total up the entire length of tubing required and round up to the next available tube kit length.

Figure A

Single Inboard Cylinder

- fittings required supplied with helm and cylinder

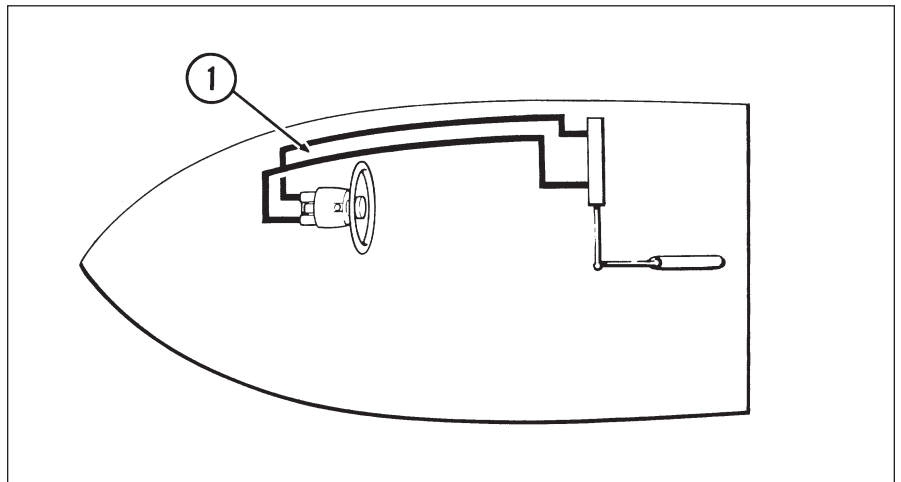
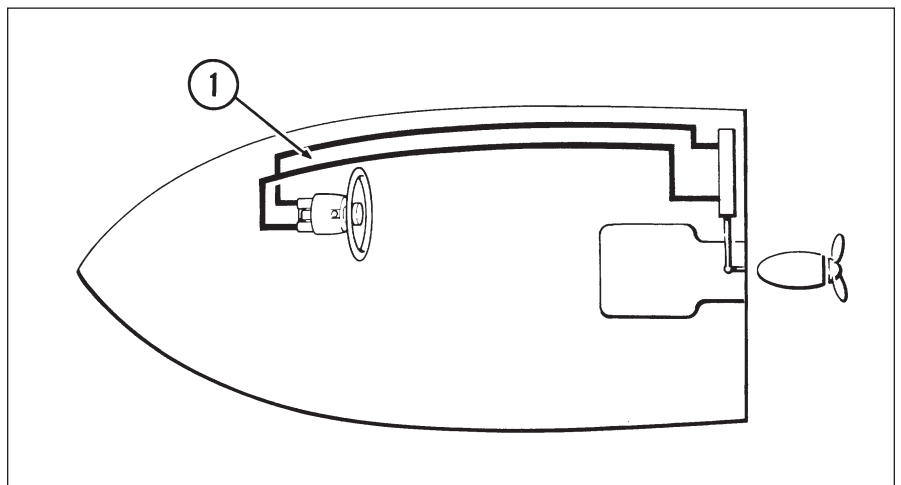


Figure B

Single Sterndrive Cylinder

- fittings required supplied with helm and cylinder



Parts list

For Figures A, B

ITEM #	DESCRIPTION	PART NUMBER	QUANTITY REQUIRED
1	3/8" DIA NYLON OR COPPER TUBE		AS MEASURED

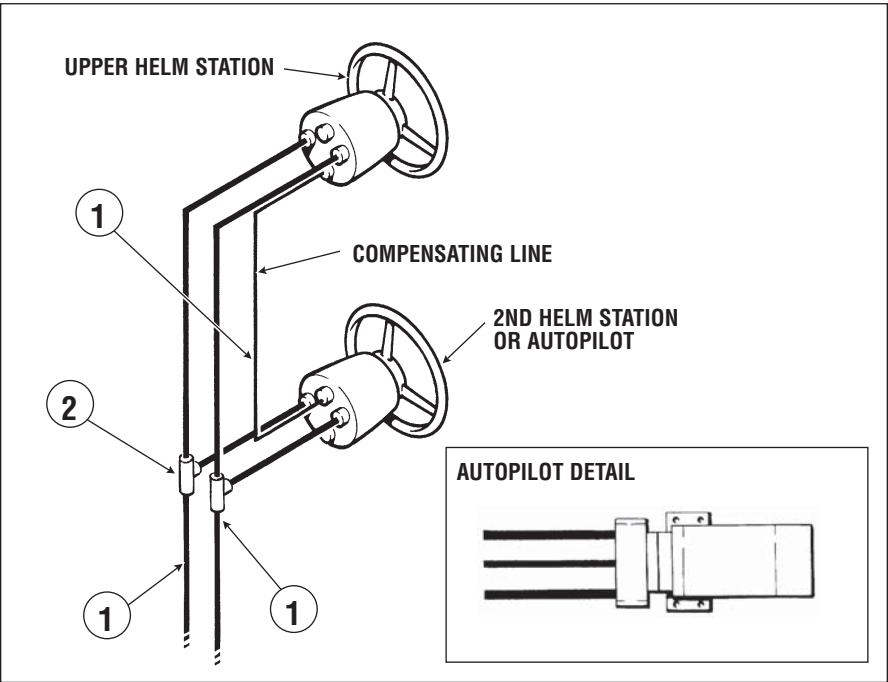
ADDITIONAL SEASTAR STEERING STATION OR AUTOPILOT KIT

- 1) Refer to illustration Figure E.
- 2) Determine the location of the second station or autopilot power pack.
- 3) Measure along the path of the tube routing from the upper helm pump to the second station or autopilot power pack. Multiply this length by three for the amount of tubing required.
- 4) Select the tubing kit based on the total system tubing requirement.

Figure E
2nd Steering Station or Autopilot

NOTICE

- a) A compensating line is required between helm stations or the helm and autopilot power pack.
- b) All hoses should be routed with a gradual rise (particularly the compensating line) so that air will not be trapped in the lower helm station.
- c) The second helm station or autopilot power pack may be connected at any location between the upper helm station and the cylinder. For existing single station installations the nylon or copper tubing may be cut and the tee fittings installed at any convenient location.



ITEM #	DESCRIPTION	PART NUMBER	QUANTITY REQUIRED	REF PAGE #
1	3/8" DIA NYLON OR COPPER TUBE	HT5_ _ _	AS MEASURED	10-11
2	FITTING KIT	HF5502	1	

Required details for the addition of an autopilot.

- 1) Most SeaStar Helm pumps have a built in check valve. Full feedback helm pumps do not have a built in check valve and one will be required for the installation of an autopilot, refer to page 9-4 of this guide to determine whether your helm pump has check valves built in.
- 2) Autopilot mfg. requires the volume of your steering cylinder(s) to provide an adequate autopilot pump, refer to page 12-2 for volumes of your cylinder.requirement.

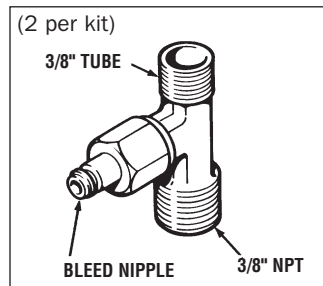
FITTINGS

SeaStar®

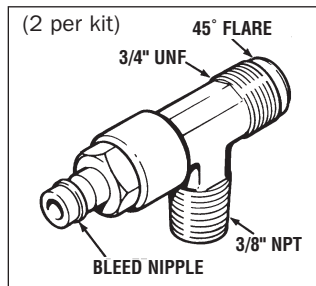
FITTINGS

All SeaStar Manual Hydraulic steering systems utilize the same style of fittings for all applications. These are 3/8" compression fittings which utilize a 9/16"-24 extra fine thread. Refer to page 10-1.

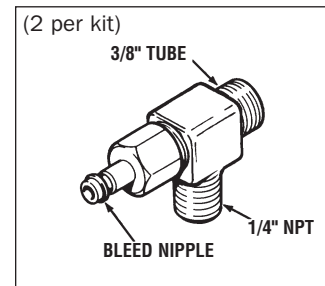
HF5518 Vertical Bleeder Tee



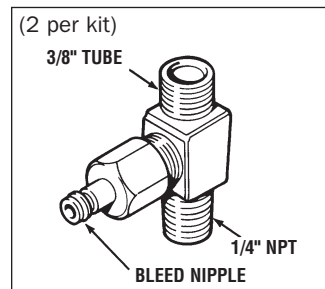
HF5519 Bleed Tee (TM Cylinders)



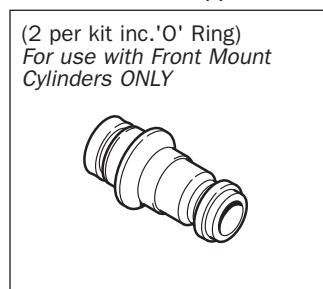
HF5520 Horiz. Bleeder Tee



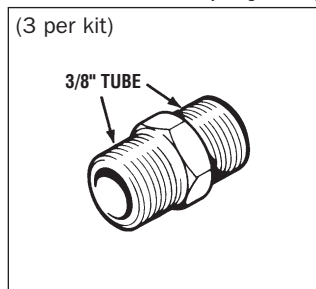
HF5521 Vertical Bleeder Tee



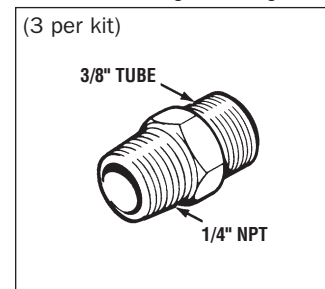
HF5548 Bleed Nipple



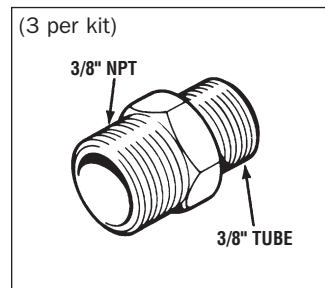
HF5527 Union Coupling Fitting



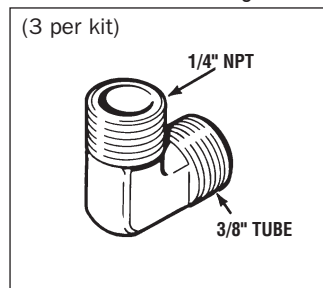
HF5528 Straight Fitting



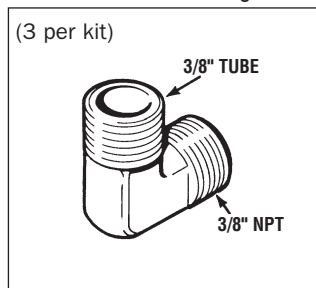
HF5532 Connector Fitting



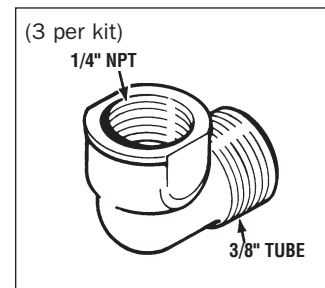
HF5529 Elbow Fitting



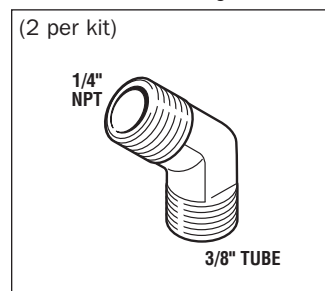
HF5534 Elbow Fitting



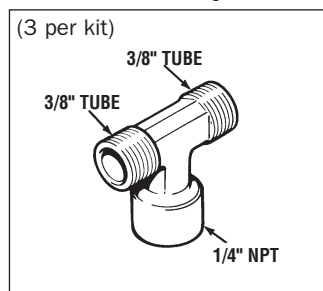
HF5538 Street Elbow



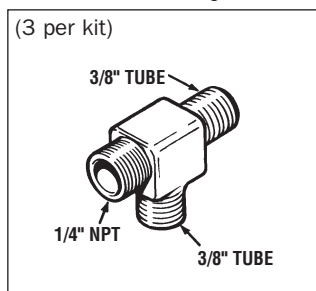
HF5540 45° Fitting



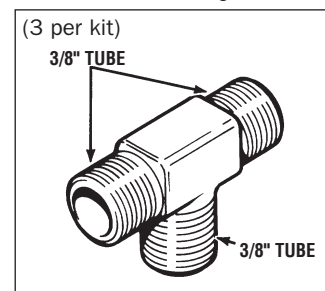
HF5533 Tee Fitting



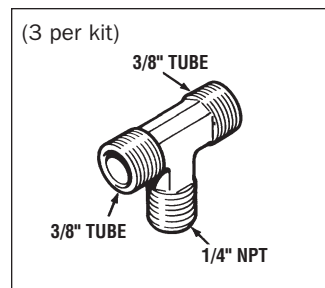
HF5531 Tee Fitting



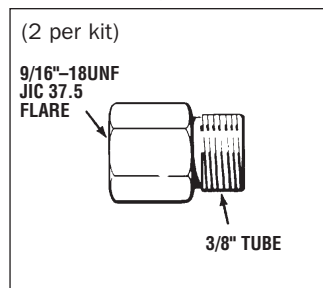
HF5530 Tee Fitting



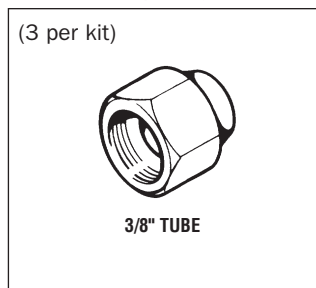
HF5536 Tee Fitting



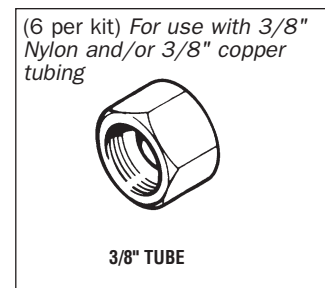
HF5566 Adapter Fitting



HF5524 Cap Plug Nut



HF5526 Tube Nut



HF5501

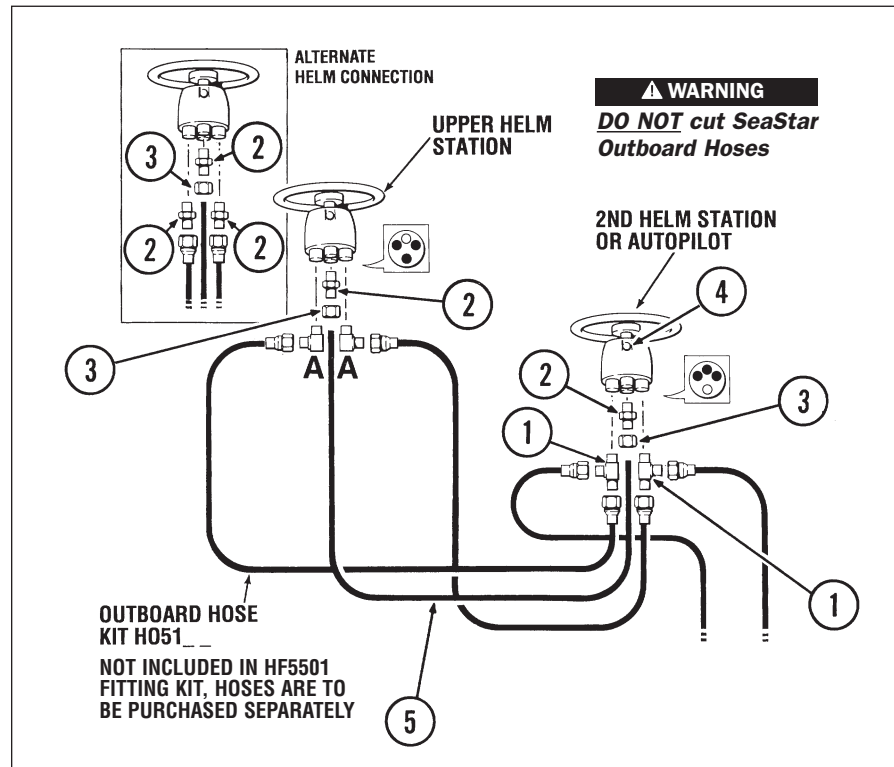
Application

Fitting kit to add a 2nd station or autopilot to an outboard system.

ITEM NO.	DESCRIPTION	QUANTITY PER KIT	PART NO.
1	Tee Fitting 1 End – 3/8" NPT (M) 1 End – 1/4" NPT (M) Center – 3/8" Tube (M)	2	600603
2	Connector Fitting 3/8" Tube (M) – 1/4" NPT (M)	4	600602
3	Tube Nut – 3/8" Dia.	4	280327
4	Non-Vented Filler Plug	1	HA5432
5	SeaStar Nylon Tube 3/8" Dia.	25ft	HT5092
A*	Elbow 3/8" Tube (M) – 1/4" NPT (M)	2	

* SUPPLIED WITH HELM PUMP.

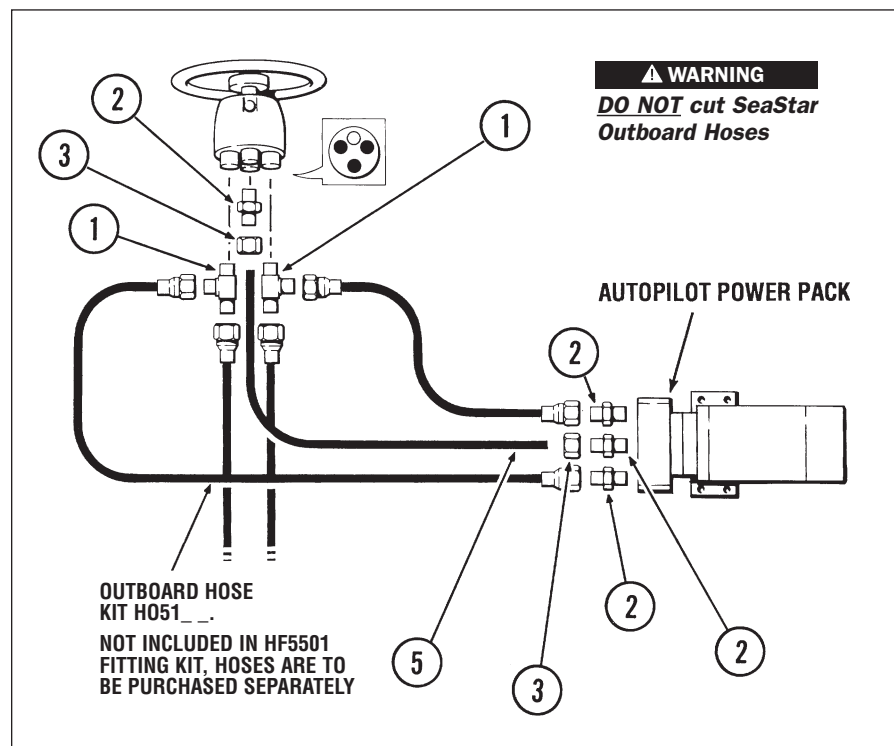
NOTE: HF5501 FITTING KIT IS TO BE USED WHEN THE SYSTEM HAS BEEN PLUMBED WITH SEASTAR OUTBOARD STEERING HOSE ONLY.



Autopilot powerpack connection

CAUTION

DO NOT cut SeaStar Outboard Steering hose. Once cut there is no means to field swage fittings to the ends of the hoses.



HF5502

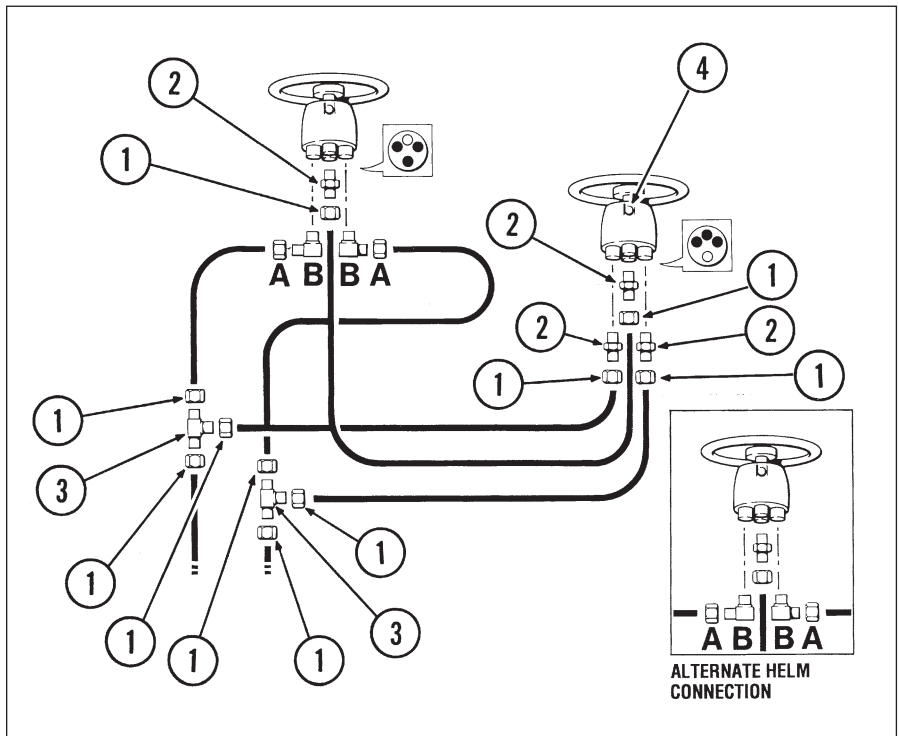
Application

Fitting kit to add a 2nd station or autopilot to an inboard or sterndrive system

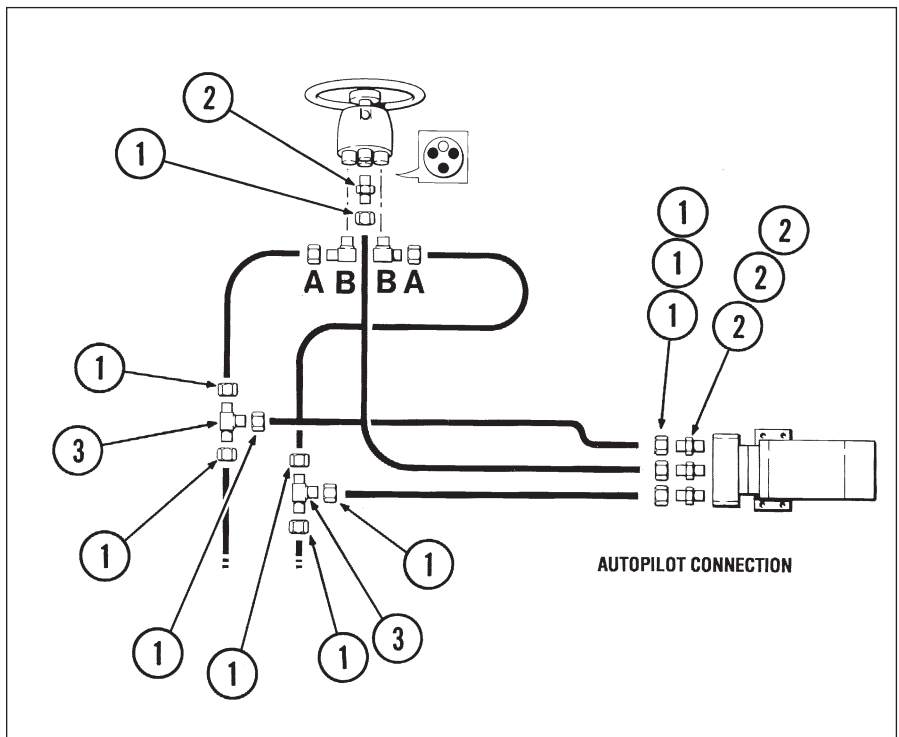
ITEM NO.	DESCRIPTION	QUANTITY PER KIT	PART NO.
1	Tube Nut – 3/8" Dia.	10	280327
2	Connector Fitting 3/8" Tube (M) – 1/4" NPT (M)	4	600602
3	Tee Fitting 3 Ends – 3/8" Tube	2	600605
4	Non-Vented Filler Plug	1	HA5432
A*	Tube Nut – 3/8" +Dia.	2	
B*	3/8" Elbow 1/4" NPT (M)	2	

* SUPPLIED WITH HELM

NOTE: USED IN SYSTEMS PLUMBED WITH 3/8" DIAMETER NYLON OR COPPER TUBE



Autopilot powerpack connection



HF5507

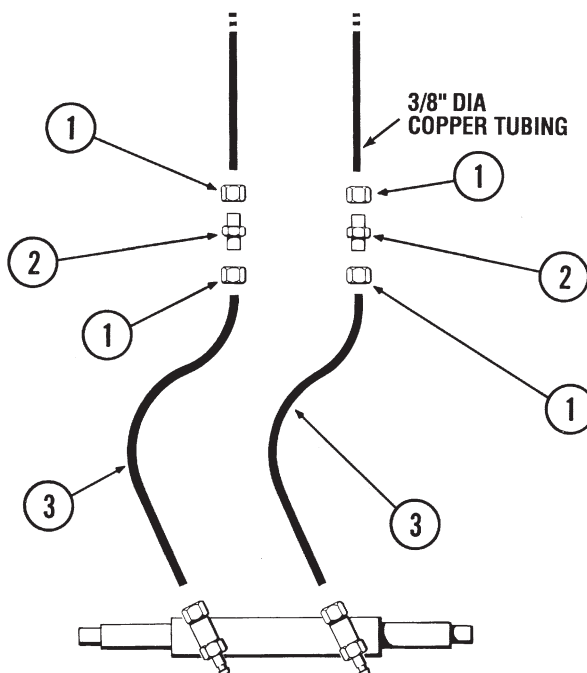
Application

Kit to connect 3/8" diameter copper tubing to SeaStar cylinders (using 3/8" diameter nylon tubing)

ITEM NO.	DESCRIPTION	QUANTITY PER KIT	PART NO.
1	Tube Nut – 3/8" Dia.	4	280327
2	Connector Fitting 3/8" Tube (M) – 3/8" Tube (M)	2	280929
3	Nylon Tubing 3/8" Dia.	6ft	795628

NOTICE

DO NOT use with SeaStar Outboard Cylinders and/or SeaStar Sterndrive cylinder # HC5332.



HF5508

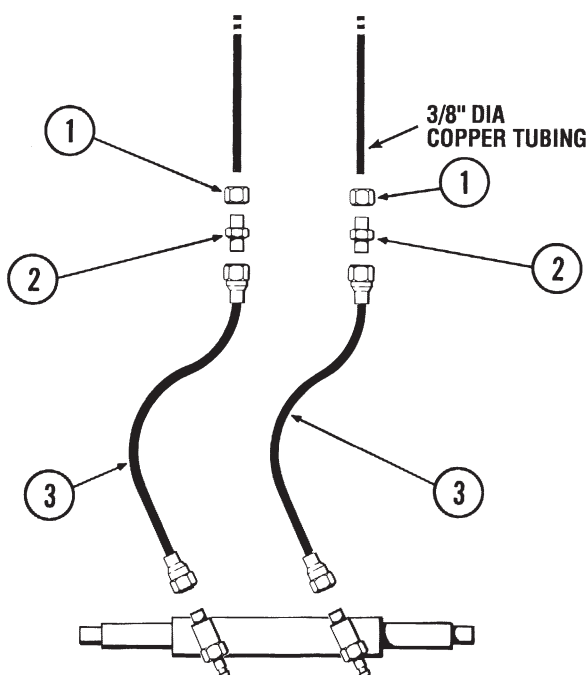
Application

Kit to connect 3/8" diameter copper tubing to SeaStar cylinders (using SeaStar outboard hose)

ITEM NO.	DESCRIPTION	QUANTITY PER KIT	PART NO.
1	Tube Nut – 3/8" Dia.	2	280327
2	Connector Fitting 3/8" Tube (M) – 3/8" Tube (M)	2	280929
3	18" Hose c/w Fittings	2	338621

CAUTION

DO NOT cut SeaStar Outboard Steering hose. Once cut there is no means to field swage fittings to the ends of the hoses.



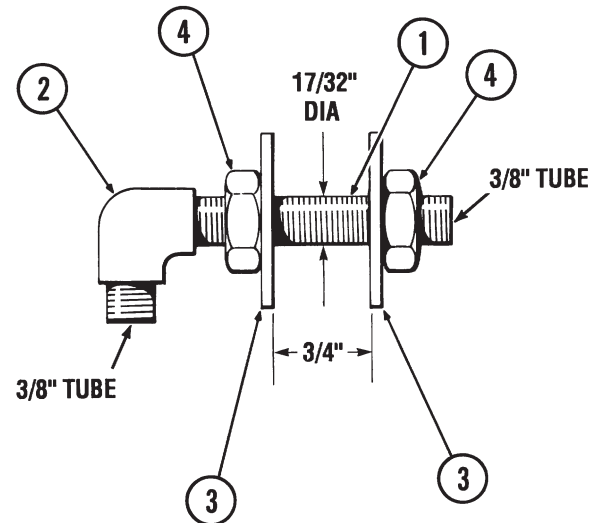
HF5512

3/4" bulkhead fitting kit

Application: Single cylinder installations

2 Assemblies per kit

ITEM NO.	DESCRIPTION	QUANTITY PER KIT	PART NO.
1	Connector Fitting	2	286323
2	Street Elbow 3/8" Tube (M) – 1/4" NPT(F)	2	600606
3	Washer	4	202224
4	Nut	4	191621



2 OF EACH ILLUSTRATED INCLUDED IN KIT

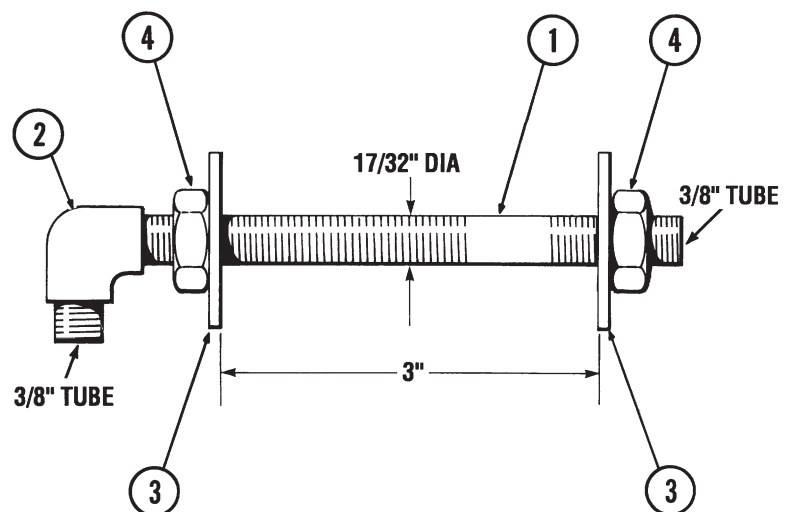
HF5513

3" bulkhead fitting kit

Application: Single cylinder installations

2 Assemblies per kit

ITEM NO.	DESCRIPTION	QUANTITY PER KIT	PART NO.
1	Connector Fitting	2	600608
2	Street Elbow 3/8" Tube (M) – 1/4" NPT(F)	2	600606
3	Washer	4	202224
4	Nut	4	191621



2 OF EACH ILLUSTRATED INCLUDED IN KIT

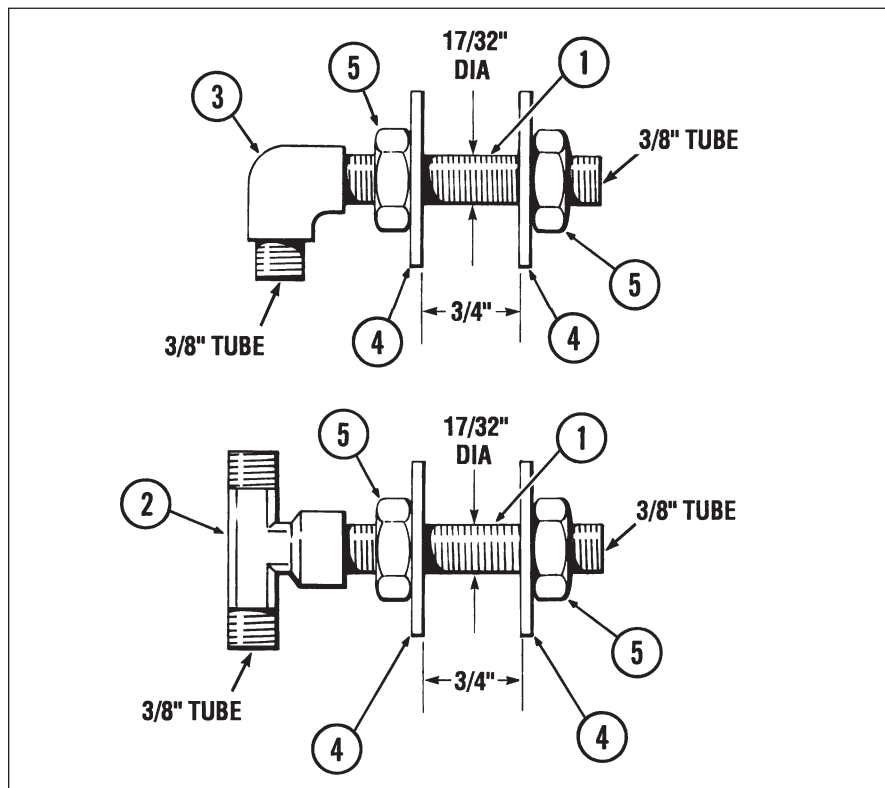
HF5514

3/4" bulkhead fitting kit

Application: Dual cylinder installations

ITEM NO.	DESCRIPTION	QUANTITY PER KIT	PART NO.
1	Connector Fitting	4	286323
2	Tee Fitting 2 Ends – 3/8" Tube (M) Center – 1/4" NPT (F)	2	284826
3	Street Elbow 3/8" Tube (M) – 1/4" NPT (F)	2	600606
4	Washer	8	202224
5	Nut	4	191621

2 OF EACH ILLUSTRATED INCLUDED IN KIT



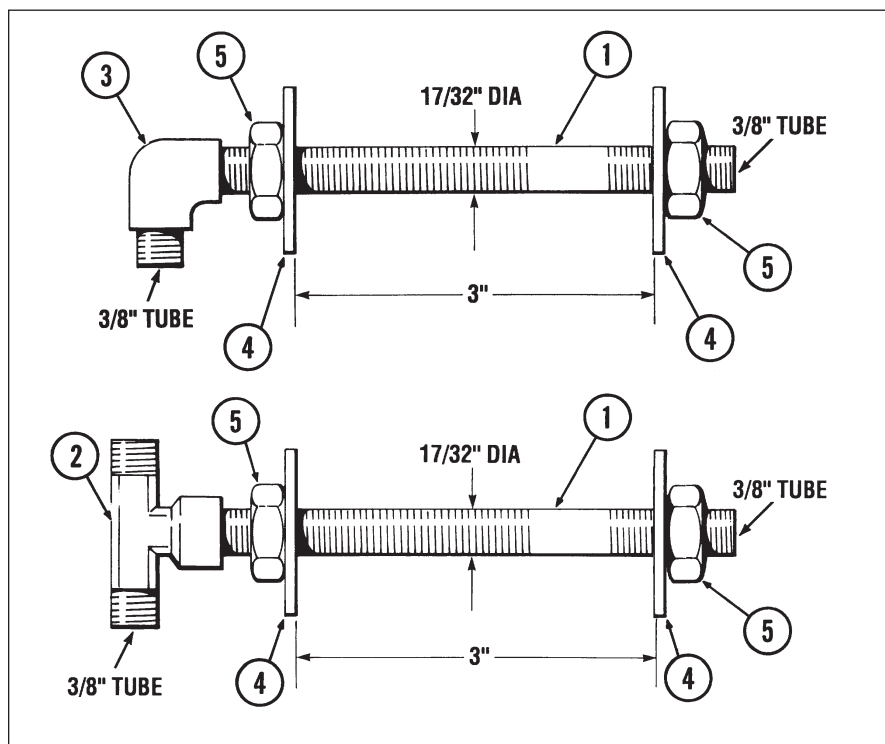
HF5515

3" bulkhead fitting kit

Application: Dual cylinder installations

ITEM NO.	DESCRIPTION	QUANTITY PER KIT	PART NO.
1	Connector Fitting	4	286323
2	Tee Fitting 2 Ends – 3/8" Tube (M) Center – 1/4" NPT (F)	2	284826
3	Street Elbow 3/8" Tube (M) – 1/4" NPT (F)	2	600606
4	Washer	8	202224
5	Nut	4	191621

2 OF EACH ILLUSTRATED INCLUDED IN KIT

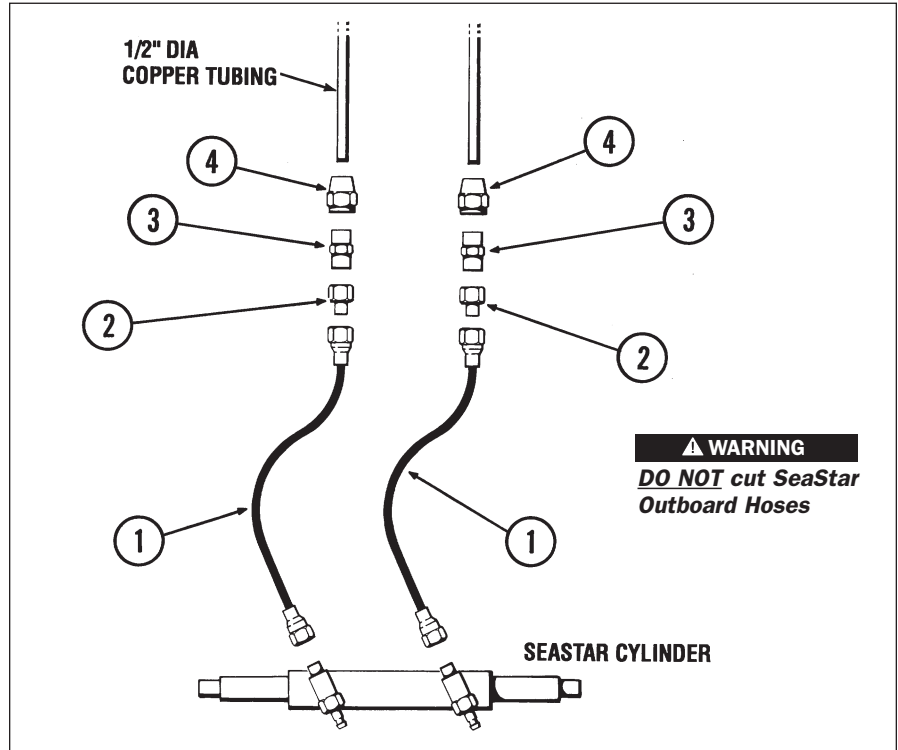


HF5568

Application

Kit to connect 1/2" diameter copper tubing to SeaStar cylinders

ITEM NO.	DESCRIPTION	QUANTITY PER KIT	PART NO.
1	18" Hose Kit	2	338621
2	Connector Fitting 3/8" NPT(F) – 3/8" Tube (M)	2	653624
3	Connector Fitting 1 End – 3/8" NPT(M) 1 End – 1/2" Dia. 45° Flare	2	555421
4	Tube Nut 1/2" Dia. Flare	2	555027

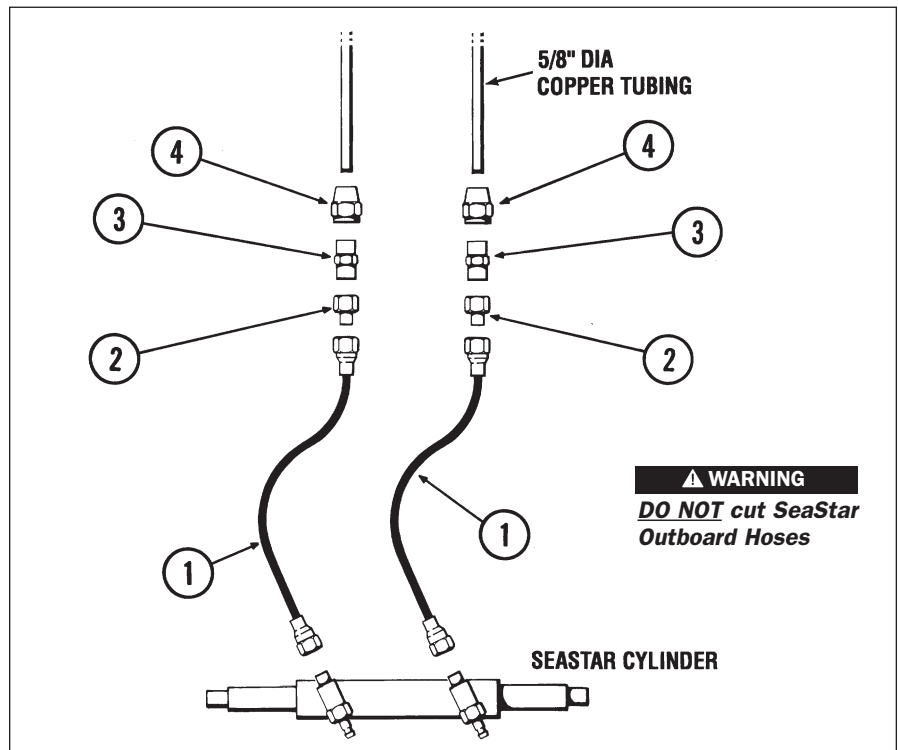


HF5569

Application

Kit to connect 5/8" diameter copper tubing to SeaStar cylinders

ITEM NO.	DESCRIPTION	QUANTITY PER KIT	PART NO.
1	18" Hose Kit	2	338621
2	Connector Fitting 3/8" NPT(F) – 3/8" Tube (M)	2	653624
3	Connector Fitting 1 End – 3/8" NPT(M) 1 End – 5/8" Dia. 45° Flare	2	288028
4	Tube Nut 5/8" Dia. Flare	2	555121



CAUTION

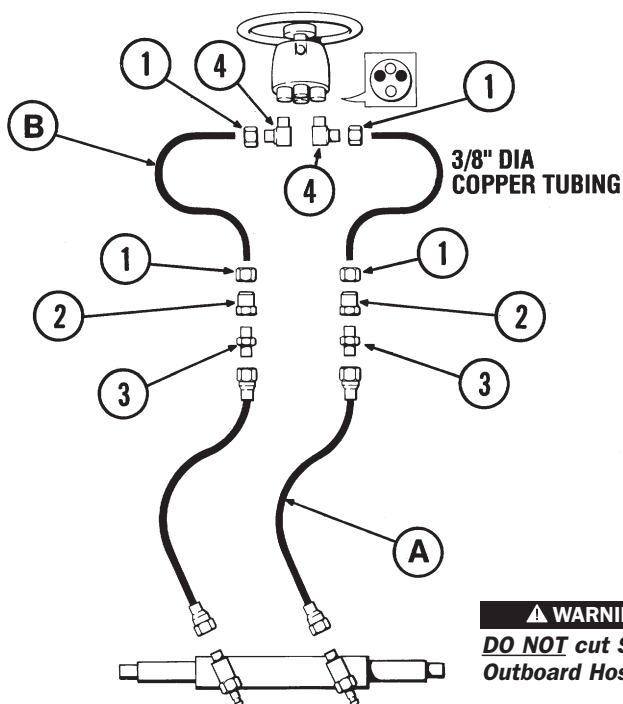
DO NOT cut SeaStar Outboard Steering hose. Once cut there is no means to field swage fittings to the ends of the hoses.

HF5581

Application
45° flare fitting connection kit
for SeaStar systems

ITEM NO.	DESCRIPTION	QUANTITY PER KIT	PART NO.
1	Tube Nut 3/8" Dia. 45° Flare	4	653022
2	Connector Fitting 1 End – 3/8" Dia. 45° Flare (M) 1 End – 3/8" NPT (F)	2	653126
3	Connector Fitting 3/8" Tube (M) – 3/8" NPT (F)	2	600602
4	Elbow 1 End – 1/4" NPT (M) 1 End – 3/8" Dia. 45° Flare (M)	2	288526
A*	Outboard Hose Kit		H051__
B*	Copper Tube 3/8" Dia.		

* NOT SUPPLIED WITH FITTING KIT



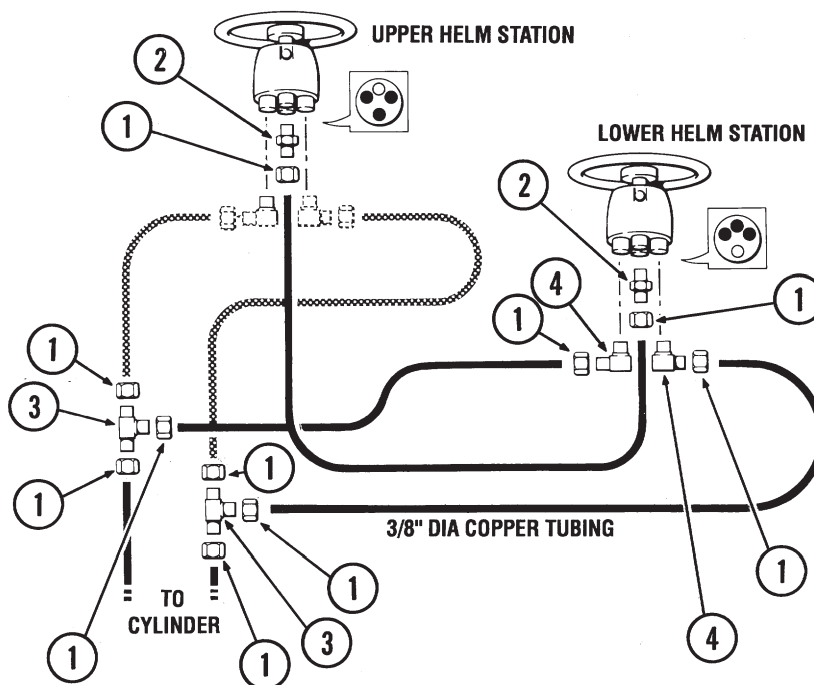
HF5582

Application
Add a station or autopilot kit
using 3/8" 45° flare fittings

ITEM NO.	DESCRIPTION	QUANTITY PER KIT	PART NO.
1	Tube Nut 3/8" Dia. 45° Flare	10	653022
2	Connector Fitting 1 End – 3/8" Dia. 45° Flare (M) 1 End – 1/4" NPT (M)	2	653323
3	Tee Fitting Both Ends – 3/8" Dia. 45° Flare (M)	2	653220
4	Elbow 1 End – 1/4" NPT (M) 1 End – 3/8" Dia. 45° Flare (M)	2	288526

NOTICE

Fittings for port and starboard lines in upper station not included.



SEASTAR LIQUID TIE BAR ALIGNMENT VALVE Part# HA5471-2

NOTICE

If a mechanical tiebar can be used, it is advisable that one is fitted. There is no substitute for a mechanical tiebar

CAUTION

Side Mount or Unbalanced Cylinders, such as SeaStar cylinder HC5370 can only be used with the valve by re-orienting the port engine tilt tube, to allow for mounting cylinder on the port (left) side of the port engine. Cylinder rods must face each other.

WARNING

The use of a standard helm at high speed (55 mph +) or a high load, eg: full throttle forward/reverse, may cause a vacuum in the liquid tie bar and cause engine/rudders to misalign, resulting in momentary loss of steering control. This will not occur if a SeaStar Pro Helm Pump (part # HH5770) is used.

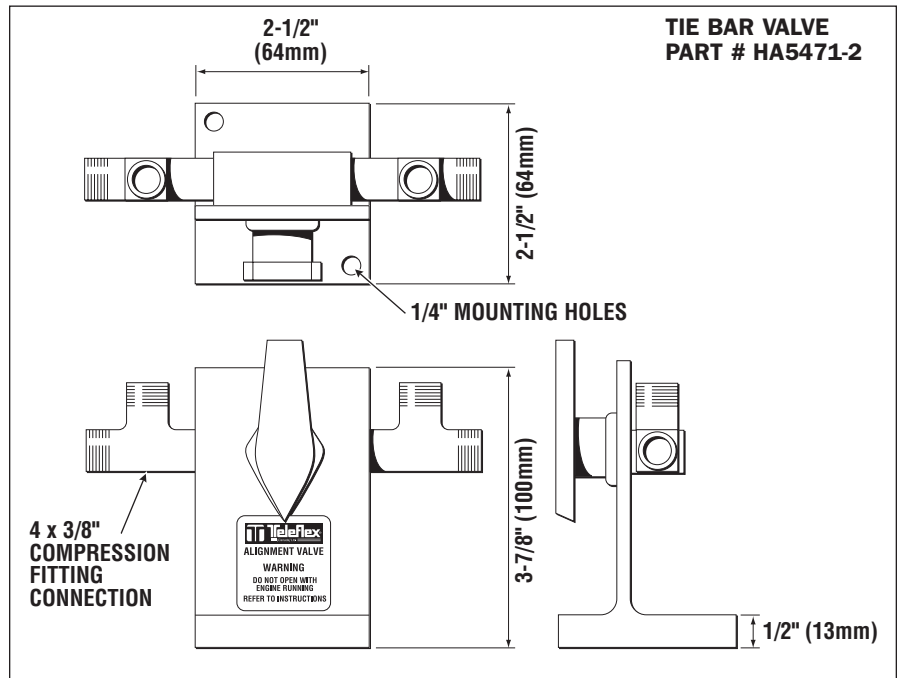
CAUTION

DO NOT allow cylinder body to move (HC5345), or shaft to move back into cylinder (HC5370).
DO NOT use a wrench to hold cylinder.

The Cylinder Alignment Valve (part # HA5471-2) will allow for the periodic required realignment of two outboard motors or rudders that are linked together with a Hydraulic Tie Bar as opposed to a solid link or a Mechanical Tie Bar.

Boats exceeding 55 mph must use the SeaStar Pro Helm Pump (part# HH5770) and SeaStar Pro Kevlar Hoses.

Due to the potential for leakage across the piston seals, it is possible for the engines to get out of synchronization. We are unable to predict, due to circumstances beyond our control, the frequency that misalignment may occur, therefore Engine alignment should be checked and corrected as required before leaving the dock.



Cylinder Alignment Valve Bleeding Instructions

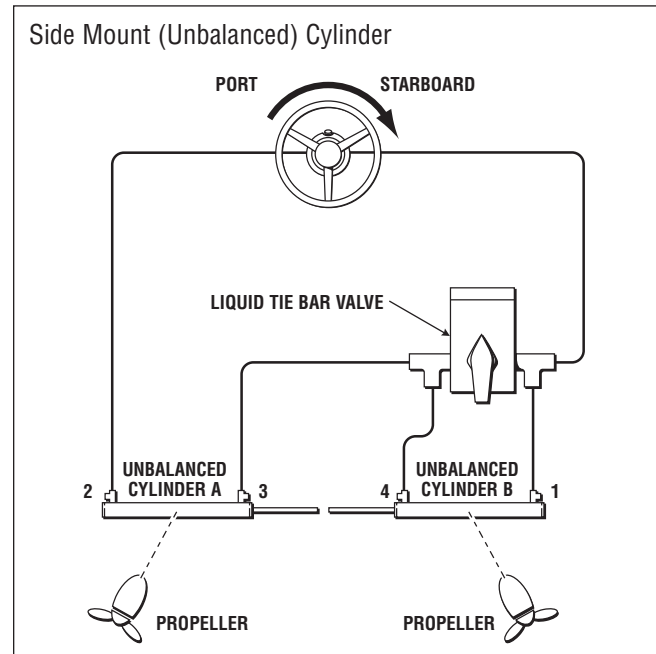
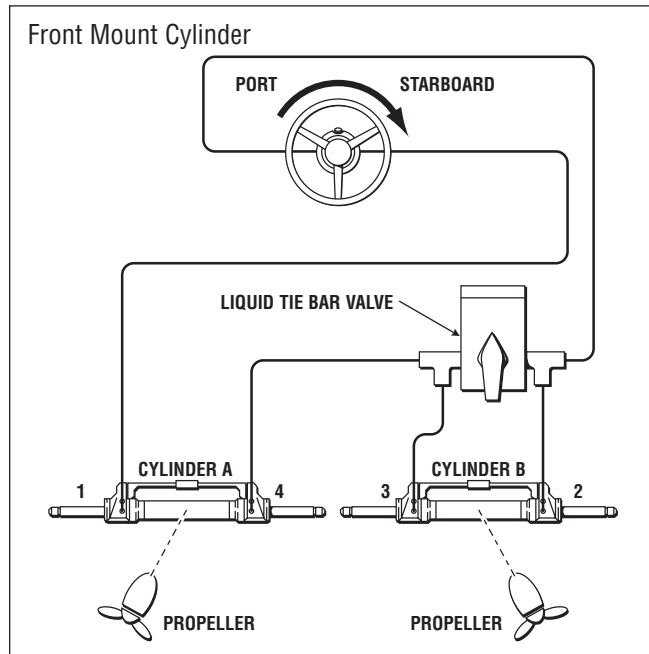
Referencing the cylinder alignment valve installation schematic.

- Fill helm with oil and attach filler device / container to helm
- Open valve
- Open bleed fitting no. 1 and pull cylinder shaft all the way out on fitting no. 1 side of cylinder
- Turn steering wheel clockwise until an air free stream of oil comes forth from bleed fitting no. 1
- Close bleed fitting no. 1
- Open bleed fitting no. 2 and pull cylinder shaft all the way out on fitting no. 2 side of cylinder
- Turn steering wheel counter-clockwise until an air free stream of oil comes forth from bleed fitting no. 2, then close bleed fitting no. 2
- Open bleed fitting no. 3 and pull cylinder shaft all the way out on fitting no. 3 side of cylinder
- Turn steering wheel counter-clockwise until an air free stream of oil comes forth from bleed fitting no. 3, then close bleed fitting no. 3
- Open bleed fitting no. 4 and pull cylinder shaft all the way out on fitting no. 4 side of cylinder
- Turn steering wheel counter-clockwise until an air free stream of oil comes forth from bleed fitting no. 4, then close bleed fitting no. 4
- Turn steering wheel back and forth from hardover to hardover a couple of times. Align cylinders by pulling cylinder rod all the way out on the same side of each cylinder and close valve

Realignment Instructions

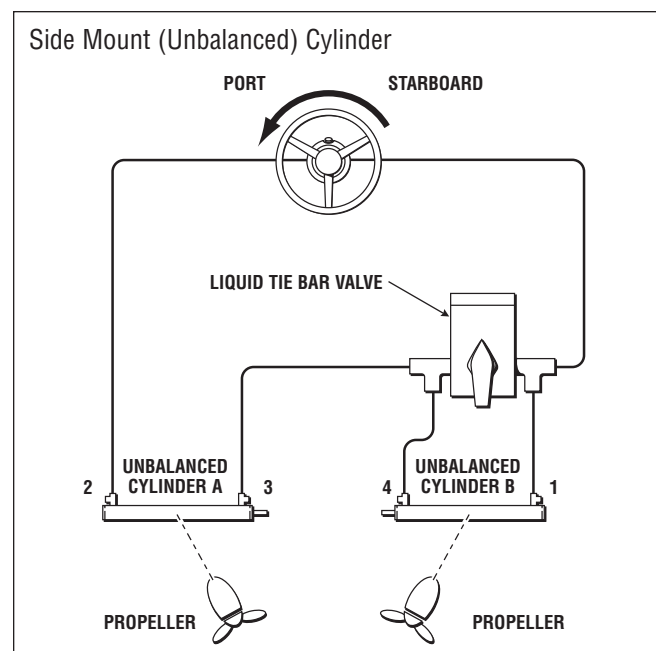
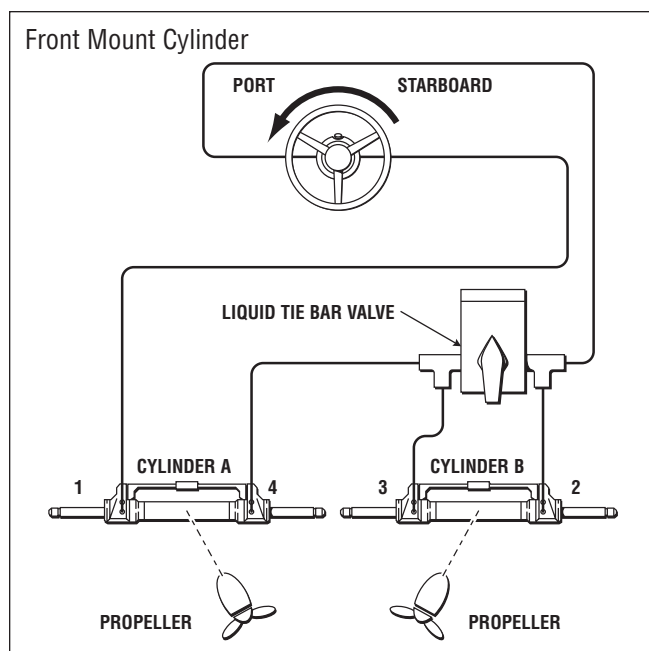
Engines Toe'd Outwards; Props too far apart

- 1 Turn the wheel hard over to Starboard. (Both cylinders move; cylinder B reaches hard over first)
- 2 Open the valve
- 3 Continue to turn the wheel hard over to Starboard. (Only cylinder A moves and reaches hard over)
- 4 Close the valve



Engines Toe'd Inwards; Props too close together

- 1 Turn the wheel hard over to Port. (Both cylinders move; cylinder B reaches hard over first)
- 2 Open the valve
- 3 Continue to turn the wheel hard over to Port. (Only cylinder A moves and reaches hard over)
- 4 Close the valve



TOOLS AND TORQUE DATA SHEETS

SeaStar Power Purge JR.

Part# HA5445-2



SeaStar®/BayStar™ Power Purge Jr. is the quickest way to bleed a SeaStar®/BayStar™ system in the field and assure a rock-solid steering feel every time!

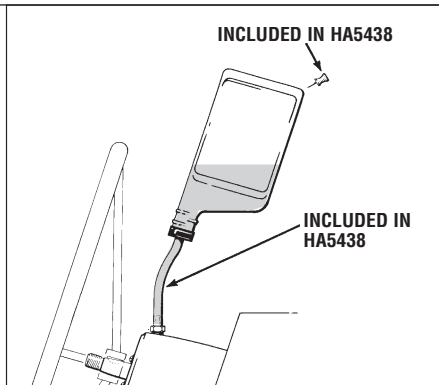
The Power Purge Jr. reduces installation and warranty costs while enhancing the quality of the boat to the end user. A typical manual fill and purge takes the average experienced installer or service technician about 30 minutes per boat — by using the Power Purge Jr. this can be reduced to 10 minutes or less.

Advantages:

- Steering feel is solid every time
- Complete Fill & Purge in 10 minutes or less
- Fast and efficient
- Easy to operate
- Screens contaminants from oil
- Quick connect fittings
- Convenient portable size
- Convenient electrical hook-up utilizing 12 volt boat battery
- Optional Dual Cylinder Purging Kit HA5461 available
- Optional 50' Hose Extension Kit HA5462, for those longer runs

SeaStar Bleed Hose

Part# HA5438



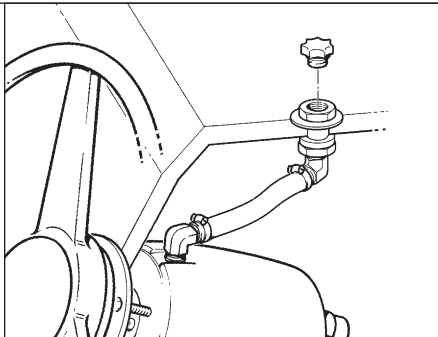
- This kit is needed to properly bleed the SeaStar Outboard steering kit
- Screws onto the SeaStar and equivalent fluid to bleed the SeaStar system
- Makes for a clean bleed when used properly

SeaStar Remote Fill

Part# HA6450

NOTICE

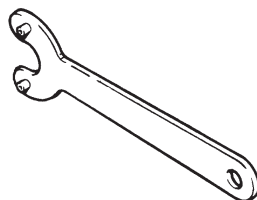
requires 3/4" hole to be drilled onto dash above helm pump.



- Can be used with ALL SeaStar Helm pumps
- Relocate your fill plug to a more convenient or hidden place

SeaStar Front Mount Gland Removal Tool

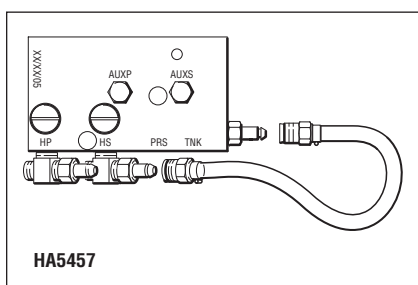
Part# 745225



- Makes changing the end glands on the front mount cylinder easy.
- Avoid damage to the gland by using the proper tool.
- Lightweight and durable.

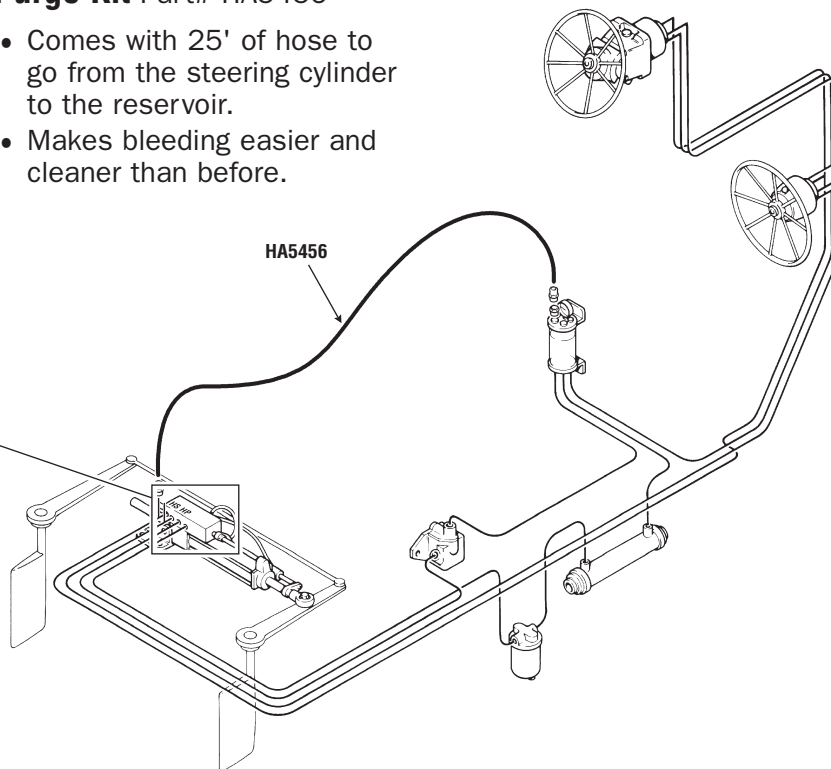
SeaStar Power Steering Purge Kit Part# HA5457

- Makes bleeding even easier than before.
- Central bleeding location—no need to run hoses to reservoir.
- Can only be used with Power Steering Cylinders made after October 2005.



SeaStar Power Steering Purge Kit Part# HA5456

- Comes with 25' of hose to go from the steering cylinder to the reservoir.
- Makes bleeding easier and cleaner than before.



SeaStar Helm Pump Drill Jigs

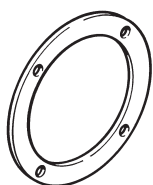
HA5405 Mounting washer for SeaStar helm studs for applications where the dashboard hole is 3-1/4 inches in diameter.

HA5465 Pilot Drill Jig for enlarging a 2 inch diameter dashboard hole to a 3 inch diameter hole. As required for all standard SeaStar and SeaStar Pro helms when using a standard 3 inch diameter hole saw.

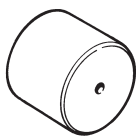
HA5466 Drill Jig for drilling mounting holes for standard SeaStar and SeaStar Pro helms. A 3 inch dashboard hole is required.

HA5467 Drill Jig for drilling mounting holes for standard SeaStar and SeaStar Pro helms where dashboard has a 3-1/4 inch hole from a previously mounted mechanical helm.

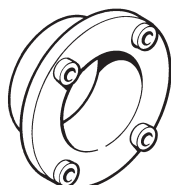
HA5468 Drill Jig for drilling mounting holes for SeaStar and SeaStar Pro traditional tilt helms (HH5741, HH5742, HH5743). Also back Mount Kit (HA5418). A 4-1/2 inch dashboard hole is required.



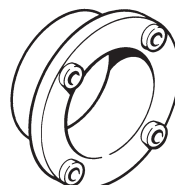
HA5405



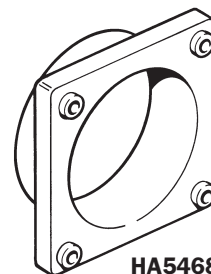
HA5465



HA5466



HA5467



HA5468

Steering Torque Data Sheet

SeaStar®

TORQUE DATA SHEETS

DISPLACEMENT HULLS ONLY

NAME: _____

CONTACT: _____

HULL DATA

HULL DIMENSIONS:

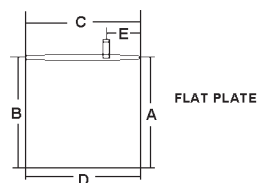
LOA _____ SAIL _____
 BEAM _____ OTHER _____
 DISPLACEMENT _____ TOP SPEED _____ Knots
 DRAFT _____ USE: _____
 NO. STEERING STATIONS _____

POWER DATA

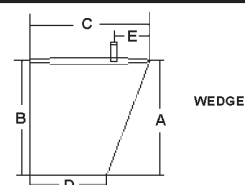
EACH SHAFT HORSEPOWER _____
 PROP DIAMETER: _____
 SINGLE ENGINE ☐
 TWIN ENGINE ☐

RUDDER DATA

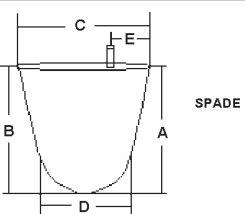
(CIRCLE TYPE OF RUDDER)



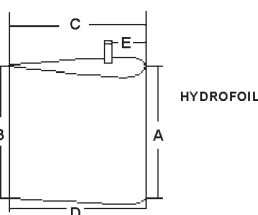
FLAT PLATE



WEDGE



SPADE



HYDROFOIL

RUDDER ARC (Midship to Hardover): _____ Degrees

RUDDER AREA: _____ Square Ft.

NO. RUDDERS ☐ One ☐ Two

RUDDER DIMENSIONS:

(A) Height _____ In.
 (B) Height _____ In.
 (C) Width _____ In.
 (D) Width _____ In.
 (E) Counter-balance _____ In.

NOTICE

Please include a detailed drawing of your rudder to assist with rudder load calculations.

Rudder Torque Data Sheet

To: _____

Phone Number: _____

Fax Number: _____

From: _____

Date: _____

PLANING HULLS ONLY

NAME: _____
ADDRESS: _____

BUILDER: _____
DESIGNER: _____
BOAT NAME: _____
NO. STEERING STATIONS: _____

HULL DATA

HULL DIMENSIONS:

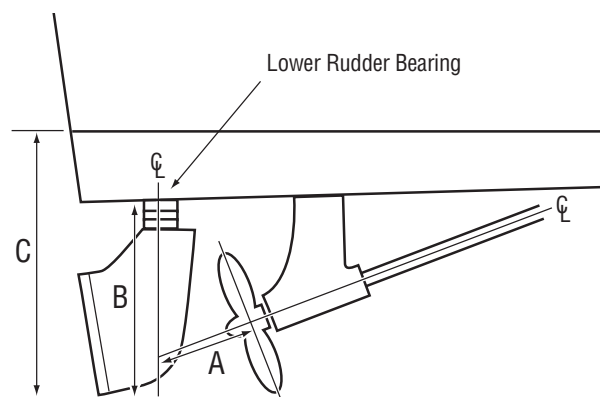
LOA _____ SAIL _____
BEAM _____ OTHER _____
DISPLACEMENT _____ TOP SPEED _____ Knots
DRAFT _____ USE: _____

POWER DATA

EACH SHAFT HORSEPOWER _____
PROP DIAMETER: _____
SINGLE ENGINE ☐
TWIN ENGINE ☐

DATA

FORMULA

Projected area of rudder = $(H+W) - (C+B)$


A = Perpendicular distance from the rudder shaft to the propeller.

B = Distance parallel to rudder shaft from rudder base to center of lower rudder bearing.

C = Perpendicular distance from waterline to rudder base.

Note: Formula presumes 23-27% counterbalance

Boat speed: _____ knots
Number of rudders: _____
Rudder area (projected area): _____ square feet
Propeller diameter: _____ feet
Perpendicular distance from the rudder shaft to the propeller: _____ feet
Distance measured parallel to the rudder shaft from the base of the rudder to the center of the lower bearings: _____ feet
Average rudder chord length: _____ feet
Perpendicular distance from the waterline to the rudder base: _____ feet
Rudder shaft diameter: _____ inches
Shaft power: _____ horsepower

NOTICE

Please include a detailed drawing of your rudder to assist with rudder load calculations.

**PLEASE TAKE A MOMENT TO COMPLETE
THIS FORM AND
RETURN IT VIA FAX TO: 604-279-2202**

BayStar™ SeaStar® Hynautic HYDRAULIC FLUID

SeaStar hydraulic steering systems require the use of a special high quality hydraulic fluid meeting MIL SPEC H-5606 G. This fluid is available in 1 liter (33.8 US fluid ounce) bottles as:

SeaStar Hydraulic Fluid: **Part Number HA5430 - 1 Litre**
HA5440 - 4 Litres

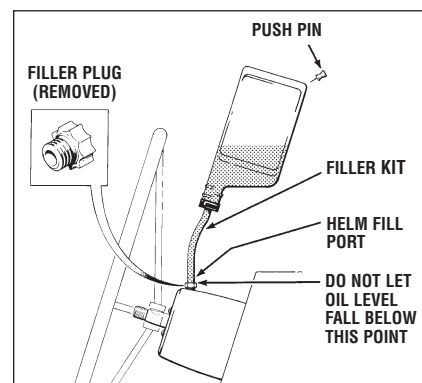


Alternate recommended hydraulic fluids for SeaStar steering systems.

Oil Manuf.	Brand Name
SeaStar	SeaStar oil part# HA5430
Shell	Aero Shell Fluid #41
Esso	Univis N15 or J13
Texaco	H015
Chevron	Aviation Hydraulic Fluid A
Mobil	Aero HFA
Petro Canada	Harmony HV115 (In Canada Only)

Optional Filler Kit

Part# HA5438



CAUTION

Substitution of non-recommended fluids may result in heavier steering and/or irreparable damage to your steering system.

NOTICE

SeaStar Hydraulic Steering Fluid can be used in Hynautic, BayStar and BayStar Plus steering systems.

NOTICE

Help protect your boating environment by ensuring that all used oil is disposed of properly.

SeaStar[®] Hynautic[®]

VOLUMES & CAPACITIES

NOTICE

Contact your nearest dealer or distributor to order replacement parts.

SeaStar Helm Pump Shaft Details:

Taper: 3/4" Standard Taper (1" PER FOOT), **WHEEL SHAFT Threads:** 5/8" - 18 UNF,
Key: #606 Woodruff Key (3/16"), **PORT SIZES:** 1/4" NPT (F)

Table A: SeaStar/Hynautic Helm Pumps

HELM DESCRIPTION	PART NUMBER	DISPLACEMENT CU. IN./REV (cc)	RELIEF VALVE SETTING PSI (BAR)	MAXIMUM WHEEL DIA. INCHES (mm)	SEAL KIT	SHAFT SEAL
SEASTAR 1.4 – STANDARD MOUNT	HH5269	1.4 (23.0)	1000 (70)	26 (660)	HS5176	225226
SEASTAR 1.4 – REAR MOUNT	HH5260	1.4 (22.9)	1000 (70)	26 (660)	HS5176*	225226*
SEASTAR 1.4 – REAR MOUNT FULL FEEDBACK	HH5231	1.4 (23.0)	1000 (70)	26 (660)	HS5176	225226
SEASTAR 1.4 – REAR MOUNT 1" STRAIGHT SHAFT	HH5279	1.4 (23.0)	1000 (70)	26 (660)	HS5151	225320
SEASTAR 1.4 – REAR MOUNT 1" TAPERED SHAFT	HH5280	1.4 (23.0)	1000 (70)	26 (660)	HS5151	225320
SEASTAR 1.4 – TILT	HH5744	1.4 (23.0)	1000 (70)		HS5176	225226
SEASTAR 1.7 – STANDARD FRONT MOUNT	HH5271	1.7 (27.8)	1000 (70)	26 (660)	HS5176*	225226*
SEASTAR 1.7 – STANDARD MOUNT FULL FEEDBACK	HH5761	1.7 (27.8)	1000 (70)	26 (660)	HS5176	225226
SEASTAR 1.7 – REAR MOUNT	HH5261	1.7 (27.8)	1000 (70)	26 (660)	HS5176*	225226*
SEASTAR 1.7 – REAR MOUNT 1" TAPERED SHAFT	HH5281	1.7 (27.8)	1000 (70)	26 (660)	HS5151	225320
SEASTAR 1.7 – TRADITIONAL TILT	HH5741	1.7 (27.8)	1000 (70)	20 (508)	HS5176*	225226*
SEASTAR 1.7 – SPORT TILT	HH5291	1.7 (27.8)	1000 (70)	26 (660)	HS5176*	225226*
SEASTAR PRO 1.7 – STANDARD MOUNT	HH5779	1.7 (27.8)	1500 (103)	26 (660)	HS5176	225226
SEASTAR PRO 1.7 – REAR MOUNT	HH5778	1.7 (27.8)	1500 (103)	26 (660)	HS5176	225226
SEASTAR PRO 1.7 – TILT	HH5773	1.7 (27.8)	1500 (103)		HS5176	225226
SEASTAR – 2.0 STANDARD FRONT MOUNT	HH5273	2.0 (33.0)	1000 (70)	26 (660)	HS5176*	225226*
SEASTAR – 2.0 STANDARD MOUNT FULL FEEDBACK	HH5760	2.0 (33.0)	1000 (70)	26 (660)	HS5176	225226
SEASTAR PRO 2.0 – STANDARD FRONT MOUNT	HH5770	2.0 (33.0)	1500 (103)	26 (660)	HS5176*	225226*
SEASTAR PRO 2.0 – REAR MOUNT	HH5771	2.0 (33.0)	1500 (103)	26 (660)	HS5176	225226
SEASTAR PRO 2.0 – TRADITIONAL TILT	HH5774	2.0 (33.0)	1500 (103)	20 (508)	HS5176*	225226*
SEASTAR PRO 2.0 – SPORT TILT	HH5290	2.0 (33.0)	1500 (103)	20 (508)	HS5176*	225226*
SEASTAR 2.4 – STANDARD FRONT MOUNT	HH5272	2.4 (39.3)	1000 (70)	26 (660)	HS5176*	225226*
SEASTAR 2.4 – STANDARD MOUNT FULL FEEDBACK	HH5762	2.4 (39.3)	100 (70)	26 (660)	HS5176	225226
SEASTAR 2.4 – REAR MOUNT	HH5262	2.4 (39.3)	1000 (70)	26 (660)	HS5176*	225226*
SEASTAR 2.4 – REAR MOUNT 1" TAPERED SHAFT	HH5282	2.4 (39.3)	1000 (70)	26 (660)	HS5151	225320
SEASTAR 2.4 – TRADITIONAL TILT	HH5742	2.4 (39.3)	1000 (70)	20 (508)	HS5176*	225226*
SEASTAR 2.4 – SPORT TILT	HH5292	2.4 (39.3)	1000 (70)	26 (660)	HS5176*	225226*
SEASTAR PRO 2.4 – STANDARD MOUNT	HH5772	2.4 (39.3)	1500 (103)	26 (660)	HS5176*	225226*

* SeaStar Helm Pumps manufactured from 1984 through 1990 require Seal Kit #HS5151 or individual Shaft Seal #225320

HELM DESCRIPTION	PART NUMBER	DISPLACEMENT CU. IN./REV (cc)	SHAFT STYLE	KEY WAY	SEAL KIT
HYNAUTIC	H-21	2.75 (45.1)	1" STRAIGHT	1/4" SQUARE	HS-02
HYNAUTIC	H-25	2.75 (45.1)	3/4" TAPERED	#9 WOODRUFF	HS-02
HYNAUTIC	H-26	2.00 (32.8)	3/4" TAPERED	#9 WOODRUFF	HS-02
HYNAUTIC	H-41	5.50 (90.1)	1" STRAIGHT	1/4" SQUARE	HS-04
HYNAUTIC	H-42	4.00 (65.5)	1" STRAIGHT	1/4" SQUARE	HS-04
HYNAUTIC	H-42-2	4.00 (65.5)	3/4" TAPERED	#9 WOODRUFF	HS-04

NOTICE

Theoretical torque about pivot point at 35 degrees articulation with 1000 psi (70 bar) system pressure.

Table B: SeaStar/Hynautic Cylinders

CYLINDER MODEL	PART NUMBER	BORE DIAMETER IN (mm)	NOMINAL SHAFT DIA IN (mm)	STROKE IN (mm)	SEAL KIT	VOLUME CUBIC IN (cc)	TORQUE (See Notice) IN-LB (KG-M)
BAYSTAR COMPACT	HC4645H	1.25 (31.7)	0.63 (16.0)	8 (203)	N/A	7.24 (118.6)	N/A
BAYSTAR COMPACT	HC4658H	1.25 (31.7)	0.63 (16.0)	8 (203)	N/A	7.24 (118.6)	N/A
BAYSTAR COMPACT	HC4647H	1.25 (31.7)	0.63 (16.0)	8 (203)	N/A	7.24 (118.6)	N/A
BAYSTAR COMPACT	HC4648H	1.25 (31.7)	0.63 (16.0)	8 (203)	N/A	7.24 (118.6)	N/A
BA125-3ATM	HC5303	1.25 (31.7)	0.63 (16.0)	3 (76)	HS5154	2.72 (44.5)	N/A
BA125-6.25ATM	HC5311	1.25 (31.7)	0.63 (16.0)	6.25 (159)	N/A	5.66 (92.7)	N/A
BA135-7	HC5332	1.37 (34.9)	0.625 (15.9)	7 (178)	HS5155	8.3 (135.2)	5741 (66.1)
BA125-7ATM	HC5312	1.25 (31.7)	0.50 (12.7)	7 (178)	HS5154	7.2 (118.2)	5025 (57.9)
BA135-7ATM	HC5313	1.375 (34.9)	0.625 (15.9)	7 (178)	HS5155	8.3 (135.2)	5741 (66.1)
BA135-8EM	HC5327	1.35 (34.2)	0.63 (16.0)	8 (203)	HS5155	9.5 (155.4)	6557 (75.5)
BA150-7ATM	HC5314	1.50 (38.1)	0.625 (15.9)	7 (178)	HS5156	10.2 (167.5)	7117 (82.0)
BA150-7TM	HC5318	1.50 (38.1)	0.625 (15.9)	7 (178)	HS5182	10.2 (167.5)	7117 (82.0)
BA175-7TM	HC5319	1.75 (44.4)	0.75 (19.0)	7 (178)	HS5183	13.7 (225.4)	9569 (110.2)
BA135-7EM	HC5332	1.375 (34.9)	0.625 (15.9)	7 (178)	HS5155	8.3 (135.2)	5741 (66.1)
BA150-7EM	HC5326	1.50 (38.1)	0.625 (15.9)	7 (178)	HS5156	10.2 (167.5)	8853 (102.0)
BA150-9TM	HC5369	1.50 (38.1)	0.625 (15.9)	9 (229)	HS5182	13.1 (214.7)	9375 (107.7)
BA175-9TM	HC5373	1.75 (44.4)	0.75 (19.0)	9 (229)	HS5183	17.7 (290.0)	12600 (145.5)
BA200-11TM	HC5378	2.00 (50.8)	0.75 (19.0)	11 (279)	HS5185	26.0 (426)	23140 (267.2)
BA200-11TMC	HC5379	2.00 (50.8)	0.75 (19.0)	11 (279)	HS5185	26.0 (426)	23140 (267.2)
BA200-9	HC5802	2.00 (50.8)	0.75 (19.0)	9 (229)	HS5198	21.25 (348.2)	18900 (218.3)
BA200-11	HC5804	2.00 (50.8)	0.75 (19.0)	11 (279)	HS5198	26.0 (426)	23140 (267.2)
125-8EM	HC5328	1.25 (31.7)	0.50 (12.7)	8 (203)	HS5154	8.3 (135.2)	7142 (82.3)
92VPS	HC5331	1.25 (31.7)	0.50 (12.7)	8 (203)	HS5153	8.3 (135.2)	N/A
BA125-8EMV	HC5330	1.25 (31.7)	0.50 (12.7)	8 (203)	HS5154	8.3 (135.2)	7142 (82.3)
PIVOT MOUNT	HC5345	1.375 (35)	0.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	N/A
PIVOT MOUNT	HC5347	1.375 (35)	0.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	N/A
PIVOT MOUNT	HC5348	1.375 (35)	0.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	N/A
PIVOT MOUNT	HC5358	1.375 (35)	0.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	N/A
FRONT MOUNT	HC5342	1.262 (32.56)	0.75 (19.0)	10 (254)	HS5157	8.13 (133.2)	N/A
SIDE MOUNT	HC5370	1.25 (31.7)	0.50 (12.7)	8 (203)	HS5153	8.3 (135.2)	N/A
SPLASHWELL MOUNT	HC5380	1.25 (31.7)	0.50 (12.7)	9 (228)	HS5155	9.3 (152.1)	N/A
CATAMARAN O/B	HC5343	1.262 (32.0)	0.75 (19.0)	10 (254)	HS5157	8.13 (133.2)	N/A
CATAMARAN O/B	HC5374	1.50 (38.1)	0.75 (19.0)	10 (254)	KS-06	13.3 (217.95)	8990 (103.8)
HYNAUTIC	K-5	1.50 (38.1)	0.875 (22.2)	9.0 (229)	KS-15	15.9 (260.5)	10790 (124.6)
HYNAUTIC	K-8	2.50 (63.5)	1.000 (25.4)	9.5 (241)	KS-18	39.2 (642.4)	26575 (306.9)
HYNAUTIC	K-9	2.50 (63.5)	1.000 (25.4)	14.5 (368)	KS-18	55.0 (901.3)	39850 (460.2)
HYNAUTIC	K-18	1.25 (31.7)	0.625 (15.9)	7.0 (178)	KS-02	7.0 (114.7)	5972 (68.8)
HYNAUTIC	K-19	1.25 (31.7)	0.625 (15.9)	9.0 (229)	KS-02	9.0 (147.5)	7685 (88.54)
HYNAUTIC	K-22	1.50 (38.1)	0.750 (19.0)	10.0 (254)	KS-04	13.3 (217.9)	8990 (103.8)
HYNAUTIC	K-27	1.50 (38.1)	0.750 (19.0)	10.0 (254)	KS-04	13.3 (217.9)	8990 (103.8)
HYNAUTIC	K-31	2.00 (50.8)	0.875 (22.2)	10.0 (254)	KS-05	25.5 (417.9)	17320 (200.0)
TOURNAMENT SERIES	HC6750	1.375	0.75 (19.0)	8 (203)	HS5157	8.3 (135.2)	N/A
TOURNAMENT SERIES	HC6751	1.375	0.75 (19.0)	8 (203)	HS5157	8.3 (135.2)	N/A
TOURNAMENT SERIES	HC6752	1.375	0.75 (19.0)	8 (203)	HS5157	8.3 (135.2)	N/A
TOURNAMENT SERIES	HC6753	1.375	0.75 (19.0)	8 (203)	HS5157	8.3 (135.2)	N/A
TOURNAMENT SERIES	HC6754	1.375	0.75 (19.0)	8 (203)	HS5157	8.3 (135.2)	N/A
TOURNAMENT SERIES	HC6755	1.375	0.75 (19.0)	8 (203)	HS5157	8.3 (135.2)	N/A

NOTICE

Theoretical torque about pivot point at 35 degrees articulation with 1000 psi (70 bar) system pressure.

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e-mail: dutch@lfsinc.com
www.lfsinc.com

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99576
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www.lfsinc.com

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Alaska
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e-mail: reddeninc@worldnet.att.net
www.reddenmarine.com

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Homer
Alaska
99603
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Toll Free: 800-478-8612
e-mail: reddeninc@worldnet.att.net
www.reddenmarine.com

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99518
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Toll Free: 800-226-4562
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66111-3483
USA
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Louisiana
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e-mail: sales@beaconsupply.com
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USA
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11944
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www.paxtonco.com

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www.benrock.com

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Oregon
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Foot of 15th Street, Box 296
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Oregon
97103
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29492
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77003
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76118
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Fischer Panda

Operation manual

Description of the generator and operation manual



Panda 8000NE PMS Digital Super silent technology

230V - 50Hz / 120V - 60Hz / 7kW

Fischer Panda GmbH

Current revision status

	Document
Actual:	Panda_8000NE_PMS_Digital_s00860_Operation manual.R03_1.4.08
Replace:	Panda_8000NE_PMS_Digital_s00860_Operation manual.R02a

Revision	Page
Model Changes: New generator housing, new relais, water filler cap removed	--

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Fischer Panda

FISCHER GENERATORS have been manufactured since 1978 and are a well-known brand for first class diesel generators with especially effective sound-insulation.

Fischer has been one of the leading manufacturers in respect of quality and know-how during this period.

FISCHER, as the worldwide manufacturer of modern marine diesel generators, developed the Sailor-Silent series for example and produced a GFK sound-insulated capsule as early as 1979 and the basis for new generator technology.

The companies Fischer and Icemaster amalgamated under the direction of Icemaster in 1988, in order to concentrate on the development of new products. Production was moved to Paderborn.

The amalgamation of the two qualified companies led to the development of a complete new programme within a short space of time. The generators developed at that time set new technological standards worldwide.

The generators became more efficient and powerful than other generators in the same nominal performance range, because of the improved cooling. Panda generator demonstrated its superiority in several tests by renowned institutes and magazines during the past years. The patented VCS (voltage Control System) means it can meet all demands including motor speed. The start-booster (ASB) means Panda generators meet the highest demands in respect of voltage stability and starting values. A Panda generator, with the same drive motor, produces 15 % more effective output than the majority of conventional generators. This superiority in efficiency also ensures a fuel saving to the same extent.

The 100% water-cooled Panda generators are currently manufactured in the performance range from 2 to 100 kW in various versions. Fast running motors are preferred for performances up to approx. 30 kW (nominal speed 3000 rpm). The heavier slow runners are preferred for the higher range. The fast running generators have proved themselves many times for many uses, that they meet the demands in quality of yachts and vehicles, and offer space and weight saving of 50 % compared to slow running generators.

In addition to the Panda series, Fischer Panda also supply the super compact high-tech sound-insulated battery charging generators from the DC/AC Panda AGT series, which is a very interesting solution for the production of mobile power.

The HTG-alternators ensure that a charging rate of 285 amps is achieved that was scarcely thought possible for this compact construction. This alternator replaces a separate shipboard generators (constant 230 volts AC with up to 3500 kW from the main machine)

Fischer Panda GmbH, 33104 Paderborn, reserves all rights regarding text and graphics. Details are given to the best of our knowledge. No liability is accepted for correctness. Technical modifications for improving the product without previous notice may be undertaken without notice. Before installation, it must be ensured that the pictures, diagrams and related material are applicable to the genset supplied. Enquiries must be made in case of doubt.

Safety first

These symbols are used throughout this manual and on labels on the machine itself to warn of the possibility of personal injury. Read these instructions carefully. It is essential that you read the instructions and safety regulations before you attempt to assemble or use unit.



This danger symbol refers to toxic danger and draws attention to special warnings, instructions or procedures which, if not strictly observed, may result in severe personal injury or loss of life.



This danger symbol refers to electric danger and draws attention to special warnings, instructions or procedures which, if not strictly observed, may result in electrical shock which will result in severe personal injury or loss of life.



This warning symbol draws attention to special warnings, instructions or procedures which, if not strictly observed, may result in damage or destruction of equipment, severe personal injury or loss of life.



This warning symbol draws attention to special warnings, instructions or procedures which, if not strictly observed, may result in damage or destruction of equipment

Tools

This symbols are used throughout this manual to show which tool must be used at maintenance or installation.

	Spanners X = required size
	Hook wrench for oil filter
	Screw driver, for slotted head screws and for recessed head screws
	Multimeter, multimeter with capacitor measuring
	Socket wrench set
	Hexagon wrench keys

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.



Attention, Important Directions regarding Operation!

1. The installation certificate must be completed when taken into use, and certified by a signature.
2. The installation certificate must be despatched within two weeks of use to Fischer Panda.
3. The official guaranty confirmation will be completed by Fischer Panda after receipt and sent to the customer.
4. A guaranty must be shown to make any claims.

Claims against the guaranty will not be accepted if the above said instructions are not, or only partially, carried out.

Manufacturer declaration in accordance with the machine guideline 98/37/EG

The generator has been developed in such a way, that all assembly groups correspond to the CE guidelines. If machine guideline 98/37/EG is applied, then it is forbidden to start the generator, until it has been ascertained that the system into which the generator is to be integrated, also corresponds to the machine guideline regulation 98/37/EG. This includes the exhaust system, cooling system and electrical installation.

The evaluation of "protection against contact" must be carried out when installed, in conjunction with the respective system. This includes correct electrical connections, a safe ground wire connection, foreign body and humidity protection, protection against humidity due to excessive condensation, as well as overheating through appropriate and inappropriate use in its installed state. The responsibility lies with those who undertake installation of the generator in the final system.

Use the advantages of the customer registration:

- Thus you receive to extended product informations, which are sometimes safety-relevant
- you receive, if necessarily free Upgrades

Far advantages:

By your full information Fischer Panda technicians can give you fast assistance, since 90% of the disturbances result from errors in the periphery.

Problems due to errors in the installation can be recognized in the apron.

Technical Support per Internet: info@fischerpanda.de

Safety Precautions

The electrical installations may only be carried out by trained and qualified personnel!



Safety Instructions concerning operating the generator

- The generator must not be taken into use with the cover removed.
- If the generator is being installed without a sound insulation capsule, then make sure, that all rotating parts (belt-pulley, belts etc) are covered and protected so that there is no danger to life and body!
- If a sound insulation covering will be produced at the place of installation, then well-placed signs must show that the generator can only be switched on with a closed capsule.
- All servicing-, maintenance or repair work may only carried out, when the motor is not running.
- There is full current in the AC control box when the generator is running. It must therefore be ensured that the control box is closed and cannot be touched when the generator is running.
- Do not work in an ambient, where there are explosives. Working on an electrical system in an ambient where there are flammable gases is dangerous.
- Electrical voltages above 48 volts (battery chargers greater than 36 volts) are always dangerous to life). The rules of the respective regional authority must be adhered to. Only an electrician may carry out installation of the electrical connections for safety reasons.

Ground Wire:

The generator, is "earthed" as series (centre and ground are connected together in the generator terminal box by a bridge). This is an initial ground fuse, which offers protection, as long as no other measures are installed. Above all, it is conceived for the delivery and possible test run.

This "neutralisation" (Protective Earthing Neutral - PEN) is only effective, if all parts of the electrical system are commonly "earthed" to a common potential. The bridges can be removed, if this is necessary for technical reasons and another protective system has been setup.

Safety Instructions concerning working on the generator

The battery must always be disconnected, if work on the generator or electrical system is to be carried out, so that the generator cannot be unintentionally started. **It is not allowed to disconnect the battery during operation!** After the generator has been stopped, the battery can be disconnected!

Switch off all load when working on the generator

All load must be disconnected, in order to avoid damages to the devices. In addition the semi conductors in the AC control box must be disconnected in order to avoid the boat capacitors being activated. The minus pole of the battery ought to be removed.

Safety Instructions concerning the capacitors

Capacitors are required to run the generator. These have two varying functions:

- A) The working capacitors
- B) The (Booster) capacitors

Both Groups are located in a separate AC-Control box.

Capacitors are electrical stores. There could be a residual of high electrical current at the contacts for a period disconnection from the circuit. The contacts may not be touched for safety reasons, If the capacitors are to be exchanged or checked, and then a short circuit between the contacts should be made so that the stored energy is discharged.

If the generator is switched off in the normal manner, the working capacitors are automatically discharged by means of the windings. The booster capacitors are discharged by means of internal discharge resistors.

All capacitors must be short-circuited before work is carried out on the AC-Control box for safety reasons.

Safety Instructions concerning the cables

Cable Type

It is recommended is that the cable used be UL 1426 (BC-5W2) compliant, with Type 3 stranding (ABYC Section E-11)

Cable Size

The cable size must be selected taking into account the amperage, voltage and conductor length (from the positive power source connection to the electrical device and back to the negative power source connection.

Cable Installation

It is recommended that a self draining wire loom classified as V-2 or better in accordance with UL 94 be installed in the section of the cable routed in the interior of the sound capsule. Care should be taken to avoid hot surfaces such as the exhaust manifold or engine oil drain bolt and routed clear of any possible sources of chafing.

Battery

Warning:

Do not use Gel-Cel batteries, because the regulation voltage is high for this type of batteries.

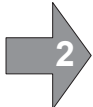
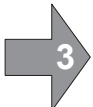
Do not use large batterybanks as a starting battery. The generator must have a dedicated starter battery (maximum size group 24).



Recommend starter battery size (if model not shown - please see engine manual)

Panda 6000 -8000	12V, 28AH equivalent	Panda 18	12V, 65AH equivalent
Panda 9000-14000	12V, 36AH equivalent	Panda 24-30	12V, 70AH equivalent
Panda 16	12V, 52AH equivalent	Panda 33-42	12V, 100 to 120AH equivalent



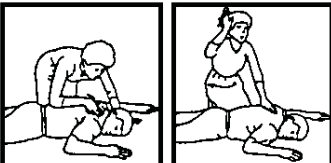
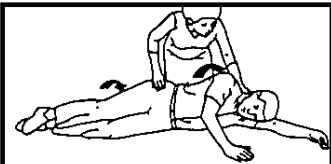
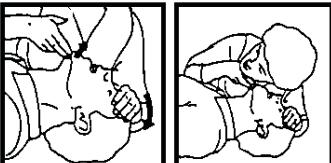
	5 Safety steps to follow if someone is the victim of electrical shock	
	Do not try to pull or grab the individual.	
	Send for help as soon as possible.	
	If possible, turn off the electrical power.	
	If you cannot turn off the electrical power, pull, push, or lift the person to safety using a wooden pole, rope, or some nonconductive material.	
	After the injured person is free of contact with the source of electrical shock, move them a short distance away and immediately start necessary first aid procedures.	

WHEN AN ADULT STOPS BREATHING

WARNING



DO NOT attempt to perform the rescue breathing techniques provided on this page, unless certified. Performance of these techniques by uncertified personnel could result in further injury or death to the victim.

1 Does the Person Respond?		2 Shout, "Help!"
Tap or gently shake victim. Shout, "Are you OK?"		Call people who can phone for help.
3 Roll Person onto Back.		
Roll victim toward you by pulling slowly.		
4 Open Airway.		5 Check for Breathing.
Tilt head back, and lift chin. Shout, "Are you OK?"		Look, listen, and feel for breathing for 3 to 5 seconds.
6 Give 2 Full Breaths.		
Keep head tilted back. Pinch nose shut. Seal your lips tight around victim's mouth. Give 2 full breaths for 1 to 1½ seconds each.		
7 Check for Pulse at side of Neck.		8 Phone EMS for Help.
Feel for pulse for 5 to 10 seconds.		Send someone to call an ambulance.
9 Begin Rescue Breathing.		10 Recheck Pulse Every Minute.
Keep head tilted back. Lift chin. Pinch nose shut. Give 1 full breath every 5 seconds. Look, listen, and feel for breathing between breaths.		Keep head tilted back. Feel for pulse for 5 to 10 seconds. If victim has pulse, not breathing, continue rescue breathing. If no pulse, begin CPR.

A. The Panda Generator

A.1 Type plate at the Generator

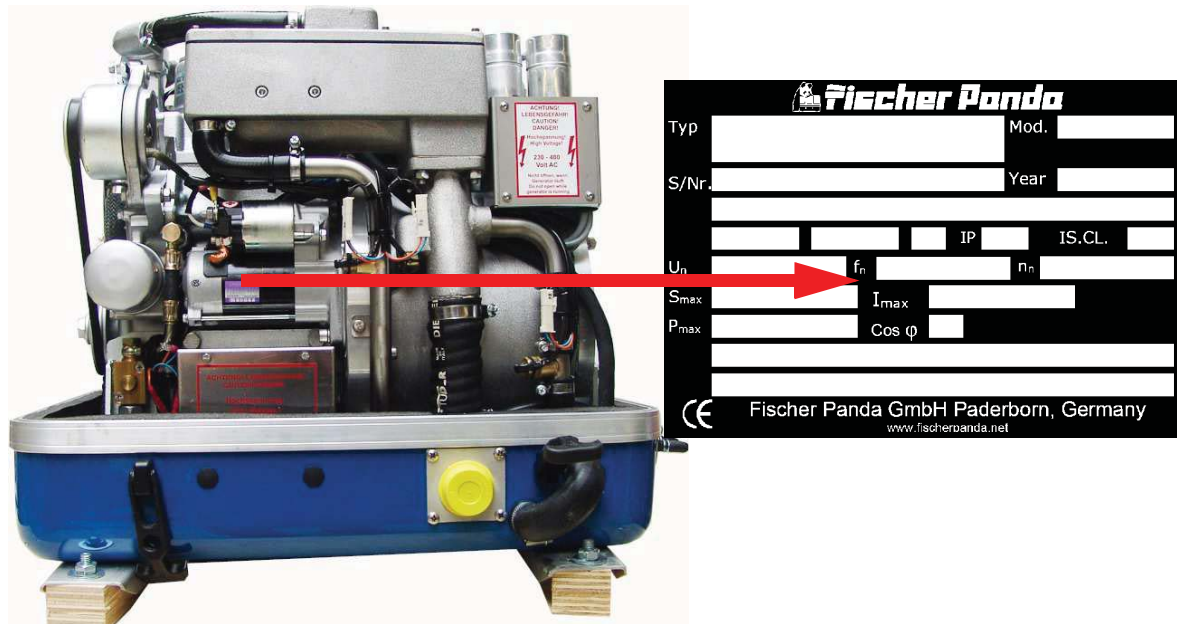


Fig. A.1-1: Type plate

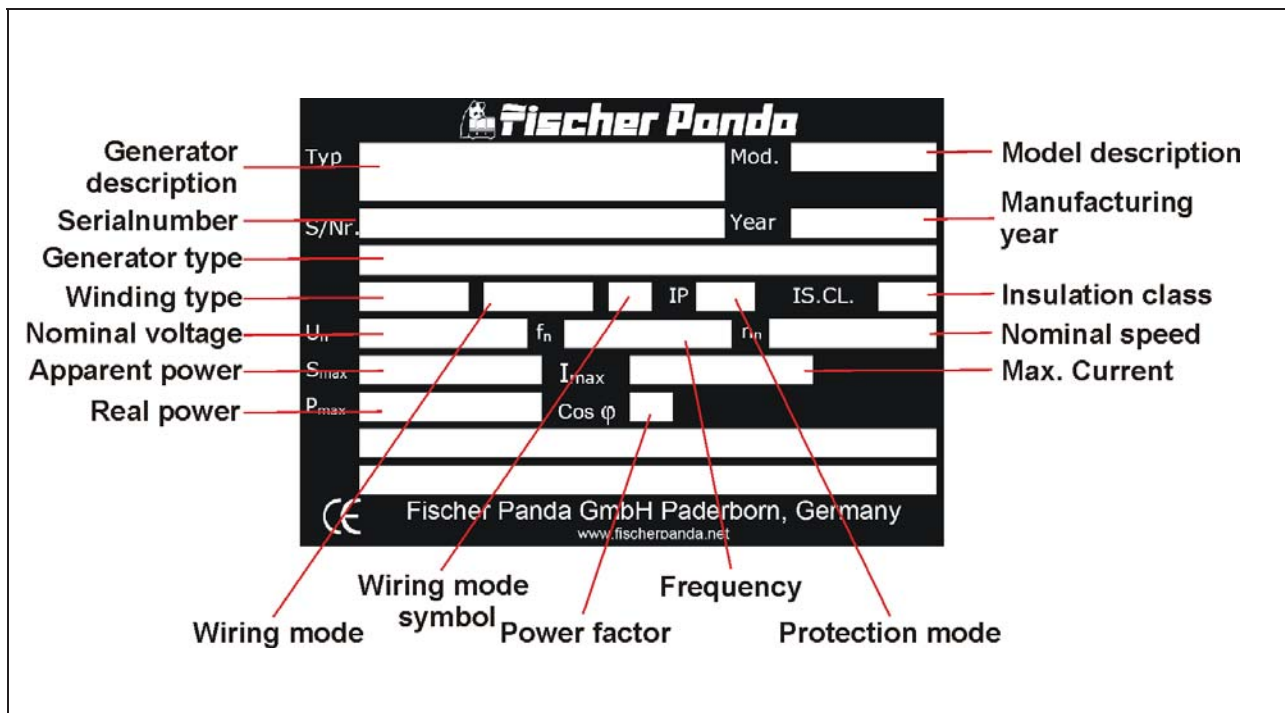


Fig. A.1-2: Discription type plate

A.2 Description of the Generator

A.2.1 Right Side View - Panda 8000 NE 50Hz + 60 Hz

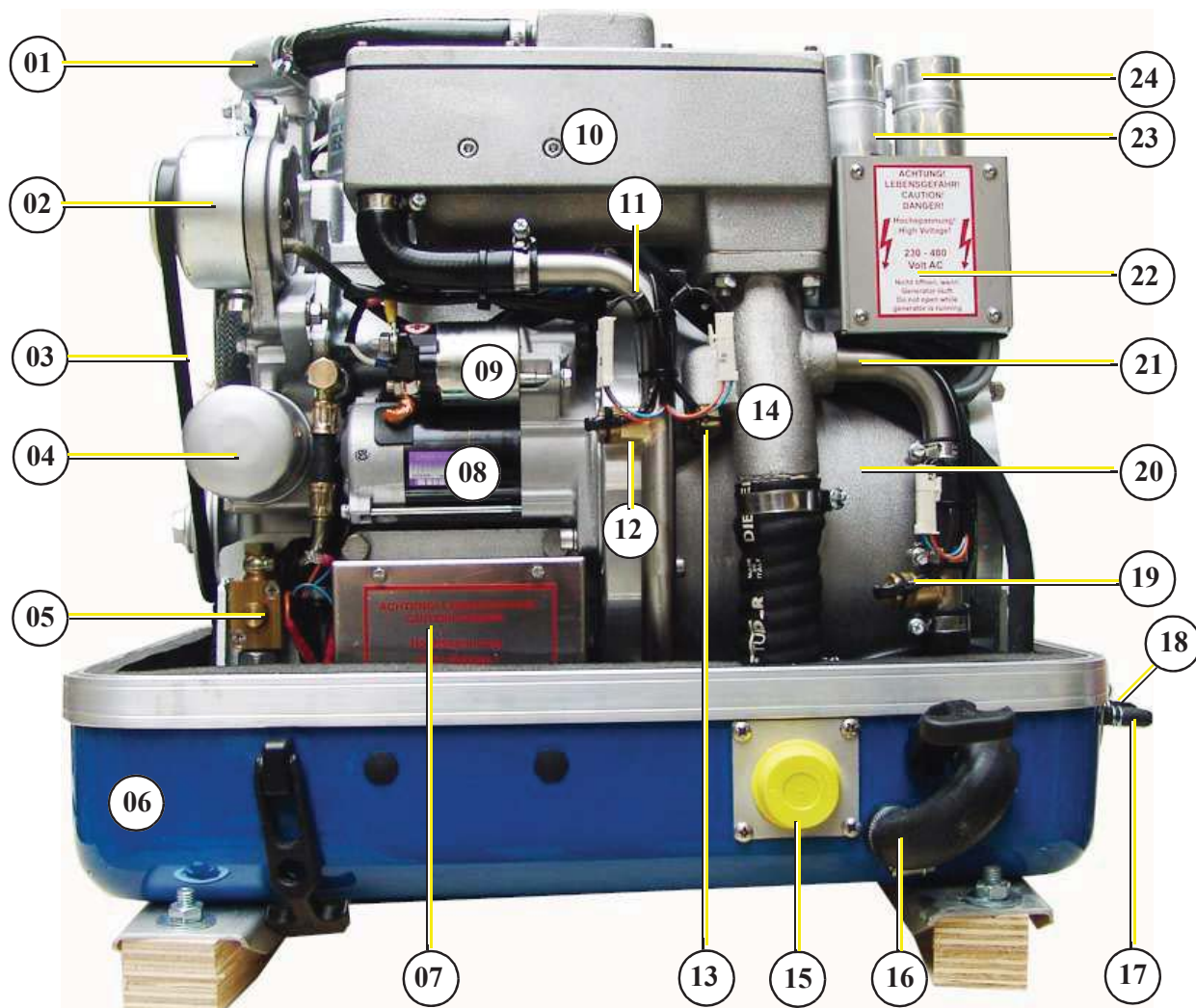
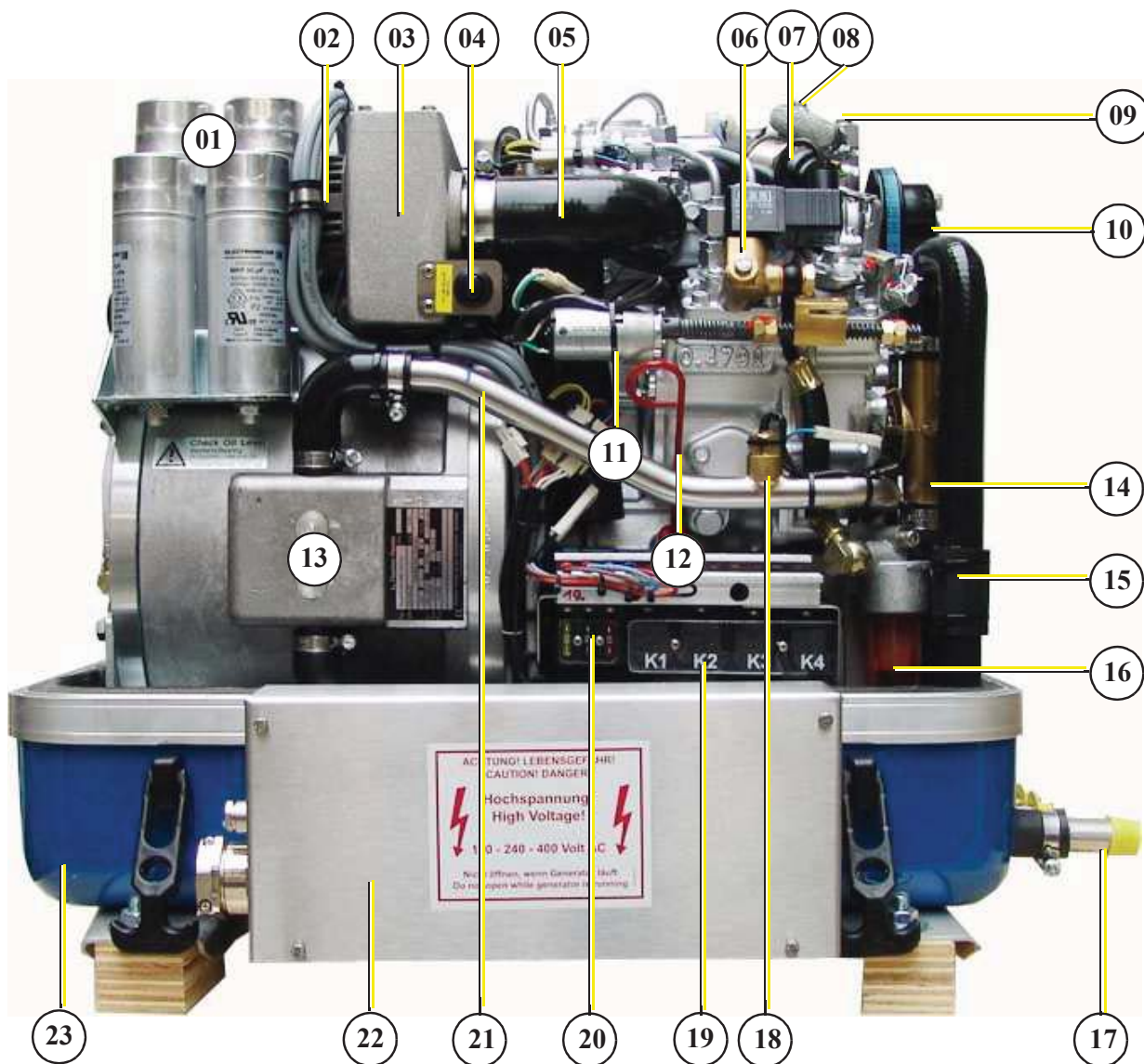


Fig. A.2.1-1: Right Side View Panda 8000 NE

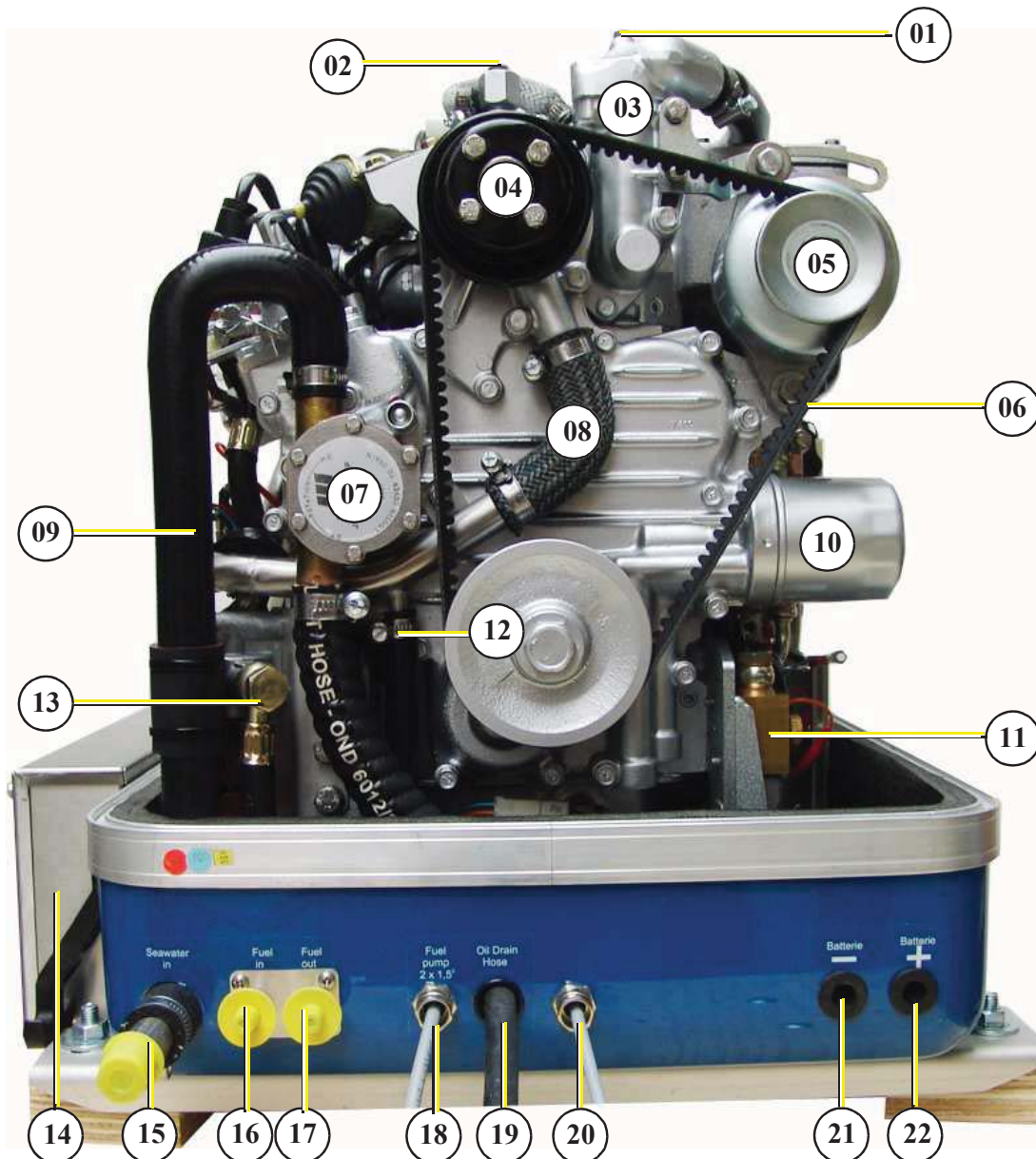
A.2.2 Left Side View - Panda 8000 NE 50Hz + 60 Hz



- | | |
|---|---|
| 01. Excitation capacitors (4x50μF) | 13. Cooling water connection block |
| 02. Charge control for DC-alternator | 14. Raw water pump |
| 03. Air suction housing with air filter | 15. Raw water intake hose |
| 04. Failure bypass switch | 16. Fuel filter |
| 05. Air suction hose to induction elbow | 17. Raw water inlet |
| 06. Fuel solenoid valve | 18. Thermo-sensor freshwater in |
| 07. Stop solenoid | 19. Power relays |
| 08. Ventilation screw thermostat housing | 20. Electrical fuses |
| 09. Ventilation screw internal cooling water pump | 21. Cooling water pipe, connection block - cooling water pump |
| 10. Pulley for internal cooling water pump | 22. Control box |
| 11. Actuator for speed control | 23. Sound cover - base part |
| 12. Oil dipstick | |

Fig. A.2.2-1: Left Side View Panda 8000 NE

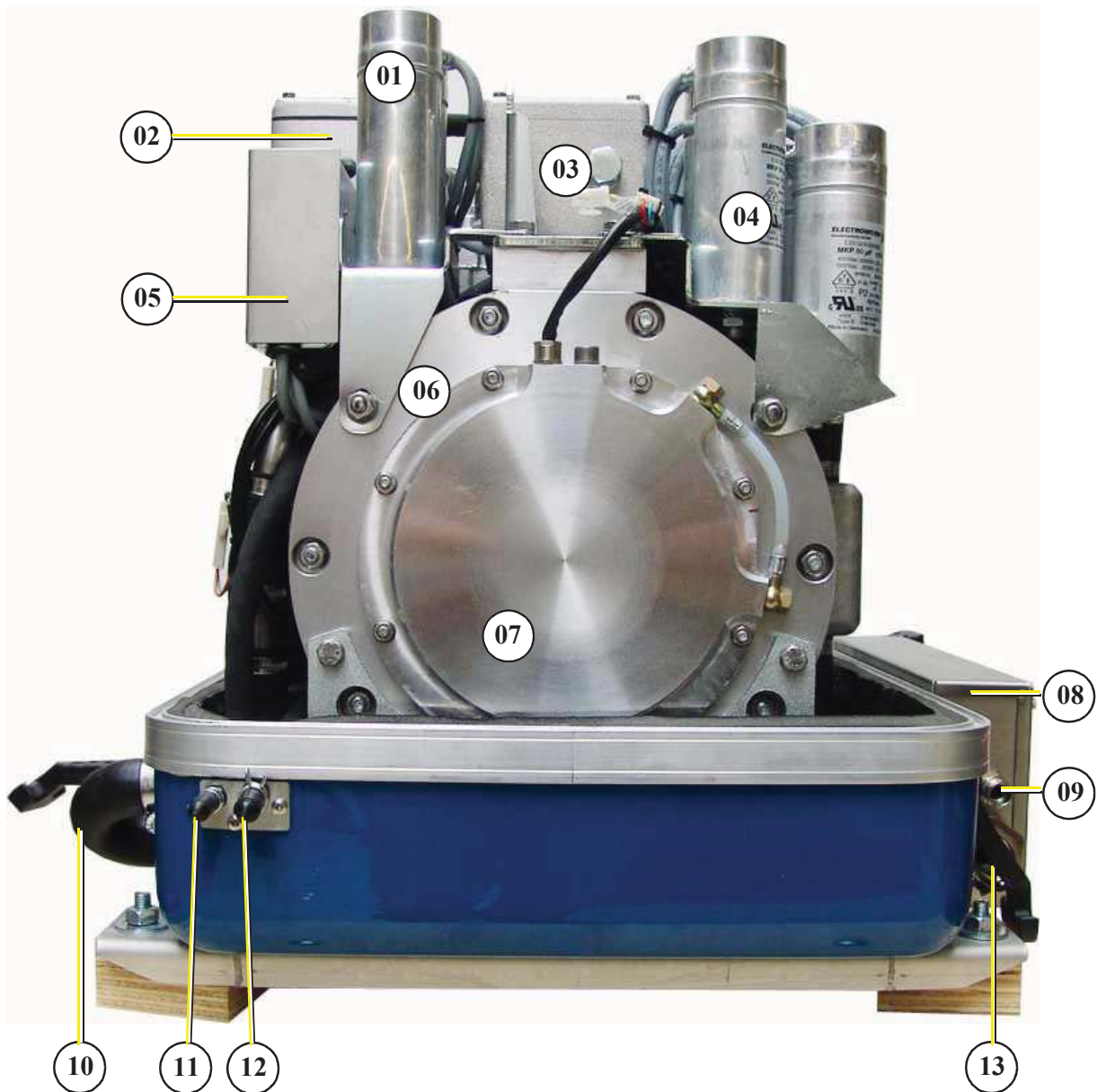
A.2.3 Front View - Panda 8000 NE 50Hz+60Hz



- | | |
|--|---|
| 01. Ventilation screw thermostat housing | 12. Injection hose, freshwater from external expansion tank |
| 02. Ventilation screw internal cooling water pump | 13. Fuel filter |
| 03. Thermostat housing with thermostat set | 14. Control box |
| 04. Pulley for internal cooling water pump | 15. Raw water inlet |
| 05. 12V DC-alternator | 16. Fuel intake connection |
| 06. V-belt for DC-alternator and internal cooling water pump | 17. Fuel backflow connection |
| 07. Raw water pump | 18. Cable fuel pump |
| 08. Freshwater intake pipe | 19. Oil drain hose |
| 09. Hose for raw water intake | 20. Cable for fuel level sensor |
| 10. Engine oil filter | 21. Passage for cable starter battery minus (-) |
| 11. Oil pressure switch | 22. Passage for cable starter battery plus (+) |

Fig. A.2.3-1: Front View Panda 8000 NE

A.2.4 Back View - Panda 8000 NE 50Hz

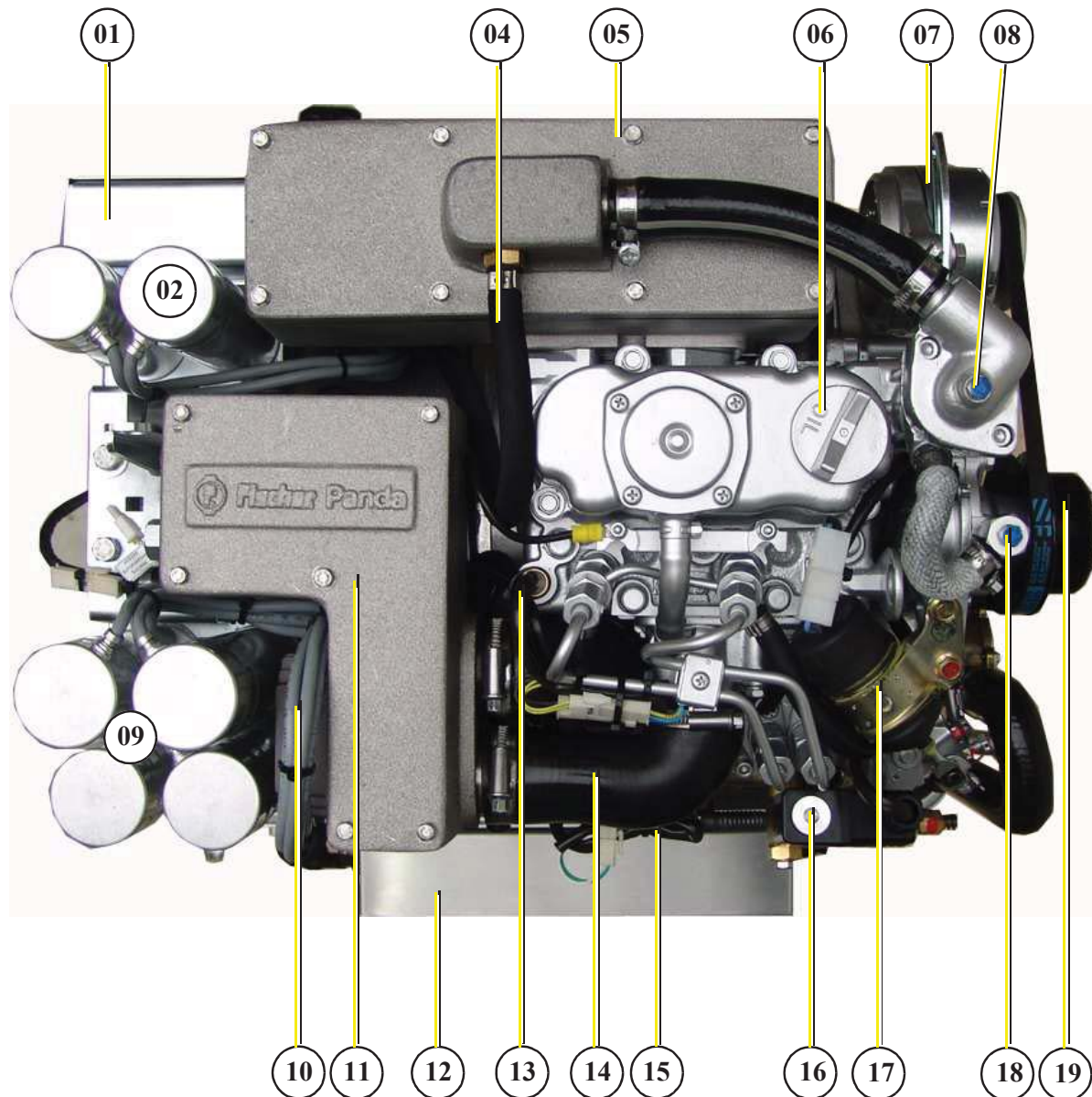


- 01. Booster capacitor
- 02. Water-cooled exhaust elbow
- 03. Air suction housing with air filter
- 04. Excitation capacitors (4x50 μ F)
- 05. Solid state relay for booster capacitor
- 06. Generator front cover
- 07. Cover for oil-cooled bearing

- 08. Control box
- 09. Passage for cable control panel
- 10. Connection external ventilation valve
- 11. Intake to external cooling water expansion tank
- 12. Backflow from external cooling water expansion tank
- 13. Passage for cable load

Fig. A.2.4-1: Back View Panda 8000 NE 60 Hz only

A.2.5 View from Above - Panda 8000 NE 50Hz+60Hz

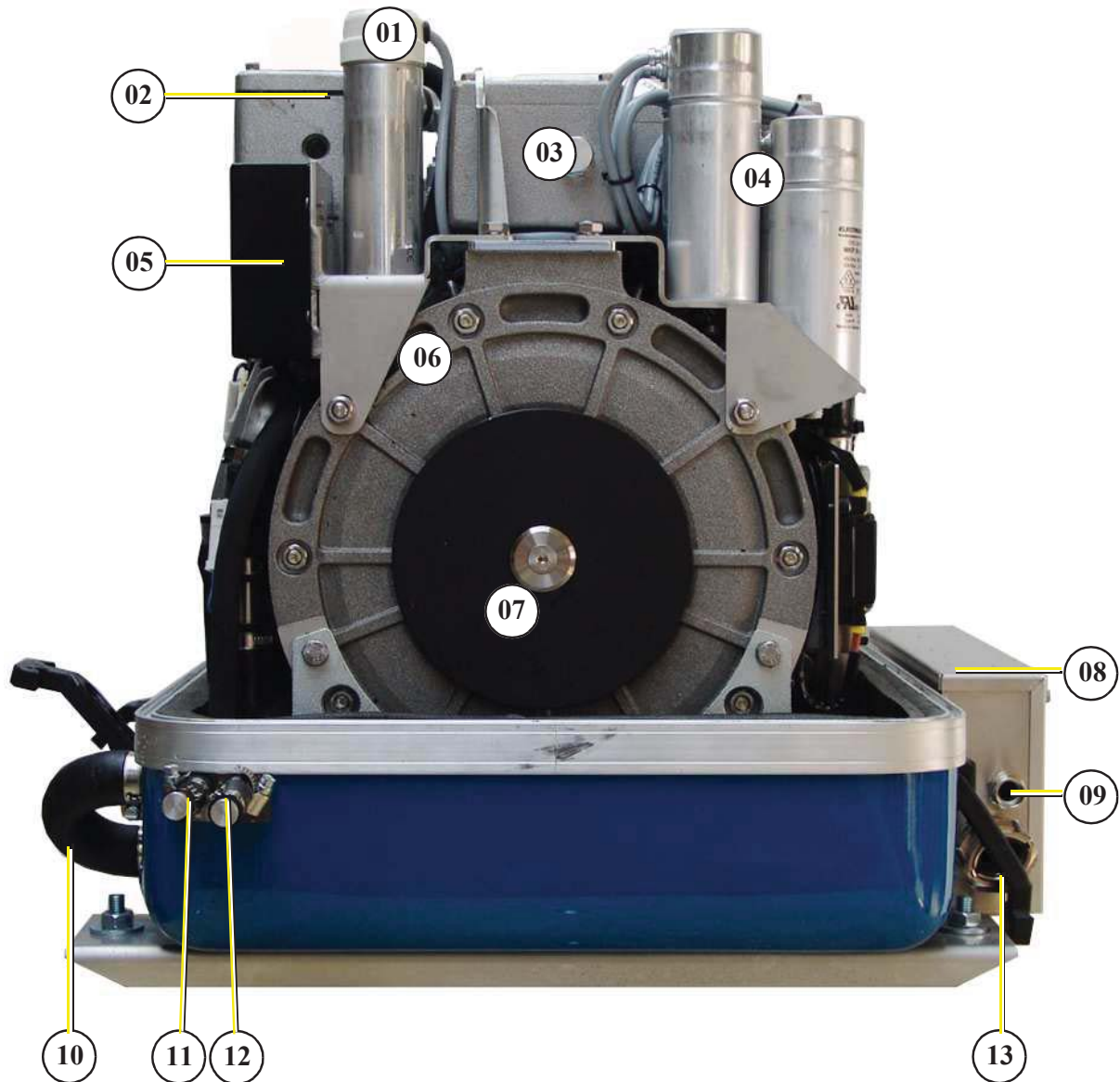


- 01. Solid state relay for booster capacitor
- 02. Booster capacitor (1x60 μ F)
- 04. Ventilation hose to external expansion tank
- 05. Water-cooled exhaust elbow
- 06. Engine oil filler neck
- 07. 12V DC-alternator
- 08. Ventilation screw thermostat housing
- 09. Excitation capacitors (4x50 μ F)
- 10. Charge control for DC-alternator

- 11. Air suction housing with air filter
- 12. Control box
- 13. Cylinder head thermo-switch
- 14. Air suction hose to induction elbow
- 15. Actuator
- 16. Fuel solenoid valve
- 17. Stop solenoid
- 18. Ventilation screw internal cooling water pump
- 19. Pulley for internal cooling water pump

Fig. A.2.5-1: View from above Panda 8000NE

A.2.6 Back View - Panda 8000 NE 50Hz



- | | |
|---|---|
| 01. Booster capacitors | 08. Control box |
| 02. Water-cooled exhaust elbow | 09. Passage for cable control panel |
| 03. Air suction housing with air filter | 10. Connection external ventilation valve |
| 04. Excitation capacitors (4x50µF) | 11. Intake to external cooling water expansion tank |
| 05. Solid state relays for booster capacitors | 12. Backflow from external cooling water expansion tank |
| 06. Generator front cover | 13. Passage for cable load |
| 07. bearing with cooling plate | |

Fig. A.2.6-1: Back View Panda 8000NE 50 Hz only

A.3 Details of functional units

A.3.1 Remote control panel

The remote control panel is equipped with some new monitoring functions, which increases the operational safety of the generator. A failure message is shown over contacts which are normally closed. If a connection is intermitted triggers this a failure message.



01. Digital display
02. S1 Button „ON/OFF“ „Stand by“
03. S2 Button „Alarm mute / Program level“

04. S3 Button „Screen shift“
05. S4 Button „rpm Shift n1/n2“
06. S5 Button „Generator run/stop / Select Save“

Fig. A.3.1-1: Remote control panel

A.3.2 Components of Cooling System (Raw water)

Raw water intake

The diagram shows the supply pipes for the generator. The connection neck for the raw water connection is shown on the left hand side. The cross-section of the intake pipe should be nominally larger than the generator connection.

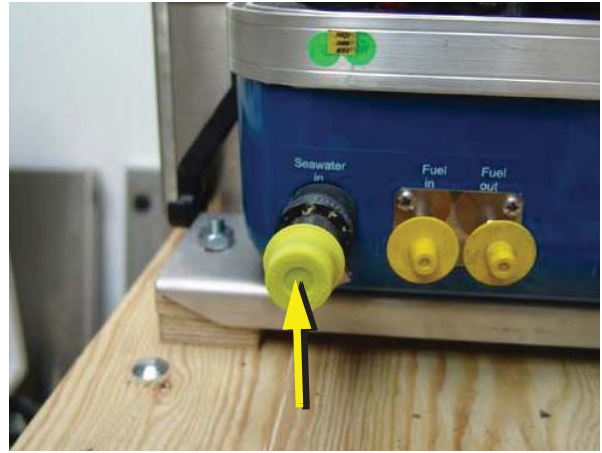


Fig. A.3.2-1: Raw water intake

Raw water impeller pump

The raw water pump is fitted with a rubber impeller. This pump is self-inductive. If, for example, you forget to open the sea valve, then you must expect the impeller to be destroyed after a short period of time. It is recommended to store several impellers on board as spare parts.

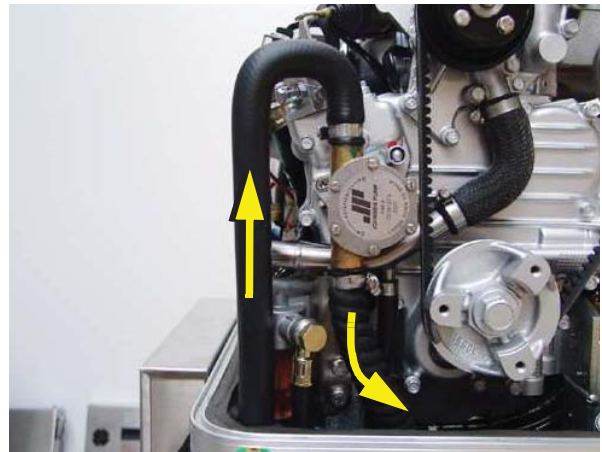


Fig. A.3.2-2: Raw water impeller pump

Impellerfilter

See *impellerfilter datasheet*

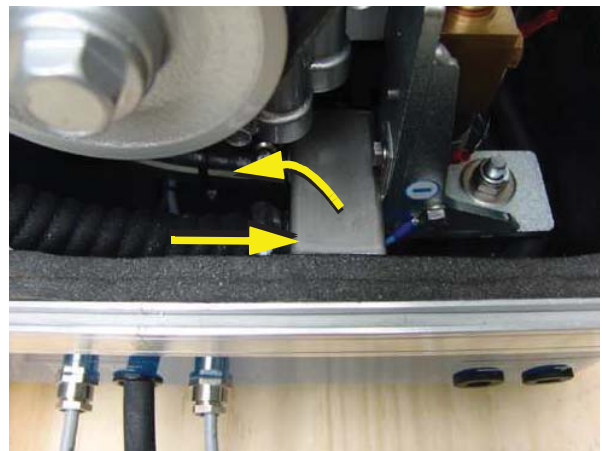


Fig. A.3.2-3: Raw water impeller pump

Heat exchanger

Separates the raw water system from the freshwater system.

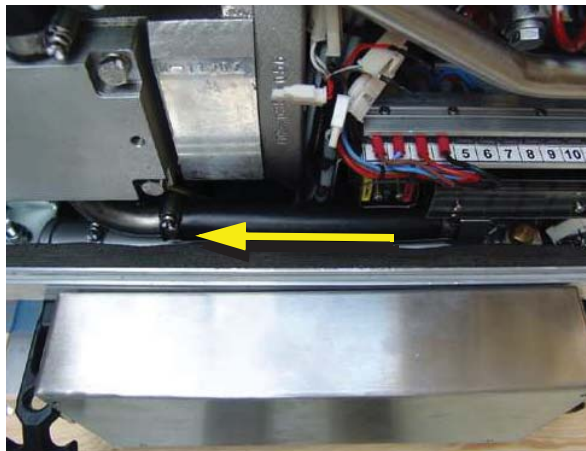


Fig. A.3.2-4: Heat exchanger

Ventilation valve

A siphon must be installed if the generator sinks below the water line because of the rocking of the boat, even if it is only for a short period of time. A hosepipe on the generator casing has been produced for this. Both connecting pieces are bridged by a formed piece of hose.

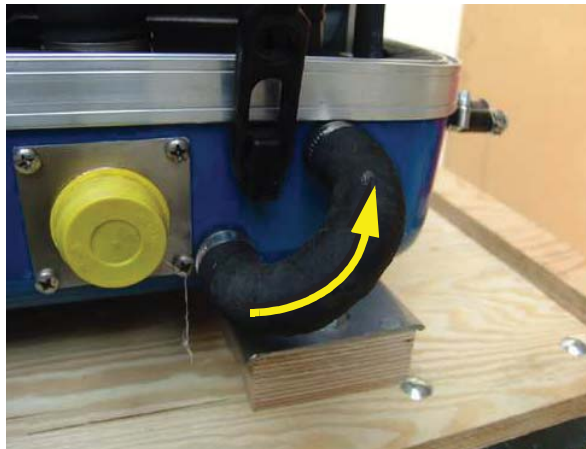


Fig. A.3.2-5: Connection external vent valve

Raw water injector nozzle

The injection point for the marine generator water-cooled exhaust system is situated at the exhaust connection pieces. The exhaust connections must be regularly checked for signs of corrosion.

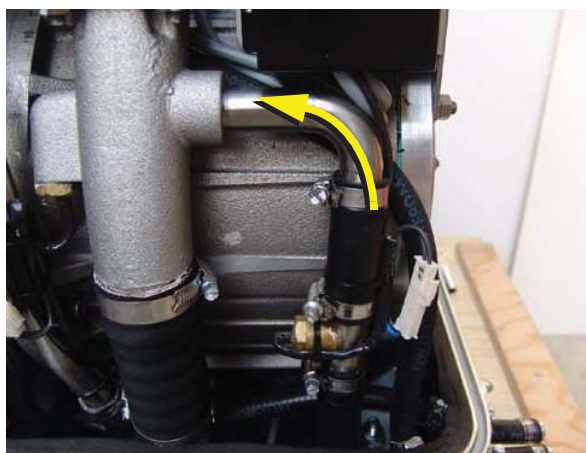


Fig. A.3.2-6: Raw water injector nozzle

A.3.3 Components of Cooling System (Freshwater)

Freshwater backflow

The cooling water is fed to the heat exchanger from the water-cooled manifold by means of the pipe shown in the diagram.

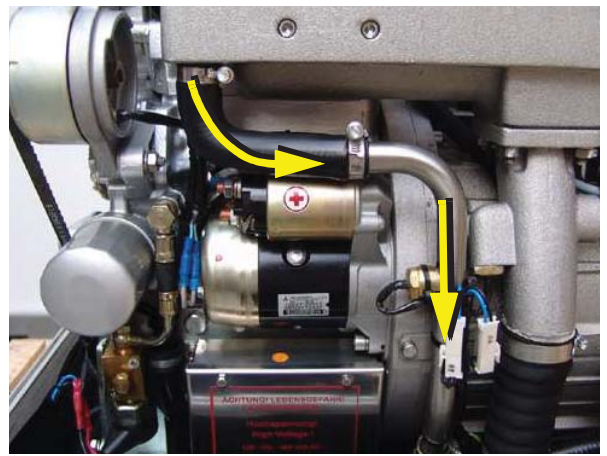


Fig. A.3.3-1: Freshwater backflow

Ventilation pipe

The ventilation pipe at the water-cooled exhaust manifold leads to the external expansion tank. This pipe only serves as a ventilation pipe, if both pipes are to be connected to the external expansion tank (ventilation pipe and intake pipe).

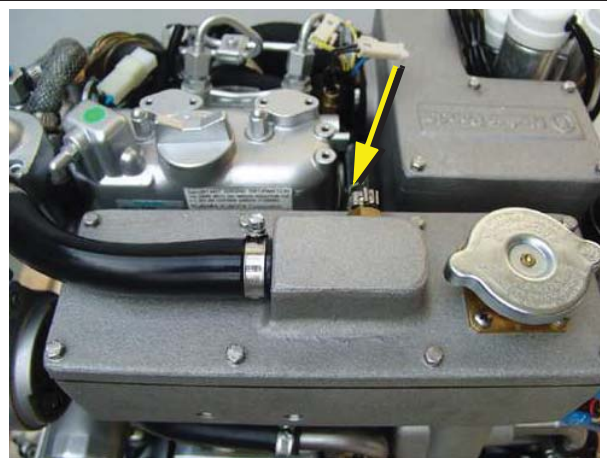


Fig. A.3.3-2: Ventilation pipe

Hose connection pieces for the external expansion tank

The external expansion tank is connected by two hose connections. The connecting pieces shown here serves as constant ventilation for the water-cooling system.

In case the external expansion tank is connected with two hoses, the system will ventilate itself. In this case, additional ventilation is only necessary when the generator is initially filled, or if the cooling water is not circulating.

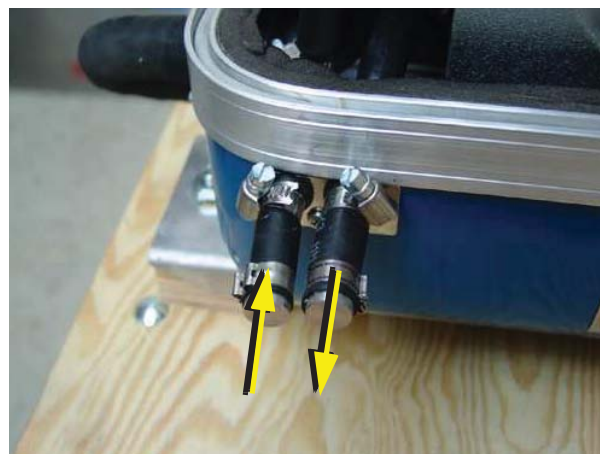


Fig. A.3.3-3: External expansion tank

Heat exchanger

Separates the raw water system from the freshwater system.

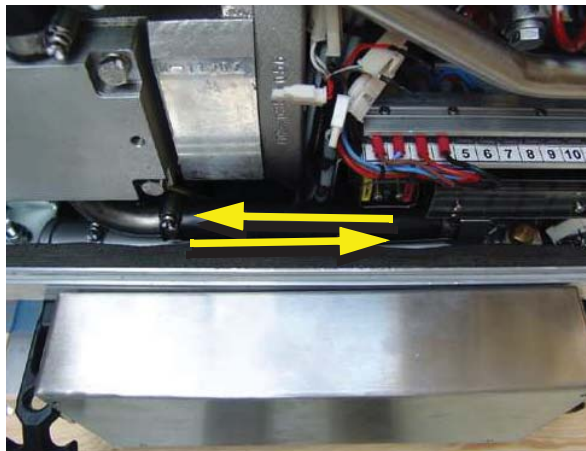


Fig. A.3.3-4: Heat exchanger

Cooling water connection block

The cooling water is fed to the generator and drained via the cooling water connection block. The cooling water connection block consists of an aluminium alloy, which can behave like a sacrificial anode.

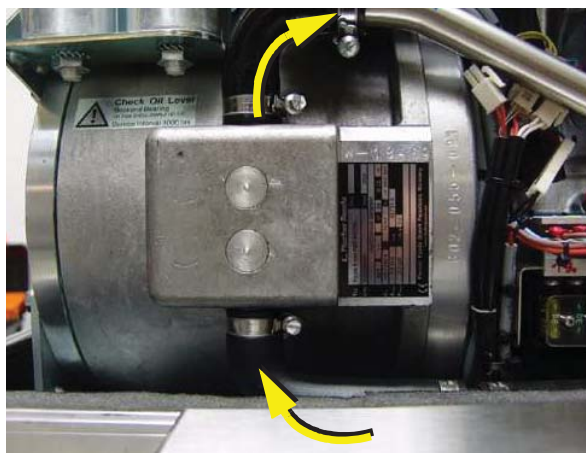


Fig. A.3.3-5: Cooling water connection block

Cooling water pipe

From the cooling water connection block the fresh water is lead to the water pump

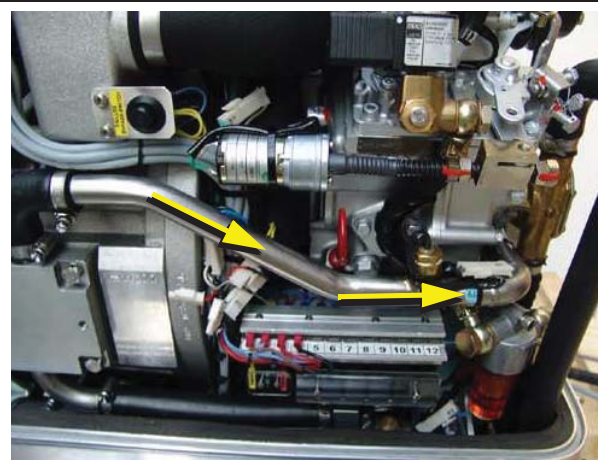


Fig. A.3.3-6: Cooling water pipe

Internal cooling water pump

The diesel motor cooling water pump (see arrow) aids the circulation of the internal freshwater system.

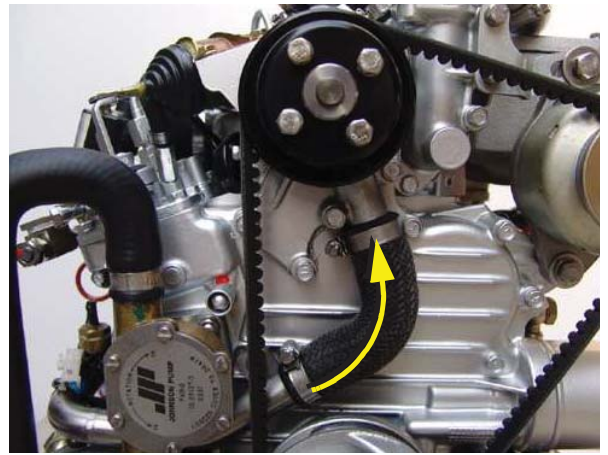


Fig. A.3.3-7: Internal cooling water pump

Cooling water intake

A.) To the thermostat housing

B.) From the external expansion tank

The intake pipe from the external cooling water expansion tank is connected to the point shown with „B“.

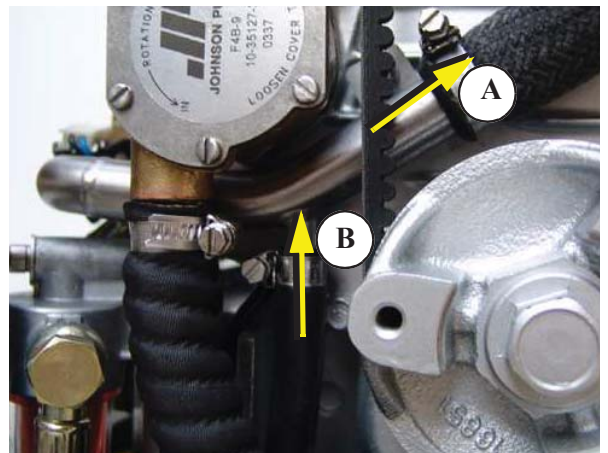


Fig. A.3.3-8: Internal cooling water pump

Ventilation screw cooling water pump

The ventilation screw above the cooling water pump casing may not be opened, whilst the generator is running. If this occurs by mistake, air will be drawn through the opening. Extensive ventilation of the whole system is then necessary.



Fig. A.3.3-9: Ventilation screw cooling water pump

Ventilation screw thermostat housing

The ventilation screw on the thermostat housing should occasionally be opened for control purposes. Standing machinery should principally carry out ventilating.



Fig. A.3.3-10: Ventilation screw thermostat housin

Water-cooled exhaust manifold

The manifold is cooled by means of the internal cooling system (freshwater). The cooling water filler necks on the casing of the manifold may not be opened. These cooling water necks are only required to fill the motor with cooling water in cases of repair. The normal cooling water controls may only be carried out at the external expansion tank.

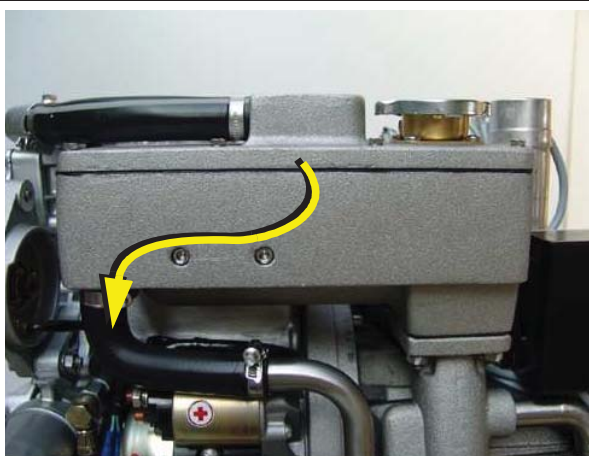


Fig. A.3.3-11: Water-cooled exhaust manifold

A.3.4 Components of the fuel system

External fuel pump

The Panda generator is always supplied with an external, electrical (12 V of DC) fuel pump. The fuel pump must be always installed in the proximity of the tank. The electrical connections with the lead planned for it are before-installed at the generator. Since the suction height and the supply pressure are limited, it can be sometimes possible that for reinforcement a second pump must be installed.

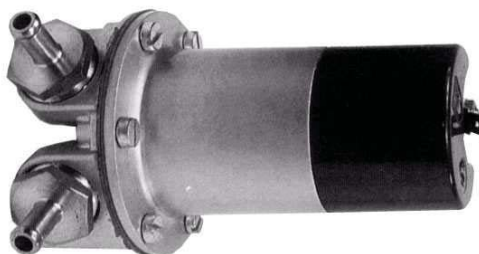


Fig. A.3.4-1: External fuel pump

Connecting pieces for the fuel pipe

1. Fuel intake
2. Fuel backflow



Fig. A.3.4-2: Fuel connections

Fuel filter

A consequential filtering of fuel is especially important for all marine systems. A fine filter, which is firmly attached to the inside of the sound insulation capsule for the marine version, is supplied on delivery, and loose for other makes. In all cases a further pre-filter with water separator must be installed. See directions for fuel filter installation.

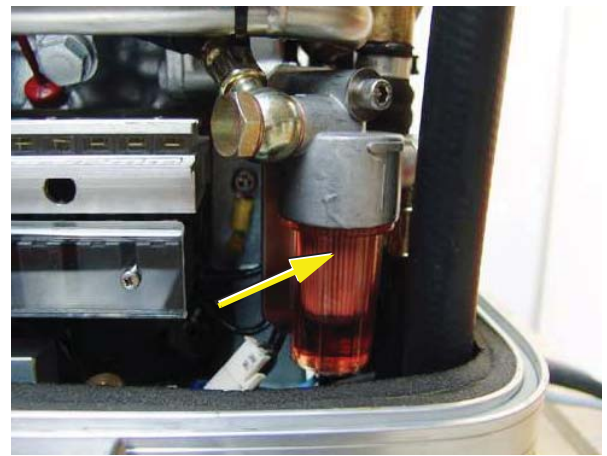


Fig. A.3.4-3: Fuel filter

Fuel solenoid valve

The fuel solenoid valve opens automatically if „START“ is pressed on the remote control panel“. The solenoid closes, if the generator is switched to „OFF“ position. It takes a few seconds before the generator stops. If the generator does not start or does not run smoothly (i.e. stutters), or does not attain full speed, then the cause is fore-mostly the solenoid.

- 1) Fuel solenoid valve
- 2) Ventilation screw solenoid valve
- 3) Magnetic coil

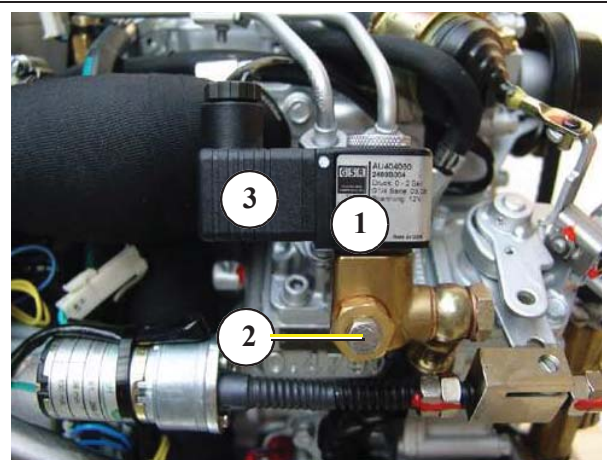


Fig. A.3.4-4: Fuel solenoid valve

Injection nozzles

If the engine does not start after the ventilation, the fuel injection lines must be de-aerated individually.

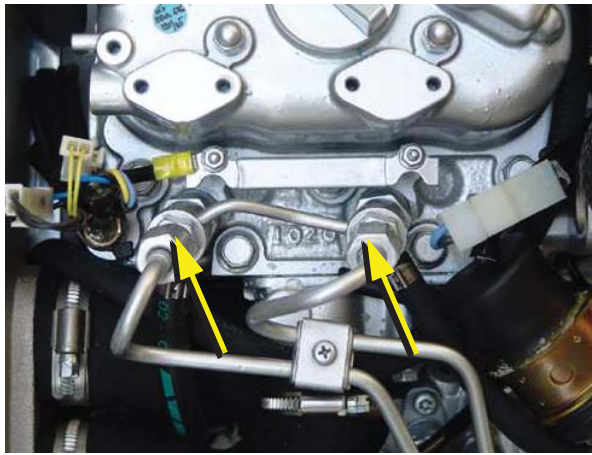


Fig. A.3.4-5: Injection nozzles

Glow plugs

The glow plugs serve the pre-chamber for the heating with cold start. The heat-treat fixture must be operated, if the temperature of the generator is under 16°C. This is practically with each start the case. The heat-treat fixture may be held down also during start and favoured the starting procedure.

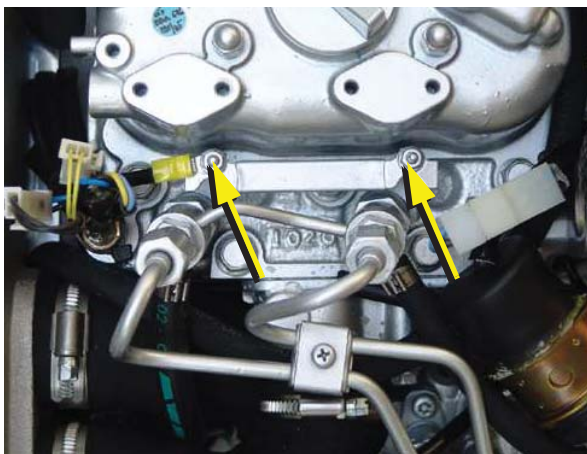


Fig. A.3.4-6: Glow plugs

Stop solenoid for engine stop

Some model are additional equipped with an stop solenoid. The generator is stopped by the co-operation of the stop solenoid immediately after switching off. The adjustment of the stop solenoid must always be checked, in order to be sure that the stop lever can move also during the operation freely and is not under pre-stressing.



Fig. A.3.4-7: Stop solenoid

A.3.5 Components of combustion air

Air suction openings at the sound cover

The sound cover for the marine generator is normally provided at the lower surface with drillings, through which the combustion air can influx.

It must be consistently paid attention that the generator is installed in such a way that from down no water can arrive into the proximity of these air openings. (minimum distance 150 mm)



Fig. A.3.5-1: Combustion air intake

Drillings for combustion air at the sound cover

Drillings at the lower surface of the sound cover serve the admission of fresh air for the entrance. It must be safe that no raw water or other water can come into this range of this openings. If air is sucked in through these openings, water can penetrate also into the sound cover.

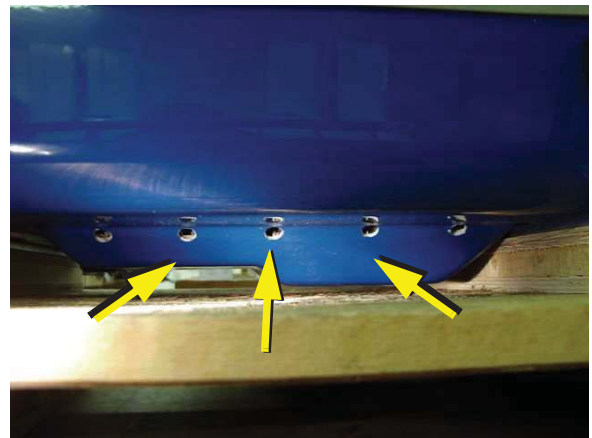


Fig. A.3.5-2: Sound cover drillings

Air suction housing with 12V DC charge control

The shown air suction housing shows the 12V DC charge control (pos. 2) at the exterior. This charge control is to be checked, if the 12V DC voltage is not correct.

If the cover (pos. 1) is removed, the inside of the air suction housing becomes visible. In these air suction housings is a filter element. At the marine version the filter is normally not changed. It should be checked once in a while.

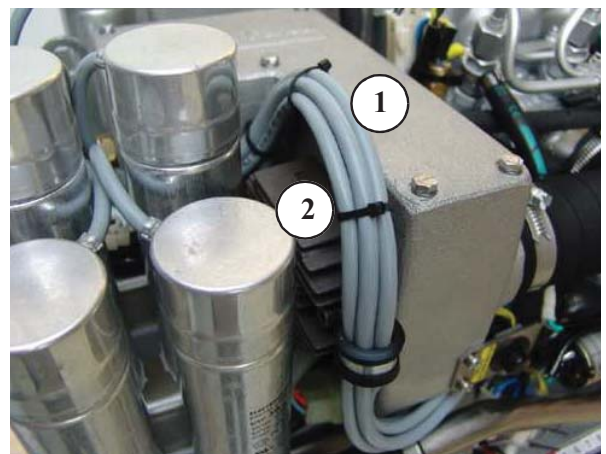


Fig. A.3.5-3: Air suction housing

Air suction housing with air filter set

The figure shows the air filter element in the air suction housing. However the return pipe of the crank case exhaust flows also into the air suction housing, it can be faced with older generators and/or with engines on high running time that oil vapors affect the air filter. Therefore an check is advisable once in a while.

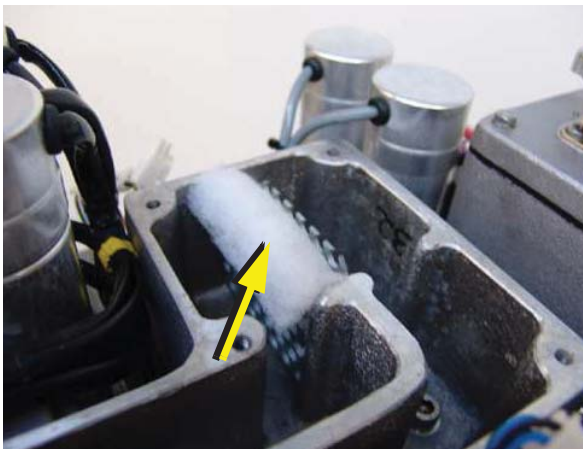


Fig. A.3.5-4: Air filter set

Combustion chamber intake elbow

The figure shows the induction elbow at the combustion engine. At the front of this induction elbow you can see the hose connection between air suction housings and induction elbow. The air filter must be checked, if this hose pulls together at operation.

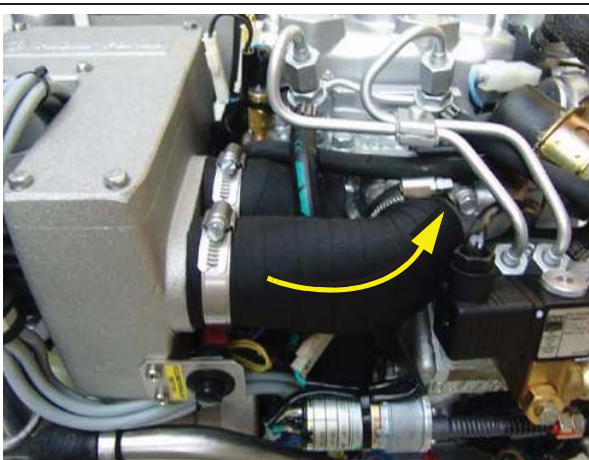


Fig. A.3.5-5: Combustion chamber intake elbow

Exhaust elbow

On the back of the engine is the water-cooled exhaust elbow. On the top side the pipe union for the internal raw water circuit is to be seen and the filler neck for the cooling water. This cooling water filler neck is used only at first filling. Control of the cooling water and if necessary refill takes place at the external cooling water expansion tank.

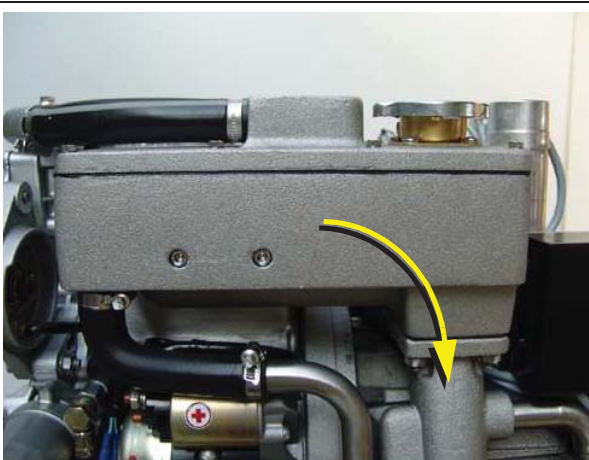


Fig. A.3.5-6: Exhaust elbow

Exhaust connection at the exhaust elbow

Raw water from the external cooling circle is fed here.

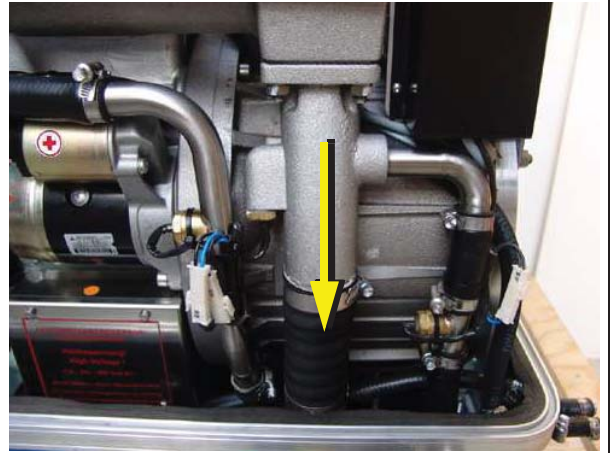


Fig. A.3.5-7: Exhaust connection

Exhaust outlet

Connect the exhaust pipe with the water lock.

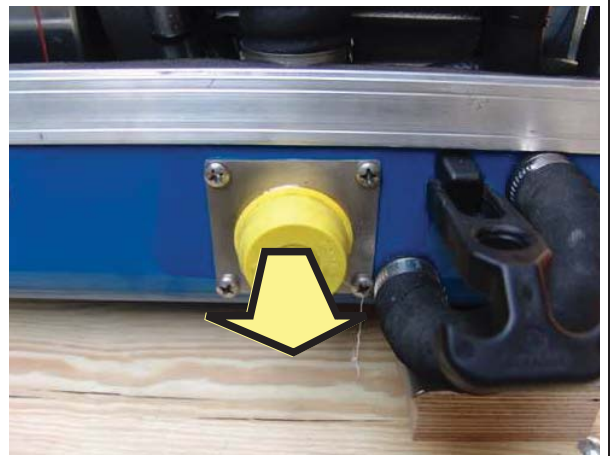


Fig. A.3.5-8: Exhaust outlet

A.3.6 Components of the electrical system

Passage for cable starter battery

1. Passage for cable starter battery (plus)
2. Passage for cable starter battery (minus)

During the connection to the starter battery it must be always ensured that the contact is perfectly guaranteed.

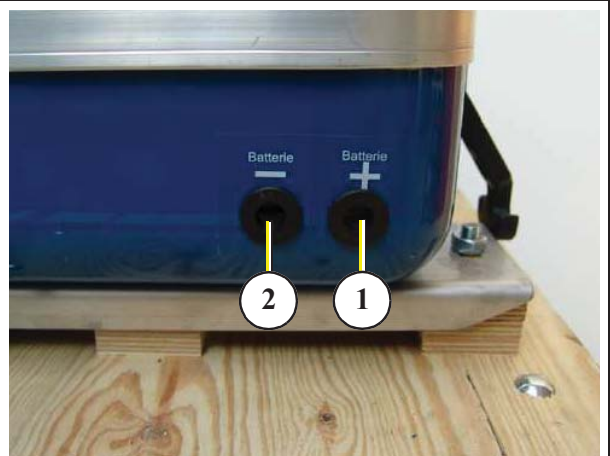


Fig. A.3.6-1: Passage for cable starter battery

Connection starter battery plus cable

The plus cable of the starter battery must be connected at the solenoid of the stater motor.

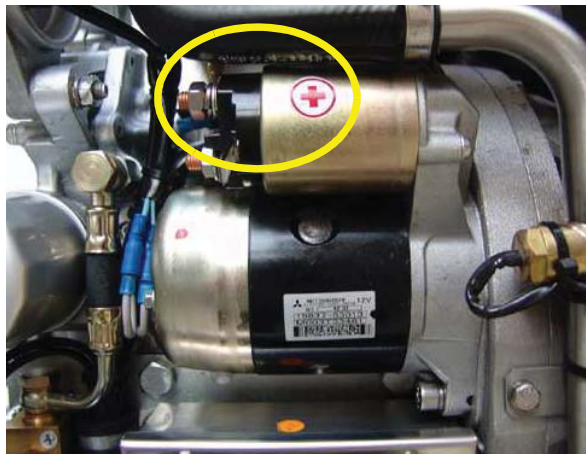


Fig. A.3.6-2: Connection starter battery plus cable

Connection starter battery minus cable

The minus cable of the starter battery must be connected at the right engine bracket when you look from the front side.



Fig. A.3.6-3: Connection starter battery minus cable

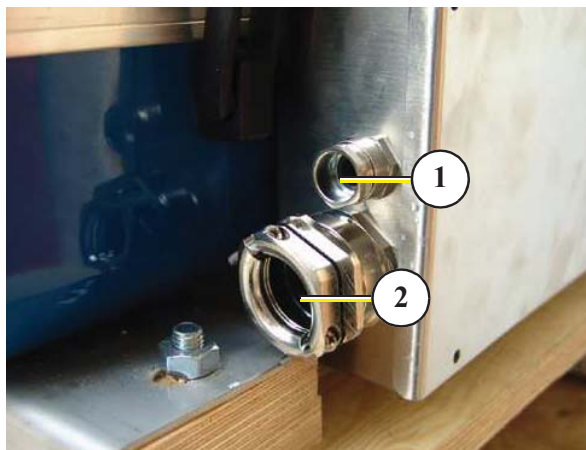
Passage for load and remote control panel


Fig. A.3.6-4: Passage for load and remote control panel

Terminal block for load 120V/60Hz

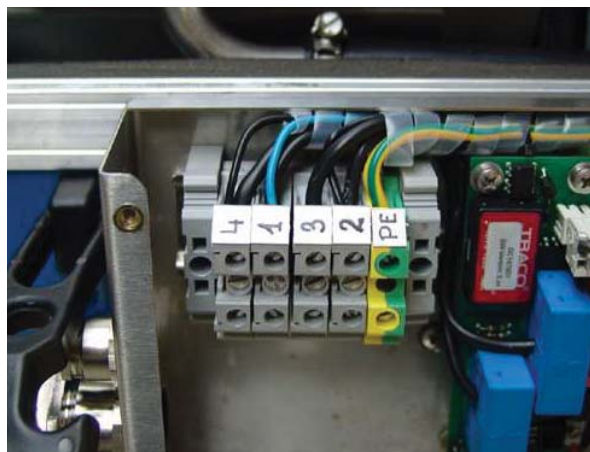


Fig. A.3.6-5: Terminal block 120V/60Hz

Terminal block for load 230V/50Hz

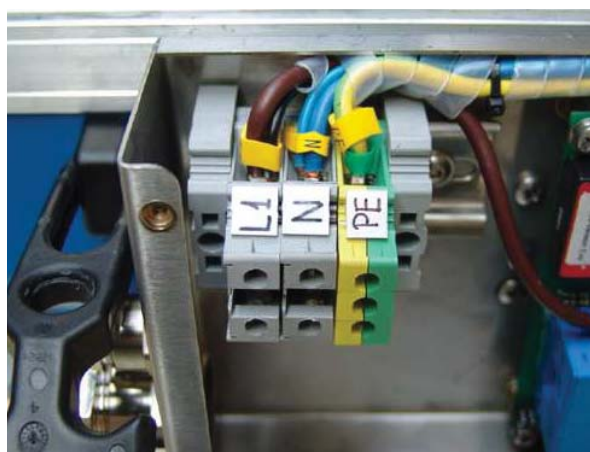


Fig. A.3.6-6: Terminal block 230V/50Hz

Panel interface (on VCS)

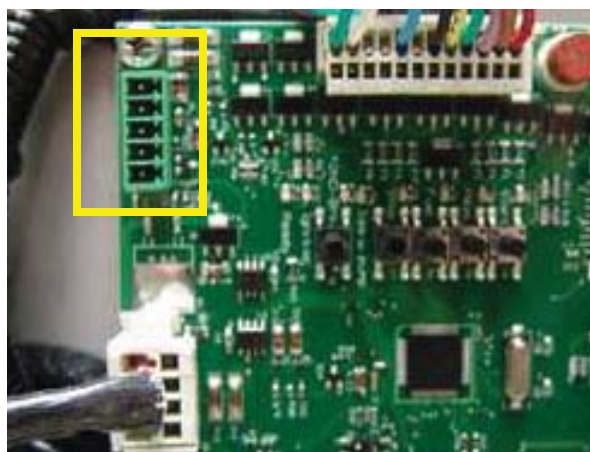


Fig. A.3.6-7: Panel interface (on VCS)

Connection external fuel pump and fuel level sensor

At the front of the sound cover is the withdrawal for the cable for the fuel pump and the fuel level sensor.

1. Cable for fuel pump
2. Cable for fuel level sensor

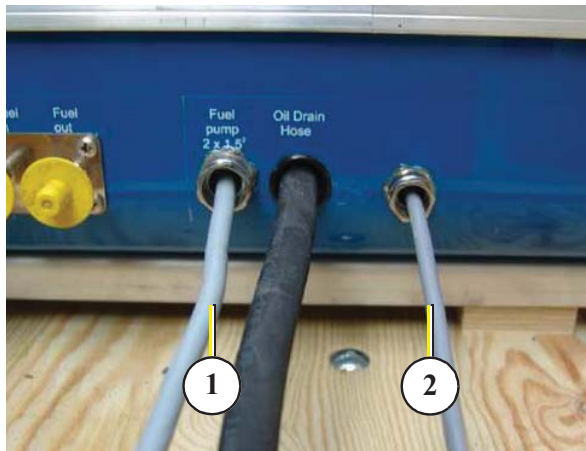


Fig. A.3.6-8: Fuel pump and fuel level sensor cable

Starter motor

1. Starter motor and
2. Solenoid switch

The Diesel engine is electrically started. On the back of the engine is accordingly the electrical starter with the solenoid switch.

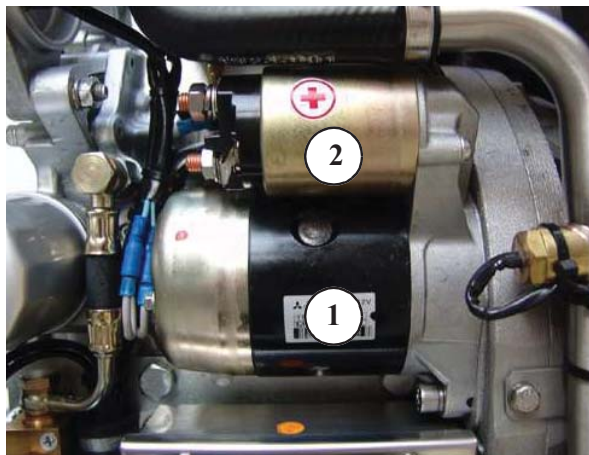


Fig. A.3.6-9: Starter motor

Actuator for speed regulation

The generator voltage is determined by progressive speed control through "VCS" in conjunction with the speed actuator. Speed increases with increasing load.



Fig. A.3.6-10: Actuator

DC-alternator

All Panda generators from Panda 6.000 are provided with its own charge system for the 12V DC mains. This DC-alternator is powered over a v-belt together with the internal cooling water pump.

The 12V charge system may be used only for the generator-own starter battery.



Fig. A.3.6-11: DC-alternator

Charge control for DC-alternator

The voltage regulator for the 12V DC-alternator is on the back of the air suction housing. The housing is formed for cooling purposes. The voltage regulator may not be covered from the outside. The surface must be accessible for the cooling.



Fig. A.3.6-12: Charge control

Generator power terminal box 120V/60Hz

At the back of the generator is the generator power terminal box. In this box the electrical connection points of the AC generator are connected. Here is also the bridge for the protective grounding of the generator. The cover may only be removed, if it is guaranteed that the generator cannot be inadvertently started.



Fig. A.3.6-13: Generator power terminal box 120V/60Hz

Generator power terminal box 230V/50Hz

At the back of the generator is the generator power terminal box. In this box the electrical connection points of the AC generator are connected. Here is also the bridge for the protective grounding of the generator. The cover may only be removed, if it is guaranteed that the generator cannot be inadvertently started.

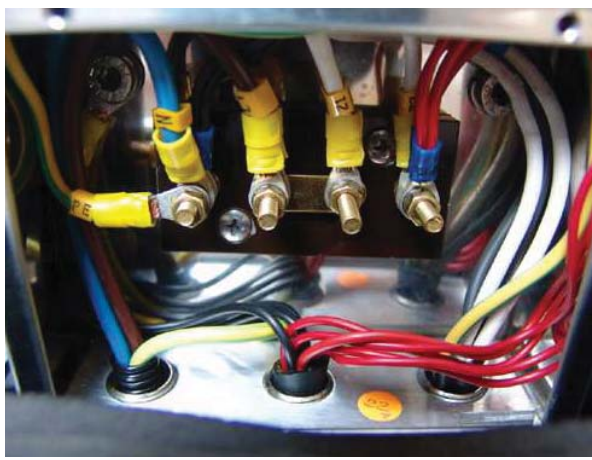


Fig. A.3.6-14: Generator power terminal box 230V/50Hz

Relays

K0 power relay for ground isolate relay

K1 power relay for starter motor

K2 power relay for glow plugs

K3 power relay for fuel pump

K4 power relay for stop solenoid

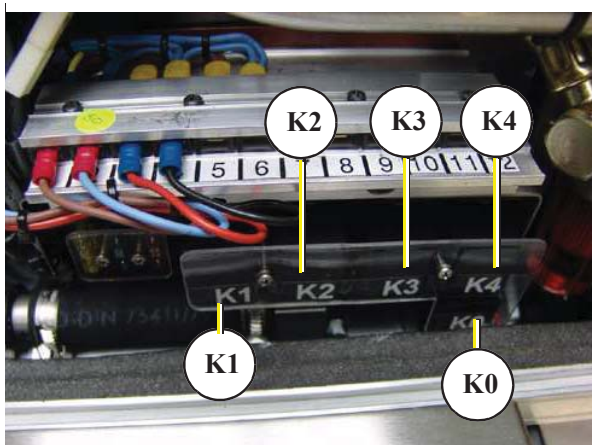


Fig. A.3.6-15: Relays

Fuses

F1 fuse 20A for relay K0

F2 fuse 30A for relay K2

F3 fuse 10A for 12V DC system

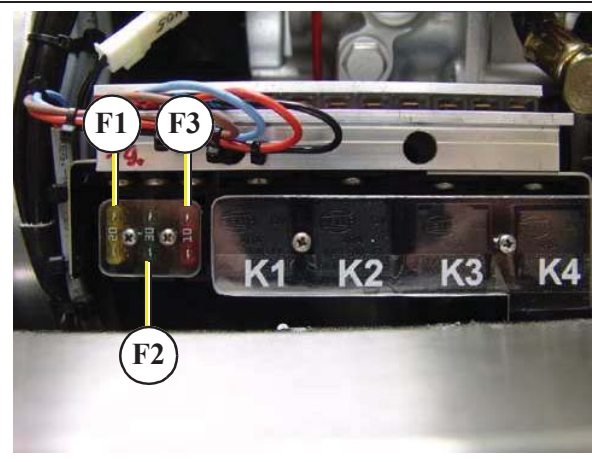


Fig. A.3.6-16: Fuses

VCS printed circuit board

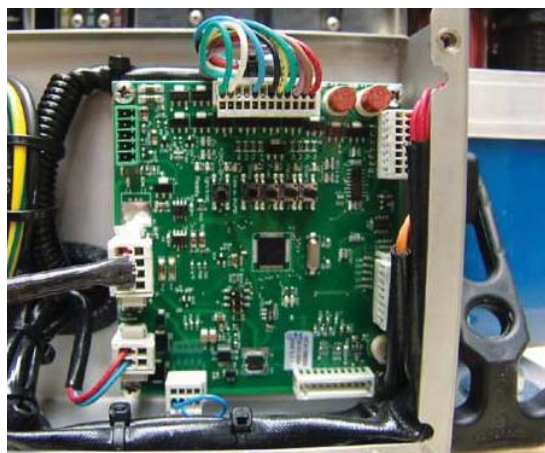


Fig. A.3.6-17: VCS

Current transformer board

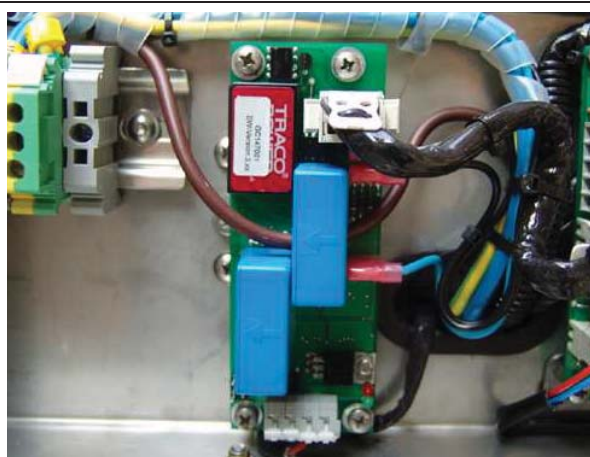


Fig. A.3.6-18: Current transformer board

Booster capacitors 120V/60Hz

2x40 μ F



Fig. A.3.6-19: Booster capacitors 120V/60Hz

Booster capacitor 230/50Hz

1x60 μ F



Fig. A.3.6-20: Booster capacitor 230V/50Hz

Excitation capacitors 50Hz+60Hz

4x50 μ F



Fig. A.3.6-21: Excitation capacitors 120V/60Hz

**Solid state relays for booster capacitors
120V/60Hz**

2xSolid state relays for booster cpacitors.



Fig. A.3.6-22: Solid state relays for booster cpacitors 120V/60Hz

**Solid state relay for booster capacitor
230V/50Hz**

1xSolid state relay for booster capacitor.

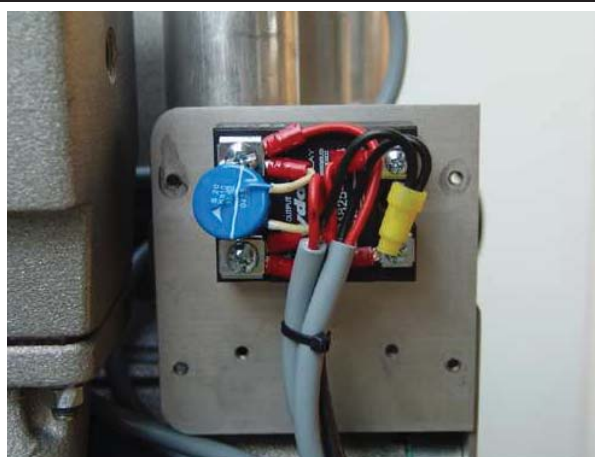


Fig. A.3.6-23: Solid state relay for booster capacitor 230V/50Hz

Failure bypass switch



Fig. A.3.6-24: Failure bypass switch

A.3.7 Sensors and switches for operating surveillance

Thermo-switch at cylinder head

The thermo-switch at the cylinder head serves the monitoring of the generator temperature. All thermo-switches for the generators from Panda 6.000 upward are two-pole and laid out as "openers".

110°C and 130°C



Fig. A.3.7-1: Thermo-switch at cylinder head

Thermo-switch in the generator coil

1. Generator coil
2. Thermo-switch 4x165/175°C
3. Housing

For the protection of the generator coil there are two thermo-switches inside the coil, which are for inserted parallel and safety's sake independently from each other.

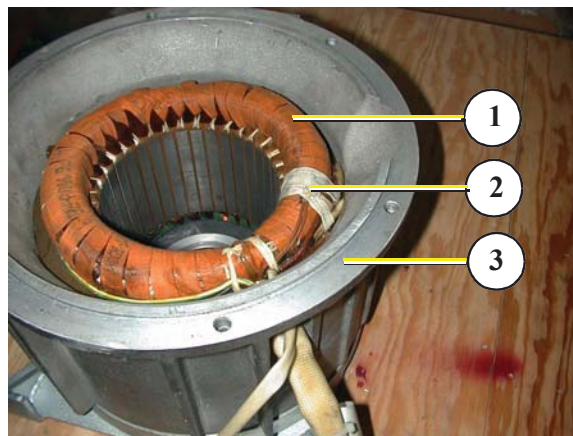


Fig. A.3.7-2: Coil thermo-switch

Thermo-switch at the front plate

The generator bearing is equipped with an thermoswitch, which switches the engine off if the temperature becomes to high.

130°C

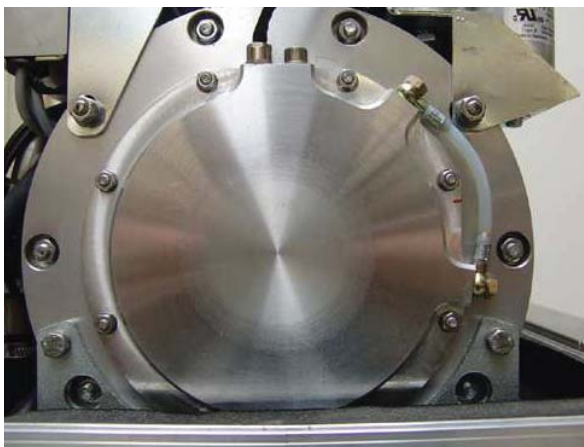


Fig. A.3.7-3: Thermo-switch at front plate

Thermo-sensor raw water in



Fig. A.3.7-4: Thermo-sensor raw water in

Thermo-sensor raw water out



Fig. A.3.7-5: Thermo-sensor raw water out

Thermo-sensor exhaust

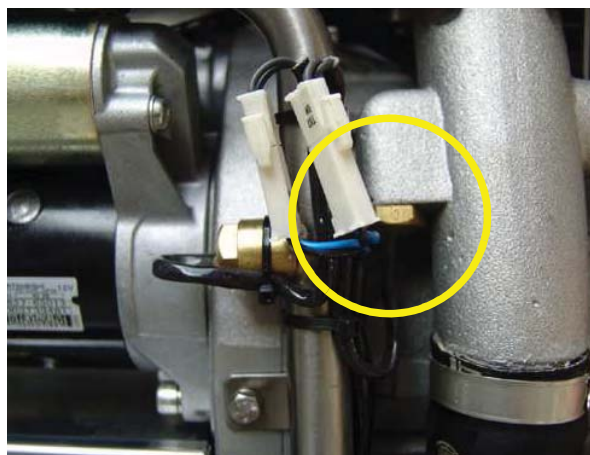


Fig. A.3.7-6: Thermo-sensor raw water out

Thermo-sensor fresh water in

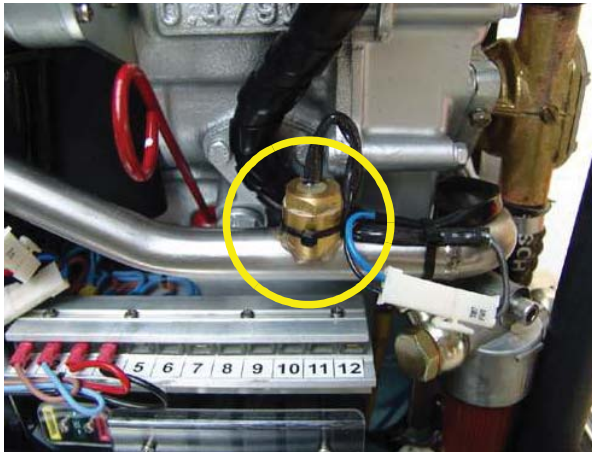


Fig. A.3.7-7: Thermo-sensor fresh water in

Thermo-sensor fresh water out

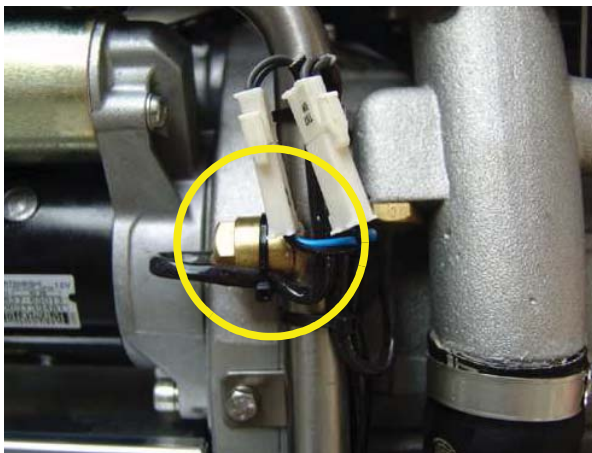


Fig. A.3.7-8: Thermo-sensor fresh water out

Thermo-sensor oil temperature



Fig. A.3.7-9: Thermo-sensor oil temperature

Oil pressure switch

In order to be able to monitor the lubricating oil system, an oil pressure switch is built into the system. The oil pressure switch is on the back of the engine (below the oil filter).



Fig. A.3.7-10: Oil pressure switch

A.3.8 Components of the oil circuit

Oil filler neck with cap

Normally the filler neck for the engine oil is on the top side of the valve cover. At numerous generator types a second filler neck is attached additionally at the operating side. Please pay attention that the filler necks are always well locked after filling in engine oil.

Consider also the references to the engine oil specification.



Fig. A.3.8-1: Oil filler neck with cap

Oil dipstick

At the dipstick the permissible level is indicated by the markings "maximum" and "minimum". The engine oil should be never filled up beyond the maximum conditions.



Fig. A.3.8-2: Oil dipstick

Oil filter

The oil filter should be exchanged with an oil change.

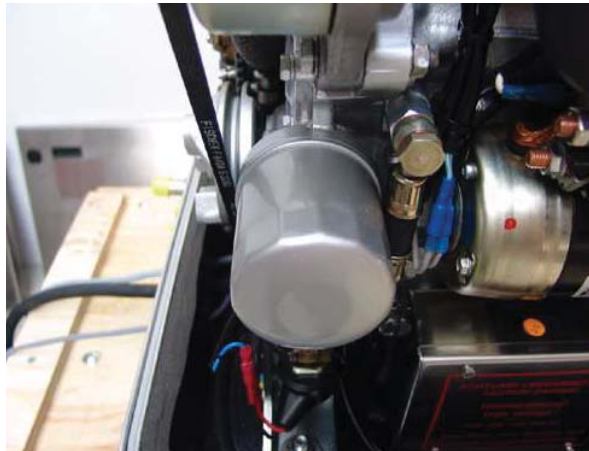


Fig. A.3.8-3: Oil filter

Oil drain hose

The Panda generator is equipped that the engine oil can be drained over an drain hose. The generator should be always installed therefore that a collecting basin can be set up deeply enough. If this is not possible, an electrical oil drain pump must be installed.

Note: Lubricating oil should be drained in the warm condition!



Fig. A.3.8-4: Oil drain hose

A.4 Operation instructions

A.4.1 Preliminary remark

Tips regarding Starter Battery

Fischer Panda recommends normal starter battery use. If a genset is required for extreme winter conditions, then the starter battery capacity should be doubled. It is recommended that the starter battery be regularly charged by a suitable battery-charging device (i.e., at least every 2 Months). A correctly charged starter battery is necessary for low temperatures.



A.4.2 Daily routine checks before starting

1. Oil Level Control (ideal level: MAX).

AtTENTION! OIL PRESSURE CONTROL!

True, the diesel motor automatically switches off when there is a lack of oil, but it is very damaging for the motor, if the oil level drops to the lowest limit. Air can be sucked in suddenly when the boat rocks in heavy seas, if the oil level is at a minimum. This affects the grease in the bearings. It is therefore necessary to check the oil level daily before initially running the generator. The oil level must be topped up to the maximum level, if the level drops below the mark between maximum und minimum levels.

The oil level of the oil cooled bearing must be checked before every start - see flow glas at the generator front cover. Service interval 1000hrs.

2. State of Cooling Water.

The external compensation tank should be filled up to a maximum of in a cold state. It is very important that large expansion area remains above the cooling water level.

3. Open Sea Cock for Cooling Water Intake.

For safety reasons, the seacock must be closed after the generator has been switched off. It should be re-opened before starting the generator.

4. Check Raw Water Filter.

The raw water filter must be regularly checked and cleaned. The impeller fatigue increases, if residual affects the raw water intake.

5. Check all Hose Connections and Hose Clamps are Leakage.

Leaks at hose connections must be immediately repaired, especially the raw water impeller pump. It is certainly possible that the raw water impeller pump will produce leaks, depending upon the situation. (This can be caused by sand particles in the raw water etc.) In this case, immediately exchange the pump, because the dripping water will be sprayed by the belt pulley into the sound insulated casing and can quickly cause corrosion.

6. Check all electrical Lead Terminal Contacts are Firm.

This is especially the case with the temperature switch contacts, which automatically switch off the generator in case of faults. There is only safety if these systems are regularly checked, and these systems will protect the generator, when there is a fault.

7. Check the Motor and Generator Mounting Screws are Tight.

The mounting screws must be checked regularly to ensure the generator is safe. A visual check of these screws must be made, when the oil level is checked.

8. Switch the Land Electricity/Generator Switch to Zero before Starting or Switch Off all the load.

The generator should only be started when all the load have been switched off. The excitation of the generator will be suppressed, if the generator is switched off with load connected, left for a while, or switched on with extra load, thus reducing the residual magnetism necessary for excitation of the generator to a minimum. In certain circumstances, this can lead to the generator being re-excited by means of a DC source. If the generator does not excite itself when starting, then excitation by means of DC must be carried out again.

9. Check the Automatic Controls Functions and Oil Pressure.

Removing a cable end from the monitoring switch carries out this control test. The generator should then automatically switch off. Please adhere to the inspection timetable (see Checklist in the appendix).

A.4.3 Starting Generator

1. If necessary, open the fuel valve.
2. If necessary, close the main battery switch.
3. Check if all the load have been switched off.
The load is switched off, before the generator is switched off. The generator is not to be started with load connected. If necessary, the main switch or fuse should be switched off or the load should be individually switched off.
4. Press Standby „ON/OFF“ button (Position 2 on control panel).
Control light for "Stand by" button must light up.
5. Press Generator "RUN/STOP" button (Position 06 on control panel).
After the automatic pre-glow phase the engine starts. Control light for „Generator“ button must light up. If the genset does not immediately start, then the fuel intake should be checked to ensure it is flowing freely. (For temperatures below - 8°C check whether there is winter fuel)
6. Check circuit-voltmeter and frequency is within the tolerance rage
7. Switch on load.

A.4.4 Stopping the Generator

1. Switch off load.
2. If the load is higher than 70% of the nominal load, the generator temperatures should be stabilised by switching off the load for at least 5 minutes.
At higher ambient temperatures (more than 25°C) the generator should always run for at least 5 minutes without load, before it is switched off, regardless of the load.
3. Press Generator „RUN/STOP“ button and switch off the generator.
4. Press Standby „ON/OFF“ button to switch off the panel.
5. Activate additonal switches (Battery switch, fuel stop valve etc.).
NOTE: Never switch off the battery until the generator has stopped.
6. If necessary, close sea cock.

B. Installation Instruction

B.1 Placement

B.1.1 Placement and Basemount

Since Panda generators have extremely compact dimensions they can be installed in tight locations, attempts are sometimes made to install them in almost inaccessible places. Please consider that even almost maintenance-free machinery must still remain accessible at least at the front (drive belt, water pump) and the service-side (actuator, dipstick). Please also note that in spite of the automatic oil-pressure sensor it is still essential that the oil level has to be checked regularly.

The generator should not be installed in the proximity of light walls, which can get into resonant vibrations by airborne sound. If this is not possible, these surfaces should line with 1mm lead foil, so the mass and the swinging behavior are changed.

Avoid to install the generator on a smooth surface with small mass (e.g. plywood plate). This affects in the unfavorable case like an amplifier the airborne sound waves. An improvement obtains by compound these surfaces by ribs. Also break-throughs should be sawed, which interrupt the surface. Disguising the surrounding walls with a heavy layer (e.g. lead) plus foam material improves the conditions additionally.

The engine draws its inlet combustion air through several holes in the capsule base. Therefore the capsule must be fitted with sufficient clearance between the capsule underside and the base plate (min. 12mm ($\frac{1}{2}$ ")).

The generator sucks its air from the surrounding engine room. Therefore it must be ensured that sufficient ventilation openings are present, so that the genset cannot overheat.

High temperature of the intake air decline the power of the genset and increases the coolant temperature. Air temperatures of more than 40°C reduce the power by 2% per temperature rise of 5°C. In order to keep these effects as small as possible, the temperature in the engine room should not be higher than 15°C in relation to the outside temperature.

B.1.2 Notice for optimal sound insulation

The convenient base consists of a stable framework, on which the generator is fastened by means of shock-mounts.

Since the genset is "free" downward, the combustion air can be sucked in unhindered.

In addition are void the vibrations, which would arise with a closed soil.

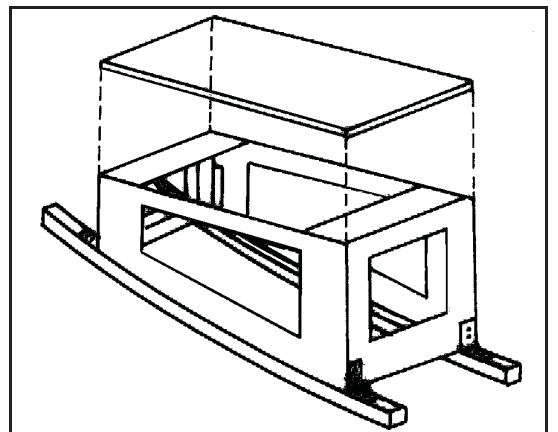


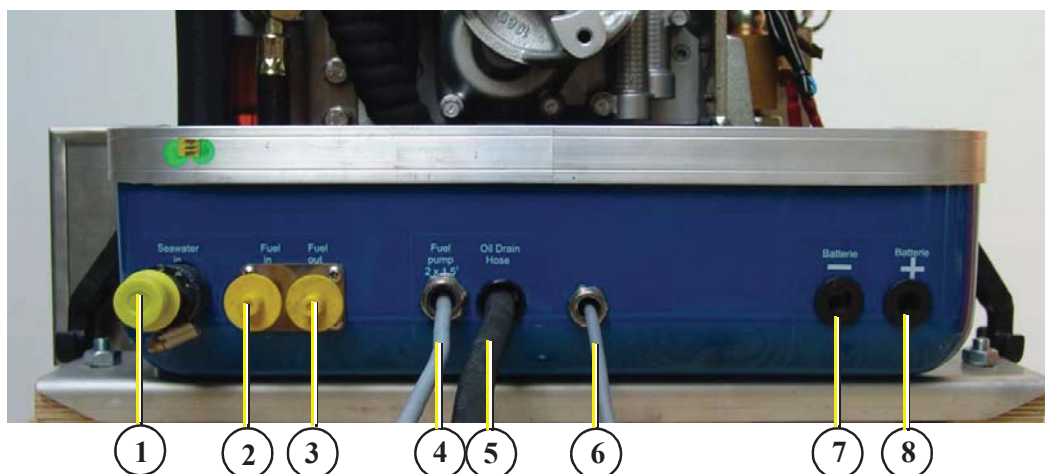
Fig. B.1.2-1: Sound isolation

B.2 Generator Connections - Scheme

The generator comes supplied with all supply lines (i.e. electric cables, fuel lines etc.) already connected to the motor and generator. The supply lines are fed through the capsule's front base panel and are shielded at the capsule inlets with water-proof grommets.

All electrical connections, cable types and sizes must comply to the appropriate regulations. The supplied cables are rated for ambient temperatures up to 70°C (160°F). If the cables are required to meet higher temperature requirements, they must be run through conduits.

ATTENTION! Before working (installation) on the System read the section “Safety Precautions” on page 11 in this Manual.



- | | |
|---------------------------------|---|
| 1. Raw water inlet | 5. Motor oil drain hose |
| 2. Fuel supply (in) | 6. Cable for main power |
| 3. Fuel return line (out) | 7. Generator Starter-battery negative (-) |
| 4. Cable for external fuel pump | 8. Generator Starter-battery positive (+) |

Fig. B.2-1: Connections



- | | |
|--|--|
| 1. Backflow from external expansion tank | 3. Exhaust output |
| 2. Intake to external expansion tank | 4. Connection external ventilation valve |

Fig. B.2-2: Connections

B.3 Cooling System Installation - Raw water

B.3.1 General References

The genset should have its own raw water (coolant water) inlet and should not be connected to any other engine systems. Ensure that the following installation instructions are complied with:

Avoid galvanic corrosion

For the avoidance of galvanic corrosion the chapter "Service instruction for marine gensets (corrosion protection)" is to be considered.

B.3.2 Quality of the raw water sucking in line

In order to keep the suction resistance in the line at a minimum, the raw water intake system (i.e. sea cock, thru-hull fitting, inlet filter, etc.) must have an inner diameter of at least 1" (25mm).

This applies also to installation components such as thru-hull fitting, sea cock, raw water filter etc.

The intake suction line should be kept as short as possible. Install the raw water inlet in close proximity to the genset.

After start-up the cooling water quantity must be measured (e.g. by catching at the exhaust). The flow rate, as well as the necessary cross section of the cooling water pipe take from Table 2, "Diameter of conduits," on page 127.

B.3.3 Installation above waterline

The Panda is equipped with a direct drive water intake pump mounted directly on the motor. Since the intake pump is an impeller pump there are wearing parts which will likely require replacement after some time. Ensure that the genset is installed such that the intake pump can be easily accessed. If this is not possible, an external intake pump could be installed in an easily accessed location.

If the generator is installed above the waterline it is possible that the impeller wearout will be stronger. After the start the pump runs dry some seconds.

The raw water hose should describe a loop as near as possible to the raw water inlet of the generator (see picture below). With it the pump only sucks in air for a short time. The impeller will be lubricated by the raw water and its life time will rise.

By the installation of a check valve in the raw water inlet line, which is under the waterline, this problem can be limited a little.

It is very important to change the impeller every few month. When starting the generator you should pay attention and listen when raw water comes out from the exhaust. If this lasts longer than 5 seconds the impeller has to be changed, because he sucks to much air before raw water reaches the impeller and the impeller wears out strongly. In this case the impeller loses its function, which leads to an overheating of the engine.

If the impeller isn't exchanged early enough, the impeller wings can break into pieces and clog the cooling circuit. Therefore it is very important to change the impeller every few month.

NOTE:

Never change the impeller for many years, without exchanging the old pump. If the sealing ring is defective within the pump, raw water runs into the sound cover of the genset. A repair is then very expensive.

Replacement impeller and also a spare pump should always be on board. The old pump can be sent back to ICEMASTER, where it is then economically overhauled completely.

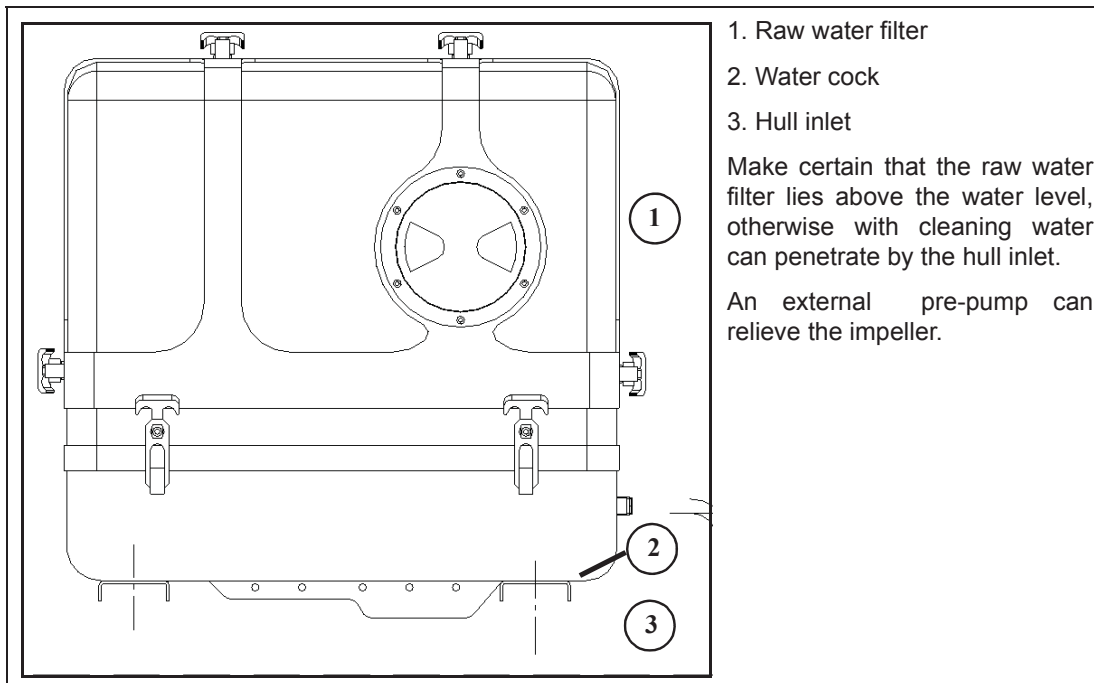


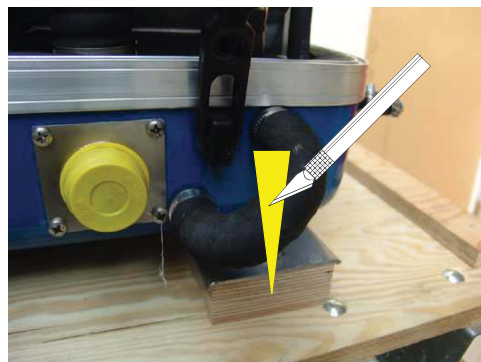
Fig. B.3.3-1: Raw water filter

B.3.4 Installation below waterline

If the generator can not be attached at least 600mm over the waterline, a vent valve must be installed into the raw water line. With location beside the "midship line" a possible heeling must be considered! The water hose for the external vent valve at the back of the sound cover splits on the pressure side of the pump and at both ends in each case extended with a connecting nipple by a hose end. Both hose ends must be led out outside of the sound cover to one point, if possible 600mm over the waterline in the midship line. The valve is connected at the highest place with the two hose ends. If the valve is blocked, the cooling water pipe cannot be ventilated after the stop of the generator, the water column is not interrupted and the water can penetrate into the combustion chamber of the engine. This leads to the destruction of the engine!



Fig. B.3.4-1: Vent valve



Cut the hose for the external vent valve...

Fig. B.3.4-2: Vent valve

...and bent it upwards.

Both hose ends must be led out outside of the sound cover to one point, if possible 600mm over the waterline in the midship line. The valve is connected at the highest place with the two hose ends.

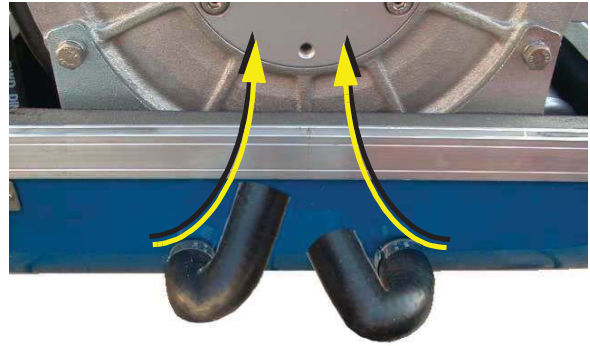
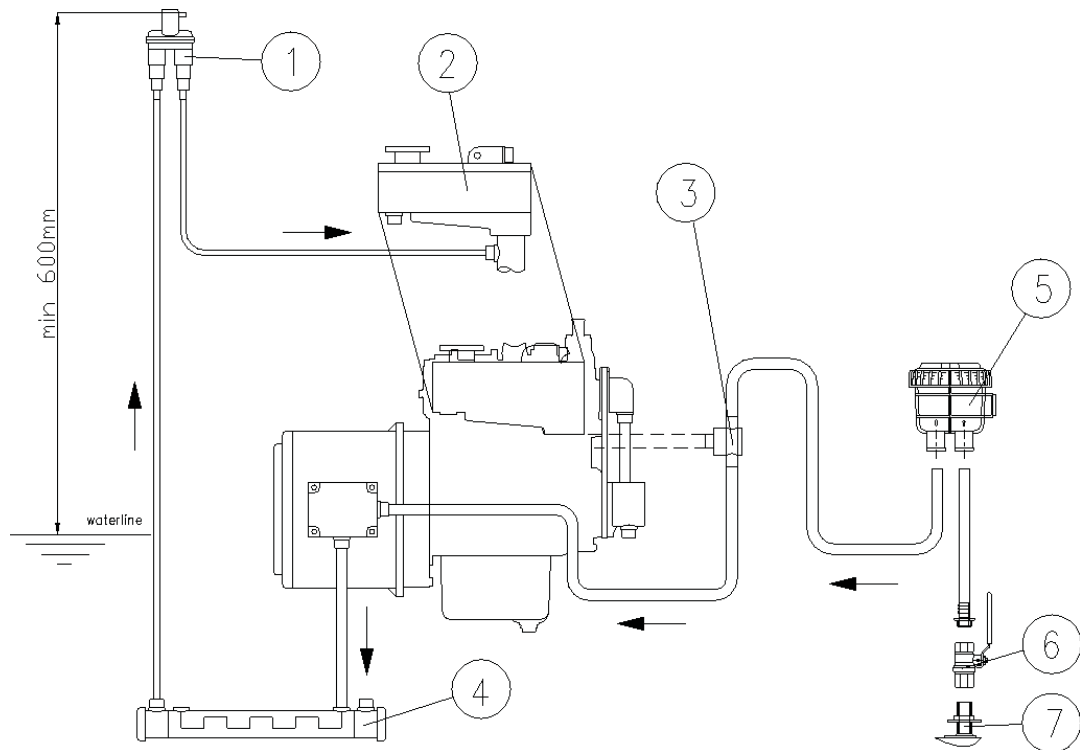


Fig. B.3.4-3: Vent valve

B.3.5 Gensethousing cooled by raw water



- 1. Vent valve
- 2. Coolant connection block
- 3. Raw water pump
- 4. Exhaust manifold

- 5. Raw water filter $\varnothing$ 1"
- 6. Water cock $\varnothing$ 1"
- 7. Hull inlet

Fig. B.3.5-1: Cooling water scheme

B.3.6 Gensethousing cooled indirect (heat exchanger)

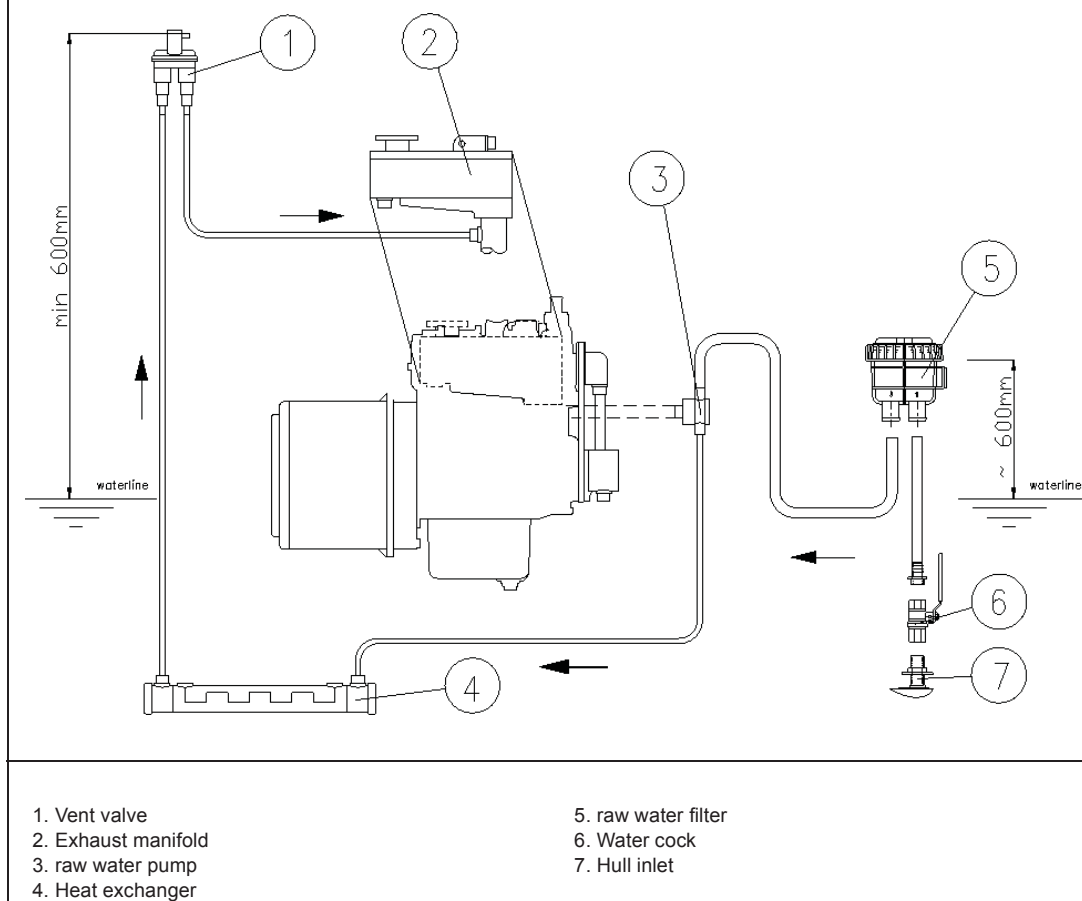


Fig. B.3.6-1: Cooling water scheme

B.4 The Freshwater - Coolant Circuit

B.4.1 Position of the external Cooling Water Expansion Tank

The Panda generator is normally supplied with an additional, external cooling water expansion tank. This tank must be installed in such a way that its lower edge is at least 500mm more highly arranged than the upper edge of the sound cover.

If this 500mm should be fallen below, i.e. the cooling water expansion tank is lower installed, very large problems can occur with filling and ventilating. Extend and displace the hose lines to the outside or possibly even up to the deck.

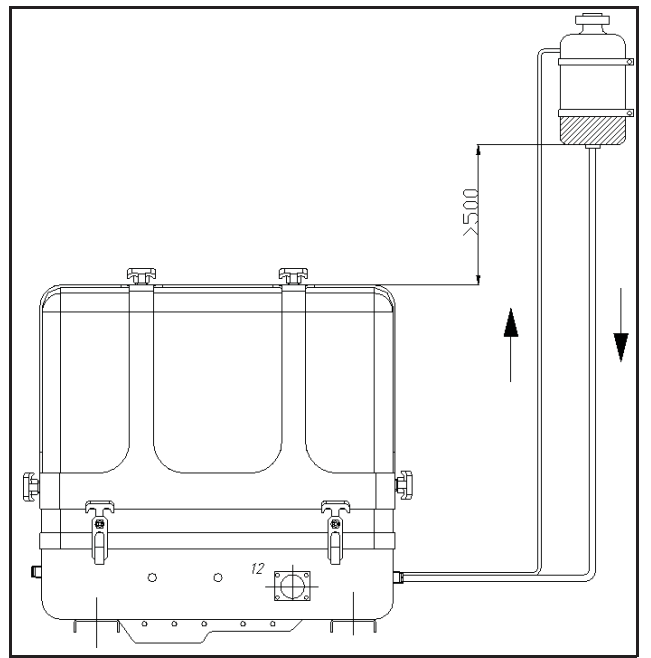


Fig. B.4.1-1: Cooling water expansion tank



ATTENTION! The external cooling water expansion tank may be filled only up to the lower edge of the lower tension tape (see note "max") in the maximum filling level in cold condition.

B.4.2 De-aerating at the first filling of the internal cooling water circuit

1. Fill up the external cooling water expansion tank with coolant.

ATTENTION: maximum fill level = „max.“- mark.

The cover of the external expansion tank temporarily must be opened (all other closures are now closed!).



Fig. B.4.2-1: Expansion tank

2. Open vent screw on the pipe socket of the internal cooling water pump. Close the vent screw when air free water comes out

Check the water level in the expansion tank during the venting. Fill up if necessary.

Never open the vent screw while the generator is running

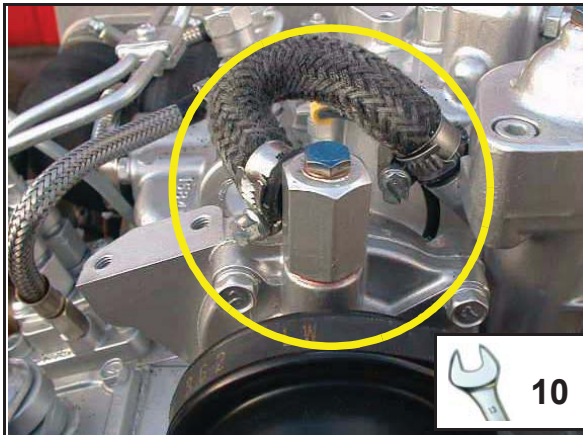


Fig. B.4.2-2: Venting screw

3. Open vent screw on the thermostat housing. Close the vent screw when air free water comes out

Check the water level in the expansion tank during the venting. Fill up if necessary.

Never open the vent screw while the generator is running



Fig. B.4.2-3: venting screw

4. Start the Generator

After filling the generator it must be started. During this first phase of start-up, the generator may not be loaded. Switch the generator off after about 10 sek. of operation!

6. Repeat the steps 1-4 till no air comes out of the vent screw at thermostat housing.

Close the vent screws.

Fill up the expansion tank.

Close the expansion tank.

7. Re-ventilating process 10 Operating hours after the first start-up (and if necessary)

Also after the first implementing a small amount of air can be reside in the cooling circuit. To ensure an immaculate und actual operating of the cooling system the ventilating process must be repeated casual in the next few days (weeks, if necessary). Small amount of air will still exit out of the ventilating openings, especially if the generator stood still for a long time.



ATTENTION! During the ventilating process repeated checks must be made to check the cooling water is indeed circulating. If there are air bubbles in the internal cooling water pump, it could be that the cooling water is not circulating. The generator will heat up very quickly and switch off, because of overheating.

Anti-freeze

In the interest of safety, the freezing point of the closed circuit coolant should be checked on a regular basis. Be sure that the coolant/antifreeze mixture is good for at least -15°C (5 °F) and if it is possible that your genset experiences lower temperatures, for example during storage or transportation, then the entire cooling system should be drained and purged

B.4.3 Pressure Test for Controlling the Cooling Water Circuit

Check if a temperature difference exists between cooling water in-flow and cooling water return flow by use of the hand.

Feel the cooling water in-flow line at the internal cooling water pump.

Feel the cooling water return pipe either at the outlet of the water-cooled exhaust elbow union or at the side, where this pipe exits at the heat exchanger.

The temperature difference between in-flow and return should be approx 10 degrees.



B.4.4 Pressure test for control of cooling water circuit

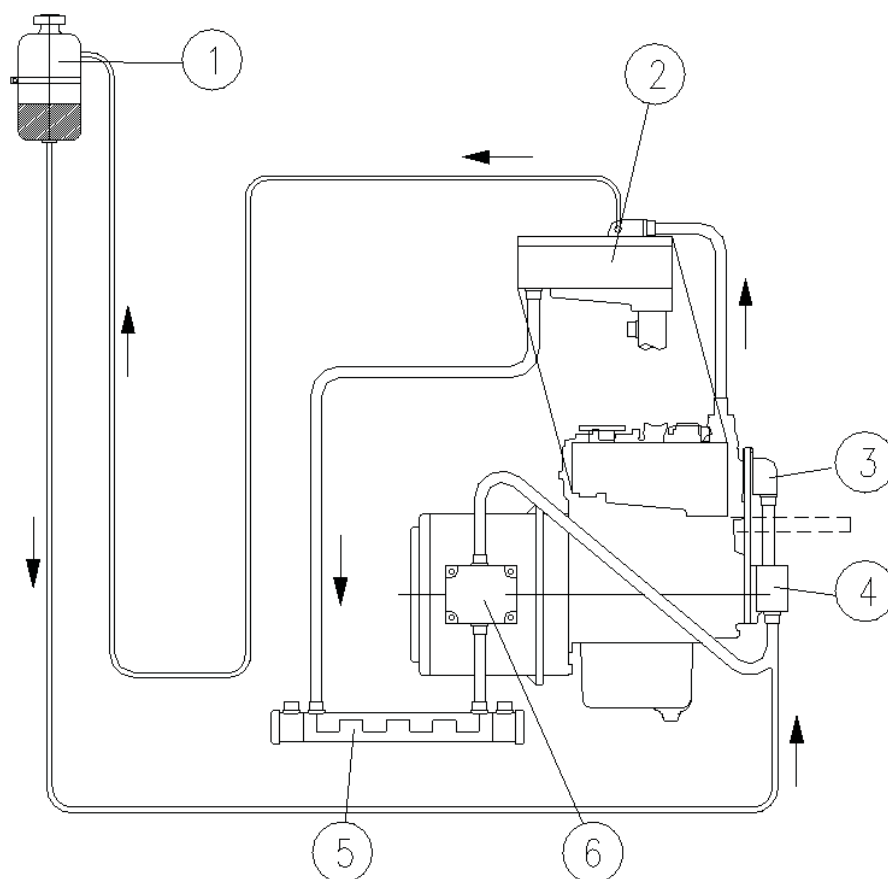
Check with the hand if a temperature difference exists whether between cooling water in-flow and cooling water return.

Feel the cooling water in-flow line at the internal cooling water pump.

Feel the cooling water return pipe either at the outlet of the water-cooled exhaust elbow union or at the side, where this pipe entry at the heat exchanger.

The temperature difference between in-flow and return is approx 10 degrees.

B.4.5 Scheme for Freshwater Circuit at Two Circuit Cooling System



- 1. Expansion Tank
- 2. Exhaust Manifold
- 3. Thermostat Housing

- 4. Freshwater pump
- 5. Heat Exchanger
- 6. Cooling Water Connection Block

Fig. B.4.5-1: Freshwater scheme

B.5 Watercooled Exhaust System

By injecting the outlet raw water into the exhaust manifold, the exhaust gases are cooled and the noise emissions from the exhaust system are reduced.

B.5.1 Installation of the standard exhaust system

The generator exhaust system must remain completely independent and separate from the exhaust system of any other unit(s) on board. The exhaust hose has an inner diameter of 40mm (1.6") (Panda 14000 and above approx. 50mm). The water lock must be installed at the lowest point of the exhaust system. An optional noise insulated water lock can also be installed. The exhaust hose descends from the capsule to the water lock. Then the hose rises via the "goose neck" to the silencer (see drawing). The goose neck must be vertical and sit preferably along the ship's keel centre line. The exhaust system must be installed so that the back pressure inside the exhaust does not exceed 0.4 bar (6 psi) and total length does not exceed 6m (20 ft.).

Exhaust diameter see *Table 2, "Diameter of conduits," on page 127*

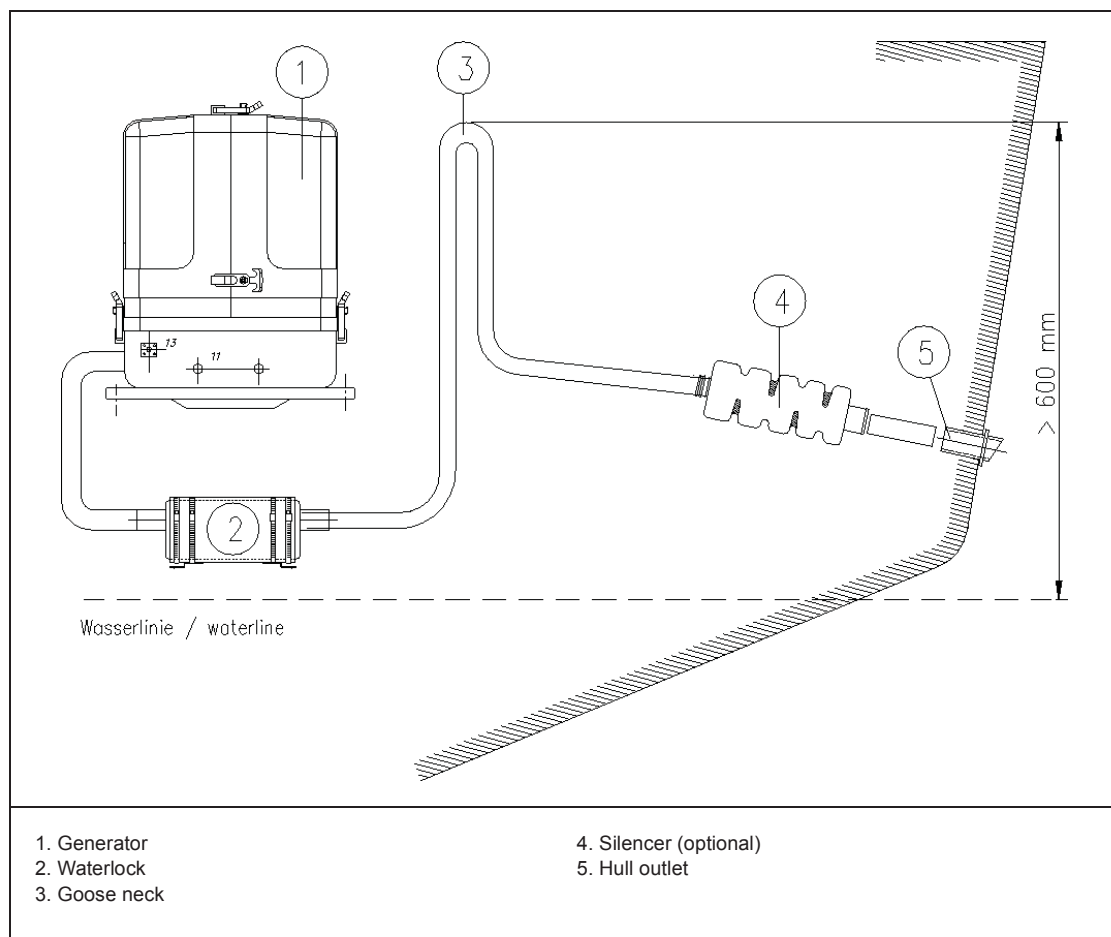


Fig. B.5.1-1: Standart exhaust system

B.5.2 Exhaust / water separator

The exhaust/water separator

In order to reduce the noise level of the generator unit to a minimum, an optional exhaust outlet muffler mounted next to the thru-hull fitting can be installed. Additionally there is component at ICEMASTER, which exercise both functions of a "exhaust goose neck", and the water separation. With this "exhaust/water separator" the cooling water is derived over a separate pipe. Thereby the exhaust noises at the exterior of the yacht are strongly decreased. Particularly the "water splash" allocate.

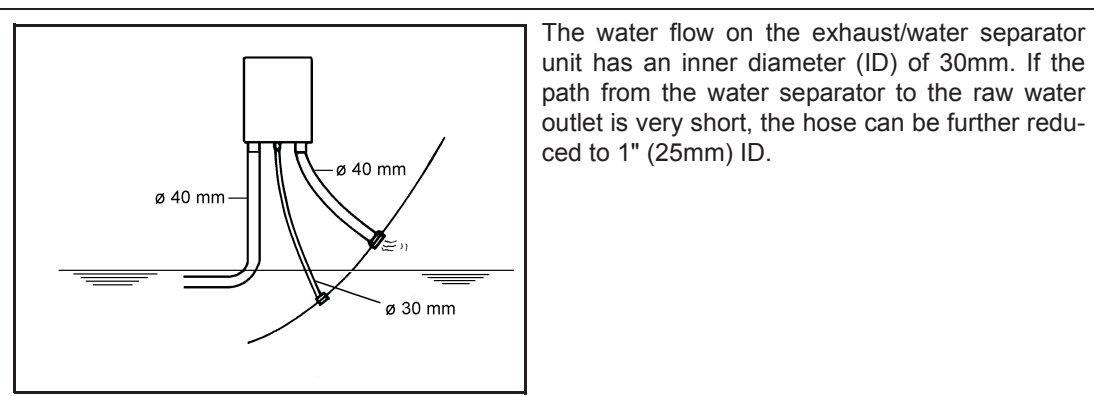


Fig. B.5.2-1: Exhaust/water separator

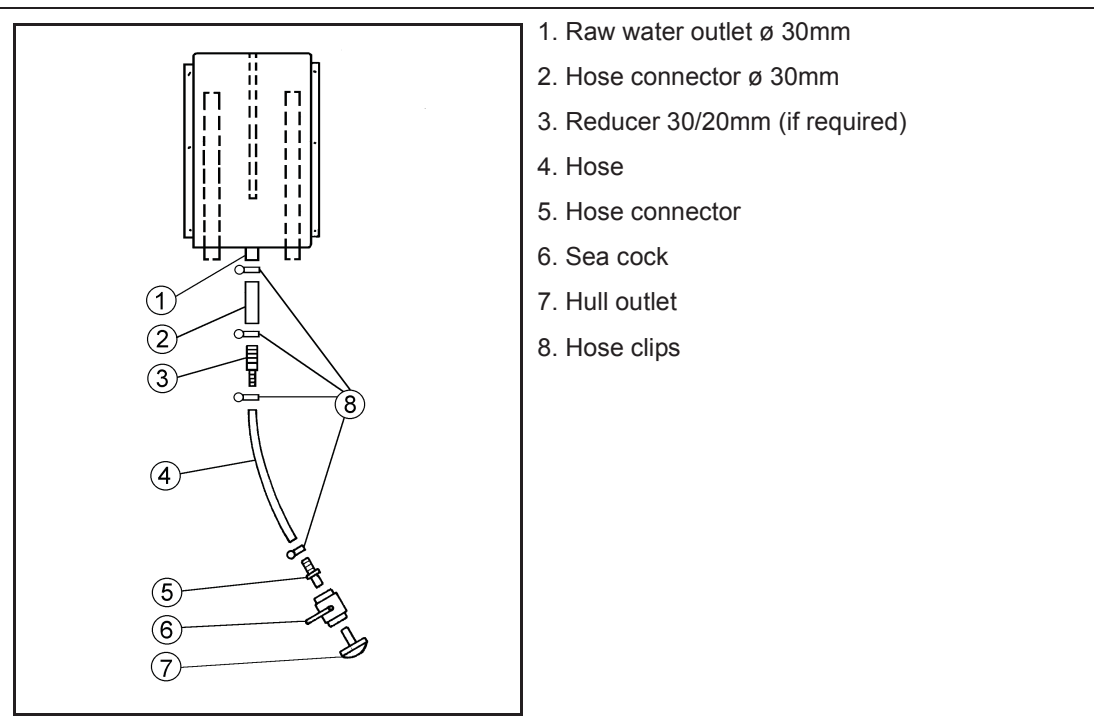


Fig. B.5.2-2: Exhaust/water separator

B.5.3 Installation exhaust/water separator

If the exhaust/water separator was sufficiently highly installed, a goose neck is no longer necessary. The exhaust/water separator fulfills the same function. If the "Supersilent" exhaust system were installed correctly, the generator will not disturb your boat neighbour. The exhaust noise should be nearly inaudible. The best result is reached, if the hose line, which derive the cooling water, is relocate on a short way "falling" directly to the outlet and this outlet is under the water-line.

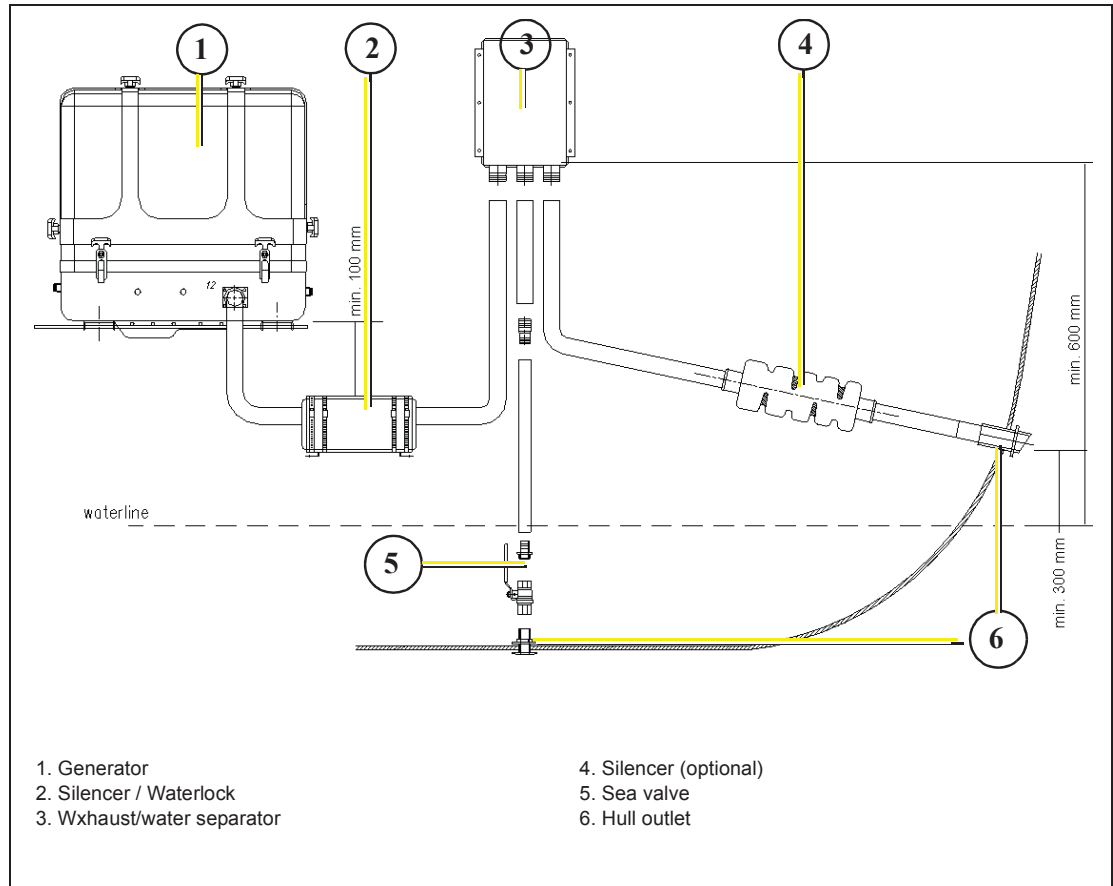


Fig. B.5.3-1: Installation exhaust/water separator

If the thru-hull exhaust outlet has to be mounted far from the generator, an exhaust-water separator must definitely be installed. The raw water from the separator must then run along the shortest possible path to the thru-hull outlet. For such long exhaust routes, the exhaust hose diameter should also be increased from NW40mm to NW50mm in order to reduce the back-pressure. The exhaust may have a length of over 10m (32 ft.) if the exhaust hose diameter is increased to 50mm. An additional outlet exhaust muffler close to the hull outlet will help further to reduce noise emissions.

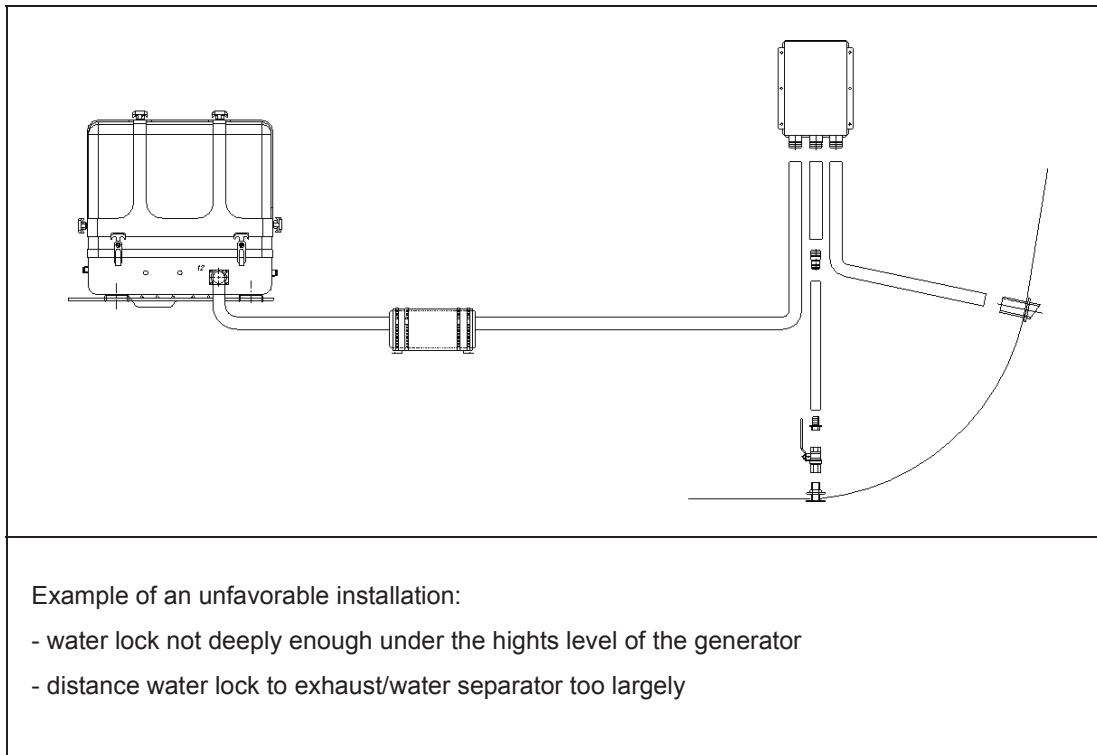


Fig. B.5.3-2: Example for unfavorable installation

B.6 Fuel System Installation

B.6.1 General References

Inside the generator capsule itself, there is the fuel filter installed (Exception Panda 4500). Additional fuel filters (with water separator) must be mounted outside the capsule in easily accessible places in the fuel lines between the tank intake fuel pump and the diesel motor's fuel pump.

Generally forward and return fuel flow pipes must be mounted to the diesel tanks. Do not connect the generator fuel supply lines with any other fuel lines of other diesel systems.

The following items need to be installed:

- Fuel supply pump (12V-DC)
- Pre-filter with water separator (not part of the delivery)
- Fine particle fuel filter
- Return fuel line to fuel tank (unpressurized)

The fuel supply pump should be mounted as close to the fuel tank as possible. The electric cable for the fuel pump is already installed on the generator (length 5m).

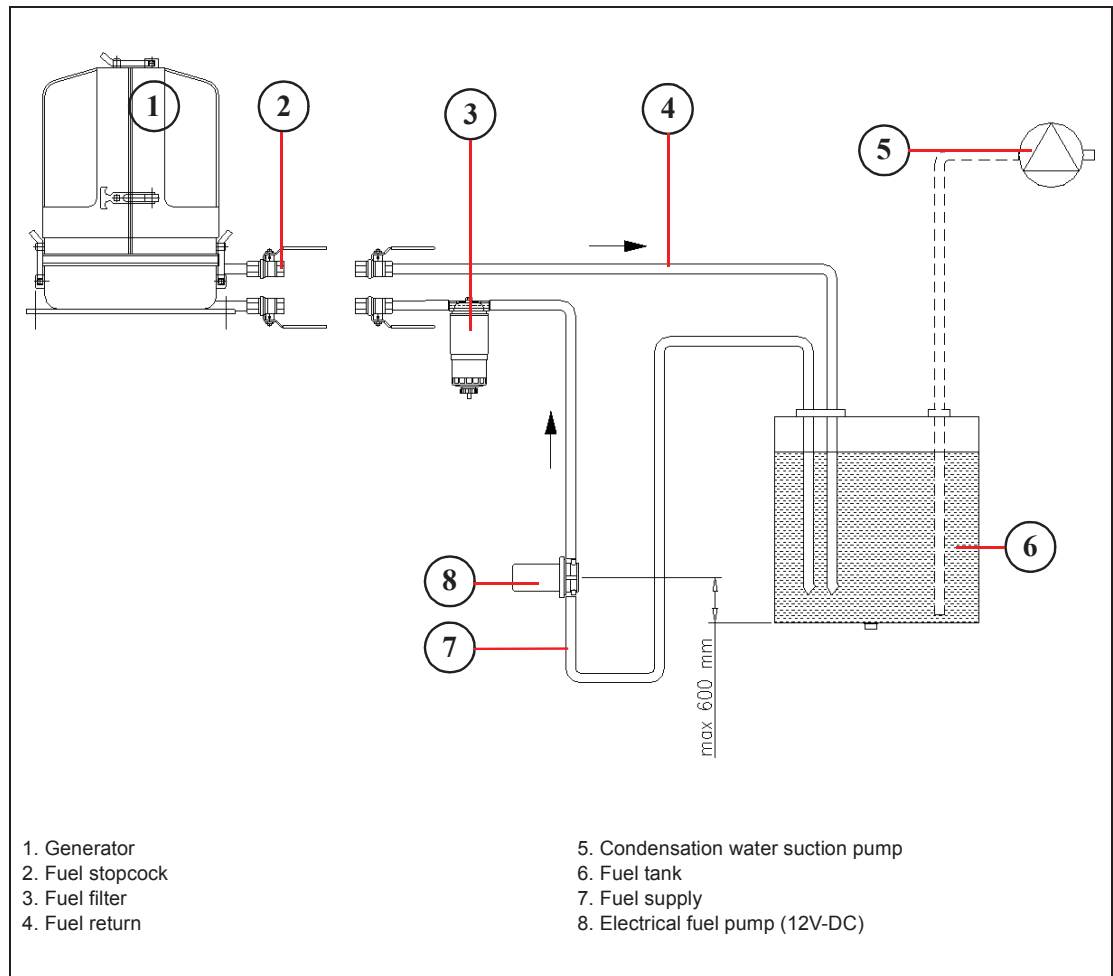


Fig. B.6.1-1: Fuel system installation

B.6.2 The electrical fuel pump

Electrical fuel pump

With the Panda generator is usually supplied an external, electrical fuel pump (12V DC). The fuel pump must be installed close at the fuel tank. The electrical connections are preloaded at the generator with the lead planned.

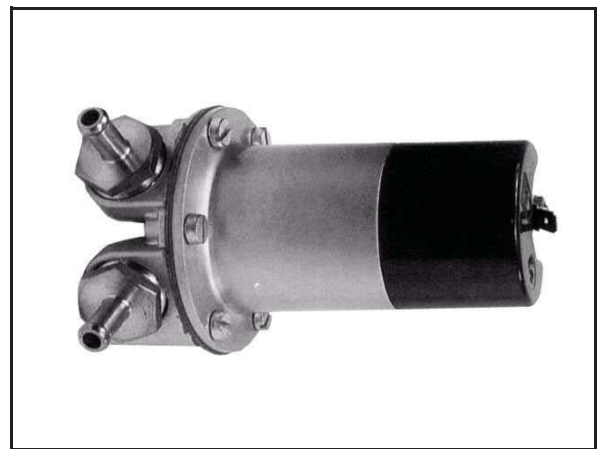


Fig. B.6.2-1: Electrical fuel pump

- Suction height of the pump: max. 1,2m at 0,2 bar
- Diameter of fuel lines: Table 2, "Diameter of conduits," on page 127

B.6.3 Connection of the fuel lines at the tank

Lead the return fuel pipe connected to the day tank to the floor

The return pipe connected to the tank must be dropped to the same depth as the suction pipe, if the generator is mounted higher than the tank, in order to prevent fuel running back into the tank after the motor has been switched off, which can lead to enormous problems if the generator is switched off for a long period.

Non-return Valve in the Suction Pipe

A non-return valve must be fitted to the suction pipe, which prevents the fuel flowing back after the generator has been switched off, if it is not possible to use the return flow pipe as a submerge pipe by placing it in the tank. The instructions "Bleeding Air from the Fuel System" must be read after initial operation or after it has stood still for a long period, in order to preserve the starter battery.

ATTENTION! Non-return valve for the fuel return pipe

If the fuel tank should be installed over the level of the generator (e.g. daily tank), then a non-return valve must be installed into the fuel return pipe to guaranteed that through the return pipe no fuel is led into the injection pump.



B.6.4 Position of the pre-filter with water separator

Additionally to the standard fine filter a pre-filter with water separator must be installed outside of the sound cover in the fuel system line. (is not included in delivery.)



Fig. B.6.4-1: Fuel filter with water separator

B.6.5 Bleeding air from the fuel system

Normally, the fuel system is designed to bleed out air itself i.e. as soon as the electric starter motor starts operation the fuel pump starts working and the fuel system will be air-bled after some time automatically. It is nevertheless essential to bleed the system as follows prior to the first operation (as all hoses are empty):

Switch „Stand by“- switch on control panel "ON".

Push „Fuel pump“- switch S3 (located on the relay board) and hold tight. The electric fuel pump has to be running audibly. By moving the switch you can hear the solenoid valve of the generator starting and stopping (when the sound cover is taken off). After the fuel pump has been running 3 to 4 minutes because the switch has been pushed down the bleeding screw of the solenoid valve has to be unscrewed. When opening the screw carry on pushing the switch. To avoid fuel getting in the sound cover a piece of cloth or absorbent paper should be put under the connection. As soon as fuel is running out without bubbles the air bleeding screw can be screwed in again. Only now stop pushing the „Fuel pump“-switch S3.

Now the unit can be started by pushing the "Run/Stop"-button. The unit should start after a short while. Should the unit not start one of the pipe union nuts of a injection hose has to be unscrewed and one has to try again to start the unit. After the unit has started the pipe union nut has to be tightened again.

„Stand by“-switch "OFF".

Fuel solenoid valve

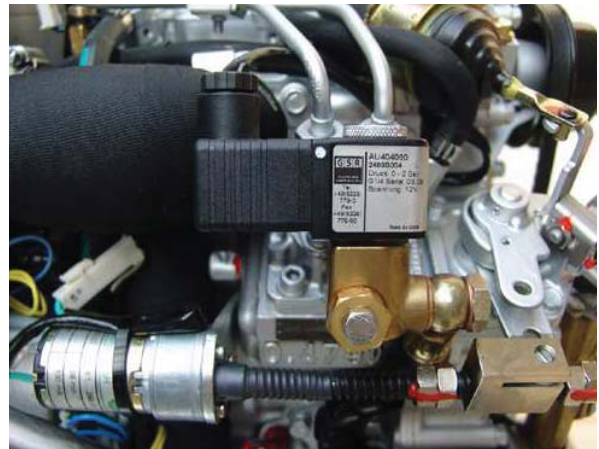


Fig. B.6.5-1: Fuel solenoid valve

B.7 Generator 12V DC System-Installation

The Panda has its own dynamo to charge a 12V starter battery.

It is recommended to install an additional starter battery for the generator.

The generator is then independent from the remaining battery set. This enables you to start the genset at any time with its own starter battery even if the other batteries are discharged. A further advantage of a separate starter battery is that it isolates the generator's electric system from the rest of the boat's DC system, i.e. minus pole (-) is not connected electrically to Earth/Ground.

The generator is then Earth/Ground free with regard to the rest of the boat.

B.7.1 Connection of the 12V starter battery

The positive (+) battery cable is connected directly to the solenoid switch of the starter.

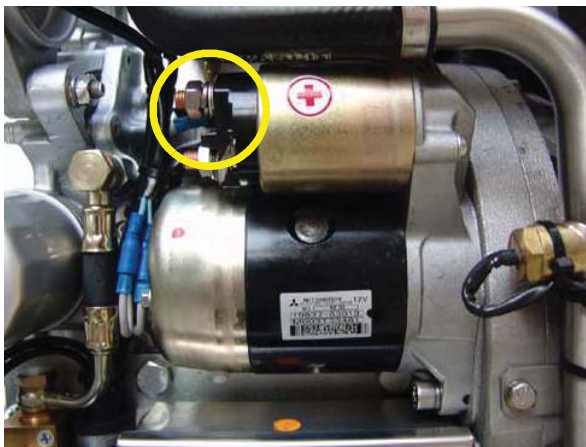


Fig. B.7.1-1: Connection of positive starter battery cable

The negative (-) battery cable is connected to the engine foot.



Fig. B.7.1-2: Connection of negative starter battery cable

All Panda generators are equipped with an independent 12V-DC starter motor. The connecting lines cross-section from the battery to the DC system should measure 25mm².

1. Solenoid switch for starter motor
2. Starter motor

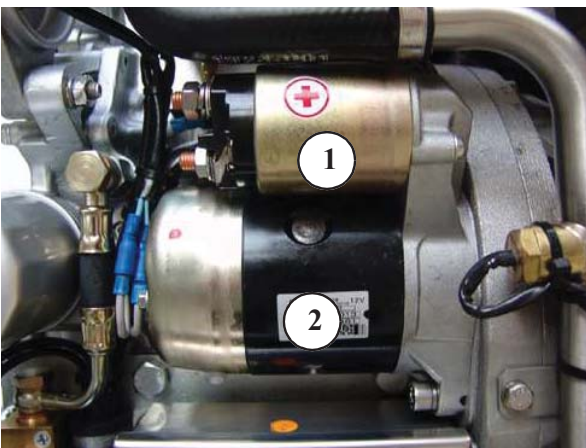


Fig. B.7.1-3: Starter motor

B.7.2 Installation of the remote control panel

The control cables are securely connected to the genset. On the back of the control panel is a terminal block for the remote control cable.

Please ensure that the remote control panel is installed in a protected, dry and easily accessible place.

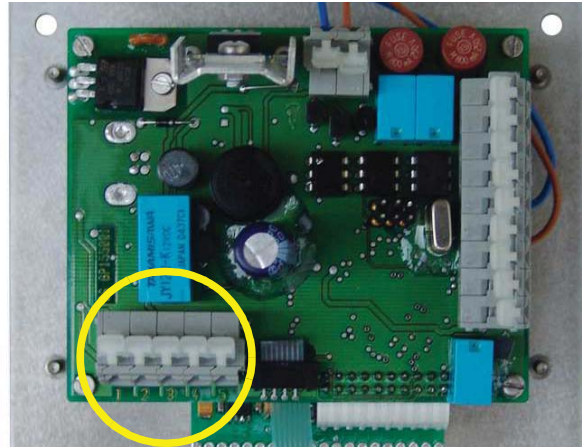


Fig. B.7.2-1: Remote control panel - back side

B.7.3 The speed sensor

Speed sensor

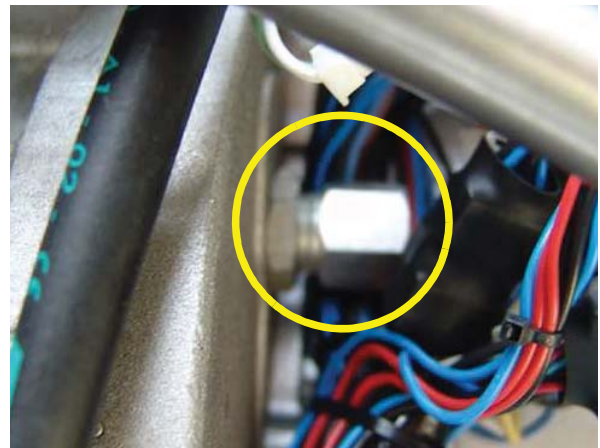


Fig. B.7.3-1: Speed sensor

Installation of the speed sensor

The speed sensor tip must have between 0.3 to 0.8mm of clearance (air gap) from the gear tooth tips. In order to achieve this clearance: the speed sensor tip should be aligned with the tip of a gear tooth and screwed in until it touches the tip of the tooth. (**ATTENTION! Ensure that when inserting the sensor, that the sensor tip is not screwed into the root of the gear tooth**). The screw is subsequently turned anticlockwise by half a turn (0.3 to 0.8mm) and held by a counter nut.

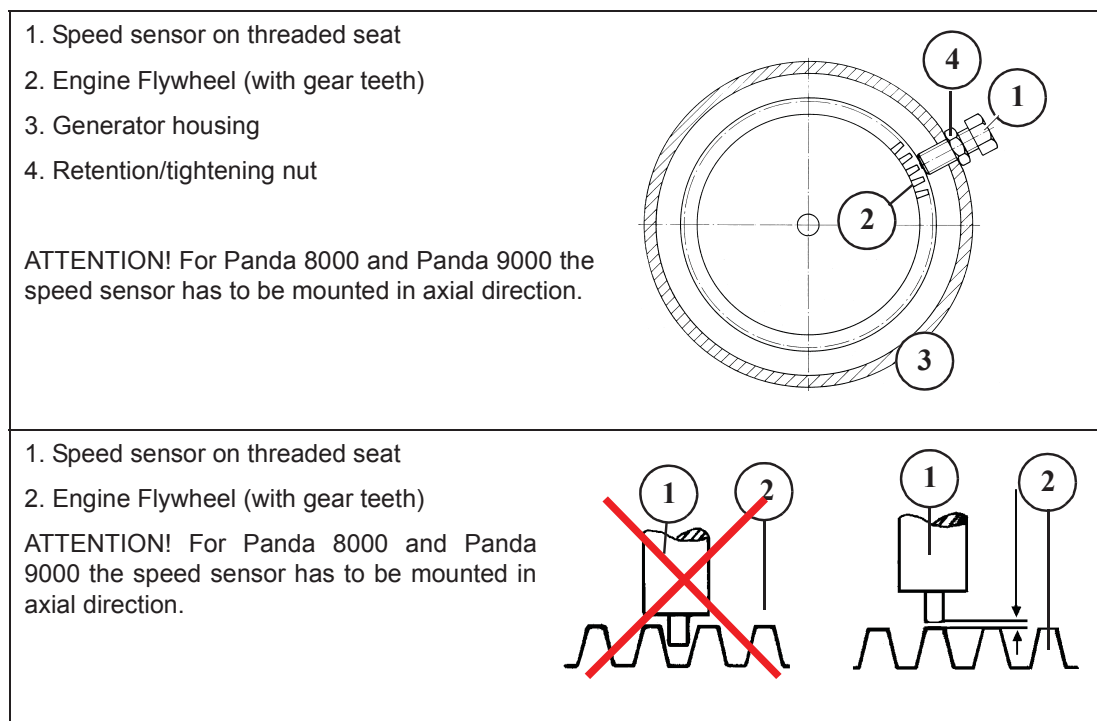


Fig. B.7.3-2: Speed sensor

B.7.4 Electronic starter control unit

If there is an automatic starting requirement and if the remote control panel is switched off, then this automatic starting requirement is ignored. Automatic starting is only possible if after switching on of the remote control panel the automatic starting requirement takes place.

B.8 Generator AC System-Installation



ATTENTION! Before the electrical system is installed, READ the “Safety Precautions” on page 11 in this manual FIRST! Be sure that all electrical installations (including all safety systems) comply with all required regulations of the regional authorities. This includes lightninging conductor, personal protection switch etc.

B.8.1 Installation AC-Box

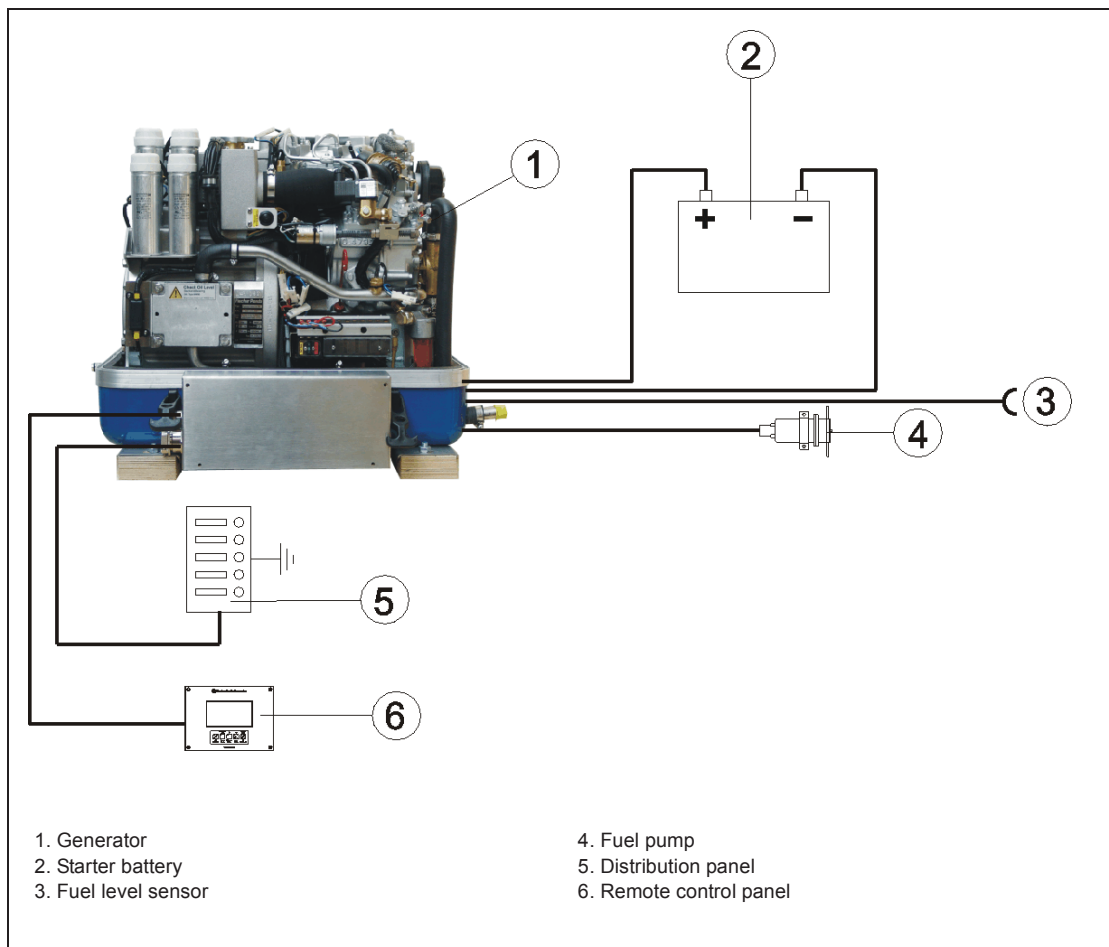


Fig. B.8.1-1: Installation scheme

A power source selector switch must be installed between the generator (or if applicable, AC-Control box) and the ship's electrical supply system. This switch must be used to ensure that all AC consumers can be switched off at once. This switch should also be installed to keep the generator and shore (grid) power systems separate.

A 3-way cam-type switch should be used. This switch basic positions: "Shore power" - "OFF" - "Generator". If an (DC-AC) inverter is used, a fourth position will be required.

0. OFF

I. Generator

II. Shore power connection

III. Inverter

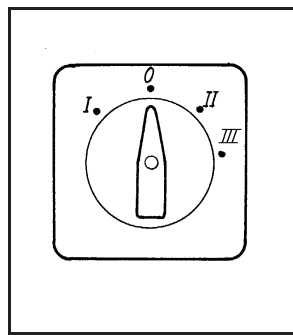


Fig. B.8.1-2: Selector switch

The cam-type switch must have **2 poles**, so that "MP" and "phase" can be switched off.

If a 3-phase current system is also installed with the option of supplying from either the generator or shore power, an **additional** switch must be installed to keep these systems separate.

An alternative to a manual rotating switch is an automatic power relay. When the generator is not running, the relay remains in the shore power position. As soon as the generator is running, the power relay switches automatically to the generator position.

If the system has both single and 3-phase AC, it is CRITICAL that the two systems remain SEPARATE!

Electrical fuses

It is absolutely essential that the electrical system installation is inspected by a qualified electrical technician. The generator should have its own AC **input electrical fuses**. The fuses should be sized such that the rated current of the generator on each of the individual phases is not exceeded by more than 25%.

Data for gensets with power output greater than 30kW on request!

The fuses must be of the slow type. A 3-way motor protection switch must be installed to protect the electrical motor.

Required fuses see *Table 3, "Rated current," on page 127.*

Required cable cross-sections

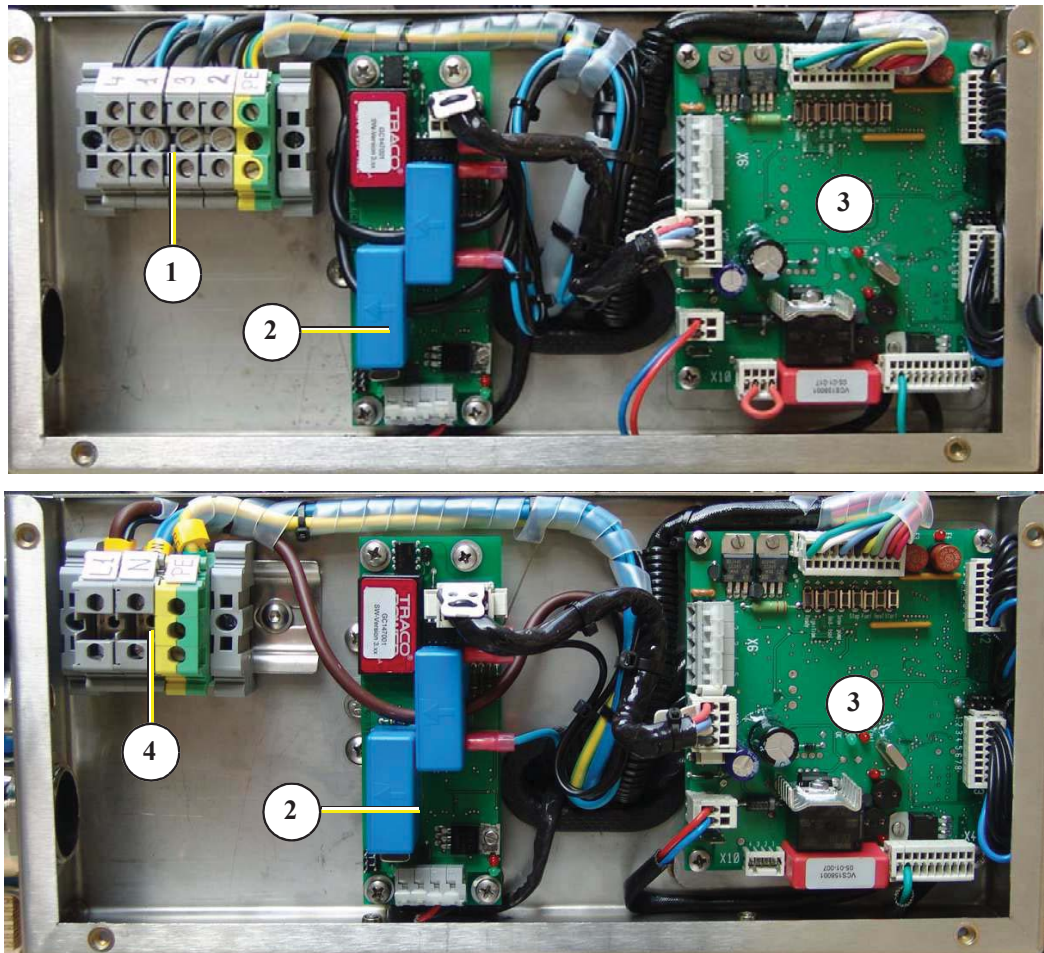
The following recommended electrical cable dimensions (cross sections) are the minimum required sizes for a safe installation. (*see Table 4, "Cable cross-section," on page 127*)

B.8.2 Control box



Danger - High voltage

ATTENTION! Before working on the System read the section “Safety Precautions” on page 11 in this Manual.



1. Terminal block 120V/60Hz
2. Current transformer board

3. VCS board
4. Terminal block 230V/50Hz

Fig. B.8.2-1: Control boxes 120V/60Hz and 230V/50Hz (sample picture)

B.8.3 VCS-voltage control

All Panda generators from Panda 8000 upwards are fitted with the electronic voltage control "VCS" as standard.

The VCS controls the generator voltage and motor speed. A servo motor on the injection pump can increase the engine speed by up to 8%.

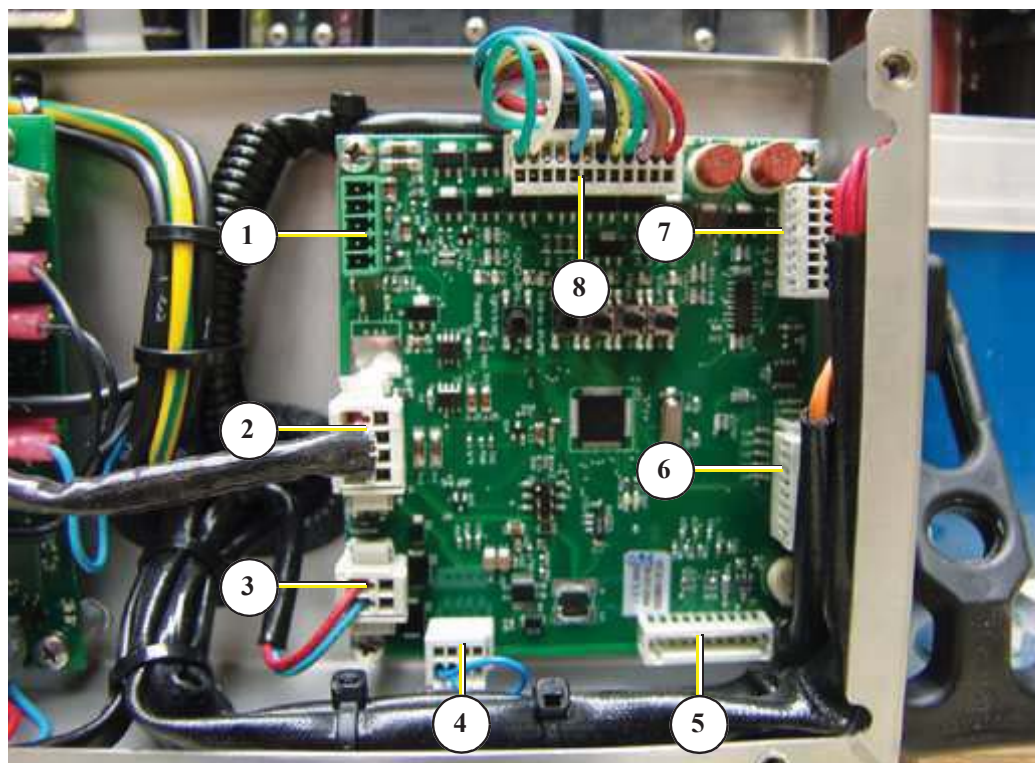
If the generator is run without load, the voltage should be 240V with a frequency of approx 57,8 to 58,6Hz (48,5 - 49Hz for 230V 50Hz models). The frequency (equates to the speed) can be increased by up to 8%. This ensures that the engine speed is increased when there is an extra load. The maximum speed is achieved when 80% load is reached.

All signals pass through the circuit board in the Control box. The signal impulse for the servo motor is passed to the electric motor by means of the 5 core wire.

The generator maintains its full capability if the VCS has a defect.

In this case the base current must be raised to at least 240V by adjusting the minimum setting on the speed gauge, in order to ensure that the generator output voltage at 70% nominal load does not drop below 215V.

For detailed information section F.7, "Scheme VCS board," on page 133.



- | | |
|---|---|
| 1. Terminal for control panel J6 | 5. Connector for Analogue/binary input J4 |
| 2. Connector for CT board J7 | 6. Connector for Analogue/binary input J3 |
| 3. Connector for Power supply J5 | 7. Connector for Analogue input J2 |
| 4. Connector for Digital/binary input J10 | 8. Connector for Binary output J9 |

Fig. B.8.3-1: VCS board

B.8.4 Current transformer board

For detailed information section F.8, "Scheme current transformer board," on page 136.

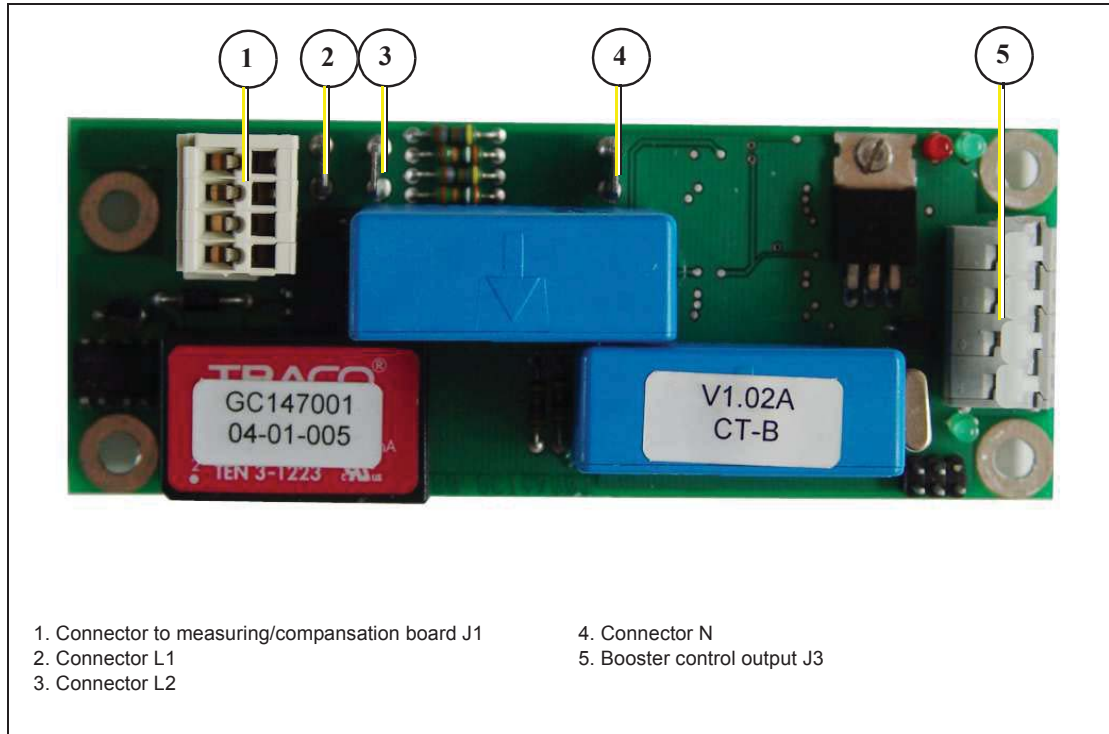


Fig. B.8.4-1: Current transformer board

B.9 Insulation test



ATTENTION: Once the electrical system installation is complete, a ground insulation test must be performed as follows:

- 1.) Switch off all on-board electrical devices.
- 2.) Start the generator..
- 3.) Measure the AC-voltage with a voltmeter (adjust to Volt/AC) between:
 - a) generator housing and AC-Control box
 - b) generator housing and ground.

The measured voltage must not exceed 50mV (millivolts).

4.) Once the safety systems have been installed, they must be checked. If a leakage current relay has been installed, it also has to be tested. In order to ensure that the leakage voltage relay functions properly, the individual generated phases from the generator must be checked between each other, between phase and ground, (the single phase or 4th phase also needs to be checked in this fashion).

5.) If the generator is protected by a ground connection, then **ALL** electrical devices, must also be connected to this "common" ground (usu. ground contacts are attached to the devices' metallic housings).

The electrical system installation must also comply to the hook-up requirements of the shore current grid. Generally a leakage current relay is sufficient for safe electrical operation, however, this must be confirmed by the electrical safety standard in the region where the system is attached to a main land power grid. The relay has to be meet the required safety standard regulations.

In addition to a proper circuit diagrams, terminal points, connections, electrical devices, etc. should also be labelled with stickers or signs

There is always the possibility that circuits have been rerouted/changed or individual components have not been correctly laid out on the circuit diagrams.

The installation electrician should therefore check and label all electrical connections to ensure that they correspond to the main circuit diagram. The inspection and correct labelling is especially critical for terminals L1/ L2/L3/L1'/N (for the 230V-50Hz model) and for terminals L1/L2/L3/N & 1/2/3/4 for the 60Hz (120V) models. The electrician is **therefore obliged, before** installation to check whether the generator is earth-free. As long as this test has not been carried out all other components for electrical installation must be removed. Once the system has been installed and inspected, this test should also be performed with all electrical devices (i.e. voltage check between common and metallic housings) while the generator is running.

B.10 Voltage controller

With a engine-operated generator set count always on the fact that through disturbances at the controlling of the diesel engine the control of the number of revolutions monitoring is lost. In this case the diesel engine could wind up without limitation and produce a voltage, which becomes substantially larger than the electrical load can process. This can destroy very expensive items of equipment. It must be taken for granted that for the protection of the electrical load a voltage controller with isolating relays is used for a solid installation. The appropriate accessory components are available at Icemaster.

If it is about a duo combination generator, the voltage control for both output parts (single phase AC and three-phase AC) should be planned.

At different PANDA generators a voltage control is integrated. This voltage control affects only the diesel engine. If the rated voltage exceeds approx. 15%, this voltage control is activated, as the diesel engine is turned off. This is only possible with the delay of some seconds, load could be damaged in the meantime. The only safe method for the protection of the electrical devices is the installation of an external voltage controller with separation contactor.

We recommend this measure with all reproduction and point out also that the generator manufacturer is not responsible for damage, which are caused by overvoltage at external devices.

Protect your valuable devices by an external voltage controller!

Position of the external voltage controller

Reasonable the external voltage controller is mounted in such a way it works not only for the generator but for all AC voltage supplies in the electrical system, also for shore power and inverter. In these cases usually a selector switch is intended, which can be determined, which voltage supply is switched to the electrical system. The voltage controller must be installed at the exit of the selector switch, thus in the electrical system.

B.10.1 Adjustment of the rated voltage

The voltage controller must be ordered for the appropriate rated voltage (12, 24, 32, 48, 42 V DC). Other voltage on request.

Changing between these voltages is not possible.

B.10.2 Functional description of the voltage controller

The voltage controller has 3 different adjustment possibilities:

upper switching point, lower switching point and time lag of the generator.

In factory setting the voltage controller is in the following attitude:

- a) upper switching point (disconnection) 13.6V
- b) lower switching point (insertion) 11.52V

- A) upper switching point (disconnection)
- B) lower switching point (insertion)
- C) t_d = time lag of the generators after achievement of the upper switching point

- 1.measuring voltage plus (+)
- 2.measuring voltage minus (-)
- 3.Charging voltage
- 4.Battery lower voltage
- 5.not allocated
- 6.not allocated
- 7.output positive (+)
- 8 output negative (-)

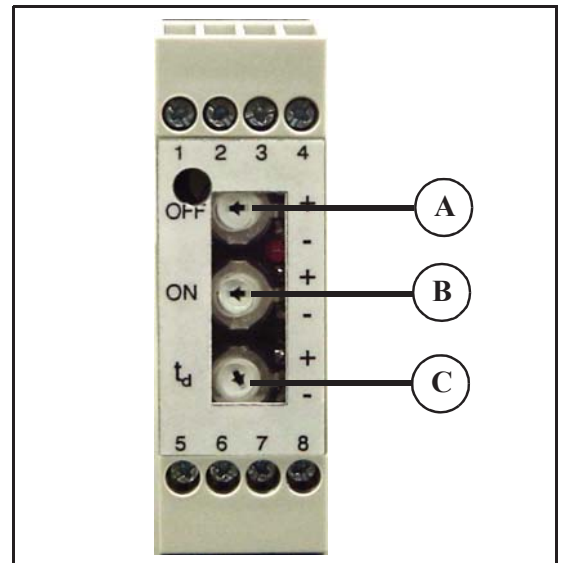


Fig. B.10.2-1: Voltage controller

B.10.3 Time lag of the switching points

For the upper as well as for the lower switching point a time delay is adjusted. That is, the voltage must have overstep or fall short of the switching point on the time lag.

Following values are adjusted:

- a) upper switching point (13,6V), lag: min. 20 seconds
- b) lower switching point (11,52V), lag: 40 seconds

Additional notes to the recommendation "External, electrical voltage controller"

At Diesel engines count always on the fact that a diesel engine "revs up" due to special circumstances uncontrolled. This is the case if by damage to the system engine oil arrives into the sucking in way. This is possible at many engines by the crank case exhaust. A crank damage could cause for example that by overpressure too much oil is pressed into the crank case, so that this oil arrives into the sucking in way. The engine cannot switch off itself any longer. Usually then a damage to the engine is the result. It would be fatal, even if this damage to the engine were the cause of the destruction of all switched on electrical load, because uncontrolled revving up of the Diesel engine leads also to an extreme increase of the voltage. Only by an external voltage controller with separation contactor can be prevented such damage.

B.11 Instructions on prevention of galvanic corrosion

Galvanic corrosion

If several machines are connected by a common electrical potential (e.g. mass) and the system is also still in contact with other metal parts (e.g. the trunk of a neighbour ship), always assume that the different construction units proceed different electrical voltage, which affect on the entire system and the construction units. DC voltage causes an electric current, if in the environment of these parts electrically leading liquids (electrolyte) are available. Also calls "galvanic process". The electrical charge of the negatively charged ranges (anode) is led to the positively charged range (cathode). The negatively charged part (anode) "is sacrificed" thereby, i.e. that the electrical particles at the surface of the material cause decomposition with this chemical process. Since aluminum is an electrically negatively charged metal, aluminum will play the role of the anode compared with most remaining metals. This applies in particular opposite copper, brass, and steel, high-grade steel etc.. These metals are positively charged.

Several measures must be considered when making the installation, so that bimetallic corrosion can be avoided as much as possible:

- Electrical isolation of the water pump. Synthetic washers and synthetic distant plates are attached beneath the water pump, so that the potential difference between the generator and raw water is interrupted.
- Separation of the water columns (between raw water and generator) after switching off. This can either be a stop valve turned by hand. (BEWARE! The valve must be closed after each operation). Or by the installation of an automatic ventilation valve. In this case the valve opens and shuts automatically.
- Connecting all components (hull outlet, generator, heat exchanger etc.) to a common potential. For this all elements are connected by means of a cable (earthed).
- Strict separation of the generator from 12V ship mains, that means earth free installation of the 12V system (generator installation and general ship mains).

Please take more details from the information pack "Bimetallic Corrosion (Electrolysis)", which You can order from Fischer Panda gratis.

C. Mode of Operation of the Generator

C.1 Mode of Operation of Operating Surveillance

Internal monitoring switches

The generator is equipped about failure switches, which are indicated on the remote control panel, and also about failure switch, which switch-off the generator automatically without indicating a failure in the remote control panel:

The remote control panel supervised the following values. In the case of a disturbance the generator is switched off, in order to avoid damage to the genset:

1. Cooling water temperature at cylinder head, at exhaust manifold and exhaust connection
2. Raw water and fresh water temperature
3. Coil temperature
4. Oil pressure

The fault is transmitted, if one of these switches measures a value that exceeds the required value (all switches are openers). The current is switched off by the main relay. (Fuel magnet valve closes, the fuel suction pump is switched off, VCS is switched off).

The combustion engine possesses an oil pressure control switch, which switches the engine off if the oil pressure drops under a certain value.

The additional failure switch in the generator coil, it is also indicated at the remote control panel, interrupts directly the current supply to the main power relay. By this constellation it is guaranteed that the generator switches off in each case when an error is present.

This measure is, if possibly, a circuit at the remote control panel failed.

Thermo-switch at cylinder head

The thermo-switch at the cylinder head serves the monitoring of the generator temperature. All thermo-switches for the generators from Panda 6.000 upward are two-pole and laidout as "openers".

110°C and 130°C



Fig. C.1-1: Thermo-switch at cylinder head

Thermo-switch in the generator coil

1. Generator coil
2. Thermo-switch 4x165°C/175°C
3. Housing

For the protection of the generator coil there are two thermo-switches inside the coil, which are for inserted parallel and safety's sake independently from each other.

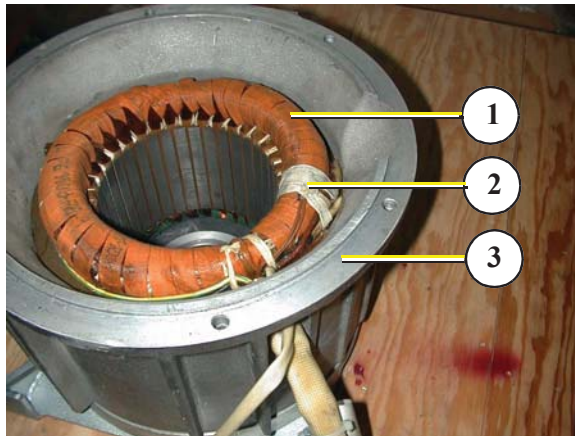


Fig. C.1-2: Coil thermo-switch

Thermo-switch at the front plate

The generator bearing is equipped with an thermoswitch, which switches the engine off if the temperature becomes to high.

130°C

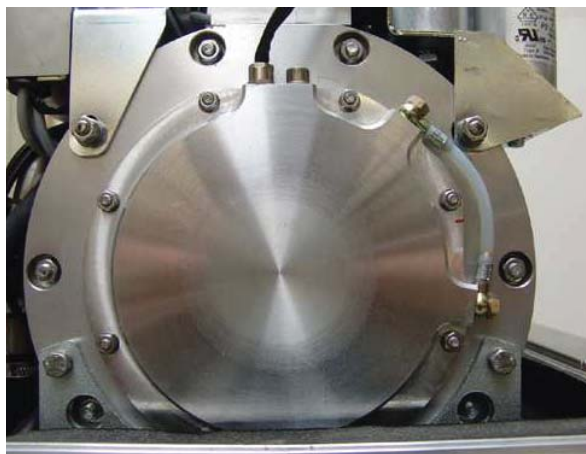


Fig. C.1-3: Thermo-switch at front plate

Thermo-sensor raw water in



Fig. C.1-4: Thermo-sensor raw water in

Thermo-sensor raw water out



Fig. C.1-5: Thermo-sensor raw water out

Thermo-sensor exhaust

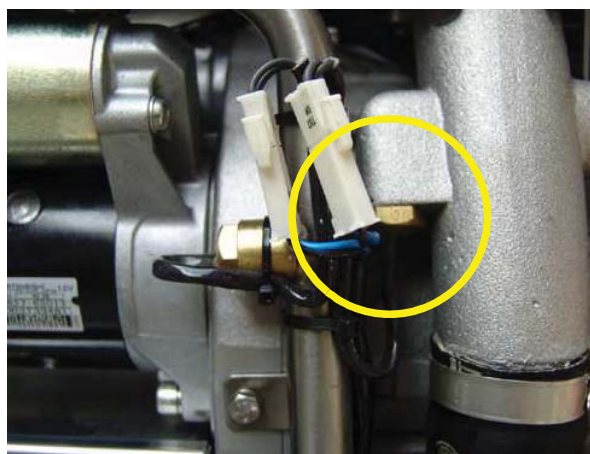


Fig. C.1-6: Thermo-sensor raw water out

Thermo-sensor fresh water in

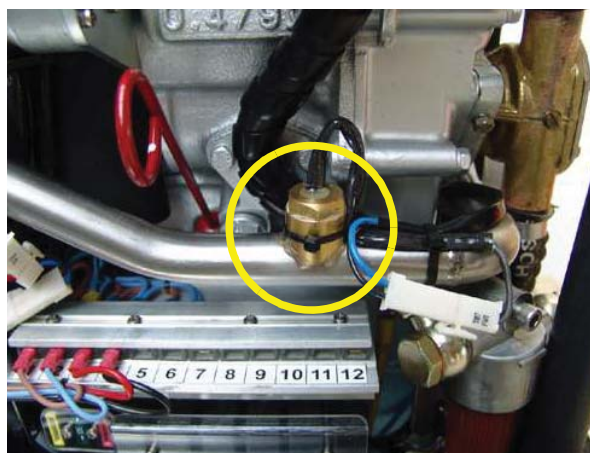


Fig. C.1-7: Thermo-sensor fresh water in

Thermo-sensor fresh water out

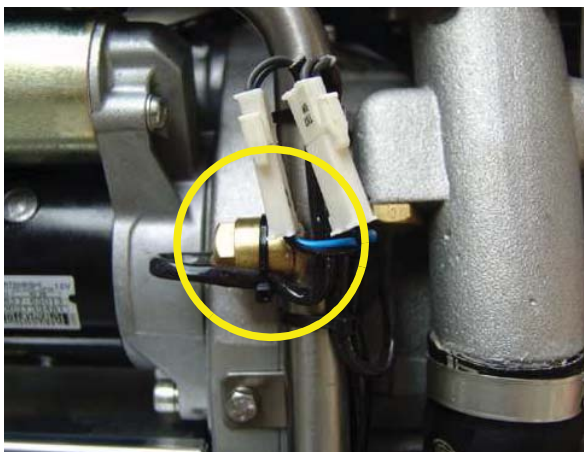


Fig. C.1-8: Thermo-sensor fresh water out

Thermo-sensor oil temperature



Fig. C.1-9: Thermo-sensor oil temperature

Oil pressure switch

In order to be able to monitor the lubricating oil system, an oil pressure switch is built into the system. The oil pressure switch is on the back of the engine (below the oil filter).



Fig. C.1-10: Oil pressure switch

C.1.1 Regulation of the generator voltage by the VCS

The output voltage of the generator is permanently measured by the VCS (approx. 20 times per second!). As soon as by a load the voltage is affected, the speed regulation provides to adapt to the changed power demand by appropriate change of the engine speed.

Not only by the excitation of the generator it is worked against to the initiating voltage drop, but also by the raising of the number of revolutions whereby the drive potential improves.

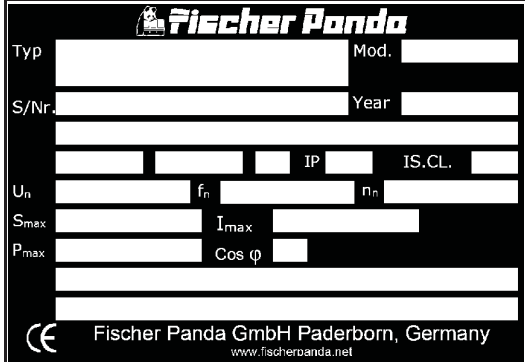
C.1.2 Overloading of engine during longer operation

Please ensure that the genset is not overloaded. Overloading occurs when the electrical load (demand) induces a load torque in the generator which is higher than that which the diesel drive motor can provide. Overloading causes the engine to run rough, burn oil, creates excessive exhaust (environmentally unfriendly) and even to stall. Extra caution should be practised with multi-power units (single and 3-phase current generation) to avoid overloading the diesel drive engine.

The generator should only be loaded at the peak rated power for short periods only! A high peak current is required to start many electrical devices, especially electric motors and compressors (from a still stand state).

The height of the rated output (P) can taken from the identification plate attached on the housing.

In order to guarantee a long life span, the continuous load should not exceed 80% of the nominal load. By continuous output we understand the continuous operation of the generator over many hours. It is harmless for the engine to supply for 2-3 hours the full rated output.



The identification plate contains the following fields:

- Typ: [] Mod. []
- S/Nr. [] Year []
- [] IP [] IS.CL. []
- U_n [] f_n [] n_n []
- S_{max} [] I_{max} []
- P_{max} [] Cos φ []

At the bottom, it features the CE mark and the text: Fischer Panda GmbH Paderborn, Germany, www.fischerpanda.net

The total conception of the Panda generator guarantees that the continuous load operation does not release superelevated temperatures of the engine also with extreme conditions. It is to be considered that the exhaust gas values in the full load operation become more unfavorable (soot formation).

^

C.1.3 Use the failure bypass switch for fuel delivery

Switch on the "Stand by"-switch at the control panel. Functional elements must shine.

Press „Failure bypass switch“ (located at the air suction housing) and hold. The electrical fuel pump must run audibly. The pressing of the switch become audible switching on and off of the fuel solenoid valve at the generator (with removed sound cover).

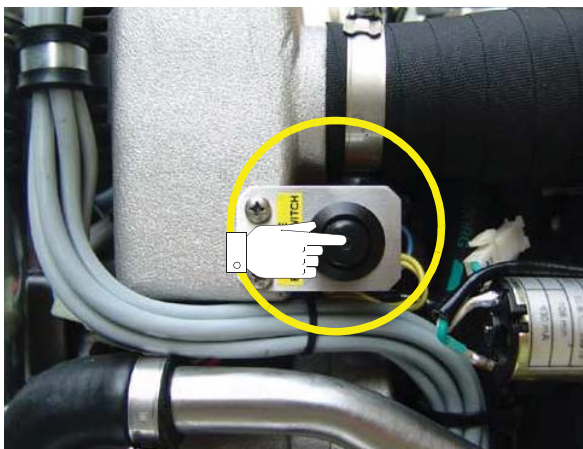


Fig. C.1.3-1: Failure bypass switch

C.2 Operation of electric motors with high starting current

C.2.1 General references

Electric motors can need for a very short time an increased starting current when starting. The starting current can amount to up to 10 times of the rated current. This applies in particular to 2-pole engines and particularly to fan engines with larger power, in addition, to engines, which compressor with flywheels or the like propels. If such engines are to be operated, contact the technician of Fischer Panda, in order to find suitable measures, which work against the high starting current and/or layout the generator for the higher starting current.

C.2.2 Compensation of 1 phases engines

If inductive electrical load is connected, then there is a phase shift between current and voltage; the portion of the blind current becomes larger. This effect meets by automatic activating of additional capacitors and compensates the idle current. This compensation of the inductive load causes that the efficiency of the generator is increased. By the automatic compensation can more engines or a larger electrical load with an inductive character be operated. In other words: the usable power of the generator is increased.

C.2.3 Compensation of 3 phases engines

See folding sheet "Operation Instructions for Generator with Inductive Loads"

C.3 Operation of the generator with additional units

C.3.1 General references

The Panda generator is arranged that the operation of additional gensets, which are flanged on directly to the front cover of the generator, is possible. If such gensets are intended, this - if possible - should be considered with the order of the generator. With the mounting of additional hydraulic pumps the employment of an electrical separation clutch is always recommended. The appropriate components are available for the different generator types. It is caused that the additional hydraulic pump is in operation even if it is actually used.

Depending upon power of the additionally appropriate gensets the power is reduced, which can put the combustion engine to the generator at the disposal.

Panda generator with electrically adjustable clutch



Fig. C.3.1-1: Panda generator with clutch

C.4 Operation of the generator with HTG generator

C.4.1 General references

Beside the alternating current gensets ICEMASTER supplies also the super-compact High tech battery load gensets from the series of PANDA AGT in sound-insulated construction, which represent a very interesting alternative solution in a DC-AC power technology merged for generation of current within the mobile range.

The new HTG generators with 280 A charging current offer themselves a alternative for an on-board current generator, if a diesel set is not intended. These generators differ according to the technology very substantially from all conventional products. The size is so compact that you can exchange it also against a generator according to standard. This generator can ensure a 230V alternating current supply up to 3.000W power in connection with a PANDA HD inverter also in continuous operation.

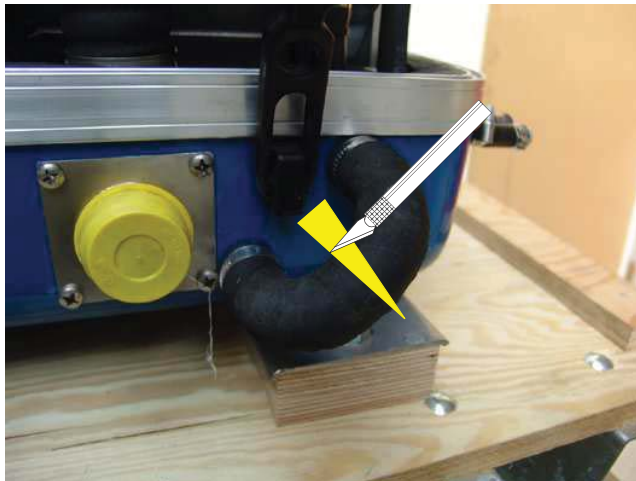
C.5 Operation of the generator with automatic start

If the generator set were set up far away from the location of the remote control panel that the user cannot hear surely, whether the generator starts, a automatic starting option (accessories) should be installed. With this option the starter is disengaged automatically, if the starting speed is exceeded.

C.6 Operation of the generator with installation under the waterline

If the generator cannot be installed clearly at least 600mm over the waterline, a vent valve must be installed into the raw water line. At installation beside the "midship's line" a possible heeling must be considered!

The water hose in the sound cover is split on the pressure side of the pump and extended in each case in the sound cover at both ends with a connecting nipple by a hose end. Both hose ends must led out from the sound cover to a point, which is at least for 600mm over the waterline (if possible in the midship's line). The valve is inserted at the highest place, at least 600mm over the waterline.



Cut the hose rubber for the external valve vent....

Fig. C.6-1: Connection external vent valve

...and bent it upwards.

Both hose ends must be led out outside of the sound cover to one point, if possible 600mm over the waterline in the midship line. The valve is connected at the highest place with the two hose ends.

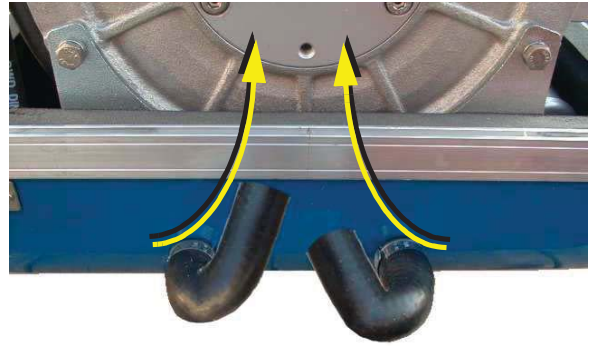


Fig. C.6-2: Connection external vent valve

C.6.1 Control of the vent valve

If the valve is blocked, the cooling water pipe cannot be ventilated after the stop of the generator, the water column is not interrupted and the water can penetrate into the combustion chamber of the engine.

This lead to destruction of the engine!

C.7 Operation of the generator with installation over the water-line

Generator over the waterline:

If the generator is installed over the waterline, a stronger impeller wear is possible, the pump can run after the start some seconds dry.

It is very important that the impeller is exchanged every few months. When starting the generator attention should be always paid and heard to it, when raw water withdraws from the exhaust neck. If this takes longer than 5 seconds the impeller must be exchanged, he sucks in air before raw water reaches the impeller (see picture below) and the impeller then wears strongly. In this case the impeller loses his effect and raw water can penetrate into the engine as well as substantially destroy it. If the impeller is not exchanged early enough, the entire pump must be replaced. Otherwise the impeller wings break in pieces and it stresses some time to remove these again. Replacement impeller should always be on board.

With the installation of the generator it must be paid attention that the impeller pump is well accessible, since the impeller is a wearing part. If this place at the location can be reached not well, an external pump with electric drive can be used instead of the pump built firmly in the sound cover, which should be installed in a well accessible place.

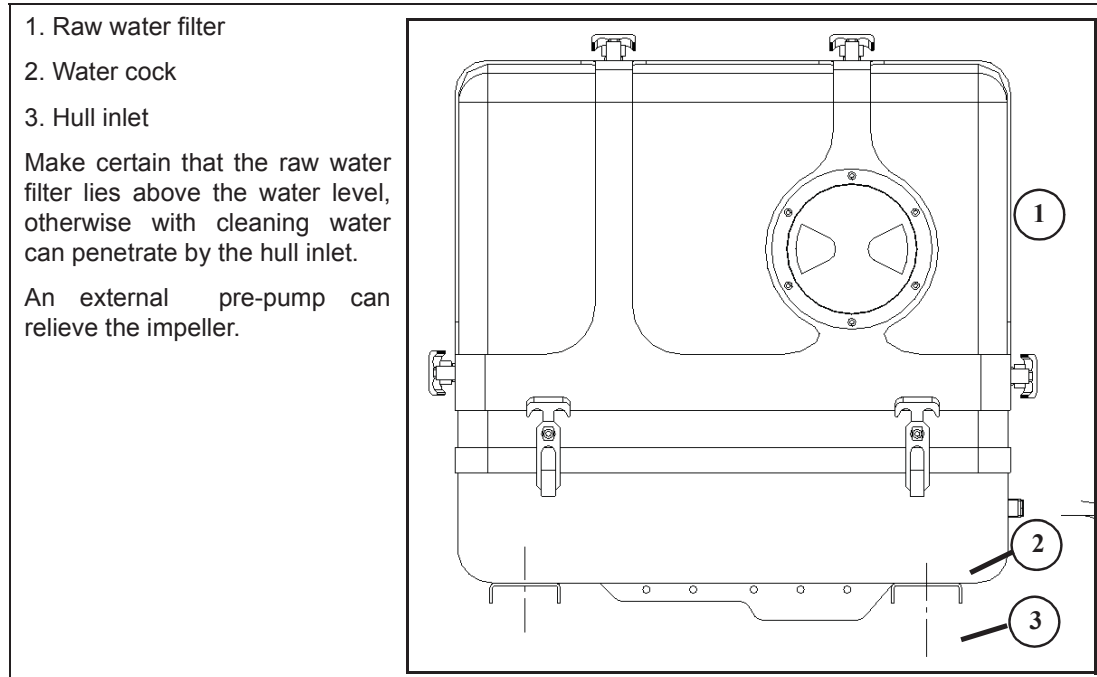


Fig. C.7-1: Installation over waterline - water cock

D. Maintenance Instructions

D.1 General maintenance instructions

D.1.1 Checks before starting

- Oil level
- Cooling system leaks
- Visual check for any changes, leaks oil drain system, v-belt, cable connections, hose clips, air filter, fuel lines

Every 100h

- Lubrication of actuator-trapezoid thread spindle

D.1.2 Hose elements and rubber formed component in the sound cover

Check all hoses and hose connections for good condition. The rubber hoses are very sensitive to environmental influences. They can season fast with dry air, in which environment of muted oil and fuel steams and increased temperature. The hoses must be checked regularly for elasticity. There are operating situations, at which the hoses must be renewed once in the year.

Additionally to usual tasks of maintenance (oil level check, oil filter control etc.) further maintenance activities are to be accomplished for marine gensets. It belongs control of the sacrificial anode (cooling water connection block) and the front seal cover at the generator.

For Maintenance Intervals section F.4, "Inspection checklist for services," on Page 130.

D.2 Oil circuit maintenance

The first oil change is to be accomplished after a period of operation from 35 to 50 hours. Afterwards the oil is to be changed after 100 hours. For this the oil SAE30 for temperatures over 20°C and SAE20 for temperatures between 5°C and 20°C is to be used. At temperatures under 5°C oil of the viscosity SAE10W or 10W-30 is prescribed.

Type and amount of required oil see:

section F.2, "Technical data," on Page 128.

D.3 Execution of an oil change

Oil drain hose

For the oil change an oil drain hose is lead through the sound cover.



Fig. D.3-1: Oil drain hose

Oil drainage screw

The oil can be discharged by opening the oil drainage screw. For counteracting use a second wrench.

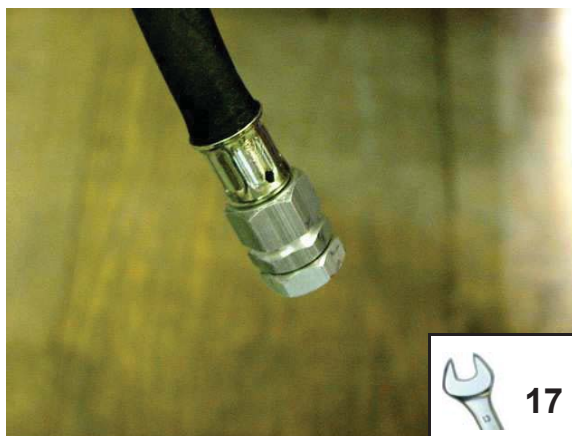


Fig. D.3-2: Oil drainage screw

Oil drain pump

If discharging of the oil is not possible, we recommend the employment of a hand pump, which can be attached to the oil drain hose.

Afterwards the oil drain screw is closed again.

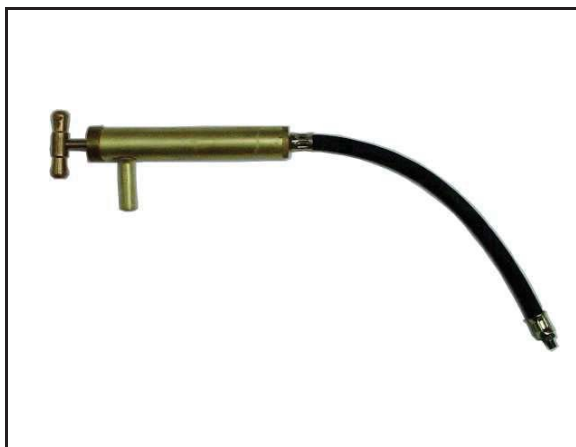


Fig. D.3-3: Oil pmup



Oil filter change

The oil filter can be loosen with an oil filter strap.

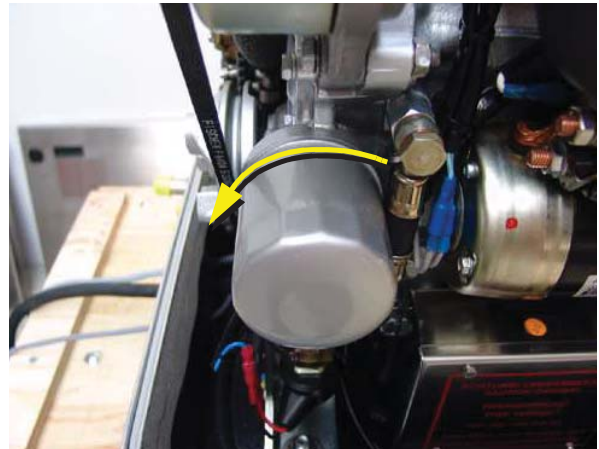


Fig. D.3-4: Oil filter



Oil filter gasket

Before the insertation of the new oil filter the gasket should be coated with something oil.

Tighten the oil filter only by hand.



Fig. D.3-5: Oil filter



Open the oil filler neck

After opening the cap of the oil filler neck the new oil is refilled.

Please wait instant, before measure the oil level, the oil must set off in the sump.



Fig. D.3-6: Oil filler neck

Oil dipstick

With the help of the engine oil dipstick the oil level is to be examined. The prescribed filling level may not exceed the „Max“ marking.

We recommend 2/3 oil level.

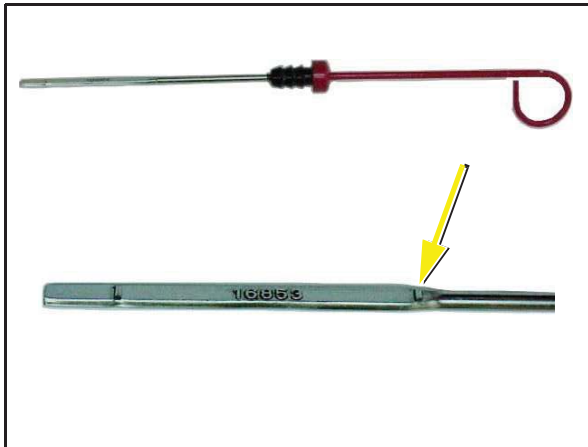


Fig. D.3-7: Oil dipstick

D.4 Checking the water separator in the fuel supply

The pre-filter with water separator has a cock at its lower surface, with this cock the downward sunk water can be discharged.

This is simply possible, water is heavier due to its density than the Diesel.



Fig. D.4-1: Fuel filter with water separator

D.4.1 De-aerating the fuel system

Normally, the fuel system is designed to bleed out air itself i.e. as soon as the electric starter motor starts operation the fuel pump starts working and the fuel system will be de-aerated after some time automatically. It is nevertheless essential to bleed the system as follows prior to the first operation (as all hoses are empty):

1. Switch the main „Stand by“ switch on control panel to „ON“. Functional components must illuminate.

2. Push Failure bypass switch (located at the air suction housing) and hold tight. The electric fuel pump has to be running audibly. By moving the switch you can hear the solenoid valve of the generator starting and stopping (when the sound cover is taken off).

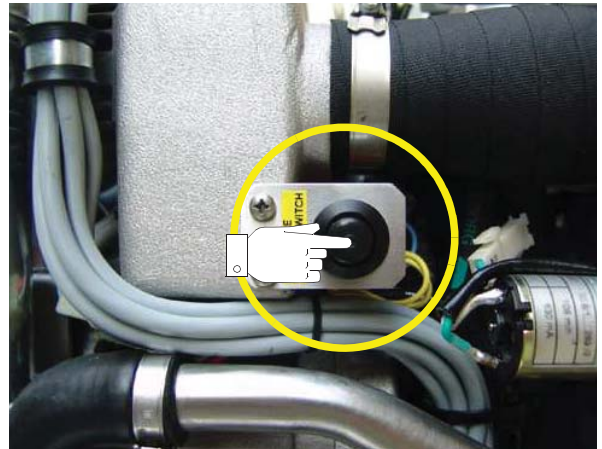


Fig. D.4.1-1: Failure bypass switch

3. After the fuel pump has been running 3 to 4 minutes because the failure bypass switch has been pushed down the bleeding screw of the solenoid valve has to be unscrewed. When opening the screw one has to carry on pushing the switch. To avoid fuel getting in the sound cover a piece of cloth or absorbent paper should be put under the connection. As soon as fuel is running out without bubbles the air bleeding screw can be screwed in again. Now stop pushing the switch.

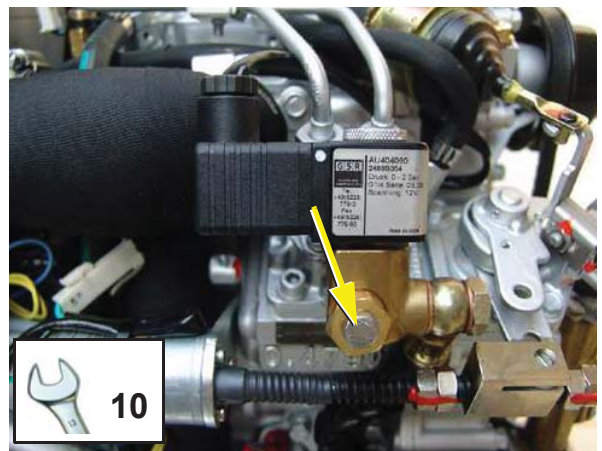


Fig. D.4.1-2: Fuel solenoid valve

4. Now the unit can be started by pushing the "Run/Stop"-button. The unit should start after a short while.
5. Should the unit not start the pipe union nuts of the injection nozzles has to be loosen and try again to start the unit. After the unit has started the pipe union nut has to be tightened again.
6. „Stand by“-switch "OFF".

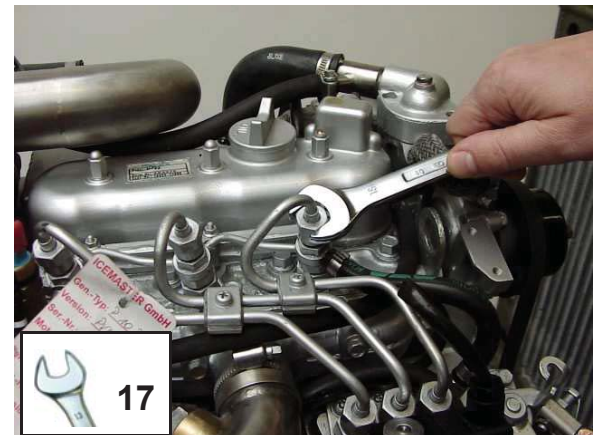


Fig. D.4.1-3: Injection nozzle

D.4.2 Replacing fuel filter

Filter replacement depends on the amount of fuel contamination build up, but should take place, as a minimum, every 300 operation hours.

- 01. Fuel filter housing
- 02. Fuel filter element
- 03. See-through bowl

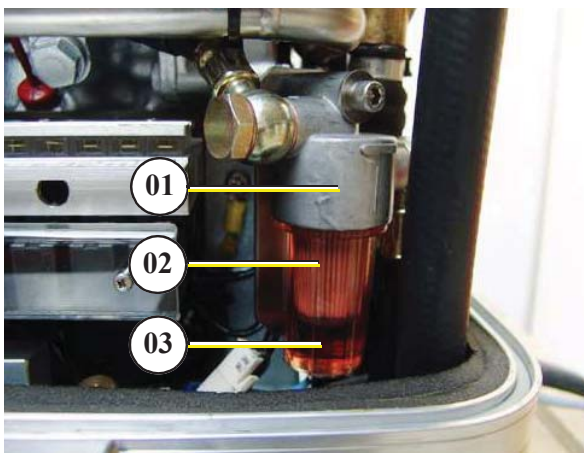


Fig. D.4.2-1: Fuel filter

Spin the bowl (03) from the mounting head (01) by hand.



Fig. D.4.2-2: Fuel filter

Spin the filter element (02) from the mounting head (01).



Fig. D.4.2-3: Fuel filter

Tighten the new filter element (02) firmly to the mounting head (01).

Lube the o-ring for the bowl with a temperature resistant safety grease (specification: Anti-Seize). Tighten the bowl (03) to the mounting head (01).



Fig. D.4.2-4: Fuel filter

D.5 Exchange the air filter

Open the air suction housing by loosen the six screws on the housing cover.



Fig. D.5-1: Air suction housing

Change the air filter mat

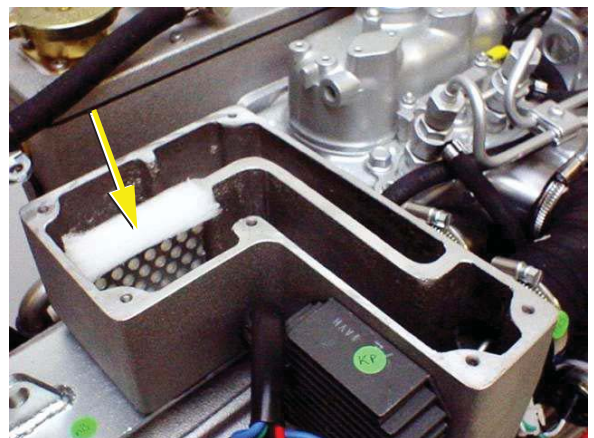


Fig. D.5-2: Filter inlet

D.6 De-aerating of the coolant circuit / freshwater

Special notes for the ventilation of the cooling system

If the cooling water is drained or if other air should have arrived into the cooling system, it is necessary to de-aerate the cooling system. This de-aerate procedure must be repeated several times:

ATTENTION ! Before opening the de-aerating points the generator must be stagnant !!!

Pay attention that the external coolant expansion tank is connected with the generator by the two intended connection points.

Further it should be guaranteed that the expansion tank is attached in sufficient height (600mm) over the level of the generator exhaust elbow union.



Open de-aerating screw at the cooling water pump.



Fig. D.6-1: De-aerating screw - water pump

Open de-aerating screw at the thermostat housing



Fig. D.6-2: De-aerating screw - thermostat housing

Fill in cooling water into the cooling water expansion tank. If it is to be recognized that the cooling water level does not fall anymore (with cold cooling water the cooling water level must be $\frac{1}{3}$, close the filler-cap and the cooling water screws and start the generator.



Fig. D.6-3: Cooling water filler neck

Now the cooling water is only filled over the external expansion tank. This is connected by 2 hoses with the genset.

The external expansion tank should be filled in the cold condition only up to maximally 20%. It is very important that a large extension space over the cooling water level remains.

Repeat this procedure several times.

If no change of the cooling water level can be determined, the generator is started for 5 minutes. Afterwards repeat the de-aeration two - three times.

It is meaningful to repeat the de-aeration procedure also after some days again to guarantee that in the system remained bubbles are removed.



The de-aerating screw over the housing of the cooling water pump may be opened under no circumstances, while the generator runs. If this happens inadvertently, through the opening air is sucked in. A very complex de-aeration of the entire system is necessary thereafter.



Fig. D.6-4: De-aerating screw - water pump

D.6.1 Draining the coolant

In principle only describes here, how the cooling water of the raw water cycle can be drained. The mixture of the fresh water circuit should not be drained in principle. See measures for the preparation of the winter storage.

The simplest and cleanest method consists of the fact to bring the external vent valve below the generator level and hold over a collecting basin. Open the valve now, the water from the raw water circuit flows downward into the container.

D.7 Exchange of the v-belt for the internal cooling water pump

The relative high ambient temperature in the closed sound insulated capsule (about 85°C) can be a reason for a reduced lifespan of the v-belts. It is possible that the "softener" in the rubber compound lose their effect after a short operating time because the air in the sound insulated capsule can be relative warm and dry. The v-belt must be controlled in a very short time interval. It can be happen to change the v-belt after some weeks because of unfavorably conditions. Therefore the control is needed in an interval of 100 operating hours. The v-belt ia a wearing part. It should be enough spare v-belts on board. We suggest to stand by the according service-packet.

Loosen the fixing screw above the alternator.

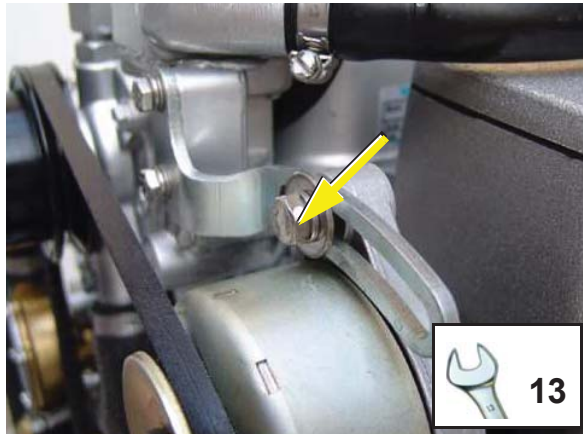


Fig. D.7-1: Fixing screw alternator

Loosen the fixing screw below the alternator only a little bit.

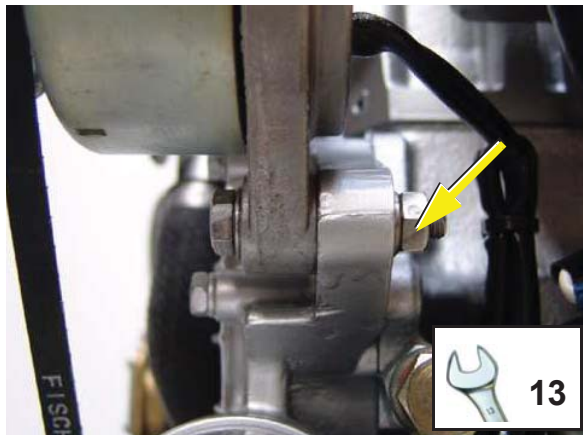


Fig. D.7-2: Fixing screw alternator

Press the alternator to the direction of the thermostat housing.

Now the v-belt can be changed (type: XPZ 850).

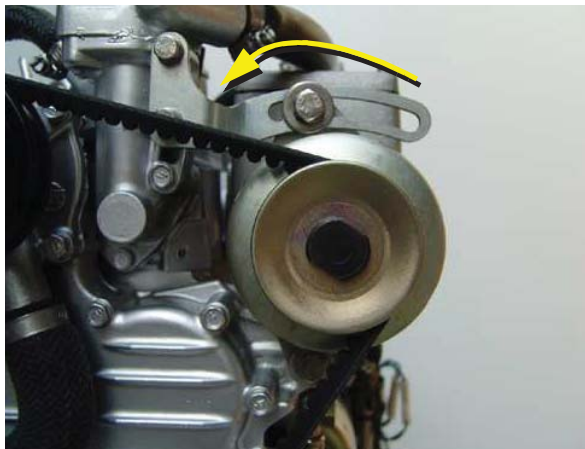


Fig. D.7-3: Alternator

Stretch the v-belt by pulling the alternator back. The v-belt should be able to be pressing approx. 1cm with the thumb.

Tighten the fixing screws above and below the alternator.

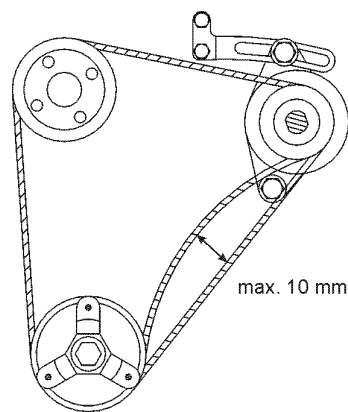


Fig. D.7-4: Change v-belt

D.8 The raw water circuit

D.8.1 Clean raw water filter

The raw water filter should be released regularly from arrears. In each case the water cock must be closed before. It is mostly sufficient to beat the filter punnet.

If water should seep through the cover of the raw water filter, this may be sealed in no case with adhesive or sealant. Rather must be searched for the cause for the leakage. In the simplest case the sealing ring between caps and filter holders must be exchanged.



Fig. D.1: Raw water filter

D.9 Causes with frequent impeller waste

The impeller of the cooling water pump must be regarded as wearing part. The life span of the impeller can be extremely different and exclusively depends on the operating conditions. The cooling water pumps of the PANDA generators are laid out in such a way that the number of revolutions of the pump lies low compared with other gensets. This is for the life span of the pump a positive effect. Unfavorably affects the life span of the impeller, if the cooling water sucking in way is relatively long or the supply is handicapped, so that the cooling water sucking in range develops a negative pressure. This can reduce first of all the power of the cooling water pump extremely that the wings of the impeller are exposed to very strong loads. This can shorten the life span extremely. Further the operation of the impeller pump loaded in waters with a high portion of suspended matters. The use of the impeller pump is particularly critical in coral waterbodies. Cases are well-known, which a impeller pump had so strongly run after 100 hours already that the lip seal on the wave was ground in. In these cases sharp crystal parts of the coral sand assess in the rubber seal and affect like an abrasive the high-grade steel shank of the impeller pump. If the generator were mounted over the water level it is particularly unfavorable for the impeller pump. After the first start some seconds will pass by, until the impeller can suck in cooling water. This short unlubricated operation time damages the impeller. The increased wear can lead after short time to the loss. (see special notes: "Effects on the impeller pump, if the generator is mounted over the waterline")

D.9.1 Exchange of the impeller

Close the raw water stop cock.

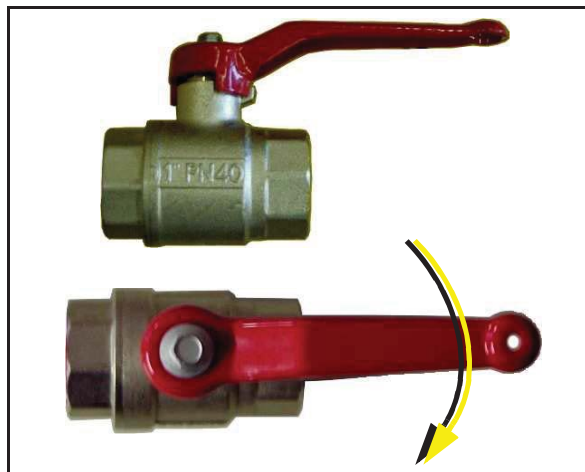


Fig. D.9.1-1: Raw water cock

Raw water pump on the front side of the genset.

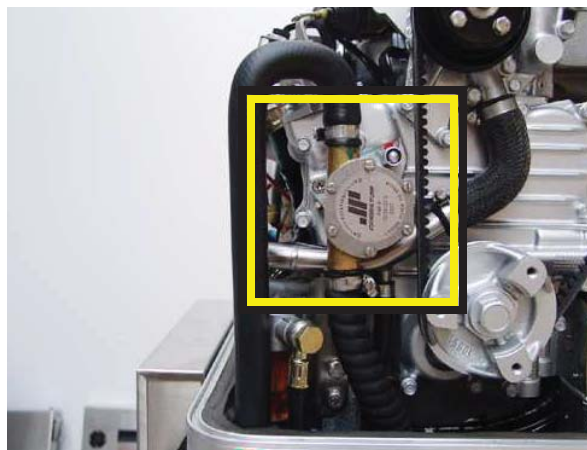


Fig. D.9.1-2: Raw water pump

Remove the cover of the raw water pump by loosen the screws from the housing.

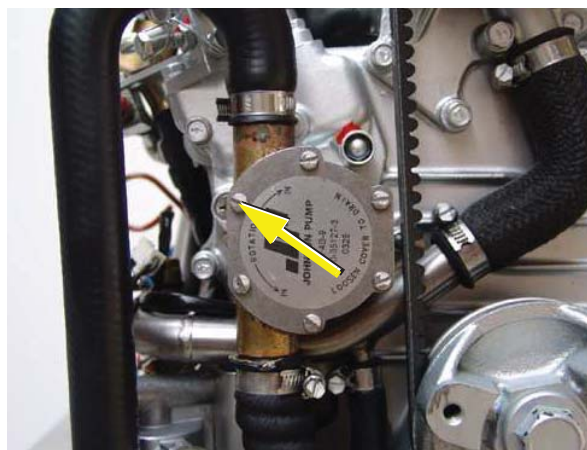


Fig. D.9.1-3: Cover raw water pump

Pull to the impeller with a multigrip pliers of the wave.

Mark the impeller, to make sure that these is used in the correct position at re-installation.

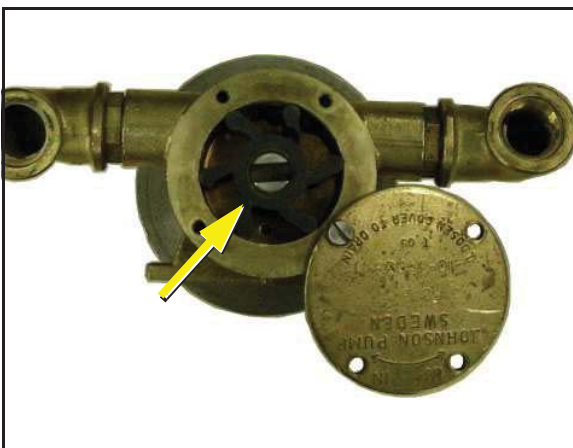


Fig. D.9.1-4: Impeller pump

Check to the impeller for damage and replace it if necessary.

Before the reinsertion into the housing the impeller should have been lubricated with glycerin or with a non-mineral oil based lubricant e.g. silicone spray.



Fig. D.9.1-5: Impeller

The impeller is attached to the pump wave (if the old impeller is used, pay attention to the before attached marking).

Fastening the cover and use a new seal.



Fig. D.9.1-6: Gasket

D.10 Conservation at longer operation interruption

D.10.1 Measures on preparation of the winter storage



1. Rinse raw water circuit with an anti-freeze solution, even if this contains a corrosion protection means. The raw water inlet must be removed at the water cock. Over a hose connector the anti-freeze protection mixture is to be sucked in from a container. The leaked cooling water with the exhaust is to be led back into the sucking in container. The circuit must be kept upright some minutes to guaranteed that the anti-freeze protection mixture reaches all ranges of the cooling system.
2. The concentration of the anti-freeze mixture in the internal cooling circuit must be checked with a suitable measuring instrument. The concentration must be furnished according to the lowest temperatures which can be expected.
3. Clean raw water filter and check seal.
4. Check water cock for practicability. And spray with a corrosion protection oil from the inside or lubricate with acidless grease.
5. Check all hoses and hose connectors for good condition. The rubber hoses are very sensitive to enviromental influences. They can age fast with dry air, in environment of light oil and fuel steams and increased temperature. The hoses must be checked regularly for elasticity. There are operating situations, which the hoses must be renewed once in the year.
6. Check the hose connectors at all raw water valves doubly and if possible protect them with double hose clamps.
7. Dismount the impeller of the cooling water pump and check for wear. The impeller may not remain in the pump. It must be greased with vaseline and be kept at a dark place. It can be reintragrated in the spring again into the pump, if it is in good condition. The impeller is a wearing part, it is recommended to renew it always in the spring, independently how many operating hours the genset ran.
8. Control of the vent valve at the raw water inlet. If the generator is installed below the waterline, always a vent valve is necessary. The vent valve must be checked also during the season regularly. In the winter storage the vent valve should always be disassembled, checked and greased. Hardens or got parts dirty are to be replaced.
9. Check water lock: If the generator were rinsed with an anti-freeze mixture, the antifreeze mixture can leave in the water lock. If the generator were rinsed with fresh water, the water in the water lock must be drained. Otherwise the danger exists that the collector is blown up and destroyed by ice.
10. Check the exhaust/water separator on leakage and if the hose connectors at the lower surface of the separation unit are in normal condition. (with extremely sulfureous fuels it is possible that also high-grade steel tube ends are attacked.)
11. Check all construction units at the generator inside the sound cover for leakages. If there are traces of humidity in the sound cover, the cover must be dried. Further the cause for the wetness must be surched and eliminated.
12. During the winter storage the upper section of the sound cover must be taken off, in order to avoid condensed moisture formation, if traces of humidity remain in the sound cover inside casing by leakages in the raw water circuit.
13. The generator housing and the housing of the engine should be sprayed with a corrosion protection oil before the winter storage. This procedure is recommended also in the season. This procedure can avoid that arising and humidity marks on the surface of the aluminum construction units be noticed too late.
14. Disconnect the starter battery (positive and negative pole).
15. Lubricate the spindle for the number of revolutions adjustment device with a special lubricant (Antiseize grease).

D.10.1 Measures on preparation of the winter storage (Forts.)

16. Check cooling water connection block at the generator housing on traces of corrosion and if necessary renew. (only such traces are to be considered, which refer to clear "blossoming" of the material. If the surface is only grey coated, this is only an indication for the fact that aluminum came into contact with condensed moisture.)
17. Use of a air dehumidifier. The best way to protect a yacht in the winter storage against damage by humidity is, to place a air dehumidifier inside the ship and lock all hatches. The devices have a hygrometer, which switches the device off, if the humidity is under the adjusted value. There is no better method, in order to protect pads, cable, electronics, wood, engines etc. optimally against any rotting by humidity.

D.10.2 Initiation at spring

- Before the first start turn the engine once with the hand, in order to eliminate necessary existing corrosion beginnings in the bushing. If necessarily carry out normal engine inspection.
- Change engine oil and engine oil filters.
- Reintegrate the impeller of the cooling water pump and check pump for leakage.
- Charge starter battery of the generator, connect cables and check battery voltage.
- Start generator and check the basic adjustments of the generator such as voltage, speed regulation etc..
- Check all switching off devices for function by operational procedures.

Icemaster does not take over adhesion for possible damages!

D.11 Replacing Water pump

1. Unscrew the water pump mounting screws (2), and remove the water pump (1) from the gear case cover. Use a spanner size 10mm.

When reassembling

- Apply liquid-type gasket (Three Bond 1215 or its equivalent) to both sides of the new water pump gasket.

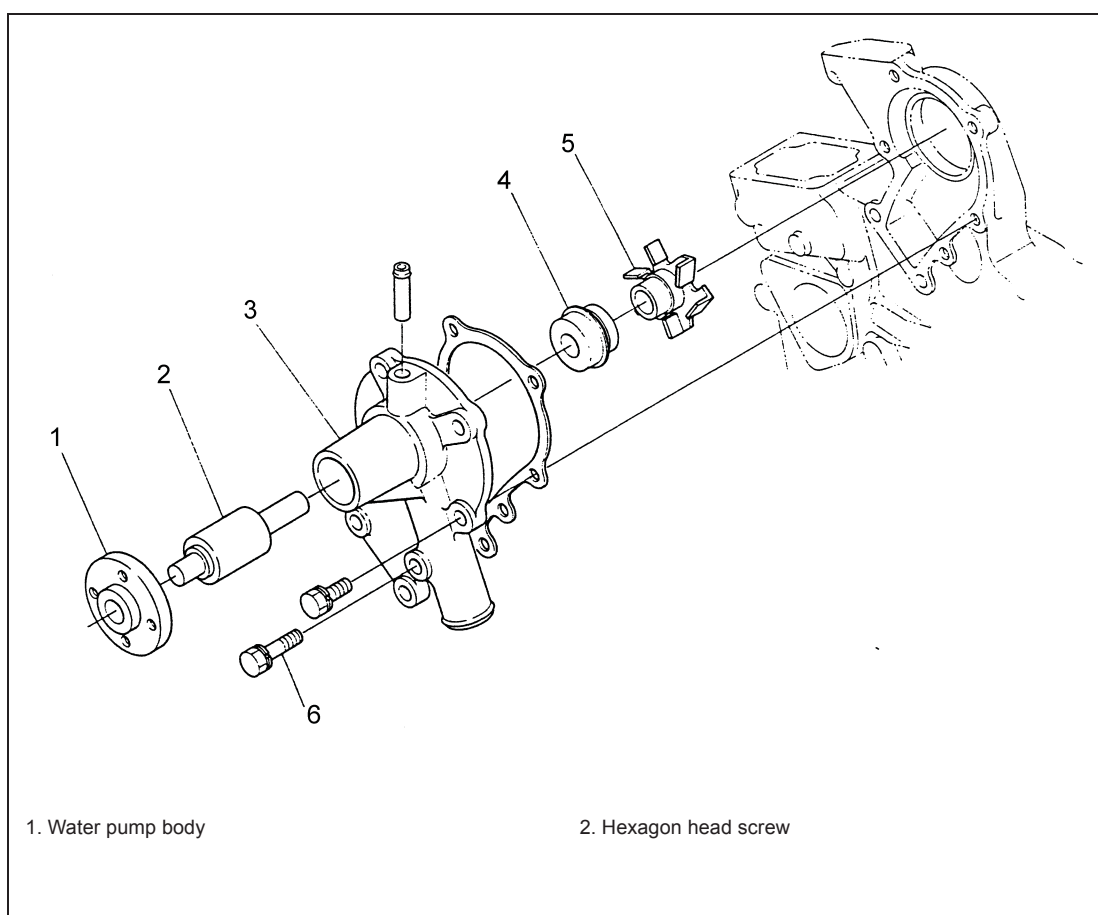
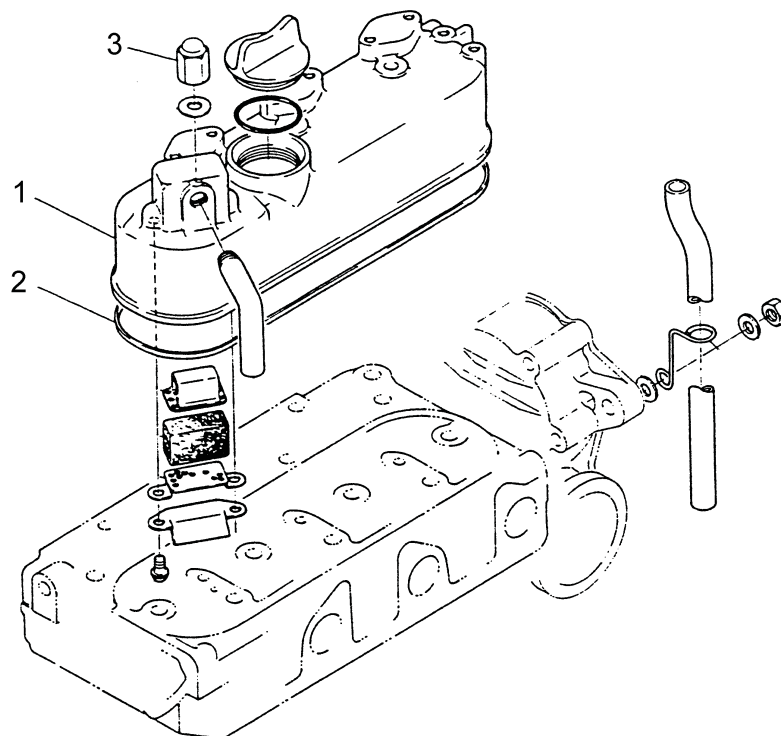


Fig. D.11-1: Water pump

D.12 Replacing Valve cover gasket

1. Remove the valve cover cap nuts (3). Use a spanner size 10mm.
2. Remove the valve cover (1).
3. Check to see that the valve cover gasket (2) is defective.
4. Replace the valve cover gasket (3) with a new one.
5. Install the valve cover (1), using care not to damage the o-ring.
6. Tighten the valve cover cap nuts (3). Tighten torque: 3,9 to 5,9Nm.



1. Valve cover
2. Valve cover gasket

3. Hexagon cap nut

Fig. D.12-1: Valve cover

D.12.1 Adjustment of the valve clearance

Tools:

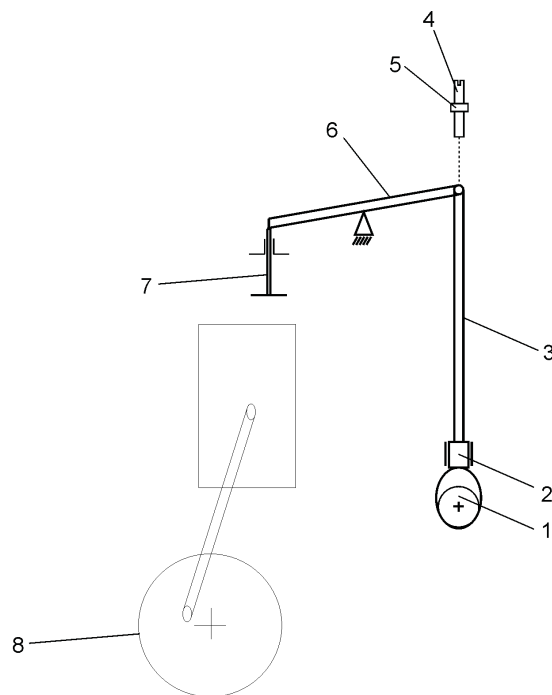
- 22mm, 10mm, 11mm spanner
- Screwdriver
- Gap Feeler Gauge

1. Ensure engine is completely cold (very important!)

2. Remove valve cover - 10mm spanner.
3. Turn crankshaft pulley with 22mm spanner until valve to be adjusted is closed and gap between the valve and the rocker arm is at its maximum - see Fig. D.12.1-2, "Closed valve," on Page 106.
4. Check the valve gap with the feeler gauge. The gap should be between 0.145mm and 0.185mm. The feeler gauge should slide with light contact between valve and rocker arm.
5. If adjustment is necessary, release the locknut with 11mm soanner and adjust the gap to the reqired clearance with the screwdriver. Re-toghten the locknut then re.check the clearance if required. Repeat adjustment if necessary.
6. Repeat whole procedure for the other valves.
7. Replace valve cover gasket, replace calve cover and tighten screw to torque: 3,9 to 5,9Nm.

Note:

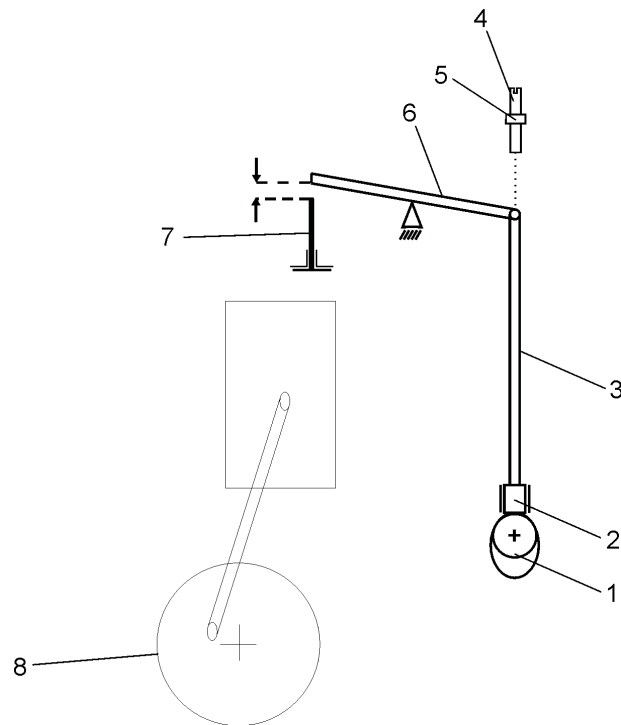
Mark the valves which are controlled!



1. Camshaft
2. Push rod rammer
3. Push rod
4. Adjusting screw

5. Locknut
6. Rocker arm
7. Valve
8. Crankshaft

Fig. D.12.1-1: Open valve



- 1. Camshaft
- 2. Push rod rammer
- 3. Push rod
- 4. Adjusting screw

- 5. Locknut
- 6. Rocker arm
- 7. Valve
- 8. Crankshaft

Fig. D.12.1-2: Closed valve

E. Generator Failure

E.1 Tools and measuring instruments

In order to be able to manage disturbances while driving, following tools and measuring instruments should belong to the equipment on board:

- Multimeter for voltage (AC), frequency and resistance
- Measuring instrument for inductance
- Measuring instrument for capacity
- Current absorbing clamps
- Thermometer (ideal is a infrared thermometer)
- Pressure device (pincer) für coolant circuit

E.2 Overloading the Generator

Please ensure that the genset is not overloaded. Overloading occurs when the electrical load (demand) induces a load torque in the generator which is higher than that which the diesel drive motor can provide. Overloading causes the engine to run rough, burn oil, creates excessive exhaust (environmentally unfriendly) and even to stall. Extra caution should be practised with multi-power units (single and 3-phase current generation) to avoid overloading the diesel drive engine.

The generator should only be loaded at the peak rated power for short periods only! A high peak current is required to start many electrical devices, especially electric motors and compressors (from a still stand state).

In order to prolong the genset's life expectancy, the nominal electrical demand on the system should not be more than 70% of the rated genset peak load.

Keep PEAK LOADING demand in mind when switching on electrical devices (esp. fridge compressors, electric motors, battery chargers, kettles, etc.) which are fed by the generator. Careful "powering up" (gradual loading) of the electrical demand on the generator will help prolong the life of your genset! The genset can be run for several hours at partial load (i.e. 2/3 of rated power), however it is not advised that it is run for more than 2-3 hours at full load. The Panda is designed so as not to overheat even under extreme conditions. Note: The exhaust gas will become sooty during peak-load operation.

Effects of Short Circuiting and Overloading on the Generator

The generator **cannot** be damaged by short circuiting or overloading. Short circuiting and overloading suppress the magnetic excitation of the generator, thus, no current is generated and the voltage will collapse. This condition is immediately offset once the short-circuit has been eliminated and/or the electrical overload removed.

Overloading the Generator with Electric Motors

With the operation of electric motors it must be considered that these take up a multiple of their rated output as starting current (six to tenfold).

If the power of the generator for the engine is not sufficient, the voltage in the generator breaks down after switching on the engine. For special approach problems the manufacturer can give recommendations regarding the accomplishment of the situation (e.g. amplified capacitors, gradual start switch or extra developed starting unit for electric motors).

The system efficiency can be improved up to 50% and the starting current can be improved up to 100% by a professional adjustment of the engines. If the inductive load (electrical motors etc.) lies over 20% of the generator rated output a compensation is appropriate (see in addition also the writing: "Operation Instructions for Generators with Inductive Loads").

E.2.1 Monitoring the Generator Voltage

ATTENTION! - see "Safety Precautions" on Page 11.

The voltage range of the power stations normally lies between 200 and 240V (100 - 130V in the 60Hz version). In some countries even substantially larger tension deviations are being called "normally". The PANDA generators are aligned that they keep these default values during normal load.

With high load or overload it can occur that the voltage drops on 190V (95V in the 60Hz version) and partly still more deeply. That can become critical for certain devices (e.g. for electric motors, cooling compressors and possibly for electronic devices). It must be paid attention that the voltage for such load is sufficient. This can be supervised by a voltmeter.

The voltmeter should be always installed behind the change over switch generator/land power, so that each voltage source is shown. No further voltmeter is provided for the generator itself.

If additional load is switched on, the voltage must be controlled in each case at the voltmeter. Sensitive devices must be switched off so long, until the voltage exceed the critical parameter.

Under certain circumstances the generator provides overvoltage. This arises if the number of revolutions of the generator is increased. Changing the number of revolutions may be made only with a tachometer and/or a voltmeter.

If sensitive and/or valuable devices are used, which are to be protected against this risk, an automatic overvoltage protection must be mounted. (voltage control with disconnection).



E.2.2 Automatic Voltage Monitoring and Auto-Shut Down

If air conditioning units (compressors) or other such valuable equipment is installed on-board, it is recommend that an automatic voltage monitoring unit be installed to protect this equipment from possible sharp voltage drops. The voltage monitoring system shuts down the entire system (and therefore all users) by means of a circuit breaker relay as soon as the voltage falls below a set value (the monitor will also shut down the on-board grid automatically when the generator is stopped). Such a relay with contactor can be obtained from the installator or as a complete unit from your Panda dealer.

E.3 Adjusting Instructions for the Spindle of the actuator

Two independent devices limit engine speed range. They are:

- a. Regulating nuts on the spindle of the actuator left and right of the spindle nut.
- b. An adjusting screw at the base of the rev regulator lever. (only upper revs limit)

1. Actuator
2. Spiral thread spindle
3. Regulating nuts for max. speed
4. Spindle nut with speed regulator level
5. Regulating nuts for min. speed

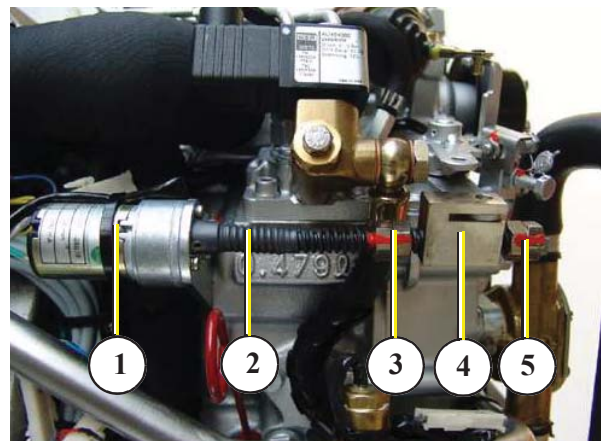


Fig. E.3-1: Actuator

During any work on the generator all load must be switched off to avoid damage to the equipment. Also the solid state relay, located in the electrical cabinet should be disconnected to avoid an accidental discharge of the booster capacitors.

01. Solid state relay for booster capacitors
02. Solid state relay for booster capacitors

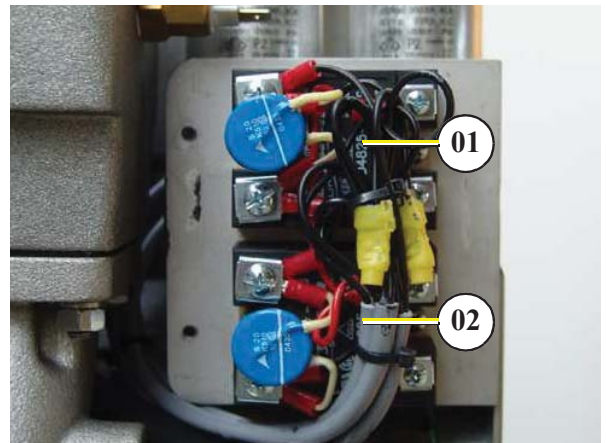


Fig. E.3-2: Solide state relays 120V/60Hz

During any work on the generator all load must be switched off to avoid damage to the equipment. Also the solid state relay, located in the electrical cabinet should be disconnected to avoid an accidental discharge of the booster capacitors.

01. Solid state relay for booster capacitor

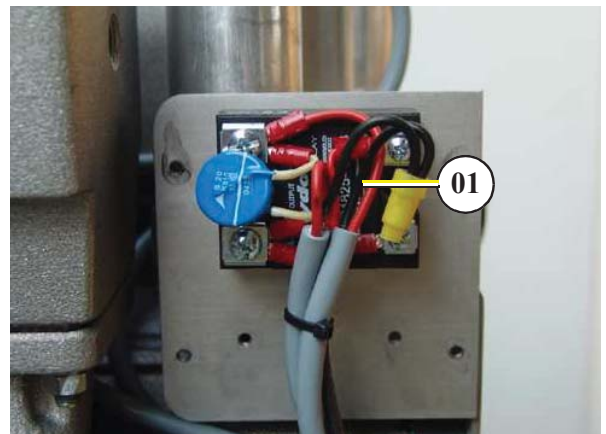


Fig. E.3-3: Solide state relays 230V/50Hz

E.3.1 Adjustment of the maximum engine speed:

1. Disconnect the electrical supply line to the actuator.

01. Plug for actuator

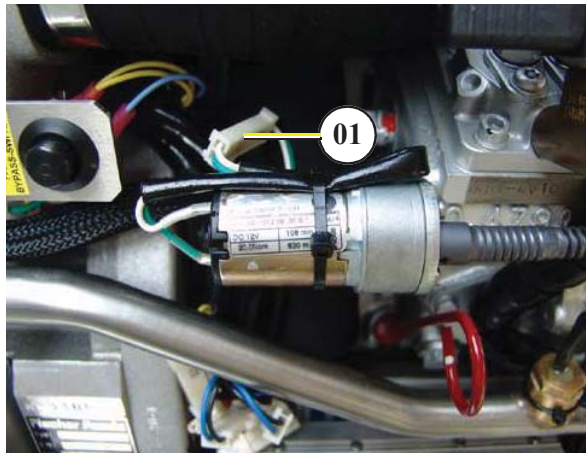


Fig. E.3.1-1: Electrical supply actuator

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2. Loosen the max speed lock nut with two spanners size 14mm.

01. Spanner size 14mm

02. Spanner size 14mm

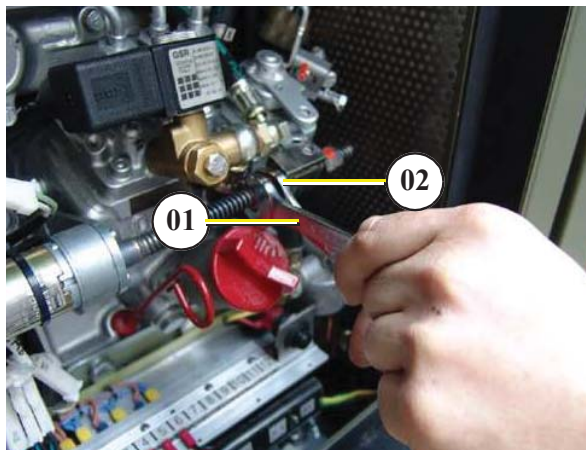


Fig. E.3.1-2: Max speed lock

3. Connect a voltmeter (TRMS) with a display range 300V AC to the AC outlet between 4 and 1 to the load sokket.

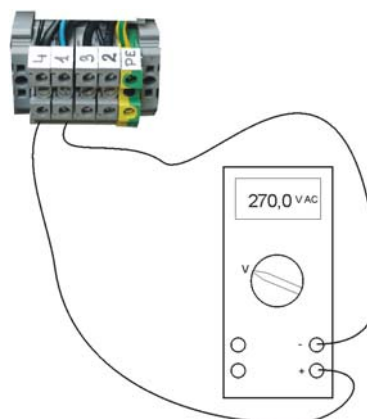


Fig. E.3.1-3: Connect voltmeter - 120V/60Hz

4. Connect a voltmeter (TRMS) with a display range 300V AC to the AC outlet between L1 and N to the load socket.

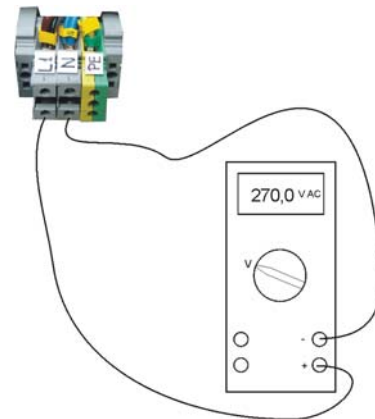


Fig. E.3.1-4: Connect voltmeter - 230V/50Hz

5. Ensure no electrical load is connected.
6. Start the generator.

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7. Increase the speed of the generator by turning the spiral spindle manually until the voltmeter shows a value of 260V.



Fig. E.3.1-5: Turning spindle



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8. Turn the limit nut tight to keep the speed setting.
9. Secure the limit nut with the lock nut.
01. Spanner size 14mm
02. Spanner size 14mm

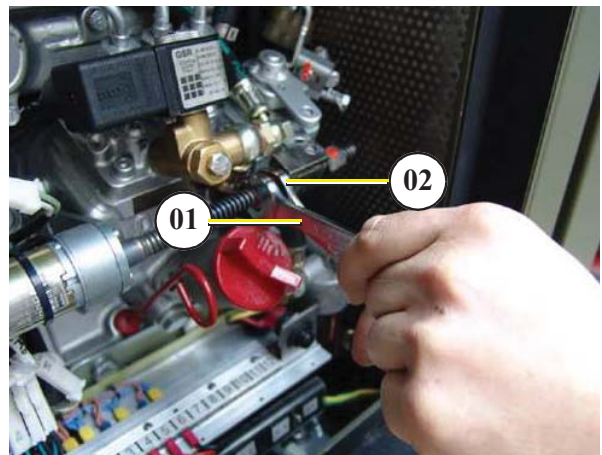


Fig. E.3.1-6: Max speed lock

10. Check the voltage of the generator is limited to max. 260V (without load).
11. Re-adjust if necessary by repeating the procedure.

E.3.2 Adjustment of minimum engine speed

1. Repeat the loosening procedure detailed above on the minimum speed locking and adjusting nuts.
2. Be sure that no electrical load is connected.
3. Start the generator.
4. Decrease the rev of the generator by turning the spindle of the actuator manually until the volt-meter shows a value of 200V.
5. Tighten both nuts as before.
6. Check the lower voltage of the generator is limited to min. 200V without load.
7. Re-adjust if necessary.

E.3.3 Lubrication of the spiral thread spindle

The spiral thread spindle must be lubricated carefully and regularly. Use only a temperature resistant safety grease (up to 100°C) ". Ensure lubricant is applied right up to the nuts and especially between the nuts and the spindle nut (See Fig. E.3.3-1, "Actuator mechanism," on Page 112)

It is possible that the spindle could seize if it is not regularly lubricated. Should this be the case, the generator may switch off automatically due to over or under voltage.



1. Speed actuator
2. Spiral thread spindle

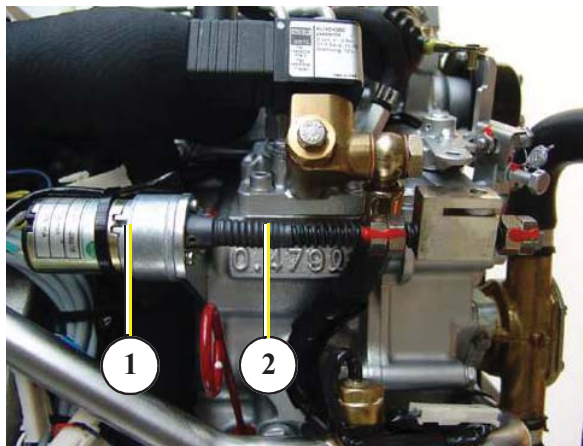


Fig. E.3.3-1: Actuator mechanism

E.3.4 Overload damage to the actuator mechanism

If a generator overload occurs, the voltage falls and the actuator will move to the upper limit trying to increase engine revolutions. If this situation goes on for a long time it can result in damage to the actuator windings. The actuator may not become inoperative, but its action may become weak and not perform in all spindle positions as well as it should. So the voltage of the generator may be regulated poorly or possibly not at all.

If it is noticed that the spindle of the actuator is operating slowly or erratically the actuator may need to be replaced. To check the actuator, follow the procedure below.

If the actuator does not move:

1. The actuator does not move but the spindle can be turned manually. Disconnect the power to the actuator and connect an external 12V-DC source to the actuator.
 - a. If the actuator still does not operate it is defective and must be replaced
 - b. If the actuator works properly with the external voltage source:
 1. Check the fuse on the VCS printed circuit board.
 2. Check if the alternator voltage sensor (X3) is properly connected to the VCS circuit board.
 3. Check filters.
 4. Check if the VCS DC supply voltage is properly connected (clamp 3(+) and clamp 4(-) of X1).
 5. Check if the VCS output to the actuator is properly connected (clamp 1(+) and clamp 2(-) of X1).

If no fault is found, the VCS circuit board must be replaced.

Voltage control check procedure:

1. Switch off load.
2. Disconnect the power to the actuator.
3. Turn the actuator spindle manually to check if an adjusting nut is jammed.
4. Turn the actuator spindle manually to check if the adjusting nuts allow smooth spindle operation.

If no fault is found from these checks there is nothing mechanically wrong. Proceed to check electrical functions:

1. Reconnect the power to the actuator.
2. Start the generator.
3. Turn the actuator spindle by hand and check if the spindle is returned by the actuator motor.
4. If the motor reacts strongly (the motor can normally be halted with the fingers) the drive is working properly.
5. If the motor is weak or hesitant there are short circuits in the actuator windings and the actuator must be replaced.

Check the limits of the generator voltage

The mechanical voltage limitation should be checked regularly as follows:

1. Disconnect the electrical supply line to the actuator.
01. Plug for actuator

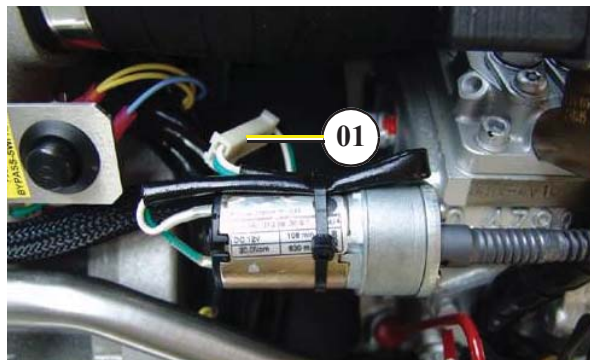


Fig. E.3.4-1: Electrical supply actuator

2. Switch off any load.
3. Connect an electrical voltmeter.
4. Start the generator.
5. Turn the actuator manually to the lower limit stop point.
6. The voltage must be 200V between L1 and N.
7. Turn the actuator manually to the upper limit stop point. The max. voltage is 260V.
8. A new adjustment is necessary in case of variation from these figures.

E.3.5 VCS By-Pass Facility

If there is a problem in the VCS which cannot be cured (e.g. awaiting parts), the generator can be run safely and normally with the VCS generator output monitor disconnected. The engine speed can then (if necessary) be adjusted as already described to produce the required voltage and the generator will run normally.

E.3.6 Low Generator Output Voltage

ATTENTION! Before working (installation) on the System read the section "Safety Instructions" in this Manual.

Panda generators are designed such that even high electrical variations will not cause serious damage to the generator.

If the generator does not produce any voltage while the engine is running, the suspected cause lies outside the generator capsule.

- electrical load not switched off prior to start
- short circuit somewhere in electrical system
- electrical overload



E.4 Low Generator-Output Voltage

If the produced alternating voltage is too low, switch the load off, in order to relieve the generator. Mostly the problem already solved. If the output voltage is still too low, even if all load is switched off, the generator runs without load, you can assume one or more condensers are defective.



E.4.1 Discharge the capacitors

ATTENTION! Never work at the electrical cabinet, when the generator is running! Do not contact the capacitor. Before working on the system read the section "Safety Precautions" on Page 11.

- 1) Switch off generator
- 2) Disconnect starter battery
- 3) Open the sound cover
- 4) Remove the caps of the capacitors

The capacitors are discharged, by short circuit the two contacts. In addition use the cone end of an isolated screwdriver.



Fig. E.4.1-1: Discharge capacitors

E.4.1.1 Checking the capacitors

If the capacitors are to be checked, it is to be made certain that the capacitors will be discharged before touching.

Already a visual check can give information on whether the capacitors are defective:

- Leaks dielectric?
- did the capacitor became longer?

The capacitors can be tested with a multimeter. Switch the measuring instrument to "pass" and connect both connections of the capacitor with the connections at the measuring instrument.

Touch with the test prods the two contacts of the capacitor. By the internal battery a charge transfer in the capacitor should take place now.

If changes the poles of the capacitor with the test prods, again a short "beep" should have to be heard. This short sound is only an indication for the fact that the capacitor is not defective.



Fig. E.4.1-1: Checking capacitors

Should a steady sound or no sound have to be heard, the capacitor is defective and must be replaced.

In order to go surely that the capacitor has still its full capacity, use a capacity measuring instrument.

The capacitors, which not achieve the imprinted capacity value at this measurement, should be exchanged as fast as possible. If all capacitors are still functional, must be checked whether the connection to the strip is correct.

Checking the electrical connections to the capacitors

It must be ensured that the electrical connections to the capacitor are always tight fitting. Loose connections with transitional resistance can mean that the contact surfaces will become heated externally. This can lead to faster deterioration of the capacitors.

E.4.2 Checking the generator voltage

In order to test, whether the fixed winding produces enough voltage, proceed in such a way:

1. Guarantee that the connection to the electrical system is interrupted.
2. Remove all conductions in the power terminal box of the generator.
3. Starter battery must be connected with the generator.
4. Start the generator start.
5. Measure with a voltmeter the votage between the phase(s) and N. If the measured values are under the substantially values in Table 1, "Voltage values stator coil," on Page 126, a coil damage is to be accepted.

During the measurement in the 60Hz version both partial coils must be interconnected, i.e. a connection must be provided between line 1 and line 3. (see wiring diagram)

(notes: the voltage results from the remainder magnetism of the rotor, which induced a voltage in the coil.)

E.4.3 Measuring the coil resistance

For this a measuring instrument must be used that is suitable for low impedance values.

- Adjust the measuring instrument to resistance test. If hold the poles of the measuring instrument hold together, 0.00 ohms should be indicated. If the poles are isolated, the display should indicate an overflow. Please implement this test, in order to examine the equipment.
- Measure of the resistance within the individual windings.

If strong deviations in the individual coils are measured, must assumed that there is a coil short-circuit in a coil. This leads to the fact that the generator does not excite itself any longer.

The actual values between the coils and ground are not to be determined exactly. It depends primarily on the fact that the values of all three measurements are close to the same. Deviations among themselves refer to a coil short-circuit. In this case the generator must be wound again by a specialist.

E.4.4 Checking the coil(s) to short-circuit

In order to check the coils for short-circuit, first all lines, which lead to the electrical system, must be interrupted. This happens on the power terminal box of the generator or, if available, in the electrical system junction box. Guarantee that no voltage lies at the lines, before they are interrupted (see Fig. E.4.1-1, "Discharge capacitors," on Page 115).

Now remove the bridge between "N" and "PE", so that coils and housing are electrically separate from each other.

Check with a circuit indicator (multimeter) in the power terminal box if between the individual connection points of the coil and the housing (PE) a pass exists.

The contacts which can be measured depend on the type of the generator (see identification plate):

HP1 - 50Hz: L, Z

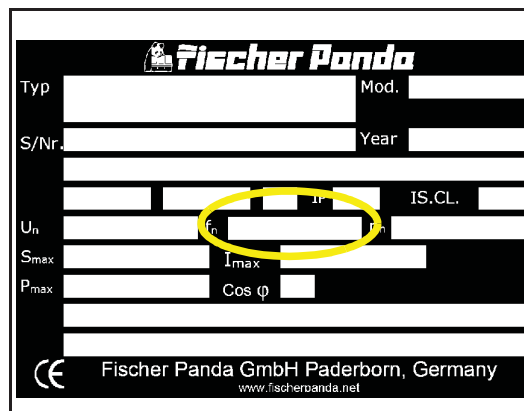
HP1 - 60Hz: L, Z

HP3 - 50Hz:: L1, L2, L3

HP3 - 60Hz:: L1, L2, L3, 1, 2, 3, 4

DVS - 50Hz : L1, L2, L3, L1'

DVS - 60Hz : L1, L2, L3, L1', 1, 2, 3, 4



The identification plate is a rectangular label with the Fischer Panda logo at the top. It contains several fields for technical data: Typ, Mod., S/Nr., Year, Un, Smax, Imax, Pmax, Cos φ, and IS.CL. A yellow circle is drawn around the IS.CL. field.

If a pass (beep) should be determined, the generator must be returned for examination in the plant, or it can also be wound again locally. For this coil datas can be requested.

Fig. E.4.4-1: Identification plate

E.4.5 Measuring the inductive resistance

Unfortunately the checking of the ohmic resistance permits still no reliable statement about the condition of the coil. If the ohmic resistance values arise inequalities between the coils, that is a safe indication for the fact that the coil is defective. To be exactly sure the inductive resistance of the coil have to be measured. For this a special measuring instrument is necessary, which measures the inductance of a coil.

Inductance is measured in the same way as the ohmic resistance, i.e. the coils are compared. The value is indicated in mH (milli Henry).

The arranging value for the inductive resistance can take from the section F.2, "Technical data" on page 128.

Note: These values depends strongly from the measuring method (kind of the measuring instrument)

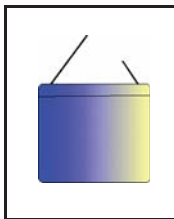
E.5 Generator provides no Voltage

E.5.1 Rotor Magnetism Loss and "Re-magnetizing"

.ATTENTION! See "Safety Precautions" on Page 11.



With asynchronous generators it can be the fact that the generator can not build up independently voltage after longer service lives, or, if it were switched off under full load. The cause lies in the fact that the rotor lost its remainder magnetism.



This remainder magnetism can be restored in a simple manner by a DC battery. In addition the „shore power“ must be switched off and any connection to a AC-source must be interrupted.

Likewise the genset must be switched off, i.e. also the starter may not be operated. The power source selector is switched to "generator". Only the plug socket must be connected with the generator.

Now the two poles of a 9V battery are connected with the plug socket or held to the appropriate contacts in the on-board current distribution. Use not a battery bank or the generator starter battery, this could damage the coil. The DC voltage may be applied only for a short time (1-2 seconds). In the coil the remainder magnetism is restored by the short current pulse, and the generator can be normally started.

E.6 Starting Problems

E.6.1 Fuel Solenoid Valve

The fuel solenoid valve is located in front of the injection pump. It opens automatically, if the „START“-button is pressed on remote control panel. If the generator is switched to "OFF", the solenoid valve closes. It takes some seconds, before the generator stops.

If the generator fails to start, runs rough, does not reach the proper RPM, or does not stop properly, the first item to suspect in most cases is the fuel solenoid valve and should be inspected first.

A check of the fuel solenoid valve by removing the plug from the fuel solenoid valve for a short period whilst in operation (first remove the small retention screw) and replace it immediately. The motor should "react immediately" by revving high. If the motor does not react sharply to the reconnection of the solenoid wire, it is a sign that the solenoid valve could be faulty.

1. Fuel solenoid valve
2. Injection nozzle
3. De-aerating screw

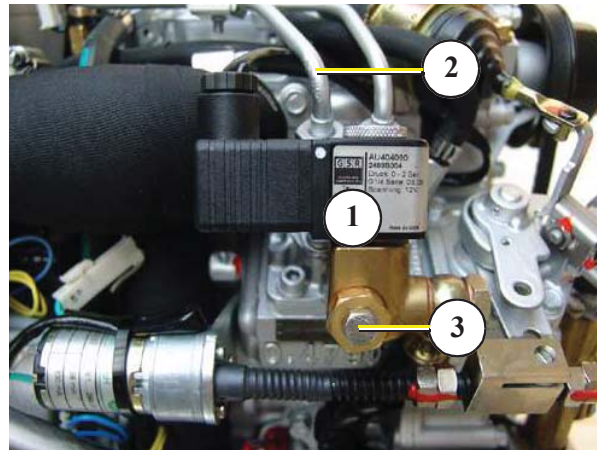


Fig. E.6.1-1: Fuel solenoid valve

E.6.2 Stop solenoid

There are two different variations:

A. Energized to stop

By pressing the „OFF“-button on the remote control panel the stop solenoid is supplied with voltage and operate, through this the injection nozzles resets to zero position and the generator stops.

B. Energized to run

This version is equipped with two solenoids an actuating and a stop solenoid. After being fed with current, the actuating solenoid attracts the adjusting lever of the fuel injection pump, through which the fuel can flow. The actuating solenoid is switched off once the final position has been reached, which is maintained by the stop solenoid for as long as the generator is running

.ATTENTIONT

When starting the "START"-button may not be pressed longer than 5 sec., because the stop solenoid pulls too much current over the starter. Otherwise the stop solenoid must be disconnected.



Stop solenoid



Fig. E.6.2-1: Stop solenoid

Damage to starter motor

The starter is fitted with a free wheel or axial rotating spring cog, which prevents the starter being driven externally by means of the motor. The free wheel will be heavily worn, if the starter still operates, thereby causing damage to the springs, roller bearings or cog teeth. This could lead to complete destruction of the starter.

It is important that every person who operates the generator is informed of this situation. This is practically the only handling error that can be made on board that can lead to fatal consequences for both generator and operator.

E.6.3 Dirty fuel filter

If the fuel filter is dirty change the filter element.

For replacing the filter element see section D.4.2, "Replacing fuel filter" on page 92.

01. Fuel filter element

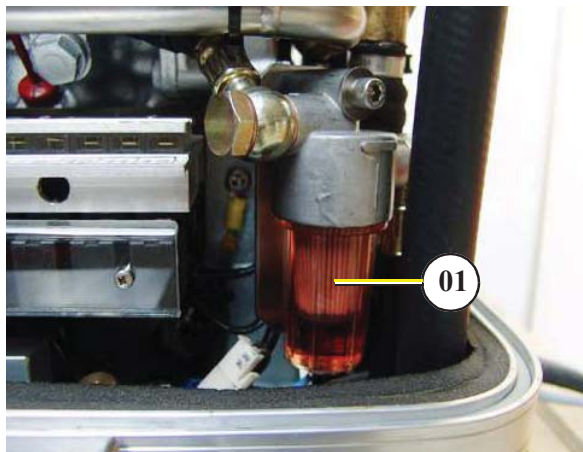


Fig. E.6.3-1: Fuel filter

E.6.4 Failure Bypass Switch

The start-failure bypass switch enables an immediate restart facility of the generator, should it cut out, even if this was caused by over-heating. There is normally a requirement to wait until the motor has cooled down to the correct temperature. This can last for several hours in certain circumstances, since the generator is enclosed in a sound-insulated casing, which prevents heat loss.

Failure bypass switch

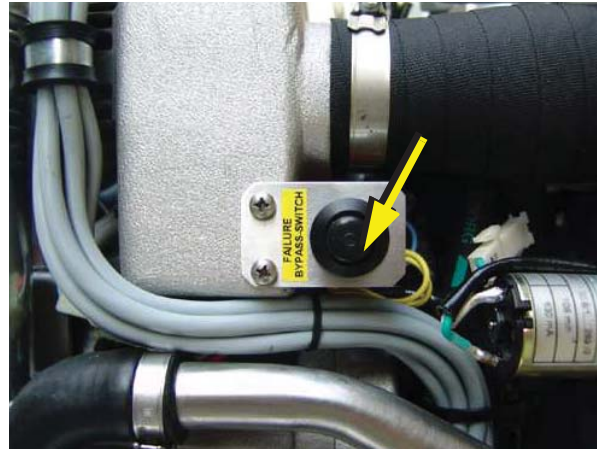


Fig. E.6.4-1: Failure bypass switch

To prevent such a shut down period the generator can be started in the normal way while pressing the Failure bypass button is depressed. This by-passes any faults thus allowing the generator to run.

Before pressing the bypass button and starting the generator, a manual check of the engine oil level must be carried out as it is possible that the oil pressure switch caused the generator to cut out. Once it has been ascertained that the reason for the engine cutting out is over- heating and not lack of oil, the generator can be started and run for several minutes without load, so that the engine is returned to normal operating temperature.

CAUTION:

If temperature is the reason for the generator cutting out when it is running under load, then an immediate investigation should be made to determine the cause. It could be a fault with the internal cooling system, the fan, the radiator air-intake or dirty radiator.

Repeated use of the failure bypass switch should be avoided, if the generator repeatedly cuts out during operation without determining the cause of the engine cut-outs.

The generator should always be run without load for several minutes before being switched off, so that temperature stabilisation occurs. Residual heat can cause the generator to overheat, even after it has been switched off.

Should the overheating alarm be activated after the generator has been switched off, then this can also be bypassed using the switch.

E.6.5 Troubleshooting Table

For Troubleshooting see section F.1, "Troubleshooting" on page 123.

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F. Tables

F.1 Troubleshooting

GENERATOR OUTPUT VOLTAGE TOO LOW For 50Hz versions: less than 200V For 60Hz versions: less than 100V	
Cause	Solution
Generator is overloaded.	Reduce the electrical load. (Switch off load)
Motor is not reaching the rated rpm.	Refer to "motor faults" section.
Defective capacitor(s).	Check capacitors and replace if necessary.

GENERATOR VOLTAGE TOO HIGH (MORE THAN 240V-50Hz / 135V-60Hz) If the generator is providing excessively high voltage, the following potential causes should be investigated:	
Cause	Solution
Over-energizing due to wrong capacitors.	Check capacitors type and replace if necessary.
Measuring voltage on the VCS circuit board is missing.	Check VCS System, check cable connections.

GENERATOR VOLTAGE FLUCTUATES	
Cause	Solution
1. Disturbances on the electrical system/user side. 2. Motor disturbances.	1. Check if electrical load is fluctuating. 2. Refer to section: "Motor runs irregular".

GENERATOR NOT ABLE TO START ELECTRIC MOTOR	
Cause	Solution
If the generator is unable supply enough power to start an electric motor (120V-60Hz), it is usually because the motor draws too much current during starting process.	Check the motor's current draw required for starting (switch to 380V if possible). This could be remedied by providing stronger capacitors or installing an optional "Easy Start Booster Set". Enquire at your nearest Panda dealer or directly at the manufacturer.

DIESEL MOTOR FAILS TO START	
Cause	Solution
Starter battery switched "OFF".	Check position of battery switch and switch "ON" (if installed).
Starter battery voltage insufficient (battery too weak).	Inspect battery terminals and cables for a good electrical connection (Inspect against corrosion, tattered wires, etc.).
Starting current disrupted.	During the normal starting process, the battery voltage drops to 11V with a fully charged battery. If the voltage does not drop during starting, the electrical connection is faulty. If the battery voltage drops lower than 11V, then the battery has been discharged.

STARTER IS TURNING MOTOR, BUT FAILS TO START	
Cause	Solution
Fuel inlet solenoid valve not opening.	Check wire connections and circuitry to solenoid valve. (ref. DC wiring diagram)
Fuel pump not working.	Check fuel-filter and pump: clean if necessary.
Lack of fuel.	Check fuel supply.
Glow-plugs not working correctly.	Check glow plugs and heating time.
Too much air in fuel lines.	Test fuel system for leakage. Bleed air from fuel system (refer to section "Bleeding Air from Fuel System").
Fuel-filter blocked.	Replace fuel filter.

MOTOR DOES ACHIEVE ENOUGH SPEED DURING STARTING PROCESS	
Cause	Solution
Starter battery voltage insufficient.	Check battery.
Damaged bearing(s) piston (seized).	Repairs need to be carried out by Kubota-Service. (refer to Kubota motor-manual)
Cooling water in combustion chamber.	1. Turn generator "OFF" at control panel. 2. Remove the glow plug (see Kubota-manual). 3. Rotate the motor by hand carefully. 4. Check if there is water in the oil and change both oil and filter if necessary. 5. Determine cause for excess water in the combustion chamber. The excess water can be caused by a defective air vent in the cooling water system, which should be checked and cleaned, or replaced if faulty.

MOTOR RUNS IRREGULARLY	
Cause	Solution
Faulty centrifugal injector governor.	Have the centrifugal governor inspected by a Kubota-Service technician.
Too much air in fuel lines.	Bleed air from fuel system.

MOTOR SPEED DROPS	
Cause	Solution
Lack of fuel	Check fuel supply system: - fuel filter, renew if necessary - check fuel pump - check fuel lines (bleed if necessary)
Lack of intake air.	Check air intake paths. Check and clean air filter (and intake muffler if installed).
Generator overloaded by too many load.	Reduce the electrical load (switch off load).
Generator overloaded by over-energizing.	Check that the proper capacitor type is installed and that they are connected correctly.
Defective generator (windings, bearings, or other).	Generator must be sent to manufacturer for repair of damaged bearings or winding.
Damaged engine.	Repair of bearing damage, etc., by Kubota-Service.

MOTOR RUNS IN OFF POSITION	
Cause	Solution
Fuel inlet solenoid valve or throttle shut solenoid is not switching off.	Check wire connections to solenoid. Check valve functions as in the "Inlet Fuel Solenoid Valve" or in the throttle shut off solenoid sections. Replace if necessary.

MOTOR STOPS BY ITSELF	
Cause	Solution
Lack of fuel.	Check fuel supply system.

Excess heat in cooling system (thermo switch tripped)-lack of cooling water. Is indicated on the remote control panel.	Check cooling water system flow: water pump, inlet water filter, extra heat exchanger coolant flow.
Lack of oil (oil pressure sensor tripped). Is indicated on the remote control panel.	Check oil-level and if necessary top up. Check motor's oil-pressure and have repaired by Kubota-Service if necessary.

SOOTY, BLACK EXHAUST	
Cause	Solution
Generator is overloaded.	Check electrical load and switch off unnecessary load.
Insufficient intake air.	Check intake air filter; clean if necessary.
Fuel injector faulty.	Replace injector.
Valve clearance incorrect.	Readjust valve clearance to correct value (refer to Kubota-manual).
Poor fuel quality.	Use better quality diesel (recommended: 2-D Diesel).
Poor combustion.	Incorrect AFR (air/fuel ratio) due to motor timing adjustment. Have motor serviced by Kubota.

GENERATOR MUST BE SHUT OFF IMMEDIATELY IF:	
Cause	Solution
- motor rpm suddenly rises or drops - unusual noise comes from genset - exhaust colour suddenly becomes dark - leakage in the cooling water system.	Refer to respective section of manual and if necessary, have repaired by Kubota-Service, or Panda representative.

Tabelle 1: Voltage values stator coil

Terminal	Panda 8000
4 - 2 (60Hz)	~ 2-3 Volt
L - N (50Hz)	~ 2-3 Volt

Tabelle 2: Diameter of conduits

Generator type	Ø Cooling water conduit		Ø Exhaust conduit	Ø Fuel conduit	
	Freewater [mm]	Raw water [mm]		Supply [mm]	Return [mm]
Panda PMS 8000 NE	20	20	40	8	8

Tabelle 3: Rated current

Panda 8000 - 120 V / 60 Hz	61,8 A
Panda 8000 - 230 V / 50 Hz	27,0A

Tabelle 4: Cable cross-section

Wiring for vehicles. Single phase, not tin plated, PVC-insulated.		
Nominal conductor cross-section [mm²]	Allowed continuous current (guidance level) ^a	
	at +30°C [A]	at +50°C [A]
1	19	13,5
1,5	24	17,0
2,5	32	22,7
4	42	29,8
6	54	38,3
10	73	51,8
16	98	69,6
25	129	91,6
35	158	112
50	198	140
70	245	174
95	292	207
120	344	244

a. According to DIN VDE 0298, part 4.


IMPORTANT FOR THREEPHASE GENERATORS!

The cable cross-section must be arranged at three-phase generators, if load of the generator is asymmetric!

F.2 Technical data

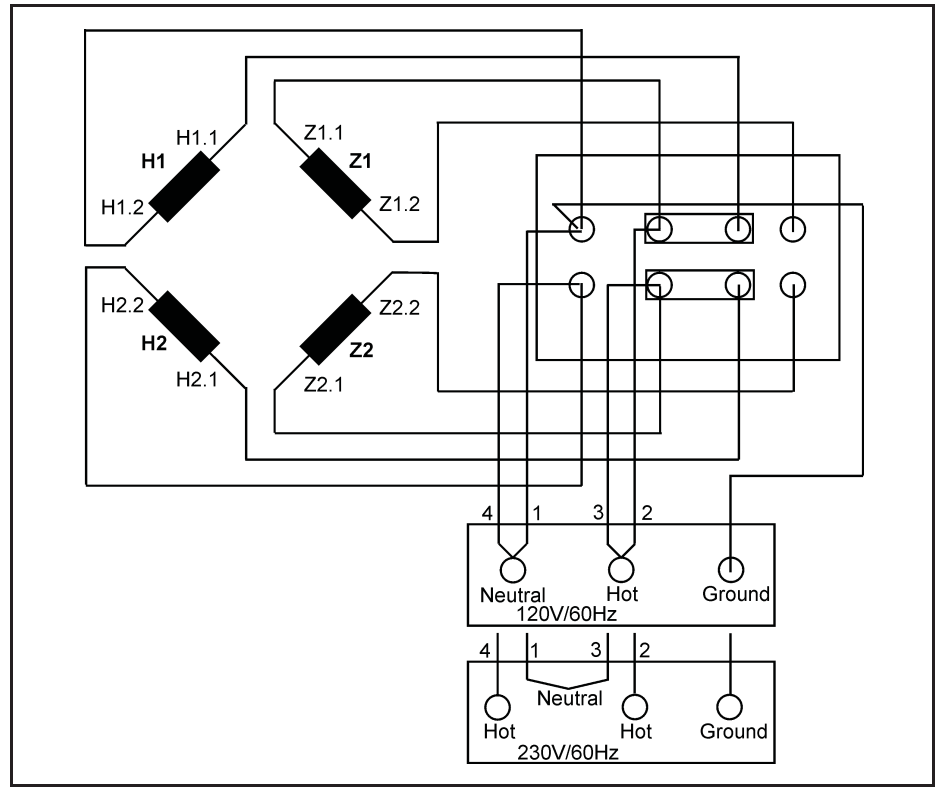
	Panda 8000NE PMS Digital 120V/ 60Hz	Panda 8000NE PMS Digital 230V/ 50Hz
Type	Kubota Z 482	Kubota Z 482
Governor	VCS	VCS
Automatic Startbooster	yes	yes
No. cylinder	2	2
Bore	67mm	67mm
Stroke	68mm	68mm
Stroke volume	479cm ³	479cm ³
max. power (SAEJ1349) at 3600rpm	9,32kW	9,32kW
Rated speed	3600rpm	3000rpm
Idle running speed ^a	3510rpm	2900rpm
Lubrication oil capacity	2,1l	2,1l
Fuel consumption ^b	ca. 0,84 - 2,24l	ca. 0,84 - 2,24l
Oil consumption	max. 1% of fuel consumption	max. 1% of fuel consumption
Cooling water requirement for raw water circuit	16-28l/min	16-28l/min
Da	240mm	240mm
Di	135mm	135mm
Lfe	100mm	100mm
Ohmic resistance	H1/H2: 0,125 Ohm; Z1/Z2: 0,625 Ohm	H1/H2: 0,36 Ohm; Z1/Z2: 0,48 Ohm
Inductive resistance	H1/H2: 0,61 mH; Z1/Z2: 4,85 mH	H1/H2: 2,99 mH; Z1/Z2: 5,8 mH
Capacitors	Booster: 2x40µF Excitation: 4x50µF	Booster: 1x60µF Excitation: 4x50µF

a. progressive governor by VCS

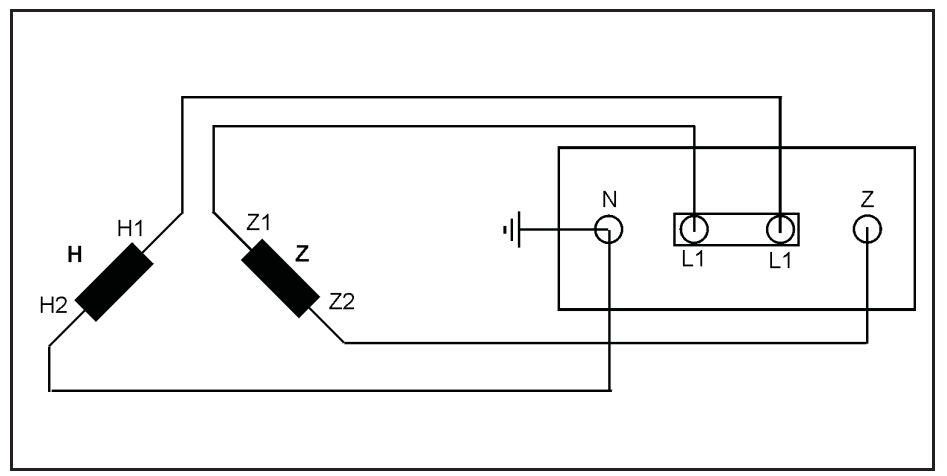
b. 0,35l/kW electrical power, the randomized values between 30% and 80% of the power rating

F.3 Types of coil

HP1 - 120V / 60 Hz



HP1 - 230V / 50 Hz



F.4 Inspection checklist for services

Inspection-Category				Inspection work			
A	Installation check	D	100 h	1)	check	4)	change
		E	500 h	2)	measure	5)	sealing
B	daily	F	1000 h	3)	clean	6)	check isolation
C	35 - 50 h	G	5000 h				

	Inspection-Category							Inspection work
	A	B	C	D	E	F	G	
01.	5)	5)	5)	5)	5)	5)	4)	coolant water hoses
02.	1)	1)	1)	1)	1)	4)	4)	raw water pump (impeller)
03.	1)	1)	3)	3)	3)	3)	3)	water separator / fuel pre-filter
04.	1)	1)	4)	4)	4)	4)	4)	engine oil
05.			4)	4)	4)	4)	4)	oil filter
06.	1)	1)	1)	4)	4)	4)	4)	air filter
07.	1)	1)	1)	1)	1)	1)	1)	fuel lines (leaks)
08.	1)	1)	1)	4)	4)	4)	4)	fine particle fuel filter
09.	1)		1)		1)	1)	1)	valve clearance
10.	1)	1)	4)	5)	4)	4)	4)	valve cover gasket
11.			1)		1)	1)	1)	coolant therm (sensor)
12.			1)		1)	1)	1)	exhaust temp sensor
13.			1)		1)	1)	1)	oil pressure sensor
14.		1)	1)	1)	1)	1)	1)	belt tension
15.	1)	1)	1)	1)	4)	4)	4)	"V" belts
16.						1)	1)	Thermostat
17.	1)	1)	1)	1)	1)	1)	1)	generator & engine screws
18.	1)	1)	1)	1)	1)	1)	1)	unit's base mount screws
19.	6)	6)	6)	6)	6)	6)	6)	check electrical cables
20.	1)	1)	1)	1)	1)	1)	1)	motor reinforced mountings
21.	1)	1)	1)	1)	1)	1)	1)	actuator mounting
22.	1)	1)	1)	1)	1)	1)	1)	starter motor mounting screws
23.	1)	1)	1)	1)	1)	1)	1)	screws generator-engine
24.	1)	1)	1)	1)	1)	1)	1)	voltage output of alternator 12 V
25.	2)		2)	2)	2)	2)	2)	input temp of coolant under load
26.	2)		2)	2)	2)	2)	2)	outlet temp of coolant under load
27.						4)	4)	generator rotor bearing
28.			1)	1)	1)	1)	1)	signs of corrosion to generator
29.			1)	1)	1)	1)	1)	check generator coolant block
30.			1)	1)	1)	1)	1)	capacitors in AC-Control box
31.	1)		1)	1)	1)	1)	1)	ASB function test
32.	1)		1)	1)	1)	1)	1)	VCS function test
33.	2)		2)	2)	2)	2)	2)	voltage without load
34.	2)		2)	2)	2)	2)	2)	voltage under load
35.	2)		2)	2)	2)	2)	2)	generator output under load
36.	2)		2)	2)	2)	2)	2)	engine speed (rpm)
37.						1)	4)	injector test
38.						1)	1)	compression
39.	1)	1)	1)	1)	1)	1)	1)	hose clips

F.5 Engine oil

Engine oil classification

Operating range:

The operating range of an engine oil is determined by SAE class. "SAE" is for the union of American engineers (Society of Automotives Engineers). The SAE class of an engine oil only informs over the viscosity of the oil (larger number = more viscous, lower number = more highly liquidly) e.g. to 0W, 10W, 15W, 20, 30, 40. The first number shows the liquid of cold weather, the second number refers to the fluidity with heat. Complete yearly oils have usually SAE 10W-40, SAE 15W-40 etc.

Quality of oil:

The quality of an engine oil is specified by the API standard ("American Petroleum Institutes"). The API designation is to be found on each engine oil bundle. The first letter is always a C.

API C for diesel engines

The second letter is for the quality of the oil. The more highly the letter in the alphabet, the better the C für Dieselmotoren.

Examples for diesel engine oil:

API CG Engine oil for highest demands, turbo-tested

Engine oil types	
above 25°C	SAE30 or SAE10W-30 SAE10W-40
0°C to 25°C	SAE20 or SAE10W-30 SAE10W-40
below 0°C	SAE10W or SAE10W-30 SAE10W-40

F.6 Coolant specifications

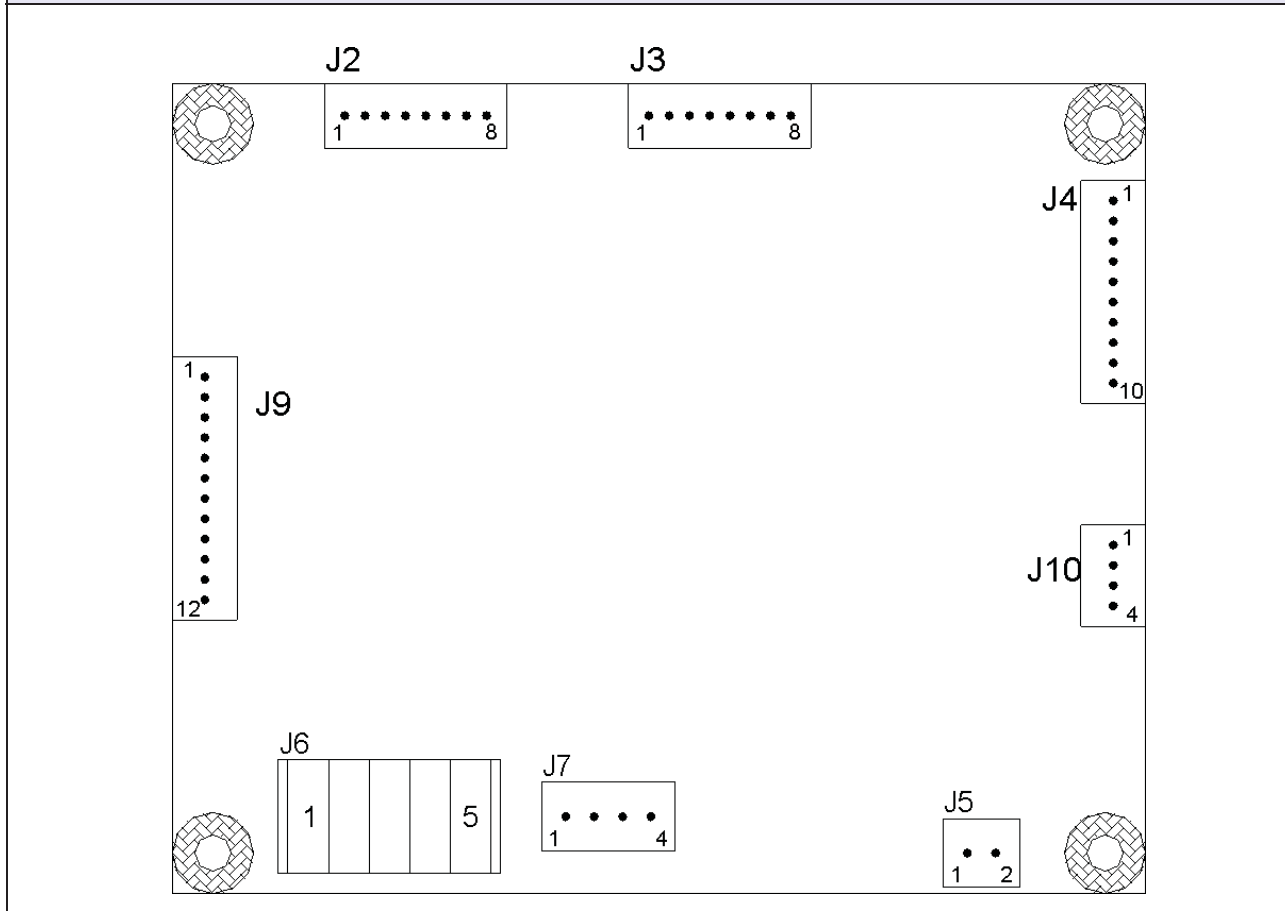
Use a mixture of water and antifreeze. The antifreeze needs to be suitable for aluminium. The antifreeze concentration must be regularly checked in the interests of safety.

ICEMASTER recommend to use the product: GLYSANTIN PROTECT PLUS/G 48

Engine coolant automotive industry Product description		
Product name	GLYSANTIN ® PROTECT PLUS / G48	
Chemical nature	Monoethylenglycol with inhibitors	
Physical form	Liquid	
Chemical and physical properties		
Reserve alkalinity of 10ml	ASTM D 1121	13 – 15 ml HCl 01 mol/l
Density, 20°C	DIN 51 757 procedure 4	1,121 – 1,123 g/cm³
Water content	DIN 51 777 part 1	max. 3,5 %
pH-value undiluted		7,1 – 7,3

Coolant mixture ratio	
Water/antifreeze	Temperature
70:30	-20°C
65:35	-25°C
60:40	-30°C
55:45	-35°C
50:50	-40°C

F.7 Scheme VCS board



F.7.1 Legend VCS board

J2, Analogue input	
1	Temperature raw water input
2	Temperature fresh water input
3	Temperature cylinder head
4	Tank sensor
5	Temperature coil 1
6	Temperature coil 2
7	Temperature bearing
8	Reference (Ground)

J3, Analogue / binary input	
1	Oil pressure analogue
2	Oil pressure switch
3	Temperature engine oil
4	Temperature raw water outlet
5	Temperature fresh water outlet
6	Temperature exhaust manifold
7	Temperature diode heat sink
8	Reference (Ground)

J4, Analogue / binary input	
1	Supply output battery voltage / 2,5A
2	Supply output 5V / 1A
3	Binary input air intake
4	Analogue input raw water pressure
5	Binary input engine oil level
6	Binary input bearing oil level
7	Binary input coolant level
8	Binary input water leakage
9	Binary input alternator signal
10	Reference (Ground)

J5, Power supply	
1	+9...18 or +18...36V DC
2	Reference (Ground)

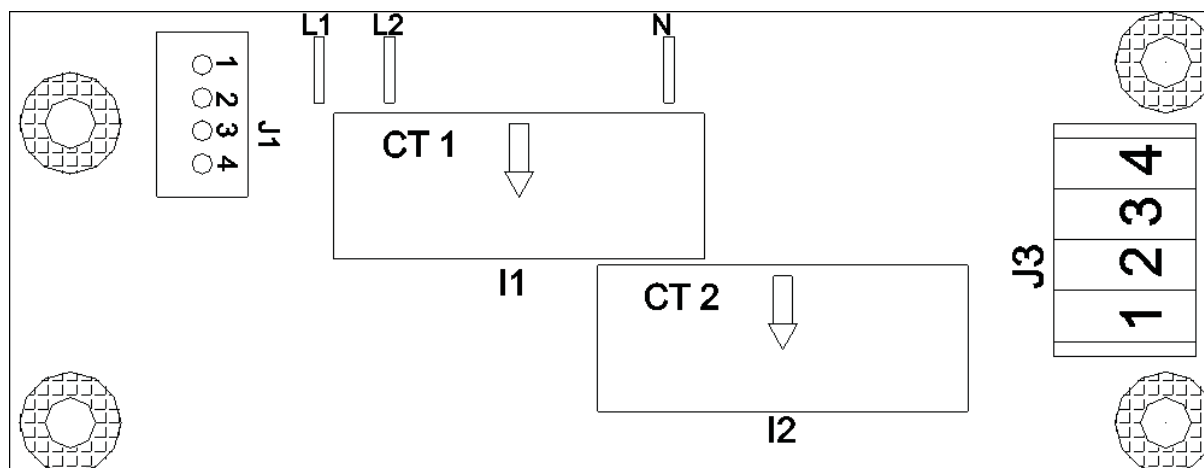
J6, Panel connector	
1	Supply battery voltage / 1A
2	Reference (Ground)
3	Trigger signal „VCS on“
4	Serial IO „Data+“
5	Serial IO „Data-“

J7, CT board connector	
1	Supply battery voltage / 1A
2	Reference (Ground)
3	Serial IO „Data+“
4	Serial IO „Data-“

J9, Binary output	
1	Supply output battery voltage / 1A
2	Supply output battery voltage / 1A
3	Output „Motor start“
4	Output „Glow plugs“
5	Output „Fuel pump“
6	Output „Motor stop“
7	Output „Raw water pump“
8	Output „Ground separation relay“
9	Output „Ignition“
10	Output „Ready“
11	Output „Actuator +“
12	Output „Actuator -“

J10, Digital / binary input	
1	Supply output battery voltage / 0,5A
2	Sensing input local remote start
3	Sensing input engine speed
4	Reference (Ground)

F.8 Scheme current transformer board



F.8.1 Legend measuring board

J1, Connector to measuring/compensation board	
1	Supply voltage output
2	Ground
3	Serial bus data +
4	Serial bus data -

J3, Booster control output	
1	Booster on, +15V / max 10mA
2	Booster reference
3	Booster on, +15V / max 10mA
4	Booster reference

G. Remote control panel

The remote control panel is equipped with some monitoring functions, which increases the operational safety of the generator. A failure message is shown over contacts which are normally closed. If a connection is intermitted triggers this a failure message.

There are two different displays:

- 1) The „Engine view“, which shows you the engine relevant datas like temperatures.
- 2) The „Generator view“, which shows you the generator relevant datas like voltages.

To Start the Engine:

- 1.) Press the „Standby“-Switch (02) - the LED below the button has to come up.

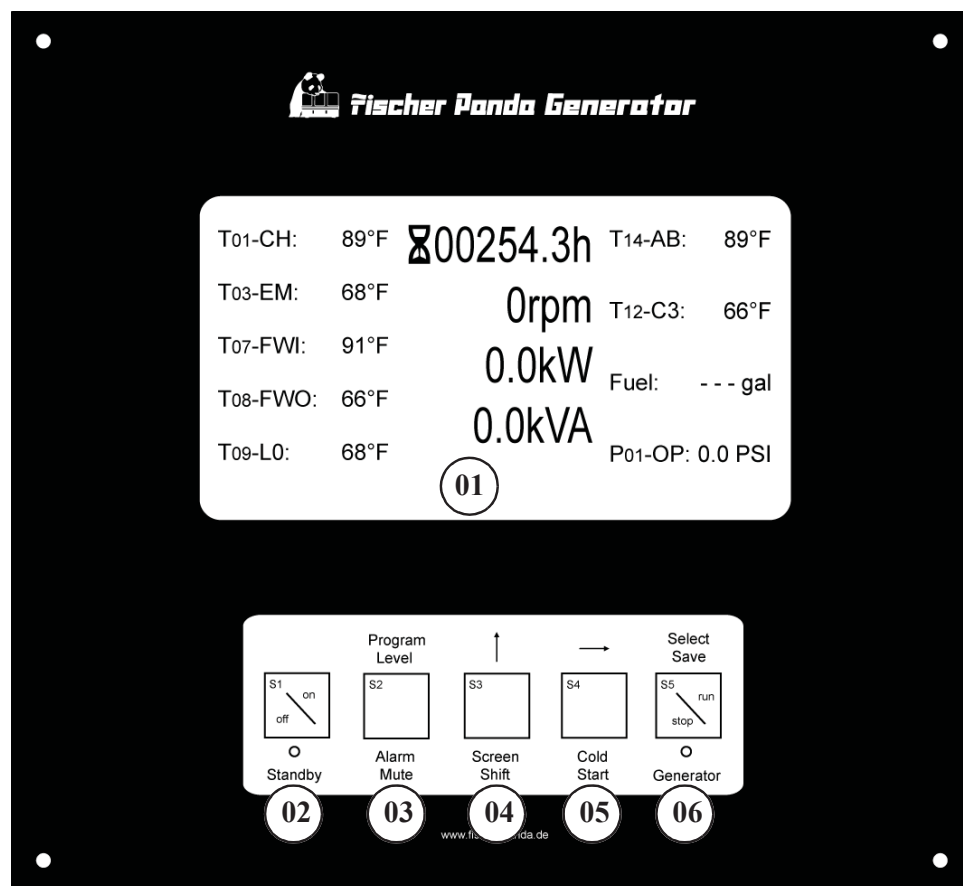
You should see a display that looks like the one beneath.

- 2.) Press the „run/stop“ button (06) (after the automatic pre-glow phase the engines starts)

The LED below the button blinks during the start procedure, when the engine has started the LED flashes constant.

First the generator runs in idle-speed for the predefined period.

Then the engine runs up to the normal rotation speed.



01. Digital display

02. S1 Button „ON/OFF“ „Stand by“

03. S2 Button alarm mute / program level

04. S3 Button display shift

05. S4 Button rpm shift / cold start

06. S5 Button run/stop / select save

Panel „Engine view“ in Stand by mode

T01-CH: Cylinder head

T02-EM: Exhaust manifold

T07-FWI: Freshwater - in

T08-FWO: Freshwater - out

T09-LO: Lubricating oil

T14-AB: Alternator bearing

T12-C3: Temperatur at coil 3

(display changes - only the coil with the the highest temperature)

P01-OP: Oil-pressure

„- -“ means that the sensor isn't connected or a cable is broken.

T01-CH: 89°F	⌚00254.3h	T14-AB: 89°F
T03-EM: 68°F	0rpm	T12-C3: 66°F
T07-FWI: 91°F	0.0kW	Fuel: - - - gal
T08-FWO: 66°F	0.0kVA	P01-OP: 0.0 PSI
T09-LO: 68°F		

L.O. prss. switch P09

Panel „Generator view“ in Stand by mode

01: rounds per minute

02: elapsed hours

03: apparent power

04: frequency 0Hz

05: status line(s)

06: effective power with bar line

PF: active power factor

Bs: battery voltage

C2: compensation level

Un: phase voltage

In: phase current

01	02	03	04
0rpm	⌚00254.3h		0.0 Hz
U1: 0V	0.0kVA	I1: 0 A	
U2: 0V		I2: 0 A	
U3: 0V		I3: 0 A	
PF: 1.00i	0.0kW	C2: 0 %	
T01: 89°F	Bs: 26.5 V	T10: 89°F	

L.O. prss. switch P02

Panel „Engine view“ when unit is running without load

After pressing start and after the automatic pre-glow phase, the generator runs in idle-speed.

The engine runs up to the normal rotation speed of about 3529rpm.

The temperatures at the different test points begin to change.

Oil pressure shows 58 PSI.

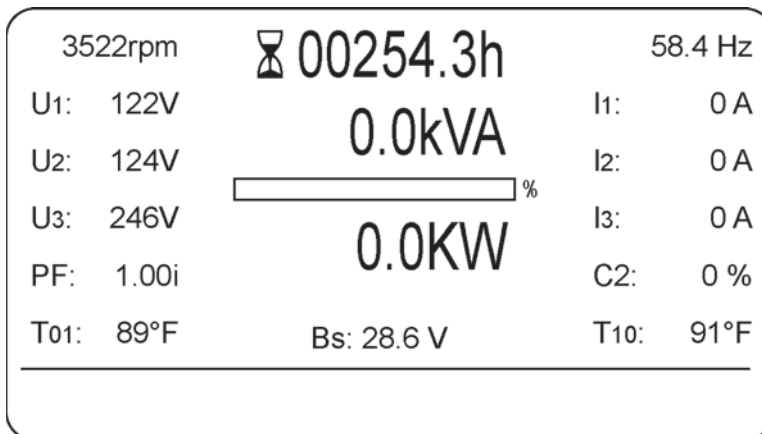
T01-CH: 89°F	⌚00254.3h	T14-AB: 91°F
T03-EM: 91°F	3529rpm	T12-C3: 98°F
T07-FWI: 68°F	0.0kW	Fuel: - - - gal
T08-FWO: 95°F	0.0kVA	P01-OP: 58 PSI
T09-LO: 89°F		

Panel „Generator view“ when unit is running without load

The rotation speed keeps constant at approx. 3500rpm

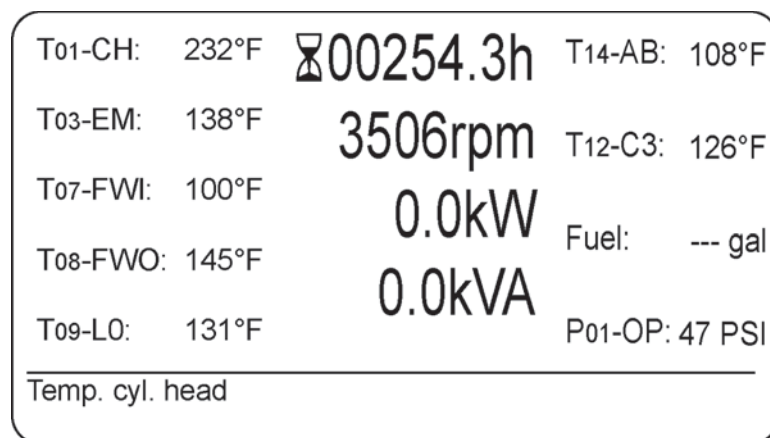
Now you can see the voltages at the separat phases.

Values for kVA and kW are 0, because the generator runs without load.


Panel „Engine view“ in case of warning

T01-CH, the cylinder head - temperature has reached 232°F. The other temperatures are inside the permissible range.

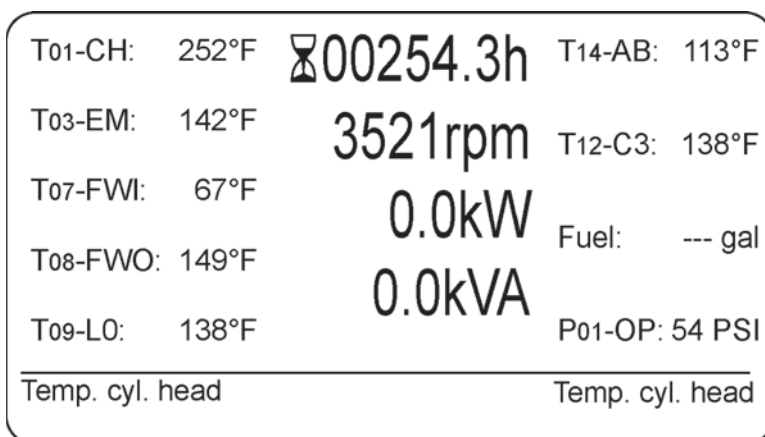
A warning „Temp. cyl head“ occurs at the lower left side of the panel.


Panel „Engine view“ in case of error

T01-CH, the cylinder head - temperature has reached 252°F. The other temperatures are inside the permissible range.

A warning „Temp. cyl head“ occurs at the lower left side of the panel.

Additionally, a failure comes at the lower right side.



Panel „Engine view“ after error-caused shutdown

The engine shuts down and the two status lines show different warnings and failures.

Naturally, there aren't 491°F at the T01 or T08. This value says that the temperature is too high and the engine has shut down.

T01-CH: 491°F	⌚ 00254.3h	T14-AB: 95°F
T03-EM: 122°F	0rpm	T12-C3: 106°F
T07-FWI: 68°F	0.0kW	Fuel: --- gal
T08-FWO: 491°F	0.0kVA	P01-OP: 0.0 PSI
T09-L0: 89°F		
Frequency	Voltage low	
Lube oil press	Lube oil press	

Program mode for panel parallel switching

ATTENTION: It is not allowed to program two panels at the same time. Program first one panel and then the second.

To get into the „Program mode“ press the buttons „Program Level (S2)“ and „Display shift (S3)“ at the same time.

In this mode you must adjust the panel for parallel switching.

To change the settings use button S3 and to scroll use button S2.

The „Display“ must be switched to „US standard“.

The first panel get the „Address 0“.

The second panel get the „Address 1“

To store this settings press the button „Select Save“.

Display:	US standard (metric)
Address:	0 (1-7)
Nominal power:	0200 x0.1kW

An failure override button enables an immediate restart facility of the generator, should it cut out, even if this was caused by over-heating. There is normally a requirement to wait until the motor has cooled down to the correct temperature. This can last for several hours in certain circumstances, since the generator is enclosed in a sound-insulated casing, which prevents heat loss.

This period can be reduced by pushing the „Alarm Mute“ button. By pressing the button all faults are overrided for 10 seconds. When the button is pressed again during the 10 seconds, 10 seconds will be added to the remaining time. The generator can be started. The button bypasses any faults allowing the generator to run.

Before depressing the button, a manual check of the oil dipstick must be carried out to determine whether the generator has sufficient oil, as it is possible that the oil pressure switch causes the generator to cut out. If it has been ascertained that the reason for the motor cutting out is overheating and not lack of oil, the generator can be run for several minutes without load, so that the motor is cooled by the circulating coolant.

ATTENTION:

If the temperature is the reason for the generator cutting out when it is running under load, then an immediate check must be made to determine the cause. It could be a fault with the cooling system, one of the fans, the air-intake or a fault with the external cooling system.

Continual use of the starter-override switch should be avoided, while the generator cuts out during operation. The generator must always run without load for several minutes before being switched off, so that a temperature compensation occurs. Heat accumulation can cause the generator to overheat, even after ist has been switched off.

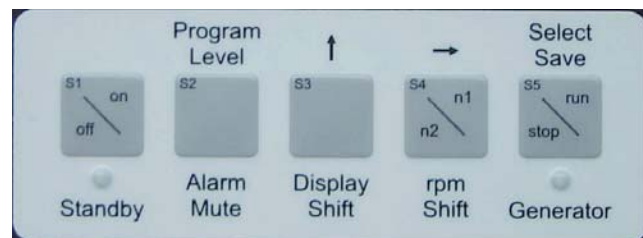
Should the overheating alarm be set off, caused by heat accumulation, after the generator has been switched off, then this can also be bypassed using the switch.

Push:

„Alarm Mute“ to acknowledge

again „Alarm Mute“ to deactivate all sensors and

„Motor Start“ to restart the engine



Fischer Panda Datasheet

H. Impellerfilter

 Fischer Panda	Art Nr..	31.06.03.003P
 Fischer Panda	Bez.	Impellerfilter for Marine Panda P6, P8, P9, P10, P12 and P14 since March 2007

	Dokument	Hardware	Software
Aktuell:	R2 04.05.07	12.04.07	-----
Replace:	V1 12.04.07		-----

Tested for a flow rate up to 22l/min





Fischer Panda Datasheet

H.1 General

Starting with March 2007 the Fischer Panda generators type 6, 8, 9, 10, 12 and 14 has got an extra impellerfilter.

H.2 How it works

When the impeller breaks, pieces of rubber will penetrate into the cooling system. This pieces can stock in the pipes with lower diameter (such as the heat exchanger) and reduce the cooling water flow. Expensive reconstruction and cleaning of the raw water circle is necessary.

The Fischer Panda impellerfilter hold this pieces of rubber back, so they can be easely removed. The flow through diameter of the cooling water is expanded in the impellerfilter, in emergency situation (like heavy sea) it is possible to change only the impeller itself and clean the impellerfilter afterwards at a better time. an emergency stop of the generator in fact of a to low cooling water flow and an overheating will be nearly banned. The impellerfilter must be cleaned after each impeller break. If you are not sure that every piece of rubber is removed at the cleaning we recommend to change the impellerfilter.

H.3 Cleaning and replacement of the impellerfilter



The battery must always be disconnected, if work on the generator or electrical system is to be carried out, so that the generator cannot be unintentionally started.

Note the safety instruction in the generator manual.

Seawater valve must be shut.

Open the generator sound cover like it is explained in the generator manual



**Attention!!! Parts of the generator and the cooling water may be hot after operation
!!!DANGER!!!**

Fischer Panda Datasheet

Impellerfilter

The impellerfilter is mounted at the right front motorbase.

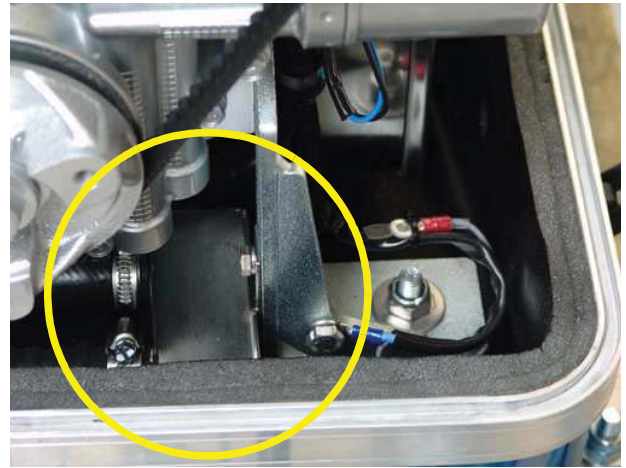


Fig. H.3-1: Impellerfilter

Loose holding screw

Loose the holding screw two turns

Srew M6 (*SW 10)

*SW 10 = wrench size 10mm

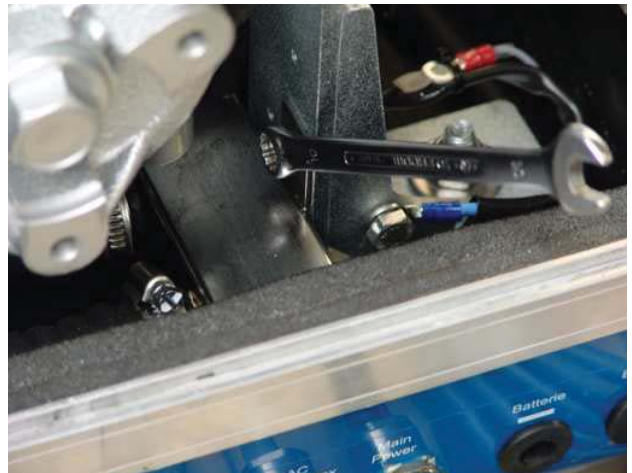


Fig. H.3-2: Holding screw

Fischer Panda Datasheet

First hose clamp

Loose the front hose clamp.

Use a screwdriver, or better a wrench SW 7mm



Fig. H.3-3: First hose clamp

Second hose clamp

Loose the second hose clamp

Use a screw driver, or better a wrench SW 7mm

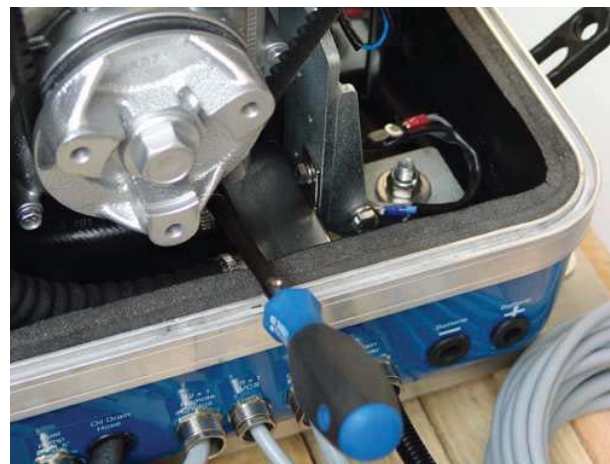


Fig. H.3-4: Second hose clamp

Remove the cooling water hose
remove the first cooling water hose

Some raw water may flow out of the hose or the impeller-filter

The hose can be closed with the cap you get together with the impellerfilter spare part pack.



Fig. H.3-5: cooling hose

Fischer Panda Datasheet

Remove the holding screw

Remove the impellerfilter holding screw

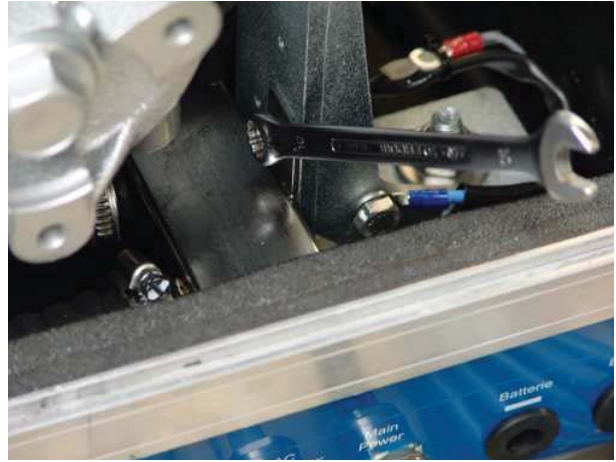


Fig. H.3-6: Holding screw

Pull the Impellerfilter out of the capsule

The second cooling water hose can be removed within these procedure.

Some raw water may flow out of the hose or the impeller-filter

The hose can be closed with the cap you get together with the impellerfilter spare part pack.



Fig. H.3-7: Remove Impellerfilter

Clening of the impellerfilter with water

The best cleanind will be to flush the filter against the flow direction



Fig. H.3-8: Cleaning with water

Fischer Panda Datasheet

Option: Cleaning of the impellerfilter with air pressure



Fig. H.3-9: Cleaning with air

Replace the cleaned/new filter in reverse procedure..

Fig. H.3-10: Replace

H.4 Spare part kit

Fischer Panda Art Nr. 21.03.02.005S



Impellerfilter Art. No. 31.06.03.003P

Screw M6x10 Art. No. G3A20093306010

with spring ring Art.No. G3A20012706

cap 19mm (2x) Art.No. PMGPN610U19

Fischer Panda Datasheet

H.5 Dimensions

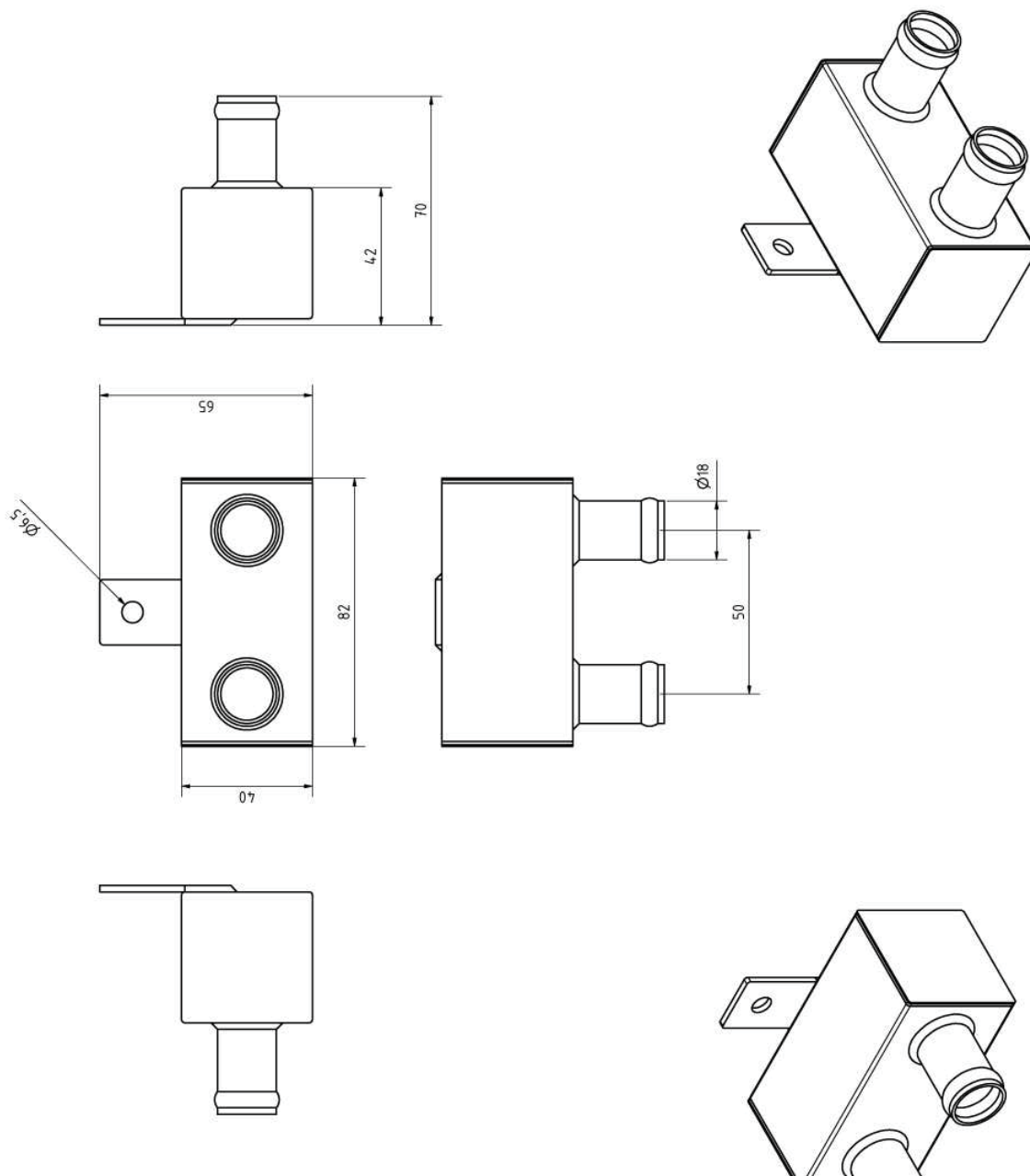


Fig. H.5-1: Dimensions





Fischer Panda

Partlist



Diesel-Generator: Panda 8 mini PMS Digital Super silent technology

120V - 60Hz / 7,0kW

Fischer Panda GmbH

Current revision status

	Document
Actual:	Panda_8 mini PMS_Digital_60Hz_Partlist.R01_20.1.09
Replace:	

Revision	Page

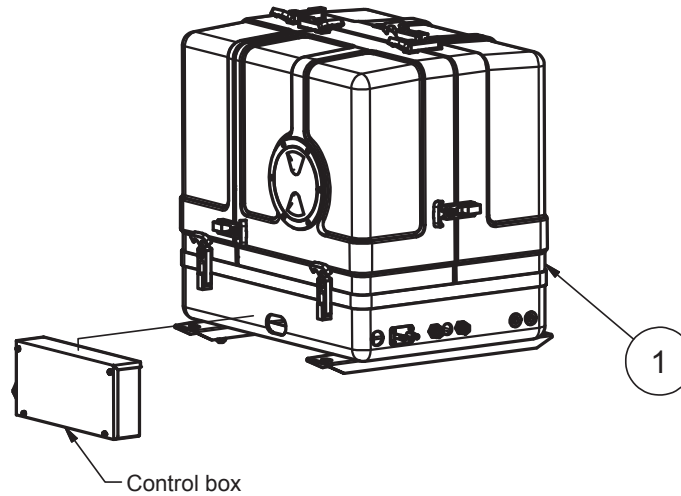
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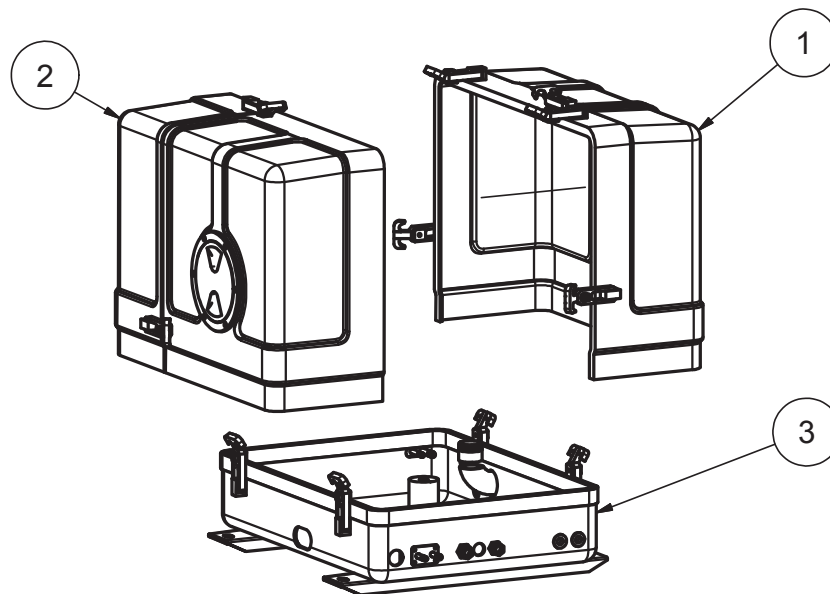
Table of contents

Group: Sound cover

Type: Panda 8 Mini PMS Digital 120V/60Hz



Parts List					
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.
1	1	sound isolation capsule complete for Panda 8 Mini PMS Digital GFK 3D	Schalldämmkapsel komplett P8 mini PMS Digital GFK 3D	FP2-005008	31.01.01.007H

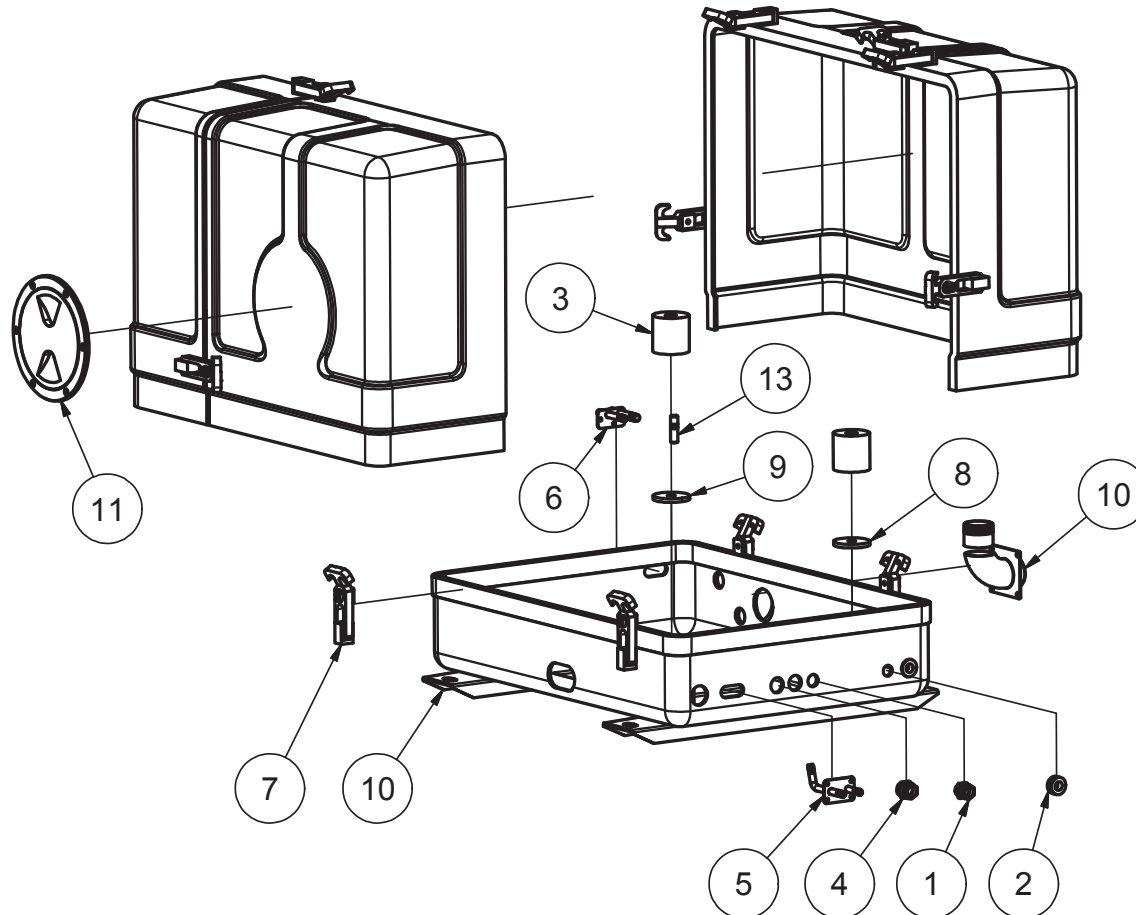


Parts List					
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.
1	1	sound isolation capsule right Panda 8 mini Digital two-parts GFK 3D	Schalldämmkapsel Oberteil rechts Panda 8 mini Digital 2-tlg GFK 3D	FP2-005034	31.01.02.006H
2	1	sound isolation capsule left Panda 8 mini Digital two-parts left GFK 3D	Schalldämmkapsel Oberteil links Panda 8 mini Digital 2-tlg GFK 3D	FP2-005032	31.01.02.005H
3	1	sound isolation capsule bottom Panda 8 mini Digital two-parts left GFK 3D	Schalldämmkapsel Unterteil Panda 8 mini Digital incl. Anbauteilen	FP2-005016	31.01.01.006H



Group: Sound cover parts

Type: Panda 8 Mini PMS Digital 120V/60Hz

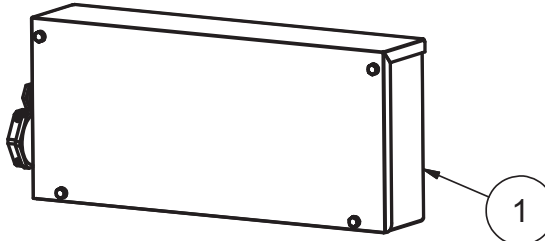


Parts List						
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.	-
1	1	screwed cable gland M16	Kabelverschraubung M16x1,5 08-10mm Ms vernickelt o. Zugentlastung, Sechskantzwischenstutzen	FP1-000996	34.07.04.032H	
2	2	rubber grommet double sided 12x20x24mm	Kabeldurchführungstülle doppelseitig Ø 12x20x24mm	FP2-001915	34.03.12.018H	
3	4	rubber mounts type "C" 50x50mm with double side internal thread M10, SH 55°	Metall-Gummi-Puffer 50x50mm Typ "C" beidseitig Innengewinde M10, SH 55°	FP2-003807	32.30.02.019H	
4	1	screwed cable gland M20	Kabelverschraubung M20x1,5 07-12mm Ms vernickelt o. Zugentlastung, Sechskantzwischenstutzen	FP1-001447	34.07.04.033H	
5	1	Capsule pass through fuel 2x8mm, 1 pipe red.down to 6mm	Kapseldurchführung Kraftstoff 2x8mm mit Reduzierung 1x6mm	FP2-003817	31.20.04.006H	
6	1	capsule lead-through flange 25x45mm, 1 x hose fitting 8mm, 1 x hose fitting 10mm	Kapseldurchführung Flansch 25x45mm, 1x Schlauchstutzen 8mm, 1x Schlauchstutzen 10mm	FP1-000842	31.20.04.007H	
7	4	capsule lock with t-handle 112mm, complete with keeper	Kapselverschluß 112mm mit Knebelgriff, komplett mit Schließzapfen	FP2-000114	40.04.01.032H	
8	2	Distance washer OD50 H5	Distanzscheibe D = 50mm H = 5mm	FP2-005027	31.03.62.005H	
9	2	Distance washer OD50 H5	Distanzscheibe D = 50mm H = 5mm	FP2-005028	31.03.62.005H	
10	1	Capsule pass through exhaust gas Ø40mm 90°1-1/4" e xternal thread	Kapseldurchführung Abgas Ø40mm 90°1 1/4"AG 3DS	FP2-003823	31.20.04.009H	
11	1	inspection cover with o-ring seal, inside Ø 127mm, outside Ø 175mm	Inspektionsdeckel Kunststoff weiß mit O-Ring, Innen Ø 127mm, Aussen Ø 145mm	FP1-000883	40.04.04.004H	
12	2	Sound Cover Bracket 510x70/80x22	Kapselfuß U-Form 510x70/80x22	FP2-006684	31.03.12.002H	
13	8	stud screw (1,25 d) M 10x25 DIN 939 zinc plated	Stiftschraube (1,25 d) M 10x25 DIN 939 verzinkt	FP1-000889	32.01.10.020H	

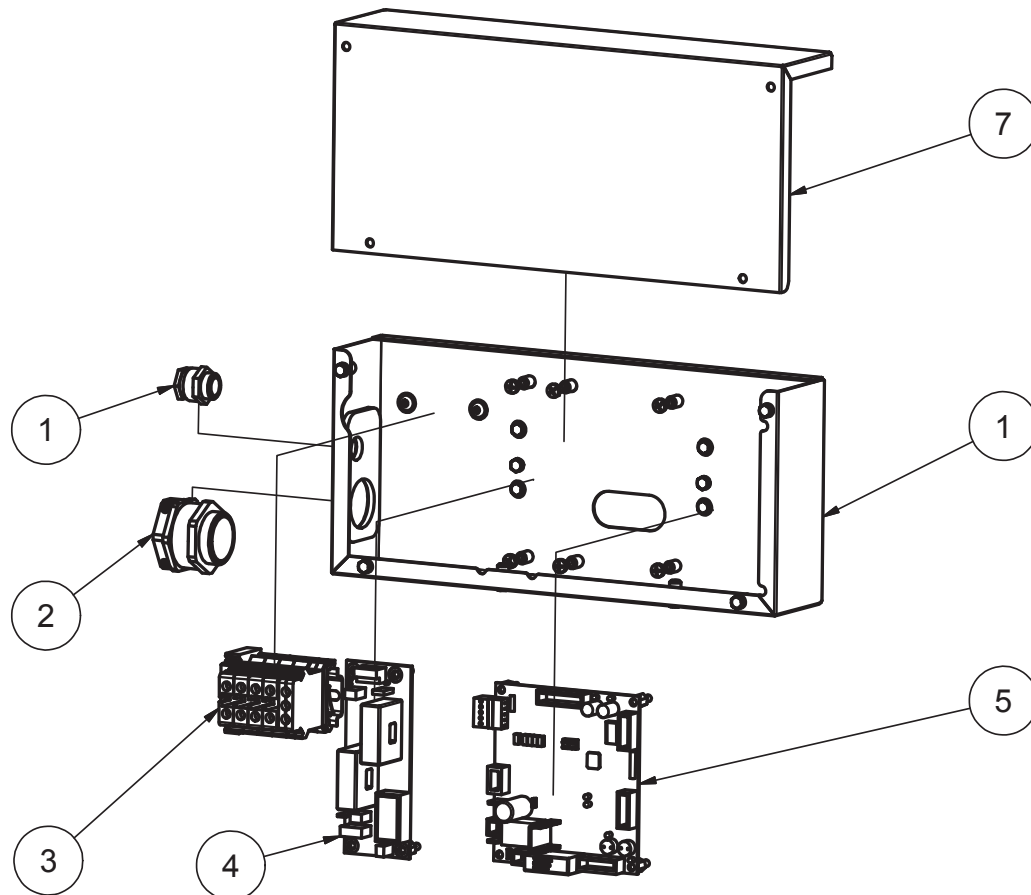
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Group: Control box

Type: Panda 8 Mini PMS Digital 120V/60Hz



Parts List					
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.
1	1	Governing Box complete P8 Mini PMS Digital 60Hz	Steuerungsbox kplt. P 8 MINI PMS Digital 60Hz	FP2-004986	31.40.01.003H



Parts List					
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.
1	1	screwed cable gland M16	Kabelverschraubung M16x1,5 08-10mm Ms vernickelt o. Zugentlastung, Sechskantzwischenstutzen	FP1-000996	34.07.04.032H
2	1	screwed cable gland M32	Kabelverschraubung M32x1,5 19-26mm Ms vernickelt m. Zugentlastung u. Biegeschutz	FP2-000569	34.07.04.051H
3	4	Universal terminal block with screw connection 0.2-16mm² gray	Universalklemme mit Schraubanschluss 0,2-16 qmm grau	FP2-000682	34.06.01.066H
4	1	external measuring board with 2 transformer 100A	Externe Strommeßstelle mit 2 Wandler 100A	FP2-001604	21.02.03.002H
5	1	voltage regulation VCS 158010 Marine P8mini	Spannungsregelung VCS 158010 Marine P8mini	FP2-001606	21.02.01.020H
1	1	Governing Box (Metal sheet without additional parts)	Steuerungsbox (Blechteil ohne Anbauteile)	FP2-004692	31.40.01.001H
7	1	Cover Governing Box	Deckel Steuerungsbox	FP2-004693	31.40.01.002H

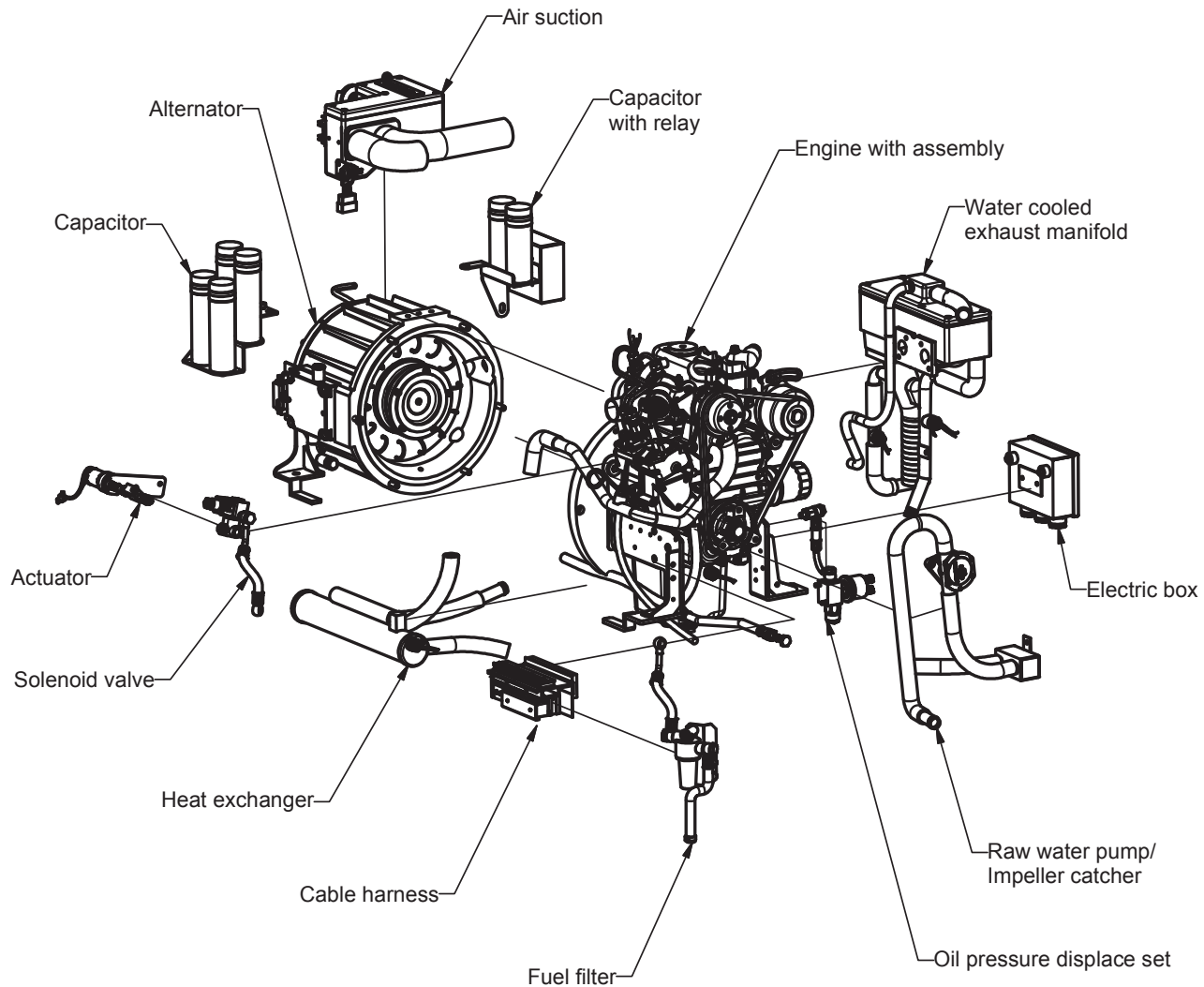
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Control box



Group: Genset groups

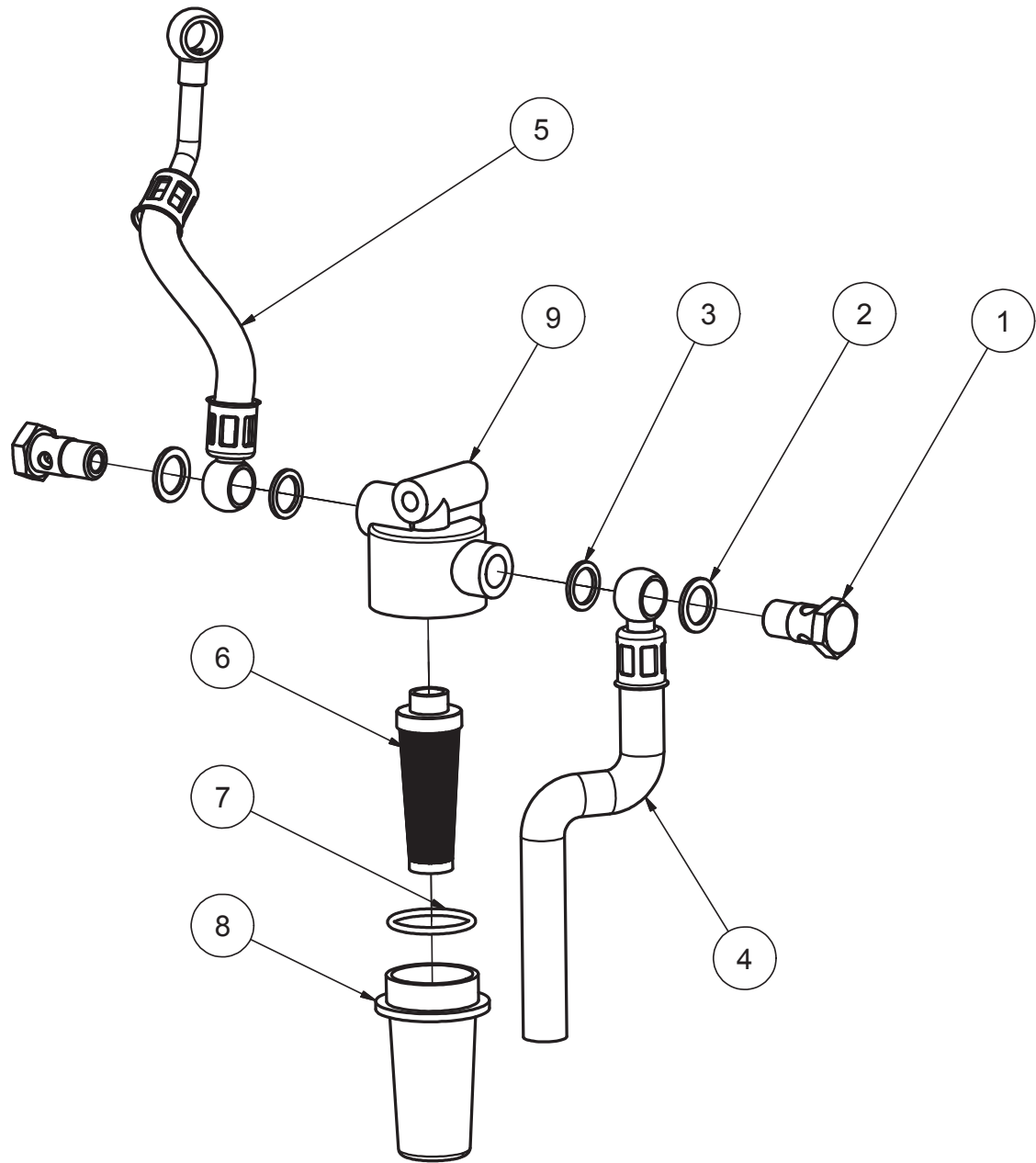
Type: Panda 8 Mini PMS Digital 120V/60Hz



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Group: Fuel filter

Type: Panda 8 Mini PMS Digital 120V/60Hz



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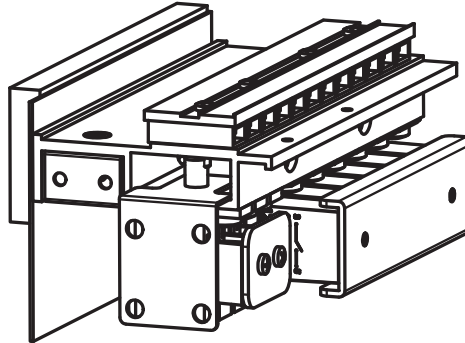
Parts List					
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.
1	2	banjo bolt DIN7643 R1/4" NW8	Hohlschraube DIN7643 R1/4" NW8	FP2-000217	32.21.01.017H
2	2	sealing washer 14x20x1,5 DIN 7603 copper massive	Dichtring 14x20x1,5 DIN 7603 Kupfer massiv	FP2-000224	32.02.02.023H
3	2	sealing washer 13x18x1,5 DIN 7603 copper massive	Dichtring 13x18x1,5 DIN 7603 Kupfer massiv	FP2-000223	32.02.02.021H
4	1	fuel hose DN8 150mm with ring nipple NW2 8mm	Kraftstoffleitung DN8 150mm mit Ringnippel NW2 8mm	FP2-002068	31.23.20.008H
5	1	fuel hose DN8 115mm with 2 x ring nipple NW2 8mm	Kraftstoffleitung DN8 115mm mit 2xRingnippel NW2 8mm	FP2-002054	31.23.20.005H
6	1	fuel filter insert type 025-RAC 10 micron with O-ring seal	Kraftstofffiltereinsatz Typ 025-RAC 10 micron inklusive O-Ring	FP2-000373	36.01.02.010H
7	1	O-ring seal for fuel-filter type 025-RAC	O-Ring für Kraftstofffilter Typ 025-RAC	FP2-000374	36.01.02.011H
8	1	collection bowl for fuel-filter type 025-RAC see-through	Sammelbehälter für Kraftstofffilter Typ 025-RAC durchsichtig	FP2-000371	36.01.02.012H
9	1	bracket for fuel-filter Type 025-RAC	Halterung für Kraftstofffilter Typ 025-RAC	FP2-000370	36.01.02.009H



Group: Cable harness old type

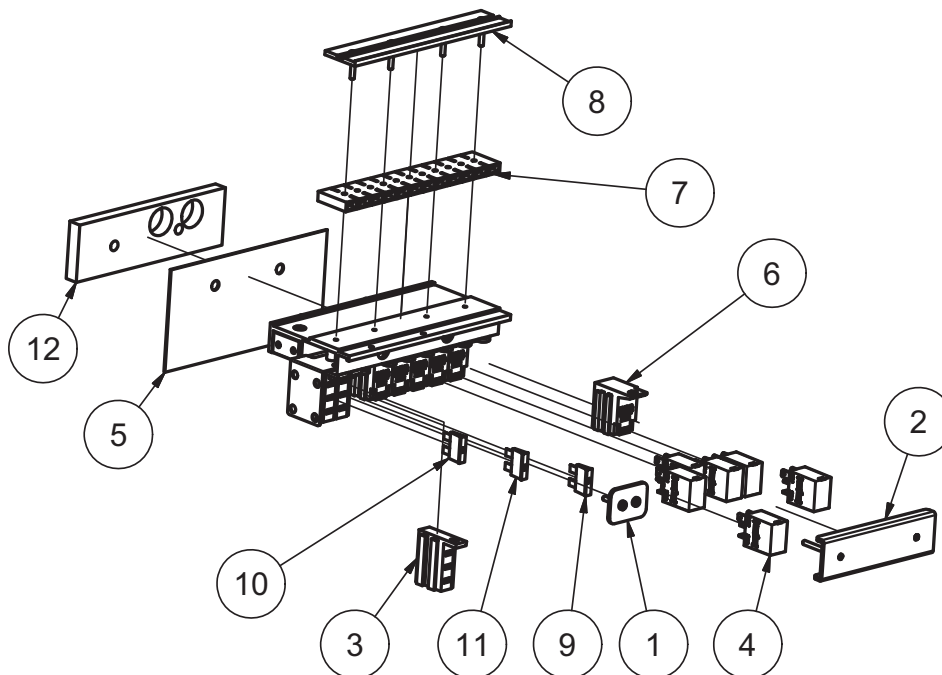
Type: Panda 8 Mini PMS Digital 120V/60Hz

older type



Delivery
with connection cables

Parts List					
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.
1	1	Cable Harness cplt. P8 Mini Digital (5 Minirelays)	Kabelbaum P8 Mini Digital 120V/60Hz (5 Mini Relais)	FP2-004334	31.41.20.018H

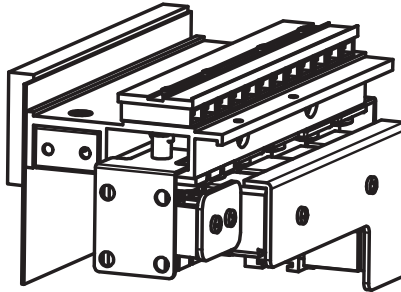


Parts List					
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.
1	1	cover acrylic-glass flat 35x25mm	Abdeckung Plexiglas Flach 35x25mm	FP2-004346	31.41.03.010H
2	1	cover acrylic-glass U-profile 107x40x9mm	Abdeckung Plexiglas U-Form 107x40x9mm	FP2-004347	31.41.03.009H
3	3	socket for flat fuse	Steckhülsegehäuse für Flach-Sicherungseinsätze,	FP1-000745	34.08.03.025H
4	6	micro relay closer 12V, 25A	Microschaltrelais Schliesser 12V, 25A	FP2-000949	34.08.02.131H
5	1	Insulating plate 150x75x1mm	Isolierplatte 150x75x1mm	FP1-000767	31.41.06.009H
6	6	socket for micro relay 5-pole	Steckhülsegehäuse für Mikrorelais	FP2-000951	34.08.02.132H
7	1	Terminal Strip - Connection 12 pole	H5HE8KV002132001	FP1-000429	34.04.50.001H
8	1	aluminium strip wiring connector 150x30mm	Profilschiene Kabelbaum 150x30mm	FP1-000774	31.03.20.037H
9	1	flat fuse vehicle red 10A	Flachsicherung KFZ 10A rot	FP2-000580	34.08.03.020H
10	1	flat fuse vehicle yellow 20A	Flachsicherung KFZ 20 A gelb	FP2-000581	34.08.03.022H
11	1	flat fuse vehicle green 30A	Flachsicherung KFZ 30A grün	FP2-000582	34.08.03.024H
12	1	Insulation plate terminal box 140mm x 42 mm x 10mm	Isolierplatte Panda 8000 PMS NE 140mmx42mmx10mm	FP1-001141	31.41.06.011H

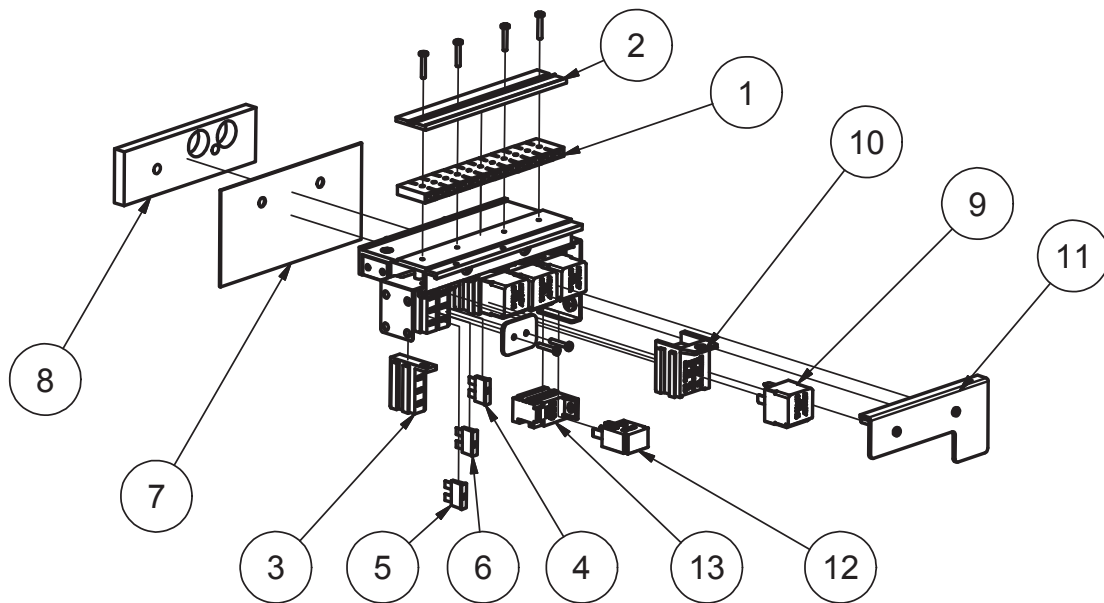
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Group: Cable harness new type

Type: Panda 8 Mini PMS Digital 120V/60Hz

Delivery
with connection cables

Parts List					
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.
1	1	Cable Harness cplt. P8 Mini Digital	Kabelbaum P8 Mini Digital 120V/60Hz	FP1-007245	31.41.20.016H

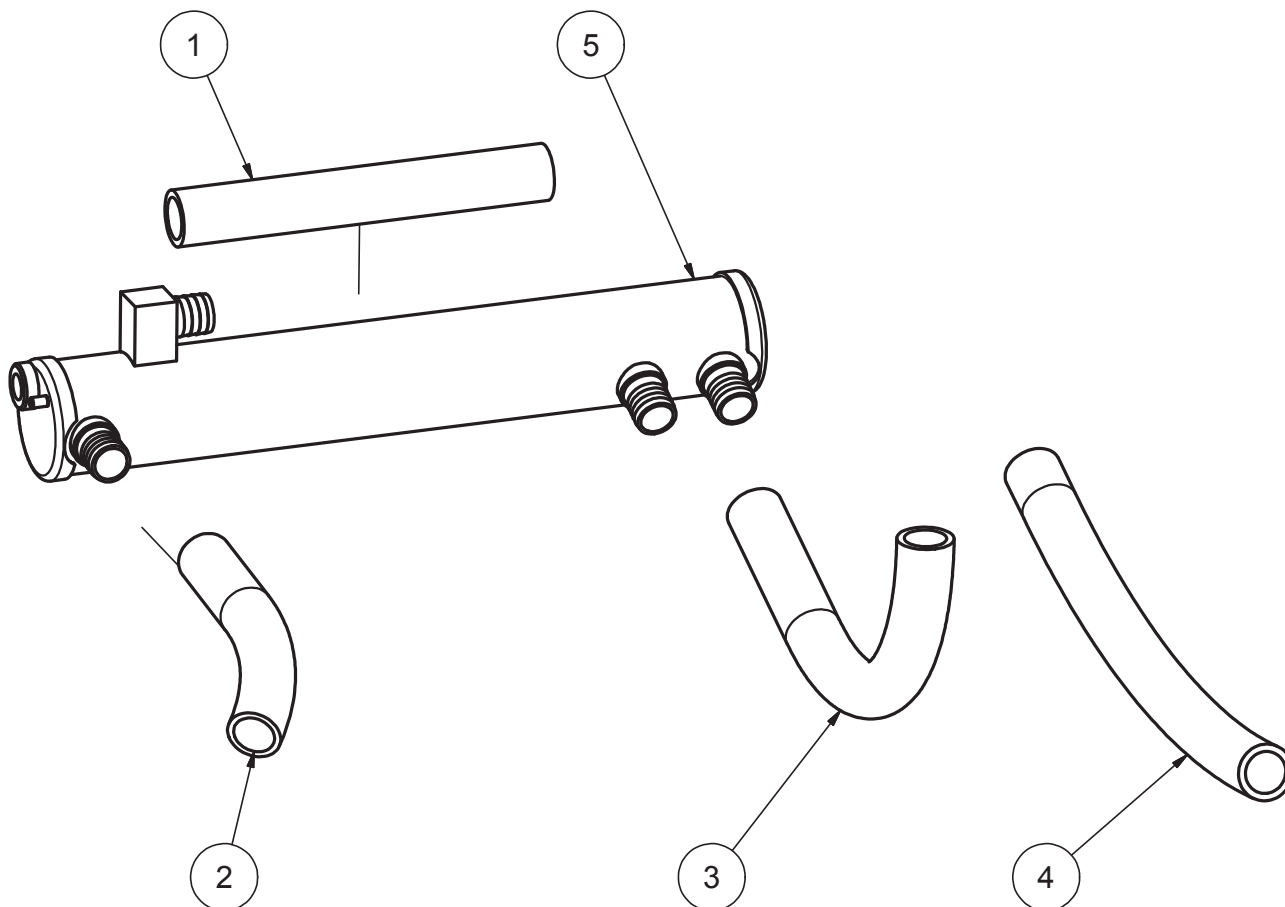


Parts List					
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.
1	1	Terminal Strip - Connection 12 pole	H5HE8KV002132001	FP1-000429	34.04.50.001H
2	1	aluminium strip wiring connector 150x30mm	Profilschiene Kabelbaum 150x30mm	FP1-000774	31.03.20.037H
3	3	socket for flat fuse	Steckhülsegehäuse für Flach-Sicherungseinsätze,	FP1-000745	34.08.03.025H
4	1	flat fuse vehicle red 10A	Flachsicherung KFZ 10A rot	FP2-000580	34.08.03.020H
5	1	flat fuse vehicle yellow 20A	Flachsicherung KFZ 20 A gelb	FP2-000581	34.08.03.022H
6	1	flat fuse vehicle green 30A	Flachsicherung KFZ 30A grün	FP2-000582	34.08.03.024H
7	1	Insulating plate 150x75x1mm	Isolierplatte 150x75x1mm	FP1-000767	31.41.06.009H
8	1	Insulation plate terminal box 140mm x 42 mm x 10mm	Isolierplatte Panda 8000 PMS NE 140mmx42mmx10mm	FP1-001141	31.41.06.011H
9	4	relay 12V 30A NO 1 pole	KFZ-Relais 12V 30A Schliesser 1-polig (mit durchgebohrten Kontakten)	FP2-000945	34.08.02.007H
10	4	socket for relay 9-pole	Relaishalterung 9-polig für KFZ-Relais	FP1-000739	34.08.02.072H
11	1	cover acrylic-glass flat 35x25mm	Abdeckung Plexiglas Flach 35x25mm	FP1-007251	31.41.03.011H
12	1	Relay 12V with Paralellresistor	Relais 12V mit Parallelwiderstand zur Spule	FP2-000948	34.08.02.133H
13	1	socket for micro relay 5-pole	Steckhülsegehäuse für Mikrorelais	FP2-000951	34.08.02.132H



Group: Heat exchanger

Type: Panda 8 Mini PMS Digital 120V/60Hz

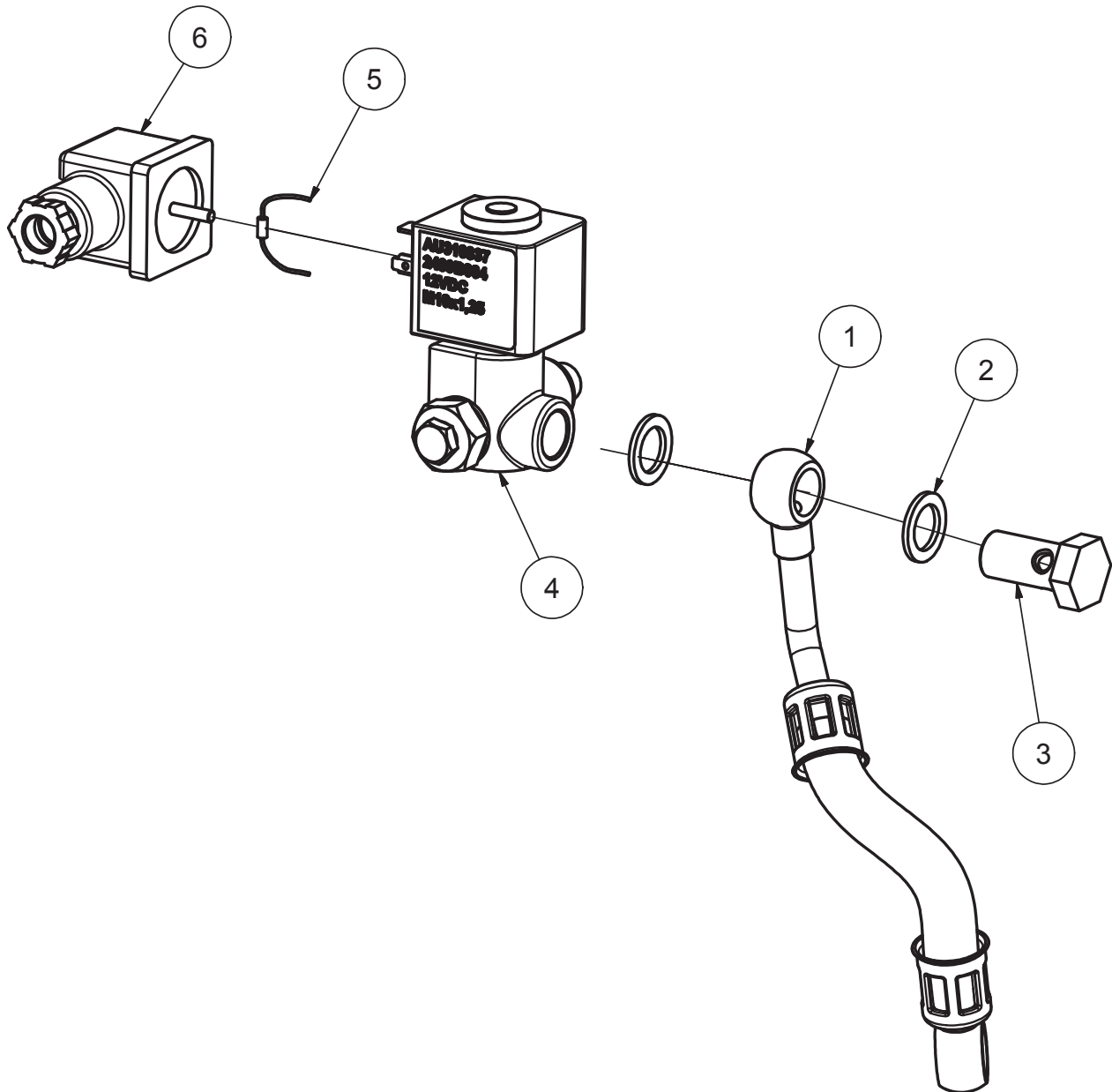


Parts List						
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.	-
1	1	coolant water hose type DIN 73411 NW Ø 20mm	Kühlwasserschlauch DIN 73411 NW Ø 20mm	FP2-003941	33.04.05.011H	
2	1	coolant water hose type DIN 73411 NW Ø 20mm	Kühlwasserschlauch DIN 73411 NW Ø 20mm	FP2-003945	33.04.05.011H	
3	1	exhaust hose type Fischer Panda black with wirehelix inside Ø 20mm	Abgasschlauch schwarz mit Drahtinnenspirale Ø 20mm	FP2-003943	33.04.08.003H	
4	1	coolant water hose type DIN 73411 NW Ø 20mm	Kühlwasserschlauch DIN 73411 NW Ø 20mm	FP2-003942	33.04.05.011H	
5	1	heat exchanger OD 55mm L 355mm connectors OD 20mm for Panda 8 PMS Digital	Wärmetauscher DA 55mm L 355mm Anschlüsse DA20mm für Panda 8 PMS Digital	FP2-003925	31.06.01.010H	

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Group: Fuel solenoid valve

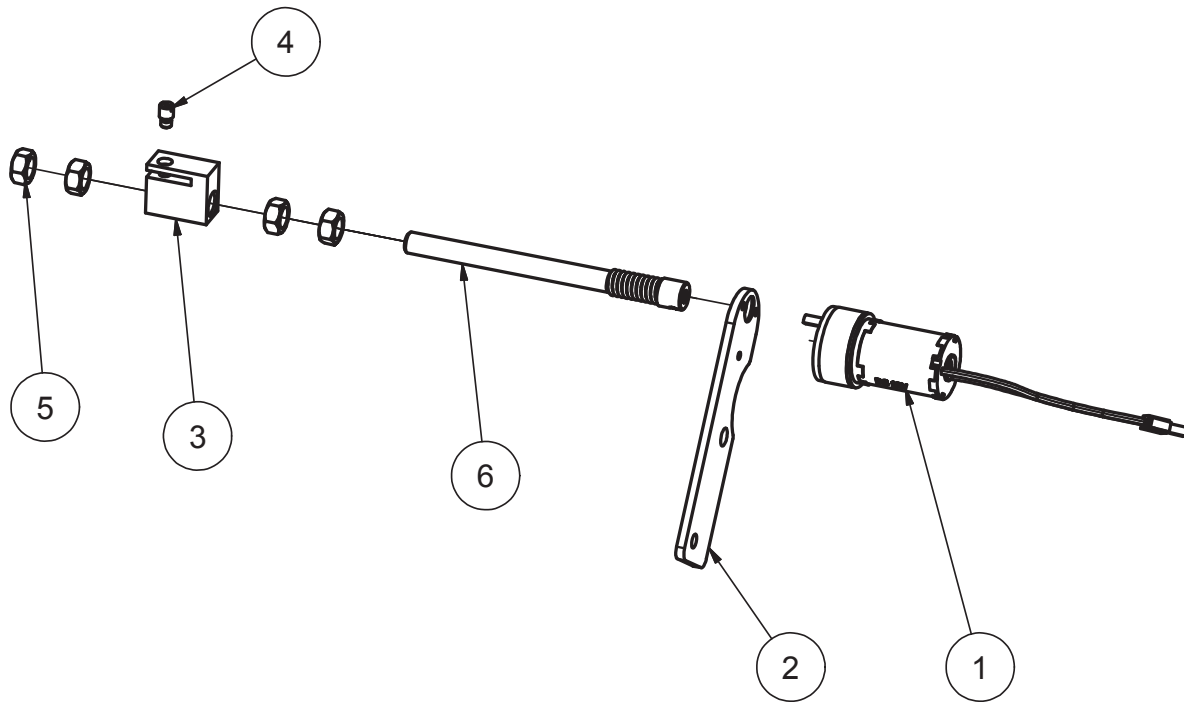
Type: Panda 8 Mini PMS Digital 120V/60Hz



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Parts List					
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.
1	1	fuel hose DN8 115mm with 2 x ring nipple NW2 8mm	Kraftstoffleitung DN8 115mm mit 2xRingnippel NW2 8mm	FP2-002054	31.23.20.005H
2	2	sealing washer 12x18x1,5 DIN 7603 copper massive	Dichtring 12x18x1,5 DIN 7603 Kupfer massiv	FP2-001330	32.02.02.020H
3	1	banjo bolt DIN7643 M12x1,5 NW6	Hohlschraube DIN7643 M12x1,5 NW6	FP1-000679	32.21.01.012H
4	1	fuel solenoid valve GSR 12V with banjo bolt M10x1,25	Kraftstoff Magnetventil GSR 12V mit Hohlschraube M10x1,25, mit Entlüftungsschraube	FP1-005624	34.08.06.007H
5	1	diode type 1N 4007	Diode Typ 1N 4007	FP1-000729	34.10.01.008H
6	1	plug connector GDM 2009, 2 pole+PE	Winkelkupplung GDM 2009, 2pol.+PE	FP2-000276	34.05.10.001H

Solenoid valve

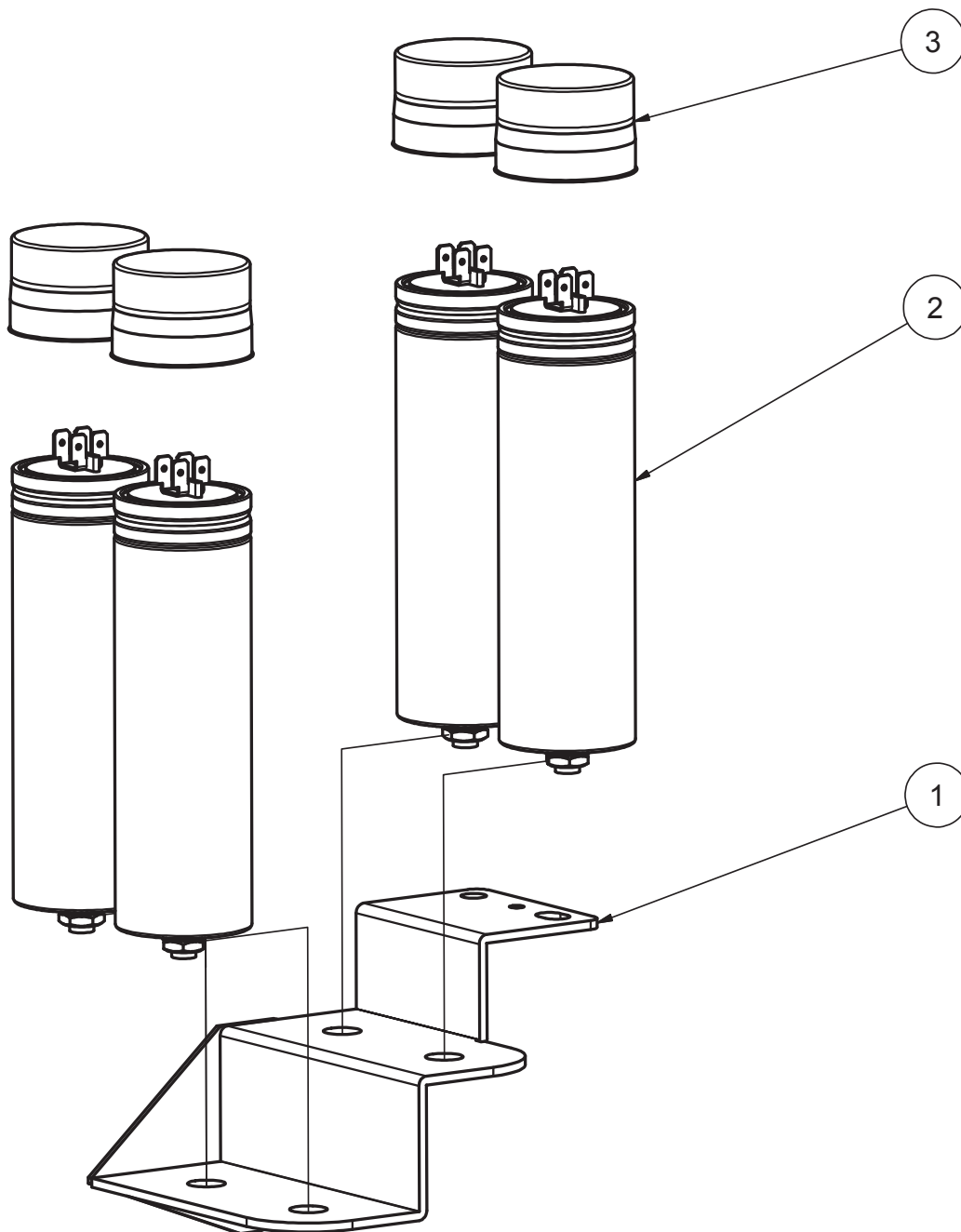
Group: Actuator
Type: Panda 8 Mini PMS Digital 120V/60Hz


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Parts List						
Pos	Qty	Bezeichnung	Description	Specification	Artikel Nr.	-
1	1	Stellmotor für Gashebel 12V mit AMP-Stecker	actuator for throttle 12V with AMP-plug	FP1-000477	34.08.05.011H	
2	1	Halterung für Stellmotor 129,5x35mm Befestigung 1xM6 und 1xM8 verzinkt	bracket for acutator 129,5x35mm mounting 1xM6 and 1xM8	FP2-003383	31.03.27.002H	
3	1	Gashebel-Mitnehmer mit Trapezgewinde	actuator for throttle, trapezoid thread	FP1-000473	31.05.03.021H	
4	1	Zapfenschraube M 5x4	slotted shoulder screw M 5x4	FP1-000471	31.03.60.006H	
5	4	Trapezgewindemutter TR 10x3, SW 14	trapezoid thread nut TR 10x3, SW 14	FP1-000472	31.05.03.020H	
6	1	Trapezgewindespindel TR 10x3 140mm mit Feder und Klemmhülse	trapezoid thread spindle TR 10x3 140mm with spring and clamping piece	FP1-001139	31.05.03.010H	

Group: Capacitors

Type: Panda 8 Mini PMS Digital 120V/60Hz

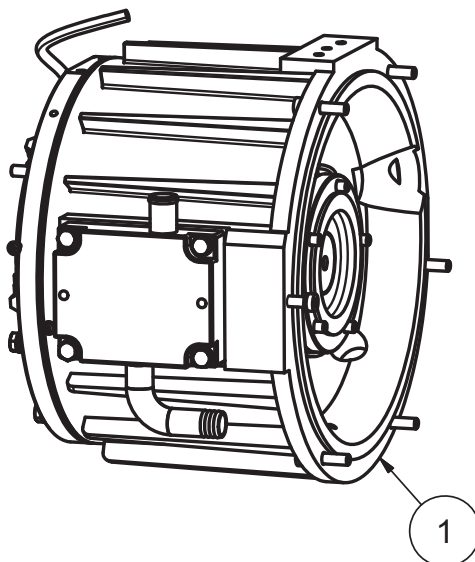


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Parts List						
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.	-
1	1	Bracket capacitors P8 Mini Digital	Halterung Kondensatoren P8Mini Digital	FP2-003398	31.03.20.022H	-
2	4	capacitor 60µF MKP 50x148mm	Kondensator 60µF MKP 50x148mm	FP2-000518	34.09.02.041H	-
3	4	protection cap Ø 45 mm for capacitors	Berührungsschutzkappe Ø 45 mm für Kondensatoren	FP2-000534	34.09.05.023H	-

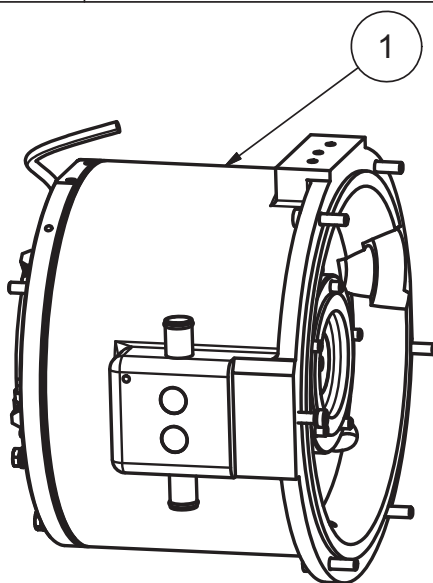
Group: Alternator
Type: Panda 8 Mini PMS Digital 120V/60Hz

old type



Parts List						
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.	-
1	1	alternator Panda 8 mini HP1 120V/60HZ oil-cooled bearing complete	Alternator Panda 8 mini HP1 120V/60Hz ölgekühltes Lager komplett	FP2-004312	31.10.01.003P	

new type

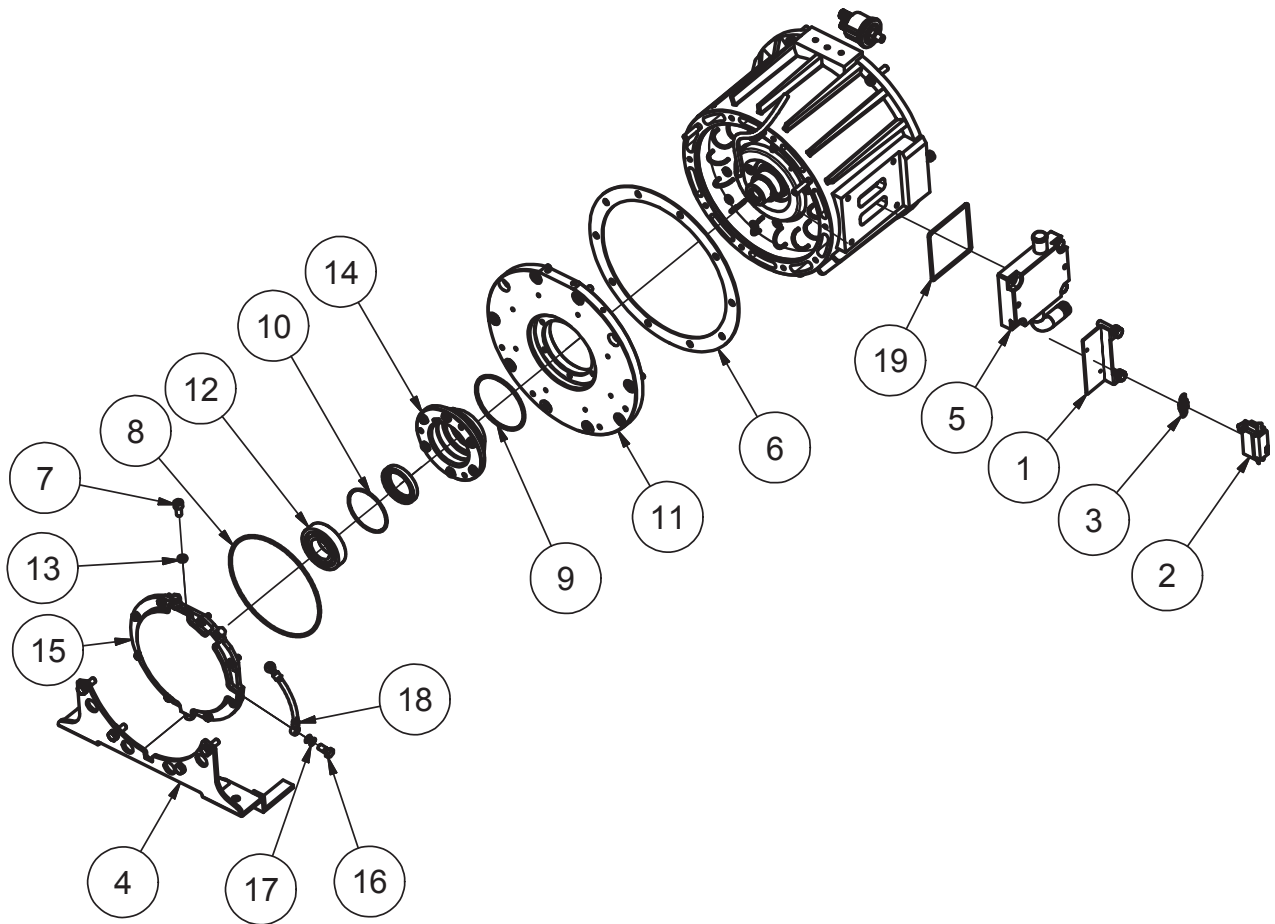


Parts List						
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.	-
1	1	alternator Panda 8 mini HP1 120V/60HZ oil-cooled bearing complete	Alternator Panda 8 mini HP1 120V/60Hz ölgekühltes Lager komplett	FP1-007244	31.10.01.003P	

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Group: Alternator old type

Type: Panda 8 Mini PMS Digital 120V/60Hz



Parts List						
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.	-
1	1	Bracket fuses	Halteflasche Sicherungen	FP2-004315	31.03.20.025H	
2	1	Fuse Holder for High Power Fuse	Sicherungshalter für Hochstromsicherungen	FP2-000625	34.08.03.059H	
3	1	BF-1 fuse insert nominal voltage up to 32V green type 153.5631.540	BF1-Sicherungseinsatz Nennspannung bis 32V grün Typ 153.5631.540	FP2-000577	34.08.03.008H	
4	1	alternatorbracket	Generatorfuß	FP1-001077	31.03.02.012H	
5	1	cooling water block 125x100mm connection 2x20mm	Wasseranschlußblock 125x100mm Anschluss 2x20mm	FP1-000420	31.09.03.040H	
6	1	end shield cover Ø288/240mm 10 holes 9mm	Stirndeckeldichtung Ø288/240mm 10 Löcher 9mm	FP1-000437	31.19.02.002H	
7	1	ventilation screw M 8 x 16	Entlüftungsschraube M 8 x 16	FP1-000482	31.03.60.009H	
8	1	O-Ring FPM80 170,0x3,0mm	O-Ring FPM80 170,0x3,0mm	FP1-000558	32.02.01.082H	
9	1	O-Ring FPM80 089,0x3,0mm	O-Ring FPM80 089,0x3,0mm	FP1-000559	32.02.01.072H	
10	1	O-Ring FPM80 071,0x2,0mm	O-Ring FPM80 071,0x2,0mm	FP1-000560	32.02.01.067H	
11	1	stator-cover 288mm	Statordeckel 288mm	FP1-001071	31.11.02.001H	
12	1	grooved ball bearing 6207 C3 S1	Rillenkugellager 6207 C3 S1	FP1-000484	32.04.01.013H	
13	2	sealing washer 08x13x3,0 DIN 7603 Alu massive	Dichtring DIN7603 08x13x3,0 Alu massiv	FP1-000483	32.02.02.039H	
14	1	bearing carrier oilcooled bearing 6207	Lagersitz Stator für ölgekühltes Lager 6207	FP1-000409	31.11.03.002H	
15	1	end shield cover 214mm 8 holes oil cooled	Stirndeckel 214mm 8 Löcher ölgekühlt	FP2-004297	31.11.04.002H	
16	2	banjo bolt DIN7643 M8x1,0 NW2	Hohlschraube DIN7643 M8x1,0 NW2	FP2-000205	32.21.01.010H	
17	4	sealing washer 08x12x1,0 DIN 7603 copper massive	Dichtring 08x12x1,0 DIN 7603 Kupfer massiv	FP2-000785	32.02.02.010H	
18	1	oil level indicator (transparent tube D=05 x 1 mm) L=110 mm	Ölstandanzeige (transparenter Schlauch D=05 x 1 mm) L=110 mm	FP2-001629	31.23.20.012H	
19	1	O-Ring NBR70 106,0x3,0mm	O-Ring NBR70 106,0x3,0mm	FP2-000774	32.02.01.061H	

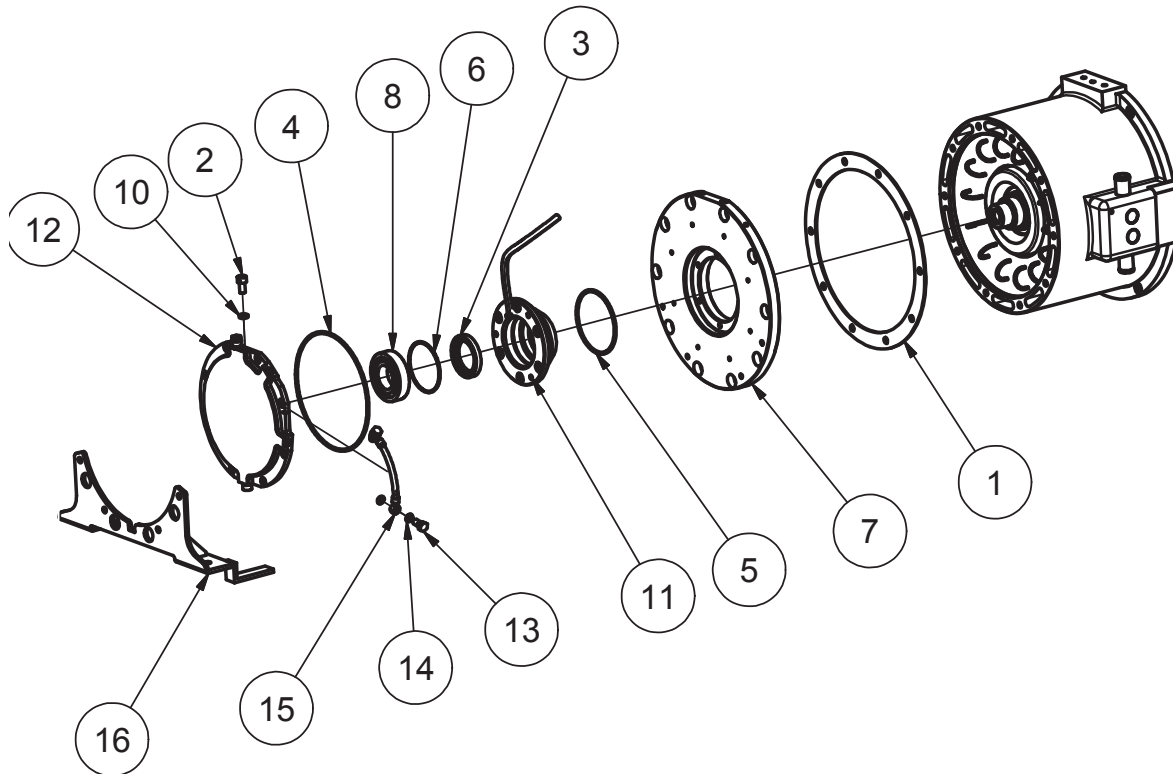
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Alternator cover old type



Group: Alternator new type

Type: Panda 8 Mini Digital 120V/60Hz

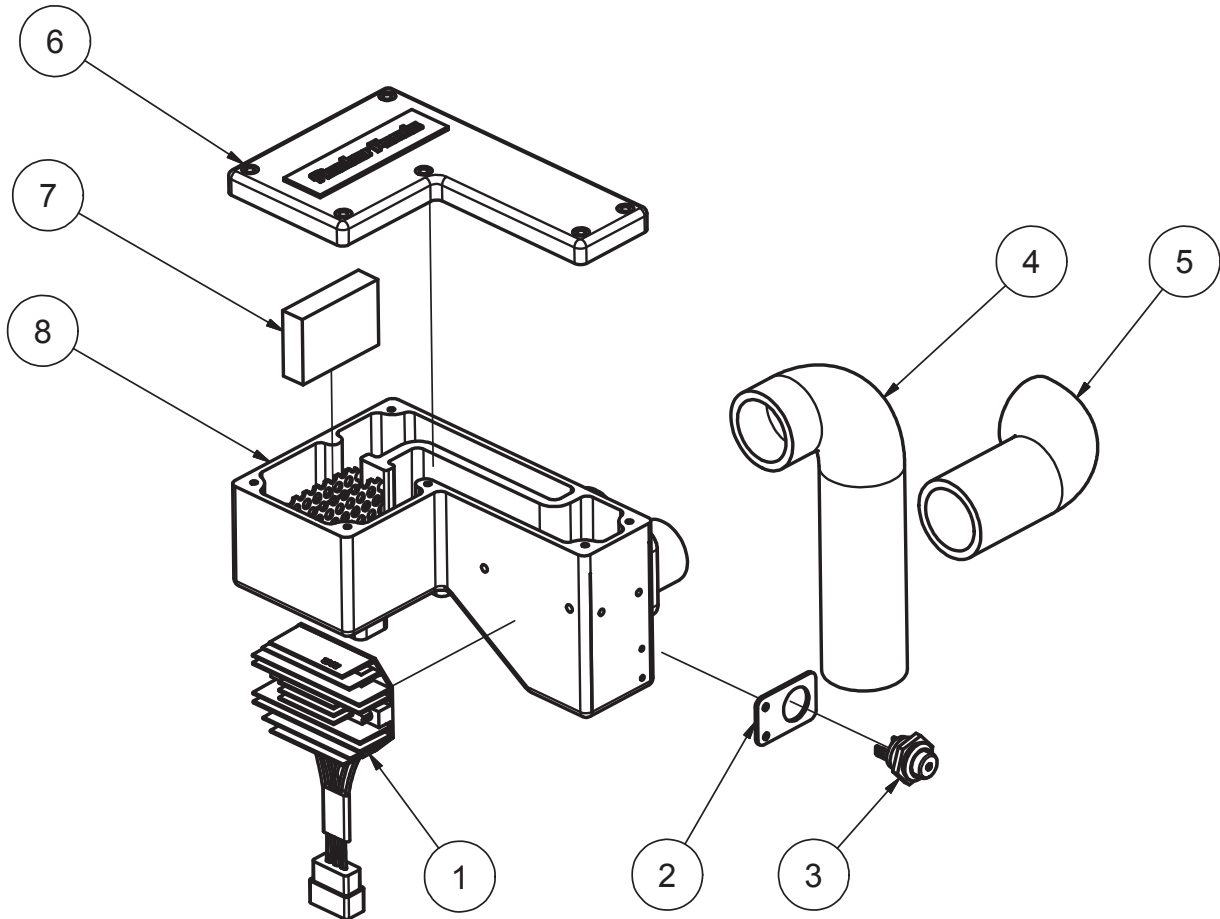


Parts List					
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.
1	1	end shield cover Ø288/240mm 10 holes 9mm	Stirdeckeldichtung Ø288/240mm 10 Löcher 9mm	FP1-000437	31.19.02.002H
2	1	ventilation screw M 8 x 16	Entlüftungsschraube M 8 x 16	FP1-000482	31.03.60.009H
3	1	shaft sealing ring Viton 45x62x7mm BAUMX7	Wellendichtring Viton 45x62x7mm Form BAUMX7	FP1-000568	32.02.03.015H
4	1	O-Ring FPM80 170,0x3,0mm	O-Ring FPM80 170,0x3,0mm	FP1-000558	32.02.01.082H
5	1	O-Ring FPM80 089,0x3,0mm	O-Ring FPM80 089,0x3,0mm	FP1-000559	32.02.01.072H
6	1	O-Ring FPM80 071,0x2,0mm	O-Ring FPM80 071,0x2,0mm	FP1-000560	32.02.01.067H
7	1	stator-cover 288mm	Statordeckel 288mm	FP1-001071	31.11.02.001H
8	1	grooved ball bearing 6207 C3 S1	Rillenkugellager 6207 C3 S1	FP1-000484	32.04.01.013H
9	1	screwed cable gland M12	Kabelverschraubung M12x1,5 05-07mm Ms vernickelt o. Zugentlastung, Sechskantzwischenstutzen	FP1-000746	34.07.04.030H
10	2	sealing washer 08x13x3,0 DIN 7603 Alu massive	Dichtring DIN7603 08x13x3,0 Alu massiv	FP1-000483	32.02.02.039H
11	1	bearing carrier oilcooled bearing 6207	Lagersitz Stator für ölgekühltes Lager 6207	FP1-000409	31.11.03.002H
12	1	end shield cover 214mm 8 holes oil cooled	Stirdeckel 214mm 8 Löcher ölgekühlt	FP2-004297	31.11.04.002H
13	2	banjo bolt DIN7643 M8x1,0 NW2	Hohlschraube DIN7643 M8x1,0 NW2	FP2-000205	32.21.01.010H
14	4	sealing washer 08x12x1,0 DIN 7603 copper massive	Dichtring 08x12x1,0 DIN 7603 Kupfer massiv	FP2-000785	32.02.02.010H
15	1	oil level indicator (transparent tube D=05 x 1 mm) L=110 mm	Ölstandanzeiger (transparenter Schlauch D=05 x 1 mm) L=110 mm	FP2-001629	31.23.20.012H
16	1	alternatorbracke	Generatorfuß	FP1-001077	31.03.02.012H

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Group: Air suction

Type: Panda 8 Mini PMS Digital 120V/60Hz



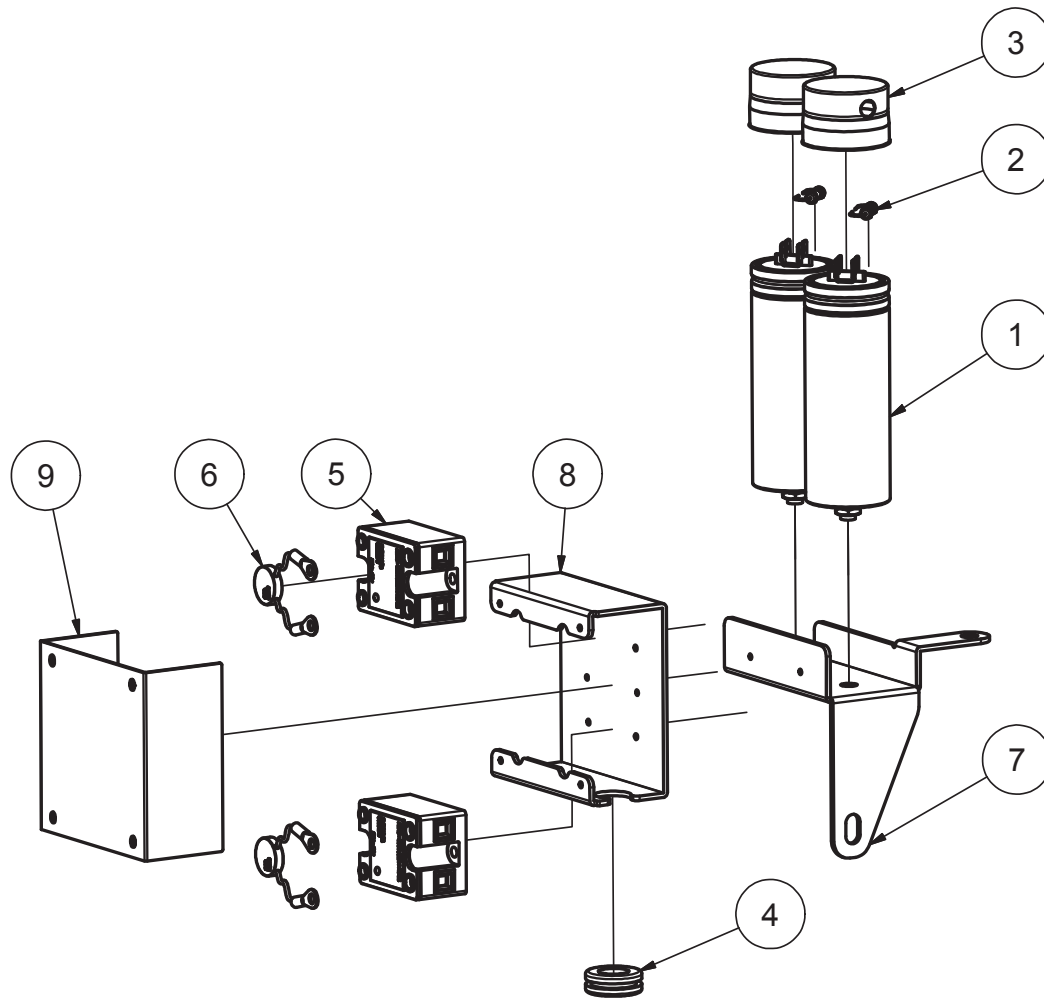
Parts List					
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.
1	1	charge controller alternator 12V/10A	Laderegler Lichtmaschine 12V/10A	FP1-000413	30.02.02.029H
2	1	bracket for failure-bypass-switch	Halterung für Fehlerüberbrückungstaster	FP1-000769	31.03.20.020H
3	1	Push switch for failure bypass, cold start, lamp test HEL 6JF 001 571-001 without dampness protection	Druckknopfaster für Fehler Bypass ohne Feuchtigkeitsschutz	FP1-000412	34.08.01.048H
4	1	formed hose Ø40mm 180mm-90°60mm	Formschlauch Ø40mm 180mm-90°60mm	FP1-001122	33.04.09.004H
5	1	formed hose Ø40mm 70mm-90°	Formschlauch Ø40mm 70mm-90°	FP1-001123	33.04.09.006H
6	1	air suction housing Z482 top cover	Luftansauggehäuse Z482 Deckel	FP1-000424	31.07.02.008H
7	1	airfilter insert 100x60x15mm type 1	Luftfiltereinsatz 100x60x15mm grob Typ 1	FP1-000421	31.07.01.007H
8	1	Air suction housing Z482 bottom part with 2x pipe 40mm	Luftansauggehäuse Z482 Unterteil mit 2xRohr 40mm	FP1-006302	31.07.02.007H

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Group: Capacitors with relays

Type: Panda 8 Mini PMS Digital 120V/60Hz

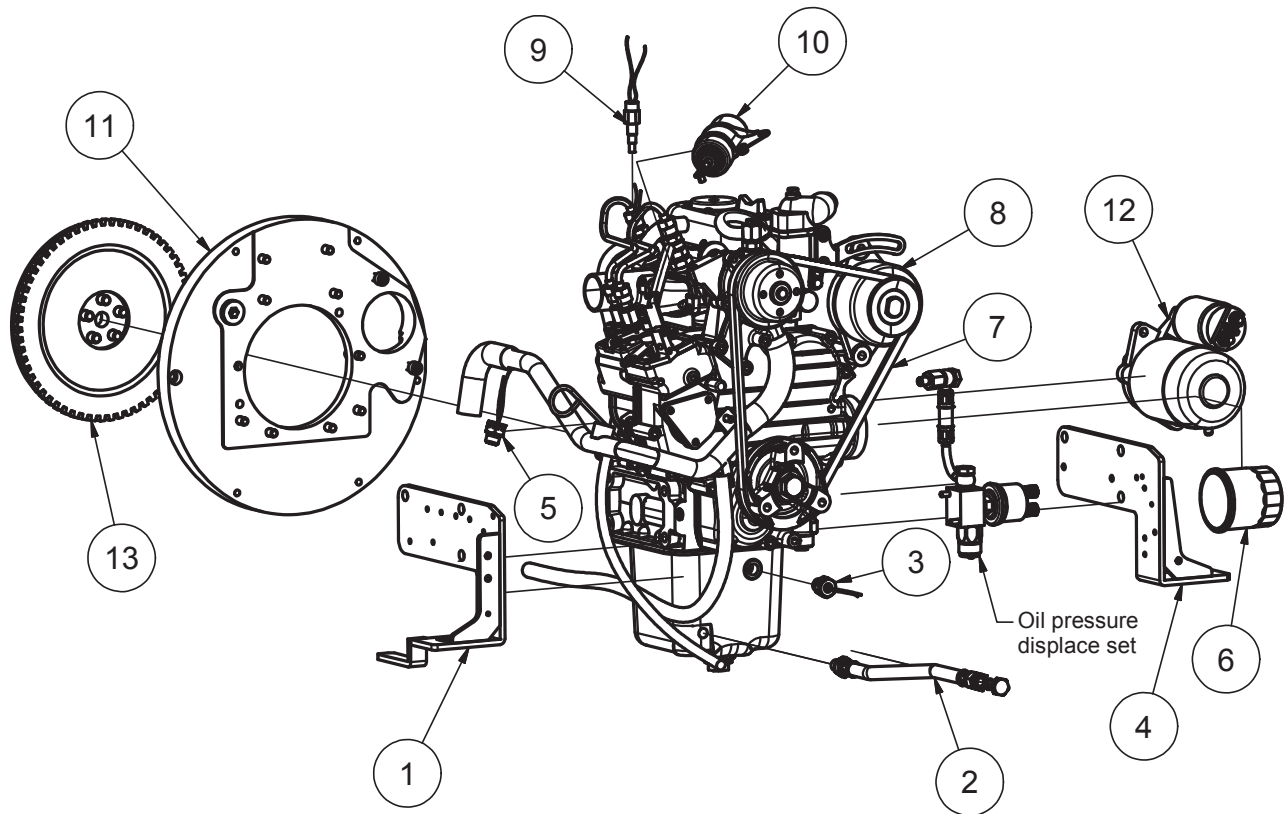


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Parts List						
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.	-
1	2	capacitor 40µF MKP 45x119mm	Kondensator 40µF MKP 45x119mm	FP2-000515	34.09.02.036H	
2	2	resistor 100 kOhm 2,0 W	Widerstand 100 kOhm 2,0 W	FP2-000544	34.09.01.008H	
3	2	protection cap Ø 45 mm for capacitors	Berührungsschutzkappe Ø 45 mm für Kondensatoren	FP2-000534	34.09.05.023H	
4	1	rubber grommet double sided 16x24x30mm	Kabeldurchführungsstülpe doppelseitig Ø 16x24x30mm	FP2-000481	34.03.12.020H	
5	2	Semi-conductor relay 48-600V AC 25A	Halbleiter-Relais 48-600V AC 25A	FP2-000956	34.08.02.087H	
6	2	Varistor type SIOV complete	Varistor Typ SIOV Kplt.	FP2-000658	31.41.30.001H	
7	1	Bracket Capacitors and Relaybox Panda 8 Mini Digital	Halter Kondensatoren und Relaisbox Panda 8 Mini Digital	FP2-004423	31.03.20.023H	
8	1	Relayboxbottom Panda 8 Mini Digital	Relaisboxunterteil Panda 8 Mini Digital	FP2-004424	31.03.20.035H	
9	1	Relayboxcover Panda 8 Mini Digital	Relaisboxdeckel Panda 8 Mini Digital	FP2-004425	31.03.20.036H	

Group: Engine with assembly

Type: Panda 8 Mini PMS Digital 120V/60Hz



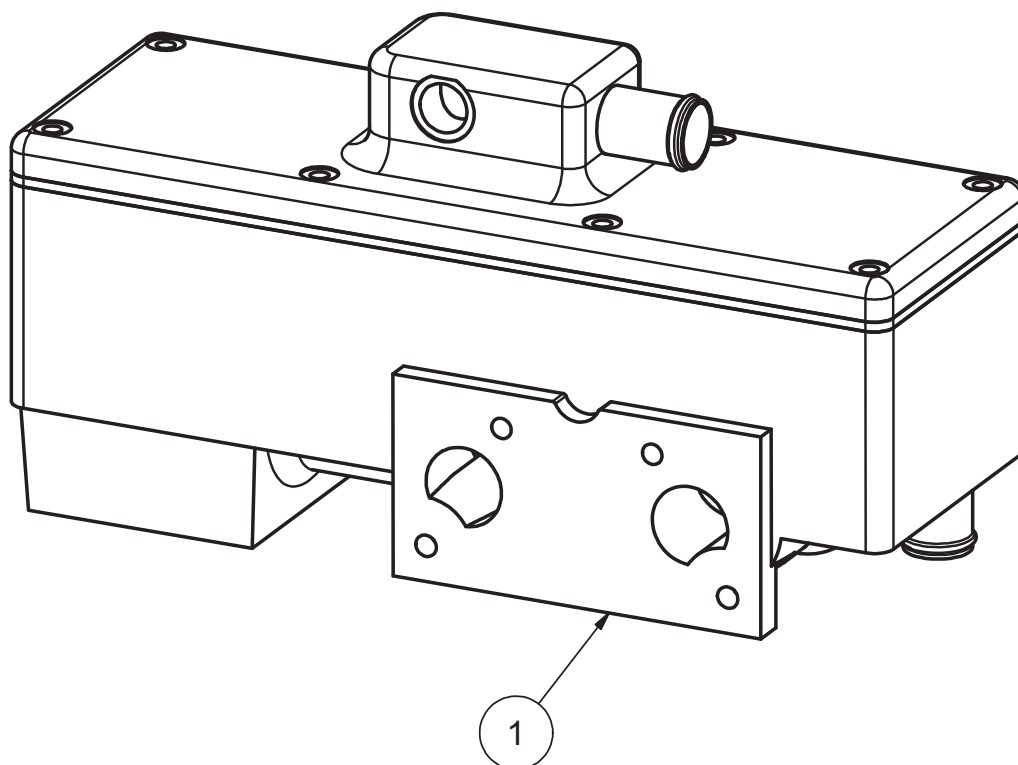
Parts List					
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.
1	1	Engine bracket right Z482	Motorfuss rechts Z482	FP1-001053	31.03.01.008H
2	1	oil drain hose 8mm length 600mm complete with fittings	Ölablassschlauch 8mm Länge 600mm mit komplett mit Anschluss und Stopfen	FP2-001783	31.23.20.007H
3	1	Temperaturesensor 100k M14x1,5	Temperatursensor 100k M14x1,5	FP2-001791	31.41.05.001H
4	1	Engine bracket left Z482	Motorfuss links Z482	FP1-001048	31.03.01.007H
5	1	Temperaturesensor 100k M14x1,5	Temperatursensor 100k M14x1,5	FP2-001791	31.41.05.001H
6	1	oil filter for Kubota type Z482, D722, D782, V800	Ölfilter für Kubota Typ Z482, D722, D782, V800	FP1-000434	36.01.01.003H
7	1	v-belt type Gates Quad-Power XPZ 850-II	Keilriemen Typ Gates Quad-Power XPZ 850 II	FP1-000439	36.02.01.018H
8	1	alternator (dynamo) 12V/10A Ø90mm	Lichtmaschine 12V/10A Ø90mm	FP1-000427	30.02.02.032H
9	1	temperature switch 130'sensor NTC	Thermoschalter mit NTC-Sensor 130°C	FP2-004577	31.41.05.002H
10	1	stop solenoid Z482 D722 D782 (1 pole connection)	Stopmagnet Z482 D722 D782 (1 poliger Anschluss)	FP2-001062	30.02.02.036H
11	1	engine flange Z482	Motoranbauflansch Z482	FP1-000315	31.05.20.001H
12	1	starter motor 12V Z482	Anlasser 12V Z482	FP2-003615	30.02.02.030H
13	1	flywheel Kubota Z482, D722	Schwungscheibe Kubota Z482, D722	FP1-000236	31.05.01.007H

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Group: Water cooled exhaust manifold cpl.

Type: Panda 8 Mini PMS Digital 120V/60Hz

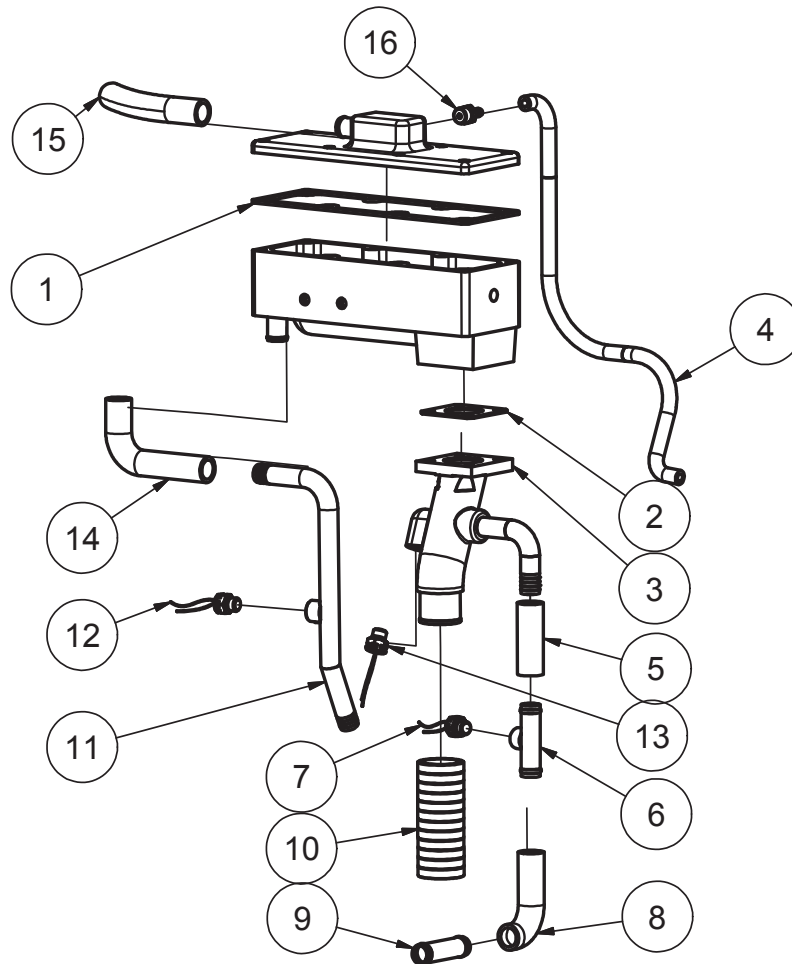


Parts List					
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.
1	1	exhaust manifold complete Z482	Abgaskrümmter komplett Z482	FP2-003451	31.06.01.025H

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Group: Water cooled exhaust manifold

Type: Panda 8 Mini PMS Digital 120V/60Hz



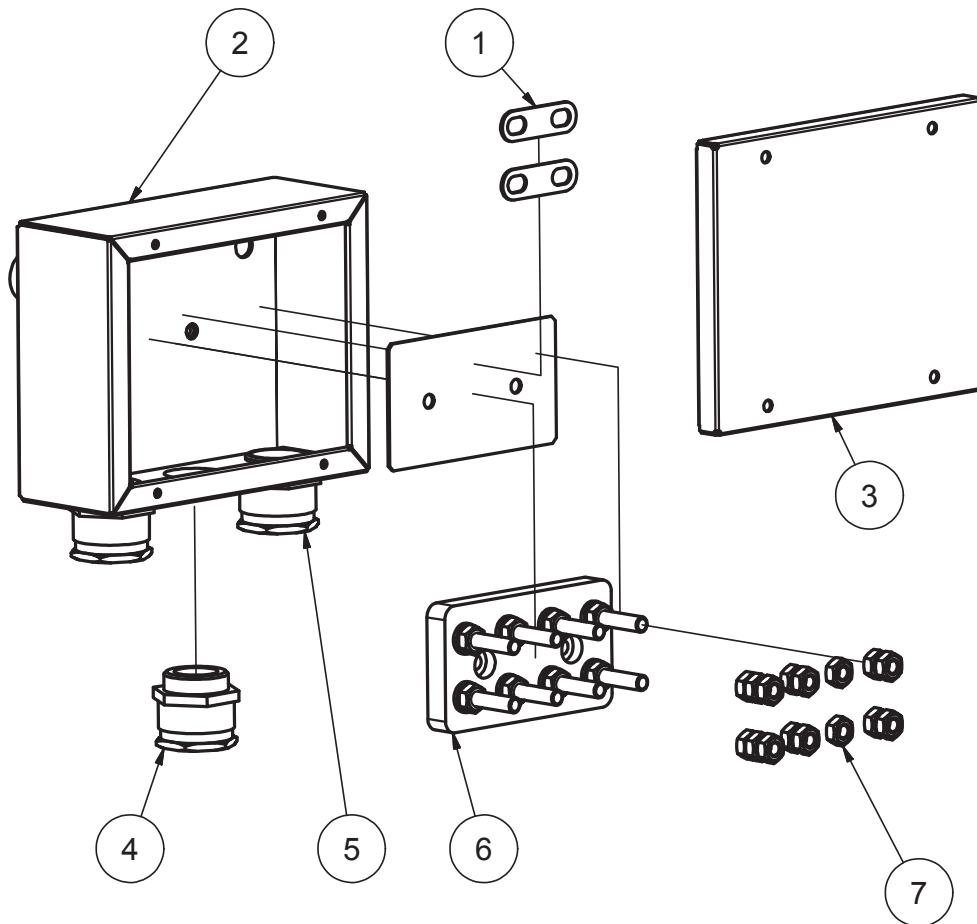
Parts List					
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.
1	1	Gasket top cover exhaust manifold 280x97mm, 8 holes	Deckeldichtung Abgaskrümmer 280x97mm, 8 Löcher	FP1-001149	31.19.01.001H
2	1	gasket exhaust manifold Z482 68x68x2mm Ø40mm	Dichtung Abgaskrümmer Z482 68x68x2mm Ø40mm	FP1-000678	30.02.08.040H
3	1	Exhaust adaptor for P8 Mini PMS Digital	Abgasanschlußstutzen, P8 Mini PMS Digital	FP2-004141	31.05.01.003H
4	1	coolant water hose type DIN 73411 NW Ø 8mm	Kühlwasserschlauch DIN 73411 NW Ø 8mm	FP2-004159	33.04.05.004H
5	1	coolant water hose type DIN 73411 NW Ø 20mm	Kühlwasserschlauch DIN 73411 NW Ø 20mm	FP2-004163	33.04.05.011H
6	1	hose connetor t-piece Ø 20mm - M14x1,5 - 20mm	Schlauchverbinder T-Stück Ø 20mm-M14x1,5-20mm	FP2-004149	31.20.02.006H
7	1	Temperaturesensor 100k M14x1,5	Temperatursensor 100k M14x1,5	FP2-001791	31.41.05.001H
8	1	formed hose Ø18mm 125mm-90°125mm	Formschlauch Ø18mm 125mm-90°125mm	FP2-004168	33.04.09.015H
9	1	coolant pipe OD20 L75	Kühlwasserrohr DA 20mm L75	FP1-000442	31.22.01.002H
10	1	exhaust hose type Fischer Panda black with wirehelix inside Ø 40mm	Abgasschlauch schwarz mit Drahtinnenspirale Ø 40mm	FP2-004169	33.04.08.006H
11	1	coolant pipe OD20 60-90°225 with brass socket M14 and bracket	Kühlwasserrohr DA 20 60-90°225 mit MS Muffe M14 und Halteklasche	FP1-001941	31.22.02.022H
12	1	Temperaturesensor 100k M14x1,5	Temperatursensor 100k M14x1,5	FP2-001791	31.41.05.001H
13	1	Temperaturesensor 100k M14x1,5	Temperatursensor 100k M14x1,5	FP2-001791	31.41.05.001H
14	1	formed hose Ø18mm 125mm-90°125mm	Formschlauch Ø18mm 125mm-90°125mm	FP2-004167	33.04.09.015H
15	1	coolant water hose type DIN 73411 NW Ø 20mm	Kühlwasserschlauch DIN 73411 NW Ø 20mm	FP1-001165	33.04.05.011H
16	1	thread feed pipe brass hexagonal 3/8" external thread x 8mm hose connector	Gewindestutzen Ms Sechskant 3/8" Aussengewinde x 8mm Schlauchanschluß	FP2-003175	32.20.02.011H

Water-cooled exhaust manifold



Group: Electric box

Type: Panda 8 Mini PMS Digital 120V/60Hz

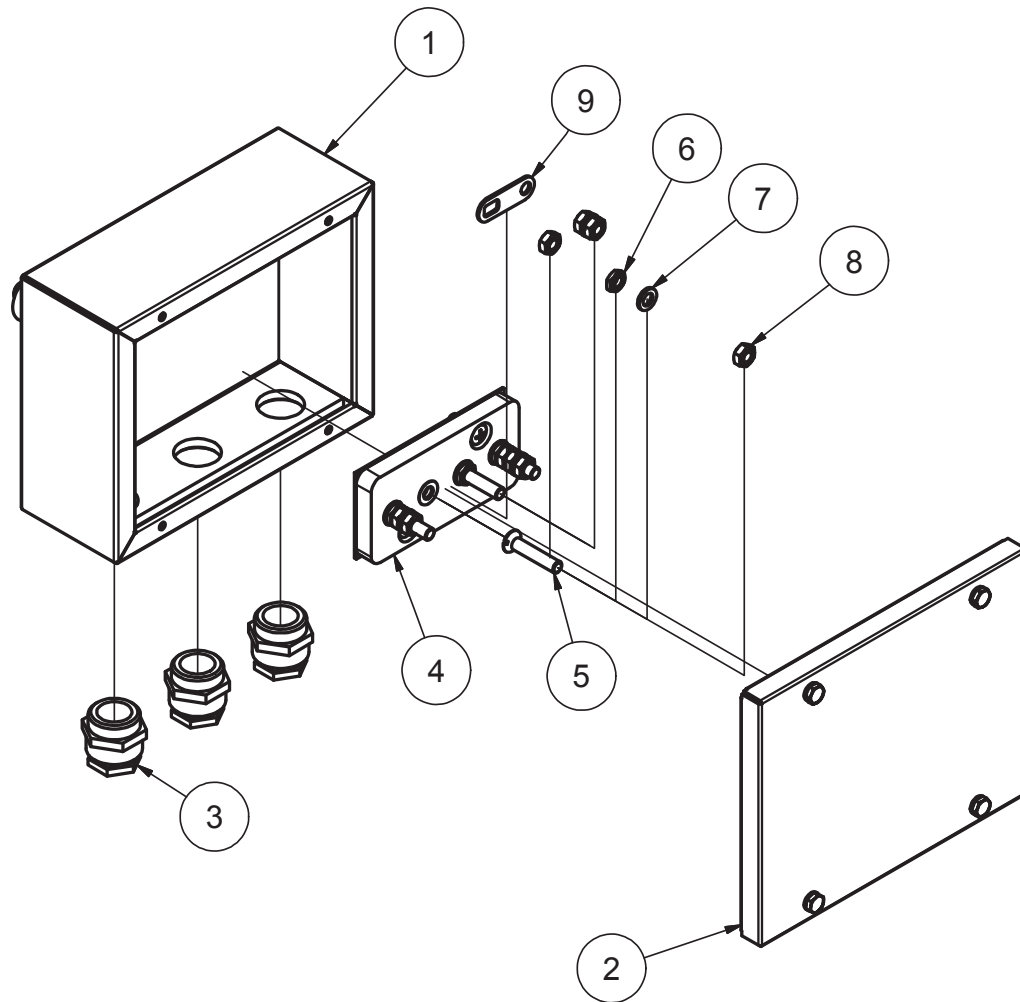


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Parts List					
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.
1	2	connection bridge M06 for insulation plate	Klemmbrettverbindung M6 Messing	FP1-000708	34.14.06.006H
2	1	bottom part for Power terminal box 140x110mm	Unterteil für Klemmkasten 140x110mm	FP2-003573	31.41.02.004H
3	1	cover for Power terminal box 140x110mm	Deckel für Klemmkasten 140x110mm	FP2-003579	31.41.02.005H
4	2	screwed cable gland M25	Kabelverschraubung M25x1,5 07-15mm Ms vernickelt o. Zugentlastung, Sechskantzwischenstutzen	FP1-000701	34.07.04.036H
5	1	screwed cable gland M25	Kabelverschraubung M25x1,5 09-19mm Ms vernickelt o. Zugentlastung, Sechskantzwischenstutzen	FP1-000700	34.07.04.037H
6	1	terminal block 50x90x10mm 8 x M6 bolt	Klemmstein 50x90x10mm 8 x M6 Bolzen	FP2-003480	31.41.06.004H
7	16	hexagon nut M 6 DIN 934 brass	Sechskantmutter M 6 DIN 934 Messing	FP1-000549	32.01.20.047H

Group: Electric box

Type: P8 mini PMS Digital 230V 50Hz



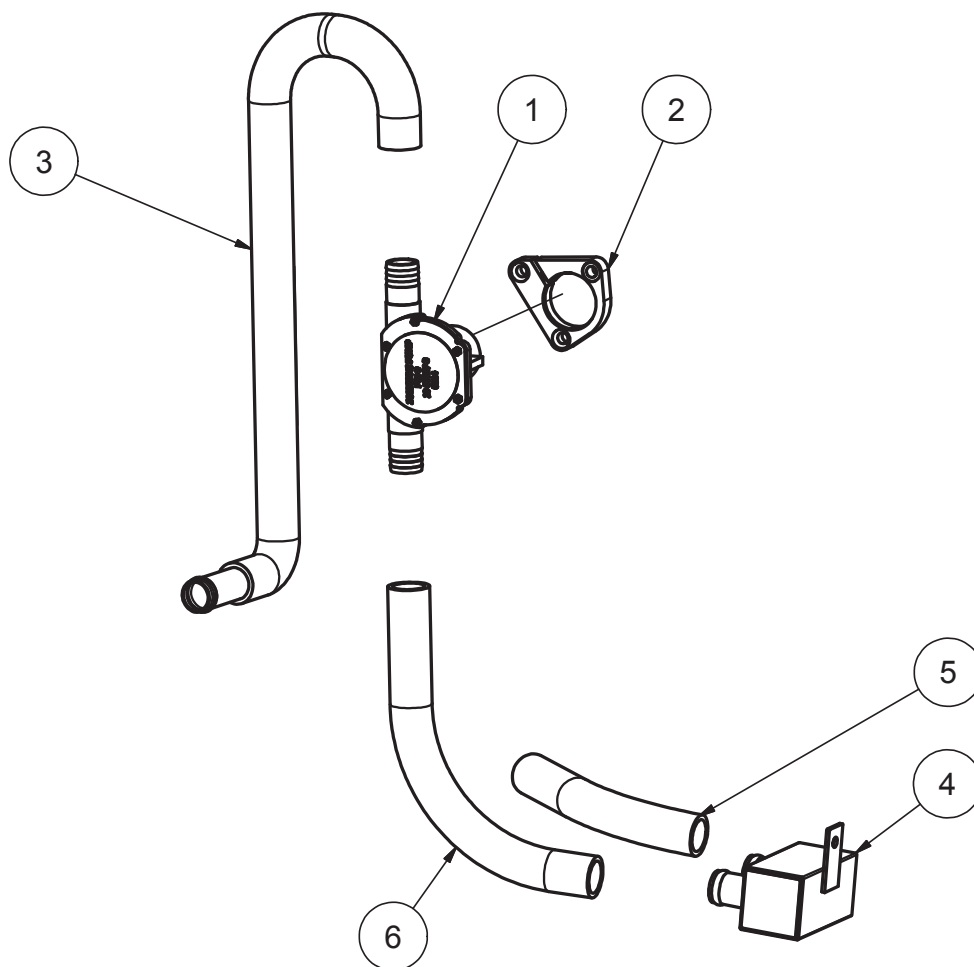
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Parts List					
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.
1	1	Power terminal box base Part P06-P08	Klemmkastenunterteil P6-P8	FP1-001105	31.41.70.013H
2	1	Cover power terminal box P6-P8	Deckel für Klemmkasten P6-P8	FP1-001108	31.41.70.014H
3	3	screwed cable gland M20	Kabelverschraubung M20x1,5 10-12mm Ms vernickelt o. Zugentlastung, Sechskantzwischenstutzen	FP1-001116	34.07.04.035H
4	1	Insulating plate 40x80x1mm	Isolierplatte 40x80x1mm	FP1-001097	31.41.06.006H
5	4	slotted countersunk flat head screw M 5x25 DIN 963 brass	Senkkopfschraube Schlitz M 5x25 DIN 963 Messing	FP1-001103	32.01.03.085H
6	4	hexagon nut M 5 DIN 439 brass	Sechskantmutter M 5 DIN 439 Messing	FP1-001101	32.01.20.024H
7	6	spring washer Ø 5,4mm DIN 127 A2	Federring Ø 5,4mm DIN 127 A2	FP1-000492	32.01.42.003H
8	9	hexagon nut M 5 DIN 934 brass	Sechskantmutter M 5 DIN 934 Messing	FP1-001118	32.01.20.046H
9	1	connection bridge M05 for insulation plate	Klemmbrettverbindung M5 Messing	FP1-001119	34.14.06.005H

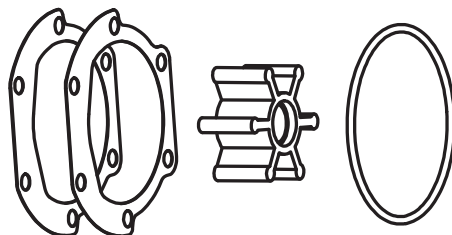


Group: Raw water pump/ Impeller catcher

Type: Panda 8 Mini PMS Digital 120V/60Hz



Parts List					
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.
1	1	impeller pump F4B-9	Impellerpumpe F4B-9	FP1-000410	36.03.01.008H
2	1	bracket impeller pump F4B-9	Halterung Impellerpumpe F4B-9	FP1-000766	31.03.21.005H
3	1	formed hose Ø18mm 20mm-180°275mm-90°150mm	Formschlauch Ø18mm 20mm-180°275mm-90°150mm	FP1-000752	33.04.09.009H
4	1	impeller strainer 2xhose-fitting 18mm	Impellersieb 2xSchlauchstutzen 18mm	FP1-000280	31.09.30.001H
5	1	coolant water hose type DIN 73411 NW Ø 20mm	Kühlwasserschlauch DIN 73411 NW Ø 20mm	FP1-001024	33.04.05.011H
6	1	coolant water hose type DIN 73411 NW Ø 20mm	Kühlwasserschlauch DIN 73411 NW Ø 20mm	FP1-001171	33.04.05.011H

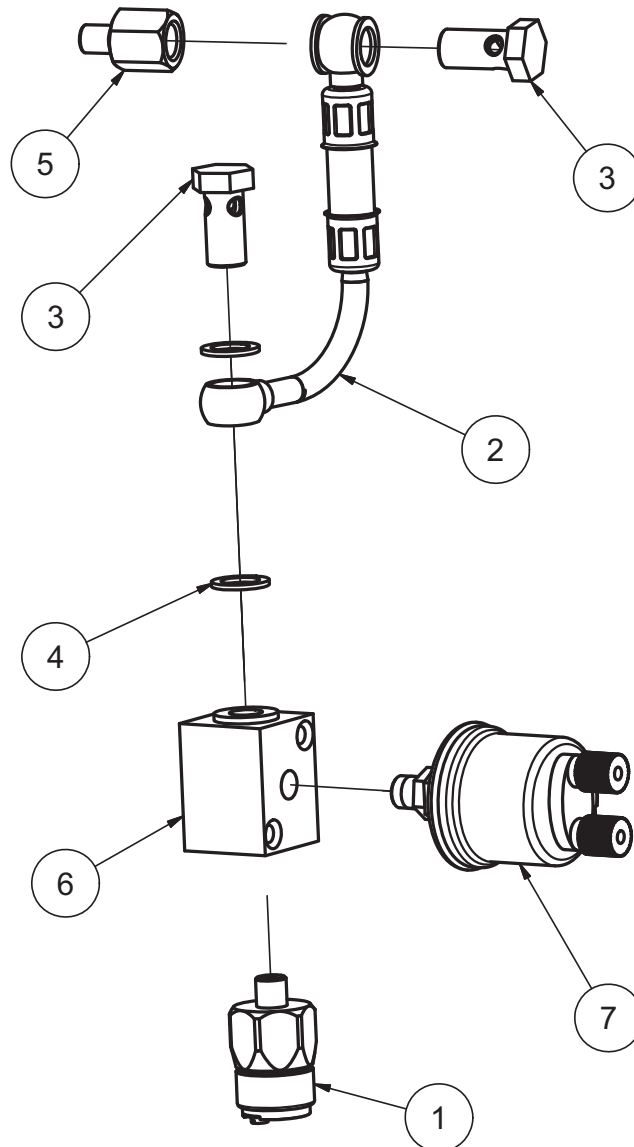


Parts List					
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.
1	1	impellerset for pump F4B with O-seal and gasket	Impellersatz für Pumpe F4B mit O-Ring und Dichtung	FP1-001724	21.03.02.016H

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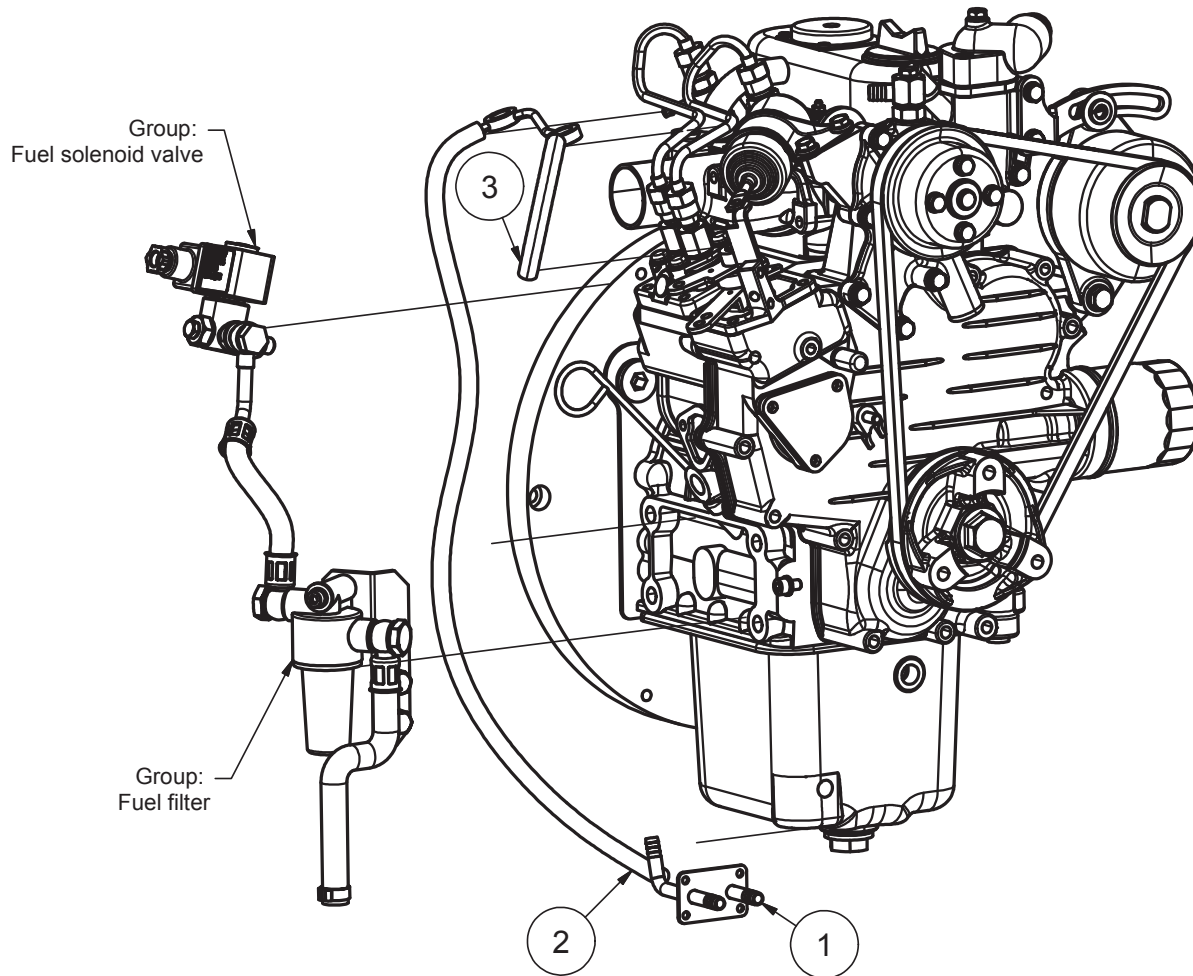
Group: Oil pressure sensor kit

Type: Panda 8 Mini PMS Digital 120V/60Hz



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Parts List						
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.	-
1	1	oil pressure switch normal open 1/8" NPT-Thread 0,5 bar	Öldruckschalter Schließer 1/8" NPT-Gewinde 0,5 bar	FP2-000645	34.12.03.006H	
2	1	elbow 90° with high banjo NW6	Rohrbogen 90° mit Ringstück hoch NW6	FP1-000731	32.21.06.004H	
3	2	banjo bolt DIN7643 M12x1,5 NW6	Hohlschraube DIN7643 M12x1,5 NW6	FP1-000679	32.21.01.012H	
4	4	sealing washer 12x18x1,5 DIN 7603 copper massive	Dichtring 12x18x1,5 DIN 7603 Kupfer massiv	FP2-001330	32.02.02.020H	
5	1	Oil reduction VDO 1/8" NPT/ 12x1,5	Reduzierstück VDO 1/8" NPT/ 12x1,5	FP2-003317	31.20.01.001H	
6	1	Connectorblock Oilpressure Switch / Oilhose 1/8"NPT x M12 x 1,5	Verbindungsblock Öldruckschalter/ Ölschlauch 1/8"NPT M12x1,5 Ölfilterverlegung	FP2-004476	31.21.01.002H	
7	1	oil pressure sensor electrical 2-pole 6 - 24V M 10x1	Öldruckschalter massefrei, M10x1 6-24V, 2-polig	FP2-000601	34.12.03.010H	

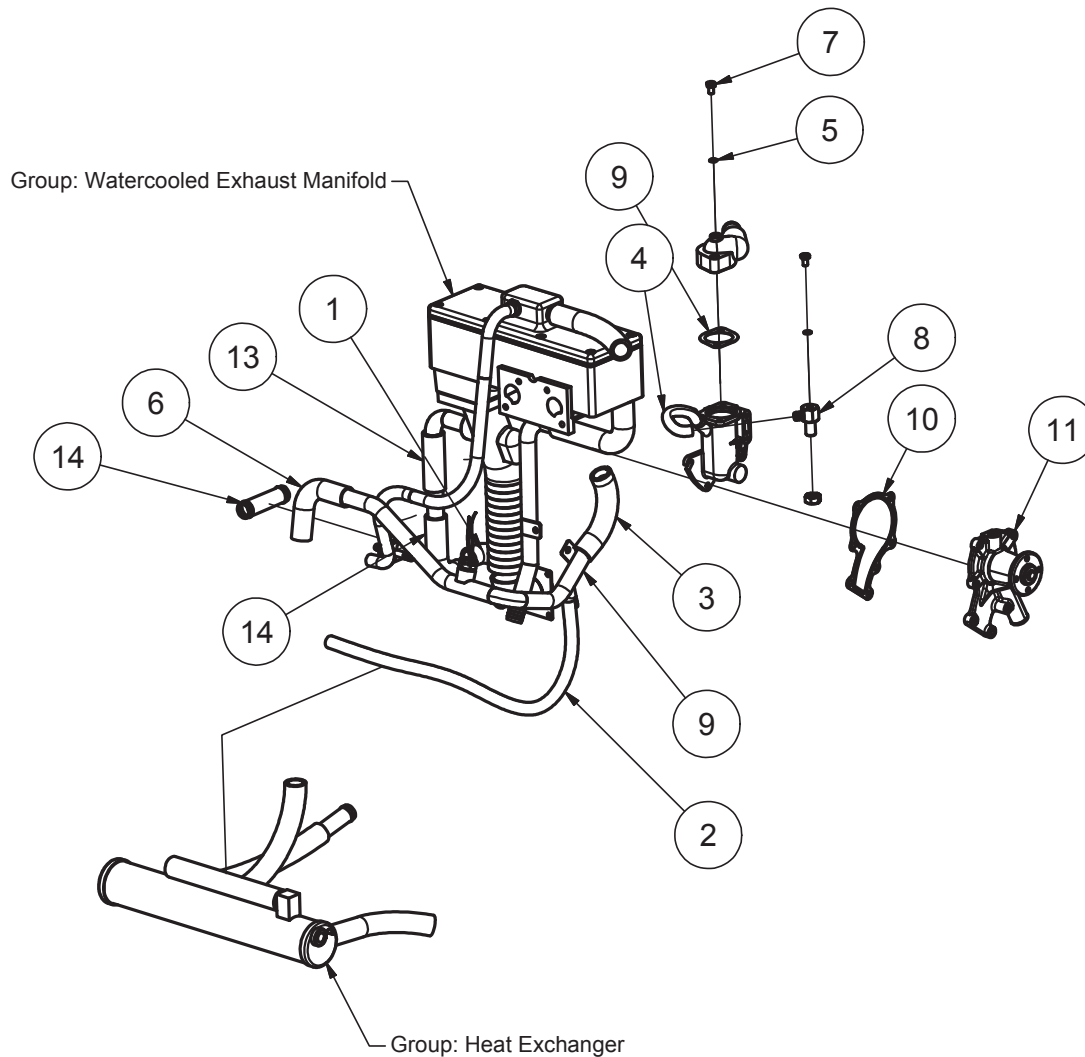
Group: Fuel flow scheme
Type: Panda 8 Mini PMS Digital 120V/60Hz


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Parts List						
Pos	Qty	Description	Bezeichnung	Specification	Artikel Nr.	-
1	1	Capsule pass through fuel 2x8mm, 1 pipe red.down to 6mm	Kapseldurchführung Kraftstoff 2x8mm mit Reduzierung 1x6mm	FP2-003817	31.20.04.006H	
2	1	fuel hose ISO 7840 A1 Ø 5mm	Kraftstoffschlauch ISO 7840 A1 Ø 5mm	FP1-001066	33.04.07.003H	
3	1	fuel hose ISO 7840 A1 Ø 5mm	Kraftstoffschlauch ISO 7840 A1 Ø 5mm	FP1-000658	33.04.07.003H	

Group: Cooling water flow scheme

Type: Panda 8 Mini PMS Digital 120V/60Hz



Parts List					
Pos	Qty	Bezeichnung	Description	Specification	Artikel Nr.
1	1	Kühlwasserschlauch DIN 73411 NW Ø 10mm	coolant water hose type DIN 73411 NW Ø 10mm	FP1-001032	33.04.05.005H
2	1	Kühlwasserschlauch Wasserpumpe Z482 D722	hose for waterpump Z482 D722	FP1-000637	30.02.50.007H
3	1	Formschlauch Wasserrücklauf	formed hose cooling water runback	FP2-003682	30.02.04.016H
4	2	Dichtring 06x10x1,0 DIN 7603 Kupfer massiv	sealing washer 06x10x1,0 DIN 7603 copper massive	FP2-000784	32.02.02.009H
5	1	Formschlauch Ø18mm 125mm-90°125mm	formed hose Ø18mm 125mm-90°125mm	FP1-001044	33.04.09.015H
6	2	Entlüftungsschraube M6x10 blau lackiert	Bleeder screw M6x10, painted blue	FP1-000639	31.03.60.004H
7	1	Entlüftungsnißpel für Wasserpumpe	bleeding nipple for waterpump	FP1-000446	31.09.02.004H
8	1	Dichtung Thermostatgehäuse	gasket for thermostat housing	FP1-000589	30.02.08.006H
9	1	Kühlwasserrohr DA20 mit Muffe M14x1,5	coolant pipe OD20 with sleeve M 14x1,5	FP2-004496	31.22.02.031H
10	1	Dichtung Wasserpumpe Z482/D722/V800	gasket waterpump Z482/D722/V800	FP1-000582	30.02.08.044H
11	1	Wasserpumpe Kubota Z 482 / D722	water pump Kubota Z482 / D722	FP1-000597	30.02.04.018H
12	1	Kühlwasserschlauch DIN 73411 NW Ø 20mm	coolant water hose type DIN 73411 NW Ø 20mm	FP2-004163	33.04.05.011H
13	1	Kühlwasserrohr DA 20mm L75	coolant pipe OD20 L75	FP1-000442	31.22.01.002H
14	1	Formschlauch Ø18mm 125mm-90°125mm	formed hose Ø18mm 125mm-90°125mm	FP2-004168	33.04.09.015H

Deluxe Flush Electric Toilets

FEATURES

- Space saving stylish design
- Regular household size seat
- Virtually silent operation for undisturbed sleep
- User selectable choice of "one touch" flush cycles for minimal water usage - a 'Quick Flush' uses less than 1 quart (1 litre)
- Owner selectable choice of leaving bowl wet or dry after use
- Fresh or raw water rinse models
- Non-clogging large bore flush pump macerates waste
- Uses less than 1.0 amp/hour per day
- ISO 8846 MARINE - Ignition Protection
- Crevice free contours for added cleanliness and hygiene
- All plumbing and wiring easily concealed
- Angled or Vertical back vitreous china bowl



Angled



Vertical

The two bowls differ only in the shape of the back of the toilet. The angled back version gives minimal footprint and makes it easy to mount against a sloping surface or in a corner. The vertical back version allows snug fitting against a vertical bulkhead.

* * * * *

MODEL RANGE

Description	Model	Rinse Water Variant	DC Voltage	Fuse / Breaker
	14" 58060-1012	Fresh	12 Vdc	25 amp
	58060-1024	Fresh	24 Vdc	15 amp
	58260-1012	Raw	12 Vdc	25 amp
	58260-1024	Raw	24 Vdc	15 amp
	14" 58080-1012	Fresh	12 Vdc	25 amp
	58080-1024	Fresh	24 Vdc	15 amp
	58280-1012	Raw	12 Vdc	25 amp
	58280-1024	Raw	24 Vdc	15 amp



NEW!

Touch Pad
Controller

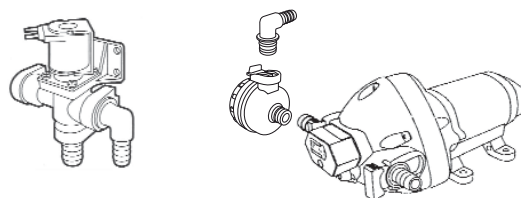


Description	Model	Rinse Water Variant	DC Voltage	Fuse / Breaker
	17" 58020-1012	Fresh	12 Vdc	25 amp
	58020-1024	Fresh	24 Vdc	15 amp
	58220-1012	Raw	12 Vdc	25 amp
	58220-1024	Raw	24 Vdc	15 amp
	17" 58040-1012	Fresh	12 Vdc	25 amp
	58040-1024	Fresh	24 Vdc	15 amp
	58240-1012	Raw	12 Vdc	25 amp
	58240-1024	Raw	24 Vdc	15 amp

RINSE OPTIONS

(1) Fresh Water

(2) Raw Water



(1) **580X0 Series** are supplied with a combined solenoid valve and siphon breaker assembly for connection to any existing pressurized water system capable of delivering 2.9 US gpm (11 lpm) or more. The siphon breaker ensures there is no backflow from the toilet into the water system.

(2) **582X0 Series** are supplied with a remote mounted self-priming pump to bring in sea, river or lake rinse water. Complete with Pumpgard™ strainer.

* * * * *

TOUCH PAD CONTROLLER



The Deluxe Flush toilet range features a multi-function 'one touch' control pad offering four options - 'Fill', 'Quick Flush', 'Flush' or 'Empty'.

In addition, the owner can set the control at any time so that the bowl is left either 'Dry' or 'Wet' after flushing. The recommended 'Dry' setting minimises total water usage. If water usage is not a concern, the 'Wet' setting automatically adds 1 quart (1 litre) of water after flushing, ready for the next user.

Simultaneously holding down both 'Quick Flush' and 'Flush' buttons for 5 seconds switches between bowl always left 'Dry' and bowl always left 'Wet' modes.

- 'Fill' may be touched when the bowl is 'Dry' to add 1 quart (1 litre) of water before use, if thought necessary.
- 'Quick Flush' first rinses and then empties the bowl after light use. On 'Dry' setting, this uses less than 1 quart (1 litre) of water.
- 'Flush' rinses and empties the bowl twice after heavy use. If the bowl is 'Dry', touching 'Fill' first is recommended. This uses just 2.5 quarts (2.5 litres) of water.
- 'Empty' does exactly what it says without adding any water, whenever desired.

Even when the bowl is apparently 'dry', there is an anti-odour water lock in the pump housing.

* * * * *

APPLICATIONS

You may install JABSCO Deluxe Flush electrically operated marine toilets in both power and sailing craft, either above or below the waterline, for use on sea, river, lake or canal.



Caution! Jabsco electrical toilets are designed specifically for marine use. Consult Jabsco for advice about possible non-marine application.

Your installation may discharge the waste either overboard (provided that your national and local regulations allow this), or into a treatment system or into an on-board holding tank (U.S.C.G. Marine Sanitation Devices Type I, II and III).

* * * * *

SPECIFICATIONS

Bowl, seat and cover

- Hygienic white glazed vitreous china bowl for ease of cleaning.
- Luxury wooden seat and cover with tough baked enamel coating.

Flush pump

- Internally mounted, high speed, non-clogging, centrifugal, waste macerating pump driven by powerful 240 watt, 12 or 24 Vdc, permanent magnet motor with ball bearings and robust ceramic seal, discharges up to 6ft (2m) above the base of the toilet.

Either Solenoid Valve

- Jabsco solenoid valve and syphon breaker assembly for connection to any existing pressurised water system capable of delivering 2.9gpm (11 lpm) or more. The syphon breaker ensures that there is no backflow from the toilet into the water system.

Or Rinse pump

- Jabsco, self-priming up to 3m (10ft), dry running, diaphragm water pump driven by 12 or 24 Vdc, permanent magnet, ball bearing motor.

Control Panel

- One Touch 'Press and Release' switch pad, sealed for life, with 10ft (3m) link cable, fitted quick connector, and heat shrink seal.

Control Box

- Sealed for life, with external leads to ship's 12 or 24 Vdc Positive and Negative power supply, to Flush pump and to either Solenoid Valve or Rinse Pump, plus 6 way quick connector input from Control Panel. Reverse polarity protected, computer controlled circuitry with heavy duty mechanical relays for ultra reliability.

Standards

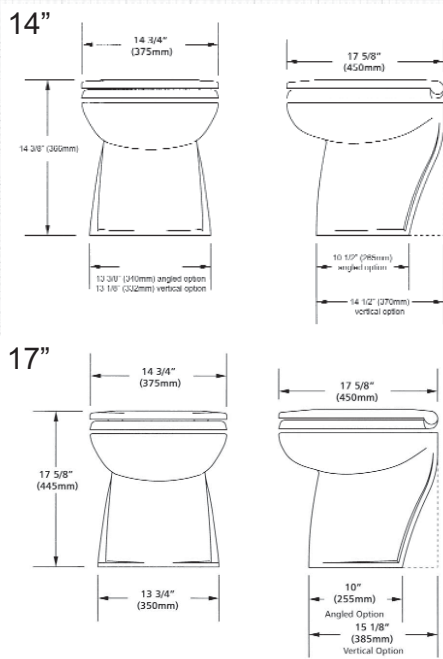
- Complies with ISO8846 MARINE [Ignition protection].



Ports

- Raw Water Rinse pump inlet & outlet, and Toilet Rinse inlet - $\frac{3}{4}$ " (19mm) hose tails.
- Fresh Water Rinse solenoid valve inlet - choice of $\frac{1}{2}$ " (13mm) hose tail or $\frac{1}{2}$ " (13mm) male thread. Outlet - $\frac{3}{4}$ " (19mm) hose tail.
- Flush pump discharge - $1\frac{1}{2}$ " (38mm) hose tail.

Dimensions - inches (mm)



INSTALLATION INSTRUCTIONS

YOUR TOILET is just one part of a system. Correct installation of the whole system is essential if you want the toilet to perform properly, operate reliably and safely, and give satisfactory length of life.

- The seat and lid is delivered boxed and unfitted for its protection.
- Key numbers, e.g. ('Key 31') are references to the exploded view diagram on the back page.

* * *

Location

- Select a location that will give sufficient clearance all round and above the bowl.
- The mounting surface must be flat, rigid and strong enough to support a man's weight and should be at least 2" (50mm) wider and 2" (50mm) deeper than the base of the toilet.
- You will need sufficient clearance below the mounting surface to be able to secure the mounting bolts, and to be able to remove them for maintenance.
- Offer up the seat and lid to the bowl. They should be able to swing up and over, so that they will not fall forward when the craft heels or pitches. When they are swung over they must be supported so that the hinges are not strained. Remove the seat and lid and put them aside until the installation is complete.

* * *

Mounting

YOU WILL need:

- 4 x 1 1/4" (6mm) diameter stainless steel bolts of

length to suit the thickness of the mounting surface.

- 4 stainless steel nuts, preferably self-locking. If you do not use self-locking nuts you will need some nut-locking compound.
- 4 plastic and 4 stainless steel 1 1/4" (6mm) washers
- A tube of white silicone sealant.
- Offer up the toilet in the selected position and, using the holes in the base as a guide, mark the positions for the 4 bolt holes on the mounting surface. Remove the toilet and drill 4 vertical holes of 5/16" (8mm) diameter through the mounting surface.

Now complete all of the rest of the installation before you secure the bowl.

* * *

Through Hull Fittings

YOU MAY need:

- 3/4" 19mm bore seacock for the Rinse pump and, if you are discharging the waste over board, a 1 1/2" 38mm bore seacock for the waste outlet.
- Follow the seacock manufacturer's own instructions concerning materials and methods of installation.
- Ensure the inlet seacock is positioned where it will be below the waterline at all times when the craft is underway, and also ensure that any other outlet seacock is both aft of, and higher than, the inlet seacock.



HAZARD RISK: Through Hull fittings.

FOLLOW THESE INSTRUCTIONS!

If the installation of the toilet results in it being connected to ANY through-hull fitting that may possibly be below the waterline at ANY time, whether when the craft is at rest, underway and heeling or rolling or pitching, you must install the toilet in accordance with these Installation Instructions. If you do not, water may flood in, causing the craft to sink, which may result in loss of life.



HAZARD RISK: Accidental Damage.

USE SEACOCKS!

If the toilet is connected to ANY through-hull fittings and if the toilet or pipework is damaged, water may flood in causing the craft to sink, which may result in loss of life. Therefore, if you are making connections between the toilet and ANY through-hull fittings that may possibly be below the waterline at ANY time, full bore seacocks must be fitted to those hull fittings, to allow them to be shut off.

The seacocks **MUST** also be positioned where they are easily accessible to all users of the toilet. If, for any reason, it is not possible to do this, then secondary bore marine quality valves **MUST** be fitted to the hoses where they are easily accessible.



CAUTION! Use lever operated, full bore marine seacocks and valves. The use of screw-down gate valves is not recommended.

Pipework - selection of correct method

YOU MUST select the correct method for the inlet pipework from 2 options and for the outlet pipework from 4 options, according to whether the toilet is above or below the waterline, and to whether it discharges the waste overboard or into an on-board holding tank.

* * *



HAZARD RISK: Bowl Rim Below Waterline.

USE VENTED LOOPS!

If the toilet is connected to ANY through-hull fittings, and if the rim of the bowl falls below the waterline, water may flood in causing the craft to sink, which may result in loss of life.

Therefore, if the rim of the toilet is less than 8" (20cm) above the waterline when the craft is at rest, or if there is ANY possibility that the rim of the bowl may be below the waterline at ANY time, a ventilated anti-syphon loop **MUST** be fitted in any pipework connected to a through-hull fitting, irrespective of whether inlet or outlet.

SPECIAL NOTE 1: The smaller bore inlet pipework is more hazardous than the larger outlet pipework. Unless there is a ventilated anti-syphon loop in the inlet pipework, water will flow into the bowl whenever both the inlet seacock is open and the rim of the bowl is below the actual waterline.

SPECIAL NOTE 2: Making a loop in the hose without fitting a vent may be just as hazardous as no loop at all, because water may syphon over a loop. It is the vent that actually prevents the syphon.



HAZARD RISK: Pipework Becomes Loose.

USE HOSE CLIPS!

If the toilet is connected to ANY through-hull fittings and if the pipework becomes disconnected, either from a through-hull fitting or seacock, or from the toilet or any secondary valve, water may flood in and cause the craft to sink, which may result in loss of life.

Therefore the ends of ALL flexible hoses fitted directly or indirectly between the toilet and ANY through-hull fitting that may possibly be below the waterline at ANY time, **MUST** be secured to the hose tails to which they are connected, using two stainless steel worm-drive hose clips.

Pipework - General instructions for all options

YOU WILL need:

- *Spiral reinforced smooth bore flexible hoses for both the ¾" 19mm inlet and the 1½" (38mm) outlet pipework.*
- *Two stainless steel worm-drive hose clips for*

every hose tail connection.

- Secure the hose runs so that the hoses cannot move and chafe, and so that they do not exert any leverage on the hose tail fittings to which they are connected, as this may cause adjacent joints to leak.
- Avoid sharp bends in the hoses as this may cause them to become kinked.
- Keep all pipework runs as straight and as short as possible, avoiding rising and falling over obstructions which creates airlocks.
- If it is difficult to fit the hose onto the hose tails of the toilet or seacocks, lubricate it with water, or soften the hose by dipping the end in hot water.



CAUTION: Do not apply flame to the hose. Do not apply flame or heat to the plastic hose tails on the toilet, rinse pump or solenoid valve. Do not use oils, greases or synthetic lubricants. Do not apply sealing compounds to any hose connections. Do not over tighten hose clips. Any of these actions may result in cracking or breakage of the plastic parts.

- Secure the ends of all hoses to the hose tails with two stainless steel worm-drive hose clips, ensuring that all inlet connections are airtight and that all the outlet connections are water tight.

* * *

Fresh Water Rinse Pipework

YOU WILL need:

- *A 'T' piece that fits your boat's pressurised water system pipework.*



CAUTION: Turn off power to the water pressure system pump, and open cold water taps to de-pressurise the system.

- Install a 'T' fitting in the pressurised cold water pipework near to the toilet to provide a ½" (13mm) feed to the Solenoid Valve.



CAUTION: If you ever connect your water system to unregulated USA City Water supplies, you **MUST** fit or use a Pressure Regulator to prevent risk of flooding.

- Mount the Solenoid Valve and Syphon Valve assembly (key 31) in a dry position, on a vertical surface, with the outlet port facing **DOWN**, as close to the Rinse Intake Elbow (key 3) as possible **AND** at least 8" (20cm) **ABOVE** the Rinse Intake Elbow.
- Install suitable pipework between the 'T' fitting and the ½" (13mm) inlet port on the Solenoid Valve.
- Run ¾" (19mm) hose by the most direct route from the ¾" (19mm) outlet port on the Solenoid Valve to the Rinse Intake Elbow.

* * *

Raw Water Rinse Pipework - 2 options

- Install the Raw Water Rinse pump (key 32) in a dry position close to the toilet where it will not be more than 6ft (2m) above the heeled waterline at any time.

- Fit the Pumpguard™ (key 33) supplied to the inlet of the Rinse pump.
- For more detail refer to the separate Data Sheet supplied with the Rinse pump.

Option 1: Toilet below the heeled waterline

YOU MUST fit a ¾" (19mm) Vented Loop fitting, Jabsco part number 29015-0000.

- Run ¾" (19mm) hose by the most direct route from the inlet seacock to the inlet of the Pumpguard™ fitted to the Rinse pump.



CAUTION: Do not position the ventilated anti-syphon loop between the inlet seacock and the rinse pump, because it may prevent the rinse pump from priming.

- Arrange a length of ¾" (19mm) hose between the Rinse pump outlet and the Rinse Intake Elbow (key 3), to form an anti-syphon loop whose highest point is at least 20cm (8") above the highest possible waterline, and fit the ¾" (19mm) Vented Loop at the highest point.

Option 2: Toilet always above the heeled waterline

- Run ¾" (19mm) hose by the most direct route from the inlet seacock to the inlet of the Pumpguard™ fitted to the Rinse pump.
- Run ¾" (19mm) hose by the most direct route from the outlet of the Rinse pump to the Rinse Intake Elbow.

* * *

Discharge Pipework - 4 options

Option 1: Toilet below the waterline and discharging overboard.

YOU MUST fit a 1½" (38mm) Vented Loop fitting, Jabsco part number 29015-0010.

- Run 1½" (38mm) outlet hose from the non-return valve assembly (key 24) to form a loop which is at least 8" (20cm) above the highest possible waterline, and fit the 1½" (38mm) Vented Loop at the highest point.

Option 2: Toilet always above the heeled waterline and discharging overboard.

- Run 1½" (38mm) outlet hose from the non-return valve assembly (key 24) down to the outlet seacock by the most direct route.

Option 3: Toilet discharging into holding tank AND top of holding tank above non-return valve at any time.

YOU MUST FIT a 1½" (38mm) Vented Loop fitting, Jabsco part number 29015-0010.

- If there is ANY possibility that the discharge non-return valve assembly (key 24) may be below the top of the tank at ANY time, a ventilated anti-syphon loop must be fitted in the outlet pipework to ensure that the contents of the tank do not syphon out through the bowl.

- Arrange the outlet hose to form a loop which is at least 8" (20cm) above the highest possible level that the top of the tank may reach, and fit the Vented Loop at that highest point.

Option 4: Toilet discharging into holding tank, AND non-return valve always above the top of holding tank.

- Run the outlet hose by the most direct route from the non-return valve assembly (key 24) down to the holding tank inlet.

* * *

Controls and Electrics

YOU MUST:

- Connect the Control Box (key 26) either directly to the battery or to a primary distribution board with sufficient spare amperage capacity.
- Keep the total length of both the positive and negative wires to a minimum, selecting your wire size from the Electrical Specifications table below.



CAUTION: Inadequate wire size will result in voltage drop, and will reduce performance.

- Make all joints with appropriately rated marine grade terminal blocks and crimp connectors.
- Use marine grade multi-strand copper wire.
- Support all wires approximately every 18" (45cm) with plastic cable clips.

YOU MUST FIT the correct size of fuseholder or circuit breaker, selected from the Electrical Specifications table. If you connect the Control Box directly to the battery, fit your fuseholder or circuit breaker within 7" (17cm) of the battery.

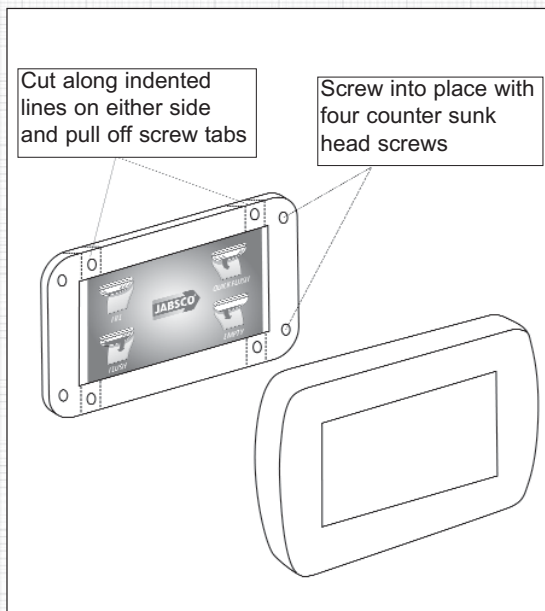


CAUTION: Remove fuse, or turn circuit breaker off, whilst installing Controls and Electrics.

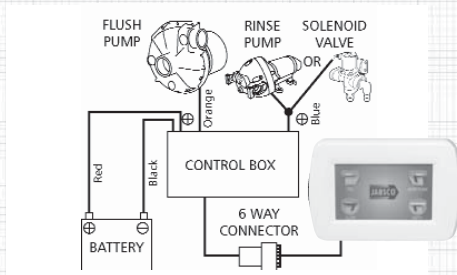
- Fix the Control Box (key 26) in a dry but accessible position close to the Flush pump.
- Select a position for the Control Panel (key 26) that is convenient for both standing and seated users, and which allows you to run the 10ft (3m) control cable out of sight to the Control Box.
- To use the Jabsco Fascia Panel provided, (Key 29) drill a 5/8" (16mm) hole for the 6 way control cable connector. Screw the control panel (key 28) onto selected location with suitable counter sunk head screws. Clip on fascia panel (key 29)
- To use Gewiss fascia panels remove the four screws tabs (see picture below). Cut a rectangular hole 53mm x 92mm. Fix panel to selected location with four counter sunk head screws. Clip on Gewiss fascia panel
- To use Vimar fascia panels remove the four screw tabs (see picture below) Cut a



rectangular hole 53mm x 92mm. Place adaptor (key 30) onto panel (key 28) and screw into place with four counter sunk head screw. Clip on Vimar panel onto adaptor.



- Slide the Heat Shrink Sleeve (key 27) over the control cable. Plug in the 6 way control cable to the Control Box, and carefully use a hot air gun or hairdryer to seal the Heat Shrink Sleeve over the 6 way connector.
- Note that the Control Box has 4 other leads - Red and Black, Orange and Blue.



- Connect your boat's Positive (+) feed to the Red (+) input lead of the Control Box, and your boat's Negative (-) return to the Black (-) output lead of the Control Box.
- Connect the Orange (+) output lead of the Control Box to the Red (+) input lead of the Flush pump motor (key 21).
- **Either** connect the Blue (+) output lead of the Control Box to any terminal of the Solenoid Valve (key 31) **or** to the Red (+) input lead of the Raw Water Rinse pump (key 32).
- **Either** connect the remaining terminal of the Solenoid Valve **or** the Black (-) output lead of the Rinse pump to your boat's Negative (-) return.

ELECTRICAL SPECIFICATIONS						
Voltage	Amp Draw	Fuse/Breaker	Wire size mm ² (AWG) per metre (foot) of length*			
			0-4m (0-13ft)	4-6m (13-20ft)	6-12m (20-40ft)	12-18m (40-60ft)
12 Vdc	20	25 amp	4 mm ² (#10)	6 mm ² (#8)	8 mm ² (#6)	19mm ² (#4)
24 Vdc	10	15 amp	2.5mm ² (#16)	4 mm ² (#14)	6 mm ² (#10)	8mm ² (#10)

* Wire length is the total distance from the battery to the Flush pump and back to the battery

Securing the bowl and fitting the seat and lid

- Apply a bead of white silicone sealant to the base of the toilet.
- Bolt down the toilet, using plastic washers next to the china, with stainless steel washers between the plastic washers and the bolt heads. Tighten the fastenings securely. If you are not using self-locking nuts, use nut-locking compound.
- Fit the seat and lid using the adjustable fastenings supplied with it.

Testing

- Ensure that the battery is fully charged, and that the circuits are live.
- Open both seacocks.
- Refer to the next section - OPERATING INSTRUCTIONS.
- To prime the Solenoid Valve or Rinse pump on first installation, operate the 'Quick Flush' function several times until water flows into the toilet bowl. Thereafter they are automatically switched by the Control Panel.

Safety

Ensure that this INSTRUCTION MANUAL reaches the owner, skipper or operator of the craft as it contains essential safety information.

ON COMPLETION - CLOSE BOTH SEACOCKS

* * * * *

OPERATING INSTRUCTIONS

The toilet is one of the most used pieces of equipment on your boat. Correct operation of the toilet is essential for the safety and comfort of your crew and craft.

- Open inlet and outlet seacock (and secondary valves if fitted)
- Use Touch Pad Controller as described on Page 2.
- Use good quality hard or soft household toilet paper, but do not use more than necessary.
- Do not put anything in the toilet unless you have eaten it first, except toilet paper.



HAZARD RISK: Accidental Damage.

SHUT SEACOCKS!

If the toilet is connected to ANY through-hull fittings that are below the waterline at any time, and if the toilet or pipework is damaged, water may flood in, causing the craft to sink, which may result in loss of life.

Therefore after every usage, both seacocks (or secondary valves) **MUST** be shut.

Whenever your craft is unattended, even if for only a short period of time, both seacocks (even if secondary valves are fitted) **MUST** be shut.

- Ensure that ALL users understand how to operate the toilet systems correctly and safely, including seacocks and secondary valves.
- Take special care to instruct children, the elderly and visitors.

* * *

Cleaning

- To clean the bowl, use any liquid or cream ceramic cleaner.



CAUTION: Do NOT use aggressive chemical agents such as Acetone or Bleach because the plastic parts may crack and the enamel coating on the seat and lid may blister.

- To clean the rest of the toilet, including the seat and lid, use a non-abrasive liquid cleaner. Polish with a dry cloth only.



CAUTION: Do not use abrasive pads on any part of the toilet and do not use cream cleaners except for the bowl.

- To disinfect the toilet, use a liquid disinfectant diluted in accordance with the manufacturers instructions. You may apply it to all parts of the toilet using a sponge or soft brush as necessary.



CAUTION: Do not use thick liquid toilet cleansers or neat bleach. They may damage the valves, gaskets, seals and the enamel coating of the seat and lid.

SERVICING INSTRUCTIONS

Jabsco Deluxe Flush electric toilets do not normally require maintenance during the season, provided that they are winterised in the autumn.

- Regularly check all fastenings for tightness and leaks.



HAZARD RISK: Leaks.

REPAIR LEAKS IMMEDIATELY!

If the toilet is connected to ANY through-hull fittings and, if the toilet or the pipework develops a minor leak, it can suddenly become a major leak that allows water to flood in, causing the craft to sink, which may result in loss of life. Therefore, if ANY leak develops you must repair it immediately.

Control Panel and Control Box

- These 'sealed for life' units are maintenance free.

Solenoid Valve

- The Solenoid Valve is maintenance free.

Rinse pump

- Please refer to the Data Sheet provided for the 31331-Series Rinse pump.

Ceramic shaft seal

- In the unlikely event that water begins to drip from the shaft of the Flush pump motor (key 18), the ceramic seal is worn and must be replaced.

Electrical connections

- Carefully inspect all electrical connections, even if they are protected. Remove any corrosion on the terminals or in the cables, and remake any loose or weak connections, because these cause voltage drop when under load, which directly reduces both Rinse and Flush pump performance. Protect all electrical connections against moisture.

Servicing & Winterisation - preparation

Jabsco Deluxe Flush electric toilets are designed to be user serviceable and no special skills are required.

- Flush the toilet in accordance with the OPERATING INSTRUCTIONS and ensure that all waste has left the discharge pipework and that the bowl is empty.
- CLOSE BOTH SEACOCKS (even if secondary valves are fitted)
- SWITCH OFF POWER OR REMOVE FUSE.
- Be ready to mop up any water that may come out of the system.

Servicing - Winterisation

Drain the complete system, both as protection against frost damage and to discourage the growth in the pipework of bacteria that cause unpleasant smells.

- Loosen hose clips and disconnect the hose ends from both the seacock hose tails. Ensure that all water is drained from the toilet system.



CAUTION: The use of anti-freeze is NOT RECOMMENDED, as it is impossible to ensure that it penetrates the complete toilet system. If, for any reason, anti-freeze is used it **MUST** be glycol based.



HAZARD RISK: Seacocks opened by mistake.

ATTACH WARNING NOTICE!

If you leave the toilet disassembled and, if the seacocks are opened when the craft is afloat, water will flood in and may cause the craft to sink, which may result in the loss of life. Therefore, you **MUST** attach a warning notice to the seacocks and, if possible wire the seacocks shut.

If you are not leaving the toilet disassembled:

- Reconnect all hose ends and secure them with their hose clips.
- Replace the non-return valve assembly.
- Fasten down the seat and lid to prevent use and attach a warning notice.



Servicing - Flush pump

YOU WILL need a phillips screwdriver, flatblade screwdriver, spanner (7mm), 10mm socket (1/4" drive) and a Service kit 58100-2000 - refer to the PARTS LIST for details.

Remove complete pump assembly

- Unfasten and separate waste valve clamp from discharge elbow. Non-return valve (key 24). Keep its fastenings and its joker (key 25) valve, and inspect it. Replace the joker valve if it is damaged or age hardened.
- Remove the hose clip (key 10) where the inlet hose (key 9) is fastened to the bowl outlet.
- Cut the support strap (key 5) that fastens the motor to the support block (key 6).
- Cut the support strap (key 4) that holds the hose
- Remove the complete pump and hoses assembly from the bowl. Disconnect the Flush pump positive and negative motor leads.

Check pump chamber

- Undo the seven screws (key 11 & 12) and nuts (key 20) that fasten the upper pump body (key 14) to the lower pump body (key 20)
- Separate the 2 pump bodies. Remove the joint ring (key 15), and inspect it. Replace the joint ring if it is damaged or age hardened.
- Thoroughly clean and de-scale all parts.

Remove shaft seal (only if leaking)

- Hold the impeller and undo the nut holding it onto the shaft (nb. this is a left handed thread). The nut will need to be replaced. Remove impeller from shaft.
- Separate lower pump body from motor.
- Using a blunt instrument, carefully push out the ceramic seal assembly (key 19) from the lower pump body (key 20).

Fit new shaft seal

YOU MUST:

- *Have perfectly clean and dry fingers when you handle the ceramic seal, or wear surgical gloves.*



CAUTION: Do NOT allow anything at all to touch or fall onto the mating faces of the new ceramic seal!

- Take the stationary half of the new seal (white ceramic face in rubber cup) and, with rubber cup at the bottom, press it into the seal housing in the lower pump body (Key 20) using your clean, dry fingers only, leaving white ceramic face exposed.
- Carefully slide the rotating half of the ceramic seal (black carbon face) down the motor shaft to cover the white ceramic face.
- Replace impeller on motor shaft. Fit washer and left hand nut.

Re-assemble pump

- Place joint ring (key 15) in position.
- Re-fasten the upper pump body (key 14) to the lower pump body (key 20), using the 7 screws (key 11 & 12) and nuts (key 13).

Refit pump assembly

- Reconnect the Flush pump positive and negative motor leads. Offer up the complete pump and hoses assembly to the bowl and to the bowl outlet.
- Re-fasten the motor to the support block (key 6), using a new support strap (key 5).
- Re-fasten the inlet hose (key 9) to the bowl outlet, with the hose clip (Key 10), using a new support strap (key 4).
- Re-assemble non-return valve assembly.

Hoses

- Examine all hoses throughout their length for chafe, kinks and splits under hose clips. Check all hose clips for corrosion and replace worn or damaged parts.



CAUTION: Do not apply flame to the hose. Do not apply flame or heat to the plastic hose tails on the toilet, rinse pump or solenoid valve. Do not use oils, greases or synthetic lubricants. Do not apply sealing compounds to any hose connections. Do not over tighten hose clips. Any of these actions may result in cracking or breakage of the plastic parts.

- Reconnect all loose hose ends and secure them with their hose clips.

Servicing - Testing

- Open inlet and outlet seacocks (and secondary valves if fitted).
- Switch on power or replace fuse.
- Use Touch Pad Controller as described on page 2, to check all functions, and then inspect for leaks.

ON COMPLETION - CLOSE BOTH SEACOCKS!

* * * * *

SPARE PARTS

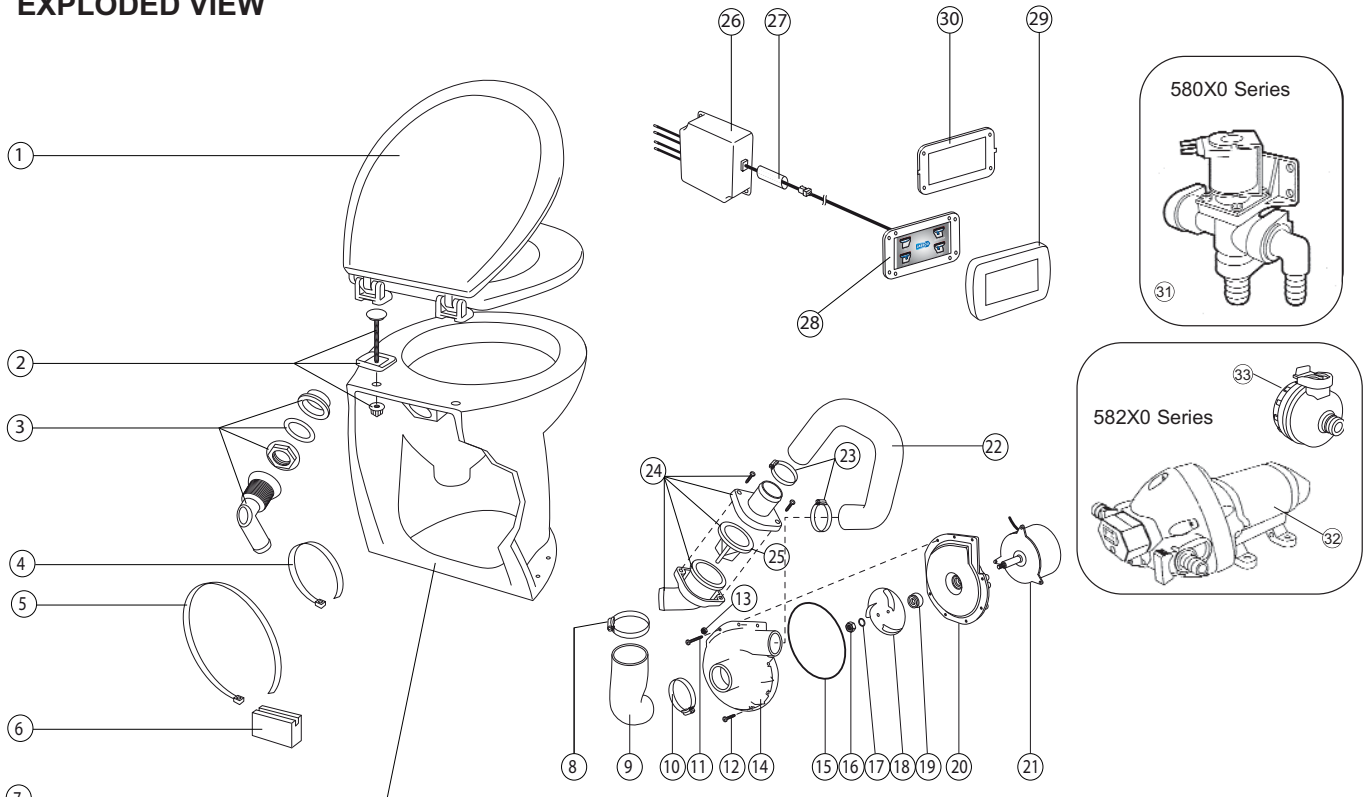
Service Kits Available		
Kit	Part no.	Description
A	58100-2000	Major Service Kit
B	58103-1012	Pump Assembly, 12v
	58103-1024	Pump Assembly, 24v
C	58029-1000	Control Kit

Key	Description	Qty per Toilet	Part no.	Qty per Service Kit		
				A	B	C
1	Seat & Lid, Set	1	58104-1000			
2	Hinge Kit, Pair	1	58105-1000			
3	Rinse Intake Seal & Elbow	1	58107-1000			
4	Support Strap, Discharge Hose	1	See Kits	1	1	
5	Support Strap, Motor	1	See Kits	1	1	
6	Support Block, Motor	1	See Kits	1	1	
7	14" Bowl, Angled Back	1	58048-1000			
	14" Bowl, Vertical Back	1	58068-1000			
	17" Bowl, Angled Back	1	58028-1000			
	17" Bowl Vertical Back	1	58038-1000			
8	Hose Clip, Large	1	See Kits	1	1	
9	Inlet Hose, Flush Pump	1	See Kits	1	1	
10	Hose Clip, Medium	1	See Kits	1	1	
11	Screw, Long	4	See Kits	1	4	
12	Screw, Short	3	See Kits	1	3	

Key	Description	Qty per Toilet	Part no.	Qty per Service Kit		
				A	B	C
13	Nut	7	See Kits	2	7	
14	Pump Body, Upper	1	See Kits		1	
15	Ring Seal	1	See Kits	1	1	
16	Nut	1	See Kits	1	1	
17	Washer	1	See Kits	1	1	
18	Impeller	1	See Kits		1	
19	Ceramic Seal	1	See Kits	1	1	
20	Pump Body, Lower	1	See Kits		1	
21	Motor 12v	1	See Kits		1	
	Motor 24v	1	See Kits		1	
22	Outlet Hose, Pump	1	See Kits	1	1	
23	Clip, Small	2	See Kits	2	2	
24	Non - Return Valve Assembly	1	58109-1000			
25	Joker Valve	1	29092-1000			
26	Control box, electronics	1	See Kits			1
27	Heat Shrink Sleeve, Control Cable	1	See Kits			1
28	Panel	1	See Kits			1
29	Jabsco White Fascia Panel	1	See Kits			1
30	Adaptor Plate	1	See Kits			1
31	Solenoid Valve, 12v	1	37038-1012			
	Solenoid Valve, 24v	1	37038-1024			
32	Rinse Pump, 12v	1	31331-0092			
	Rinse Pump, 24v	1	31331-0094			
33	Pump Guard	1	46400-9500			

GB

EXPLODED VIEW



TROUBLE SHOOTING

Bowl fills when not in use

- Shut seacocks
- Fit Vented Loops

Waste water re-appears in bowl

- Check non-return valve assembly (key 24)

Bowl does not empty

- Open Outlet Seacock
- Check non-return valve assembly (key 24), Discharge Hose or Outlet Seacock for blockage.
- Remove pump and check for blockage

Water does not come in

- Open Inlet seacock
- Check Inlet hose connections are airtight
- Check electrical connections to Solenoid Valve or Rinse pump



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JAPAN



Isotemp Basic, Slim/B & Slim Square

Water heater



Installation and operating instructions



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3. Mounting
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1 - Safety instructions

This manual has been compiled to help you to operate your water heater with safety and pleasure. It contains information about operation and maintenance.
Please read it carefully and make yourself familiar with the product and keep this manual in a safe place on board.

It is important that your water heater is correctly installed and maintained. During the winter period when the unit is not being used it is essential that it is drained to avoid risk of damage due to freezing.
Every single water heater is individually pressure tested prior to delivery and carries a two year factory warranty in respect of defects in material and/or manufacture.

Indel Marine S.r.l. accepts no responsibility or liability for damage to equipment, injury to personnel that may result from improper installation or operation of this product.



Danger!

All electrical installations on board must be carried out by authorized specialists.
The water heater must be properly grounded to the AC system.



Danger!

Always use recommended wire size, fuse/circuit breaker and a GFC-breaker.



Warning!

Do not connect the heater element to the power net until the water heater tank is filled with water.



Warning!

Risk of scalding, the hot water in the water heater will be as hot as the engine.

Caution!

Consider the chapter 4.5 electrical connections regarding risk of corrosion in connection with shore power.

Caution!

Follow carefully the engine manufacturers instructions regarding connection to the engine cooling system.

Environment:

This appliance is marked according to the European directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE).

By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product.



The symbol  on the product, or on the accompanying documents indicates that this appliance may not be treated as household waste.

Instead it should be handed over to the applicable collection point for the recycling of electrical and electronic equipment. Disposal must be carried out in accordance with local environmental regulations for waste disposal.

For more detailed information about treatment, recovery and recycling of this product, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

1. Locating the tank

The water heater can be mounted anywhere on the vessel as long as the connections to the engine heat exchanger are below the engine header tank (Fig. 1). It is best to keep the length of the heat exchanger hoses short to keep flow resistance and heat loss to a minimum. In many installations the tank heat exchanger is simply connected in series with the engine coolant circuit. In some installations it is connected in parallel with a flow restrictor/diverter.

The choice depends on the specific recommendations of the engine manufacturer and or installer. Please consult the manufacturer or dealer of your engine for any recommendations they may have for connecting to the engine cooling system.

In case the tank has to be placed above the engine header tank, the engine water hose circuit must be equipped with an air bleeder valve on the highest point. This is available as an extra equipment.

Principal connection diagram

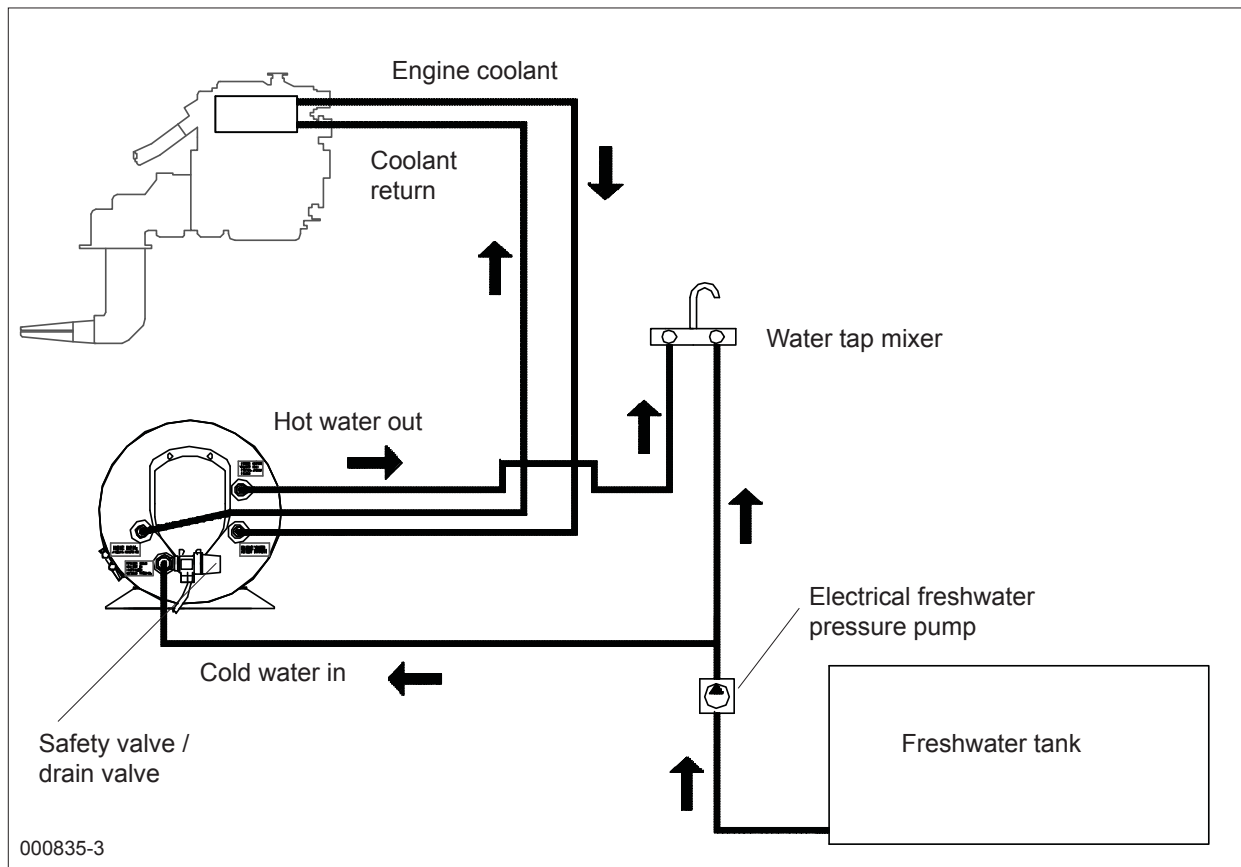


Fig. 1

2. Mounting

The Isotemp Basic, Slim & Slim Square water heaters are designed to give excellent performance when mounted horizontally and vertically. The drain / safety valve must always be at the lowest point. The mounting brackets can be adjusted to the side on Basic and Slim for mounting the tank on a bulkhead. Always mount the tank to a suitable shelf or bulkhead and **keep in mind the extra weight of the tank when it is full of water.**

See alternative mounting positions fig. 2.

Slim Square can be standing or laying down flat, or placed in other alternative positions as seen in fig. 7. Fig. 3 shows Basic, fig. 4 Basic with double coils, fig. 5 Slim and fig. 6 Slim Square water hose connections. It is to prefer to keep about 30 cm (1 ft.) free space in front of the water heater for future service measures.

Isotemp Basic & Slim
Mounting alternatives, horizontal or vertical.

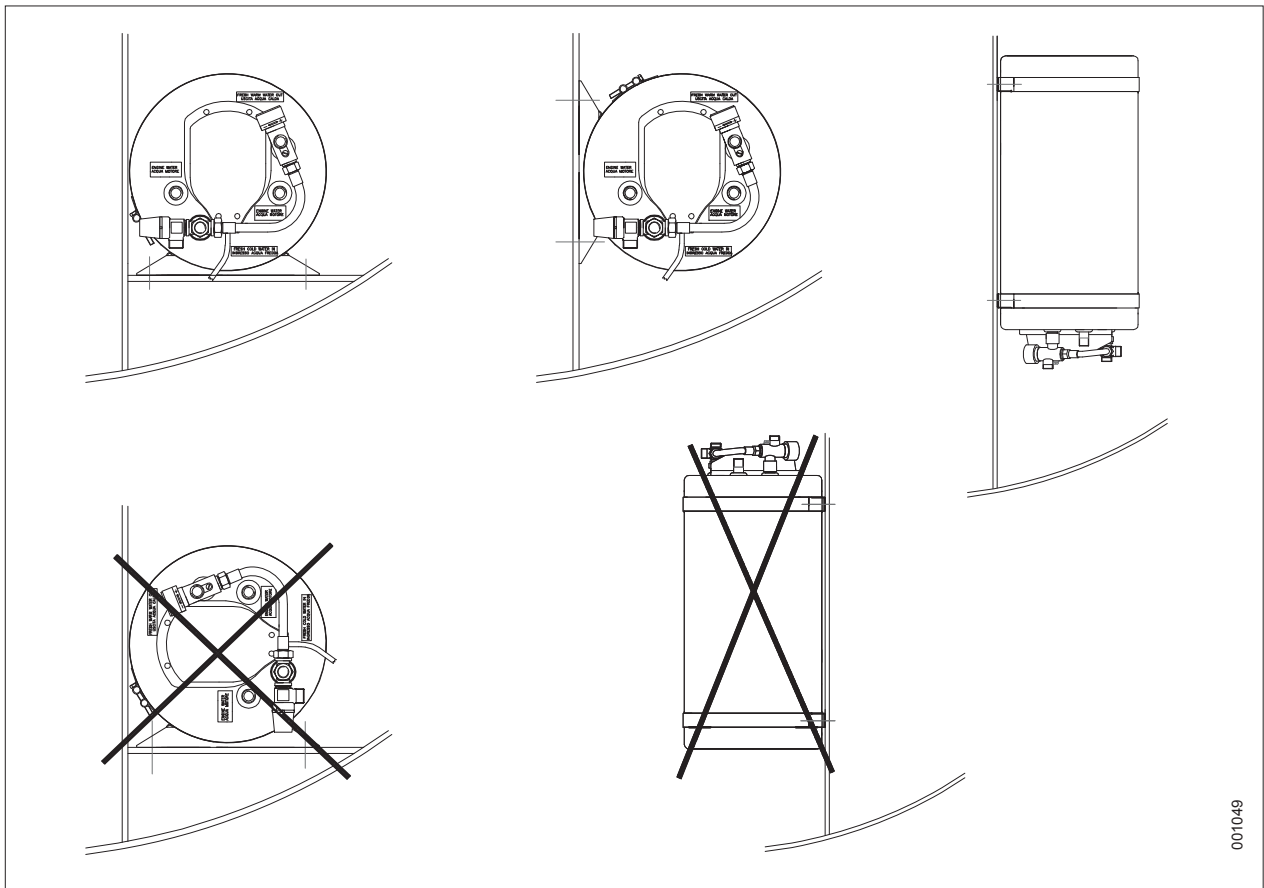


Fig. 2

Isotemp Basic without and with thermostat mixer valve

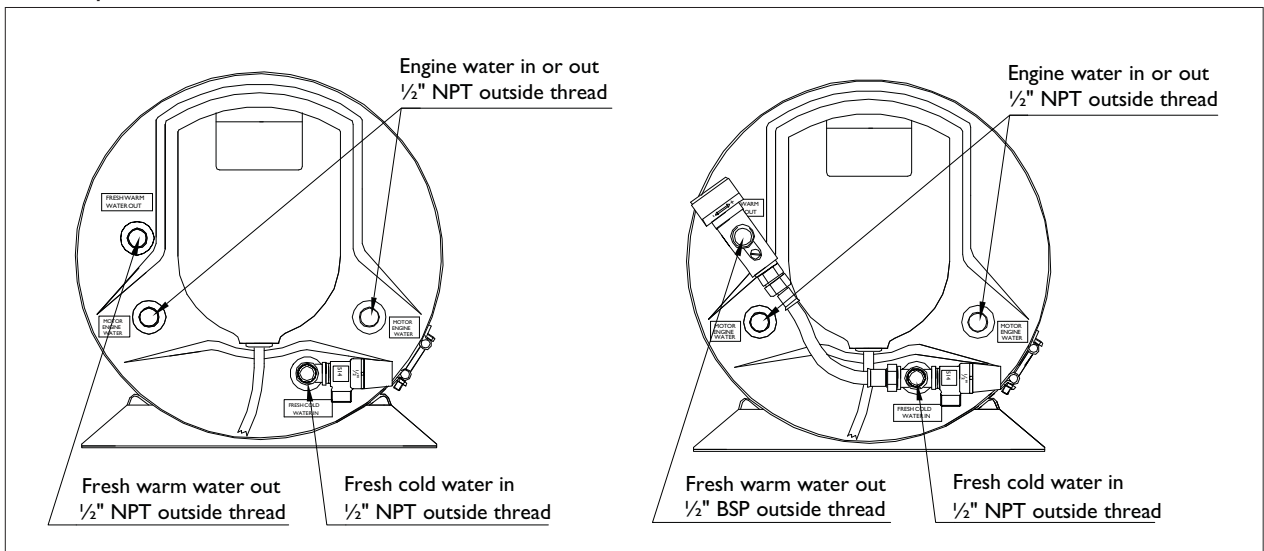


Fig. 3

Isotemp Basic with double coils, without and with thermostat mixer valve

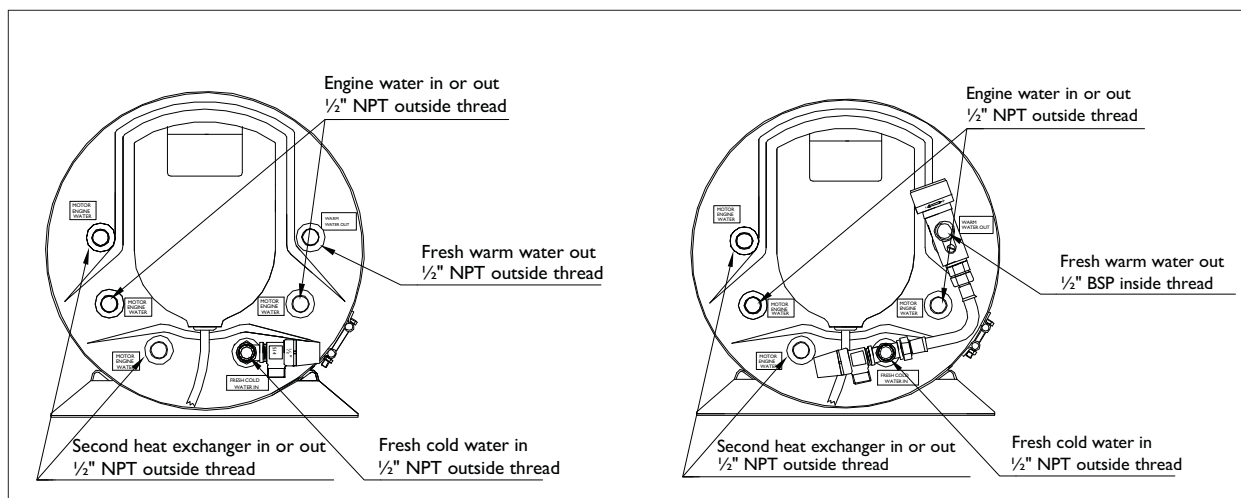


Fig.4

Isotemp Slim without and with thermostat mixer valve

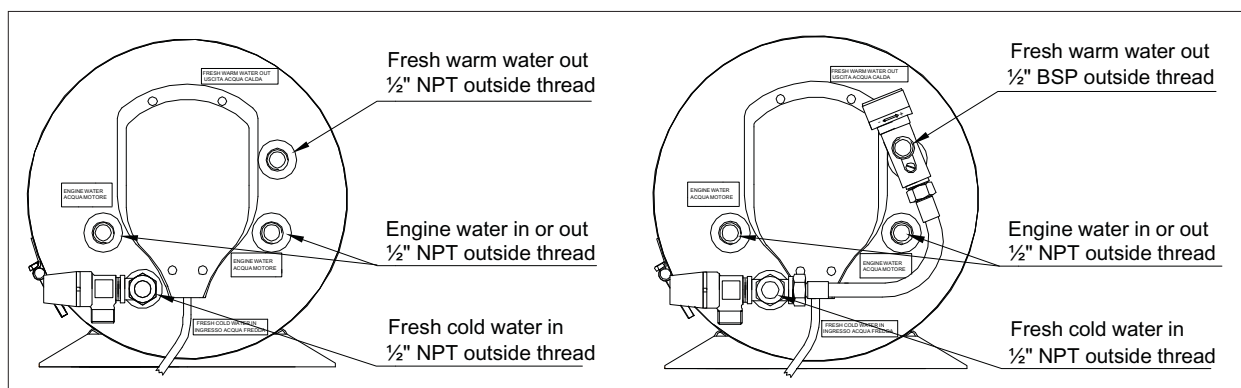


Fig. 5

Slim Square without and with thermostat mixer valve

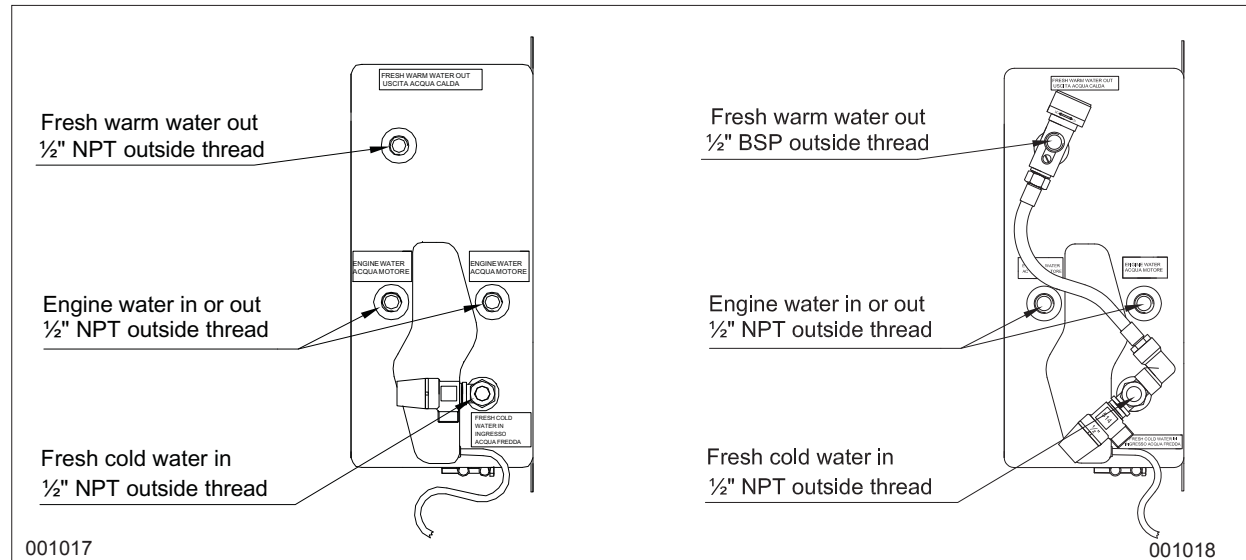


Fig. 6

Slim Square

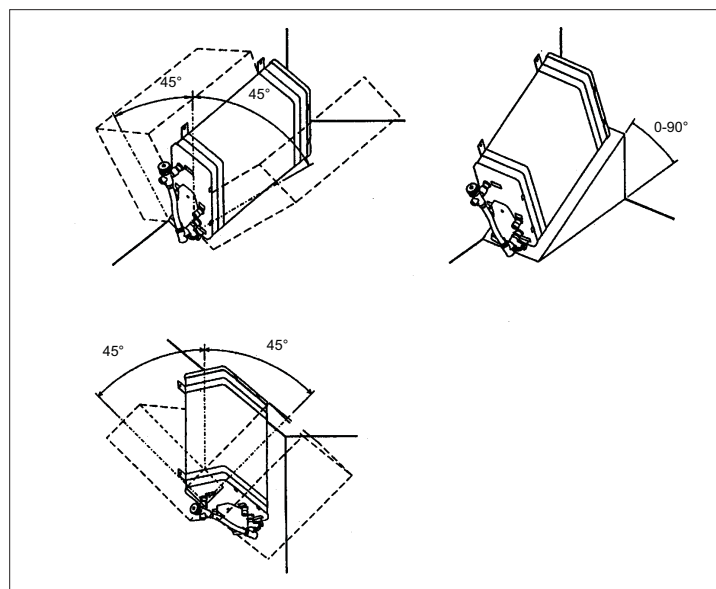


Fig. 7

Slim Square alternative mounting positions.

Remember, safety valve always at the lowest position.

4. Connections

4.1 Material: Use only fittings and accessories made of non-corrosive material such as brass or stainless steel. Avoid plastic fittings on the water heater depending on the heat, unless they are specially made for this purpose. This is important, a leak in this area can cause a sudden engine overheat as well as a dangerous hot water spray.

4.2 Hoses: For the engine connections, use heat re

sistant (100°C / 210°F) reinforced rubber hoses, resistant to anti-freeze and pressure approved for 5 bar / 70 psi. For the fresh water, cold inlet and warm outlet, use heat resistant fresh water hoses (food industry quality). They shall be rated 8 bar / 115 psi. Fasten the hoses carefully with hose clamps. Seal the threaded connections with e.g. Loctite 577 or Bondline T777.

4.3 Connections to engine (see connection diagram, fig. 1):

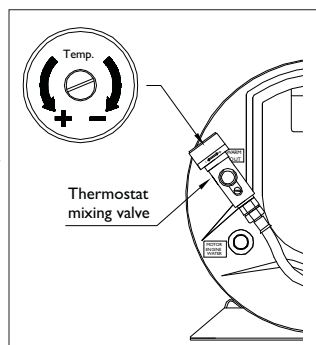
The water heater may be used with fresh water cooled engines. The flow of cooling water from the engine through the water heater should be at least 2 litres/min. If the boat has two engines, connect the water heater to one engine only. When two water heaters are mounted, they shall be connected in parallel.

Connection to the engine shall be done with min. 5/8" /16 mm hoses and adaptors to avoid restrictions. See the instructions in the engine operators manual, regarding hose connection points.

4.4 Freshwater connections (see connection diagram, fig 1):

The water heater is fed with fresh water from the electrical pressure pump in the water system. Max working pressure for the pump: 3.8 bar / 55 psi, 2.9 bar / 42 psi for Slim Square. Please note that the pressure relief valve on the tank is set to 7.0 bar /100 psi and 5.5 bar / 80 psi respectively. Fresh water is taken in at the safety valve. The hot water outlet, which also vents the water heater, should be connected to a mixer tap at the sink and/or basin outlet.

Warning! Please note that the hot water is as hot as the engine, there is a risk of scalding! Mix in cold water at the taps. In case the water heater is equipped with a tempering valve (thermostatic mixing valve) a proper temperature of the warm water can be set on the adjustable tempering valve to avoid scalding. The temperature can be set between 38 and 65 °C / 100 and 150 °F.



The waste water hose must always have a free outlet. There must be no valves or skin fittings, fitted to the waste water hose. This hose must always have a free outlet. A small quantity of water can drain from the relief valve when the tank is heated. The water expands during heating. This is a normal situation and indicates the system works properly.

4.5 Electrical connections

See wiring diagram fig. 8

All internal connections are made in the factory. The power supply cable is fitted with an standard EU plug, which should be fitted to a correctly installed socket. This socket, as all "high-voltage" installations on board, must be carried out by an authorized electrician to fulfil valid safety regulations. The water heater is designed to meet regulations in this field. The shore power system installation on board, must include a ground fault circuit interrupter.

When leaving the boat for longer periods, always unplug the cable connector from the socket. This should be done even if the shore power system is shut off, as there can be a difference in the electrical system, between the earth and the sea-water earth of the boat. This can seriously damage the water heater or the heating element.

Installation of a insulation transformer in the shore power equipment eliminates any risk of galvanic corrosion via the shore power connection.

Always unplug the heater and/or turn off all circuit breakers and disconnect shore power connections before removing the connection cover. The electrical circuit is controlled by a service thermostat set to 75°C / 167°F and a double overheat protector that is set to 96°C / 205°F. If the overheat protector trip, it has to be manually reset. This is done by pressing the small knob on top of the overheat protector.

See section 6:2.

Wiring diagram

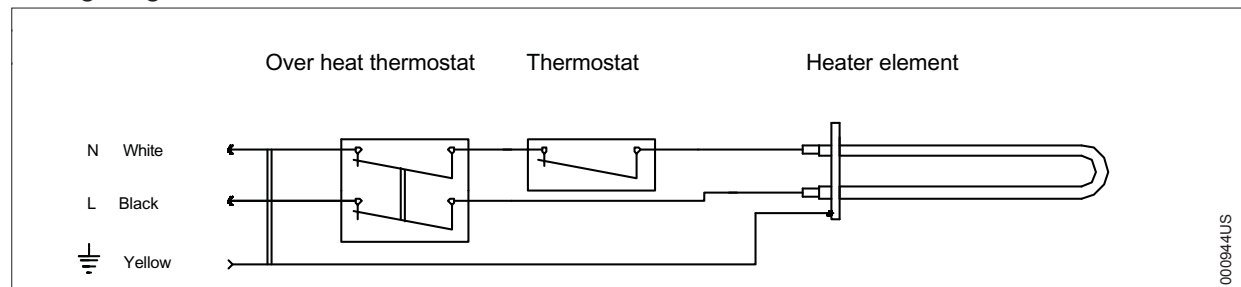


Fig. 8

5. Start up/test

Fill the hot water tank by turning on the water pressure pump and opening a hot water tap to allow air to bleed out of the hoses and / or plumbing.

Check the drain and pressure relief valve by pushing the lever. Water will flow into the drain hose. Make sure the drain hose is not blocked or closed. Pull the lever back to closed position.

Start the engine to check the circulation of the coolant. It will be necessary to add coolant to the system to compensate for the additional volume of the exchanger and hoses. Check for air locks in the connecting hoses and raise and lower these as necessary to clear the air from the hoses before securing the hoses in place. Lastly plug in the tank and turn on the circuit breaker. Check for proper operation.

6. Maintenance

6:1 Winter drain: When there is a risk of freezing the tank must be drained.

This is done by taking off the hot water hose or opening the air bleeder screw mounted on the mixing valve, if such a valve is mounted. Take the air screw away completely, and open the drain valve by turning the black knob anticlockwise one snap on the safety valve. The valve is closed again by tuning further one step anticlockwise.

If the engine is raw-water cooled the heat exchanger must also be drained by removing the hoses and blowing air into the coils to drain any water. The tank can now be safely left in the vessel over the winter. When leaving the vessel for longer periods, it is recommended to take out the power cord to eliminate the risk of stray current from the shore power earth connections.

6:2 Replacing / re-setting thermostat:

Warning: Be sure to turn power off first!

The immersion heater is 115V-750W. The thermostat equipment has an integrated working thermostat and a double overhear protection thermostat. This is manually re-settable, by pushing the pin on the top of the thermostat.

(See fig. 10). Also check why the overhear thermostat initially tripped before re-connection the power supply.

Turn off the power! Pull out the cable plug. Take off the front plastic cover (Basic and Slim 4 screws, Square 3 screws).

Reset overhear thermostat.

Replacing thermostats: Pull off the cable shoes after having noticed their positions. Thermostat sensor ends are put into a tube on the heater element fastening flange. Pull them out. Unscrew fastening screws for the thermostats. Mount new thermostats in opposite order. Be sure sensor ends are properly put into the tube.

When leaving the boat for longer periods, it is recommended to disconnect the power supply cable plug. This should be done even if the shore power system is shut off, as there can be a difference in the electrical system, between the earth lead and the salt water earth of the boat. This can seriously damage the water heater and/or engine with propulsion equipment.

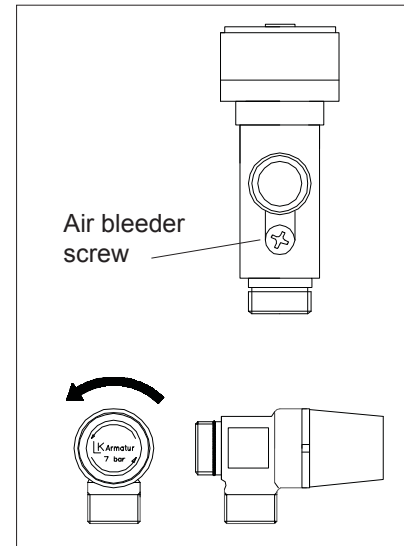


Fig. 9

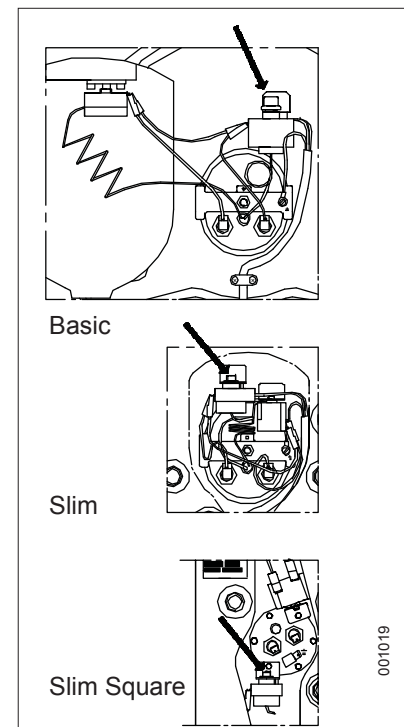


Fig. 10

6:3 Replacing heater element:

**Warning! Be sure to turn power off first!
Drain the tank from water.**

Basic and Slim

Take off the plastic cover, unscrew the two screws at the sides and push the cover downwards. Dismantle the thermostat and the overheat protector from their brackets for better access on the Slim model.

On Basic they can be left in position during the operation. Pull off the wires from the heating element tabs.

Loosen the centre nut, fig. 11-A and take off the support, fig. 11-B. Put on the nut again on the centre bolt for easier handling, easier to grab by hand.

Push off the mounting flange and rubber gasket inwards, it will come out together with the heater element unit. Turn the heater element unit 90° to the left, the wire tabs shall point to the right.

Twist the unit until the inner end hits the tank to the left. Pull out the heater element unit through the hole with the left side first.

Unscrew the heater element from the mounting flange.

Mount the new heating element with new seal rings and a new big rubber gasket in the opposite order to the description above. The inner end of the heating element shall point slightly downwards after assembly.

Slim Square

The heating element unit is on the Square model fastened by six screws on a flange which is fastened into the tank. It has a rubber gasket. See fig. 11

First, pull off the wires from the heating element tabs.

Loosen all six screws, the heating element unit including the flange can be pulled out. Note the position of the flange.

The heating element is fastened on the flange with nuts. Unscrew the heating element from the mounting flange. Mount the new heating element with new seal rings and a new big rubber gasket in the same position as before.

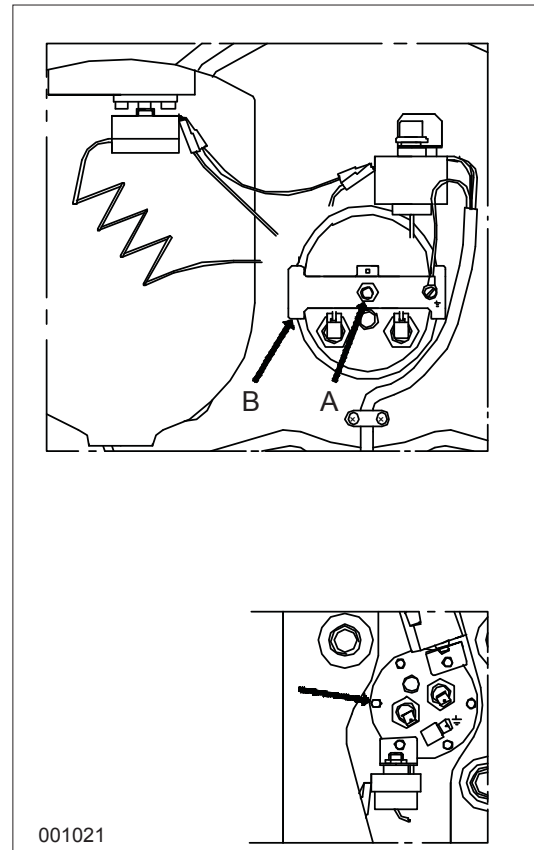


Fig. 11

7. Double heat exchanger, Basic 40 & 75 litres.

Double heat exchanger water heaters have connections for the second heat exchanger located also on the front, side by side with ordinary heat exchanger connections.

See fig. 4

Replacement of the heating element is made the same way as the description above.

8. Technical data

8.1 Basic

Type	Volume gal.	Weight lbs	Heater element	Heater element options	Thermostat mixing valve
602421B000003	6.4	30.8	115V-750W	230V-750W	X
603023B000003	8	37.5	115V-750W	230V-750W	X
604021B000003	11	44	115V-750W	230V-750W 230V-1200W	X
604023BD00003 Double heat exch.	11	48.5	115V-750W	230V-750W 230V-1200W	X
605021B000003	13	50.7	115V-750W	230V-750W 230V-1200W 230V-2000W	X
607521B000003	20	64	115V-750W	230V-750W 230V-1200W 230V-2000W 230V-3000W	X
607523BD00003 Double heat exch.	20	68.4	115V-750W	230V-750W 230V-1200W 230V-2000W 230V-3000W	X

Dimensions:

See fig 12

Material:

Heat exchanger coil, storage tank and connections: stainless steel AISI 316

Outside cover and mounting brackets: Stainless steel AISI 304

Heater element:

Nickel plated copper

Insulation:

Polyurethane

Safety valve:

7 bar / 100 psi

Dimensions Basic

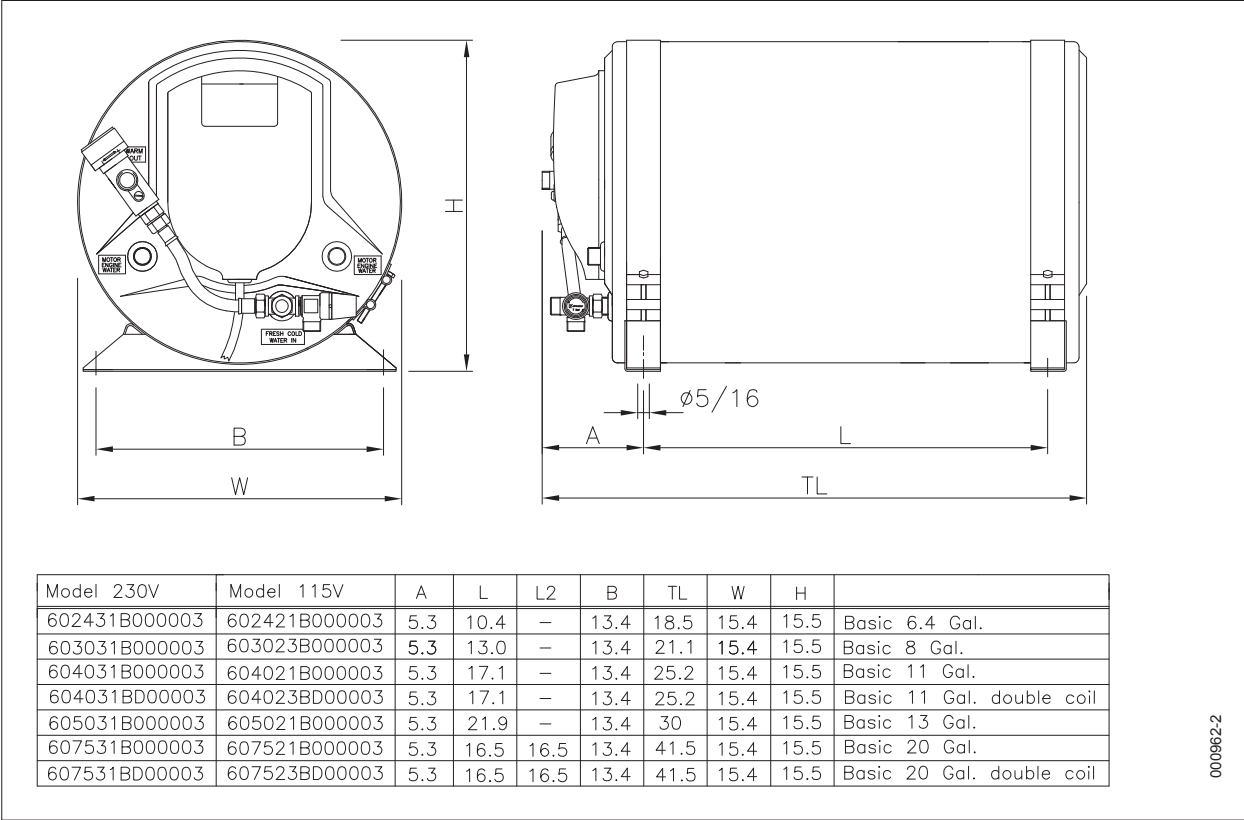


Fig. 12

8.2 Slim/B

Type	Volume gal.	Weight lbs	Heater element	Heater element option	Thermostat mixer valve
601521S000003	4	23	115V-750W	230V-750W	X
602021S000003	5	26.5	115V-750W	230V-750W	X
602521S000003	6.5	30	115V-750W	230V-750W	X

Dimensions: See fig 13

Material: Heat exchanger coil, storage tank and connections: stainless steel AISI 316
Outside cover and mouting brackets: Stainless steel AISI 304

Heater element: Nickel plated copper

Insulation: Polyurethane

Safety valve: 7 bar / 100 psi

Dimensions Slim/B

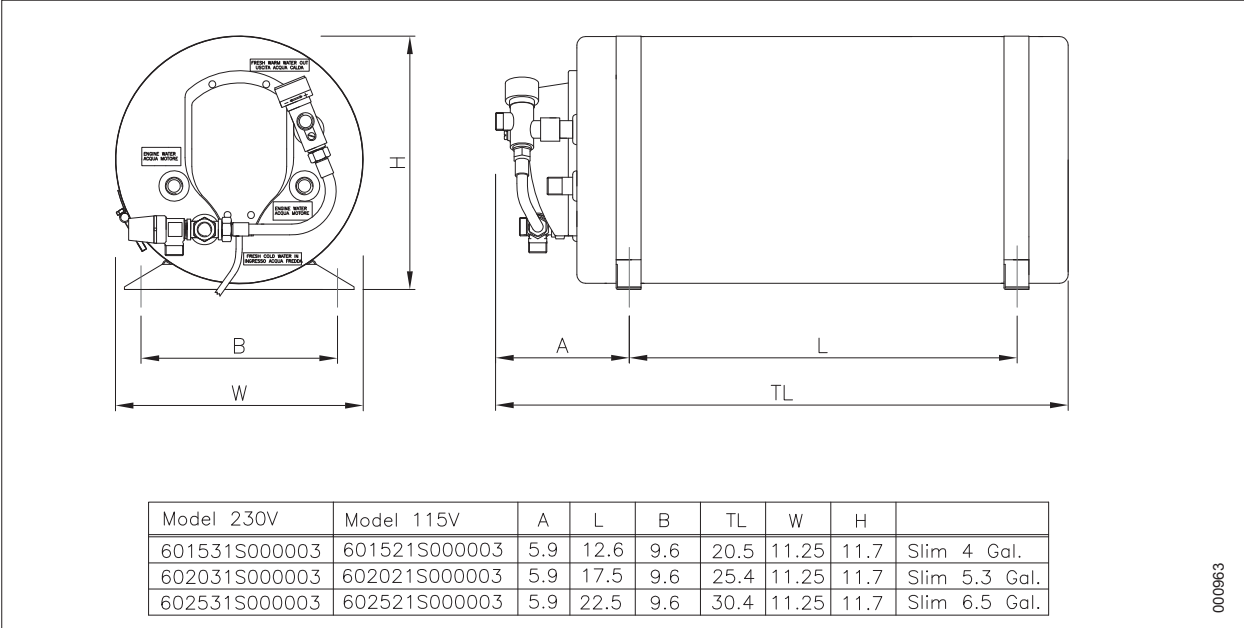


Fig. 13

8.3 Slim Square

Type	Volume gal.	Weight lbs	Heater element	Heater element option	Thermostat mixer valve
601623Q000003	4.2	35	115V-750W	230V-750W	X

Dimensions:

Material:

Heater element:

Insulation:

Safety valve:

See fig 14

Heat exchanger coil, storage tank and connections: stainless steel AISI 316

Outside cover and mouting brackets: Stainless steel AISI 304. Outer gables plastic.

Nickel plated copper

Polyurethane

5.5 bar / 80 psi

Slim Square Dimensioner

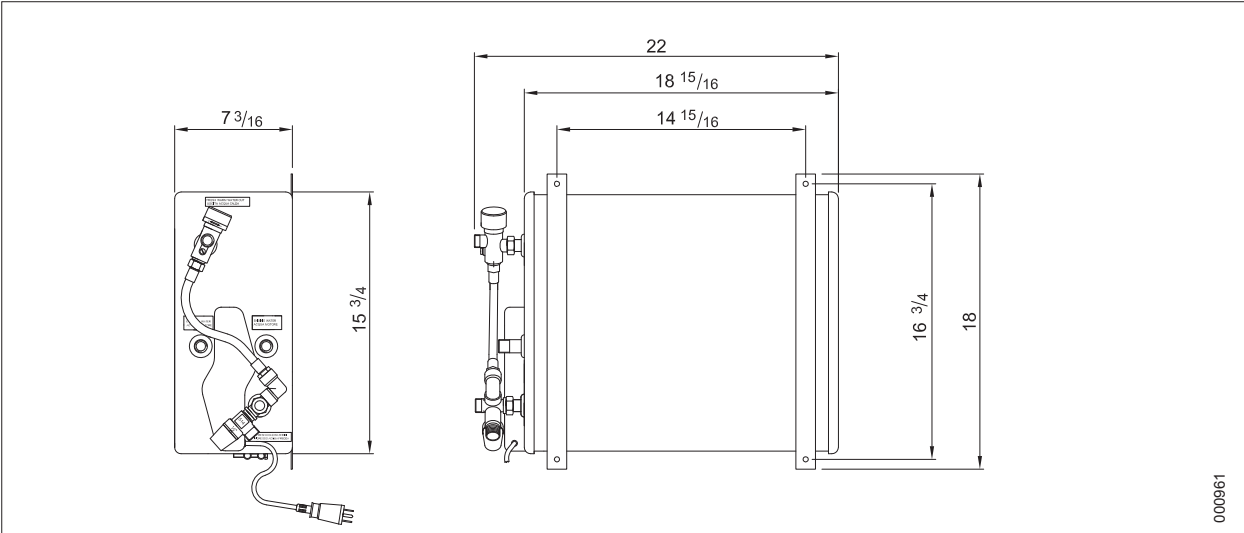


Fig. 14

ISTRUZIONI PER L'USO	Pagina	2
INSTRUCTIONS FOR USE	Page	18
NOTICE D'EMPLOIE	Page	34
GEBRAUCHSANWEISUNG	Seite	50
INSTRUCCIONES PARA EL USO	Página	66
MANUAL DE USO	Página	82
GEBRUIKSAANWIJZING	Bladzijde	97



INTRODUZIONE

Gentile cliente:

Nel ringraziarLa di aver scelto un nostro prodotto la VITRIFRIGO si augura che Lei possa rimanere completamente soddisfatto dell'acquisto effettuato.

Il presente manuale è considerato parte integrante del frigorifero e deve seguire il percorso di vendita fino all'utilizzatore e che la Vitrifrigo ne vieta la riproduzione di qualsiasi parte.

Ogni frigorifero, prima di lasciare il nostro stabilimento, è sottoposto a severi collaudi e controlli che ne garantiscono il corretto funzionamento.

Per ulteriori informazioni e chiarimenti potrà interpellare i nostri centri assistenza o direttamente i nostri uffici.

Vitri Alceste



AVVERTENZE GENERALI

- Leggere attentamente questo manuale prima di utilizzare il frigorifero.
- Qualora questo apparecchio dovesse sostituirne uno di vecchio tipo si raccomanda di rendere inservibile l'eventuale serratura prima di rottamarlo.
- Verificare che l'imballo sia integro, in caso contrario segnalarlo al trasportatore.
- Procedere allo sballaggio ed alla installazione del prodotto operando con massima cautela; si consiglia, per evitare ferite accidentali, l'uso di guanti protettivi, in particolare per i modelli con unità refrigerante remota (fig. 3).
- Dopo aver sballato l'apparecchio assicurarsi che non sia danneggiato. Eventuali danni devono essere segnalati al rivenditore entro e non oltre le 24 ore dalla data di acquisto.
- Il prodotto deve essere usato esclusivamente per la conservazione di cibi e bevande.
- L'apparecchio deve essere posizionato lontano da fonti di calore assicurando al medesimo sufficiente aerazione (vedi indicazioni successive).
- Si consiglia di attendere almeno un'ora prima di mettere in funzione il frigo per dar modo al circuito refrigerante di essere completamente efficiente.
- Prima di collegare il prodotto verificare che la tensione di rete corrisponda a quanto riportato sulla targhetta di identificazione dell'apparecchio o a quella indicata sulla targhetta posta sul compressore.
- Ad installazione eseguita verificare che l'apparecchio non appoggi sul cavo di alimentazione.
- Per eventuali problemi di funzionamento rivolgersi presso il nostro centro assistenza più vicino; in ogni caso avvalersi di personale qualificato.
- Prima di eseguire qualsiasi operazione di manutenzione o pulizia, disinserire la presa di corrente.
- Evitare di introdurre nel comparto a bassa temperatura liquidi in contenitori di vetro.
- Non gettare l'imballo del vostro apparecchio ma selezionate i materiali secondo le prescrizioni locali relative allo smaltimento dei rifiuti.
- Il presente prodotto non deve essere gettato nei rifiuti urbani ma deve essere smaltito come raccolta separata. Contattare i centri di raccolta Rifiuti Apparecchiature Elettriche ed Elettroniche (RAEE) presenti sul vostro territorio oppure renderlo al venditore all'atto dell'acquisto di un'apparecchiatura nuova equivalente.
- Il prodotto, se non smaltito correttamente, può avere potenziali effetti dannosi sull'ambiente e sulla salute umana dovuti a determinate sostanze presenti al suo interno.
- Il simbolo riportato a fianco indica che il prodotto non può essere smaltito come rifiuto urbano.
- Lo smaltimento abusivo o non corretto del prodotto comporta sanzioni giuridiche di tipo amministrativo e/o penale severe come previsto dalle leggi vigenti.
- È fatto assoluto divieto di utilizzare il frigorifero per usi diversi da quelli previsti.
- Curare sempre la perfetta pulizia e tenere sempre in efficienza i dispositivi di sicurezza.
- Mantenere libere da ostruzioni le aperture di ventilazione nell'involucro dell'apparecchio e/o struttura da incasso.
- Non rimuovere mai le protezioni (carter) del frigorifero.
- Eseguire sempre le verifiche, i controlli e le manutenzioni programmate descritte in questo manuale.
- L'apparecchio non deve essere esposto alla pioggia.
- Adatto per l'uso nei campeggi.



Informazioni generali

Scopo del manuale

Questo manuale, relativo ai Frigoriferi della serie “INTERIOR (230Vca) / OCEAN-RUNNER (12/24Vcc)”, intende fornire una guida per il corretto e sicuro impiego degli stessi e per la loro razionale manutenzione.

Al fine di imparare in breve come far funzionare ed utilizzare il frigorifero in vostro possesso è necessario leggere attentamente questo manuale di uso e manutenzione sin dal primo utilizzo.

Il buon funzionamento del frigorifero dipende anche da una manutenzione efficiente ed efficace. La conoscenza dei lavori di manutenzione è, perciò, necessaria. Le indicazioni per l'uso indicano tutte le operazioni di avvio, di arresto e di funzionamento.

Il frigorifero è stato costruito conformemente a tutti i requisiti di sicurezza previsti dalle direttive in materia, pur tuttavia, la sicurezza massima dell'utente dipende da una attenta lettura di questo manuale e da una pulizia e manutenzione costante ed attenta.

Alcune informazioni o figure di questo manuale potrebbero mostrare dettagli e particolari che possono differenziarsi leggermente da quelle del frigorifero in vostro possesso, senza però che le informazioni essenziali vengano modificate. In base al costante miglioramento, il frigorifero potrà mostrare variazioni che non sono contenute in questo manuale. Eventuali modifiche appariranno, secondo le necessità nelle successive versioni del manuale.

Identificazione del costruttore

Il frigorifero è progettato e prodotto esclusivamente presso la :

Vitrifrigo s.n.c

Via Della Produzione, 9

61020 Montecchio (PU)

Tel. +39 0721 491080

Fax. +39 0721 497739

E-Mail. vitrifrigo@vitrifrigo.com

www.vitrifrigo.com

DESCRIZIONE DELL'APPARECCHIO (fig.2 e fig.7)

12/24Vcc – 220Vca

- A) evaporatore orizzontale
- A1) evaporatore verticale
- B) gocciolatoio
- C) scatola termostato
- D) griglie estraibili
- E) ripiano in vetro (solo su alcuni modelli)
- F) cassetto portafrutta (solo su alcuni modelli)
- G) balconcini (estraibili)

12/24Vcc Portatili

- A) cestello
- B) chiusura cricchetto
- C) evaporatore
- D) vite fissaggio staffa
- E) staffa di fissaggio
- F) mascherina con termostato Digitale
- G) mascherina con termostato LED
- H) termostato manuale (solo C26)
- I) interruttore (solo C26)
- J) maniglia
- K) presa 12/24Vcc – 220Vca

L'etichetta riportante matricola e dati tecnici è posizionata all'interno del frigo nella parte superiore del lato destro. Le prime tre cifre della matricola identificano l'anno e la settimana di costruzione. Tutti i materiali che vengono a contatto con gli alimenti sono conformi alla direttiva 2004/1935/CEE. La rumorosità emessa dalla macchina è minore di 70 dB(A).

INSTALLAZIONE

Assicurarsi che l'apparecchio non sia danneggiato. Eventuali danni di trasporto devono essere segnalati tempestivamente al rivenditore e comunque non oltre le 24 ore successive alla consegna.

Manipolare il prodotto con la massima attenzione. Nel posizionare il gruppo refrigerante (nei modelli di frigoriferi con impianto refrigerante remoto) agire con precauzione onde evitare ostruzioni o rotture sui tubi di collegamento. Posizionare sempre il frigorifero ed il gruppo refrigerante remoto, (nelle versioni con tale soluzione) su piano orizzontale.

Assicurare al gruppo frigorifero sufficiente aerazione predisponendo nel mobile contenitore due aperture, una sul fondo in corrispondenza del gruppo refrigerante, la seconda sulla parte superiore o sulla parte alta del fianco. Tali aperture dovranno avere una superficie non inferiore ai 300 cmq. Qualora non fosse possibile, lasciare un canale di almeno 50 mm fra la parte superiore del frigorifero ed il piano soprastante (vedi fig.5). Installare il frigo lontano da fonti di calore in luogo asciutto e ben aerato.

Lasciare fermo l'apparecchio per almeno un'ora prima di metterlo in funzione. In tale intervallo procedere alla prima pulizia.

PULIZIA DEL FRIGORIFERO

Prima di procedere alla pulizia assicurarsi che il frigorifero non sia collegato all'impianto elettrico. In caso contrario disinserire la spina dalla presa di corrente.

ESTERNO.

Lavare l'esterno del frigorifero con acqua tiepida, ripassare con acqua fredda ed asciugare con un panno morbido. Evitare l'uso di prodotti abrasivi.

INTERNO.

Togliere le griglie (o il cestello), i contenitori e le vaschette per il ghiaccio e procedere alla pulizia utilizzando acqua tiepida con l'aggiunta di bicarbonato di sodio o aceto. Sciacquare ed asciugare accuratamente con un panno morbido. Evitare tassativamente l'uso di prodotti abrasivi, detergenti o saponi.

CONDENSATORE.

E' consigliabile effettuare, almeno una volta l'anno, la pulizia del condensatore (vedi fig.4) per mezzo di una aspirapolvere o di un pennello asciutto.

In caso di prolungato inutilizzo dell'apparecchio, onde evitare la formazione di muffe o cattivi odori, togliere la spina, vuotarlo completamente, procedere alla pulizia dell'interno e lasciare la porta semiaperta.

COLLEGAMENTO ELETTRICO

Questo apparecchio è conforme alle normative 89/336/CEE sulla soppressione dei radiodisturbi. Prima di collegare il prodotto assicurarsi che la tensione di rete corrisponda a quella riportata sulla targhetta di identificazione o a quella indicata sulla targhetta posta sul compressore.

REGOLAZIONE DELLA TEMPERATURA

Ogni frigorifero è equipaggiato di un termostato per il mantenimento automatico della temperatura.

■ TERMOSTATO MECCANICO

Per scegliere la temperatura desiderata agire sulla manopola di regolazione.

Quando la manopola è in posizione '0' o 'STOP' il frigorifero non funziona.

Spostando la manopola in posizione '1' il frigorifero entra in funzione.

Ruotando la manopola dalla posizione '1' alla posizione '5' si ottengono temperature sempre più fredde.

Per schema elettrico vedi fig. 8e/h (12/24V) o fig. 9 (115V/230V)

Alcune versioni di frigoriferi sono equipaggiati con termostati la cui simbologia della regolazione della temperatura si differenzia dalla descrizione sopra, in questi casi fare riferimento alla fig.1. Il raffreddamento del frigorifero aumenta ruotando la manopola in senso orario.

Per una razionale sistemazione e conservazione dei cibi attenersi alla tabella sottostante:

Cibo	Tempo di conservazione	Disposizione nel frigo
Carne e pesce pulito (avvolgere in sacchetti o fogli di plastica).	2 o 3 giorni	Sulla griglia sotto la zona freezer.
Uova.	1 mese	Utilizzare gli scomparti della controporta.
Burro, margarine.	1 settimana	Utilizzare gli scomparti della controporta.
Cibi cotti, torte e minestre (chiudere in recipienti ermetici ed introdurre dopo il raffreddamento).	3 o 4 giorni	Sulla griglia nella parte più bassa del frigorifero.
Salumi crudi, pasta fresca, creme, budini, cioccolati, pasticcini alla crema, lardo, pasticceria secca, pomodori rossi.	3 o 4 giorni	Su qualsiasi griglia.
Bottiglie.		Negli appositi vani della controporta.
Frutta e verdura.		Nella verduriera; nella parte inferiore del frigo.

SOSTITUZIONE DELLA LAMPADINA

Per effettuare la sostituzione della lampadina procedere come segue:

- Estrarre perpendicolarmente alla base il coperchio di protezione facendo attenzione a non danneggiare i perni di fissaggio.
- Allontanare una delle due molle per poter sfilare la lampadina.
- Ripiegare un poco le due molle l'una verso l'altra e inserire la nuova lampadina.
- **Controllare che la lampadina sia ben serrata sulle molle.**
- Riposizionare il coperchio.

REVERSIBILITA' DELLA PORTA

Per variare il verso di apertura della porta con chiusura a PIN:

- Smontare la cerniera superiore e la chiusura a PIN.
- Estrarre la porta fino a liberarla dalla cerniera inferiore.
- Smontare la cerniera inferiore e rimontarla sulla parte opposta del frigorifero.
- Riposizionare la porta sulla cerniera inferiore.
- Rimontare la cerniera superiore e la chiusura a PIN nella parte opposta.

CAMBIO PANNELLO

Per poter smontare e/o cambiare il pannello porta occorre agire nel seguente modo:

- Togliere la porta seguendo le indicazioni del paragrafo precedente.
- Svitare le viti presenti sulla base inferiore ed estrarla.
- Sfilare il pannello facendolo scorrere verso il basso.
- Montare il nuovo pannello inserendolo al posto di quello eliminato facendolo scorrere verso l'alto fino al blocco.
- Rimontare la base inferiore.

SBRINAMENTO DELL'APPARECCHIO

Sarà opportuno procedere allo sbrinamento del frigorifero ogni qualvolta si riscontri uno spessore di brina superiore a tre millimetri. Tale operazione è necessaria per garantire un buon rendimento del frigorifero ed evitare maggior consumo di energia elettrica.

Per ottenere il completo sbrinamento del frigorifero ruotare la manopola del termostato in posizione stop. Mantenere la porta aperta onde accelerare i tempi di sbrinamento.

Non rimuovere lo strato di brina utilizzando utensili metallici appuntiti o taglienti che possono provocare forature nella piastra refrigerante con conseguenze irreparabili per l'apparecchio.

Nei frigoriferi ad accumulo di freddo, lo sbrinamento avviene automaticamente. Si consiglia di svuotare il gocciolatoio giornalmente.

A fine sbrinamento provvedere alla messa in funzione del frigorifero riportando la manopola del termostato nella posizione desiderata.

AVVERTENZE PARTICOLARI PER FRIGORIFERI 220 Vca

COLLEGAMENTO ELETTRICO

E' obbligatoria a termini di legge la messa a terra dell'apparecchio. Assicurarsi che il sistema di messa a terra dell'impianto elettrico sia perfettamente efficiente.

Si declina ogni responsabilità per eventuali danni subiti da persone o cose derivanti dalla mancata osservanza di tale norma.

E' sconsigliabile l'uso di adattatori, prese multiple e prolunghe. Se il loro uso si rendesse indispensabile utilizzare esclusivamente materiale conforme alle vigenti norme di sicurezza facendo attenzione a non superare il limite di portata in valore di corrente riportato sui materiali stessi. In caso di incompatibilità fra la presa e la spina dell'apparecchio è preferibile sostituire la presa con altra di tipo adatto. Tale operazione è consigliabile sia eseguita da personale qualificato il quale dovrà accertare che la sezione dei cavi della presa sia idonea alla potenza assorbita dall'apparecchio.

COSA FARE SE IL FRIGO NON FUNZIONA

1- L'APPARECCHIO NON FUNZIONA

Controllare che:

- il termostato non sia nella posizione "STOP".
- non manchi corrente.
- l'interruttore automatico dell'impianto elettrico non sia disinserito.
- la spina sia efficiente e correttamente inserita nella presa di corrente.
- la presa di corrente sia efficiente. Per tale verifica collegare alla presa un apparecchio la cui funzionalità sia certa.
- il cavo di alimentazione non sia interrotto.

2- FRIGORIFERO RUMOROSO

Controllare che:

- il frigorifero o il gruppo refrigerante sia ben livellato.
- il frigorifero non sia a contatto con mobili che possono causare vibrazioni.
- i tubi del circuito refrigerante posti sul retro non abbiano punto di contatto e non vibrino contro l'apparecchio.

3- FRIGORIFERO CON RESA INSUFFICIENTE

Controllare che:

- la porta chiuda ermeticamente.
- il frigorifero non sia vicino a fonti di calore.
- che il frigorifero o il gruppo refrigerante remoto sia sufficientemente aerato.
- non vi sia sull'evaporatore un eccessivo riporto di brina.
- che il condensatore non sia intasato di polvere.
- che la ventola giri liberamente (nelle versioni con raffreddamento forzato).
- che l'interno non sia troppo stipato.

Se al termine di tali verifiche non si riuscisse ad ottenere un funzionamento regolare, rivolgersi al servizio assistenza.

AVVERTENZE PARTICOLARI PER FRIGORIFERI 12-24 Vcc

INSTALLAZIONE

Per l'installazione di frigo o impianti frigo a bordo di caravan, camper, motor home etc. si consiglia di predisporre il mezzo con prese di aerazione direttamente sull'esterno (vedi fig.6).

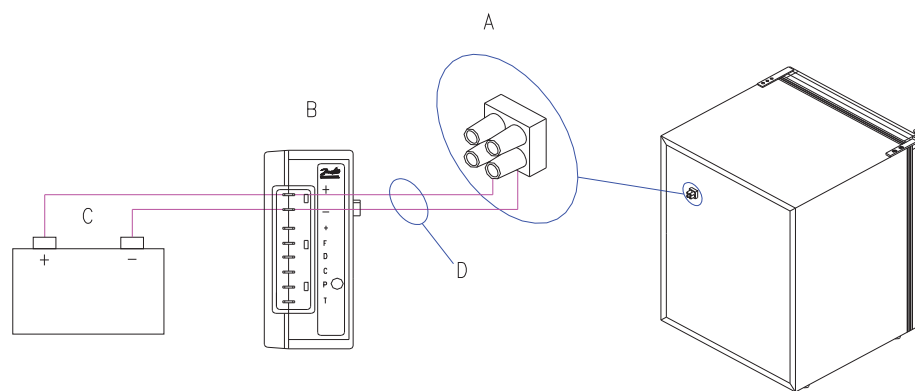
Per l'installazione dei frigoriferi portatili è disponibile su alcuni modelli una staffa per il fissaggio del frigorifero (vedi fig.7).

COLLEGAMENTO ELETTRICO

Per i frigoriferi alimentati a 12Vcc o 24Vcc si consiglia di collegare gli impianti direttamente alla batteria attenendosi alle corrispondenti istruzioni del compressore Danfoss in dotazione (vedi pag.16 e pag.17).

Collegamento alimentazione luce interna su frigoriferi 12/24Vcc con motore remoto:

- Collegare il cavo in opzionale "D" (Cod.**R10777**) alla morsettiera presente sullo schienale del frigo e alla centralina del compressore. (La morsettiera "A" non è polarizzata, pertanto la connessione può essere effettuata indistintamente.)
- Collegare la batteria alla centralina del compressore, **facendo attenzione alla polarità!**
 - Morsettiera collegamento luce interna.
 - Centralina compressore.
 - Batteria.
 - Cavo in dotazione alimentazione luce interna.



AVVERTENZE PARTICOLARI PER FRIGORIFERI 12-24 Vcc 100-240 Vca

COLLEGAMENTO ELETTRICO

Si consiglia di collegare la linea di alimentazione a 12Vcc o 24Vcc direttamente alla batteria attenendosi alle corrispondenti istruzioni del compressore Danfoss in dotazione (vedi pag.16 e pag.17).

Predisporre la linea di alimentazione in Vca utilizzando cavo tripolare di sezione minima per conduttore di 1 mmq ed isolamento adeguati alle modalità ed all'ambiente di utilizzo e conforme alle normative vigenti.

Realizzare la connessione alla linea di alimentazione in Vca mediante una connessione spina presa di portata adeguata conforme alle normative vigenti o predisporre un interruttore magnetotermico differenziale omipolare con portata di 6 ampere e con apertura dei contatti di almeno 3mm o comunque conforme alle normative vigenti.

Al termine dell'installazione verificare la continuità del circuito di terra ed eseguire tutte le prove di sicurezza elettrica previste dalle normative vigenti.

Proteggere e bloccare adeguatamente i cavi al fine di evitare che trazioni accidentali del cavo possano disconnetterlo dalle connessioni o che possano venire a contatto con parti calde con temperatura superiore a 50°C o con parti taglienti.

L'installazione delle linee di alimentazione è consigliabile sia eseguita da personale qualificato il quale provvederà alla verifica della rispondenza dell'impianto alle normative vigenti ed a rilasciare le relative certificazioni di conformità.

E' obbligatoria a termini di legge la messa a terra dell'apparecchio. Assicurarsi che il sistema di messa a terra dell'impianto elettrico sia perfettamente efficiente.

Si declina ogni responsabilità per eventuali danni subiti da persone o cose derivanti dalla mancata osservanza di tale norma.

Collegamento alimentazione luce interna su frigoriferi 12/24Vcc 100-240 Vca con motore remoto:

- Collegare il cavo opzionale (Cod. **R10777**) per il collegamento della luce interna dalla morsettiera presente sullo schienale del frigo e alla centralina del compressore seguendo lo schema presente alla figura 15. (La morsettiera non è polarizzata, pertanto la connessione può essere effettuata indistintamente.)

REGOLAZIONE DELLA TEMPERATURA

▪ TERMOSTATO MECCANICO

Nei frigoriferi ad accumulo di freddo 12Vcc o 24Vcc onde ottenere il massimo risparmio energetico si consiglia di posizionare la manopola del termostato in posizione 'A' per i frigo con capacità massima di 75 lt; in posizione 'A1' per capacità superiori (fig.1).

▪ TERMOSTATO "LED"

Il termostato elettronico "LED" è provvisto di due comandi a pulsante:

- Il comando di accensione e spegnimento "ON/OFF"
- Il comando di regolazione della temperatura "*"

Premendo il comando contrassegnato con "ON/OFF" si ottiene alternativamente **l'accensione o lo spegnimento del frigorifero.**

Per impostare la temperatura desiderata premere il comando contrassegnato con il simbolo *.

Ad ogni pressione l'indicatore luminoso a LED scorre da sinistra verso destra, per le posizioni intermedie si avrà l'accensione dei due LED vicini.

Quando l'indicatore si trova a sinistra, il frigorifero è al minimo (più caldo) mentre ogni posizione verso destra indica un aumento della temperatura (più fredda) di circa 3°C.

Per selezionare una temperatura più fredda premere ripetutamente il comando fino all'accensione dell'indicatore luminoso più a destra (massimo freddo), la successiva pressione realizza l'accensione dell'indicatore luminoso più a sinistra.

Per schema elettrico vedi fig. 8°a/b/f°



▪ TERMOSTATO DIGITALE

Il termostato DIGITALE consente di monitorare costantemente la temperatura interna del frigo l'accensione/spegnimento del compressore.

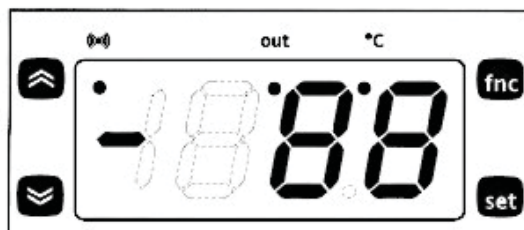
L'utente dispone di un display e di quattro tasti per il controllo dello stato e la programmazione dello strumento.

Al momento del collegamento dell'alimentazione il display comincia a lampeggiare e si arresta visualizzando la temperatura attuale all'interno del frigo.

Per default il termostato è impostato a 0°C.

COME MODIFICARE I PARAMETRI:

- Premere il tasto **SET** velocemente (entro 5 sec.) 2 volte. La prima volta comparirà la scritta “SET” e la seconda il valore “0” o precedentemente impostato.
- Agendo sui pulsanti  o  modificare la temperatura che il frigo dovrà raggiungere.
- Premere il tasto **FNC** velocemente 2 volte per confermare la temperatura impostata. La prima volta comparirà la scritta “SET” e la seconda la temperatura interna.
- Il puntino posto sotto la scritta “OUT” indica che il compressore e la ventola sono in funzione.



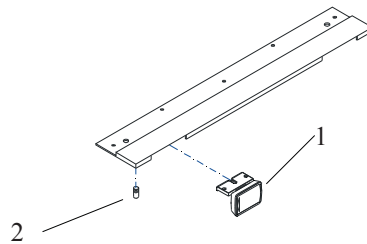
I rispettivi schemi elettrici sono riportati nelle fig. 8c/d/g (12/24V)

**UN MANUALE ISTRUZIONI RELATIVO AL TERMOSTATO DIGITALE È
COMUNQUE PRESENTE IN DOTAZIONE IN OGNI FRIGO.**

REVERSIBILITA' DELLA PORTA

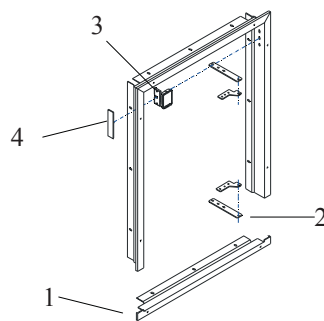
Per variare il verso di apertura della porta con chiusura NAUTIC-EUROPA:

- Smontare la cerniera inferiore ed estrarre la porta verso il basso.
- Smontare la maniglia Nautic (1) e riposizionarla sulla porta nella parte opposta facendo attenzione agli interassi dei fori.
- Svitare il perno d'incernieramento (2) dalla staffa e avvitarlo nella parte opposta.
- Riposizionare la porta facendo attenzione che la chiusura lavori in modo efficiente.
- Rimontare la cerniera inferiore nella parte opposta del frigorifero.



Per variare il verso di apertura della porta con chiusura NAUTIC-USA:

- Smontare la base del profilo di fissaggio (1) se presente.
- Smontare la cerniera e il piastrino inferiore (2) ed estrarre la porta verso il basso.
- Smontare la maniglia Nautic (3), invertire i fermi e la molla interna per modificarne il movimento di apertura; ruotare l'impugnatura per il verso della freccia.
- Riposizionare la maniglia Nautic sul lato opposto della porta facendo attenzione agli interassi dei fori.
- Spostare il piastrino di aggancio chiusura (4) sul lato opposto del profilo.
- Riposizionare la porta facendo attenzione che la chiusura lavori in modo efficiente.
- Riposizionare la cerniera, il piastrino inferiore e la base del profilo di fissaggio.



COSA FARE SE IL FRIGO NON FUNZIONA

1- L'APPARECCHIO NON FUNZIONA

Controllare che:

- il termostato non sia nella posizione “STOP”.
- l'interruttore automatico dell'impianto elettrico non sia disinserito.
- il fusibile posto sul dispositivo elettronico del frigorifero sia integro.
- il cavo di alimentazione non sia interrotto.
- la batteria sia efficiente.
- **la tensione sulla morsettiera del dispositivo elettronico del frigorifero sia uguale a quella della batteria.** Nel caso verificaste una caduta di tensione superiore a 0,2-0,4V controllare che:
 - la sezione del cavo che collega la batteria al dispositivo elettronico del frigorifero sia di dimensione adeguata (vedi tabella su istruzioni Danfoss allegate).
 - lungo la linea di alimentazione eventuali punti di giunzione non siano deteriorati o non correttamente serrati.
 - non vi siano ossidazioni sui poli della batteria e nei punti di contatto.
-

2- FRIGORIFERO RUMOROSO

Controllare che:

- il frigorifero o il gruppo refrigerante sia ben livellato.
- il frigorifero non sia a contatto con mobili che possono causare vibrazioni.
- i tubi del circuito refrigerante posti sul retro non abbiano punto di contatto e non vibrino contro l'apparecchio.

3- FRIGORIFERO CON RESA INSUFFICIENTE

Controllare che:

- la porta chiuda ermeticamente.
- il frigorifero non sia vicino a fonti di calore.
- che il frigorifero o il gruppo refrigerante remoto sia sufficientemente aerato.
- non vi sia sull'evaporatore un eccessivo riporto di brina.
- che il condensatore non sia intasato di polvere.
- che la ventola giri liberamente (nelle versioni con raffreddamento forzato).
- che l'interno non sia troppo stipato.

Se al termine di tali verifiche non si riuscisse ad ottenere un funzionamento regolare, rivolgersi al servizio assistenza.

ISTRUZIONI DANFOSS BD35/BD50F 12-24 Vcc

L'unità elettronica di controllo è un'apparecchiatura con possibilità di due diverse tensioni di alimentazione. Ciò significa che la stessa unità è utilizzabile sia in sistemi con alimentazione a 12V, sia a 24V. La tensione massima per sistemi a 12V è di 17V, mentre quella per i sistemi a 24V è di 31,5V. La massima temperatura ambiente consentita è di 55°C. L'unità elettronica di controllo è dotata di una protezione termica incorporata che entra in funzione in caso di surriscaldamento arrestando il compressore.

Installazione (fig. 10)

Collegare il connettore terminale dell'unità elettronica di controllo al terminale del compressore. Montare l'unità sul compressore incastrando il coperchio sulla testa della vite (1).

Alimentazione (fig. 10)

L'unità elettronica di controllo deve essere sempre collegata direttamente ai poli della batteria (2). Connettere il polo positivo al + ed il negativo al -; diversamente l'unità non potrà funzionare. L'unità è protetta contro l'inversione di polarità. Per proteggere l'installazione deve essere sempre montato un fusibile (3) sul cavo + il più vicino possibile alla batteria. Si raccomanda l'uso di un fusibile da 15A per il circuito a 12V e di un fusibile da 7,5A per il circuito a 24V. Se si fa uso di interruttore generale (4), esso va dimensionato per un minimo di 20A. Le dimensioni dei cavi raccomandate in fig. 11 devono essere rispettate. Evitare ulteriori connessioni al sistema di alimentazione per evitare che eventuali cadute di tensione influiscano sulle impostazioni per la protezione della batteria.

Protezione batteria (fig. 10)

L'arresto ed il riavvio del compressore dipendono dall'impostazione dei prescelti limiti di tensione misurati sui morsetti + e - dell'unità elettronica di controllo. Le impostazioni standard per i sistemi con alimentazione rispettivamente a 12V e 24V sono indicati in fig. 12. Possono comunque essere impostati altri limiti (fig. 13) nel caso in cui si effettui una connessione per mezzo di una resistenza (9) tra i morsetti C e P. Nelle applicazioni per pannelli solari senza batteria si raccomanda un resistore da 220 kW. Nella modalità AEO (ottimizzazione energetica mediante controllo adattativo) il compressore BD adatterà sempre la propria velocità alla reale richiesta di resa frigorifera entro una tensione d'esercizio casuale compresa tra 9,6 e 31,5 V.

Termostato (fig. 10)

Il termostato (7) va collegato tra i morsetti C e T. Senza resistenza nel circuito di controllo il compressore con unità elettronica 101N0210 o 101N0220 ruoterà alla velocità di 2.000 giri/min quando il termostato è inserito. Con il termostato collegato direttamente al terminale C, l'unità elettronica 101N0300 adatterà la

propria velocità alla reale richiesta di resa frigorifera. È possibile ottenere altre velocità del compressore, comprese nella gamma 2000-3500 giri/min, inserendo una resistenza (8) per la regolazione della corrente (mA) nel circuito di controllo. I valori della resistenza per diverse velocità del motore sono riportati in fig. 14.

Ventilatore (opzionale, Fig. 10)

È possibile collegare un ventilatore (5) tra i terminali + ed F. Collegare il positivo al + e il negativo ad F. Poiché la tensione di uscita tra i morsetti + ed F viene sempre regolata a 12V, va utilizzato un ventilatore a 12V sia nel caso di alimentazione a 12V che nel caso di alimentazione a 24V! L'uscita per il ventilatore è in grado di fornire una corrente continua di 0,5 Aavg. In fase di accensione è comunque permesso un assorbimento di corrente maggiore per un tempo di 2 secondi.

LED (opzionale, fig. 10)

È anche possibile collegare un diodo LED da 10 mA (6) tra i morsetti + e D. Nel caso in cui l'unità elettronica di controllo registri un errore di funzionamento, il diodo lampeggerà un certo numero di volte. Il numero dei lampeggi dipende dal tipo di errore registrato, con una durata per ciascun lampeggio di 1/4 di secondo. Alla sequenza di lampeggi fa seguito una pausa senza lampeggiare, dopo di che la sequenza relativa all'errore in questione verrà ripetuta ogni 4 secondi.

Numero-lampeggi	Tipo di errore
5	Arresto termico dell'unità elettronica (Se il sistema di refrigerazione è stato sottoposto a carico eccessivo o se la temperatura ambiente è troppo elevata, l'unità di controllo si surriscalderà).
4	Velocità del motore troppo bassa (Se il sistema di refrigerazione viene sottoposto ad un carico eccessivo, il motore non è in grado di mantenere la velocità minima di 1.850 rotazioni/min).
3	Errore nell'avviamento del motore (Il rotore è bloccato o la pressione differenziale nel sistema di refrigerazione è troppo alta (>5 bar)).
2	Arresto del ventilatore per sovracorrente (Il ventilatore assorbe dall'unità elettronica di controllo una corrente superiore a 1 A _{avg}).
1	Arresto per protezione batteria (La tensione di alimentazione si trova al di fuori del valore di stacco impostato).

ISTRUZIONI DANFOSS BD35/BD50F
12-24 Vcc / 110-240 Vca

L'unità elettronica è un dispositivo multitensione. Può essere utilizzato sia con sistemi di alimentazione da 12V/24V DC che da 100-240V AC 50/ 60Hz. In caso di sistema di alimentazione a 12V DC la tensione massima è 17V DC; per sistemi di alimentazione a 24V DC la tensione massima è 31.5V DC. In caso di sistema di alimentazione AC, la tensione massima è 265V AC, la tensione minima è 85V AC. La temperatura ambiente massima è di 55°C. L'unità elettronica è dotata di un isolamento termico incorporato che attiva ed arresta il funzionamento del compressore in caso la temperatura dell'unità elettronica diventi troppo elevata (100°C / 212°F sul circuito stampato). **La potenza assorbita è limitata a 100W. Vedi la scheda tecnica BD50F per i dettagli.**

Installazione (fig. 10)

Collegare il connettore terminale dell'unità elettronica di controllo al terminale del compressore. Montare l'unità sul compressore incastrando il coperchio sulla testa della vite (1).

Alimentazione (fig. 10)

DC: L'unità elettronica di controllo deve essere sempre collegata direttamente ai poli della batteria (2). Connettere il polo positivo al + ed il negativo al -; diversamente l'unità non potrà funzionare. L'unità è protetta contro l'inversione di polarità. Per proteggere l'installazione deve essere sempre montato un fusibile (3) sul cavo + il più vicino possibile alla batteria. Si raccomanda l'uso di un fusibile da 15A per il circuito a 12V e di un fusibile da 7,5A per il circuito a 24V. Se si fa uso di interruttore generale (4), esso va dimensionato per un minimo di 20A. Le dimensioni dei cavi raccomandate in fig. 11 devono essere rispettate. Evitare ulteriori connessioni al sistema di alimentazione per evitare che eventuali cadute di tensione influiscano sulle impostazioni per la protezione della batteria.

AC: I cavi elettrici devono essere collegati ai morsetti contrassegnati L ed N sulla unità elettronica. Tensione nominale da 100 a 240 V AC 50/60Hz. Interruttore di sicurezza: limite superiore = 270V AC, limite inferiore = 80V AC. Un fusibile 4A (11) deve essere montato nel cavo di tensione (L) per proteggere l'impianto. Qualora si utilizzi un interruttore principale (12), deve essere regolato ad una corrente di almeno 6A. Il cavo deve avere dimensione minima di 0.75 mm² o 18 AWG. NB: se necessario è possibile utilizzare la connessione di terra.

Generale: è possibile collegare contemporaneamente all'unità elettronica sia alimentazione AC che alimentazione DC. In questo caso, AC sarà la fonte di alimentazione preferenziale. In caso di disconnessione dell'alimentazione AC o di caduta al di sotto di 85V

AC si attiverà il sistema di alimentazione a 12V DC con un ritardo di 1 minuto. Qualora venga ristabilita l'alimentazione AC, non vi sarà alcun ritardo nel funzionamento del compressore.

Protezione batteria (fig. 10)

L'arresto ed il riavvio del compressore dipendono dall'impostazione dei prescelti limiti di tensione misurati sui morsetti + e - dell'unità elettronica di controllo. Le impostazioni standard per i sistemi con alimentazione rispettivamente a 12V e 24V sono indicati in fig. 12. Possono comunque essere impostati altri limiti (fig. 13) nel caso in cui si effettui una connessione per mezzo di una resistenza (9) tra i morsetti C e P.

Termostato (fig. 10)

Il termostato (7) va collegato tra i morsetti C e T. Senza resistenza nel circuito di controllo il compressore con unità elettronica 101N0210 o 101N0220 ruoterà alla velocità di 2.000 giri/min quando il termostato è inserito. È possibile ottenere altre velocità del compressore, comprese nella gamma 2000-3500 giri/min, inserendo una resistenza (8) per la regolazione della corrente (mA) nel circuito di controllo. I valori della resistenza per diverse velocità del motore sono riportati in fig. 14.

Ventilatore (opzionale, Fig. 10)

È possibile collegare un ventilatore (5) tra i terminali + ed F. Collegare il positivo al + e il negativo ad F. Poiché la tensione di uscita tra i morsetti + ed F viene sempre regolata a 12V, va utilizzato un ventilatore a 12V sia nel caso di alimentazione a 12V che nel caso di alimentazione a 24V! L'uscita per il ventilatore è in grado di fornire una corrente continua di 0,5 Aavg. In fase di accensione è comunque permesso un assorbimento di corrente maggiore per un tempo di 2 secondi.

Lampada (opzionale, Fig. 1)

Una lampada da 5 Watt 12V DC (10) può essere collegata fra i morsetti A e C. La tensione d'uscita fra i morsetti A e C è sempre regolata su 12V DC. Sia con il sistema di alimentazione a 12V che con quello a 24V deve essere utilizzata una lampada 12V DC. L'uscita della lampada può erogare una tensione continua di 0,5A di media.

LED (opzionale, Fig. 1)

Un LED da 10mA (6) può essere collegato fra i morsetti + e D. In caso l'unità elettronica rilevi un errore di funzionamento, il diodo lampeggia per un determinato numero di volte. Questo numero dipende dal tipo di errore di funzionamento rilevato. Ogni lampeggiamento ha la durata di ¼ di secondo. Alla sequenza di lampeggiamento segue un intervallo privo di emissioni luminose, e quindi la sequenza relativa ad ogni errore rilevato è ripetuta ogni 4 secondi.

INTRODUCTION

Dear Customer,

Thank you for choosing a VITRIFRIGO product. We hope that you will be completely satisfied with your purchase.

This manual is considered an integral part of the refrigerator and must accompany it from the time of sale to the end user. Vitrifrigo prohibits the reproduction of this manual in any part or form.

Before leaving our works, every refrigerator is subjected to stringent tests and inspections to guarantee correct operation.

For more information or clarifications, please contact one of our assistance centres or our offices directly.

Vitri Alceste



WARNINGS

- Read this manual carefully before using the refrigerator.
- If this appliance is replacing an older model, any locking device must be rendered completely non-functional prior to disposal.
- Verify that the packaging should be not damaged, otherwise tell it to the forwarder agent.
- Unpacking and installation of the unit must be carried out with the utmost care. To avoid accidental injury use protective gloves, in particular for the models with remote refrigerating unit (Fig. 3).
- After unpacking the appliance, ensure that it is not damaged in any way. Notification of damage must be given to the dealer no later than 24 hours from the purchase date.
- The appliance must be used exclusively for the conservation of food and drinks.
- Install the appliance far from any heat sources and allow for sufficient ventilation (see indications below).
- After installation, wait at least one hour before switching on the refrigerator. This precaution ensures optimum refrigeration efficiency.
- Before connecting the appliance to the power supply, check that the line voltage corresponds to the specifications stated on the appliance rating plate and that of the compressor.
- After installation check, that the appliance is not standing on the power cable.
- For any operational problems, please contact your nearest Vitrifrigo assistance centre. In any case, always refer to qualified personnel for assistance.
- Before carrying out any maintenance or cleaning operations, disconnect the appliance from the power supply.
- Do not put glass containers holding liquids into the freezer compartment.
- Dispose of packaging material in accordance with local by-laws for sorted waste recycling.
- This machine cannot be thrown away with urban waste; it must be disposed of as separate refuse. Contact the special refuse collection centres for electrical and electronic appliances in your area or return it to your dealer when you purchase a newer model.
- If not disposed of correctly, the machine may cause damage to the environment and to people's health on account of the specific substances it contains.
- The symbol shown here opposite indicates that this machine cannot be disposed of with urban waste.
- Should you fly tip or dispose of the machine incorrectly, you risk fines and/or legal action being taken against you, as specified by the laws in force.
- The use of the refrigerator for anything other than its intended purpose is strictly prohibited.
- Always keep the appliance perfectly clean and maintain the safety devices in good working order.
- Keep the air vents in the appliance casing and/or cabinet for built-in installation free from obstruction.
- Never remove safeguards (casings) from the refrigerator.
- Always perform the checks, inspections, and scheduled maintenance, as specified on page x of this manual.
- The appliance must never be exposed to rain.
- Suitable for campsite use.



General Information

Purpose of the manual

This manual, which applies to refrigerators from the “INTERIOR (230 V AC) OCEAN-RUNNER (12/24 V DC)” ranges, is intended as a guide for the correct and safe use of same as well as for their routine maintenance.

To learn all about how to operate and use your refrigerator within a short space of time, you must read this use and maintenance manual carefully as from the first time of use.

The correct operation of your refrigerator also depends on efficient and effective maintenance. However, it is necessary to know how to perform maintenance operations. The instructions for use indicate all of the operations required to start, stop and operate your refrigerator.

Your refrigerator has been made in compliance with all of the safety requirements foreseen by the relevant directives. However, maximum user safety depends on reading this manual carefully as well as on constant, careful cleaning and maintenance. Some of the information or figures in this manual may show details or features that differ slightly from those on your refrigerator; this does not alter essential information. Due to our policy of constant product improvement, your refrigerator may have variations not mentioned in this manual. Any variations will be included in subsequent versions as necessary.

Manufacturer's identity

This refrigerator is designed and made exclusively by:

Vitrifrigo s.n.c

Via Della Produzione, 9
61020 Montecchio (PU)

Italy

Tel. +39 0721 491080

Fax. +39 0721 497739

E-Mail. vitrifrigo@vitrifrigo.com

www.vitrifrigo.com

DESCRIPTION OF THE APPLIANCE (Fig. 2 and Fig. 7)

12/24Vcc – 220Vca

- A) Horizontal evaporator
- A1) Vertical evaporator
- B) Drip tray
- C) Thermostat housing
- D) Removable wire racks
- E) Glass shelf (on some models only)
- F) Salad drawer (on some models only)
- G) Door compartments (removable)

12/24Vcc Portatili

- A) Basket
- B) Pawl closure
- C) Evaporator
- D) Bracket fastening screw
- E) Fixing bracket
- F) Mount with digital thermostat
- G) Mount with LED thermostat
- H) Manual thermostat (C26 only)
- I) Switch (C26 only)
- J) Handle
- K) 12/24 V DC – 220 V AC socket

The data plate bearing the serial number and technical data is located on the upper right-hand section, inside the refrigerator. The first three figures of the serial number indicate the year and week of manufacture.

All materials exposed to contact with food comply with EC directive 2004/1935.

Noise emission levels are maintained below 70 dB (A).

INSTALLATION

Ensure that the appliance is in no way damaged. Any damage resulting from transport must be reported to the dealer no later than 24 hours after delivery.

Handle the appliance with care. Take care when positioning the refrigerating unit (in the case of refrigerators with remote refrigerating units) to avoid breaking the connection pipelines or obstructing them in any way. Always ensure that the refrigerator and remote refrigerating unit (where supplied) are installed on a flat surface. For built-in installation, cut two holes in the cupboard that will accommodate the refrigerator: one at the bottom next to the refrigerating unit and the second in the top or on the upper half of the side. The holes must have an area of at least 300 cm². If this is not possible, leave a gap of at least 50 mm between refrigerator top and the interior surface of the top of the cupboard (see Fig. 5).

Install the refrigerator away from heat sources in dry and well-ventilated surroundings. Leave the appliance for at least one hour before switching on. In the meantime the appliance should be cleaned for the first time.

CLEANING THE REFRIGERATOR

Before cleaning, ensure that the refrigerator is not connected to the power supply. If necessary, extract the plug from the power socket.

EXTERIOR

Clean exterior first with warm and then with cold water. Dry with a soft cloth. Avoid all use of abrasive products.

INTERIOR

Remove the racks (or basket), containers, and ice trays, and clean the interior using warm water mixed with a little bicarbonate of soda or vinegar. Rinse and dry carefully with a soft cloth. Never use abrasive products, detergents or soap.

CONDENSER

The condenser (Fig. 4) should be cleaned at least once a year using a vacuum cleaner or a dry brush.

In the case of prolonged disuse, to avoid the formation of mould or unpleasant odours, extract the plug from the socket, empty the unit completely, clean the interior, and leave the door ajar.

ELECTRICAL CONNECTION

This appliance complies with EC directive 89/336 governing radio suppression. Before connecting the appliance to the power supply, check that the line voltage corresponds to the indications on the appliance rating plate and those of the compressor plate.

TEMPERATURE CONTROL

Each refrigerator is fitted with a thermostat, which automatically maintains set temperatures.

▪ MECHANICAL THERMOSTAT

Select the desired temperature by means of the adjustment knob.

When the knob is on "0" or "STOP" the refrigerator is not in operation.

The refrigerator is started by turning the knob to "1". Temperature settings range from 1 to 5; 5 being the lowest temperature.

For the wiring diagram, see Fig. 8e/h (12/24 V) or Fig. 9 (115 V/230 V)

Some models are fitted with thermostats with different temperature scale markings to those described above. In this case refer to Fig. 1. Decrease temperature by turning the knob clockwise.

For rational food storage and conservation refer to the table below:

Food	Storage Time	Position in Refrigerator
Cleaned meat or fish (place in plastic bags or wrapping)	2 to 3 days	On the rack under the freezer compartment
Eggs	1 month	Use door compartment
Butter, margarine	1 week	Use door compartment
Cooked food, cakes and soups (cool and place in airtight, sealed containers)	3 to 4 days	On the lowest rack in the refrigerator
Cold cuts of meat, fresh pasta, confectioners creams and custards, puddings, chocolate, cream cakes, lard, pastries, tomatoes	3 to 4 days	On any rack
Bottles		In the bottle compartment inside door
Fruit and vegetables		In the salad drawer at the bottom of the refrigerator

REPLACING THE LAMP

To replace the lamp (see fig. 2), proceed as follows:

- Remove the protective cover perpendicularly from the base. Take care not to damage the fastening pins.
- Move one of the two springs in order to be able to slide out the lamp.
- Bend the two springs lightly towards one another and insert the new lamp.
- **Make sure that the light is correctly tightened on the springs.**

Refit the cover.

REVERSING THE DOOR

To change the door opening direction on doors with PIN closure:

- Remove the top hinge and PIN closure.
- Pull the door away until it comes free of the bottom hinge.
- Remove the bottom hinge and refit it on the opposite side of the refrigerator.
- Refit the door on the bottom hinge.
- Fit the top hinge and PIN closure on the opposite side.

PANEL CHANGING

To remove and/or change the panel, proceed as follows:

- Remove the door, as indicated in the previous section.
 - Loosen the screws on the lower base section and remove it.
 - Remove the panel by sliding it out downwards.
 - Insert a new panel in place of the old one, sliding it upwards as far as the stop.
- Refit the lower base section.

DEFROSTING

Defrosting should be carried out whenever the frost layer exceeds a thickness of three millimetres. This is necessary to guarantee efficient refrigeration and to avoid excessive power consumption.

To completely defrost the refrigerator turn the thermostat knob to "stop". Keep the door open to speed up defrosting time.

Do not attempt to remove the frost layer using any sharp metal instruments. This could pierce the refrigerator plate and cause irreparable damage to the appliance.

In portable absorption refrigerators, defrosting is carried out automatically. We recommend emptying the drip tray every day.

After defrosting, switch the refrigerator on by turning the thermostat knob to the desired setting.

SPECIAL WARNINGS FOR 220 V AC REFRIGERATORS

ELECTRICAL CONNECTION

The appliance must be earthed in accordance with the law.

Ensure that the earthing plant of the electrical system is in perfect working condition.

The manufacturer declines any responsibility for injury to people or damage to property caused by non-compliance with the above regulations.

Avoid the use of adaptors, multiple sockets and extension leads. If absolutely necessary, only use products that conform to current safety standards and take care not to exceed the maximum power stated in the product specifications.

If the socket and the appliance plug are incompatible, replace the socket with one of the correct type. This operation should be carried out by a qualified electrician who must ensure that the wire size of the socket is suitable for the electrical input of the appliance.

TROUBLESHOOTING

1- IF YOUR REFRIGERATOR DOES NOT WORK

Check that:

- the thermostat is not set to "Stop"
- the power supply is present
- the electrical system circuit breaker on the appliance has not tripped
- the plug is in perfect condition and is inserted properly in the socket
- the power socket functions properly. To check, connect up a similar appliance that you know functions correctly
- the power cable is not faulty.

2- EXCESS REFRIGERATOR NOISE

Check that:

- the refrigerator is standing on a completely level surface
- the refrigerator is not touching other objects which may cause vibrations
- the refrigerating circuit tubes at the back of the unit are not touching or vibrating against the appliance

3- INSUFFICIENT REFRIGERATING POWER

Check that:

- the door is sealed properly
- the refrigerator is not positioned close to heat sources
- the refrigerator and remote refrigerating unit are sufficiently ventilated
- frost has not accumulated on the evaporator
- dust has not blocked the condenser
- the fan rotates freely (in forced cooling models)
- the refrigerator is not over-full

If, after checking the above, the refrigerator still does not function, consult your nearest assistance centre.

SPECIAL WARNINGS FOR 12-24 V DC REFRIGERATORS

INSTALLATION

When installing the refrigerator in caravans, campers, motor homes etc., fit air vents communicating directly with the outside (see Fig. 6).

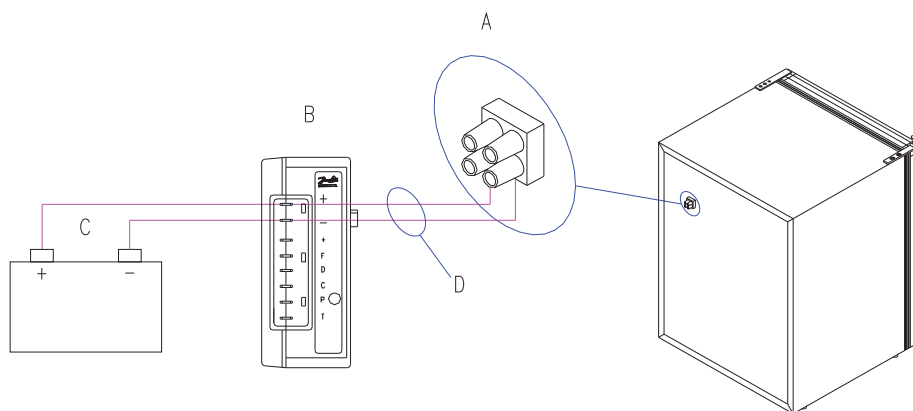
For installation purposes, some portable refrigerator models have a bracket to fix the refrigerator in place (see Fig. 7).

ELECTRICAL CONNECTION

For refrigerators powered at 12 or 24 V DC, we recommend connecting the systems directly to the battery, following the corresponding instructions for the Danfoss compressor supplied (see p.32 and p. 33).

Connecting power to the internal light on 12/24V DC refrigerators with remote motor:

- Connect the optional cable “D” (Code **R10777**) to the terminal board on the back of the refrigerator and to the compressor control unit. (The terminal board “A” is not polarised and therefore, the connection can be made without distinction).
- Connect the battery to the compressor control unit, **taking care to respect polarity!**
 - Terminal board for internal light connection.
 - Compressor control unit.
 - Battery.
 - Internal light power cable (supplied).



SPECIAL WARNINGS FOR 12-24Vcc 100-240Vca REFRIGERATORS

ELECTRICAL CONNECTION

We recommend connecting 12 or 24 V DC power lines directly to the battery, following the corresponding instructions for the Danfoss compressor supplied (see p. 32 and p.33).

Prepare the V AC power supply line using a three-pole cable with a minimum section per conductor of 1 sq mm, suitable insulation for the intended use and environment and compliant with the standards in force.

Connect the V AC power line using a plug/socket connection with suitable capacity compliant with the standards in force. Alternatively, it is possible to fit an omnipolar differential thermomagnetic circuit breaker with a capacity of 6 amperes and contact opening of at least 3 mm or in any case, compliant with the standards in force.

When installation is complete, check the continuity of the earth circuit and perform all of the electrical safety tests foreseen by the standards in force.

Protect the cables and lock them into place sufficiently to prevent them from disconnecting if accidentally pulled or from coming into contact with hot parts at temperatures above 50°C or with sharp parts.

Power line installation should be performed by qualified technical personnel who can check the compliance of the system with standards in force and issue the relevant conformity certification.

Connecting power to the internal light on 12/24V DC refrigerators with remote motor:

- Connect the optional cable (Code **R10777**) for inside light connection from the terminal board on the back of the refrigerator and to the control unit of the compressor, following the diagram on figure 15. (The terminal board is not polarised and therefore, the connection can be made without distinction.)

TEMPERATURE CONTROL

▪ MECHANICAL THERMOSTAT

In the case of 12V DC or 24V DC portable absorption refrigerators, for maximum energy saving, set the thermostat to position "A" for refrigerators of maximum 75 l capacity, and to "A1" for models exceeding this capacity (Fig. 1).

▪ “LED” THERMOSTAT

The electronic “LED” thermostat has two button controls:

- An “ON/OFF” control
- A temperature adjustment control “✱”

Pressing the control marked “ON/OFF” will **switch the refrigerator on or off**, alternatively.

To set the required temperature, press the control marked ✱. Each time this control is pressed, the LED indicator will light up from left to right; for intermediate settings, two adjacent LEDs will light up. When the LED indicator is on the left, the refrigerator is set to minimum (warmest), while a right-hand LED position indicates a reduction in temperature (cooler) of approximately 3°C. To select a cooler temperature, press the button repeatedly until the LED furthest to the right switches on (maximum cooling); if the control is pressed again, the LED furthest to the left will switch on.

For the wiring diagram, see Fig. 8a/b/f



▪ DIGITAL THERMOSTAT

The DIGITAL thermostat can be used to monitor the internal temperature of the refrigerator constantly as well as to switch the compressor on and off.

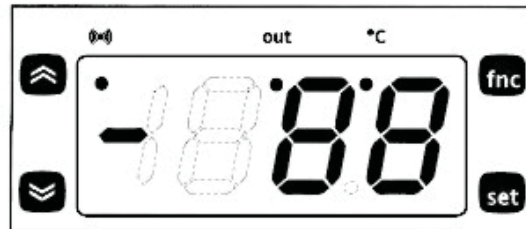
The thermostat has a display and four keys, to check its status and programming.

When first connected to the power supply, the display will begin to flash and then stop, showing the current temperature inside the refrigerator.

The default setting for the thermostat is 0°C.

EDITING THE PARAMETERS:

- Press the **SET** key twice quickly (within 5 sec.).
The first time, the display will read “SET” and the second time, it will show “0” or the parameter set previously.
- Use the  or  keys to change the temperature setting for the refrigerator.
- Press the **FNC** key twice quickly to confirm the new temperature setting.
The first time, the display will read “SET” and the second time, it will show the internal temperature.
- A small dot below the word “OUT” indicates that the compressor and fan are operating.



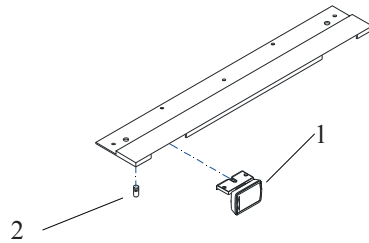
For the wiring diagram, see Fig. 8c/d/g (12/24V)

**AN INSTRUCTION MANUAL FOR THE DIGITAL THERMOSTAT IS
SUPPLIED WITH EACH REFRIGERATOR IN ANY CASE.**

REVERSING THE DOOR

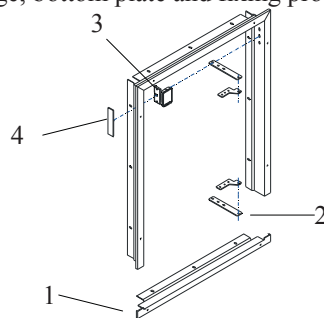
To change the door opening direction on doors with NAUTIC-EUROPA closure:

- Remove the bottom hinge and pull the door downwards.
- Take off the Nautic handle (1) and fit it back onto the door, on the opposite side, taking care to respect the distance between centres of the relevant holes.
- Unscrew the hinge pin (2) from the bracket and screw it to the other side.
- Refit the door, making sure that the closure operates effectively.
- Refit the bottom hinge on the opposite side of the refrigerator.



To change the door operating direction on doors with NAUTIC-USA closure:

- Remove the base of the fixing profile (1), if fitted.
- Remove the hinge and bottom plate (2) and pull the door downwards.
- Remove the Nautic handle (3), invert the stops and internal spring to change the opening movement; turn the handle grip in the direction of the arrows.
- Fit the Nautic handle back onto the door, on the opposite side, taking care to respect the distance between centres of the relevant holes.
- Move the catch plate (4) to the other side of the profile.
- Refit the door, making sure that the closure operates effectively.
- Refit the hinge, bottom plate and fixing profile base.



TROUBLESHOOTING

1-IF YOUR REFRIGERATOR DOES NOT WORK

Check that:

- the thermostat is not set to "STOP"
- the electrical system circuit breaker on the appliance has not tripped.
- the fuse in the electronic control unit has not blown
- the power supply cable is not faulty
- the battery is delivering sufficient power
- **the voltage on the electronic control unit terminal board corresponds to that of the battery.** If there is a voltage drop of over 0.2-0.4 V check that:
 - the size of the cable connecting the battery to the electronic control unit corresponds to specifications (see table in the Danfoss instructions enclosed)
 - any junction points in the power line are efficient and terminals are properly tightened.
 - there are no signs of oxidation on the battery poles and contact points

2-EXCESS REFRIGERATOR NOISE

Check that:

- the refrigerator and refrigerating unit are positioned on flat surfaces
- the refrigerator is not touching other objects that may cause vibrations
- the refrigerating circuit tubes at the back of the unit are not touching or vibrating against the appliance

3-INSUFFICIENT REFRIGERATING POWER

Check that:

- the door is sealed properly
- the refrigerator is not positioned close to heat sources
- the refrigerator and remote refrigerating unit are sufficiently ventilated
- frost has not accumulated on the evaporator
- dust has not blocked the condenser
- the fan rotates freely (in forced cooling models)
- the refrigerator is not over-full

If, after checking the above, the refrigerator still does not function, consult your nearest assistance centre.

INSTRUCTIONS FOR DANFOSS BD35/BD50F 12-24 V DC

The electronic unit is a dual voltage device. This means that the same unit can be used in both 12V and 24V power supply systems. Maximum voltage is 17V for a 12V system and 31.5V for a 24V power supply system. Max. ambient temperature is 55°C. The electronic unit has a builtin thermal protection which is actuated and stops compressor operation if the electronic unit temperature gets too high.

Installation (Fig. 10)

Connect the terminal plug from the electronic unit to the compressor terminal. Mount the electronic unit on the compressor by snapping the cover over the screw head (1).

Power supply (Fig. 10)

The electronic unit must always be connected directly to the battery poles (2). Connect the plus to + and the minus to -, otherwise the electronic unit will not work. The electronic unit is protected against reverse battery connection. For protection of the installation, a fuse (3) must be mounted in the + cable as close to the battery as possible. 15A fuse for 12V and 7.5A fuse for 24V circuits are recommended. If a main switch (4) is used, it should be rated to a current of min. 20A. The wire dimensions in Fig. 11 must be observed. Avoid extra junctions in the power supply system to prevent voltage drop from affecting the battery protection setting.

Battery protection (Fig. 10)

The compressor is stopped and re-started again according to the decided voltage limits measured on the + and - terminals of the electronic unit. The standard settings for 12V and 24V power supply systems appear from Fig. 12. Other settings (Fig. 13) are optional if a connection which includes a resistor (9) is established between terminals C and P. In solar applications without a battery a 220 kW resistor is recommended. In AEO (Adaptive Energy Optimizing) speed mode the BD compressor will always adapt its speed to the actual cooling demand within a random operation voltage of 9.6 to 31.5V.

Thermostat (Fig. 10)

The thermostat (7) is connected between the terminals C and T. Without any resistor in the control circuit, the compressor with electronic unit 101N0210 or 101N0220 will run with a fixed speed of 2,000 rpm when the thermostat is switched on. With the thermostat directly connected to terminal C

the electronic unit 101N0300 will adjust its speed to the actual cooling demand. Other fixed compressor speeds in the range between 2,000 and 3,500 rpm can be obtained when a resistor (8) is installed to adjust the current (mA) of the control circuit. Resistor values for various motor speeds appear from Fig. 14.

Fan (optional, Fig. 10)

A fan (5) can be connected between the terminals + and F. Connect the plus to + and the minus to F. Since the output voltage between the terminals + and F is always regulated to 12V, a 12V fan must be used for both 12V and 24V power supply systems. The fan output can supply a continuous current of 0.5Aavg. A higher current draw is allowed for 2 seconds during start.

LED (optional, Fig. 10)

A 10mA light emitting diode (LED) (6) can be connected between the terminals + and D. In case the electronic unit records an operational error, the diode will flash a number of times. The number of flashes depends on what kind of operational error was recorded. Each flash will last ¼ second. After the actual number of flashes there will be a delay with no flashes, so that the sequence for each error recording is repeated every 4 seconds.

Number of flashes	Error type
5	Thermal cut-out of electronic unit (If the refrigeration system has been too heavily loaded, or if the ambient temperature is high, the electronic unit will run too hot).
4	Minimum motor speed error (If the refrigeration system is too heavily loaded, the motor cannot maintain minimum speed 1,850 rpm).
3	Motor start error (The rotor is blocked or the differential pressure in the refrigeration system is too high (>5 bar)).
2	Fan over-current cut-out (The fan loads the electronic unit with more than 1A _{peak}).
1	Battery protection cut-out (The voltage is outside the cut-out setting).

INSTRUCTIONS FOR DANFOSS BD35/BD50F 12-24 Vcc / 110-240 Vca

The electronic unit is a multi voltage device. It can be used in both 12V/24V DC and 100-240V AC 50/60Hz power supply systems. Max. voltage is 17V DC for a 12V DC system and 31.5V DC for a 24V DC power supply system. Max. voltage is 265V AC and min. 85V AC for an AC power supply system. Max. ambient temperature is 55°C. The electronic unit has a builtin thermal protection which is actuated and stops the compressor operation if the electronic unit temperature becomes too high (100°C / 212°F on the PCB). **Power consumption is limited to 100W. See datasheet BD50F for details.**

Installation (Fig. 1)

Connect the terminal plug from the electronic unit to the compressor terminal. Mount the electronic unit on the compressor by snapping the cover over the screw head (1).

Power supply (Fig. 1)

DC: The electronic unit must always be connected directly to the battery poles (2). Connect the plus to + and the minus to -, otherwise the electronic unit will not work. The electronic unit is protected against reverse battery connection. For protection of the installation, a fuse (3) must be mounted in the + cable as close to the battery as possible. It is recommended to use 15A fuses for 12V and 7.5A fuses for 24V circuits. If a main switch (4) is used, it should be rated to a current of min. 20A. The wire dimensions in Fig. 2 must be observed. Avoid extra junctions in the power supply system to prevent voltage drop from affecting the battery protection setting.

AC: The wires must be connected to the terminals marked L and N on the electronic unit. Nominal voltages from 100 to 240 VAC 50/60Hz. Upper safety cut-out limit = 270V AC and lower limit 80V AC. A 4A fuse (11) must be mounted in the live (L) cable to protect the installation. If a main switch (12) is used, it should be rated to a current of min. 6A. The wire dimensions must be min. 0.75 mm² or AWG 18. NB: Earth connection can be used if required.

General: Both the AC and the DC power supply can be connected to the electronic unit at the same time. In this case, AC will be preferred power supply source. If the AC power supply is disconnected or drop below 85V AC on a 12V DC supply system, a time delay of 1 min. will be activated before the compressor continues on DC power supply. If AC

power supply is re-established there will be no delay in compressor operation.

Battery protection (Fig. 1)

The compressor is stopped and re-started again according to the decided voltage limits measured on the + and - terminals of the electronic unit. The standard settings for 12V and 24V power supply systems appear from Fig. 3. Other settings are optional if a connection which includes a resistor (9) is established between terminals C and P. See manual.

Thermostat (Fig. 1)

The thermostat (7) is connected between the terminals C and T. Without any resistor in the control circuit, the compressor will run with a fixed speed of 2,000 rpm when the thermostat is switched on. Other fixed compressor speeds in the range between 2,000 and 3,500 rpm can be obtained when a resistor (8) is installed to adjust the current (mA) of the control circuit. Resistor values for various motor speeds appear from Fig. 5.

Fan (optional, Fig. 1)

A fan (5) can be connected between the terminals + and F. Connect the plus to + and the minus to F. Since the output voltage between the terminals + and F is always regulated to 12V, **a 12V fan must be used for both 12V and 24V power supply systems.** The fan output can supply a continuous current of 0.5Aavg. A higher current draw is allowed for 2 seconds during start.

Lamp (optional, Fig. 1)

A 12V DC 5 Watt lamp (10) can be connected between the terminals A and C. The output voltage between the terminals A and C is always regulated to 12V DC. **A 12V DC lamp must be used for both 12V and 24V power supply systems.** The lamp output can supply a continuous current of 0.5Aavg.

LED (optional, Fig. 1)

A 10mA light emitting diode (LED) (6) can be connected between the terminals + and D. If the electronic unit records an operational error, the diode will flash a number of times. The number of flashes depends on what kind of operational error was recorded. Each flash will last ¼ second. After the actual number of flashes there will be a delay with no flashes, so that the sequence for each error recording is repeated every 4 seconds.

INTRODUCTION

Cher client:

En vous remerciant d'avoir choisi un de nos produits VITRIFRIGO espère que vous serez tout à fait satisfait de votre achat.

Ce manuel est partie intégrante du réfrigérateur et il doit suivre le parcours de vente jusqu'à l'utilisateur ; Vitrifrigo interdit toute reproduction même partielle.

Chaque réfrigérateur, avant de quitter notre établissement, est soumis à de sévères essais et contrôles qui garantissent leur fonctionnement correct.

Pour toutes informations supplémentaires ou éclaircissements, veuillez vous adresser à nos centres agréés ou directement à nos bureaux.

Vitri Alceste



AVERTISSEMENTS

- Lire attentivement ce manuel avant d'utiliser le réfrigérateur.
- Si cet appareil doit en remplacer un autre d'un type ancien, il est recommandé de rendre inutilisable l'éventuelle serrure de ce dernier avant de le mettre au rebut.
- Vérifier que l'emballage est intact, en cas contraire le signaler au transporteur.
- Déballer et installer l'appareil en faisant très attention; pour éviter toute blessure accidentelle, il est conseillé d'utiliser des gants de protection, en particulier pour les modèles avec unité réfrigérante à distance (fig. 3).
- Après avoir déballé l'appareil, s'assurer qu'il n'est pas endommagé. Tout dommage éventuel doit être signalé au revendeur dans les 24 heures à compter de la date d'achat.
- Cet appareil doit être exclusivement utilisé pour la conservation d'aliments et de boissons.
- Installer l'appareil loin de toute source de chaleur et dans une position suffisamment aérée (voir indications ci-après).
- Il est conseillé d'attendre au moins une heure avant de mettre le frigo en marche pour que le circuit réfrigérant puisse être totalement efficace.
- Avant de brancher l'appareil, vérifier que la tension du secteur correspond à ce qui est indiqué sur sa plaquette signalétique ou sur celle se trouvant sur le compresseur.
- Au terme de l'installation, vérifier que l'appareil n'est pas posé sur le cordon d'alimentation.
- Pour tout problème de fonctionnement, s'adresser à notre centre de service après-vente le plus proche; dans tous les cas, n'avoir recours qu'à des personnes qualifiées.
- Avant d'effectuer une quelconque opération d'entretien ou de nettoyage, débrancher la prise de courant.
- Eviter d'introduire des liquides dans des conteneurs en verre dans le compartiment basse température.
- Ne pas jeter l'emballage de votre appareil mais sélectionner les matériaux conformément aux prescriptions locales relatives à l'élimination des déchets.
- Ne jetez pas ce produit dans les déchets ménagers mais éliminez-le en le triant dans les déchets spécifiques. Contactez les centres de collecte des Déchets d'appareils électriques et électroniques (RAEE) présents dans votre territoire ou bien restituez-le à votre revendeur au moment de l'achat d'un appareil équivalent.
- S'il n'est pas éliminé correctement, cet appareil peut avoir des effets nocifs sur l'environnement et sur la santé humaine, causés par des substances spécifiques qu'il contient à l'intérieur.
- Le symbole représenté ci-contre indique que le produit ne peut pas être éliminé comme déchet urbain.
- L'élimination abusive ou non correcte du produit entraîne de sévères sanctions juridiques de type administratif et/ou pénal prévues par les lois en vigueur.
- Il est formellement interdit d'utiliser le réfrigérateur pour des usages autres que ceux prévus.
- Maintenir toujours bien propre l'appareil et faire en sorte que les dispositifs de sécurité fonctionnent toujours parfaitement.
- Ne jamais boucher les ouvertures de ventilation dans le châssis de l'appareil et/ou la structure à encastrement.
- Ne jamais enlever les protections (carters) du réfrigérateur.
- Exécuter toujours les vérifications, les contrôles et les entretiens programmés décrit à la page x de ce manuel.
- L'appareil ne doit pas être mis sous la pluie.
- Peut être utilisé dans les campings.



Informations générales

Finalité du manuel

Ce manuel, relatif aux Réfrigérateurs de la série “INTERIOR (230Vca) / OCEAN-RUNNER (12/24Vcc)”, entend fournir une aide pour leur utilisation correcte et sûre et leur entretien rationnel.

Afin d'apprendre brièvement comment faire fonctionner et utiliser le réfrigérateur que vous possédez, il faut lire attentivement cette notice d'emploi dès sa première utilisation.

Le bon fonctionnement du réfrigérateur dépend aussi d'un entretien efficace et efficient. Il est donc opportun de connaître les interventions d'entretien à réaliser. Les indications pour l'usage décrivent toutes les opérations de mise en marche, d'arrêt et de fonctionnement.

Le réfrigérateur a été fabriqué dans le respect des conditions de sécurité prévues par les directives en la matière ; cependant le maximum de sécurité de l'utilisateur dépend d'une lecture attentive de ce manuel et d'un nettoyage et d'un entretien constant et attentif.

Certaines informations ou figures de ce manuel pourraient montrer des détails qui pourraient être légèrement différents par rapport au réfrigérateur que vous possédez, sans toutefois que les informations essentielles ne soient modifiées. Dans une optique d'amélioration constante, le réfrigérateur pourra montrer des variations qui ne sont pas contenues dans cette notice. Les éventuelles modifications apparaîtront, selon les exigences, dans les versions successives du manuel.

Identification du constructeur

Le réfrigérateur est conçu et produit exclusivement chez :

Vitrifrigo s.n.c

Via Della Produzione, 9
61020 Montecchio (PU)

Tel. +39 0721 491080

Fax. +39 0721 497739

E-Mail. vitrifrigo@vitrifrigo.com

www.vitrifrigo.com

DESCRIPTION DE L'APPAREIL (fig.2 et fig.7)

12/24Vcc – 220Vca

- A) évaporateur horizontal
- A1) évaporateur vertical
- B) bac horizontal de récupération de l'eau
- C) boîtier thermostat
- D) clayettes amovibles
- E) tablette en verre (sur certains modèles seulement)
- F) bac à fruits (sur certains modèles seulement)
- G) balconnets (extractibles)

12/24Vcc Portatifs

- A) bac
- B) fermeture cliquet
- C) évaporateur
- D) vis de fixation bride
- E) bride de fixation
- F) panneau avec thermostat numérique
- G) panneau avec thermostat LED
- H) thermostat manuel (seulement C26)
- I) interrupteur (seulement C26)
- J) poignée
- K) fiche 12/24Vcc – 220Vca

L'étiquette reportant le numéro de série ainsi que les caractéristiques techniques est placée à l'intérieur du réfrigérateur, dans la partie supérieure droite. Les trois premiers chiffres du numéro de série correspondent à l'année et à la semaine de fabrication. Tous les matériaux pouvant entrer en contact avec les aliments sont conformes à la directive 2004/1935/CEE. Le bruit émis par l'appareil est inférieur à 70 dB(A).

INSTALLATION

S'assurer que l'appareil n'est pas endommagé. Tout dommage éventuel de transport doit être signalé rapidement au revendeur et dans tous les cas dans les 24 heures après la livraison.

Manier l'appareil en faisant très attention. Lorsqu'on positionne le groupe réfrigérant (dans les modèles de réfrigérateurs avec installation réfrigérante à distance), agir avec précaution afin d'éviter toute obstruction ou rupture des tuyaux de raccordement. Placer toujours le réfrigérateur et le groupe réfrigérant à distance (dans les versions qui en sont dotées) sur des surfaces horizontales.

Garantir une aération suffisante du groupe frigorifique en prévoyant deux ouvertures dans le meuble-conteneur, une sur le fond en regard du groupe réfrigérant, l'autre sur la partie supérieure ou sur la partie haute du côté. La surface de ces ouvertures ne devra pas être inférieure à 300 cm². Si cela n'est pas possible, laisser un espace d'au moins 50 mm entre la partie supérieure du réfrigérateur et le plateau situé au dessus (voir fig. 5).

Installer le réfrigérateur loin de toute source de chaleur dans un endroit sec et bien aéré. Laisser l'appareil à l'arrêt pendant une heure au moins avant de le mettre en marche. Dans ce laps de temps, effectuer le premier nettoyage.

NETTOYAGE DU REFRIGERATEUR

Avant de procéder au nettoyage, s'assurer que le réfrigérateur n'est pas branché sur l'installation électrique. S'il l'est, débrancher la fiche de la prise de courant.

EXTERIEUR

Laver l'extérieur du réfrigérateur à l'eau tiède, repasser à l'eau froide et sécher avec un chiffon doux. Eviter d'utiliser des produits abrasifs.

INTERIEUR

Enlever les clayettes (ou le bac à légumes), les bacs et les cuvettes pour la glace et procéder au nettoyage avec de l'eau tiède additionnée de bicarbonate de soude ou de vinaigre. Rincer et sécher soigneusement avec un chiffon doux. Eviter impérativement d'utiliser des produits abrasifs, des détergents ou des savons.

CONDENSEUR

Il est conseillé de nettoyer le condenseur (voir fig. 4) au moins une fois par an à l'aide d'un aspirateur ou d'un pinceau sec.

En cas d'inutilisation prolongée de l'appareil, afin d'éviter la formation de moisissures ou de mauvaises odeurs, débrancher la fiche, le vider complètement, en nettoyer l'intérieur et laisser la porte entrouverte.

RACCORDEMENT ELECTRIQUE

Cet appareil est conforme à la directive communautaire 89/336/CEE sur l'antiparasitage. Avant de brancher l'appareil, s'assurer que la tension du secteur correspond bien à celle qui est indiquée sur la plaquette signalétique ou à celle indiquée sur la plaquette se trouvant sur le compresseur.

REGLAGE DE LA TEMPERATURE

Chaque réfrigérateur est équipé d'un thermostat pour le maintien automatique de la température.

■ THERMOSTAT MECANIQUE

Pour choisir la température désirée, utiliser le bouton de réglage.

Quand le bouton est en position «0» ou «STOP», le réfrigérateur ne fonctionne pas.

En déplaçant le bouton sur la position «1», le réfrigérateur se met en marche.

En tournant le bouton de la position «1» vers la position «5», on obtient des températures de plus en plus froides.

Pour schéma électrique voir fig. 8 e/h (12/24V) ou fig. 9 (115V/230V)

Certaines versions de réfrigérateurs sont équipées de thermostats dont les symboles de réglage de la température se différencient de la description ci-dessus; dans ce cas, se rapporter à la fig. 1. Le refroidissement du réfrigérateur augmente en tournant le bouton en sens horaire.

Pour ranger et conserver de façon rationnelle les aliments, suivre les indications du tableau ci-dessous.

Aliments	Temps de conservation	Place dans le réfrigérateur
Viande et poisson propre (envelopper dans des sachets ou des feuilles en plastique)	2 ou 3 jours	Sur la clayette sous la zone freezer.
Œufs	1 mois	Utiliser les compartiments de la contre-porte.
Beurre, margarine	1 semaine	Utiliser les compartiments de la contre-porte.
Aliments cuits, tartes et soupes (contenus dans des récipients hermétiques et introduits dans le frigo après refroidissement)	3 ou 4 jours	Sur la clayette dans la partie la plus basse du réfrigérateur.
Charcuterie crue, pâtes fraîches, crèmes, flans, chocolats, pâtisseries à la crème, lard, pâtisseries sèches, tomates rouges.	3 ou 4 jours	Sur n'importe quelle clayette.
Bouteilles		Dans les supports de la contre-porte.
Fruits et légumes		Dans le bac dans la partie inférieure du réfrigérateur.

REEMPLACEMENT DE L'AMPOULE

Pour remplacer l'ampoule (voir fig.2) procéder comme suit:

- Extraire perpendiculairement à la base le couvercle de protection en prenant garde de ne pas abîmer les chevilles de fixation.
- Éloigner un des deux ressorts pour pouvoir ôter l'ampoule.
- Replier légèrement les deux ressorts l'un vers l'autre et introduire la nouvelle ampoule.
- **Contrôler que l'ampoule est bien serrée sur les ressorts.**
- Replacer le couvercle.

REVERSIBILITE DE LA PORTE

Pour changer le sens d'ouverture de la porte avec fermeture à PIN:

- Démonter la charnière supérieure et la fermeture à PIN.
- Extraire la porte jusqu'à la libérer de la charnière inférieure.
- Démonter la charnière inférieure et la remonter sur la partie opposée du réfrigérateur.
- Replacer la porte sur la charnière inférieure.
- Remonter la charnière supérieure et la fermeture à PIN sur la partie opposée.

CHANGEMENT DU PANNEAU

Pour démonter et/ou changer le panneau de la porte procéder de la façon suivante:

- Ôter la porte en suivant les indications du paragraphe précédent.
- Dévisser les vis présentes sur la base inférieure et ôter celle-ci.
- Enlever le panneau en le faisant glisser vers le bas.
- Monter le nouveau panneau en l'introduisant à la place de celui qui a été enlevé le faisant glisser vers le haut jusqu'à ce qu'il se bloque.
- Replacer la base inférieure.

DEGIVRAGE DE L'APPAREIL

Il convient de dégivrer le réfrigérateur dès que l'on constate que l'épaisseur de glace dépasse 3 mm. Cette opération est nécessaire si on veut garantir un bon rendement du réfrigérateur et éviter de consommer trop d'énergie électrique.

Pour un dégivrage complet du réfrigérateur, tourner le bouton du thermostat sur la position «Stop». Laisser la porte ouverte afin d'accélérer le dégivrage.

Ne pas enlever la couche de glace en utilisant des outils métalliques pointus ou coupants car on pourrait percer la plaque réfrigérante, ce qui aurait des conséquences irréparables pour l'appareil.

Dans les réfrigérateurs à accumulation de froid, le dégivrage a lieu automatiquement. Il est conseillé de vider le bac de l'eau tous les jours.

En fin de dégivrage, mettre le réfrigérateur en marche en remettant le bouton du thermostat à la position désirée.

INSTRUCTIONS PARTICULIÈRES POUR LES RÉFRIGÉRATEURS 220 Vca

RACCORDEMENT ELECTRIQUE

Aux termes la loi, il est obligatoire de mettre l'appareil à la terre. S'assurer que le système de mise à la terre de l'installation électrique est parfaitement efficace.

Le constructeur décline toutes responsabilités en cas de dommages subis par des personnes ou des choses dus au non respect de cette norme.

Il est déconseillé d'utiliser des adaptateurs, des prises multiples et des rallonges. Si leur utilisation s'avère toutefois indispensable, n'employer que des accessoires conformes aux normes de sécurité en vigueur en faisant attention de ne pas dépasser la limite de capacité en valeur de courant indiquée sur ces accessoires. En cas d'incompatibilité entre la prise et la fiche de l'appareil, il est préférable de remplacer la prise par une autre d'un type approprié. Il est conseillé de faire faire cette opération par des personnes qualifiées qui devront s'assurer que la section des câbles de la prise est appropriée à la puissance absorbée par l'appareil.

QUE FAIRE SI LE REFRIGERATEUR NE FONCTIONNE PAS

- L'APPAREIL NE FONCTIONNE PAS

Contrôler que:

- le thermostat n'est pas sur la position «STOP»;
- qu'il y a bien du courant;
- l'interrupteur automatique de l'installation électrique n'est pas débranché;
- la fiche fonctionne bien et qu'elle est correctement branchée dans la prise de courant;
- la prise de courant fonctionne bien. Pour cette vérification, raccorder à cette même prise un appareil dont on est sûr qu'il marche;
- le cordon d'alimentation n'est pas interrompu.

2- LE REFRIGERATEUR EST BRUYANT

Contrôler que:

- le réfrigérateur ou le groupe réfrigérant sont bien de niveau;
- le réfrigérateur n'est pas en contact avec des meubles pouvant causer des vibrations;
- les tuyaux du circuit réfrigérant situés à l'arrière ne touchent pas l'appareil et ne vibrent pas contre lui;

3- LE RENDEMENT DU REFRIGERATEUR EST INSUFFISANT

Contrôler que:

- la porte se ferme hermétiquement;
- le réfrigérateur ne se trouve pas à proximité d'une source de chaleur;
- le réfrigérateur ou le groupe réfrigérant à distance sont suffisamment aérés;
- qu'il n'y a pas trop de givre sur l'évaporateur;
- le condenseur n'est pas encrassé de poussière;
- le ventilateur tourne librement (dans les versions à refroidissement forcé);
- l'intérieur n'est pas trop rempli.

Si, après avoir fait ces vérifications, on n'arrive toujours pas à obtenir un fonctionnement normal, s'adresser au service après-vente.

INSTRUCTIONS PARTICULIÈRES POUR LES RÉFRIGÉRATEURS 12/24 Vcc

INSTALLATION

Pour l'installation de réfrigérateurs ou d'installations frigorifiques dans des caravanes, des autocaravanes, etc., il est conseillé de prévoir sur ces derniers des prises d'aération directement sur l'extérieur (voir fig. 6).

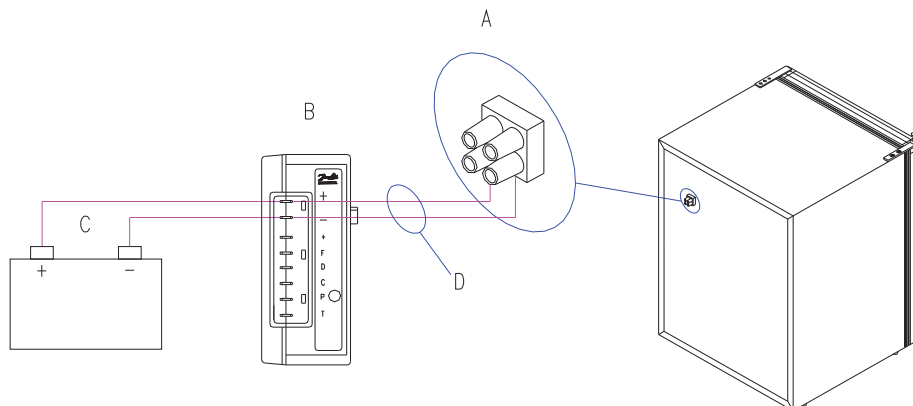
Pour l'installation des réfrigérateurs portatifs une bride de fixation est disponible sur certains modèles (voir fig.7).

RACCORDEMENT ELECTRIQUE

Pour les réfrigérateurs alimentés à 12Vcc ou à 24Vcc il est préférable de connecter les installations directement à la batterie en respectant rigoureusement les instructions correspondantes fournies relatives au compresseur Danfoss (voir page 48 et page 49)..

Connexion alimentation lumière intérieure sur les réfrigérateurs 12/24Vcc avec moteur à distance:

- Relier le câble en option "D" (Cod.**R10777**) à la boîte à bornes présente au dos du réfrigérateur et à la centrale du compresseur. (La boîte à bornes "A" n'est pas polarisée, donc la connexion peut être effectuée indifféremment.)
- Connecter la batterie à la centrale du compresseur, **en faisant attention à la polarité!**
 - boîte à bornes de connexion lumière intérieure.
 - Centrale compresseur.
 - Batterie.
 - Câble fourni alimentation lumière intérieure.



INSTRUCTIONS PARTICULIÈRES POUR LES RÉFRIGÉRATEURS 12-24 Vcc 100-240 Vca

RACCORDEMENT ELECTRIQUE

Il est conseillé de connecter la ligne d'alimentation à 12Vcc ou à 24Vcc directement à la batterie en respectant les instructions correspondantes du compresseur Danfoss fournies (voir page 48 et page 49).

Préparer la ligne d'alimentation en Vca en utilisant un câble tripolaire d'une section minimale pour un conducteur de 1 mm² et une isolation adéquate aux modalités et au milieu d'utilisation et conforme aux lois en vigueur.

Réaliser la connexion à la ligne d'alimentation en Vca par une connexion fiche prise d'une portée adéquate, conforme aux lois en vigueur ou prévoir un interrupteur magnétothermique différentiel omnipolaire d'une portée de 6 ampères et avec ouverture des contacts de 3 mm au moins ou en tout cas conforme aux lois en vigueur.

À la fin de l'installation vérifier la continuité du circuit de terre et exécuter tous les essais de sécurité électrique prévus par les lois en vigueur.

Protéger et bloquer convenablement les câbles afin d'éviter que des tractions accidentelles du câbles ne puissent le déconnecter ou qu'elles ne puissent entrer en contact avec des parties chaudes à une température supérieure à 50°C ou avec des parties tranchantes.

Il est conseillé de faire exécuter l'installation des lignes d'alimentation par un personnel qualifié qui vérifiera la conformité de l'installation aux dispositions en vigueur et délivrera les certifications de conformité correspondantes.

Connexion alimentation lumière intérieure sur les réfrigérateurs 12/24Vcc 100-240Vca avec moteur à distance:

- Relier le câble en option (Cod. **R10777**) pour le branchement de l'ampoule interne, de la boîte à bornes présente au dos du réfrigérateur au central du compresseur en suivant le schéma illustré à la figure 15. (La boîte à bornes n'est pas polarisée, par conséquent la connexion peut être effectuée indifféremment).

REGLAGE DE LA TEMPERATURE

▪ THERMOSTAT MECANIQUE

Dans les réfrigérateurs à accumulation de froid 12 Vcc ou 24Vcc, afin d'obtenir une économie d'énergie maximum, il est conseillé de mettre le bouton du thermostat sur la position «A» pour les réfrigérateurs d'une capacité maximum de 75 l et sur la position «A1» pour ceux d'une capacité supérieure (fig.1)

▪ THERMOSTAT "LED"

Il thermostat électronique "LED" est muni de deux commandes à bouton:

- La commande de mise en marche et arrêt "ON/OFF"
- La commande de réglage de la température "*"

En appuyant le bouton "ON/OFF" on obtient alternativement **la mise en marche ou l'arrêt du réfrigérateur.**

Pour programmer la température voulue, appuyer sur la touche avec le symbole *. A chaque pression l'indicateur lumineux à LED défile de la gauche vers la droite, pour les positions intermédiaires deux LEDS voisines s'allumeront. Quand l'indicateur se trouve à gauche, le réfrigérateur est au minimum (plus chaud) alors que quand il est à droite il indique une réduction de la température (plus froid) de 3°C environ. Pour sélectionner une température plus froide appuyer plusieurs fois la commande jusqu'à ce que l'indicateur lumineux plus à droite (maximum de froid) s'allume, la pression successive provoque l'allumage de l'indicateur lumineux plus à gauche.

Pour le schéma électrique, se rapporter à la fig. 8a/b/f



▪ THERMOSTAT NUMERIQUE

Le thermostat NUMERIQUE permet de contrôler constamment la température intérieure du réfrigérateur, la mise en marche/ l'arrêt du compresseur.

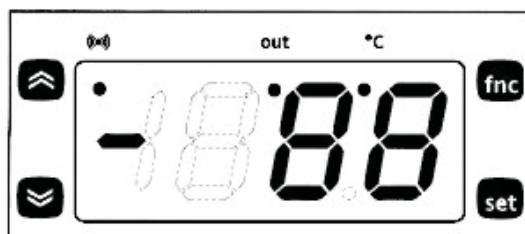
L'utilisateur dispose d'un display et de quatre touches pour le contrôle de l'état et la programmation de l'appareil.

Lors de la connexion de l'alimentation le display commence à clignoter et s'arrête en affichant la température actuelle à l'intérieur du réfrigérateur.

Par défaut le thermostat est programmé à 0°C.

COMMENT MODIFIER LES PARAMETRES:

- Appuyer sur la touche **SET** rapidement (en 5 sec.) 2 fois.
La première fois le mot “SET” s’affiche et la seconde le paramètre “0” ou celui programmé auparavant.
- En agissant sur les touches  ou  modifier la température que le réfrigérateur devra atteindre.
- Appuyer sur la touche **FNC** rapidement 2 fois pour confirmer la température programmée.
La première fois le mot “SET” s’affiche et la seconde la température à l’intérieur.
- Le petit point sous le mot “OUT” indique que le compresseur et le ventilateur sont en fonction.



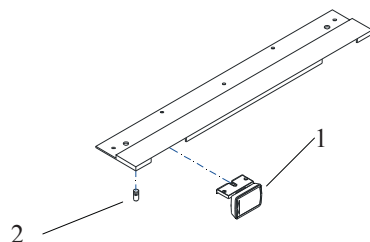
Pour le schéma électrique, se rapporter à la Fig. 8c/d/g

**UN MANUEL D'INSTRUCTIONS RELATIF AU THERMOSTAT NUMERIQUE
EST TOUJOURS FOURNI AVEC LE REFRIGERATEUR**

REVERSIBILITE DE LA PORTE

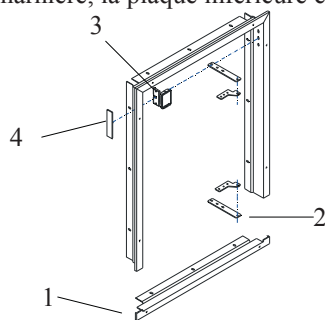
Pour changer le sens d'ouverture de la porte avec fermeture NAUTIC-EUROPA:

- Démonter la charnière inférieure et ôter la porte vers le bas.
- Démonter la poignée Nautic (1) et la replacer sur la porte de la partie opposée en prenant garde aux empattements des trous.
- Dévisser le pivot charnière (2) de la bride et le visser dans la partie opposée.
- Replacer la porte en prenant garde que la fermeture fonctionne correctement.
- Remonter la charnière inférieure dans la partie opposée du réfrigérateur.



Pour changer le sens d'ouverture de la porte avec fermeture NAUTIC-USA:

- Démonter la base du profil de fixation (1) si présent.
- Démonter la charnière et la petite plaque inférieure (2) et extraire la porte vers le bas.
- Démonter la poignée Nautic (3), inverser les arrêts et le ressort intérieur pour modifier le mouvement d'ouverture, tourner la poignée dans le sens indiqué par la flèche.
- Replacer la poignée Nautic sur le côté opposé de la porte en prenant garde aux empattements des trous.
- Déplacer la plaque d'enclenchement de la fermeture (4) sur le côté opposé du profil.
- Replacer la porte en prenant garde que la fermeture fonctionne parfaitement.
- Replacer la charnière, la plaque inférieure et la base du profil de fixation.



QUE FAIRE SI LE REFRIGERATEUR NE FONCTIONNE PAS

1- L'APPAREIL NE FONCTIONNE PAS

Contrôler que:

- le thermostat n'est pas sur la position «STOP»;
- l'interrupteur automatique de l'installation électrique n'est pas débranché;
- le fusible situé sur le dispositif électronique du réfrigérateur est intact;
- le cordon d'alimentation n'est pas interrompu;
- la batterie fonctionne bien;
- **la tension sur le bornier du dispositif électronique du réfrigérateur est égale à celle de la batterie.** En cas de chute de tension supérieure à 0,2-0,4 V, contrôler que:
 - la section du câble raccordant la batterie au dispositif électronique du réfrigérateur est correcte (voir tableau sur instructions Danfoss ci-jointes);
 - qu'il n'y a pas de points de jonction détériorés ou incorrectement serrés le long de la ligne d'alimentation;
 - qu'il n'y a pas d'oxydations sur les pôles de la batterie et aux points de contact.

2- LE REFRIGERATEUR EST BRUYANT

Contrôler que:

- le réfrigérateur ou le groupe réfrigérant sont bien de niveau;
- le réfrigérateur n'est pas en contact avec des meubles pouvant causer des vibrations;
- les tuyaux du circuit réfrigérant situés à l'arrière ne touchent pas l'appareil et ne vibrent pas contre lui;

3- LE RENDEMENT DU REFRIGERATEUR EST INSUFFISANT

Contrôler que:

- la porte se ferme hermétiquement;
- le réfrigérateur ne se trouve pas à proximité d'une source de chaleur;
- le réfrigérateur ou le groupe réfrigérant à distance sont suffisamment aérés;
- qu'il n'y a pas trop de givre sur l'évaporateur;
- le condenseur n'est pas encrassé de poussière;
- le ventilateur tourne librement (dans les versions à refroidissement forcé);
- l'intérieur n'est pas trop rempli.

Si, après avoir fait ces vérifications, on n'arrive toujours pas à obtenir un fonctionnement normal, s'adresser au service après-vente.

INSTRUCTIONS DANFOSS BD35/BD50F

12-24 Vcc

La commande électronique peut fonctionner sous deux tensions. Cela signifie que le même module peut toujours être utilisé, que la tension d'alimentation soit de 12V ou de 24V. La tension d'alimentation maximale des montages en 12V est de 17V, alors qu'elle est de 31,5V pour les montages en 24V. La température ambiante maximale admissible est de 55°C. La commande électronique est équipée d'une protection thermique intégrée qui est activée et arrête le compresseur en cas de surchauffe.

Installation (fig. 10)

Brancher la fiche de raccordement de la commande électronique aux bornes du compresseur. Monter la commande électronique sur le compresseur en bloquant/pressant le couvercle sous la tête de vis (1).

Alimentation électrique (fig. 10)

La commande électronique doit toujours être raccordée directement aux bornes de la batterie (2). Raccorder le positif à + et le négatif à - ; la commande électronique ne peut fonctionner que raccordée de cette façon et elle est protégée contre toute connexion de batterie inversée. Un fusible (3) doit être monté sur le câble +, le plus près possible de la batterie, afin de protéger l'installation. Il est recommandé d'utiliser un fusible de 15A pour le circuit en 12V et un fusible de 7,5A pour le circuit en 24V. Si un interrupteur (4) est installé, il doit être dimensionné pour une intensité d'au moins 20A. Les caractéristiques dimensionnelles des câbles électriques recommandées en fig. 11 doivent être respectées. Éviter tout raccordement supplémentaire au système d'alimentation électrique afin d'éviter qu'une éventuelle chute de tension n'affecte le réglage de protection de la batterie.

Protection de batterie (fig. 10)

L'arrêt et le redémarrage du compresseur dépendent des limites de tension choisies, mesurées sur les bornes + et - de la commande électronique. Les réglages standards des montages d'alimentation électrique en 12V et en 24V sont indiqués en fig. 12. On peut choisir d'autres limites de tension (fig. 13) en établissant une connexion comportant une résistance (9) entre les bornes C et P. Pour les applications solaires sans batterie, une résistance de 220 kW est recommandée. En mode de vitesse AEO (Adaptation Energie Optimisée), le compresseur BD modulera toujours sa vitesse de rotation en fonction de la demande de froid, sur une plage de tension de 9,6 à 31,5 V.

Thermostat (fig. 10)

Le thermostat (7) est monté entre les bornes C et T. En l'absence de résistance dans le circuit de commande, et lorsque le thermostat est enclenché, le compresseur avec une unité électronique standard 101N0210 ou

101N0220 tournera à une vitesse constante de 2.000 tr/min. Quand le thermostat est raccordé directement à la borne C, l'unité électronique 101N0300 ajustera la vitesse de rotation en fonction de la demande de froid souhaitée. Il est possible de faire tourner le compresseur à d'autres vitesses constantes, comprises entre 2.000 et 3.500 tr/min, en montant une résistance (8) sur le circuit de commande, cette résistance permettant d'ajuster l'intensité (mA). Les valeurs des résistances correspondent aux différentes vitesses de rotation du moteur sont indiquées en fig. 14.

Ventilateur (option, fig. 10)

Un ventilateur (5) peut être monté entre les bornes + et F. Raccorder le positif à + et le négatif à F. La tension de sortie entre les bornes + et F étant toujours réglée à 12 V, toujours employer un ventilateur 12V, que l'alimentation électrique soit en 12V ou en 24V. Le courant d'alimentation du ventilateur peut atteindre 0,5A moy. Une intensité plus importante est cependant acceptée pendant 2 secondes au démarrage.

LED (option, fig. 10)

Une diode électroluminescente (LED) (6) de 10 mA peut être montée entre les bornes + et D. Si la commande électronique enregistre une panne d'exploitation, la diode clignote un certain nombre de fois. Le nombre de clignotements dépend du type de panne enregistrée. Chaque clignotement dure 1/4 seconde. Le type de panne est défini par le nombre de clignotements (voir tableau ci-dessous).

Nombre de clignotements	Type de panne
5	Coupure thermique de la commande électronique (En cas de charge thermique trop importante du système ou de température ambiante trop élevée, il y a surchauffe de la commande électronique).
4	Vitesse du moteur trop faible (En cas de charge thermique trop importante du système, le moteur ne peut maintenir une vitesse minimale de 1.850 tr/min).
3	Panne, démarrage de moteur (Le rotor est bloqué ou la pression différentielle dans le système de refroidissement est trop élevée) (> 5 bars).
2	Surintensité moteur de ventilateur (Le ventilateur absorbe plus de 1 A en pointe).
1	Coupure, protection de batterie (La tension se situe en dehors des limites de coupure).

INSTRUCTIONS DANFOSS BD35/BD50F

12-24 Vcc / 110-240 Vca

L'unité électronique est un dispositif multitension. On peut l'utiliser aussi bien avec des systèmes d'alimentation à 12V/24V DC qu'avec 100-240V AC 50/ 60Hz. En cas de système d'alimentation à 12V DC la tension maximale est 17V DC; pour des systèmes d'alimentation à 24V DC la tension maximale est 31,5V DC. En cas de système d'alimentation AC, la tension maximale est 265V AC, la tension minimale est 85V AC. La température ambiante maximale est de 55°C. L'unité électronique est équipée d'une isolation thermique incorporée qui actionne et arrête le fonctionnement du compresseur si la température de l'unité électronique devient trop élevée (100°C / 212°F sur le circuit imprimé). **La puissance absorbée peut atteindre 100W maximum. Consulter la fiche technique BD50F pour les détails.**

Installation (fig. 10)

Brancher la fiche de raccordement de la commande électronique aux bornes du compresseur. Monter la commande électronique sur le compresseur en bloquant/pressant le couvercle sous la tête de vis (1).

Alimentation électrique (fig. 10)

La commande électronique doit toujours être raccordée directement aux bornes de la batterie (2). Raccorder le positif à + et le négatif à - ; la commande électronique ne peut fonctionner que raccordée de cette façon et elle est protégée contre toute connexion de batterie inversée. Un fusible (3) doit être monté sur le câble +, le plus près possible de la batterie, afin de protéger l'installation. Il est recommandé d'utiliser un fusible de 15A pour le circuit en 12V et un fusible de 7,5A pour le circuit en 24V. Si un interrupteur (4) est installé, il doit être dimensionné pour une intensité d'au moins 20A. Les caractéristiques dimensionnelles des câbles électriques recommandées en fig. 11 doivent être respectées. Éviter tout raccordement supplémentaire au système d'alimentation électrique afin d'éviter qu'une éventuelle chute de tension n'affecte le réglage de protection de la batterie.

AC: Les câbles électriques doivent être connectés aux bornes marquées L et N sur l'unité électronique. Tension nominale de 100 à 240 V AC 50/60Hz. Interrupteur de sécurité: Limite supérieure = 270V AC, limite inférieure = 80V AC. Un fusible 4A (11) doit être monté dans le câble de tension (L) pour protéger l'installation. Au cas où on utiliserait un interrupteur principal (12), celui-ci doit être réglé à un courant de 6A au moins. Le câble doit avoir une dimension minimale de 0,75 mm² ou 18 AWG. NB: si nécessaire on pourra utiliser la connexion de terre.

Général: on peut connecter à l'unité électronique simultanément et l'alimentation AC et l'alimentation DC. Dans ce cas, AC sera la source d'alimentation préférentielle. En cas de déconnexion de l'alimentation AC ou de chute sous 85V AC le système d'alimentation à 12V DC entrera en

fonction avec un retard de 1 minute. Si l'alimentation AC est réarmée, il n'y aura aucun retard dans le fonctionnement du compresseur.

Protection de batterie (fig. 10)

L'arrêt et le redémarrage du compresseur dépendent des limites de tension choisies, mesurées sur les bornes + et - de la commande électronique. Les réglages standards des montages d'alimentation électrique en 12V et en 24V sont indiqués en fig. 12. On peut choisir d'autres limites de tension (fig. 13) en établissant une connexion comportant une résistance (9) entre les bornes C et P.

Thermostat (fig. 10)

Le thermostat (7) est monté entre les bornes C et T. En l'absence de résistance dans le circuit de commande, et lorsque le thermostat est enclenché, le compresseur avec une unité électronique standard 101N0210 ou 101N0220 tournera à une vitesse constante de 2.000 tr/min. Quand le thermostat est raccordé directement à la borne C, l'unité électronique 101N0300 ajustera la vitesse de rotation en fonction de la demande de froid souhaitée. Il est possible de faire tourner le compresseur à d'autres vitesses constantes, comprises entre 2.000 et 3.500 tr/min, en montant une résistance (8) sur le circuit de commande, cette résistance permettant d'ajuster l'intensité (mA). Les valeurs des résistances correspondent aux différentes vitesses de rotation du moteur sont indiquées en fig. 14.

Ventilateur (option, fig. 10)

Un ventilateur (5) peut être monté entre les bornes + et F. Raccorder le positif à + et le négatif à F. La tension de sortie entre les bornes + et F étant toujours réglée à 12 V, toujours employer un ventilateur 12V, que l'alimentation électrique soit en 12V ou en 24V. Le courant d'alimentation du ventilateur peut atteindre 0,5A moy. Une intensité plus importante est cependant acceptée pendant 2 secondes au démarrage.

Ampoule (option, Fig.1)

Une ampoule de 5 Watts 12V DC (10) peut être connectée entre les bornes A et C. La tension de sortie entre les bornes A et C est toujours réglée sur 12 V DC. **Utiliser une ampoule de 12VDC aussi bien avec le système d'alimentation à 12V qu'avec celui à 24V.** La sortie de l'ampoule peut débiter une tension continue de 0,5A en moyenne.

LED (option, Fig.1)

Une LED de 10mA (6) peut être reliée entre les bornes + et D. Au cas où l'unité électronique relèverait une erreur de fonctionnement, la diode clignote pour un nombre déterminé de fois. Ce nombre dépend du type d'erreur de fonctionnement relevé. Chaque clignotement dure ¼ de seconde. la séquence de clignotement est suivie d'un intervalle sans émissions lumineuses, ensuite la séquence relative à chaque erreur relevée est répétée toutes les 4 secondes.

EINLEITUNG

Geehrter Kunde:

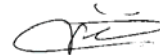
Wir danken Ihnen für Ihre Wahl unseres Produkts. von VITRIFRIGO und hoffen, dass Sie der Kauf umfassend zufrieden stellt.

Diese Anleitung ist Bestandteil des Kühlschranks und ist dem Benutzer bei Kauf des Gerätes auszuhändigen. Die Vervielfältigung, auch auszugsweise, ist untersagt.

Vor Verlassen unseres Werks wird jeder Kühlschrank strengen Prüfungen und Kontrollen unterzogen, die einen korrekten Betrieb gewährleisten.

Wenden Sie sich für weitere Informationen oder Fragen an unseren Kundendienst oder direkt an uns.

Vitri Alceste



WICHTIGE HINWEISE

- Vor Inbetriebnahme des Kühlschranks diese Anleitung aufmerksam durchlesen.
- Falls dieses Gerät ein altes Modell ersetzt, vor dessen Verschrottung den eventuellen Verschluss unbrauchbar machen.
- Sicherstellen, dass die Verpackung unbeschädigt ist, andernfalls den Spediteur darauf hinweisen.
- Das Produkt mit äußerster Vorsicht auspacken und installieren. Es empfiehlt sich, zur Vorbeugung von Verletzungen Schutzhandschuhe zu tragen, insbesondere bei Modellen mit separater Kühleinheit (siehe Abb. 3).
- Nach dem Auspacken das Gerät auf etwaige Schäden überprüfen. Diese müssen dem Händler innerhalb von 24 Stunden nach Erwerbsdatum mitgeteilt werden.
- Das Gerät darf ausschließlich für die Aufbewahrung von Lebensmitteln und Getränken verwendet werden.
- Der Kühlschrank sollte von Wärmequellen entfernt und in gut belüftetem Raum aufgestellt werden (siehe nachfolgende Anleitungen).
- Der Kühlschrank sollte mindestens eine Stunde vor Gebrauch eingeschaltet werden, damit der Kühlkreis voll betriebsfähig ist.
- Vor dem Anschließen des Geräts überprüfen, ob die Netzspannung mit der auf dem Typenschild des Kühlschranks bzw. Aufkleber des Kompressors angegebenen Spannung übereinstimmt.
- Bei der Installation darauf achten, dass das Gerät nicht auf dem Versorgungskabel aufliegt.
- Das vorliegende Produkt darf nicht in den Hausratsabfall gelangen, sondern es muss ordnungsgemäß entsorgt werden. Wenden Sie sich an die Sammelstellen für Elektro- und Elektronikgeräte (RAEE) in Ihrem Gebiet oder geben Sie das Gerät beim Kauf eines gleichwertigen Geräts an den Händler zurück.
- Falls das Produkt nicht ordnungsgemäß entsorgt wird, kann es aufgrund des Vorhandenseins bestimmter Substanzen Gefahren für die Umwelt und die Gesundheit darstellen.
- Das nebenstehend abgebildete Symbol weist darauf hin, dass das Produkt nicht in den Hausratsabfall gelangen darf.
- Die gesetzwidrige oder unsachgemäße Entsorgung des Produkts führt zu strengen verwaltungs- und/oder strafrechtlichen Sanktionen, die die geltende Rechtsprechung vorsieht.
- Für eventuelle Störungen wenden Sie sich bitte an unsere nächste Service-Stelle. In jedem Fall Fachpersonal zu Rate ziehen.
- Vor jeglichen Wartungs- bzw. Reinigungsarbeiten den Stecker abziehen.
- Keine Flüssigkeiten in Glasbehältern im Tiefkühlfach aufbewahren.
- Bei der Entsorgung des Verpackungsmaterials die örtlichen Entsorgungsvorschriften beachten.
- Das Gerät nur über entsprechende Fachunternehmen entsorgen lassen.
- Der Kühlschrank darf nur für vorgesehene Zwecke verwendet werden.
- Das Gerät sauber halten und die Sicherheitsvorrichtungen funktionstüchtig halten.
- Die Lüftungsöffnungen am Gehäuse und/oder Einbaugestell freihalten.
- Niemals die Abschirmungen (Gehäuse) des Kühlschranks entfernen.
- Die auf Seite x dieser Unterlagen beschriebenen Tests, Kontrollen und regelmäßigen Wartungsschritte immer durchführen.
- Das Gerät niemals Regen aussetzen.
- Für den Campingeinsatz geeignet.



Allgemeine Hinweise

Zweck der Anleitung

Dieses Benutzerhandbuch der Kühlschranksreihe „INTERIOR (230Vac) / OCEAN-RUNNER (12/24Vdc)“ stellt eine Anleitung zur korrekten und sicheren Nutzung und vernünftigen Pflege der Geräte dar.

Um den Betrieb und die Anwendung Ihres Kühlschranks schnell zu lernen, sollte diese Betriebs- und Wartungsanleitung zu Beginn durchgelesen werden.

Der korrekte Betrieb des Kühlschranks ist auch von einer effizienten Wartung abhängig. Daher ist die Kenntnis der notwendigen Wartungsarbeiten erforderlich. Die Bedienungsanleitung enthält alle Angaben zu Inbetriebnahme, Abschalten und Betrieb.

Der Kühlschrank wurde gemäß den gesetzlichen Sicherheitsanforderungen hergestellt, dennoch ist die maximale Sicherheit des Anwenders von einer gründlichen Lektüre dieser Anleitung und einer sorgfältigen und regelmäßigen Wartung des Gerätes abhängig.

Einige Angaben oder Abbildungen in dieser Anleitung können Details enthalten, die leicht von Ihrem Kühlschrank abweichen können, ohne jedoch die wesentlichen Informationen zu beeinflussen. Durch eine ständige Verbesserung können die Kühlschränke Variationen aufweisen, die nicht in dieser Anleitung enthalten sind. Eventuelle Modifikationen werden je nach Notwendigkeit den folgenden Ausgaben des Handbuchs hinzugefügt.

Kennzeichnung des Herstellers

Der Kühlschrank wurde ausschließlich entworfen und hergestellt durch:

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BESCHREIBUNG DES GERÄTS (Abb.2 und Abb.7)

12/24Vdc – 220Vac

- A) waagerechter Verdampfer
- A1) senkrechter Verdampfer
- B) Tropfenfänger
- C) Thermostatgehäuse
- D) abnehmbare Gitter
- E) Glasfläche (nur bestimmte Modelle)
- F) Gemüσεablage (nur bestimmte Modelle)
- G) Ablagen (herausnehmbar)

12/24Vdc Tragbar

- A) Korb
- B) Ratschenverschluss
- C) Verdampfer
- D) Schraube Befestigungsstrebe
- E) Befestigungsstrebe
- F) Maske mit Digitalthermostat
- G) Maske mit LED-Thermostat
- H) manuelles Thermostat (nur C26)
- I) Schalter (nur C26)
- J) Griff
- K) Stecker 12/24Vdc – 220Vac

Das Etikett, auf dem die Kennnummer und die technischen Daten angegeben sind, befindet sich rechts oben im Kühlschrank selbst. Die ersten drei Ziffern der Kennnummer bezeichnen Baujahr und -woche.

Alle Materialien, die mit den Lebensmitteln in Berührung kommen können, entsprechen der Richtlinie 2004/1935/EWG.

Die Geräuschemission der Maschine liegt unter 70dB(A).

INSTALLATION

Sicherstellen, dass das Gerät unbeschädigt ist. Eventuelle Transportschäden müssen innerhalb von 24 Stunden dem Händler mitgeteilt werden.

Das Gerät mit äußerster Vorsicht behandeln. Bei der Installation der Kühlanlage (bei Geräten mit separater Kühlanlage) besonders vorsichtig vorgehen, um Verbindungsleitungen nicht zu verbiegen bzw. brechen. Der Kühlschrank (und ggf. separate Kühlanlage) muss in jedem Fall auf ebener Fläche aufgestellt werden.

Die Kühlanlage muss ausreichend belüftet werden. Hierfür das Kühlschrankmöbel mit einer Öffnung unten in Höhe des Kühlaggregats und einer zweiten auf der Oberseite bzw. oben in der Seitenwand versehen. Diese Öffnungen müssen mindestens 300 cmq groß sein. Sollte dies nicht möglich sein, mindestens 50 mm Raum zwischen der Oberseite des Kühlschranks und der darüber liegenden Fläche belassen (siehe Abb. 5).

Für die Installation von Kühlschränken in Wohnwagen, Campern, Wohnmobilen usw. empfiehlt sich ein direkter Luftanschluss nach außen (siehe Abb. 6).

REINIGUNG DES KÜHLSCHRANKS

Vor der Reinigung auf jeden Fall die Stromzufuhr unterbrechen. Hierzu den Stecker herausziehen.

AUSSENREINIGUNG

Den Kühlschrank von außen mit lauwarmem Wasser waschen, mit Kaltwasser nachspülen und mit einem weichen Tuch trocknen. Keine Scheuermittel verwenden.

INNENREINIGUNG

Die Gitter (oder Korb), Behälter und Eiswürfelschalen herausnehmen, Kühlschrank mit lauwarmem Natron- bzw. Essigwasser reinigen. Nachspülen und mit einem weichen Tuch gut trocknen. Auf keinen Fall Scheuer- bzw. Reinigungsmittel oder Seife verwenden.

KONDENSATOR

Der Kondensator (siehe Abb. 4) sollte mindestens einmal im Jahr mit einem Staubsauger bzw. trockenem Pinsel gereinigt werden.

Bei längerem Stillstand des Kühlschranks folgende Maßnahmen treffen, um Schimmelbildung und unangenehme Gerüche zu vermeiden: das Versorgungskabel herausziehen, den Kühlschrank vollständig leeren, innen reinigen und die Tür etwas offen lassen.

ELEKTRISCHER ANSCHLUSS

Dieses Gerät entspricht der EG-Norm 89/336 in punkto Funkentstörung.

Vor dem Anschließen sicherstellen, dass Netzspannung und die auf dem Typenschild bzw. dem Aufkleber des Kompressors angegebene Spannung übereinstimmen.

TEMPERATURREGELUNG

Jeder Kühlschrank verfügt über ein Thermostat für den automatischen Temperatererhalt.

▪ MECHANISCHER THERMOSTAT

Die gewünschte Temperatur über den Regelgriff einstellen.

Griff auf "0" bzw. "STOP": Gerät außer Betrieb.

Griff auf "1": Gerät in Betrieb.

Griffpositionen von "1" bis "5": fortschreitend tiefere Temperaturen.

Elektroschema, siehe Abb. 8e/h (12/24V) oder Abb. 9 (115V/230V)

Einige Kühlschranksversionen sind mit Thermostaten ausgerüstet, deren Symbole zur Temperaturregung von der obigen Beschreibung abweichen. In diesen Fällen ist sich auf Abb. 1 zu beziehen. Die Kühlschranktemperatur wird durch Drehen des Schalters im Uhrzeigersinn herabgesetzt.

Für die rationelle Aufbewahrung von Lebensmitteln die folgende Tabelle beachten:

Lebensmittel	Haltbarkeit	Anordnung im Kühlschrank
Fleisch, ausgenommener Fisch (in Kühlbeutel)	2 bis 3 Tage	Rost unter Tiefkühlfach
Eier	1 Monat	Ablage in der Tür
Butter, Margarine	1 Woche	Ablage in der Tür
Gekochte Speisen, Torten und Suppen (in dicht verschlossenen Behältern, nach Abkühlung)	3 bis 4 Tage	Rost im unteren Teil des Kühlschranks
Wurstwaren, frische Nudeln, Soßen, Pudding, Schokolade, gefülltes Gebäck, Speck, trockenes Gebäck, frische Tomaten	3 bis 4 Tage	Überall
Flaschen		Aufnahme in der Tür
Obst und Gemüse		Gemüsefach; unterer Teil des Kühlschranks

AUSTAUSCH DER GLÜHBIRNE

Für den Austausch der Glühbirne folgendermaßen vorgehen:

- Die Schutzabdeckung senkrecht vom Sockel ziehen, darauf achten, dass die Befestigungsstifte nicht beschädigt werden.
- Eine der beiden Federn entfernen, um die Glühbirne herauszuziehen.
- Die beiden Federn ein wenig zueinander biegen und die neue Glühbirne einsetzen.
- **Sicherstellen, dass die Glühbirne fest in den Federn sitzt.**
- Die Schutzabdeckung wieder aufsetzen.

WECHSEL DES TÜRSCHLAGS

Wechsel des Türschlags bei PIN-Verschluss:

- Das obere Scharnier und den PIN-Verschluss ausbauen.
- Die Tür von dem unteren Scharnier ziehen.
- Das untere Scharnier ausbauen und an der gegenüberliegenden Kühlschrankseite montieren.
- Die Tür auf das untere Scharnier setzen.
- Das obere Scharnier und den PIN-Verschluss an der gegenüberliegenden Seite montieren.

AUSTAUSCH DES PANEELS

Zum Ausbau und/oder Austausch des Türpaneels folgendermaßen vorgehen:

- Die Tür entsprechend den Angaben im vorherigen Kapitel ausbauen.
- Die Schrauben an der unteren Seite herausschrauben.
- Das Paneel nach unten herausziehen.
- Das neue Paneel nach oben bis zum Anschlag hineinschieben.
- Die untere Seite montieren.

ABTAUEN DES GERÄTS

Sobald die Eisschicht 3 mm überschreitet sollte der Kühlschrank abgetaut werden. Wichtige Voraussetzung für einen einwandfreien und energiesparenden Betrieb des Geräts.

Für vollständiges Abtauen den Regelgriff auf "STOP" drehen. Zur Beschleunigung des Abtauvorgangs die Kühlschranktür offen lassen.

Eisschicht nie mit spitzen oder scharfen bzw. Metallgegenständen entfernen. Hierdurch könnte die Kühlplatte unweigerlich beschädigt werden.

Kühlschränke mit Kältespeicherung tauen automatisch ab. Der Tropfenfänger sollte daher täglich geleert werden.

Nach dem Abtauen den Kühlschrank wieder in Betrieb nehmen und den Thermostat auf die gewünschte Temperatur stellen.

BESONDERE HINWEISE FÜR KÜHLSCHRÄNKE 220 V AC

ELEKTRISCHER ANSCHLUSS

Der Kühlschrank muss nach gesetzlichen Bestimmungen geerdet werden. Vorschriftsmäßige Erdung der Elektroanlage sicherstellen.

Im Fall von Personen- bzw. Sachschäden aufgrund Nichteinhaltung dieser Vorschrift weist die Herstellerfirma jegliche Haftung zurück.

Für den Anschluss sollten keine Adapter, Vielfachstecker bzw. Verlängerungskabel verwendet werden. Sollte dies nicht vermeidbar sein, auf jeden Fall nur den einschlägigen Sicherheitsvorschriften entsprechendes Material verwenden und dabei auf keinen Fall die vorgegebenen elektrischen Stromfestigkeitsgrenzen überschreiten.

Falls Stecker und Steckdose nicht übereinstimmen, die Steckdose durch eine passende ersetzen. Dies sollte nur durch Fachpersonal ausgeführt werden, wobei zu beachten ist, dass der Kabelquerschnitt der Steckdose auf die Leistungsaufnahme des Geräts abgestimmt ist.

STÖRUNGEN UND ABHILFE

1- DAS GERÄT FUNKTIONIERT NICHT

Überprüfen, ob

- der Thermostat auf "STOP" steht;
- die Stromzufuhr unterbrochen ist;
- der Schutzschalter der elektrischen Anlage ausgeschaltet ist;
- der Stecker beschädigt ist oder falsch in der Steckdose sitzt;
- die Steckdose defekt ist. Hierfür ein anderes, sicher funktionierendes Gerät verwenden;
- das Versorgungskabel unterbrochen ist.

2- LAUTES BETRIEBSGERÄUSCH

Überprüfen, ob

- der Kühlschrank bzw. das Kühlaggregat eben stehen;
- der Kühlschrank Möbel berührt, die Vibrationen verursachen können;
- die Kühlleitungen an der Rückwand am Gerät anliegen und somit schwingen.

3- UNZUREICHENDE KÜHLUNG

Überprüfen, ob

- die Tür dicht schließt;
- der Kühlschrank in der Nähe von Wärmequellen aufgestellt ist;
- der Kühlschrank bzw. die separate Kühleinheit ausreichend belüftet sind;
- der Verdampfer vereist ist;
- der Kondensator durch Staub behindert ist;
- der Ventilator frei dreht (bei Modellen mit Lüfterkühlung);
- der Kühlschrank überfüllt ist.

Sollte nach diesen Kontrollen der Kühlschrank weiterhin nicht ordnungsgemäß funktionieren, sich mit dem Kundendienst in Verbindung setzen.

BESONDERE HINWEISE FÜR KÜHLSCHRÄNKE 12-24 V DC

Für die Installation von Kühlschränken in Wohnwagen, Campern, Wohnmobilen usw. empfiehlt sich ein direkter Luftanschluss nach außen (siehe Abb. 6).

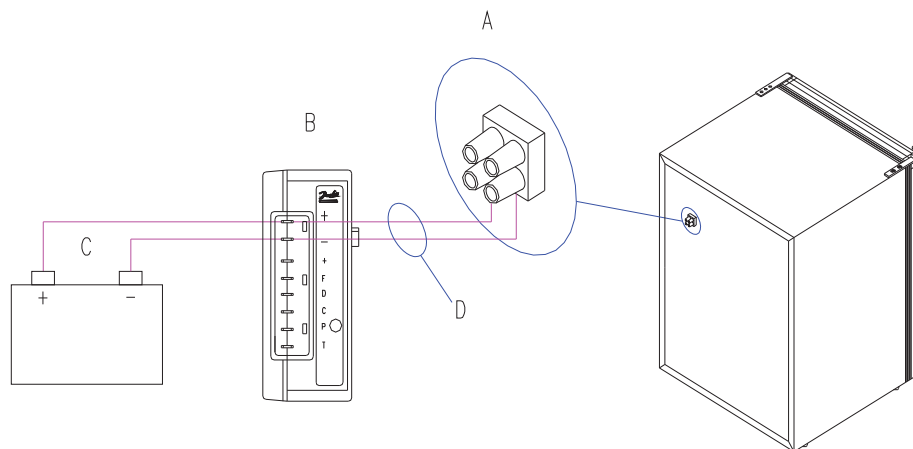
Für die Installation tragbarer Kühlschränke steht bei einigen Modellen eine Befestigungsstrebe zur Verfügung (siehe Abb.7).

ELEKTRISCHER ANSCHLUSS

Für 12 oder 24V Gleichstromkühlschränke wird empfohlen, die Anlagen gemäß den beiliegenden Anleitungen der Danfoss-Verdichter direkt an die Batterie zu schließen (siehe Seite 64 und 65).

Anschluss der Innenbeleuchtung bei 12/24Vdc-Kühlschränken mit externem Motor:

- Das optionale Kabel „D“ (Cod.**R10777**) an die Klemme an der Kühlschrankrückseite und die Kompressorsteuerung schließen. (Die Klemme „A“ ist ungepolt, daher kann der Anschluss beliebig erfolgen).
- Die Batterie an die Kompressorsteuerung anschließen, **auf die Polarität achten!**
 - Anschlussklemme Innenbeleuchtung.
 - Kompressorsteuerung.
 - Batterie.
 - Beiliegendes Kabel zur Speisung der Innenbeleuchtung.



BESONDERE HINWEISE FÜR KÜHLSCHRÄNKE 12-24Vcc 100-240Vca

ELEKTRISCHER ANSCHLUSS

Es wird empfohlen, die 12V oder 24V Gleichstromleitung entsprechend der beiliegenden Anleitung des Danfoss-Verdichters direkt an die Batterie zu schließen (siehe Seite 64 und Seite 65).

Für die Wechselstromleitung muss ein dreipoliges Kabel mit mindestens 1 mm² Querschnitt pro Leiter verwendet werden, das dem Einsatzbereich und der Umgebung sowie den geltenden Bestimmungen entspricht.

Der Anschluss an die Wechselstromversorgung muss durch einen gemäß den geltenden Bestimmungen dafür ausgelegten Stecker und Steckdose oder einen thermomagnetischen mehrpoligen 6A-Differentialschalter mit Kontaktabstand von mindestens 3 mm, bzw. den geltenden Bestimmungen entsprechend, erfolgen.

Nach der Installation sind die Funktion des Masseanschlusses zu prüfen, sowie sämtliche gesetzlich vorgesehenen elektrischen Sicherheitstests durchzuführen.

Die Kabel müssen angemessen geschützt und befestigt werden, um ein versehentliches Ziehen an den Kabeln und eine daraus folgende Abtrennung, sowie die Berührung mit über 50°C heißen oder scharfkantigen Komponenten zu verhindern.

Es wird empfohlen, die Montage der Stromleitungen durch einen Fachmann ausführen zu lassen, der die Anlage auf Entsprechung der geltenden Bestimmungen überprüft und die erforderlichen Konformitätsbescheinigungen ausstellt.

Anschluss der Innenbeleuchtung bei 12/24Vdc-Kühlschränken mit externem Motor:

- Das optionale Kabel (Cod. **R10777**) zum Anschluss der Innenbeleuchtung gemäß dem Schema auf Abbildung 15 an der Klemmleiste auf der Kühlschrankrückseite und der Verdichtersteuerung anschließen. (Die Klemmleiste ist nicht gepolt, weshalb der Anschluss beliebig erfolgen kann).

TEMPERATURREGELUNG

In 12Vdc bzw. 24Vdc-Kühlschränken mit Kältespeicherung und 75l-Inhalt sollte der Regelgriff zur optimalen Energieeinsparung auf "A", in größeren Modellen auf "A1" gestellt werden (Abb.1)

▪ „LED“-THERMOSTAT

Der elektronische „LED“-Thermostat ist mit zwei Steuertasten ausgestattet:

- Die Ein-/Ausschalttaste „ON/OFF“
- Die Temperaturregelung „*“

Durch Drücken der „ON/OFF“-Taste wird der **Kühlschrank ein- bzw. ausgeschaltet**.

Zur Einstellung der gewünschten Temperatur, die mit dem Symbol „*“ gekennzeichnete Taste drücken. Bei jedem Tastendruck leuchtet eine LED von links nach rechts auf, bei Zwischentemperaturen leuchten zwei nebeneinander liegende LEDs auf. Bei Anzeige auf der linken Seite ist der Kühlschrank auf Mindestkälte eingestellt (wärmste Stufe), während die Positionen in die rechte Richtung eine stufenweise Reduzierung (kälter) um zirka 3°C anzeigen. Zur Einstellung einer niedrigeren Temperatur wiederholt die Taste drücken, bis die rechte Leuchtanzeige leuchtet (höchste Kältestufe), die nächste Betätigung der Taste setzt die Anzeige wieder auf die ganz linke Position zurück.

Elektroschema, siehe Abb. 8a/b/f



DIGITALES THERMOSTAT

Das DIGITALE Thermostat ermöglicht eine ständige Kontrolle der Kühlschranktemperatur durch Ein-/Ausschalten des Kompressors.

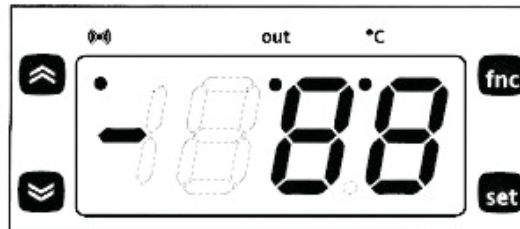
Dem Anwender stehen ein Display und vier Tasten zur Steuerung und Programmierung zur Verfügung.

Bei Inbetriebnahme beginnt das Display zu blinken und zeigt anschließend die momentane Innentemperatur des Kühlschranks an.

Die Standardeinstellung des Thermostats ist 0°C.

ÄNDERN DER PARAMETER:

- Schnell (innerhalb von 5 sek.) zweimal hintereinander die Taste **SET** drücken. Zuerst erscheint „SET“ und anschließend „0“, bzw. Der eingestellte Wert.
- Durch Drücken der Tasten  oder  die gewünschte Temperatur einstellen.
- Schnell zweimal hintereinander die Taste **FNC** drücken, um die eingestellte Temperatur zu bestätigen.
Zuerst erscheint „SET“ und anschließend die Innentemperatur.
- Der Punkt unter „OUT“ weist auf den Betrieb des Kompressors und des Ventilators hin.

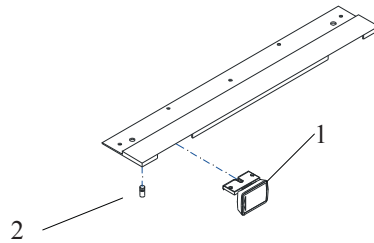


Elektroschema, siehe Abb. 8c/d/g

**JEDEM KÜHLSCHRANK LIEGT EINE DETAILLIERTE
BEDIENUNGSANLEITUNG DES DIGITALEN THERMOSTATS BEI.**

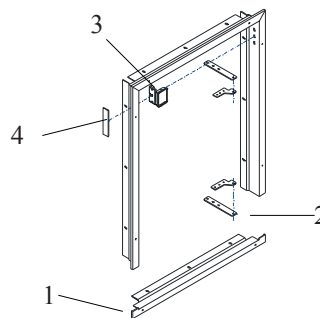
Wechseln des Türschlags bei NAUTIC-EUROPA-Verschluss:

- Das untere Scharnier ausbauen und die Tür nach unten herausziehen.
- Den Nautic-Griff (1) ausbauen und an der gegenüberliegenden Türseite montieren, dabei auf die Lochachsen achten.
- Den Scharnierstift (2) von der Strebe abschrauben und an der gegenüberliegenden Seite festschrauben.
- Die Tür einsetzen, dabei auf die gute Funktion des Verschlusses achten.
- Das untere Scharnier an der gegenüberliegenden Kühlschrankseite montieren.



Wechseln des Türschlags bei NAUTIC-USA-Verschluss:

- Den Sockel des Befestigungsprofils (1) ausbauen, wenn vorhanden.
- Das untere Scharnier und Platte (2) ausbauen und die Tür nach unten herausziehen.
- Den Nautic-Griff (3) ausbauen, die Sperren und die innen liegende Feder umdrehen, um die Richtung der Öffnungsbewegung zu verändern; den Griff in die Pfeilrichtung drehen.
- Den Nautic-Griff an der gegenüberliegenden Türseite befestigen, dabei auf die Lochachsen achten.
- Die Verschlussplatte (4) auf der gegenüberliegenden Profilseite befestigen.
- Die Tür einsetzen, dabei auf die gute Funktion des Verschlusses achten.
- Das Scharnier, die untere Platte und den Sockel des Befestigungsprofils montieren.



STÖRUNGEN UND ABHILFE

1- DAS GERÄT FUNKTIONIERT NICHT

Überprüfen, ob

- der Regelgriff auf "STOP" steht;
- der Schutzschalter der elektrischen Anlage ausgeschaltet ist;
- die Sicherung der elektronischen Vorrichtung beschädigt ist;
- das Versorgungskabel unterbrochen ist.
- die Batterie betriebsfähig ist;
- **die Spannung auf dem Klemmenbrett der elektronischen Vorrichtung mit dem Spannungswert der Batterie übereinstimmt.** Bei Spannungsabfällen über 0,2-0,4 V sicherstellen, dass
- der Kabelquerschnitt zwischen Batterie und elektronischer Vorrichtung ausreichend groß ist;
- entlang der Versorgungslinie eventuelle Verbindungspunkte nicht abgenutzt bzw. richtig befestigt sind;
- Batteriepole und Kontaktstellen keine Oxidationen aufweisen.

2- LAUTES BETRIEBSGERÄUSCH

Überprüfen, ob

- der Kühlschrank bzw. das Kühlaggregat eben stehen;
- der Kühlschrank Möbel berührt, die Vibrationen verursachen können;
- die Kühlleitungen an der Rückwand am Gerät anliegen und somit schwingen.

3- UNZUREICHENDE KÜHLUNG

Überprüfen, ob

- die Tür dicht schließt;
- der Kühlschrank in der Nähe von Wärmequellen aufgestellt ist;
- der Kühlschrank bzw. die separate Kühleinheit ausreichend belüftet sind;
- der Verdampfer vereist ist;
- der Kondensator durch Staub behindert ist;
- der Ventilator frei dreht (bei Modellen mit Lüfterkühlung);
- der Kühlschrank überfüllt ist.

Sollte nach diesen Kontrollen der Kühlschrank weiterhin nicht ordnungsgemäß funktionieren, sich mit dem Kundendienst in Verbindung setzen.

ANLEITUNG DANFOSS BD35/BD50F 12-24 Vcc

Die elektronische Steuerungseinheit arbeitet mit zwei Spannungen. Sie kann sowohl in Systeme mit 12V als auch in Systeme mit 24V Spannungsversorgung eingesetzt werden. Die maximale Spannung für 12V Systeme beträgt 17V, die für 24V Systeme 31,5V. Die maximal zulässige Umgebungstemperatur ist 55°C. Die elektronische Steuerungseinheit hat einen eingebauten Überhitzungsschutz. Dieser schaltet den Verdichter bei Überhitzung ab.

Installation (Abb. 10)

Der Stecker der elektronischen Steuerungseinheit muß zunächst auf die Anschlüsse des Verdichters gesteckt werden. Die gesamte Steuerungseinheit wird dann durch Aufsnappen des Gehäuses über den Schraubenkopf (1) montiert.

Stromversorgung (Abb. 10)

Die elektronische Steuerungseinheit muß direct mit den Klemmen der Stromversorgung (Batterie) (2) verbunden werden. Plus mit + und Minus mit - verbinden, andernfalls arbeitet die Steuerung nicht. Die Steuerung ist gegen Verpolung geschützt. Zum Schutz der Installation muß eine Sicherung (3) in der + Leitung, möglichst nahe an der Stromversorgung, montiert sein. 15A Sicherungen für 12V und 7,5A Sicherungen für 24V Stromkreise werden empfohlen. Wenn ein Hauptschalter (4) montiert wird, sollte dieser mit 20A belastbar sein. Die Leitungsdimensionierung in Abb. 11 muß beachtet werden. Zusätzliche Verbindungen in der Stromversorgung sollten vermieden werden um zu verhindern, daß ein Spannungsabfall den Batterieschutz beeinflusst.

Batterieschutz (Abb. 10)

Die Abschaltung des Verdichters und der Wiederanlauf ist abhängig von der ausgewählten Spannungsbegrenzung, die an den + und - Klemmen der Elektronik gemessen wird. Die Werkseinstellung für 12V und 24V Spannungsversorgungen werden in der Tabelle Abb. 12 dargestellt. Zusätzliche Spannungsbegrenzungen (Abb. 13) zum Schutz der Batterie können durch einen Widerstand (9) zwischen den Klemmen C und P eingestellt werden. Bei direkt solar betriebener Anwendung, ohne Batterie, wird ein 220kΩ Widerstand empfohlen. Im AEO-Betrieb (Adaptive Energie-Optimierung) stellt der BD-Verdichter die Drehzahl dem Kühlbedarf entsprechend ein, im Versorgungsspannungsbereich von 9,6 bis 31,5V.

Thermostat (Abb. 10)

Der Thermostat (7) wird an die Anschlußklemmen C und T angeschlossen. Ohne einen Widerstand im Steuerkreis läuft der Verdichter mit elektronischer

Steuerungseinheit 101N0210 oder 101N0220 mit einer Festdrehzahl von 2.000 min⁻¹, wenn der Thermostat eingeschaltet wird. Wird bei der elektronischen Steuerungseinheit 101N0300 der Thermostat ohne Widerstand an C verbunden, so stellt sich die Verdichterdrehzahl selbsttätig ein. Andere Festdrehzahlen im Bereich zwischen 2.000 und 3.500 min⁻¹ können mit einem Widerstand (8) eingestellt werden der dazu dient, den Strom (mA) im Steuerkreis zu regeln. Die Widerstandswerte für die verschiedenen Motordrehzahlen werden in der Tabelle Abb. 14 dargestellt.

Ventilator (Option, Abb. 10)

Ein Ventilator (5) kann an die Klemmen + und F angeschlossen werden. Plus an + und Minus an F. Da die Ausgangsspannung zwischen den Klemmen + und F immer auf 12V geregelt ist, muß ein 12V Ventilator für 12V und 24V versorgte Systeme benutzt werden. Der Ventilatorausgang kann einen Dauerstrom von 0,5A Durchschnitt liefern. Eine höhere Stromaufnahme ist nur während des Anlaufens für 2 Sekunden zulässig.

LED (Option, Abb. 10)

Eine 10mA Leuchtdiode (LED) (6) kann an die Klemmen + und D angeschlossen werden. Falls die elektronische Steuerung einen Bedienungsfehler registriert, wird dieser durch Aufleuchten der LED angezeigt. Die Anzahl der Leuchtpulse ist je nach Bedienfehler unterschiedlich. Jeder Impuls dauert ¼ Sekunde. Die Fehleranzeige wird alle 4 Sekunden wiederholt.

Anzahl Leuchtimpulse	Fehlertyp
5	Übertemperatur der Elektronikeinheit (Bei zu starker Belastung des Kühlsystems oder zu hoher Umgebungstemperatur wird die Elektronik zu heiß).
4	Zu niedrige Drehzahl (Bei zu stark belastetem Kühlsystem läßt sich die Mindestdrehzahl des Motors von 1.850 min ⁻¹ nicht aufrecht erhalten).
3	Motor läuft nicht an (Der Rotor sitzt fest oder der Differenzdruck im Kühlsystem ist zu hoch (>5 bar)).
2	Lüfter-Überstrom (Der Lüfter belastet die Elektronikeinheit mit mehr als 1A _{Spitze}).
1	Versorgungsspannung (Die Versorgungsspannung lag außerhalb des eingestellten Bereichs).

ANLEITUNG DANFOSS BD35/BD50F 12-24 V DC / 110-240 V AC

Die elektronische Einheit besitzt einen Spannungssensor und kann sowohl mit Versorgungssystemen mit 12V/24V Gleichstrom als auch 100-240V Wechselstrom bei 50/60Hz verwendet werden. Bei einer Gleichstromversorgung mit 12V liegt die Höchstspannung bei 17V und bei einer Gleichstromversorgung mit 24V liegt die Höchstspannung bei 31,5V. Bei Wechselstromsystemen liegen die Höchstspannung bei 265V und die Mindestspannung bei 85V. Die höchste zulässige Raumtemperatur beträgt 55°C. Die elektronische Einheit ist mit einem integrierten thermischen Schalter ausgestattet, der den Verdichterbetrieb ein- und ausschaltet, wenn die Temperatur der elektronischen Einheit zu stark ansteigt (100°C/121°F auf der Platine). Die Stromaufnahme ist auf 100W begrenzt. Siehe Datenblatt BD50F für Details.

Installation (Abb. 10)

Der Stecker der elektronischen Steuerungseinheit muß zunächst auf die Anschlüsse des Verdichters gesteckt werden. Die gesamte Steuerungseinheit wird dann durch Aufsnappen des Gehäuses über den Schraubenkopf (1) montiert.

Stromversorgung (Abb. 10)

Die elektronische Steuerungseinheit muß direct mit den Klemmen der Stromversorgung (Batterie) (2) verbunden werden. Plus mit + und Minus mit - verbinden, andernfalls arbeitet die Steuerung nicht. Die Steuerung ist gegen Verpolung geschützt. Zum Schutz der Installation muß eine Sicherung (3) in der + Leitung, möglichst nahe an der Stromversorgung, montiert sein. 15A Sicherungen für 12V und 7,5A Sicherungen für 24V Stromkreise werden empfohlen. Wenn ein Hauptschalter (4) montiert wird, sollte dieser mit 20A belastbar sein. Die Leitungsdimensionierung in Abb. 11 muß beachtet werden. Zusätzliche Verbindungen in der Stromversorgung sollten vermieden werden um zu verhindern, daß ein Spannungsabfall den Batterieschutz beeinflusst.

Wechselstrom: Die Stromkabel müssen an die mit L und N gekennzeichneten Klemmen auf der elektronischen Einheit geschlossen werden. Nennspannung von 100 bis 240V AC 50/60Hz. Sicherheitsschalter: Obergrenze = 270V AC, Untergrenze = 80V AC. Eine Sicherung 4A (11) muss zum Schutz der Anlage in das Stromkabel (L) integriert werden. Wird ein Hauptschalter (12) verwendet, muss er für eine Spannung von mindestens 6A ausgelegt sein. Das Kabel muss mindestens 0,75 mm² oder 18 AWG besitzen. ANM: wenn erforderlich, kann die Masseleitung verwendet werden.

Allgemein: Die elektronische Einheit kann gleichzeitig an eine Wechsel- und eine Gleichstromversorgung angeschlossen werden. In diesem Fall ist die Wechselstromversorgung aktiv. Bei Unterbrechung der

Wechselstromversorgung oder einen Spannungsabfall unter 85V, wird nach 1 Minute die 12V Gleichstromversorgung aktiviert. Ist die Wechselstromversorgung wieder hergestellt, erfolgt keine Verzögerung des Verdichterbetriebs.

Batterieschutz (Abb. 10)

Die Abschaltung des Verdichters und der Wiederanlauf ist abhängig von der ausgewählten Spannungsbegrenzung, die an den + und - Klemmen der Elektronik gemessen wird. Die Werkseinstellung für 12V und 24V Spannungsversorgungen werden in der Tabelle Abb. 12 dargestellt. Zusätzliche Spannungsbegrenzungen (Abb. 13) zum Schutz der Batterie können durch einen Widerstand (9) zwischen den Klemmen C und P eingestellt werden. **Thermostat (Abb. 10)**

Der Thermostat (7) wird an die Anschlußklemmen C und T angeschlossen. Ohne einen Widerstand im Steuerkreis läuft der Verdichter mit elektronischer Steuerungseinheit 101N0210 oder 101N0220 mit einer Festdrehzahl von 2.000 min⁻¹, wenn der Thermostat eingeschaltet wird. Wird bei der elektronischer Steuerungseinheit 101N0300 der Thermostat ohne Widerstand an C verbunden, so stellt sich die Verdichterdrehzahl selbsttätig ein. Andere Festdrehzahlen im Bereich zwischen 2.000 und 3.500 min⁻¹ können mit einem Widerstand (8) eingestellt werden der dazu dient, den Strom (mA) im Steuerkreis zu regeln. Die Widerstandswerte für die verschiedenen Motordrehzahlen werden in der Tabelle Abb. 14 dargestellt.

Ventilator (Option, Abb. 10)

Ein Ventilator (5) kann an die Klemmen + und F angeschlossen werden. Plus an + und Minus an F. Da die Ausgangsspannung zwischen den Klemmen + und F immer auf 12V geregelt ist, muß ein 12V Ventilator für 12V und 24V versorgte Systeme benutzt werden. Der Ventilatorausgang kann einen Dauerstrom von 0,5A Durchschnitt liefern. Eine höhere Stromaufnahme ist nur während des Anlaufens für 2 Sekunden zulässig.

Lampe (optional, Abb. 1)

Zwischen den Klemmen A und C kann eine 12V DC 5W-Lampe (10) angeschlossen werden. Sowohl bei einer Stromversorgung mit 12V, als auch mit 24V muss eine Lampe mit 12V Gleichstrom verwendet werden. Der Lampenausgang besitzt eine durchschnittliche kontinuierliche Spannung von 0,5A.

LED (optional, Abb. 1)

Zwischen den Klemmen + und D kann eine 10mA-LED (6) angeschlossen werden. Erfasst die elektronische Einheit eine Betriebsstörung, blinkt die Diode eine bestimmte Anzahl, die von der Art der Betriebsstörung abhängig ist. Jeder Blinkimpuls dauert ¼ Sekunde. Nach der Blinksequenz folgt eine Pause und die dem erfassten Fehler entsprechende Sequenz wird alle 4 Sekunden wiederholt.

INTRODUCCIÓN

Gentil cliente:

Agradeciéndole por haber elegido un producto nuestro, la empresa VITRIFRIGO desea que usted se encuentre completamente satisfecho de la compra que ha efectuado.

Le recordamos que el presente manual debe ser considerado parte integrante del frigorífico y debe seguir el recorrido de venta hasta el usuario y que la Vitrifrigo prohíbe la reproducción de cualquiera de sus partes.

Cada frigorífico, antes de abandonar nuestro establecimiento, soporta toda una serie de pruebas y de controles que garantizan el correcto funcionamiento.

Para cualquier información podrá dirigirse a nuestros centros de asistencia o directamente a nuestras oficinas.

Vitri Alceste



ADVERTENCIAS

– El manual se refiere a todos los frigoríficos con compresor fabricados por VITRIFRIGO s.n.c.

- Leer detenidamente este manual antes de utilizar el frigorífico.
- Si este aparato tuviera que sustituir otro de tipo viejo se aconseja inutilizar la cerradura antes de desguazarlo.
- Verificar que el embalaje esté entero, en caso contrario comunicarlo al transportador.
- Desembalar e instalar el producto actuando con la máxima precaución; para evitar heridas accidentales, se aconseja usar guantes de protección, en especial para los modelos con unidad refrigerante remota (fig. 3).
- Tras haber desembalado el aparato comprobar que no está dañado. Los daños han de indicarse al agente de ventas a las 24 horas a partir de la fecha de compra a más tardar.
- El producto se utilizará exclusivamente para guardar alimentos y bebidas.
- El aparato ha de ubicarse lejos de fuentes de calor asegurándole la suficiente ventilación (véanse indicaciones siguientes).
- Se aconseja esperar una hora por lo menos antes de encender el frigorífico para que el circuito refrigerante pueda ser completamente eficiente.
- Antes de conectar el producto comprobar que la tensión de red corresponde a lo que se indica en la placa de identificación del aparato o la indicada en la placa situada en el compresor.
- Una vez efectuada la instalación comprobar que el aparato no se apoya sobre el cable de alimentación.
- Para cualquier problema de funcionamiento dirigirse a nuestro centro de asistencia más cercano; en cualquier caso, utilizar personal cualificado.
- Antes de efectuar cualquier operación de mantenimiento o limpieza, desenchufar el aparato.
- No introducir en la sección de baja temperatura líquidos en recipientes de cristal.
- No desechar el embalaje del aparato, seleccionar los materiales según las prescripciones locales relativas a la evacuación de desechos.
- El presente producto no se debe tirar entre los residuos urbanos sino que se debe eliminar con recogida selectiva de residuos. Dirigirse a los centros de recogida de Residuos de Aparatos Eléctricos y Electrónicos (RAEE) presentes en su territorio o bien devolverlo al vendedor en el momento de la compra de un aparato nuevo equivalente.
- El producto, si no se elimina correctamente, puede tener potenciales efectos dañinos en el ambiente y en la salud humana debidos a determinadas sustancias presentes en su interior.
- El símbolo presente aquí a lado indica que el producto no se puede eliminar como residuo urbano.
- La eliminación abusiva o no correcta del producto comporta sanciones jurídicas de tipo administrativo y/o penal severas como previsto por las leyes vigentes.
- Está absolutamente prohibido utilizar el frigorífico para usos diferentes de aquellos previstos.
- Cuidar siempre la perfecta limpieza y tener siempre eficientes los dispositivos de seguridad.
- Mantener siempre libre de obstrucciones los orificios de ventilación en la envoltura del aparato y/o estructura de empotrado.
- No sacar nunca las protecciones (cárter) del frigorífico
- Efectuar siempre las verificaciones, los controles y el mantenimiento programados descritos en el capítulo 13 de este manual leyendo atentamente las advertencias.
- El aparato no debe ser expuesto a la lluvia.
- Su uso es apropiado en las acampadas.



Informaciones generales

Objetivo del Manual

Este manual, relativo a los Frigoríficos de la serie “INTERIOR (230Vca) / OCEAN-RUNNER (12/24Vcc)”, se propone suministrar una guía para la utilización correcta y segura de los mismos y para su racional mantenimiento.

Para aprender en poco tiempo cómo hacer funcionar y utilizar el frigorífico que usted posee es necesario leer atentamente este manual de uso y mantenimiento ya desde el primer uso. El correcto funcionamiento del frigorífico depende en gran parte de un mantenimiento eficiente y eficaz. Por este motivo, es preciso el conocimiento de los trabajos de mantenimiento. Las indicaciones para el uso indican todas las operaciones de puesta en marcha, de detención y de funcionamiento.

El frigorífico ha sido construido en conformidad con todos los requisitos de seguridad (considerados pertinentes) previstos por las directivas en materia; no obstante esto, la seguridad máxima del operador así también como la de otras personas depende de una atenta lectura de este manual y de una limpieza y mantenimiento constantes y esmerados.

Algunas informaciones o figuras de este manual pueden mostrar detalles o partes que pueden diferenciarse ligeramente de aquellas del frigorífico que usted posee, pero las informaciones esenciales no han sido modificadas. En base al constante mejoramiento, el frigorífico podrá mostrar variaciones que no están contenidas en este manual. Eventuales modificaciones aparecerán, según las necesidades, en las versiones sucesivas del manual.

Identificación del constructor

El frigorífico ha sido proyectado y producido exclusivamente en la:

Vitrifrigio s.n.c
via della Produzione, 9
61020 Montecchio di PESARO
Tel. +39 0721 491080
Fax. +39 0721 497739
E-Mail. Vitrifrigio@vitrifrigio.com
www.vitrifrigio.com

DESCRIPCION DEL APARATO (fig. 2 y fig. 7)

12/24Vcc – 220Vca

- A) evaporador horizontal
- A1) evaporador vertical
- B) goteador
- C) caja del termostato
- D) rejillas extraíbles
- E) estante de cristal (sólo en algunos modelos)
- F) cajón portafruta (sólo en algunos modelos)
- G) balconillos (extraíbles)

12/24Vcc Portatátiles

- A) cestita
- B) cierre en cric
- C) evaporador
- D) tornillos de fijación bornes
- E) borne de fijación
- F) pantalla con termostato Digital
- G) pantalla con termostato LED
- H) termostato manual (solo C26)
- I) interruptor (solo C26)
- J) manopla
- K) enchufe 12/24Vcc – 220Vca

La etiqueta, en la que se indican la matrícula y los datos técnicos, está situada en el interior del frigorífico, en la parte superior del lado derecho. Las primeras tres cifras de la matrícula se refieren al año y la semana de fabricación. Todos los materiales que pueden entrar en contacto con alimentos son conformes a la directiva 2004/1935/CEE. El nivel del ruido emitido por la máquina es menor de 70dB(A).

INSTALACION

Comprobar que el aparato no está dañado. Los posibles daños de transporte han de indicarse inmediatamente al agente de venta y de todas formas no superando nunca las 24 horas a partir de la entrega.

Manipular el producto con el máximo cuidado. Al colocar el grupo refrigerante (en los modelos de frigoríficos con sistema refrigerante remoto) actuar con precaución para evitar obstrucciones o roturas en los puntos de unión. Colocar siempre el frigorífico y el grupo refrigerante remoto, (en las versiones con esta solución) sobre una superficie horizontal.

Garantizar al grupo frigorífico su ventilación suficiente efectuando en el mueble-contenedor dos aperturas, una en el fondo a la altura del grupo refrigerante y la segunda en la parte superior o en la parte alta del costado. Estas aperturas deberán tener una superficie que no sea inferior a 300 cm². De no ser posible, dejar un canal de 50 mm por lo menos entre la parte superior del frigorífico y la superficie que está encima (véase fig. 5). Instalar el frigorífico lejos de fuentes de calor en un lugar seco y bien ventilado. Dejar parado el aparato durante una hora por lo menos antes de encenderlo. En este intervalo, hacer la primera limpieza.

LIMPIEZA DEL FRIGORIFICO

Antes de limpiarlo comprobar que el frigorífico no está conectado a la instalación eléctrica. En caso contrario, desenchufarlo.

EXTERIOR.

Lavar el exterior del frigorífico con agua templada, repasar con agua fría y secar con un trapo suave. No utilizar productos abrasivos.

INTERIOR

Quitar las rejillas (o la cestita), los contenedores y las cubetas de hielo y limpiarlo utilizando agua templada con bicarbonato de sodio o vinagre. Enjuagar y secar con cuidado con un trapo suave. No utilizar nunca productos abrasivos, detergentes o jabones.

CONDENSADOR

Se aconseja efectuar, al menos una vez al año, la limpieza del condensador (véase fig. 4) con un aspirador o un pincel seco.

En caso de no utilizar el aparato durante mucho tiempo, para evitar que se forme moho o malos olores, desenchufarlo, vaciarlo completamente y limpiar el interior dejando la puerta entreabierta.

CONEXION ELECTRICA

Este aparato cumple con la normativa 89/336/CEE sobre la supresión de las interferencias de radio.

Antes de conectar el aparato comprobar que la tensión de la red corresponde a la que se indica en la placa de identificación o a la que se indica en la placa situada en el compresor.

REGULACION DE LA TEMPERATURA

Cada frigorífico va equipado con un termostato para mantener automáticamente la temperatura.

▪ TERMÓSTATO MECÁNICO

Para elegir la temperatura deseada mover el mando de regulación. Cuando el mando está en posición "0" o "STOP" el frigorífico no funciona.

Colocando el mando en posición "1" el frigorífico se activa.

Llevando el mando de la posición "1" a la posición "5" se obtienen temperaturas cada vez más frías.

Para esquemas eléctricos ver fig. 8e/h (12/24) o fig. 9 (115V/230V)

Algunas versiones de frigoríficos van equipadas con termostatos cuya simbología de la regulación de la temperatura es diferente de la descripción anterior, en estos casos remitirse a la fig. 1. La refrigeración del frigorífico aumenta girando el mando hacia la derecha.

Para una colocación y conservación racional de los alimentos, tomar como referencia la tabla de abajo.

Alimento	Tiempo de conservacion	Colocacion en el frigorifico
Carne o pescado limpio (envolver en bolsas u hojas de plástico).	2 ó 3 días	En la rejilla bajo la zona del congelador.
Huevos	1 mes	Utilizar los compartimientos contrapuerta.
Mantequilla, margarina.	1 semana	Utilizar los compartimientos contrapuerta.
Alimentos cocidos, pasteles y sopas (meter en recipientes herméticos e introducir después de que se enfrien).	3 ó 4 días	En la rejilla de la parte más baja del frigorífico.
Embutidos crudos, pasta fresca, cremas , flanes, chocolates, pastelitos de crema, manteca, pastas secas y tomates rojos.	3 ó 4 días	En cualquier rejilla.
Botellas		En los alojamientos de la contrapuerta.
Fruta y verdura		En el cajón de la verdura; en la parte inferior del frigorífico.

SUSTITUCIÓN DEL BOMBILLO

Para efectuar la sustitución del bombillo (ver fig.2) proceder como sigue:

- Extraer perpendicularmente a la base la tapa de protección procurando no dañar los pernos de ajuste.
- Alejar uno de los dos resortes para poder quitar el bombillo.
- Doblar ligeramente los dos resortes el uno hacia el otro y colocar el bombillo nuevo.
- **Controlar que el bombillo quede bien ajustado sobre los resortes.**
- Volver a posicionar la tapa.

REVERSIBILIDAD DE LA PUERTA

Para cambiar el sentido de apertura de la puerta con cierre en PIN:

- Desmontar la cremallera superior y el cierre en PIN.
- Extraer la puerta superiormente hasta sacarla de la cremallera inferior.
- Desmontar la cremallera inferior y volver a colocarla en la parte opuesta del frigorífico.
- Volver a colocar la puerta en la cremallera inferior.
- Volver a colocar la cremallera superior y el cierre en PIN en la parte opuesta.

REVERSIBILIDAD DE LA PUERTA

Para cambiar el sentido de apertura de la puerta intervenir de la siguiente manera:

- Desmontar la cremallera superior.
- Extraer la puerta superiormente hasta sacarla de la cremallera inferior.
- Desmontar la cremallera inferior y volver a colocarla en la parte opuesta del frigorífico.
- Volver a colocar la puerta en la cremallera inferior.
- Volver a colocar la cremallera superior.

DESCONGELACION DEL APARATO.

Será oportuno descongelar el frigorífico cada vez que se note un espesor de hielo superior a tres milímetros. Es necesario efectuar esta operación para garantizar un buen rendimiento del frigorífico y evitar un mayor consumo de energía eléctrica. Para descongelar completamente el frigorífico girar el mando del termostato colocándolo en posición de stop. Mantener la puerta abierta para acelerar el tiempo de descongelación.

No quitar la capa de hielo utilizando utensilios metálicos puntiagudos o cortantes que puedan perforar la chapa refrigerante con consecuencias irreparables para el aparato.

En los frigoríficos de acumulación de frío, la descongelación se realiza automáticamente. Se aconseja vaciar la bandeja recolectora de gotas cada día.

Al terminar de descongelar, activar el frigorífico colocando el mando del termostato en la posición deseada.

ADVERTENCIAS PARTICULARES PARA REFRIGERADORES 220 Vca

CONEXION ELECTRICA

Es legislativamente obligatorio poner a tierra el aparato. Comprobar que el sistema de puesta a tierra de la instalación eléctrica es perfectamente eficiente.

Se declina toda responsabilidad por posibles daños sufridos por personas o cosas que deriven del incumplimiento de dicha norma.

De desaconseja utilizar adaptadores, tomas de corriente múltiples o alargos. De tener que utilizarlos, usar exclusivamente material que cumpla con las normas de seguridad vigentes tratando de no superar el límite de capacidad en valor de corriente indicado en los materiales. En caso de incompatibilidad entre la toma de corriente y la clavija del aparato es preferible sustituir la toma con otra del tipo adecuado. Se aconseja que se efectúe esta operación por parte de personal cualificado, el cual tendrá que comprobar que la sección de los cables de la toma es adecuada a la potencia absorbida por el aparato.

QUE HACER SI NO FUNCIONA EL FRIGORIFICO

1- EL APARATO NO FUNCIONA

Controlar que:

- el termostato no está en la posición "STOP".
- no falta corriente.
- el interruptor automático de la instalación eléctrica no está desactivado.
- la clavija es eficiente y está introducida correctamente en la toma de corriente.
- la toma de corriente funciona perfectamente. Para efectuar este control enchufar un aparato del que se haya constatado su funcionamiento.
- el cable de alimentación no está interrumpido.

2- EL FRIGORIFICO HACE RUIDO

Controlar que:

- el frigorífico o el grupo refrigerante está bien nivelado.
- el frigorífico no está en contacto con muebles que puedan causar vibraciones.
- los tubos de circuito refrigerante situados en la parte posterior no tienen punto de contacto y no crean hielo contra el aparato.

3- FRIGORIFICO CON RENDIMIENTO INSUFICIENTE

Controlar que:

- que la puerta cierra herméticamente.
- el frigorífico no está cerca de fuentes de calor.
- el frigorífico o el grupo refrigerante remoto está suficientemente ventilado.
- que no hay en el evaporador una excesiva cantidad de hielo.
- que el condensador no está obstruido de polvo.
- que el ventilador gira libremente (en las versiones con refrigeración forzada).
- que el interior no está demasiado lleno.

Si al terminar estos controles no se obtiene un funcionamiento bueno, llamar al servicio de asistencia.

ADVERTENCIAS PARTICULARES PARA REFRIGERADORES 12-24 Vcc

INSTALACION

Para instalar el frigorífico o sistemas frigoríficos de caravanas, camping-cars, motor-homes, etc. se aconseja preparar el vehículo con tomas de ventilación situadas directamente en la parte exterior (véase fig. 6).

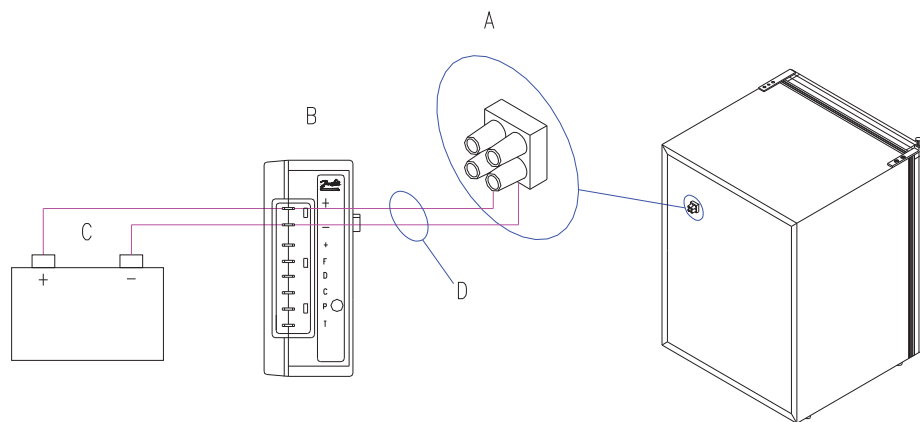
Para la instalación de los frigoríficos portátiles está disponible, para algunas modelos, un borne de sujeción (ver Fig.7).

CONEXION ELECTRICA

Para los refrigeradores alimentados a 12Vcc o 24Vcc se aconseja conectar las instalaciones directamente a la batería ateniéndose a las correspondientes instrucciones del compresor Danfoss en dotación (véase pág.80 y pág.81).

Conexión alimentación luz interna en frigoríficos 12/24Vcc con motor remoto:

- Conecte el cable opcional “D” (Cod. R10777) con la tabla de bornes presente en el dorsal de la nevera y con la centralita del compresor. (La tabla de bornes “A” no está polarizada, por lo tanto la conexión puede ser realizada indistintamente)
- Conectar la batería con la centralita del compresor, prestando atención con las polaridades:
 - Tabla de bornes conexión luz interna
 - Centralita compresor
 - Batería
 - Cable de alimentación luz interna



ADVERTENCIAS PARTICULARES PARA REFRIGERADORES
12-24Vcc 100-240Vca

CONEXION ELECTRICA

Se aconseja conectar la línea de alimentación a 12Vcc o 24Vcc directamente a la batería ateniéndose a las correspondientes instrucciones del compresor Danfoss en dotación (véase pág.80 y pág.81).

Predisponga la línea de alimentación en Vca utilizando un cable tripolar de sección mínima para conductores de 1 mm² y aislamiento adecuados a los modos y al ambiente de uso y conforme a las normativas vigentes.

Efectúe la conexión a la línea de alimentación en Vca mediante una conexión enchufe-toma de capacidad adecuada conforme a las normativas vigentes o predisponga un interruptor magnetotérmico diferencial omnipolar con capacidad de 6 amperios y con abertura de los contactos de al menos 3mm o, de todos modos, conforme a las normativas vigentes.

Una vez terminada la instalación verifique la continuidad del circuito de tierra y lleve a cabo todas las pruebas de seguridad eléctrica previstas por las normativas vigentes.

Proteja y bloquee adecuadamente los cables a fin de evitar que tracciones accidentales del cable puedan desconectarlo de las conexiones o que puedan entrar en contacto con partes calientes con temperatura superior a 50°C o con partes cortantes.

Se aconseja llevar a cabo la instalación de las líneas de alimentación recurriendo a personal calificado, el cual proveerá a comprobar la correspondencia de la instalación con las normativas vigentes y a expedir las relativas certificaciones de conformidad.

Conexión alimentación luz interna en frigoríficos 12/24Vcc con motor remoto:

- Conecte el cable opcional (Cód. **R10777**) para la conexión de la luz interior desde la caja de conexiones presente en la parte trasera del frigorífico y a la centralita del compresor siguiendo el esquema presente en la figura 15. (La caja de conexiones no está polarizada, por tanto la conexión se puede efectuar indistintamente.)

REGULACION DE LA TEMPERATURA

■ TERMÓSTATO MECÁNICO

En los frigoríficos de acumulación de frío 12 Vcc ó 24 Vcc, para obtener el máximo ahorro de energía se aconseja colocar el mando del termostato en posición "A" para el frigorífico con capacidad máxima de 75 l.; en posición "A1" para capacidades superiores (fig.1)

■ TERMÓSTATO LED

El termostato electrónico "LED" está dotado de dos mandos con teclas:

- El mando de encendido y apagado "ON/OFF"
- El mando de regularización de la temperatura "°"

Pulsando el mando señalizado con "ON/OFF" se obtiene alternativamente el encendido o el apagado del frigorífico.

Para establecer la temperatura deseada pulsar el mando con el símbolo "°". Tras cada presión el señalizador luminoso en LED se desplaza de izquierda a derecha, para las posiciones intermedias se obtendrá el encendido de los dos LED cercanos. Cuando el señalizador se encuentra a la izquierda, el frigorífico está al mínimo (más caliente), mientras que si se encuentra a la derecha hay una reducción de la temperatura (más fría) de unos 3' C. Para seleccionar una temperatura más fría pulsar repetidamente el mando hasta el encendido del señalizador luminoso más a la izquierda.

Para esquema eléctrico ver fig. 8°/b/f



■ TERMÓSTATO DIGITAL

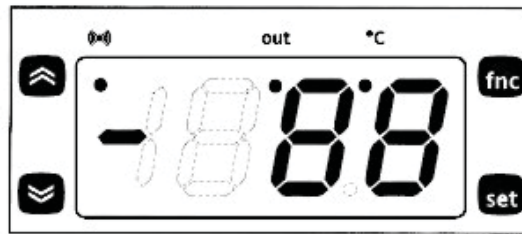
El termostato DIGITAL permite controlar constantemente la temperatura interna de la nevera tras el encendido y apagado del compresor.

El usuario está dotado de una pantalla y de cuatro teclas para el control del estado y la programación del aparato.

Tras la conexión de la alimentación, la pantalla empieza a parpadear y se detiene visualizando la temperatura actual en el interior de la nevera. Para el default el termostato está colocado en 0°C.

CÓMO MODIFICAR LOS PARÁMETROS:

- Pulsar la tecla SET rápidamente (dentro de 5 seg.) 2 veces.
la primera vez aparecerá escrito “SET” y la segunda vez el valor “0” precedentemente colocado.
- Actuando en las teclas  o  modificar la temperatura que deberá alcanzar la nevera.
- Pulsar la tecla FNC rápidamente 2 veces para confirmar la temperatura elegida.
La primera vez aparecerá escrito “SET” y la segunda la temperatura interna.
- El puntito que se encuentra debajo de la escrita “OUT” indica que el compresor y el ventilador están en marcha.

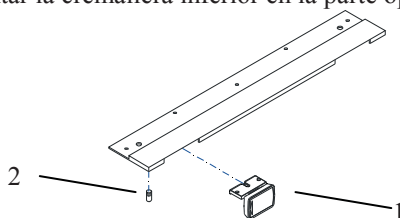


Para el esquema eléctrico ver fig. 8c/d/g

**UN MANUAL DE INSTRUCCIONES RELATIVO AL TERMÓSTATO DIGITAL
APARECE EN DOTACIÓN CON TODOS LOS FRIGORÍFICOS**

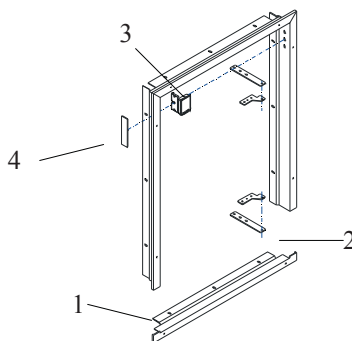
Para cambiar el sentido de la apertura de la puerta con cierre NAUTIC-EUROPA:

- Desmontar la cremallera inferior y extraer la puerta hacia abajo.
- Desmontar la manopla Nautic (1) y volver a posicionarla en la puerta en la parte opuesta, prestando atención a los orificios.
- Destornillar el perno de la cremallera (2) del borne y atornillarlo en la parte opuesta.
- Volver a posicionar la puerta prestando atención en que el cierre trabaje de manera eficiente.
- Volver a montar la cremallera inferior en la parte opuesta del frigorífico.



Para cambiar el sentido de la puerta con cierre NAUTIC-USA:

- Desmontar la base del perfil de fijación (1) si presente.
- Desmontar la cremallera y la plaqueta inferior (2) y extraer la puerta hacia abajo.
- Desmontar la manopla Nautic (3), invertir las fijaciones y el resorte interno para modificar el movimiento de apertura, girar la empuñadura hacia el sentido de la flecha.
- Volver a posicionar la manopla Nautic en el lado opuesto de la puerta prestando atención a los orificios.
- Mover la plaqueta de enganche cierre (4) en el lado opuesto del perfil.
- Volver a posicionar la puerta prestando atención que el cierre trabaje de manera eficiente.
- Volver a posicionar la cremallera, la plaqueta inferior y la base del perfil de fijación.



QUE HACER SI NO FUNCIONA EL FRIGORIFICO

1- EL APARATO NO FUNCIONA

Controlar que:

- el termostato no está en la posición "STOP".
- el interruptor automático de la instalación eléctrica no está desactivado.
- el fusible situado en el dispositivo electrónico del frigorífico está íntegro.
- el cable de alimentación no está interrumpido.
- la batería es eficiente.
- **la tensión en el tablero de bornes del dispositivo electrónico del frigorífico es igual a la de la batería.** En caso de observar una caída de tensión superior a 0,2-0,4 V controlar que :
- la sección del cable que conecta la batería al dispositivo electrónico del frigorífico tanto de dimensión adecuada (véase tabla en instrucciones Danfoss adjuntas).
- a lo largo de la línea de alimentación los posibles puntos de unión no están deteriorados o apretados correctamente.
- no hay oxidación en los polos de la batería y en los puntos de contacto.

2- EL FRIGORIFICO HACE RUIDO

Controlar que:

- el frigorífico o el grupo refrigerante está bien nivelado.
- el frigorífico no está en contacto con muebles que puedan causar vibraciones.
- los tubos del circuito refrigerante situados en la parte posterior no tienen puntos de contacto y no vibran contra el aparato.

3- FRIGORIFICO CON RENDIMIENTO INSUFICIENTE

Controlar que:

- la puerta se cierra herméticamente.
- el frigorífico no está cerca de fuentes de calor.
- el frigorífico o el grupo refrigerante remoto está suficientemente ventilado.
- no hay en el evaporador una excesiva cantidad de hielo.
- el condensador no está obstruido de polvo.
- el ventilador gira libremente (en las versiones con refrigeración forzada).
- el interior no está demasiado lleno.

Si al terminar estos controles no se obtiene un funcionamiento bueno, llamar al servicio de asistencia.

INSTRUCCIONES DANFOSS BD35/BD50F 12-24 Vcc

La unidad electrónica de control trabaja con dos tensiones. Esto significa que la misma unidad puede ser utilizada para sistemas de alimentación de 12V así como de 24V. La tensión máxima es de 17V para el sistema de 12V y de 31,5V para el sistema de 24V. La temperatura ambiente máxima es de 55°C. La unidad electrónica de control tiene incorporada una protección

térmica que desconecta el compresor en caso de temperatura excesiva.

Instalación (fig. 10)

Conéctese el conector de la unidad electrónica al terminal del compresor. Móntese la unidad electrónica en el compresor presionando la tapa por encima de la cabeza del tornillo (1).

Alimentación eléctrica (fig. 10)

La unidad electrónica de control debe siempre conectarse directamente a los polos de la batería (2). Conéctese el polo positivo a + y el negativo a -, de lo contrario la unidad electrónica de control no funcionará. La unidad está protegida contra una conexión invertida de la batería. Para la protección de la instalación, deberá montarse un fusible (3) en el conductor de signo +, lo más cerca posible de la batería. Se recomienda un fusible de 15A para el circuito de 12V y uno de 7,5A para el circuito de 24V.

Si se utiliza un interruptor general (4), éste deberá tener una intensidad nominal mínima 20 A. Las dimensiones de los conductores de la fig. 11 deberán ser respetadas. Evite uniones extras en el sistema de suministro de energía para impedir que una caída de tensión afecte el ajuste de protección de la batería.

Protección de batería (fig. 10)

El compresor se para y arranca de nuevo según los límites de voltaje establecidos y medidos en los terminales + y - de la unidad electrónica de control. Los valores estándar para sistemas de alimentación de 12V y 24V están ilustrados en la fig. 12. Se pueden establecer ajustes opcionales (fig. 13) incluyendo una resistencia (9) en el circuito entre los terminales C y P. En aplicaciones de energía solar sin batería, se recomienda una resistencia de 220 kW. Con el sistema de control AEO (optimización de energía adaptativa) el compresor BD, ajustará siempre su velocidad a la demanda de refrigeración actual dentro de un rango de tensión de funcionamiento de 9.6 a 31.5 V.

Termostato (fig. 10)

El termostato (7) está conectado entre los terminales C y T. Sin resistencia en el circuito de control el compresor con unidad electrónica 101N0210 ó

101N0220, rodará a una velocidad fija de 2.000 r.p.m. cuando el termostato está conectado. Con el termostato conectado directamente al terminal C, la unidad electrónica 101N0300, ajustará su velocidad a la demanda actual de refrigeración. Otras velocidades del compresor establecidas dentro del rango de 2.000 y 3.500 r.p.m. se pueden obtener mediante una resistencia (8) que se instala para ajustar la corriente (mA) de control del circuito. Los valores de resistencia para distintas velocidades de motor pueden verse en la fig. 14.

Ventilador (opcional, fig. 10)

Se puede conectar un ventilador (5) entre los terminales + y F. Conéctese el positivo a + y el negativo a F. Ya que el voltaje de salida entre los terminales + y F está siempre regulado a 12 V, deberá utilizarse un ventilador de 12 V, tanto para los sistemas de alimentación de 12 V como para los de 24 V. La salida del ventilador puede suministrar una corriente continua de 0,5 A avg. Se permite un valor más alto de corriente de 2 segundos de duración durante el arranque.

LED (opcional, fig. 10)

Un LED diodo emisor de luz (6) de 10 mA se puede conectar entre los terminales + y D. En caso que la unidad de control detecte una avería de funcionamiento, el diodo emitirá destellos luminosos un cierto número de veces. La velocidad de los destellos dependerá del tipo de avería detectada. Cada destello tendrá una duración de ¼ de segundo. A cada periodo de destellos le sigue otro sin destellos, de manera que la secuencia de cada detección de avería se repetirá cada 4 segundos.

Número de destellos	Tipo de avería
5	Disparo térmico de la unidad electrónica de control (Si el sistema de refrigeración ha sido excesivamente recargado, o si la temperatura ambiente es demasiado alta, la unidad electrónica se sobrecalentará).
4	Velocidad de giro del motor demasiado baja (Si el sistema de refrigeración está excesivamente recargado, el motor no puede mantener la velocidad mínima de 1.850 r.p.m.).
3	Fallo de arranque de motor (El rotor está bloqueado o la presión diferencial en el sistema de refrigeración es demasiado alta (>5 bar)).
2	Disparo por sobreintensidad del ventilador (El ventilador carga la unidad electrónica con más de 1A _{avg}).
1	Disparo de protección de batería (El valor de la tensión de alimentación está fuera del rango de ajuste de disparo).

INSTRUCCIONES DANFOSS BD35/BD50F
12-24 V DC / 110-240 V AC

La unidad electrónica es un dispositivo multitensión. Se puede utilizar tanto con sistemas de alimentación de 12V/24V CC como con los de 100-240V AC 50/ 60Hz. En el caso del sistema de alimentación de 12V CC la tensión máxima es 17V CC; para sistemas de alimentación de 24V CC, la tensión máxima es 31.5V CC. En caso de sistema de alimentación AC, la tensión máxima es 265V AC, la tensión mínima es 85V AC. La temperatura ambiente máxima es de 55°C. La unidad electrónica está equipada con un aislamiento térmico incorporado que activa y detiene el funcionamiento del compresor en caso de que la temperatura de la unidad electrónica se vuelva demasiado elevada (100°C / 212°F en el circuito impreso). La potencia absorbida está limitada a 100W. Véase la ficha técnica BD50F para los detalles.

Instalación (fig. 10)

Conéctese el conector de la unidad electrónica al terminal del compresor. Móntese la unidad electrónica en el compresor presionando la tapa por encima de la cabeza del tornillo (1).

Alimentación eléctrica (fig. 10)

La unidad electrónica de control debe siempre conectarse directamente a los polos de la batería (2). Conéctese el polo positivo a + y el negativo a -, de lo contrario la unidad electrónica de control no funcionará. La unidad está protegida contra una conexión invertida de la batería. Para la protección de la instalación, deberá montarse un fusible (3) en el conductor de signo +, lo más cerca posible de la batería. Se recomienda un fusible de 15A para el circuito de 12V y uno de 7,5A para el circuito de 24V.

Si se utiliza un interruptor general (4), éste deberá tener una intensidad nominal mínima 20 A. Las dimensiones de los conductores de la fig. 11 deberán ser respetadas. Evite uniones extras en el sistema de suministro de energía para impedir que una caída de tensión afecte el ajuste de protección de la batería.

AC: Los cables eléctricos tienen que estar conectados a los bornes marcados L y N en la unidad electrónica. Tensión nominal de 100 a 240 V AC 50/60Hz. Interruptor de seguridad: límite superior = 270V AC, límite inferior = 80V AC. Un fusible 4A (11) tiene que estar montado en el cable de tensión (L) para proteger la instalación. En caso se utilice un interruptor principal (12), tiene que estar ajustado a una corriente de al menos 6A. El cable ha de tener una dimensión mínima de 0,75 mm² o 18 AWG. NOTA: si necesario es posible utilizar la conexión de tierra.

General: es posible conectar contemporáneamente a la unidad electrónica tanto la alimentación AC como la alimentación CC. En este caso, AC será la fuente de alimentación preferente. En caso de desconexión de la alimentación AC o de caída por debajo de 85V AC, se

activará el sistema de alimentación de 12V CC con un retraso de 1 minuto. En caso se vuelva a establecer la alimentación AC, no habrá ningún retraso en el funcionamiento del compresor.

Protección de batería (fig. 10)

El compresor se para y arranca de nuevo según los límites de voltaje establecidos y medidos en los terminales + y - de la unidad electrónica de control. Los valores estándar para sistemas de alimentación de 12V y 24V están ilustrados en la fig. 12. Se pueden establecer ajustes opcionales (fig. 13) incluyendo una resistencia (9) en el circuito entre los terminales C y P.

Termostato (fig. 10)

El termostato (7) está conectado entre los terminales C y T. Sin resistencia en el circuito de control el compresor con unidad electrónica 101N0210 ó 101N0220, rodará a una velocidad fija de 2.000 r.p.m. cuando el termostato está conectado. Con el termostato conectado directamente al terminal C, la unidad electrónica 101N0300, ajustará su velocidad a la demanda actual de refrigeración. Otras velocidades del compresor establecidas dentro del rango de 2.000 y 3.500 r.p.m. se pueden obtener mediante una resistencia (8) que se instala para ajustar la corriente (mA) de control del circuito. Los valores de resistencia para distintas velocidades de motor pueden verse en la fig. 14.

Ventilador (opcional, fig. 10)

Se puede conectar un ventilador (5) entre los terminales + y F. Conéctese el positivo a + y el negativo a F. Ya que el voltaje de salida entre los terminales + y F está siempre regulado a 12 V, deberá utilizarse un ventilador de 12 V, tanto para los sistemas de alimentación de 12 V como para los de 24 V. La salida del ventilador puede suministrar una corriente continua de 0,5 A avg. Se permite un valor más alto de corriente de 2 segundos de duración durante el arranque.

Lámpara (opcional, Fig. 1)

Entre los bornes A y C se puede conectar una lámpara de 5 Vatios 12V CC (10). La tensión de salida entre los bornes A y C está siempre ajustada en 12V CC. Tanto con el sistema de alimentación de 12V como con el de 24V hay que utilizar una lámpara 12V CC. La salida de la lámpara puede suministrar una media de tensión continua de 0,5A.

LED (opcional, Fig. 1)

Entre los bornes + y D se puede conectar un LED de 10mA (6). En caso de que la unidad electrónica detecte un error de funcionamiento, el diodo parpadea un determinado número de veces. Este número depende del tipo de error de funcionamiento detectado. Cada parpadeo dura ¼ de segundo. A la secuencia de parpadeo sigue un intervalo sin emisiones luminosas, y así la secuencia relativa a cada error detectado se repite cada 4 segundos.

INTRODUÇÃO

Prezado cliente:

Agradecemos por ter escolhido um dos nossos produtos. A VITRIFRIGO espera que V.Sa. possa ficar completamente satisfeito com a compra efectuada.

O presente manual é considerado parte integrante do frigorífico e deve seguir o percurso de venda até o utilizador e a Vitrifrigo proíbe a reprodução de qualquer parte do mesmo.

Cada frigorífico, antes de deixar o nosso estabelecimento, é submetido a vistorias e controlos rigorosos que garantem o seu funcionamento correcto.

Para outras informações e esclarecimentos V.Sa. poderá contactar os nossos centros de assistência ou directamente os nossos escritórios.

Vitri Alceste



ADVERTÊNCIAS:

- Leia atentamente este manual antes de usar o frigorífico.
- Se este aparelho substituir um modelo velho, antes de desmantelá-lo, inutilize a eventual fechadura do mesmo.
- Verifique que a embalagem esteja íntegra, caso contrário comunique ao transportador.
- Proceda à desembalagem e instalação do produto usando a máxima cautela; aconselhamos a fim de evitar ferimentos acidentais, o uso de luvas de protecção, principalmente para os modelos com unidade refrigerante separada (fig. 3).
- Depois de ter desembalado o aparelho, verifique que não esteja danificado. Eventuais danos devem ser avisados ao revendedor impreterivelmente até 24 horas da data de compra.
- O produto deve ser usado exclusivamente para a conservação de alimentos e bebidas.
- O aparelho deve ser colocado longe de fontes de calor; assegure ao mesmo uma ventilação suficiente (vide sucessivas indicações).
- Aconselhamos esperar pelo menos uma hora antes de pôr em função o frigorífico a fim de permitir ao circuito refrigerante de ser completamente eficiente.
- Antes de ligar o produto, verifique que a corrente de rede corresponda à referida na placa de identificação do aparelho ou àquela indicada na placa colocada no compressor.
- Uma vez terminada a instalação, verifique que o aparelho não esteja apoiado sobre o cabo de alimentação.
- Para eventuais problemas de funcionamento, dirija-se ao nosso centro de assistência mais próximo; de qualquer forma, consulte sempre pessoal qualificado.
- Antes de quaisquer operações de manutenção ou limpeza, desligue a tomada da corrente.
- Evite introduzir na parte de baixa temperatura líquidos em recipientes de vidro.
- Não jogue fora a embalagem do vosso aparelho, mas separe os materiais segundo as prescrições locais relativas à eliminação dos mesmos.
- O presente produto não deve ser jogado nos lixos urbanos mas deve ser eliminado como recolha separada. Contactar os centros de recolha de Lixos de Aparelhagens Eléctricas e Electrónicas (RAEE) presentes no próprio território ou entregá-lo ao vendedor no acto da compra de uma aparelhagem nova equivalente.
- O produto, se não for eliminado correctamente, pode ter efeitos nocivos danosos sobre o ambiente e sobre a saúde humana devido a determinadas substâncias presentes na sua parte interna.
- O símbolo contido ao lado indica que o produto não pode ser eliminado como lixo urbano.
- A eliminação abusiva ou incorrecta do produto implica em sanções jurídicas de tipo administrativo e/ou penal severas como previsto pelas leis vigentes.
- É absolutamente proibido usar o frigorífico para empregos diferentes daqueles previstos.
- Cuide sempre da limpeza perfeita e mantenha sempre eficientes os dispositivos de segurança.
- Mantenha livre de impedimentos as aberturas de ventilação no invólucro do aparelho e/ou estrutura de encaixe.
- Não remova nunca as protecções (cárter) do frigorífico.
- Execute sempre as verificações, os controlos e as manutenções programadas descritas na pág. x deste manual.
- O aparelho não deve ser exposto à chuva.
- Adequado para uso nos acampamentos.



Informações gerais

Finalidade do manual

Este manual, relativo aos Frigoríficos da série “INTERIOR (230Vca) / OCEANRUNNER (12/24Vcc) tem a intenção de fornecer instruções para o uso correcto e seguro dos mesmos e para a relativa manutenção racional.

A fim de aprender rapidamente como fazer funcionar e usar o frigorífico em seu poder é necessário que leia com atenção este manual de uso e manutenção desde o primeiro uso.

O bom funcionamento do frigorífico depende também de uma manutenção eficiente e eficaz. O conhecimento dos trabalhos de manutenção portanto é necessário. As indicações para o uso indicam todas as operações de accionamento, de paragem e de funcionamento.

O frigorífico foi construído em conformidade com todos os requisitos de segurança previstos pelas directrizes em matéria, mesmo se todavia a segurança máxima do utente depende de uma leitura atenta deste manual e de uma limpeza e manutenção constante e profunda.

Algumas informações ou figuras deste manual poderão mostrar detalhes e partes que poderão diferenciar-se ligeiramente daquelas do frigorífico em seu poder, sem porém alterar as informações essenciais. De acordo com a melhoria constante, o frigorífico poderá apresentar variações que não estão contidas neste manual. Aparecerão eventuais modificações, segundo as necessidades nas versões posteriores do manual.

Identificação do fabricante

O frigorífico é projectado e produzido exclusivamente junto à:

Vitrifrigio s.n.c

Via Della Produzione, 9
61020 Montecchio (PU)

Tel. +39 0721 491080

Fax. +39 0721 497739

E-Mail. vitrifrigio@vitrifrigio.com

www.vitrifrigio.com

DESCRIÇÃO DO APARELHO (fig. 2 e fig. 7)

12/24Vcc – 220Vca

- A) evaporador horizontal
- A1) evaporador vertical
- B) bandeja de recolha gotas
- C) caixa termostato
- D) grelhas extraíveis
- E) prateleira de vidro (somente em alguns modelos)
- F) gaveta porta-fruta (somente em alguns modelos)
- G) pequeno balcão (extraíveis)

12/24Vcc Portáteis

- A) cesto
- B) fecho de lingueta
- C) evaporador
- D) parafuso fixação suporte
- E) suporte de fixação
- F) quadro com termostato Digital
- G) quadro com termostato LED
- H) termostato manual (somente C26)
- I) interruptor (somente C26)
- J) maçaneta
- K) tomada 12/24Vcc – 220Vca

A etiqueta que contém os dados concernentes à matrícula e aos dados técnicos, está colocada dentro do frigorífico, na parte superior do lado direito. Os primeiros três algarismos da matrícula identificam o ano e a semana de fabrico.

Todos os materiais que podem entrar em contacto com os alimentos são conformes à Directiva 2004/1935/CE.

O ruído emitido pelo aparelho é inferior a 70 dB(A).

INSTALAÇÃO

Assegure-se que o aparelho não esteja danificado. Eventuais danos de transporte, deverão ser avisados tempestivamente ao revendedor e de qualquer maneira, no máximo até 24 horas sucessivas à entrega.

Manipule o produto com a máxima atenção. Posicionando o grupo refrigerante (nos modelos de frigoríficos com instalação refrigerante separada), aja com precaução a fim de evitar obstruções ou rupturas dos tubos de conexão. Posicione sempre o frigorífico e o grupo refrigerante separado (nos modelos com esta solução), num plano horizontal.

Verifique que o grupo frigorífico seja bem ventilado, predispondo no móvel que o contém, duas aberturas: uma no fundo em correspondência do grupo refrigerante e a outra na parte superior ou naquela alta do lado. Estas aberturas deverão ter uma superfície não inferior a 300 cm². Quando isto não for possível, deixe um canal de pelo menos 50 mm. entre a parte superior do frigorífico e o plano que está encima (vide fig. 5).

Instale o frigorífico longe de fontes de calor e num lugar seco e bem ventilado.

Deixe parado o aparelho pelo menos uma hora antes de ligá-lo. Durante este intervalo, faça a primeira limpeza.

LIMPEZA DO FRIGORÍFICO

Antes de iniciar a limpeza, verifique que o frigorífico não esteja ligado na instalação eléctrica. Caso contrário, desligue a tomada da corrente.

PARA EXTERNA

Lave a parte de fora com água morna, depois com água fria e enxugue com um pano macio. Evite o uso de produtos abrasivos.

PARTE INTERNA

Tire as grelhas (ou o cesto), os recipientes e as formas para o gelo e proceda à limpeza usando água morna misturada com bicarbonato de sódio ou vinagre. Enxágue e enxugue com cuidado usando um pano macio. Evite taxativamente o uso de produtos abrasivos, detergentes ou sabões.

CONDENSADOR

Aconselhamos efectuar pelo menos uma vez por ano, a limpeza do condensador (vide fig. 4), usando um aspirador ou um pincel seco.

Em caso de desuso prolongado do aparelho, a fim de evitar a formação de bolor ou mau cheiro, desligue a tomada, esvazie-o completamente, limpe-o por dentro e deixe a porta encostada.

LIGAÇÃO ELÉCTRICA

Este aparelho é conforme às normativas CEE nº 89/336 concernentes à supressão das interferências.

Antes de ligar o produto, verifique que a corrente de rede corresponda àquela referida na placa de identificação ou àquela indicada na placa colocada no compressor.

REGULAÇÃO DA TEMPERATURA

Cada frigorífico está equipado com um termóstato para a manutenção automática da temperatura.

▪ TERMÓSTATO MECÂNICO

Para escolher a temperatura desejada, aja no manípulo de regulação.

Quando o mesmo está na posição '0' ou 'STOP', o frigorífico não funciona.

Pondo o manípulo na posição '1', o frigorífico começa a funcionar.

Pondo o manípulo da posição '1' à posição '5', obtém-se temperaturas sempre mais frias.

Para o esquema eléctrico ver fig. 8e/h (12/24V) ou fig. 9 (115V/230V)

Alguns modelos de frigoríficos estão equipados com termostatos cuja simbologia de regulação da temperatura, diferencia-se daquela acima; nestes casos é preciso ter como referência a fig. 1. O esfriamento do frigorífico aumenta girando o manípulo no sentido horário.

Para a colocação e conservação racional dos alimentos, siga a tabela abaixo.

Alimento	Tempo de conservação	Colocação no frigorífico
Carne e peixe limpo (embrulhe em saquinhos ou folhas de plástico).	2 ou 3 dias	Na grelha embaixo do freezer.
Ovos.	1 mês	Use os espaços da contraporta.
Manteiga, margarinas.	1 semana.	Use os espaços da contraporta.
Alimentos cozidos, bolos e sopas (feche em recipientes herméticos e guarde-os quando estiverem frios).	3 ou 4 dias	Na grelha na parte mais baixa do frigorífico.
Frios crus, massa fresca, cremes, pudins, chocolates, doces com base de creme, banha, doces secos, tomates maduros.	3 ou 4 dias	Em qualquer grelha.
Garrafas.		Nos vãos apropriados da contraporta.
Fruta e verdura.		Na gaveta para verduras; na parte inferior do frigorífico.

SUBSTITUIÇÃO DA LÂMPADA

Para efectuar a substituição da lâmpada (veja fig.2) proceda conforme a seguir:

- Extraia perpendicularmente à base a tampa de protecção prestando atenção para não danificar os pinos de fixação.
- Afaste uma das duas molas para poder extrair a lâmpada.
- Dobre um pouco as duas molas uma na direcção da outra e introduza a nova lâmpada.
- **Controle que a lâmpada esteja bem apertada nas molas.**
- Recoloque a tampa.

REVERSIBILIDADE DA PORTA

Para variar o sentido de abertura da porta com fecho com PIN:

- Desmonte a dobradiça superior e o fecho com PIN.
- Extraia a porta até soltá-la da dobradiça inferior.
- Desmonte a dobradiça inferior e remonte-a na parte oposta do frigorífico.
- Recoloque a porta na dobradiça inferior.
- Remonte a dobradiça superior e o fecho com PIN na parte oposta.

TROCA DE PAINEL

Para poder desmontar e/ou trocar o painel da porta é preciso agir conforme a seguir:

- Remova a porta seguindo as indicações do parágrafo anterior.
- Desaparafuse os parafusos presentes na base inferior e extraia a mesma.
- Remova o painel fazendo-o correr para baixo.
- Monte o novo painel encaixando-o no lugar daquele eliminado fazendo-o correr para cima até travar.
- Remonte a base inferior .

DESCONGELAMENTO DO APARELHO.

É oportuno descongelar o frigorífico toda vez que se forme uma camada de gelo superior a três milímetros. Esta operação é necessária para garantir o bom rendimento do frigorífico e evitar maior consumo de energia eléctrica.

Para obter o descongelamento completo do frigorífico, gire o manípulo do termostato na posição stop. Mantenha a porta aberta a fim de acelerar o tempo.

Não remova a camada de gelo utilizando utensílios metálicos pontudos ou cortantes que podem provocar furos na chapa refrigerante com consequências irreparáveis para o aparelho.

Nos frigoríficos com acúmulo de frio, o descongelamento acontece automaticamente. Aconselhamos esvaziar diariamente o dispositivo para recolher as gotas.

Quando o descongelamento estiver terminado, providencie para pôr em função o frigorífico pondo o manípulo do termostato na posição desejada.

AVISOS ESPECÍFICOS PARA FRIGORÍFICOS 220 Vca

LIGAÇÃO ELÉCTRICA

É obrigatório nos termos da lei a ligação à terra do aparelho. Verifique que o sistema de ligação à terra da instalação eléctrica esteja perfeitamente eficiente.

Declinamos quaisquer responsabilidades por eventuais danos causados a pessoas ou coisas, derivantes da não observação de tal norma.

É desaconselhável o uso de adaptadores, benjamins e extensões. Se o uso dos mesmos for indispensável, utilize exclusivamente material conforme às vigentes normas de segurança, prestando atenção a não superar o limite de potência descrito nos mesmos.

Em caso de incompatibilidade entre as tomadas, é melhor substituir aquela da parede com outra apropriada. Esta operação, aconselhamos seja feita por pessoal qualificado, que deverá verificar que a secção dos cabos da tomada da parede seja idónea a potência consumida pelo aparelho.

O QUÊ FAZER SE O FRIGORÍFICO NÃO FUNCIONA

1- O APARELHO NÃO FUNCIONA

Controle que:

- o termostato não esteja na posição “STOP”;
- não falte corrente;
- o interruptor automático da instalação eléctrica não esteja desligado;
- a tomada esteja eficiente e correctamente inserida naquela da parede;
- a tomada da parede esteja eficiente. Verifique ligando um outro aparelho na mesma cujo funcionamento você tem certeza;
- o cabo de alimentação não esteja interrompido.

2- FRIGORÍFICO RUIDOSO

Controle que:

- o frigorífico ou o grupo refrigerante esteja bem nivelado;
- o frigorífico não esteja em contacto com móveis que possam causar vibrações;
- os tubos do circuito refrigerante colocados na parte de trás não tenham pontos de contacto e não vibrem contra o aparelho.

3- RENDIMENTO FRIGORÍFICO INSUFICIENTE

Controle que:

- a porta feche hermeticamente;
- o frigorífico não esteja perto de fontes de calor;
- o frigorífico ou o grupo refrigerante separado estejam suficientemente ventilados;
- não haja acúmulo excessivo de gelo no evaporador;
- o condensador não esteja entupido de pó;
- a ventoinha gire livremente (nos modelos com esfriamento forçado)
- dentro não esteja demasiado cheio.

Se no final destas verificações, não for possível obter o funcionamento regular, dirija-se ao serviço de assistência.

AVISOS ESPECÍFICOS PARA FRIGORÍFICOS 12-24 Vcc

INSTALAÇÃO

Para a instalação de frigoríficos ou equipamentos frigoríficos a bordo de caravan, camper, motorhome, etc, aconselhamos predispô-los com tomadas de ventilação directamente do externo (vide fig. 6).

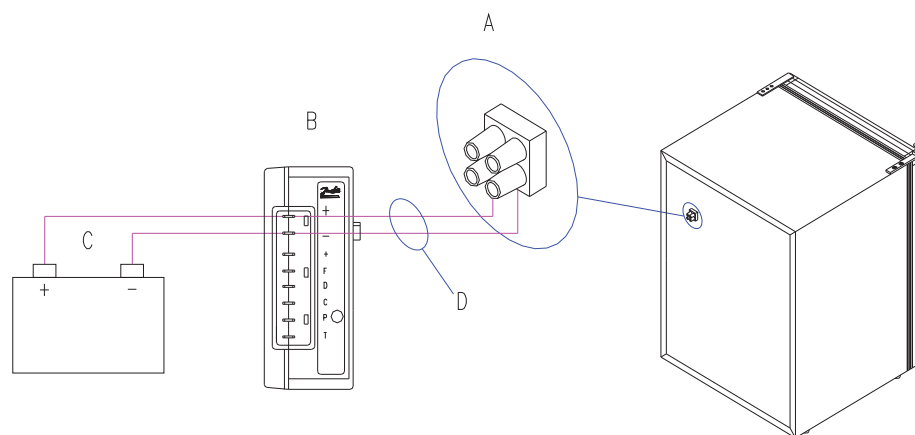
Para a instalação dos frigoríficos portáteis em alguns modelos é disponível um suporte para a fixação do frigorífico (ver fig. 7).

LIGAÇÃO ELÉCTRICA

Para os frigoríficos alimentados a 12Vcc ou 24Vcc, recomenda-se de interligar as instalações directamente à bateria seguindo as instruções correspondentes do compressor Danfoss fornecido (ver pág.95 e pág.96).

Ligação da alimentação da luz interna nos frigoríficos 12/24Vcc com motor remoto:

- Ligar o fio opcional “D” (Cod.**R10777**) à régua de bornes presente na parte traseira do frigorífico e à central do compressor. (A régua de bornes “A” não é polarizada, portanto a conexão pode ser efectuada indiferentemente.)
- Ligar a bateria à central do compressor, **prestando atenção à polaridade!**
 - Régua de bornes da ligação luz interna.
 - Central do compressor.
 - Bateria.
 - Cabo fornecido de alimentação luz interna.



AVISOS ESPECÍFICOS PARA FRIGORÍFICOS 12-24Vcc 100-240Vca

LIGAÇÃO ELÉCTRICA

Recomenda-se de ligar a linha de alimentação a 12Vcc ou 24Vcc directamente à bateria, observando as instruções correspondentes do compressor Danfoss fornecido (ver pág.95 e pág.96).

Predispor a linha de alimentação em Vca com a utilização de fio tripolar de secção mínima para condutor de 1 mmq e isolamento adequado às modalidades e ao ambiente de utilização e conforme às normas em vigor.

Realizar a conexão à linha de alimentação em Vca por meio de uma conexão de ficha tomada com capacidade adequada, em conformidade com as normas em vigor ou predispor um interruptor magnetotérmico diferencial unipolar com capacidade de 6 ampères e com abertura dos contactos de pelo menos 3 mm, de qualquer maneira em conformidade com as normas em vigor.

No fim da instalação verificar a continuidade do circuito de terra e efectuar todos os ensaios de segurança eléctrica previstos pelas normas em vigor.

Proteger e bloquear adequadamente os fios a fim de evitar que tracções acidentais do fio possam desprender o mesmo das conexões ou que possam entrar em contacto com partes quentes com temperatura superior a 50°C ou com partes afiadas.

Recomenda-se que a instalação das linhas de alimentação seja executada por pessoal qualificado o qual providenciará à verificação da correspondência da instalação com as normas em vigor e a emitir as certificações relativas de conformidade.

Ligação da alimentação da luz interna nos frigoríficos 12/24Vcc com motor remoto:

- Ligar o fio opcional (Cód. **R10777**) para a ligação da luz interna da régua de bornes presente no encosto do frigorífico e à central de comando do compressor, seguindo o esquema presente na figura 15. (A régua de bornes não é polarizada, portanto a conexão pode ser efectuada indistintamente.)

REGULAÇÃO DA TEMPERATURA

▪ TERMÓSTATO MECÂNICO

Nos frigoríficos por acumulo de frio 12Vcc ou 24Vcc a fim de obter a máxima economia de energia recomenda-se para posicionar o botão do termóstato na posição “A” para o frigorífico com capacidade máxima de 75 l; na posição “A1” para capacidades superiores (fig. 1).

▪ TERMOSTATO “LED”

O termóstato electrónico “LED” é equipado com dois comandos de botão:

- O comando de liga e desliga “ON/OFF”
- O comando de regulação da temperatura “*”

Carregando o comando marcado com “ON/OFF” obtém-se alternadamente a **ligação** e o **desligamento do frigorífico**.

Para configurar a temperatura desejada carregue o comando marcado com o símbolo *. A cada carregamento o indicador luminoso com LED corre da esquerda para a direita, para as posições intermediárias haverá o acendimento dos dois LEDs próximos. Quando o indicador estiver à esquerda, o frigorífico está no mínimo (mais quente) enquanto a posição para a direita indica uma redução da temperatura (mais fria) de cerca 3°C. Para seleccionar uma temperatura mais fria carregue repetidamente o comando até acender o indicador luminoso mais à direita (máximo frio), a pressão sucessiva realiza o acendimento do indicador luminoso mais à esquerda.

Para esquema eléctrico ver a fig. 8ª/b/f



▪ TERMÓSTATO DIGITAL

O termóstato DIGITAL permite monitorar constantemente a temperatura interna do frigorífico para a ligação/desligamento do compressor.

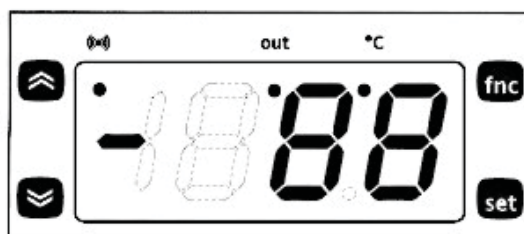
O utente dispõe de um display e de quatro teclas para o controlo do estado e a programação do instrumento.

No momento da ligação da alimentação o display inicia a lampear e pára exibindo a temperatura actual dentro do frigorífico.

Por default o termóstato é configurado em 0°C.

COMO MODIFICAR OS PARÂMETROS:

- Carregar a tecla **SET** rapidamente (em 5 seg.) 2 vezes.
A primeira vez aparecerá a escrita “SET” e a segunda o valor “0” ou configurado anteriormente.
- Agindo nos botões  ou  modificar a temperatura que o frigorífico deverá alcançar.
- Carregar a tecla **FNC** rapidamente 2 vezes para confirmar a temperatura configurada.
A primeira vez aparecerá a escrita “SET” e a segunda a temperatura interna.
- O pontinho situado sob a escrita “OUT” indica que o compressor e a ventoinha estão a funcionar.

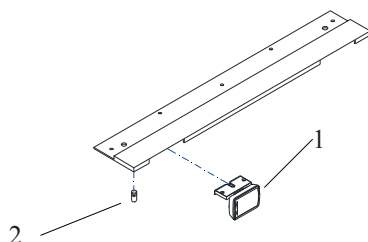


Para o esquema eléctrico ver fig. 8c/d/g

**UM MANUAL DE INSTRUÇÕES RELATIVO AO TERMÓSTATO DIGITAL
É TAMBÉM FORNECIDO EM CADA FRIGORÍFICO.**

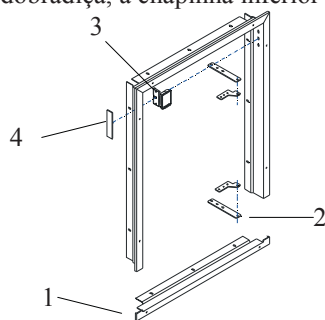
Para variar o sentido de abertura da porta com fecho NAUTIC-EUROPA:

- Desmonte a dobradiça inferior e extraia a porta para baixo.
- Desmonte a maçaneta Nautic (1) e recoloque-a na porta no lado oposto prestando atenção aos intereixos dos furos.
- Desaparafuse o pino da dobradiça (2) do suporte e aparafusá-lo no lado oposto.
- Recoloque a porta prestando atenção que o fecho funcione com eficiência.
- Remonte a dobradiça inferior no lado oposto do frigorífico.



Para variar o sentido de abertura da porta com fecho NAUTIC-USA:

- Desmonte a base do perfil de fixação (1) se presente.
- Desmonte a dobradiça e a chapinha inferior (2) e extraia a porta para baixo.
- Desmonte a maçaneta Nautic (3), inverta os fixadores e a mola interna para modificar o seu movimento de abertura; vire o manípulo para o lado da secta.
- Recoloque a maçaneta Nautic no lado oposto da porta prestando atenção aos intereixos dos furos.
- Desloque a chapinha de enganche do fecho (4) no lado oposto do perfil.
- Recoloque a porta prestando atenção que o fecho funcione de modo eficiente.
- Recoloque a dobradiça, a chapinha inferior e a base do perfil de fixação.



INSTRUÇÕES DANFOSS BD35/BD50F 12-24Vcc

A unidade electrónica de controlo é um aparelho com a possibilidade de duas tensões diferentes de alimentação. Isto significa que a mesma unidade pode ser utilizada tanto em sistemas com alimentação a 12V, como a 24V. A tensão máxima para sistemas a 12V é de 17V, enquanto aquela para os sistemas a 24V é de 31,5V. A temperatura ambiente máxima permitida é de 55°C. A unidade electrónica de controlo é dotada de uma protecção térmica incorporada que entra em funcionamento se o sobreaquecimento parar o compressor.

Instalação (fig. 10)

Interligar o conector terminal da unidade electrónica de controlo ao terminal do compressor. Montar a unidade no compressor por meio do encaixe da tampa na cabeça do parafuso (1).

Alimentação (fig. 10)

A unidade electrónica de controlo deve sempre ser ligada directamente aos pólos da bateria (2). Conectar o pólo positivo ao + e o negativo ao -; ao contrário, a unidade não poderá funcionar. A unidade é protegida contra a inversão de polaridade. Para proteger a instalação deve sempre ser montado um fusível (3) no fio + o mais próximo possível da bateria. Recomenda-se o uso de um fusível de 15A para o circuito a 12V e de um fusível de 7,5A para o circuito a 24V. Se for utilizado um interruptor geral (4), o mesmo deve ser dimensionado para o mínimo de 20 A. As medidas recomendadas para os fios na fig. 11 devem ser respeitadas. Evitar outras conexões ao sistema de alimentação para evitar que eventuais quedas de tensão influam nas configurações para a protecção da bateria.

Protecção da bateria (fig. 10)

A paragem e a reactivação do compressor dependem da configuração dos limites escolhidos de tensão medidos nos bornes + e - da unidade electrónica de controlo. As configurações standard para os sistemas com alimentação respectivamente a 12V e 24V estão indicadas na fig. 12. Por outro lado, podem ser configurados outros limites (fig. 13) se for efectuada uma conexão por meio de uma resistência (9) entre os bornes C e P. Nas aplicações para painéis solares sem bateria recomenda-se um resistor de 220 kW. Na modalidade AEO (optimização energética por meio do controlo adaptativo) o compressor BD adaptará sempre a própria velocidade à necessidade real de rendimento frigorífico no limite de uma tensão de exercício casual compreendida entre 9,6 e 31,5 V.

Termóstato (fig. 10)

O termóstato (7) deve ser ligado aos bornes C e T. Sem resistência no circuito de controlo o compressor

com unidade electrónica 101N0210 ou 101N0220 rodará na velocidade de 2.000 rpm, quando o termóstato estiver introduzido. Com o termóstato ligado directamente ao terminal C, a unidade electrónica 101N0300 adaptará a própria velocidade à necessidade real de rendimento frigorífico. É possível obter outras velocidades do compressor, incluídas na faixa 2000-3500 rpm, introduzindo uma resistência (8) para a regulação da corrente (mA) no circuito de controlo. Os valores da resistência para velocidades diferentes do motor estão contidas na fig. 14.

Ventilador (opcional, Fig. 10)

É possível interligar um ventilador (5) entre os terminais + e F. Interligar o positivo ao + e o negativo a F. Como a tensão de saída entre os bornes + e F é sempre regulada em 12V, deve ser utilizado um ventilador a 12V, tanto no caso de alimentação a 12V como no caso de alimentação a 24V! A saída para o ventilador é capaz de fornecer uma corrente contínua de 0,5 Aavg. Na fase de ligação é sempre permitida uma absorção maior de corrente durante um tempo de 2 segundos.

LED (opcional, fig. 10)

É também possível ligar um diodo LED de 10 mA (6) entre os bornes + e D. Se a unidade electrónica de controlo regista um erro de funcionamento, o diodo lampeará um certo número de vezes. O número de lampejos depende do tipo de erro registado, com uma duração para cada lampejo de 1/4 de segundo. À sequência de lampejos segue uma pausa sem lampear, depois a sequência relativa ao erro em questão será repetida cada 4 segundos.

Número de lampejos	Tipo de erro
5	Paragem térmica da unidade electrónica (Se o sistema de refrigeração tiver sido submetido a carga excessiva ou se a temperatura Ambiente for muito elevada, a unidade de controlo se aquecerá demasiado).
4	Velocidade muito baixa do motor (Se o sistema de refrigeração for submetido a uma carga excessiva, o motor não é capaz de manter a velocidade mínima de 1.850 rpm).
3	Erro no accionamento do motor (O rotor está bloqueado ou a pressão diferencial no sistema de refrigeração é muito Alta (>5 bar)).
2	Paragem do ventilador devido a sobrecarga de corrente (O ventilador absorve da unidade electrónica de controlo uma corrente superior a 1 A).
1	Paragem para a protecção da bateria (A tensão de alimentação está fora do valor configurado de arranque).

INSTRUÇÕES DANFOSS BD35/BD50F
12-24 Vcc / 110-240 Vca

A unidade electrónica é um dispositivo multivoltagem. Pode ser utilizado tanto com sistemas de alimentação de 12V/24V DC como de 100-240V CA 50/ 60Hz. No caso de sistema de alimentação a 12V DC a voltagem máxima é de 17V DC; para sistemas de alimentação a 24V DC a voltagem máxima é 31.5V DC. No caso de sistema de alimentação CA, a voltagem máxima é 265V CA, a voltagem mínima é 85V CA. A temperatura ambiente máxima é de 55°C. A unidade electrónica é dotada de um isolamento térmico incorporado que activa e pára o funcionamento do compressor se a temperatura da unidade electrónica se tornar muito elevada (100°C / 212°F no circuito impresso). A potência absorvida é limitada a 100W. Ver a ficha técnica BD50F para os pormenores.

Instalação (fig. 10)

Interligar o conector terminal da unidade electrónica de controlo ao terminal do compressor. Montar a unidade no compressor por meio do encaixe da tampa na cabeça do parafuso (1).

Alimentação (fig. 10)

A unidade electrónica de controlo deve sempre ser ligada directamente aos pólos da bateria (2). Conectar o pólo positivo ao + e o negativo ao -; ao contrário, a unidade não poderá funcionar. A unidade é protegida contra a inversão de polaridade. Para proteger a instalação deve sempre ser montado um fusível (3) no fio + o mais próximo possível da bateria. Recomenda-se o uso de um fusível de 15A para o circuito a 12V e de um fusível de 7,5A para o circuito a 24V. Se for utilizado um interruptor geral (4), o mesmo deve ser dimensionado para o mínimo de 20 A. As medidas recomendadas para os fios na fig. 11 devem ser respeitadas. Evitar outras conexões ao sistema de alimentação para evitar que eventuais quedas de tensão influam nas configurações para a protecção da bateria.

CA: Os fios eléctricos devem ser interligados aos bornes marcados L e N na unidade electrónica. Tensão nominal de 100 até 240 V CA 50/60Hz. Interruptor de segurança: limite superior = 270 CA, limite inferior = 80V CA. Um fusível 4A (11) deve ser montado no cabo de tensão (L) para proteger a instalação. Se for utilizado um interruptor principal (12), deve ser regulado a uma corrente de pelo menos 6A. O cabo deve ter uma dimensão mínima de 0.75 mm² ou 18 AWG. Obs.: se necessário é possível utilizar a conexão de terra.

Geral: é possível interligar simultaneamente à unidade electrónica tanto alimentação CA como alimentação DC. Neste caso, CA será a fonte de alimentação preferencial. No caso de desconexão da alimentação CA ou de queda abaixo de 85V CA, será activado o sistema de alimentação a 12V DC com um atraso de 1 minuto. Se for restaurada a alimentação CA, não

haverá nenhum atraso no funcionamento do compressor.

Protecção da bateria (fig. 10)

A paragem e a reactivação do compressor dependem da configuração dos limites escolhidos de tensão medidos nos bornes + e - da unidade electrónica de controlo. As configurações standard para os sistemas com alimentação respectivamente a 12V e 24V estão indicadas na fig. 12. Por outro lado, podem ser configurados outros limites (fig. 13) se for efectuada uma conexão por meio de uma resistência (9) entre os bornes C e P.

Termóstato (fig. 10)

O termóstato (7) deve ser ligado aos bornes C e T. Sem resistência no circuito de controlo o compressor com unidade electrónica 101N0210 ou 101N0220 rodará na velocidade de 2.000 rpm, quando o termóstato estiver introduzido. Com o termóstato ligado directamente ao terminal C, a unidade electrónica 101N0300 adaptará a própria velocidade à necessidade real de rendimento frigorífico. É possível obter outras velocidades do compressor, incluídas na faixa 2000-3500 rpm, introduzindo uma resistência (8) para a regulação da corrente (mA) no circuito de controlo. Os valores da resistência para velocidades diferentes do motor estão contidas na fig. 14.

Ventilador (opcional, Fig. 10)

É possível interligar um ventilador (5) entre os terminais + e F. Interligar o positivo ao + e o negativo a F. Como a tensão de saída entre os bornes + e F é sempre regulada em 12V, deve ser utilizado um ventilador a 12V, tanto no caso de alimentação a 12V como no caso de alimentação a 24V! A saída para o ventilador é capaz de fornecer uma corrente contínua de 0,5 Aavg. Na fase de ligação é sempre permitida uma absorção maior de corrente durante um tempo de 2 segundos.

Lâmpada (opcional, Fig. 1)

Uma lâmpada de 5 Watt 12V DC (10) pode ser interligada entre os bornes A e C. A tensão de saída entre os bornes A e C é sempre regulada em 12V DC. Tanto com o sistema de alimentação a 12V assim como com o de 24V deve ser utilizada uma lâmpada de 12V DC. A saída da lâmpada pode distribuir uma tensão contínua de 0,5A de média.

LED (opcional, Fig. 1)

Um LED de 10mA (6) pode ser interligado entre os bornes + e D. Se a unidade electrónica detectar um erro de funcionamento, o diodo lampeará durante um certo número de vezes. Este número depende do tipo de erro de funcionamento detectado. Cada lampejo tem uma duração de ¼ de segundo. À sequência de lampejo segue um intervalo sem emissões luminosas e, portanto, a sequência relativa a cada erro detectado é repetida cada 4 segundos.

INLEIDING

Beste klant:

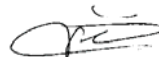
Wij zijn van mening dat u met dit product van VITRIFRIGO een uitstekende keuze hebt gemaakt en hopen dat dit product volledig aan uw wensen zal blijven voldoen.

Wij herinneren u eraan dat deze handleiding dient te worden beschouwd als integraal deel uit makend van de koelkast. U dient de handleiding samen met de koelkast van de verkoper te krijgen. Vitrifrigo verbiedt enig deel uit deze handleiding te verveelvoudigen.

Voordat de koelkasten onze bedrijfsplaats verlaten, wordt elke koelkast getest en gekeurd zodat wij kunnen garanderen dat ze perfect functioneren.

Voor meer informatie en ophelderingen kunt u onze servicecentra raadplegen of rechtstreeks onze kantoren.

Vitri Alceste



WAARSCHUWING

- Lees deze handleiding aandachtig voordat u de koelkast in gebruik neemt.
- Als dit toestel een oud vervangt, raden wij aan de vergrendeling die er eventueel op zit, onbruikbaar te maken voordat u het oude toestel sloopt.
- Controleer of de verpakking nergens beschadigd is en signaleer eventuele schade aan de transporteur.
- Haal de koelkast uit de verpakking en start voorzichtig met de installatie; draag voor alle veiligheid en om eventuele ongevallen te voorkomen beveiligingshandschoenen (afb. 3).
- Controleer of het toestel nergens beschadigd is zodra u het uit de verpakking hebt gehaald. Eventuele schade aan het toestel dient niet later dan 24 uur na de datum van aankoop aan de verkoper te worden gesignaleerd.
- Het toestel dient uitsluitend voor het bewaren van voedingsmiddelen en drank.
- Het toestel dient ver van warmtebronnen te worden geïnstalleerd en voldoende te worden geventileerd (zie de hierna volgende aanwijzingen).
- Wij raden aan ten minste een uur te wachten voordat u de koelkast in werking zet om het koelmiddelcircuit te optimaliseren.
- Voordat u het toestel aansluit, dient u de stroomgegevens te controleren op het serieplaatje en op het plaatje op de compressor.
- Na de installatie controleren of het toestel nergens op de elektrische kabel rust.
- Voor eventuele problemen het dichtstbijzijnde servicecentrum raadplegen; in elk geval dient u beroep te doen op vakkundige technici.
- Haal altijd eerst de stekker uit het stopcontact of ontkoppel andere energiebronnen voordat u het toestel reinigt of onderhoudt.
- Zet geen glazen flessen of potten met vloeistof in het koudste deel van de koelkast.
- Het afgedankte toestel mag niet als huisafval worden behandeld en dient te worden gescheiden van ander afval. Neem contact op met een ophaaldienst voor Afgedankte Elektrische en Elektronische Apparatuur in uw eigen gebied of ruil het afgedankte toestel in als u een nieuw en gelijksoortig toestel koopt.
- Als het afgedankte toestel bij het verkeerde afval terechtkomt, kan het gevaarlijk zijn voor de gezondheid en voor het milieu vanwege bepaalde stoffen die het bevat.
- Het symbool hiernaast betekent dat het afgedankte toestel niet als huisafval mag worden behandeld.
- Illegaal storten of verkeerde behandeling van het afgedankte toestel kan bestraft worden met strenge administratieve en/of strafrechtelijke door de wet bepaalde sancties.
- maar wend u tot een plaatselijk afvalverwerkingsbedrijf.
- Het is ten strengste verboden de koelkast voor andere doeleinden te gebruiken dan de voorgeschreven doeleinden.
- Houd de koelkast altijd perfect schoon en controleer of de veiligheidsmechanismen werken.
- Laat de ventilatie-openingen in de carters van het apparaat of in de inbouwkast vrij.
- Haal nooit de carters (behuizing) van de koelkast.
- Voer altijd de controles, inspecties en het onderhoud uit die beschreven zijn op pagina. x van deze handleiding.
- Het apparaat mag niet aan regen worden blootgesteld.
- Geschikt voor gebruik op campings.



Informatie van algemene aard

Doel van deze gebruiksaanwijzingen

De bedoeling van deze handleiding met de gebruiksaanwijzingen voor de koelkasten van de serie "INTERIOR (230Vca) / OCEAN RUNNER (12/24Vcc) is een leidraad te vormen voor een correct en veilig gebruik en een rationeel onderhoud van deze koelkasten.

Om zo snel mogelijk te leren hoe u de koelkast moet aanzetten en gebruiken, dient u deze gebruiks- en onderhoudsaanwijzingen aandachtig te lezen, meteen van bij het begin.

Of de koelkast goed werkt, hangt voor een groot deel af van een efficiënt en doeltreffend onderhoud. U dient de onderhoudswerkzaamheden dus onvoorwaardelijk te kennen. De gebruiksaanwijzingen bevatten alle handelingen om de koelkast aan te zetten, uit te zetten en te laten werken.

Deze koelkast is volgens alle veiligheidsvoorschriften geconstrueerd (de toepasbare voorschriften) die zijn voorzien in de desbetreffende normen. Desondanks hangt de veiligheid ervan ook af van een aandachtige studie van deze handleiding en van constante en zorgvuldige reinigings- en onderhoudswerkzaamheden.

Sommige informatie of afbeeldingen kunnen details en delen bevatten die lichtjes afwijken van de details en onderdelen van uw eigen koelkast. Dit verandert echter niets aan de essentie van de informatie die wordt verstrekt. Omdat wij voortdurend aan verbetering van onze producten werken, kan de koelkast hier en daar afwijken van wat is beschreven in deze handleiding. Eventuele modificaties zullen, naar gelang van de behoeften, in een volgende druk worden opgenomen.

Identificatiegegevens van de constructeur

Deze koelkast is uitsluitend ontworpen en geproduceerd door :

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BESCHRIJVING VAN HET APPARAAT (Afb. 2 en 7)

12/24Vcc - 220Vca

- A) horizontale verdamper
- A1) verticale verdamper
- B) druppelbakje
- C) thermostaatbox
- D) uitneembare roosters
- E) blad in glas (alleen sommige modellen)
- F) groentenbak (alleen sommige modellen)
- G) draagbakjes (uitneembaar)

12/24Vcc Draagbare apparaten

- A) mand
- B) kriksluiting
- C) verdamper
- D) schroef om de beugel te bevestigen
- E) bevestigingsbeugel
- F) voorplaat met digitale thermostaat
- G) voorplaat met LED-thermostaat
- H) manuele thermostaat (alleen C26)
- I) schakelaar (alleen C26)
- J) handvat
- K) contact 12/24Vcc - 220Vca

Het serieplaatje met het serienummer en de technische gegevens zit in de koelkast bovenaan op de rechter wand. De eerste drie cijfers van het serienummer staan voor het constructiejaar en -week.

Alle materialen die in aanraking komen met voedingsmiddelen voldoen aan de richtlijn 2004/1935/EEG. Het apparaat maakt minder dan 70 dB(A) lawaai.

INSTALLATIE

Controleer of het toestel nergens beschadigd is. Eventuele schade aan het toestel dient niet later dan 24 uur na de datum van aankoop aan de verkoper te worden gesignaleerd. Verplaats het apparaat zo voorzichtig mogelijk. Zet de koelgroep zo voorzichtig mogelijk neer om de verbindingsbuizen niet stuk te maken of te verstopen (geldt voor koelkasten met afzonderlijke koelgroepen) zodat de verbindingsbuizen niet breken of versopt raken. Zet de koelkast en de eventuele afzonderlijke koelgroep altijd op een perfect horizontale ondergrond.

Zorg voor genoeg ventilatie rondom de koelgroep: maak hiervoor in het inbouwmeubel twee openingen, één in de bodem ter hoogte van de koelgroep en één in de bovenkant of bovenaan in de zijkant. Deze openingen moeten kleiner dan 300 vierkante cm zijn. Als dit niet kan, dient u een spleet te laten van ten minste 50 mm tussen de bovenkant van de koelkast en het blad erboven (zie afb.5). Installeer de koelkast ver van warmtebronnen, op een droge en goed geventileerde plaats.

Laat het apparaat ten minste een uur rusten voordat u het in werking zet. Gebruik deze tijd voor een eerste reinigingsbeurt.

DE KOELKAST REINIGEN

Controleer of de stroom is uitgeschakeld voordat u de koelkast begint te reinigen. Is dit niet het geval, dan haalt u de stekker uit het stopcontact.

BUITENKANT

De buitenkant van de koelkast reinigen met lauw water, afspoelen met koud water en drogen met een zachte doek. Geen schurende middelen gebruiken.

BINNENKANT

De roosters (of het mandje), bakjes en ijsbakjes eruit halen en de koelkast schoonmaken met lauw water waarin u een beetje natriumcarbonaat of azijn doet. Afspoelen en zorgvuldig drogen met een zachte doek. Nooit schurende producten, reinigingsmiddelen of zeep gebruiken.

CONDENSOR

Ten minste één keer per jaar moet de condensor schoongemaakt worden (zie afb. 4) met een stofzuiger of een droge kwast.

Als het apparaat een lange tijd niet wordt gebruikt dient men de stekker uit het stopcontact te halen, de koelkast helemaal leeg te maken, de binnenkant schoon te maken en de deur een beetje open te laten staan zodat er geen schimmel of vieze luchtjes in komen.

AANSLUITEN OP HET LICHTNET

Dit apparaat voldoet aan de voorschriften van de richtlijn 89/336/EEG sulla soppressione dei radiodisturbi.

Voordat u het toestel aansluit, dient u de stroomgegevens te controleren op het serieplaatje en op het plaatje op de compressor.

TEMPERATUURREGELING

Deze koelkast is uitgerust met een thermostaat voor het automatisch constant houden van de temperatuur.

▪ MECHANISCHE THERMOSTAAT

Om de gewenste temperatuur te kiezen, dient u aan de regelknop te draaien.

Als de knop op '0' of 'STOP' staat, werkt de koelkast niet.

Als de knop op '1' wordt gezet, begint deze te draaien.

Als u de knop van de stand '1' in de stand '5' draait, wordt de temperatuur steeds lager.

Zie voor het bedradingschema de afb. 8e/h (12/24V) of 9 (115V/230V)

Sommige koelkasten zijn uitgerust met thermostaten met een andere temperatuuraanduiding dan diegene die hierboven is beschreven. Raadpleeg in dit geval de afbeelding1. Door de knop naar rechts te draaien, maakt men de koelkast kouder.

Om de voedingswaren op een rationele manier in de koelkast te zetten en te bewaren, dient u rekening te houden met de volgende tabel:

Type	Bewaartijd	Plaats in de koelkast
Vlees en schoongemaakte vis (in plastic zakjes of folie).	2 of 3 dagen	Op het rooster onder het vriesvak.
Eieren.	1 maand	In de vakjes in de deur.
Boter, margarine.	1 week	In de vakjes in de deur.
Bereide gerechten, taarten, soep (hermetisch afgesloten en helemaal afgekoeld).	3 of 4 dagen	Op het rooster onderaan in de koelkast.
Salami, verse fresca, room, pudding, chocolade, roomsoesjes e.d., spekvet, droge koekjes, rijpe tomaten.	3 of 4 dagen	Op elk rooster.
Flessen.		In de vakjes in de deur.
Fruit en groenten.		In de groentenlade; onderaan in de koelkast.

HET LAMPJE VERVANGEN

Men vervangt het lampje (fig.2) als volgt:

- Haal het beschermglas er loodrecht van de basis uit zonder de bevestigingspennen te beschadigen.
- Duw een van de twee veren weg om het lampje eruit te kunnen halen.
- Duw de twee veren een beetje naar elkaar toe en steek er een nieuw lampje tussen.
- **Controleer of het lampje stevig tussen de veren zit.**
- Steek het beschermglas er weer op.

OMKEERBARE DEUR

Om de deur met pinsluiting aan de andere kant te zetten, gaat u als volgt te werk:

- Demonteer het bovenste scharnier en de pinsluiting.
- Haal de deur er naar boven uit zodat deze uit het onderste scharnier komt.
- Demonteer het onderste scharnier en monteer dit aan de andere kant van de koelkast.
- Steek de deur op het onderste scharnier.
- Monteer het bovenste scharnier en de pinsluiting.

HET PANEEL WIJZIGEN

Om het paneel te demonteren en/of te vervangen, gaat u als volgt te werk:

- De deur eruit halen volgens de aanwijzingen in de vorige paragraaf.
- De schroeven losdraaien op de basis onderaan en de basis eraf halen.
- Het paneel naar onder eruit schuiven.
- Het nieuwe paneel monteren en op de plaats van het oude steken door het naar boven te schuiven tot aan de stop.
- De onderkant weer monteren.

HET APPARAAT LATEN ONTDOOIEN

Telkens als het ijs dikker wordt dan 3 millimeter, dient men de koelkast te laten ontdooien. Een regelmatig ontdooide koelkast rendeert meer en verbruikt minder energie.

Om de koelkast helemaal te laten ontdooien, draait u de knop van de thermostaat op stop. Laat de deur openstaan om het ontdooien sneller te laten verlopen.

Verwijder het ijs niet met puntige of scherpe metalen voorwerpen die het toestel onherroepelijk kunnen beschadigen.

Koelkasten met koude-opslag worden automatisch ontdooit. Wij raden aan het druppelbakje elke dag leeg te maken.

Na het ontdooien, dient de koelkast weer te worden aangezet door de knop van de thermostaat op de gewenste stand te zetten.

SPECIALE WAARSCHUWINGEN VOOR 220 Vca-KOELKASTEN

AANSLUITEN OP HET LICHTNET

Het is wettelijk verplicht dit toestel te aarden. Controleren of het stroomnet waarop het toestel wordt aangesloten perfect geaard is.

De fabrikant is niet verantwoordelijk voor eventuele schade aan personen of voorwerpen die voortvloeit uit het overtreden van dit voorschrift.

Wij raden af adaptors, meervoudige contacten of verlengingen te gebruiken. Als dit toch nodig is, kies dan uitsluitend materiaal dat aan alle geldende veiligheidsvoorschriften voldoet en overschrijdt nooit het vermogen dat op de materialen zelf is vermeld. Als de stekker van de koelkast niet in het stopcontact past, vervang deze dan door een andere stekker. Wij raden aan deze vervanging over te laten aan een deskundig elektricien die ook zal moeten controleren of de draden in de stekker bij het opgenomen stroomvermogen van het apparaat passen.

WAT MOET U DOEN WANNEER DE KOELKAST NIET WERKT

1- DE KOELKAST WERKT NIET

Controleren:

- de thermostaat moet op "STOP" staan.
- er moet stroom zijn.
- de hoofdstroomschakelaar moet aan staan.
- de stekker moet goed werken en in het stopcontact zitten.
- het stopcontact moet goed werken. Controleer het stopcontact door er een stekker van een goed werkend apparaat in te doen.
- de stroomkabel mag nergens onderbroken zijn.

2- DE KOELKAST MAAKT LAWAAI

Controleren:

- de koelkast of de koelgroep moet recht en vlak staan.
- de koelkast mag geen meubels aanraken die trillingen kunnen veroorzaken.
- de buizen van het koelcircuit op de achterkant mogen nergens raken en tegen het apparaat zelf trillen.

3- KOELKAST MET ONVOLDOENDE RENDEMENT

Controleren:

- de deur moet hermetisch sluiten.
- de koelkast mag niet te dicht bij een warmtebron staan.
- de koelkast of de koelgroep moet voldoende geventileerd zijn.
- er mag niet te veel ijs op de verdamper zitten.
- de condensor mag niet vol stof zitten.
- de ventilator moet vrij kunnen draaien (uitvoeringen met ventilatorkoeling).
- de koelkast mag niet te vol worden geladen.

Als u dit alles gecontroleerd hebt, en er zijn nog steeds problemen, neemt u contact op met een servicecentrum.

SPECIALE WAARSCHUWINGEN VOOR 12/24 Vcc-KOELKASTEN

INSTALLATIE

Voor het installeren van koelkasten of koelgroepen in caravans, campers, motor homes enz. raden wij aan luchtopeningen naar buiten in het vervoermiddel zelf te maken (zie afb 6).

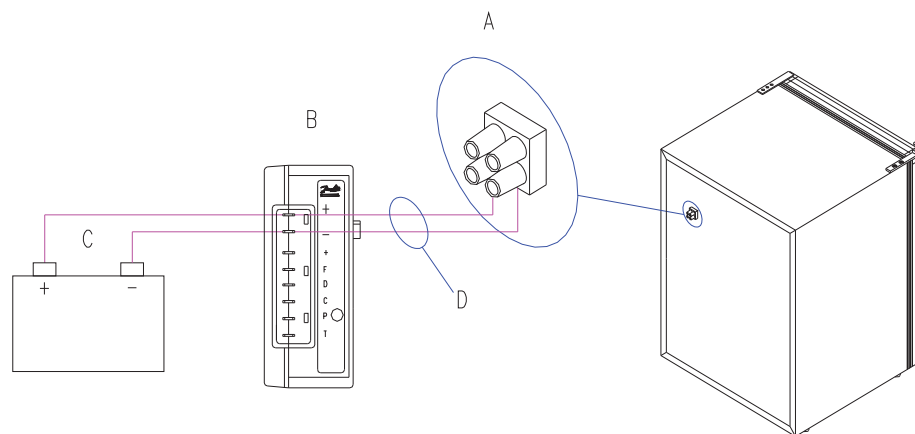
Voor het installeren van draagbare koelkasten zit op sommige modellen een beugel waarmee deze kan worden vastgemaakt (zie afb.7).

AANSLUITEN OP HET LICHTNET

Voor koelkasten die werken op 12Vcc of 24Vcc raden wij aan de leidingen direct op de accu aan te sluiten en de meegeleverde aanwijzingen die bij de Danfoss-compressor horen hiervoor te volgen (zie pag.111 en pag.112)..

De verlichting in de koelkasten 12/24Vcc met externe motor aansluiten:

- Maak de optionele kabel "D" (bestelnr.**R10777**) aansluiten op de klemmen achteraan op de koelkast en op de compressor. (Er zijn geen negatieve of positieve polen op de klemmen "A", wat betekent dat men geen rekening dient te houden met de polen voor het aansluiten.)
- Sluit de accu aan op de compressorbesturing, **maar pas op voor de polen!**
 - Klemmen voor koelkastverlichting.
 - Compressorbesturing.
 - Accu.
 - Verlichtingskabel.



SPECIALE WAARSCHUWINGEN VOOR 12/24 Vcc 100-240Vca-KOELKASTEN

AANSLUITEN OP HET LICHTNET

Wij raden aan de koelkasten die werken op 12Vcc of 24Vcc direct op de accu aan te sluiten en de meegeleverde aanwijzingen die bij de Danfoss-compressor horen hiervoor te volgen (zie pag.111 en pag.112).

Voor de Vca-aansluiting dient een draaistroomkabel te worden gebruikt die aan de geldende voorschriften voldoet met een minimum dikte van 1mm² en geïsoleerd is volgens de gebruiks- en omgevingsvereisten.

Maak de Vca-aansluiting met een stekker en een stopcontact die voldoen aan de geldende voorschriften en sterk genoeg zijn of monteer een omnipolaire differentieelschakelaar van 6 ampère en een opening tussen de contacten van minstens 3 mm of volgens de geldende voorschriften.

Controleer na de installatie of er nergens onderbrekingen zijn in het aardcircuit en voer alle veiligheidstesten uit die voorgeschreven zijn door de wet.

Beveilig en blokkeer de kabels zodat niemand ze per toeval uit het stopcontact kan trekken en ze niet in aanraking kunnen komen met voorwerpen met een temperatuur die hoger is dan 50°C of met scherpe hoeken en kanten.

Het is aanbevolen de installatie over te laten aan een deskundig elektricien die kan controleren of de aansluiting en de leiding voldoen aan de voorschriften en die een goedkeuringscertificaat kan overhandigen.

De verlichting in de koelkasten 12/24Vcc met externe motor aansluiten:

- Maak de optionele kabel (Bestelnr. **R10777**) voor de aansluiting van de binnenverlichting vast op de aansluitklemmen die achteraan op de koelkast zitten en op de compressor volgens het bedradingschema van afbeelding 15. (U hoeft voor de klemmen geen rekening te houden met positieve en negatieve polen.).

TEMPERATUURREGELING

▪ MECHANISCHE THERMOSTAAT

In koelkasten met koude-opslag op 12Vcc of 24Vcc raden wij met het oog op een zo groot mogelijke energiebesparing aan de thermostaatknop in de 'A'-stand te zetten voor koelkasten met een maximale inhoud van 75 lt; en in de stand 'A1' voor koelkasten met een grotere inhoud (afb.1).

▪ THERMOSTAAT MET "LED"

Op de elektronische thermostaat met "LED" zitten twee bedieningsknoppen:

- Een knop om de koelkast aan en uit te zetten: "ON/OFF"
- Een knop om de temperatuur te regelen "✱"

Als men de knop "ON/OFF" indrukt, zal men de koelkast **aan en uit zetten**.

Om de temperatuur te regelen drukt men op de knop met het symbool ✱. Telkens als de knop wordt ingedrukt, zal het lichtje van het LED verschuiven van links naar rechts, terwijl voor de tussenstanden de twee dichtstbijzijnde LED's gaan branden. Als de aanwijzer links staat, is de koelkast het minst koud (minimum) de stand naar rechts wijst op een lagere temperatuur (kouder) met een verschil van ongeveer 3°C. Om een koudere temperatuur te kiezen, drukt u herhaaldelijk de knop in totdat het meeste rechtse led brandt (koudste temperatuur). Als u de knop daarna weer indrukt, zal het led uiterst links gaan branden.

Zie voor het bedradingschema de afb. 8a/b/f



▪ DIGITALE THERMOSTAAT

Met de DIGITALE thermostaat wordt de temperatuur in de koelkast en het aan en uit gaan van de compressor constant en automatisch gecontroleerd.

De gebruiker heeft een display ter beschikking en vier toetsen om de staat van de koelkast te controleren en het instrument zelf te programmeren.

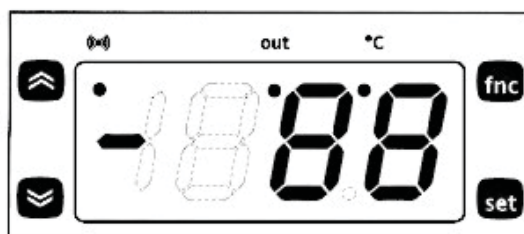
Zodra het display stroomvoeding krijgt, zal het beginnen te knipperen waarna de huidige temperatuur in de koelkast erop verschijnt.

De thermostaat is default ingesteld op 0°C.

Zie voor het bedradingschema de afb. 8c (12/24V) of 8d (12/24V-230V)

DE PARAMETERS WIJZIGEN:

- De toets **SET** 2 keer kort indrukken (niet langer dan 5 sec.) 2 volte.
De eerste keer verschijnt het woordje "SET", de tweede keer de waarde "0" of de waarde die reeds geprogrammeerd was.
- Stel met de toetsen  o  de temperatuur in die de koelkast moet bereiken.
- Druk de toets **FNC** snel 2 keer in om de ingestelde temperatuur te bevestigen.
De eerste keer verschijnt het woordje "SET", de tweede keer de echte temperatuur in de koelkast.
- Het puntje onder het woordje "OUT" betekent dat de compressor en de ventilator in werking zijn.

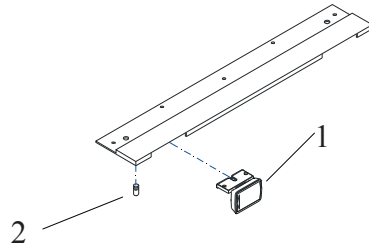


Zie voor het bedradingschema de afb. 8c/d/g

ER ZIT BIJ DE KOELKAST IN ELK GEVAL EEN HANDLEIDING VAN DE DIGITALE THERMOSTAAT.

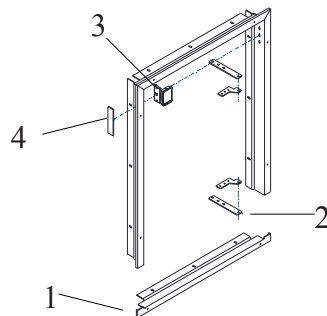
Om de deur met sluiting NAUTIC-EUROPA aan de andere kant te zetten, gaat u als volgt te werk:

- Haal de deur er naar boven uit zodat deze uit het onderste scharnier komt.
- Demonteer de klink van Nautic (1) en plaats deze op de deur aan de overkant. Meet de hartlijn tussen de openingen.
- Schroef de scharnierpin (2) uit de beugel en schroef deze vast aan de andere kant.
- Plaats de deur en controleer de sluiting.
- Monteer het onderste scharnier aan de andere kant van de koelkast.



Om de deur met sluiting NAUTIC-USA aan de andere kant te zetten, gaat u als volgt te werk:

- Demonteer de basis van het bevestigingsprofiel (1) indien aanwezig.
- Demonteer het scharnier en het onderste plaatje (2) en haal de deur er naar onder uit.
- Demonteer het handvat Nautic (3), keer de stoppen en de binnenste veer om om de beweging van de deur om te keren; draai het handvat in de richting van de pijl.
- Monteer de klink van Nautic (1) op de deur aan de overkant. Meet de hartlijn tussen de openingen.
- Verplaats het plaatje waarop de sluiting pakt (4) aan de andere kant van het profiel.
- Plaats de deur en controleer de sluiting.
- Plaats het scharnier, het onderste plaatje en de basis van het bevestigingsprofiel.



WAT MOET U DOEN WANNEER DE KOELKAST NIET WERKT

1- DE KOELKAST WERKT NIET

Controleren:

- de thermostaat moet op "STOP" staan.
- de hoofdstroomschakelaar moet aan staan.
- de zekering op het elektronisch mechanisme van de koelkast mag niet doorgebrand zijn.
- de stroomkabel mag nergens onderbroken zijn.
- de accu moet goed werken.
- **de spanning naar de klem van het elektronisch mechanisme op de koelkast moet gelijk zijn aan de spanning naar de accu.** Bij een spanningverlies groter dan 0,2-0,4V controleert u:
- de kabel tussen de accu en het elektronisch mechanisme (zie de tabel van de instructies van Danfoss).
- over de gehele aansluiting of eventuele verbindingpunten niet stuk zijn of niet goed vast zitten.
- of er geen oxidatie zit op de accupolen of op de contacten.

2- DE KOELKAST MAAKT LAWAAI

Controleren of:

- de koelkast of de koelgroep moet recht en vlak staan.
- de koelkast mag geen meubels aanraken die trillingen kunnen veroorzaken.
- de buizen van het koelcircuit op de achterkant mogen nergens raken en tegen het apparaat zelf trillen.

3- KOELKAST MET ONVOLDOENDE RENDEMENT

Controleren of:

- de deur moet hermetisch sluiten.
- de koelkast mag niet te dicht bij een warmtebron staan.
- de koelkast of de koelgroep moet voldoende geventileerd zijn.
- er mag niet te veel ijs op de verdamper zitten.
- de condensor mag niet vol stof zitten.
- de ventilator moet vrij kunnen draaien (uitvoeringen met ventilatorkoeling).
- de koelkast mag niet te vol worden geladen.

Als u dit alles gecontroleerd hebt, en er zijn nog steeds problemen, neemt u contact op met een servicecentrum.

INSTRUCTIES VOOR DANFOSS BD35/BD50F 12-24 Vcc

De elektronische unit is geschikt voor twee verschillende aansluitspanningen. Dit houdt in dat dezelfde unit voor zowel 12V als 24V voedingsspanning kan worden toegepast. De max. spanning voor een 12V systeem is 17V en 31,5V voor een 24 V voedingssysteem. De max. omgevingstemperatuur is 55°C. De elektronische unit heeft een ingebouwde thermische beveiliging die geactiveerd wordt en de werking van de compressor stopt als de temperatuur van de elektronische unit te hoog wordt.

Installatie (fig. 10)

Steek de stekker van de elektronische unit in de compressoraansluiting. Monteer de elektronische unit op de compressor door de behuizing over de schroefkop (1) te klemmen.

Voeding (fig. 10)

De elektronische unit moet altijd direct op de polen van de batterij (2) worden aangesloten. Sluit de plus op de + en de min op de - aan, anders zal de elektronische unit niet werken. De elektronische unit is tegen een verkeerde batterijaansluiting beschermd. Ter bescherming van de installatie moet er in de + kabel zo dicht mogelijk bij de batterij een zekering (3) worden gemonteerd. Een 15A zekering voor 12V en een 7,5A zekering voor 24V circuits worden aanbevolen. Als er een hoofdschakelaar (4) gebruikt is, moet er uitgegaan worden van een stroom van min. 20A. De aanbevolen kabelafmetingen in fig. 11. moeten worden aangehouden. Vermijd bijkomende verbindingen in het voedingsspannings circuit om te voorkomen dat een spanningsdaling de instelling van de batterijbeveiliging beïnvloed.

Batterijbeveiliging (fig. 10)

De compressor wordt gestopt en weer gestart volgens de vastgestelde spanningslimieten op de + en - klemmen van de elektronische unit. De standaard instellingen voor de 12V als 24V voedingssystemen blijken uit fig. 12. Andere instellingen (fig. 13) zijn optioneel als er een verbinding d.m.v. een weerstand (9) wordt aangebracht tussen de klemmen C en P. Wanneer zonneenergie gebruikt wordt, zonder batterij, is een weerstand van 220 kΩ aanbevolen. In AEO (Adaptive Energy Optimizing) modus past de compressor zijn snelheid altijd aan in functie van de vraag naar koeling; en dit binnen een willekeurige spanningsbereik 9.6 tot 31.5V.

Thermostaat (fig. 10)

De thermostaat (7) is aangesloten tussen de klemmen C en T. Zonder een weerstand in het stroomcircuit zal de compressor met een standaard elektronische unit 101N0210 or 101N0220 op een vast toerental van 2000 omw. per minuut draaien als de thermostaat wordt ingeschakeld. Met de thermostaat rechtstreeks aangesloten op de klem C, zal de elektronische eenheid

101N0300 de snelheid aanpassen in functie van de actuele vraag naar koeling. Andere vaste compressortoerentallen binnen het bereik van 2.000 en 3.500 rpm zijn mogelijk als er een weerstand (8) gemonteerd is om de stroom (mA) van het stroomcircuit af te stellen. Weerstandswaarden voor verschillende toerentallen zijn terug te vinden in fig. 14.

Ventilator (optie, fig. 10)

Tussen de klemmen + en F kan een ventilator (5) worden aangesloten. Verbind de plus met + en de min met F. Aangezien de uitgangsspanning tussen de klemmen + en F altijd 12V is, moet een 12V ventilator voor zowel de 12V als de 24V voedingsspanning worden gebruikt. De ventilator uitgang kan een continue stroom leveren van 0,5A gemiddeld. Een hogere stroom is toegestaan gedurende 2 seconden tijdens de start.

LED (optie, fig. 10)

Een 10mA lichtdiode (LED) (6) kan tussen de klemmen + en D worden aangesloten. Als de elektronische unit een werkingfout registreert, zal de diode een aantal malen knipperen. Het aantal knipperingen is afhankelijk van de werkingfout die geregistreerd wordt. Elke knippering zal ¼ seconde duren. Na het desbetreffende aantal knipperingen zal er een pauze zonder knipperingen zijn, zodat de reeks voor elke foutregistratie om de 4 seconden herhaald wordt.

Aantal knipperingen	Type fout
5	Thermisch uitschakelen van de elektronische unit (Als het koelsysteem te zwaar belast is geweest, of als de omgevingstemperatuur te hoog is, zal de elektronische unit te heet worden)
4	Fout minimumsnelheid motor (Als het koelsysteem te zwaar belast is, kan de motor de minimumsnelheid van 1.850 omw.per minuut niet aanhouden).
3	Fout motorstart (De rotor is geblokkeerd of het drukverschil in het koelsysteem is te groot (>5 bar)).
2	Ventilator overstroombeveiliging (De ventilator verbruikt meer dan 1 A _{peak}).
1	Batterijbeveiliging uitschakeling (De spanning ligt buiten de uitschakelinstelling).

INSTRUCTIES VOOR DANFOSS BD35/BD50F 12-24 Vcc / 110-240 Vca

De elektronische besturing is een multispanningsstelsel. De besturing kan gebruikt worden voor 12V/24V DC voedingstroom en voor 100-240V AC 50/ 60Hz. Als de voedingstroom 12V DC is, is de maximale spanning 17V DC; voor een voedingstroom van 24V DC is de maximum spanning 31.5V DC. Voor AC-systemen bedraagt de maximum spanning 265V AC en de minimum spanning 85V AC. De maximum omgevingstemperatuur bedraagt 55°C. De elektronische besturing is uitgerust met een ingebouwde temperatuurcontrole die de compressor uit en aan zet als de temperatuur van de elektronische besturing te hoog wordt (100°C / 212°F op het elektronisch circuit). Het opgenomen vermogen is beperkt tot 100W. **Lees het blad met technische kenmerken BD50F voor details.**

Installatie (fig. 10)

Steek de stekker van de elektronische unit in de compressoraansluiting. Monteer de elektronische unit op de compressor door de behuizing over de schroefkop (1) te klemmen.

Voeding (fig. 10)

De elektronische unit moet altijd direct op de polen van de batterij (2) worden aangesloten. Sluit de plus op de + en de min op de - aan, anders zal de elektronische unit niet werken. De elektronische unit is tegen een verkeerde batterijaansluiting beschermd. Ter bescherming van de installatie moet er in de + kabel zo dicht mogelijk bij de batterij een zekering (3) worden gemonteerd. Een 15A zekering voor 12V en een 7,5A zekering voor 24V circuits worden aanbevolen. Als er een hoofdschakelaar (4) gebruikt is, moet er uitgegaan worden van een stroom van min. 20A. De aanbevolen kabelafmetingen in fig. 11. moeten worden aangehouden. Vermijd bijkomende verbindingen in het voedingsspannings circuit om te voorkomen dat een spanningsdaling de instelling van de batterijbeveiliging beïnvloed.

AC: De elektrische kabels moeten aangesloten worden op de klemmen L en N op de elektronische besturing. Nominale spanning van 100 tot 240 V AC 50/60Hz. Veiligheidsschakelaar: bovenste limiet = 270V AC, onderste limiet = 80V AC. Een zekering van 4A (11) moet worden gemonteerd op de spanningskabel (L) ter beveiliging van het systeem. Als u een hoofdschakelaar gebruikt (12), dient op minstens 6° te worden afgesteld. De kabel moet minimaal 0.75 mm² of 18 AWG zijn. Opm.: indien nodig een aardverbinding aanbrengen.

Algemeen: u kunt tegelijkertijd op de elektronische besturing een AC en een DC voeding aansluiten. In dit geval zal het systeem voorrang geven aan de AC-voeding. Als de AC-voeding uitvalt of onder 85V AC valt, schakelt het systeem over op de 12V DC-voeding met een uitsteltijd van 1 minuut. Als de AC-voeding

weer inschakelt, zal er geen enkele schakelvertraging zijn voor de compressor.

Batterijbeveiliging (fig. 10)

De compressor wordt gestopt en weer gestart volgens de vastgestelde spanningslimieten op de + en - klemmen van de elektronische unit. De standaard instellingen voor de 12V als 24V voedingssystemen blijken uit fig. 12. Andere instellingen (fig. 13) zijn optioneel als er een verbinding d.m.v. een weerstand (9) wordt aangebracht tussen de klemmen C en P.

Thermostaat (fig. 10)

De thermostaat (7) is aangesloten tussen de klemmen C en T. Zonder een weerstand in het stuurstroom circuit zal de compressor met een standaard elektronische unit 101N0210 or 101N0220 op een vast toerental van 2000 omw. per minuut draaien als de thermostaat wordt ingeschakeld. Met de thermostaat rechtstreeks aangesloten op de klem C, zal de elektronische eenheid 101N0300 de snelheid aanpassen in functie van de actuele vraag naar koeling. Andere vaste compressortoerentalen binnen het bereik van 2.000 en 3.500 rpm zijn mogelijk als er een weerstand (8) gemonteerd is om de stroom (mA) van het stuurstroom circuit af te stellen. Weerstandswaarden voor verschillende toerentalen zijn terug te vinden in fig. 14.

Ventilator (optie, fig. 10)

Tussen de klemmen + en F kan een ventilator (5) worden aangesloten. Verbind de plus met + en de min met F. Aangezien de uitgangsspanning tussen de klemmen + en F altijd 12V is, moet een 12V ventilator voor zowel de 12V als de 24V voedingsspanning worden gebruikt. De ventilator uitgang kan een continue stroom leveren van 0,5A gemiddeld. Een hogere stroom is toegestaan gedurende 2 seconden tijdens de start.

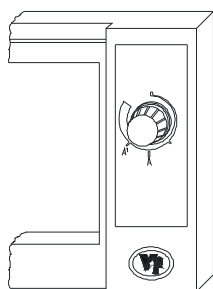
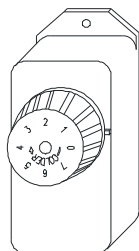
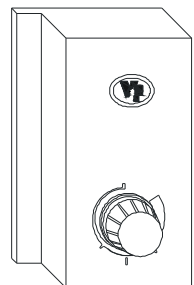
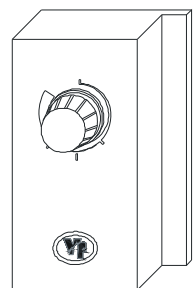
Lamp (optional, Afb. 1)

Een lamp van 5 Watt 12V DC (10) kan aangesloten worden tussen de klemmen A en C. De uitgaande spanning tussen de klemmen A en C is altijd ingesteld op 12V DC. Zowel met een voedingssysteem van 12V als één met 24V dient een lamp van 12V DC te worden gebruikt. Op de uitgang van de lamp kan een gemiddelde continue spanning van 0,5A worden gemeten.

LED (optional, Afb. 1)

Een LED van 10mA (6) kan aangesloten worden tussen de klemmen + en D. Als de elektronische besturing een fout signaleert zal deze LED een bepaald aantal keer knipperen. Het aantal keren hangt af van het type fout. Elk knippersignaal duurt ¼ seconde. Na elke knippersignaalreeks volgt een interval zonder signalen. Elke foutsignaleringsreeks wordt dus om de 4 seconden herhaald.

fig.1



Rev. 02 del 17/02/06

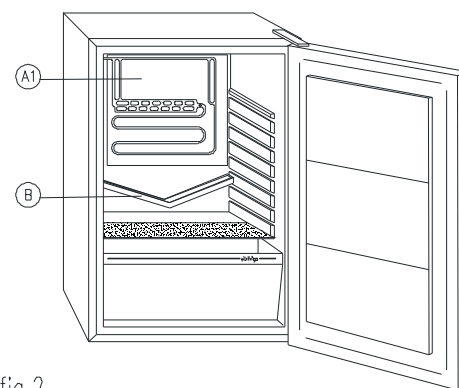
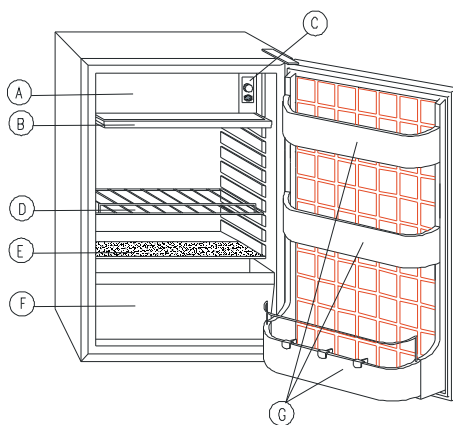


fig.2

fig.3

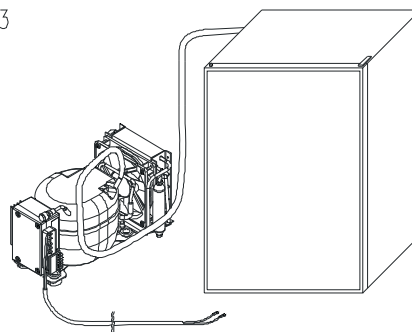


fig.4

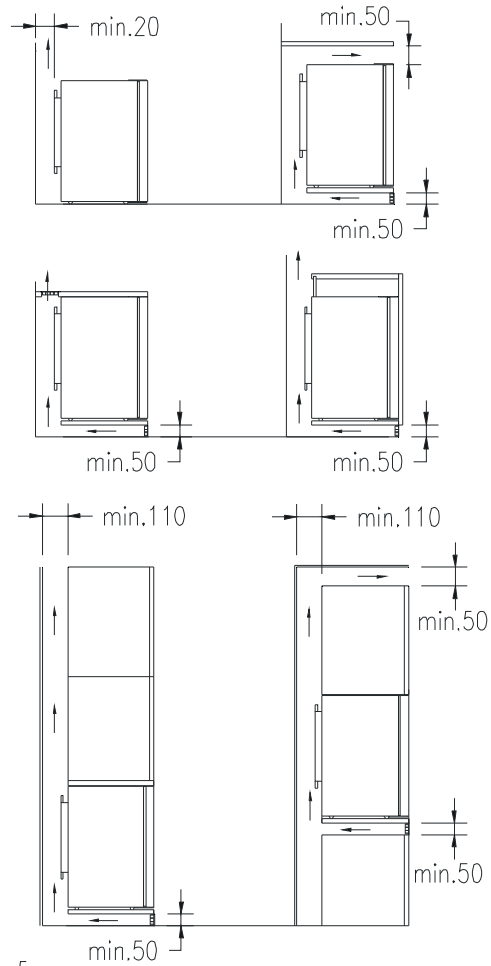
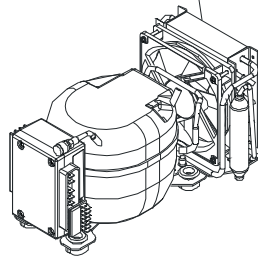
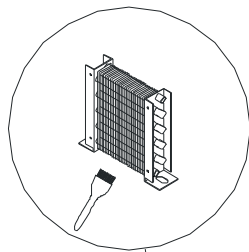
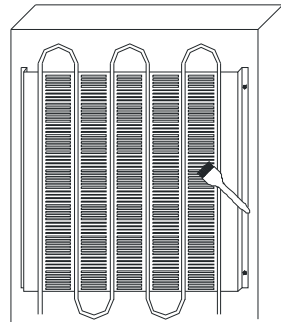


fig.5

fig.6

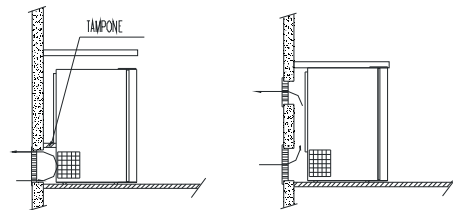


fig.7a

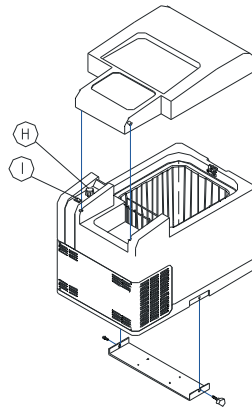
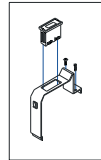


fig.7b

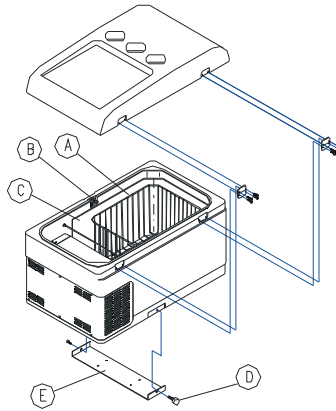
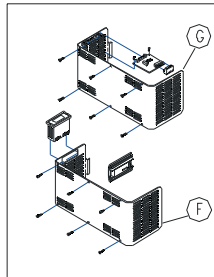


fig.7c

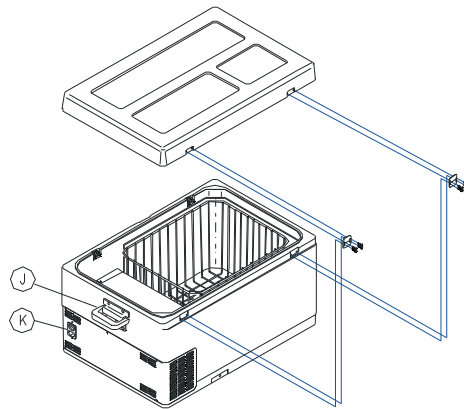
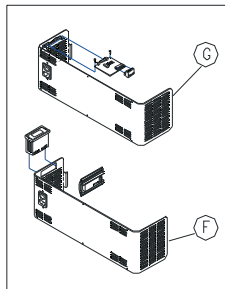


fig.8a

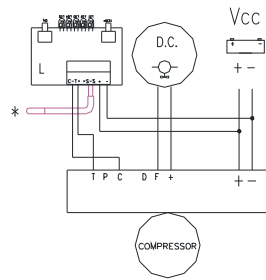


fig.8b

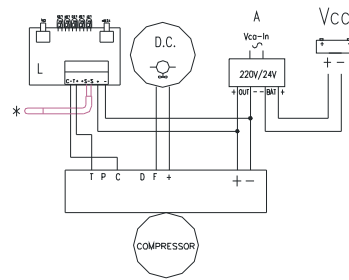


fig.8c

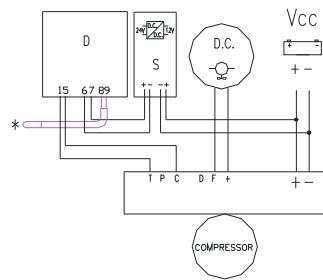


fig.8d

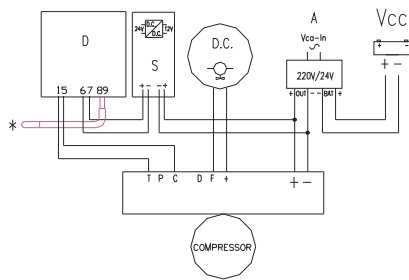


fig.8e

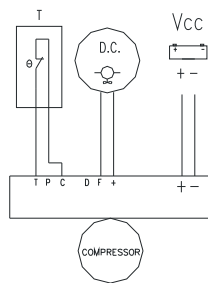


fig.8f

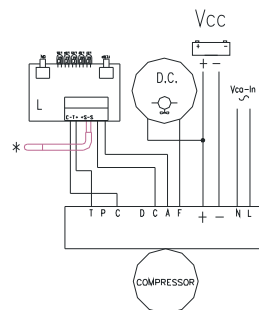


fig.8g

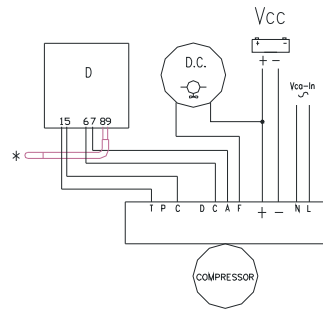


fig.8h

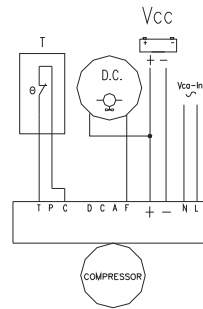


fig.9

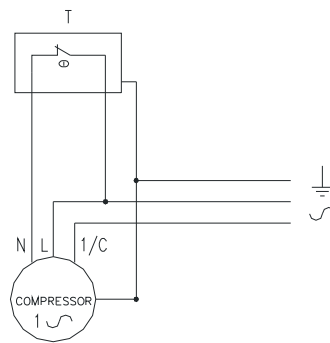
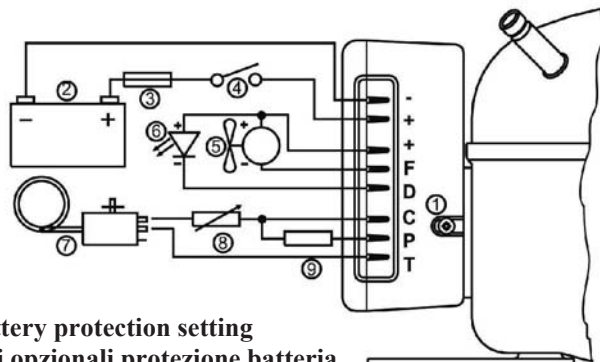


Fig.10



Optional battery protection setting Impostazioni opzionali protezione batteria

Resistor (9) kΩ	12V cut-out V	12V cut-in V	12V max. Voltage	24V cut-out V	24V cut-in V	24V max Voltage
Resistore (9) kΩ	12V stacco V	12V attacco V	Max tensione a 12V	24V stacco V	24V attacco V	Max tensione a 24V
0	9.6	10.9	17.0	21.3	22.7	31.5
1.6	9.7	11.0	17.0	21.5	22.7	31.5
2.4	9.9	11.1	17.0	21.8	22.9	31.5
3.6	10.0	11.3	17.0	22.0	23.2	31.5
4.7	10.1	11.4	17.0	22.3	23.4	31.5
6.2	10.2	11.5	17.0	22.5	23.7	31.5
8.2	10.4	11.7	17.0	22.8	23.9	31.5
11	10.5	11.8	17.0	23.0	24.2	31.5
14	10.6	11.9	17.0	23.3	24.5	31.5
18	10.8	12.0	17.0	23.6	24.7	31.5
24	10.9	12.2	17.0	23.8	25.0	31.5
33	11.0	12.3	17.0	241	25.2	31.5
47	11.1	12.4	17.0	24.3	25.5	31.5
82	11.3	12.5	17.0	24.6	25.7	31.5
220	9.6	10.9			26.0	31.5

Fig.13

Wire dimensions

Dimensioni cavi (Fig.11)

Cross section mm ²	Max length* m 12V operation	Max length* m 24V operation
Sezione mm ²	Max. lunghezza* m funzionament o a 12V	Max. lunghezza* m funzionamento a 12V
2.5	2.5	5
4	4	8
6	6	12
10	10	20

Lenght between battery and electronic unit
Lunghezza tra la batteria e l'unità elettronica

Standard battery protection setting

Impostazioni standard protezione batteria (Fig.12)

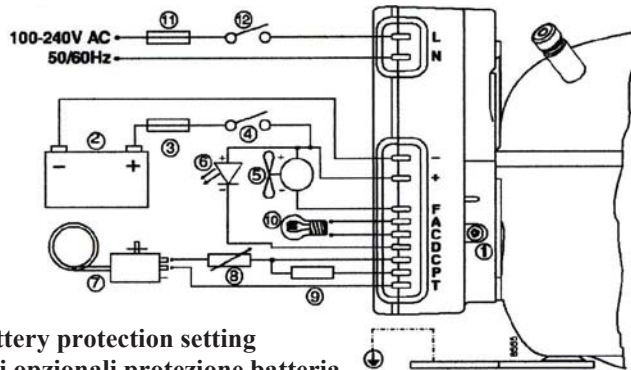
12V cut- out V	12V cut-in V	24V cut-out V	24V cut-in V
12V stacco V	12V attacco V	24V stacco V	24V attacco V
10.4	11.7	22.8	24.2

Compressor speed

Velocità compressore (Fig.14)

Resistor (8) Ω	Motor speed rpm	Contr.Circ. Current mA
Resistore (8) Ω	Velocità motore giri/min	Corrente circuitto controllo mA
0	2000	5
277	2500	4
692	3000	3
1523	3500	2

Fig.15



Optional battery protection setting Impostazioni opzionali protezione batteria

Resistor (9) kΩ	12V cut-out V	12V cut-in V	12V max. Voltage	24V cut-out V	24V cut-in V	24V max Voltage
Resistore (9) kΩ	12V stacco V	12V attacco V	Max tensione a 12V	24V stacco V	24V attacco V	Max tensione A 24V
0	9.6	10.9	17.0	21.3	22.7	31.5
1.6	9.7	11.0	17.0	21.5	22.7	31.5
2.4	9.9	11.1	17.0	21.8	22.9	31.5
3.6	10.0	11.3	17.0	22.0	23.2	31.5
4.7	10.1	11.4	17.0	22.3	23.4	31.5
6.2	10.2	11.5	17.0	22.5	23.7	31.5
8.2	10.4	11.7	17.0	22.8	23.9	31.5
11	10.5	11.8	17.0	23.0	24.2	31.5
14	10.6	11.9	17.0	23.3	24.5	31.5
18	10.8	12.0	17.0	23.6	24.7	31.5
24	10.9	12.2	17.0	23.8	25.0	31.5
33	11.0	12.3	17.0	241	25.2	31.5
47	11.1	12.4	17.0	24.3	25.5	31.5
82	11.3	12.5	17.0	24.6	25.7	31.5
220	9.6	10.9			26.0	31.5

Fig.18

Wire dimensions

Dimensioni cavi (Fig.16)

Cross section mm ²	Max length* m 12V operation	Max length* m 24V operation
Sezione mm ²	Max. lunghezza* m funzionament o a 12V	Max. lunghezza* m funzionamento a 12V
2.5	2.5	5
4	4	8
6	6	12
10	10	20

Lenght between battery and electronic unit
Lunghezza tra la batteria e l'unità elettronica

Wire dimension AC/Dimensioni cavi AC

Cross section / Sezione : min. 0.75 mm²

Standard battery protection setting

Impostazioni standard protezione batteria (Fig.17)

12V cut- out V	12V cut-in V	24V cut-out V	24V cut-in V
12V stacco V	12V attacco V	24V stacco V	24V attacco V
10.4	11.7	22.8	24.2

Compressor speed

Velocità compressore (Fig.19)

Resistor (8) Ω	Motor speed rpm	Contr.Circ. Current mA
Resistore (8) Ω	Velocità motore giri/min	Corrente circuito controllo mA
0	2000	5
277	2500	4
692	3000	3
1523	3500	2

DICHIARAZIONE DI CONFORMITA'

La VITRIFRIGO snc con sede in via della Produzione 9, 61022 Montecchio (PS), Italia,

DICHIARA

sotto la propria responsabilità che il frigorifero o unità refrigerante per la refrigerazione ed il mantenimento di cibi e bevande i cui dati sono riportati nell'etichetta sottostante ed alla quale questa dichiarazione si riferisce

E' CONFORME

ai requisiti essenziali di sicurezza previsti dalle direttive:

89/392/CEE 91/368/CEE 93/44/CEE 89/336/CEE.

DECLARATION OF CONFORMITY

VITRIFRIGO snc, with its main office in via della Produzione 9, 61022 Montecchio (PS), Italy,

hereby DECLARES,

under its sole responsibility, that the refrigerator or refrigerating unit designed for the refrigeration and preservation of food and beverages, as per the dataplate indicated below and to which this declaration refers,

COMPLIES WITH THE

basic safety requirements specified in EC directives:

89/392/EC 91/368/EC 93/44/EC EC/89/336.

DÉCLARATION DE CONFORMITÉ

La soussignée société VITRIFRIGO snc, dont le siège est à Montecchio (PS) - 61022 (ITALIE), via della Produzione 9,

ATTESTE

sous sa responsabilité que le réfrigérateur ou unité de réfrigération et de conservation d'aliments et de boissons, dont les caractéristiques sont reportées sur l'étiquette ci-dessous et objet de la présente déclaration est

CONFORME

aux exigences essentielles des directives:

89/392/CEE 91/368/CEE 93/44/CEE 89/336/CEE.

KONFORMITÄTSERKLÄRUNG

Die Firma VITRIFRIGO snc mit Sitz in Via della Produzione 9, 61022 Montecchio (PS), Italien

ERKLÄRT

in eigener Verantwortung, dass der Kühlschrank bzw. das Kühlgerät für die Kühlung und Aufbewahrung von Speisen und Getränke, dessen Daten auf nachstehendem Etikett angegeben sind, und auf das sich diese Erklärung bezieht,

mit den wesentlichen, von folgenden Richtlinien vorgeschriebenen Sicherheitsanforderungen:

89/392/EWG 91/368/EWG 93/44/EWG 89/336/EWG

KONFORM IST.

DECLARACIÓN DE CONFORMIDAD

La VITRIFRIGO snc, con domicilio en via della Produzione n° 9, 61022 Montecchio (Pésaro), Italia,

DECLARA,

bajo su propia responsabilidad, que el frigorífico o unidad refrigerante para la refrigeración y conservación de alimentos y bebidas - cuyos datos técnicos se indican en la etiqueta situada debajo, al que la presente declaración se refiere,

CUMPLE CON

los requisitos esenciales de seguridad establecidos por las directivas:

89/392/CE 91/368/CE 93/44/CE 89/336/CE.

DECLARAÇÃO DE CONFORMIDADE

A VITRIFRIGO snc, com sede na Via della Produzione n° 9 -

61022 - Montecchio (PS), Itália

DECLARA

sob a própria responsabilidade que o frigorifero ou unidade refrigerante á refrigeraçã e conservação de alimentos e bebidas, cujos dados estão contidos na etiqueta abaixo e a qual esta declaração concerne

É CONFORME

aos requisitos essenciais de segurança previstos pelas directivas:

89/392/CE 91/368/CE 93/44/CE 89/336/CE.

CONFORMITEITSVERKLARING

De firma VITRIFRIGO snc, gevestigd in de via della Produzione 9, 61022 Montecchio (PS), Italië,

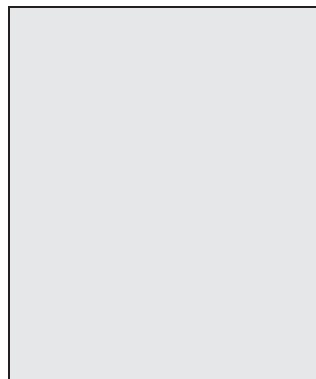
VERKLAART,

onder eigen verantwoording, dat de koelkast of de koeleenheid voor het koelen en bewaren van voedingswaren en dranken, waarvan de gegevens op onderstaand etiket zijn vermeld en waarop deze verklaring betrekking heeft,

VOLDOET

aan de fundamentele vereisten zoals gedefinieerd in de richtlijnen:

89/392/EEG 91/368/EEG 93/44/EEG 89/336/EEG.



Vitri Alceste

Vitrifrigo s.n.c.
via della Produzione 9

Tel. ++ 39 . 721 + 491080
61020 Montecchio di Pesaro.

Fax ++ 39 . 721 + 497739
Italy

Installation, Compensation, and Maintenance Instructions

For all

RITCHIE® NAVIGATOR™

Compass Models

Made in U.S.A.

CAUTION:

All Magnetic Compasses are vulnerable to magnetic interference, which will produce errors, called deviation. It is the Owner/Operator and/or Helmsman's responsibility to make sure the compass is properly installed and compensated. Compensation is the act of correcting for deviation. Magnets (speakers, microphones etc.), ferrous metals (steel, iron, etc.) and current carrying devices are common causes of deviation. It is important to understand that magnetic compasses point toward Magnetic North. There is a difference between Magnetic North and True North, and that difference is called variation. Variation differs depending on your geographical location and can be determined by referring to a local chart.

Please read the Instructions completely before beginning installation.

Selecting the Proper Location

The compass should be close enough to the helmsman and positioned below the helmsman's line of sight so it is easily read during normal operation. Direct Read Dial or CombiDamp Dial models will allow the compass to be mounted higher, near or at eye level.

You will need a flat and level surface (when the boat is on a level keel). Many boats have a curved mounting surface and if this is the case, a fairing block should be utilized to bring the compass to a level position.

Select a location that has no more than 20 degrees deviation on any of the four cardinal points (N S E and W). Most compasses have a built in compensation system that will correct for fixed deviation up to 20 degrees. It is important to realize that proper compensation is not possible when a compass is subjected to a magnetic field that is variable. Some shipboard devices can cause varying magnetic fields. Devices such as windshield wipers, high current carrying wire and even some steering wheels must be considered when selecting a location for your compass.

Testing Your Chosen Location

Use your compass to test a location. There are two brass rods near the bottom of the compass which rotate 360 degrees, the slotted ends may be all that is visible. These compensation rods are used to correct your compass for deviation. When testing a location, you do not want pre-set corrections in your compass, so neutralize the compensator rods by setting the slots in a horizontal position.

Begin your test by holding the compass away from any possible interference and observing the compass reading. Then move the compass into position carefully; keeping it pointed in the same direction. If the compass reading is different without a change in direction you are observing deviation. You need to find a location that has less than 20 degrees of deviation on the 4 cardinal points if you intend to adjust your compass using the compensator rods.

After finding a location you should test for intermittent changes in the magnetic field. With the compass mounted temporarily in its intended position try moving the steering wheel, throttle controls or anything else that might cause deviation. It is also advised to turn electrical devices off and on. Please be advised that a changing magnetic field can not be corrected with compensation and you will need to find another location for your compass.

Installation (all Models)

Mounting the Compass

Great care must be taken to mount the compass so that it is aligned with the keel of the boat. **An alignment error is a constant error on all headings caused by the compass not being pointed in the same direction as the boat.** One recommendation is to temporarily mount the compass using one fastener so if an alignment error is detected it is easily corrected. Masking tape can be used as a reference or to keep the compass steady during installation.

If you are mounting to a bulkhead that is not perpendicular to the centerline of the boat, a fairing block must be used.

Due to variations in bulkhead and deck materials, mounting screws are not supplied. Use hardware that is suitable for your specific installation. SELECT MOUNTING HARDWARE THAT IS NON-MAGNETIC. Most quality stainless steel and solid brass fasteners can be used. If you are unsure test them with a magnet.

Most models have built-in lights which will require routing the wire or wires to your power source. To assure a clean installation you may want to wait and drill the routing holes after you are satisfied with the compass alignment.

Specific model installation instructions are as follows:

Note for all flush and bulkhead mount compasses:

It is important that you use the mounting gasket included with each model. We do NOT recommend the use of bedding compound since some brands contain chemicals that could damage the plastic dome.

FN-201, FNW-201, SS-2000, SS-2000W, FN-203 & FNW-203 Flush Mount

Using the mounting template supplied with the compass, make the cutout in your chosen location and mount as instructed above (Mounting the Compass). Note: If you cannot access the compensation rods from below you need to allow for easy removal of the compass during compensation. (See Compensation instructions below).

BN-202 Bulkhead Mount

Before making the cut, make sure the bulkhead surface at the mounting location is at a ninety-degree (90°) angle to the centerline of the boat and is in a vertical position. If such is not the case, a fairing block must be used between the compass and the bulkhead. Use the mounting template supplied with the compass for cutting the necessary opening in the vertical bulkhead. If the compass is not mounted in a vertical position, serious errors can develop when the boat heels over and pitching occurs simultaneously. There is also potential error from the built-in compensator magnets if the compass is not mounted vertically.

DNP-200, DNB-200, DNW-200, DNP-203, DNB-203, DNW-203, SS-2100B, SS-2100W SS-2100P & DNW-203 Deck Mount

When you have selected and prepared the area for mounting, place the compass in position and remove the three large Phillips head screws holding the capsule unit to the binnacle. These three screws are located near the outer edge of the top bezel. NOTE: Do not remove any of the smaller Phillips head screws also located on the top bezel. The compass capsule can now be lifted out of the binnacle. Please note, the binnacle mounting flange is supplied with two sets of mounting holes. The slotted mounting holes will be used when the compass is to be mounted on a pedestal. If the compass is to be mounted directly to the deck, the round mounting holes should be used.

Night Light Wiring (all Models)

All models are supplied with a 12-volt night lighting system. To connect lights to a 24 or 32-volt system, dropping resistors are available.

Lights should be wired to an appropriately fused 12-volt circuit in your electrical system (i.e. running light circuit). Connect the red wire to positive and black to ground.

Compensation

A built-in correcting magnet system consists of two sets of magnets fixed to two adjusting rods with slotted ends. The slots should be horizontal before starting the adjusting procedure. A small non-magnetic screwdriver is provided for this purpose.

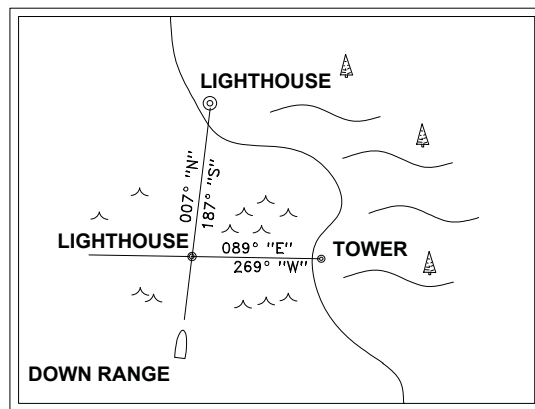
Before starting compensation, make sure you have a suitable location (see Testing Your Chosen Location).

Method 1. (Preferred)

Step One. With the compass in its intended position, but not finally secured, (see Mounting the Compass) select a course on your chart using two fixed aids that are within ten degrees (10°) of the North/South line. Try to select this course so that you can maneuver your boat "down range" of the marks selected (See example).

Step Two. From a position down range of the North/South marks, and keeping the marks lined up, run the boat visually along the Northerly course selected. Turn the port/starboard compensator (slot is facing starboard) until the compass reads correctly.

Step Three. Simply repeat steps 1 & 2, except this time, using an East/West course and the fore/aft compensator



(slot is facing aft).

Step Four. Check compass alignment by running the boat in a Southerly direction, again keeping the mark lined up. If the compass is not correct at this time, there is an alignment error. To correct, rotate the compass itself to remove one half of this error. Repeat steps 1, 2 & 4 until your North/South line is correct then repeat step 3.

Step Five. Install fastener (s), taking care not to disturb alignment.

Method 2. (Requires the use of GPS or Loran)

In this method you will be using a GPS or Loran as your reference.

1. Your GPS or Loran must be set to provide you with Magnetic, not True headings. Check your Manual.
2. GPS and Loran provide headings based on COG (course over ground). Compasses provide heading based on the direction the boat is actually pointed. Because of Tides, Currents and Winds, the boat may not always point in the same direction as COG. Pick a time and location that will minimize these effects.
3. Because the GPS and Loran calculate COG based on current and past positions you will see greater heading accuracy while traveling at higher speeds. We recommend at least 10 knots.

Step One. While at sea, with the compass in its intended position, but not finally secured, (see Mounting the Compass), obtain the Loran/GPS bearing to a fixed aid or landmark that is within 10° of a North/South line.

Step Two. Position your boat along that line and steer directly at that mark. Turn the port/starboard compensator (slot is facing starboard) until the compass heading matches the Loran/GPS bearing.

Step Three. Simply repeat steps 1 & 2, except this time, using an East/West course and the fore/aft compensator (slot is facing aft).

Step Four. Check compass alignment by running the boat 180 degrees from the heading used in step 2. If the compass is not correct at this time, there is an alignment error. To correct, rotate the compass itself to remove one half of this error. Repeat steps 1, 2 & 4 until your North/South line is correct then repeat step 3.

Step Five. Upon completing the procedure, secure the compass in its final position.

If you feel that the deviation on your boat is of an unusual nature, the services of a professional compass adjuster will be a wise investment.

To assure accuracy on all headings, check for deviation every thirty degrees and record any deviation on a deviation card. We recommend checking at the start of each boating season, and any time new equipment is added near the compass, for deviation.

Maintenance

Protect your compass from the sun when not using your boat. Strong sunlight may decrease the life of your compass. Custom fit covers are available from Ritchie.

Ritchie compasses require very little care. To remove salt spray deposits or dirt, rinse the entire compass with clean, fresh water and wipe carefully with a damp cloth. **Important Note: Never Use Chemical or Abrasive Cleaners.**

Night Lighting Systems

Ritchie's night-lights are designed to last for years of use. If you need to replace one, contact the factory with your model and serial number for a part number and price. Tel. 781-826-5131 Fax. 781-826-7336 E-mail. service@ritchienavigation.com

Warranty:

We warrant all Ritchie Magnetic Marine Compasses to be free of defects in workmanship or materials. If within three years of purchase date, a compass fails to give satisfactory service, it will be repaired or replaced without charge. This warranty does not cover breakage through accident or misuse. Replacement or repair will be made if the instrument is returned prepaid to a Ritchie Service Station or directly to E.S. Ritchie & Sons, Inc., 243 Oak Street, Pembroke, MA 02359.

RITCHIE NAVIGATION

E.S. RITCHIE & SONS, INC., P.O. BOX 548, 243 OAK ST., PEMBROKE, MASSACHUSETTS 02359 U.S.A.

Tel. (781) 826-5131 Fax (781) 826-7336 www.ritchienavigation.com

500100 Issue 3

Electric/Hydraulic TT Thruster 140-300

GB

Owner's Installation, Operation &
Basic Servicing Manual



LEWMAR®

www.lewmar.com



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Introduction

Dear Customer,

Thank you for choosing Lewmar TT Thrusters. Lewmar products are world renowned for their quality, technical innovation and proven performance. With a Lewmar thruster you will be provided with many years of outstanding service.

Product support

Lewmar products are supported by a worldwide network of distributors and Authorised Service Representatives. If you encounter any difficulties with this product, please contact your national distributor, or your local Lewmar dealer. Details are available at:

www.lewmar.com

Important information about this manual

Throughout this manual, you will see safety and product damage warnings. You must follow these warnings carefully to avoid possible injury or damage.

The type of warnings, what they look like, and how they are used in this manual are explained as follows:



Warning!

This is a warning against anything which may cause injury to people if the warning is ignored. You are informed about what you must or must not do in order to reduce the risk of injury to yourself and others.



Safety Symbol

When you see the safety symbol it means: "Do not...", "Do not do this", or "Do not let this happen".

CE Approvals

For CE approval certificates contact Lewmar.

To the best of our knowledge, the information in this manual was correct when it went to press. However, Lewmar cannot accept liability for any inaccuracies or omissions it may contain. In addition, our policy of continuous product improvement may change specifications without notice. As a result, Lewmar cannot accept liability for any differences between the product and the manual.



This manual forms part of the product and **MUST BE RETAINED** along with, OR incorporated into, the Owner's Manual for the vessel to which the thruster is fitted.

Safety notices

General

Please ensure that you thoroughly understand the operation and safety requirements of the thruster before commencing the installation. Only persons who are completely familiar with the controls and those who have been fully made aware of the correct use of the thruster should be allowed to use it. If there is any doubt of how to install or operate this unit please seek advice from a suitably qualified engineer.

- Please ensure that you thoroughly understand the operation and safety requirements of the thruster.
- Your thruster should not be operated close to swimmers, as a powerful suction of water is generated when in use.
- The tunnel installation and any hull modifications should only be carried out by a specialist. This manual is based on a GRP tunnel installation.
- We recommend that a qualified person install the thruster. Faulty installation will place the boat and crew in danger and make the warranty invalid.
- It is the unavoidable responsibility of the owner or master or other responsible party to assess the risk of any operation on the vessel.

Thruster supply

- The thruster is securely packed for transit. However all parts should be inspected for signs of damage before installation. If any parts are found to be damaged please contact Lewmar.

Fitting

- This equipment must be installed and operated in accordance with the instructions contained in this manual. Failure to do so could result in poor product performance, personal injury and/or damage to your boat.
- Electric thrusters must be located in a dry environment. Should there be a need to install in a damp /wet location then the IP (Ignition Protected) version must be used.
- Electric bow thrusters use powerful electric motors, it is very important that there is sufficient battery capacity and large enough cables for safe operation. Using smaller than recommended battery and cables will cause loss of performance and may cause dangerous overheating.
- Electric motors spark and run hot. Do not place near flammable or sealed areas.
- Main battery must not be connected and power must not be switched on until all covers and terminal protectors are correctly fitted.
- It is very dangerous to run the thruster out of the water, even for a few seconds, the motor will over speed by 300%, causing damage to the motor seals etc. and the propeller will cause serious damage to whatever comes into contact with it. This action will invalidate the warranty.
- Consult the boat manufacturer if you have any doubt about the strength or suitability of the mounting location.

Electrical

- Make sure you have switched off the power before you start installing this product.
- If in doubt about installing electrical equipment please seek advice from a suitably qualified electrical engineer.

1. Installation

1.1 Choosing location

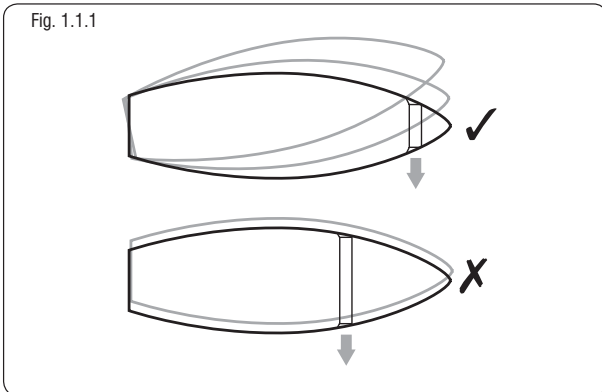
The actual position of the Thruster will depend on the internal & external construction of the Motor Boat or Sailing Yacht.

Ø = Tunnel Diameter.

For optimal performance the Thruster should be mounted within the following:

- As far forward as possible (Fig 1.1.1 lever effect).

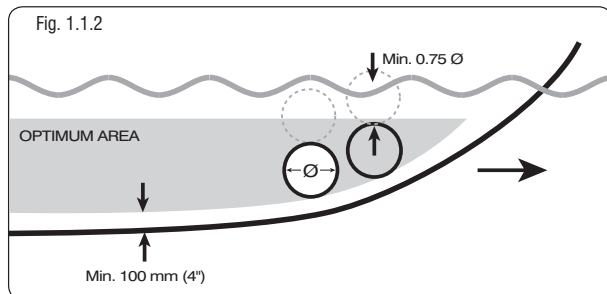
Fig. 1.1.1



- 1 x Ø below the waterline to prevent air being sucked into the tunnel. (Fig. 1.1.2 0.75 x Ø minimum.).
- Minimum suggested tunnel length 2 x Ø.

NOTE: Ensure there is sufficient space for the Thruster assembly complete with motor and controls in the boat.

Fig. 1.1.2



- TT Thruster can be fitted new or as a replacement for an existing thruster (see Fig 1.1.3).

NOTE: Check mounting holes on the saw template.

Fig. 1.1.3

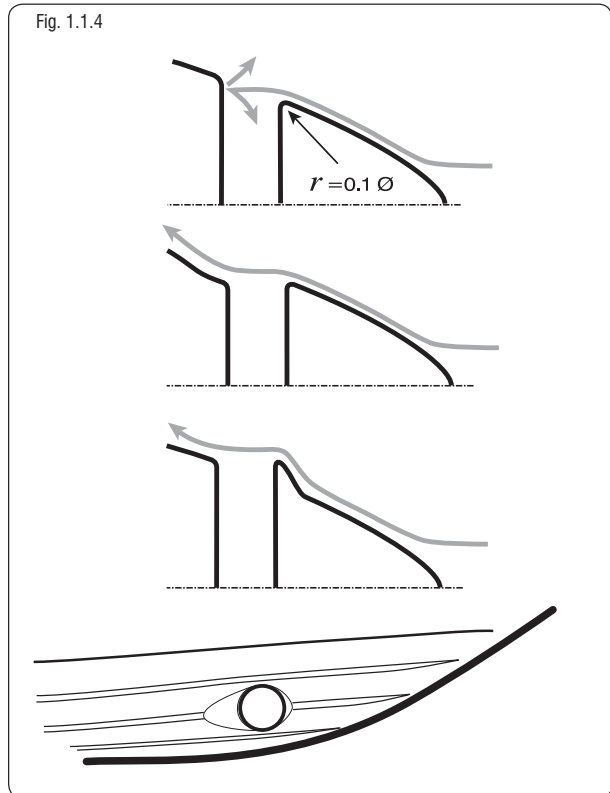
Thruster Model (kW)	Thruster I.D. mm (inch)	Wall mm (inch)
140	140 (5 1/2)	4.0 (5/32) - 5.0 (3/16)
185 (3.0 & 4.0)	185 (7 9/32)	4.0 (5/32) - 6.0 (1/4)
185 (5.0 & 6.0)	185 (7 9/32)	6.0 (1/4)
250	250 (9 27/32)	7.5 (9/32)
300	300 (11 13/16)	9.0 (11/32)

⚠ A competent, marine engineer must carry out any work on the hull of your boat.

⊘ The boat MUST be out of the water, levelled and secure in its cradle.

- The recommended tunnel is designed to fit a Lewmar saddle, take the weight of the Thruster and the torque of the motor.
- Fig 1.1.4 - To reduce any potential loss of performance or damage to the propeller the entrance of the tunnel can be altered to improve thrust as well as reduce noise.

Fig. 1.1.4



1.2 Preparing the hole for the tube

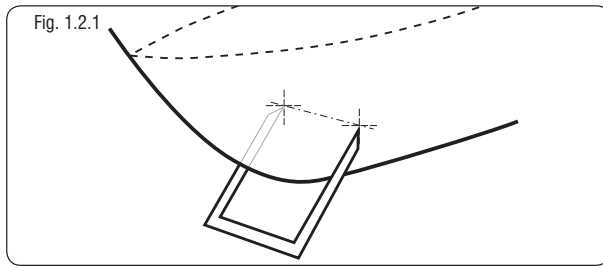
⚠ This section is for general guidance for GRP boats only. Problems caused by faulty installation of the tunnel are the installers full responsibility. A competent, marine engineer must carry out any work on the hull of your boat.

When you are satisfied the best location for the Thruster unit has been found within the parameters available proceed as follows.

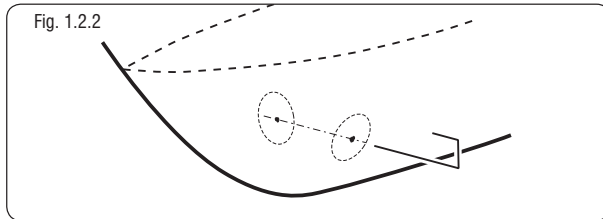
- Fig 1.2.1 - Make a jig to precisely align the drill holes either side of the hull.

NOTE: Double check everything before drilling.

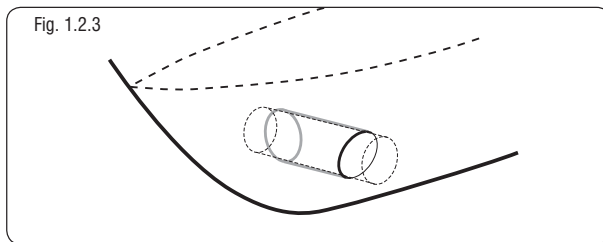
- Drill a pilot hole in both sides of the hull.



- Drill a pilot hole in both sides of the hull.



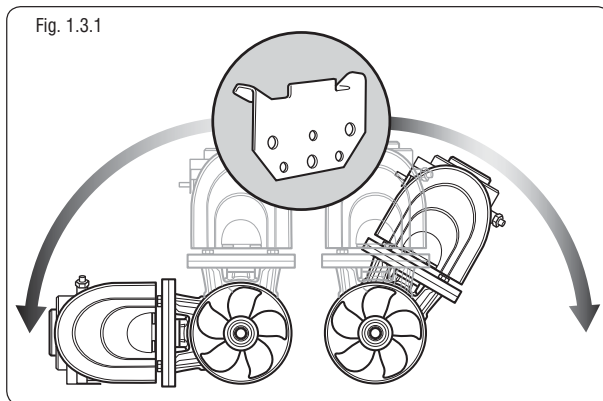
- Form a wire guide to diameter of the tunnel hole, mark, check and cut.
- Insert tube in the hole, mark and remove excess.



- Grind off gel coat etc. Insert tunnel and fix allowing enough room inside for saddle location on the tunnel.
Gel coat finished installation and antifoul.

1.3 Preparing for fitting the thruster

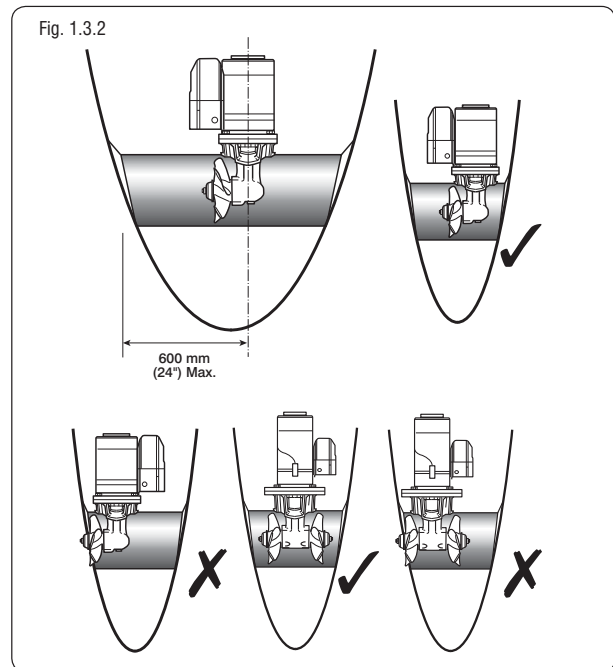
- The Thruster can be installed at any angle within 90° from vertical.



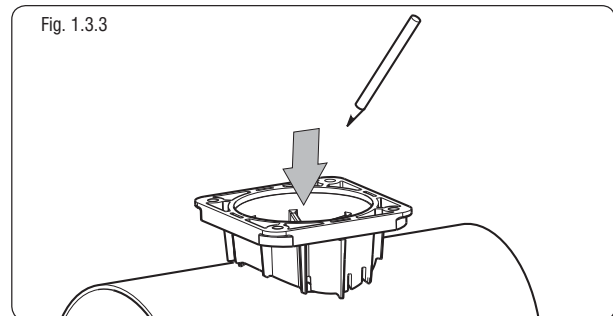
⚠ Electric motors must be supported if installed more than 30° from vertical (Fig 1.8.1).

- Choose position of thruster, ensuring internal room for motor and controls and that the propeller is easily reached from outside.

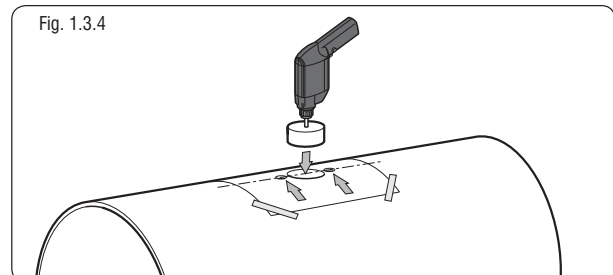
NOTE: Fig 1.3.2. - Normal install is to Port (single propeller unit)



- Place the thruster saddle in the desired position, ensure the fit is firm and free from movement then mark centre.
- To aid installation a kit is available. See Sec 6.6 Accessories.



- Position template on centre line, double check everything and drill. Remove all burrs. All the holes must be on the centre line. Poor alignment may affect hub positioning.

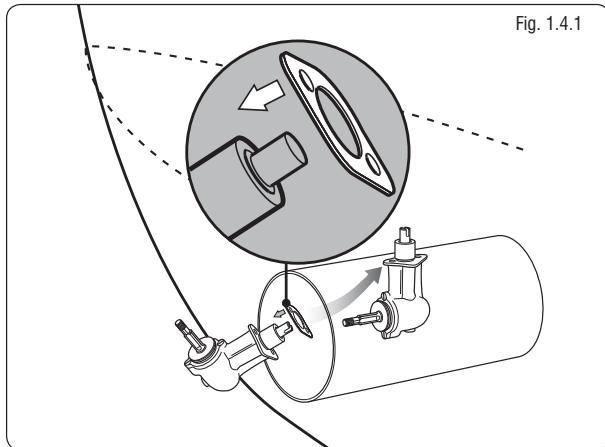


1.4 Installing hub unit and saddle models 140TT & 185TT

NOTE: Illustrations based on 140TT saddle.

- To suit the wiring configuration supplied fit the thruster propeller on the port side.
- Place gasket on hub and locate through centre hole. Sealant can be applied to gasket and flange to aid sealing.

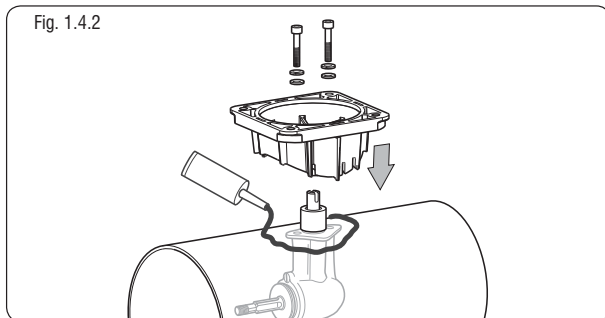
NOTE: To achieve the correct position of the propeller in the tunnel the gasket must be in place.



NOTE: Poor exterior tunnel surface could cause leakage and noise. Apply sealant to this area as required (Fig. 1.4.2).

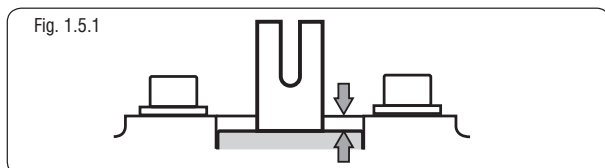
- Apply zinc chromate paste or marine grease to location bore and assemble saddle onto hub (SikaFlex® or similar maybe used to seal saddle in place). Apply Blue Loctite® 243 to bolts and hand tighten along with supplied washers (Fig. 1.4.2).

NOTE: Tighten to full torque within 10 minutes.



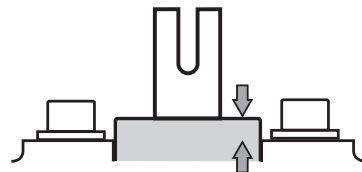
1.5 Gearbox position - 185TT only

- On installation check the position of the gearbox (leg) brass stem in the saddle.



- If it is below 2 mm ($1/16$ "), material must be removed from the tunnel (Fig 1.5.1).

Fig. 1.5.2

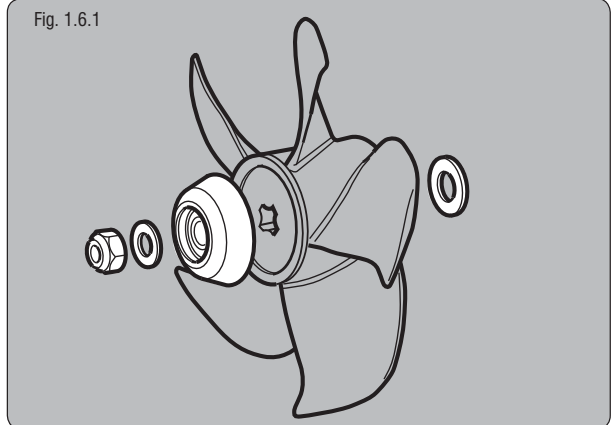


- If it is above 3.5 mm ($1/8$ "), the tunnel should be packed under the saddle (Fig 1.5.2).

1.6 Propeller assembly - all models

- Check the hub gasket is in place.
- Fig 1.6.1 - Assemble anode kit and propeller in this order: large washer, propeller, anode, small washer and nyloc nut onto propeller shaft.

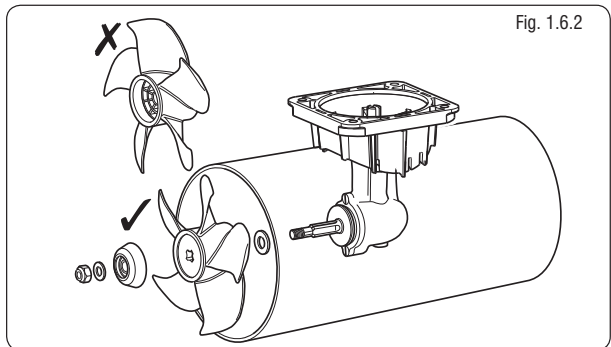
Fig. 1.6.1



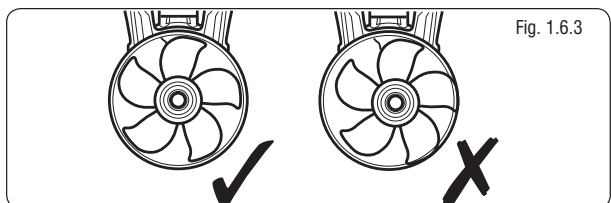
⚠ Check the propeller has been assembled in the correct order.

NOTE: Tighten each bolt alternately a number of times to full torque.

- Fig 1.6.2 - Tighten hub/saddle bolts to 9 Nm (6.6 lbs.ft) for 140 or 21 Nm (15.5 lbs.ft) for 185. Check that propeller is centred and free turning (within 10 minutes of applying Blue Loctite® 243).



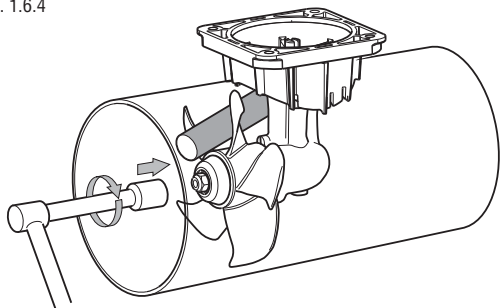
⚠ DO NOT allow propeller to touch tunnel.



⚠ DO NOT antifoul zinc anode.

- Antifoul bronze hub and propeller if desired.

Fig. 1.6.4



- Tighten propeller nut to 10 Nm (7.4 lbs.ft) for 140 or 15 Nm (11 lbs.ft) for 185, a length of wood placed between propeller blade and tunnel will stop movement.

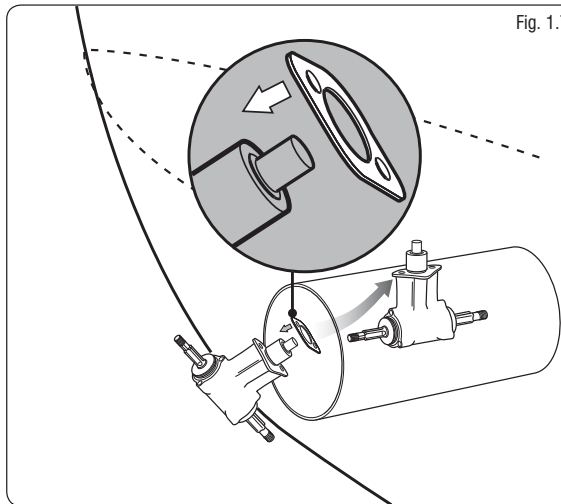
⚠ DO NOT overtighten propeller nuts.

1.7 Installing hub unit and saddle models 250TT & 300TT

- Place gasket on hub and locate through centre hole. Sealant can be applied to gasket and flange to aid sealing.

NOTE: To achieve the correct position of the propeller in the tunnel the gasket must be in place.

Fig. 1.7.1



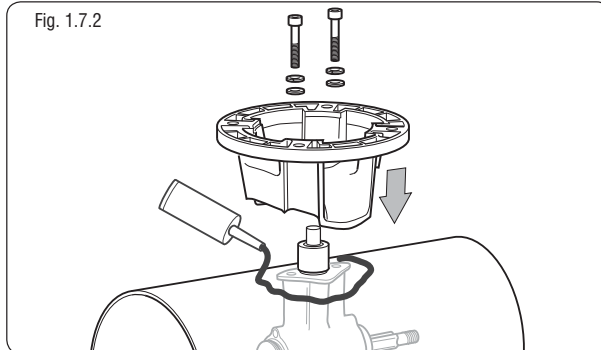
- **NOTE:** Poor exterior tunnel surface could cause leakage and noise. Apply sealant to this area as required (Fig 1.7.2).
- Apply zinc chromate paste or marine grease to location bore and assemble saddle onto hub (SikaFlex® or similar maybe used to seal saddle in place). Apply Blue Loctite® 243 to bolts and hand tighten along with supplied washers (Fig 1.7.2).

NOTE: Tighten to full torque within 10 minutes.

NOTE: Tighten each bolt alternately a number of times to full torque.

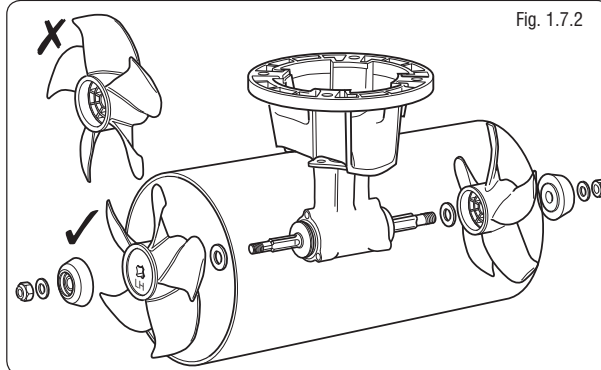
- Tighten hub/saddle bolts to 33 Nm (24 lbs.ft) for 250 or 82 Nm (60.5 lbs.ft) for 300. Check that propeller is centred and free turning (within 10 minutes of applying Blue Loctite® 243).

Fig. 1.7.2



- Assemble anode kit and propeller in this order:- large washer, propeller, anode, small washer and nyloc nut onto propeller shaft. To suit the wiring configuration supplied fit the thruster LH propeller on the port side.

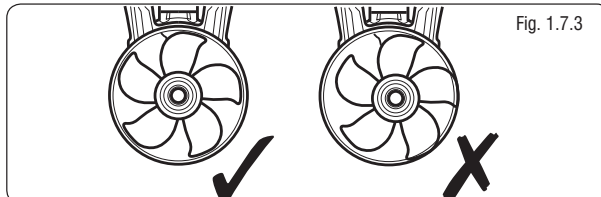
Fig. 1.7.2



⚠ Check the propeller has been assembled correctly (Fig 1.6.1).

⚠ DO NOT allow propeller to touch tunnel.

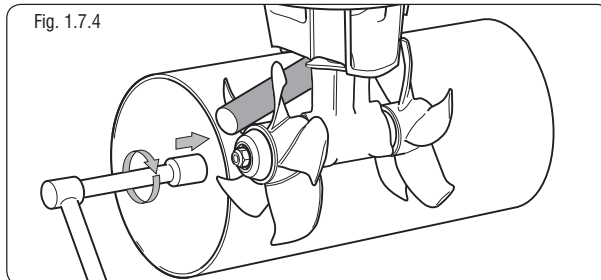
Fig. 1.7.3



⚠ DO NOT antifoul zinc anode.

- Antifoul bronze hub and propeller if desired.

Fig. 1.7.4



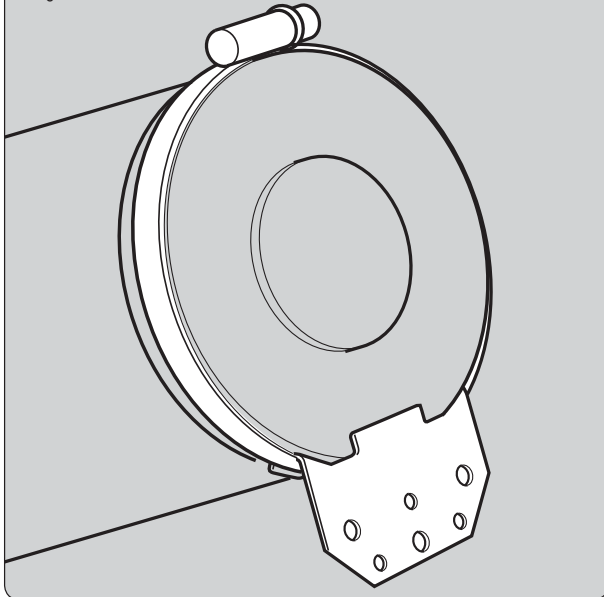
- Tighten propeller nut to 35 Nm (26 lbs.ft), a length of wood placed between propeller blade and tunnel will stop movement.

⚠ DO NOT overtighten propeller nuts.

1.8 Electric motor unit support

- If the electric motor is installed more than 30° from the vertical it **MUST** be supported and secured to the support with a strap (not supplied) around the main motor unit.

Fig. 1.8.1

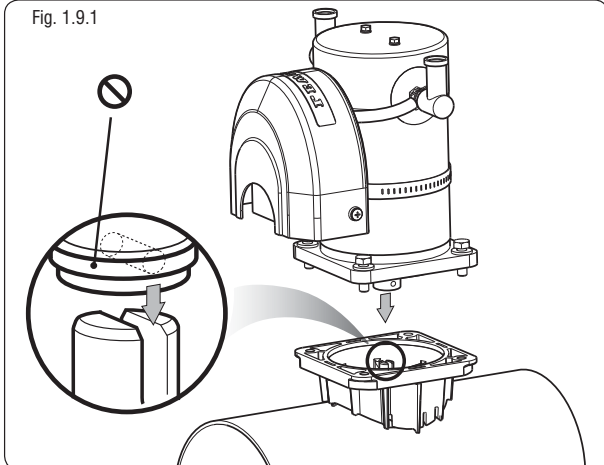


1.9 Installing electric motor unit model 140TT & 185TT

- **NOTE: Illustrations based on 140TT saddle.**
- Align motor drive pin inline with slot in shaft. Apply grease to hub shaft.

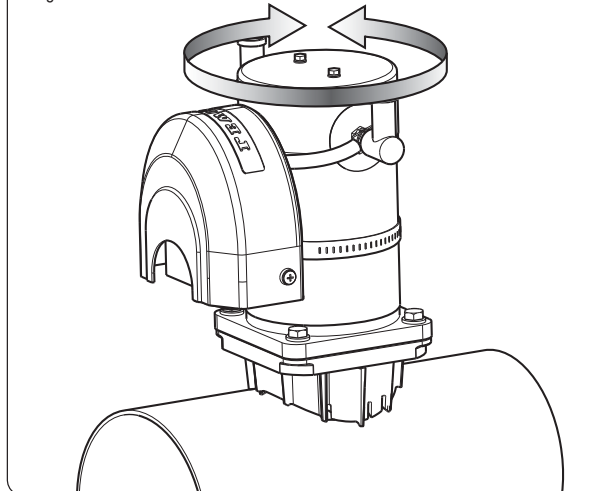
⊘ **DO NOT REMOVE** the drive pin plastic retainer tie on the motor drive shaft.

Fig. 1.9.1



- Slide motor into position and align holes for most suitable installation.
- Bolt motor assembly to saddle and tighten bolts to 20 Nm (15 lbs.ft) for 140 or 35 Nm (25.8 lbs.ft) for 185. Apply Blue Loctite® 243 to all bolts.

Fig. 1.9.2

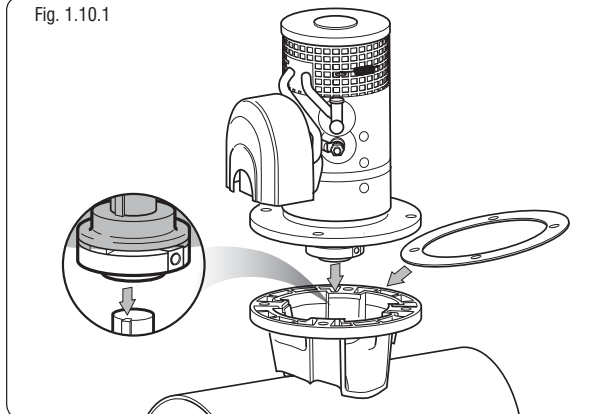


1.10 Installing electric motor unit model 250TT & 300TT

⊘ **Coupling is factory fitted. DO NOT remove.**

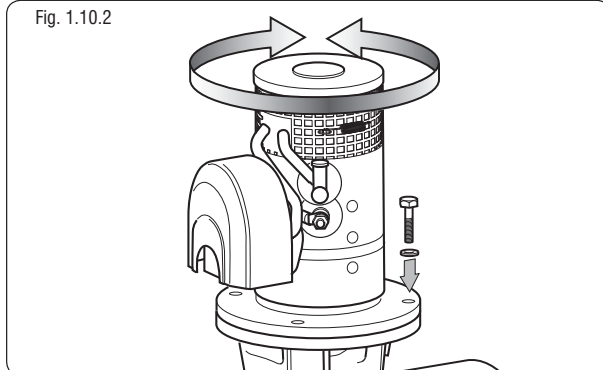
- Place insulator in between saddle and motor flange. Line up key to coupling keyway.

Fig. 1.10.1



- Remove drive shaft key retaining tie, grease shaft, slide motor into position and align holes for most suitable installation and bolt motor assembly to saddle applying Blue Loctite® 243 to bolts.

Fig. 1.10.2

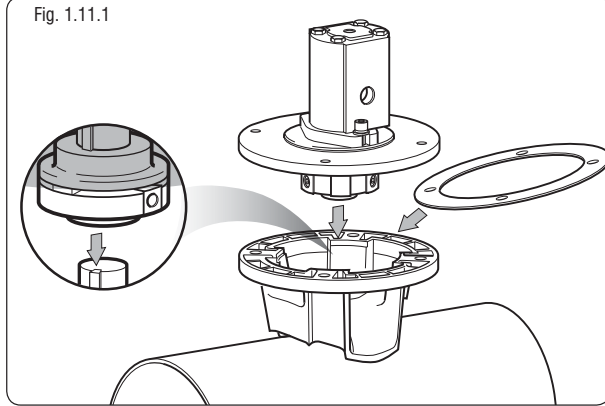


1.11 Installing hydraulic motor unit model 185TTH to 300TTH

⊘ Coupling is factory fitted. DO NOT remove.

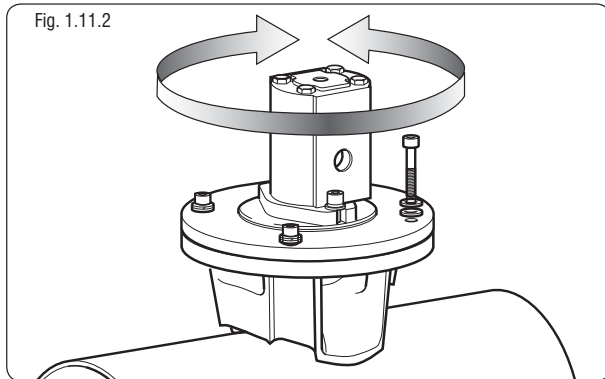
- Place insulator in between saddle and motor flange. Line up key to coupling keyway.

Fig. 1.11.1



- Remove drive shaft key retaining tie, grease shaft, slide motor into position and align holes for most suitable installation and bolt motor assembly to saddle and tighten.

Fig. 1.11.2



- Motor ports require male/female connectors with correct size hydraulic sealing washers.

185TT Main ports = $\frac{3}{8}$ " BSPP.

Main ports = $\frac{3}{4}$ " BSPP.

Drain ports = $\frac{1}{4}$ " BSPP.

NOTE: It is advisable to fit insulated pipe sections to prevent thruster corrosion.

Fig. 1.11.3

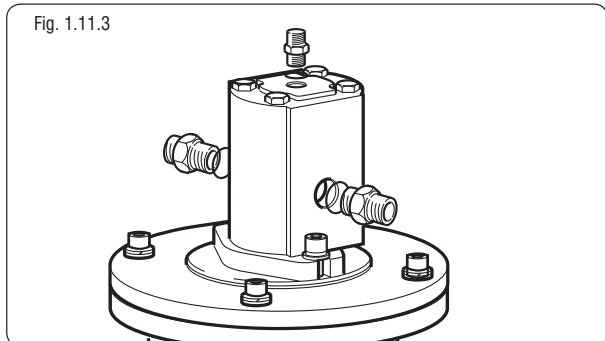


Fig. 1.11.4

Model	Part No.	Max. Output	Motor Disp.	DELTA	Flow	Max. Thrust
185TTH	591820	7 kW	6 cc/rev	210 bar	26 l/min	100 kgf
250TTH	592520	15 kW	26 cc/rev	122 bar	81.5 l/min	200 kgf
250TTH	592521	15 kW	17 cc/rev	190 bar	52.3 l/min	200 kgf
300TTH	593020	22.5 kW	30 cc/rev	182 bar	82.1 l/min	300 kgf
300TTH	593021	22.5 kW	26 cc/rev	210 bar	71.7 l/min	300 kgf

1.12 Final checks - All models

Check list hydraulic

- Check drain line fitted.
- All fittings are tight with seals in place.
- Hydraulic system has been checked and adjusted to correct pressures and flows.

Operation of Hydraulic unit

- Refer to system suppliers instructions.

Check list mechanical

- Check all bolts and nuts are tight.
- Check the propeller/s are correctly installed and the nuts tightened.
- Check the motor control box cover is in place.
- Check the propeller/s can be turned - before working on unit check battery switch is off or remove the fuse.

NOTE: Saddle and motor are firmly seated on the tube.

2. Electrical wiring installation

2.1 Typical electrical layout model 140TT 2.0 kW only

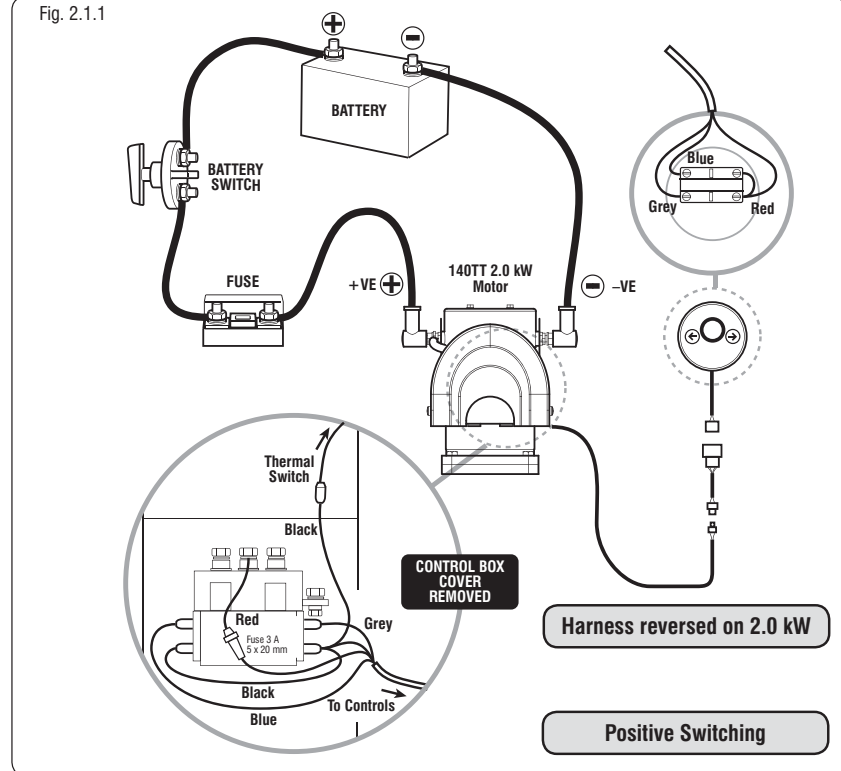
- If the thruster operates in an opposite direction to the control panel, swap the grey and blue wire connections on the contactor coils.

NOTE: Automatic battery switch can not be used with this product.

⚠ To satisfy International standards, a suitably sized battery switch should be fitted to the thruster +VE supply. Lewmar recommend this as best practice for safe installations.

Loom Wiring	
Red	+VE
Blue	Thrust port switch
Grey	Thrust starboard switch
Black	Not Used

Fig. 2.1.1



2.2 Typical electrical layout models 140TT 2.2 kW and 185TT

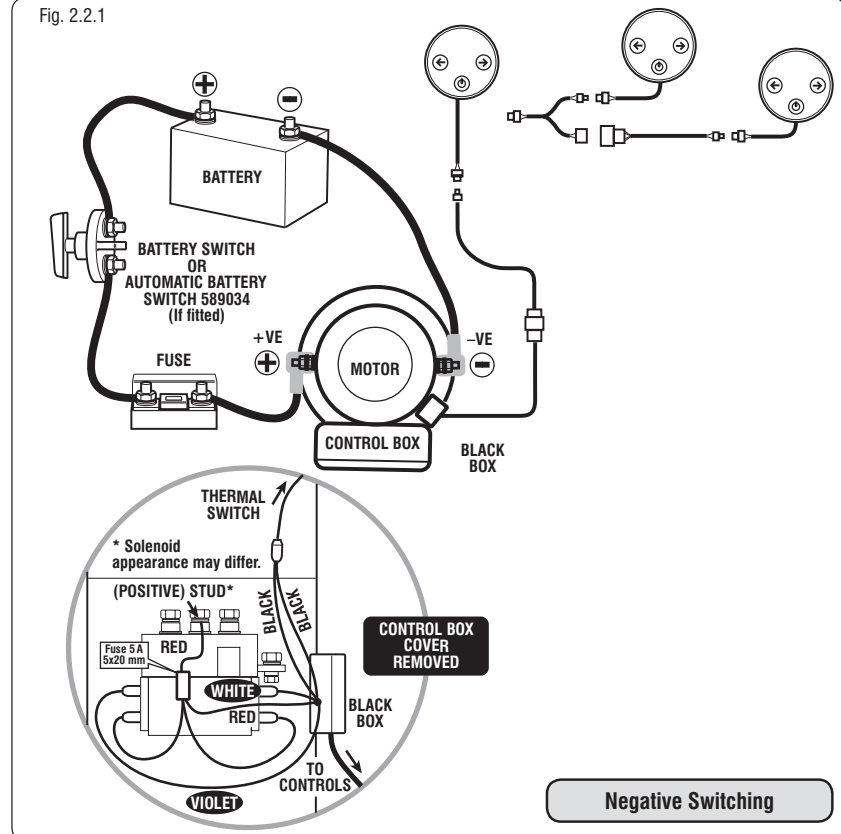
- If the thruster operates in an opposite direction to the control panel, swap the white and violet wire connections on the contactor coils.

NOTE: Automatic switch (if fitted). Main power is switched on when panel is switched on.

⚠ It is vital that the positive battery lead is connected to the positive motor terminal or damage to the electronics will occur.

Loom Wiring	
Red	+VE
Blue	Thrust port switch
Grey	Thrust starboard switch
Black	-VE

Fig. 2.2.1



2.3 Typical electrical layout models 250TT & 300TT

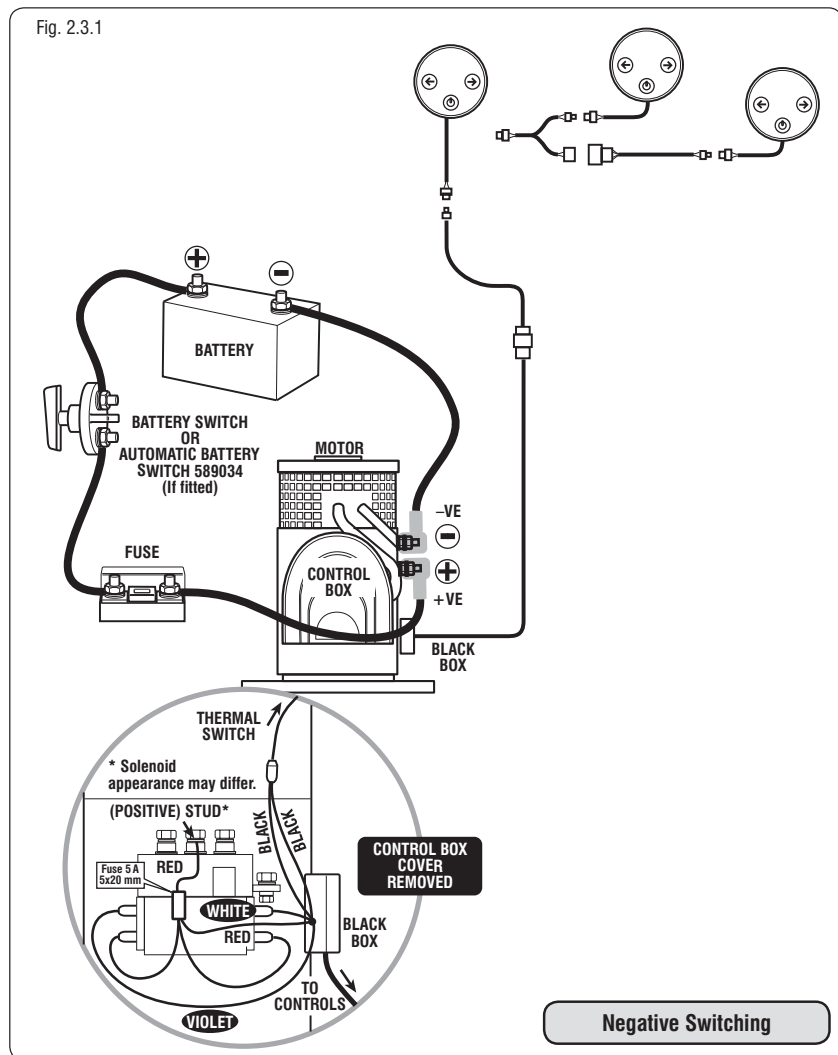
- If the thruster operates in an opposite direction to the control panel, swap the white and violet wire connections on the contactor coils.

NOTE: Automatic switch (if fitted). Main power is switched on when panel is switched on.

⚠ It is vital that the positive battery lead is connected to the positive motor terminal or damage to the electronics will occur.

Loom Wiring	
Red	+VE
Blue	Thrust port switch
Grey	Thrust starboard switch
Black	-VE

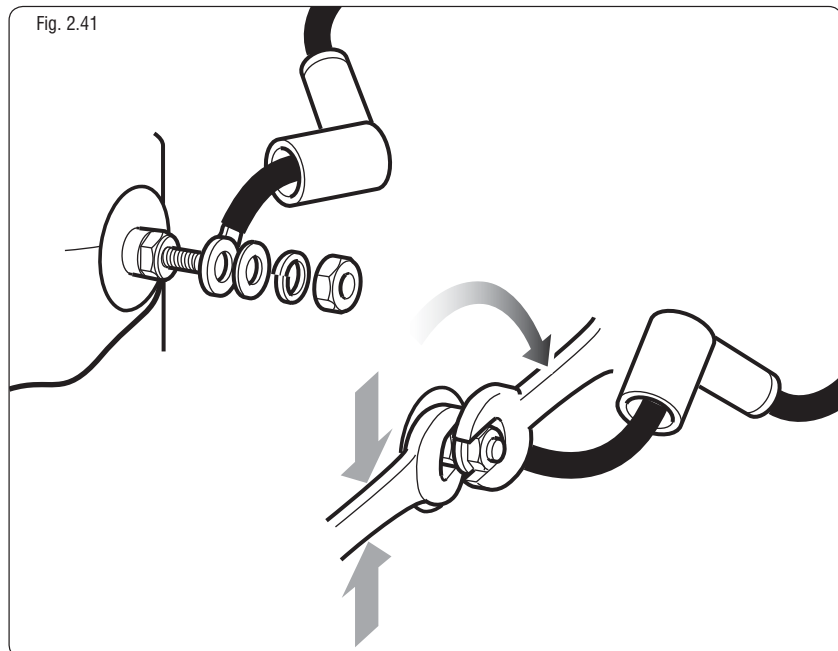
NOTE: For dual thruster controls see stern thruster manual included in sternkit or on www.lewmar.com



2.4 Electric motor terminal connections

- Terminals must be correctly clamped to motor studs. Use a pair of spanners - the one nearest motor to stop rotation of the stud.
- Spanner sizes are 13 mm for 140TT and 17 mm for 185TT - 300TT. Tighten the bolts to 20 Nm (15 lbs.ft).

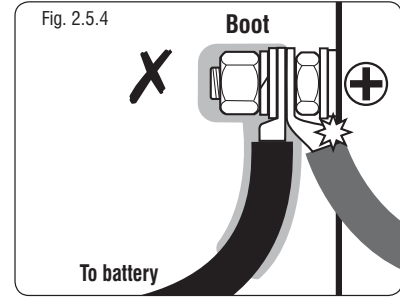
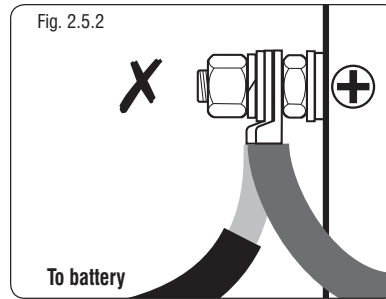
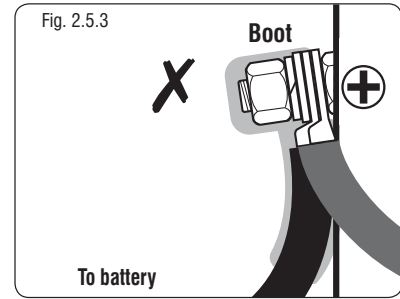
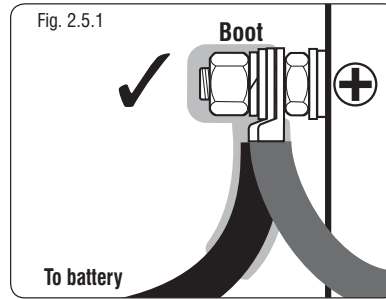
⚠ **DO NOT** overtighten electric motor terminal nuts.



2.5 Battery cable connections

⚠ Incorrect installation of battery cables or damage to connection studs may result in a short to the thruster body. Use the examples above to check for a correct installation on both +V and -V battery connections.

- Correct installation. Supplied cable boots are used and no bare wires exposed (Fig 2.6.1).
- Live wire exposed! (Fig. 2.6.2). Correct the cable installation to match (Fig 2.6.1).
- Terminal or motor is damaged. Contact Lewmar Limited (Fig 2.6.3).
- Crimp inverted and is touching motor! (Fig 2.6.4). Correct the cable installation to match as (Fig 2.6.1).



2.6 Correct cable sizes

NOTE: Cable length is total from battery to thruster and back.

- Example: Measure the total cable run from the battery to thruster and back in metres. Grey area on the table shows a total of 28 m (92 ft) of cable with a model 250 8.0 kW thruster would need 95 mm CSA (000 AWG) cable.
- Battery crank capacity should be at least equal to the thruster current.
- Main power cables should be run from the batteries and must have an inline fuse fitted.

⚠ The installation **MUST** have a battery switch that is switched off whilst the thruster is not in use or the boat is unoccupied.

- The cables should be terminated with a ring terminal corresponding to the motor studs, 8 mm ($\frac{5}{16}$ " for 140TT and 10 mm ($\frac{3}{8}$ " for 185TT, 250TT and 300TT. It is important that this termination is secure so that the high current is transferred to the motor efficiently. The minimum voltage at motor when running should be 10 V for 12 V and 21 V for 24 V units.
- Ensure the insulating boots, supplied with the unit, are correctly fitted.

NOTE: If very large cables are used discard supplied boots and fit appropriate sized ones.

CABLE CSA mm - Cable length in metres									
TT Model	Current (A)	25	35	50	70	95	120	150	175
140 2.0 kW-12 V	270	6	10	16	22	-	-	-	-
140 2.2 kW-12 V	280	6	10	15	21	-	-	-	-
185 3.0 kW-12 V	330	6	8	10	15	21	-	-	-
185 3.0 kW-24 V	160	18	22	-	-	-	-	-	-
185 4.0 kW-12 V	470	4	6	8	12	16	21	26	30
185 4.0 kW-24 V	235	12	16	25	33	-	-	-	-
185 5.0 kW-12 V	480	4	6	8	12	16	20	25	29
185 5.0 kW-24 V	240	12	16	24	32	-	-	-	-
185 6.0 kW-12 V	700	-	-	6	8	12	15	21	28
185 6.0 kW-24 V	370	9	12	16	24	32	-	-	-
250 8.0 kW-24 V	500	7	10	12	21	28	36	45	-
250 9.6 kW-48 V	330	-	26	37	50	64	-	-	-
300 10.8 kW-24 V	650	4	6	9	12	16	21	25	30
300 15.0 kW-48 V	420	-	24	35	48	62	-	-	-

CABLE AWG - Cable length in feet									
TT Model	Current (A)	3	2	1	0	00	000	0000	2x0000
140 2.0 kW-12 V	270	20	31	42	53	64	-	-	-
140 2.2 kW-12 V	280	20	30	40	50	60	-	-	-
185 3.0 kW-12 V	330	19	24	30	37	49	62	-	-
185 3.0 kW-24 V	160	63	80	-	-	-	-	-	-
185 4.0 kW-12 V	470	14	18	23	30	38	48	60	-
185 4.0 kW-24 V	235	42	50	68	80	100	-	-	-
185 5.0 kW-12 V	480	14	18	23	29	37	47	59	-
185 5.0 kW-24 V	240	42	50	68	80	100	-	-	-
185 6.0 kW-12 V	700	-	13	16	21	28	35	50	100
185 6.0 kW-24 V	370	-	37	45	60	74	97	-	-
250 8.0 kW-24 V	500	-	32	41	52	66	84	105	-
250 9.6 kW-48 V	330	-	80	98	118	154	-	-	-
300 10.0 kW-24 V	650	-	19	24	31	39	49	65	130
300 15.0 kW-48 V	420	-	74	92	112	148	-	-	-

2.7 Electrolytic test

- ⊘ To prevent electrolytic corrosion or faults, the thruster motor body and assembly **MUST** remain isolated from any power supply or grounds. The installer can check for this using a multimeter in the following ways.

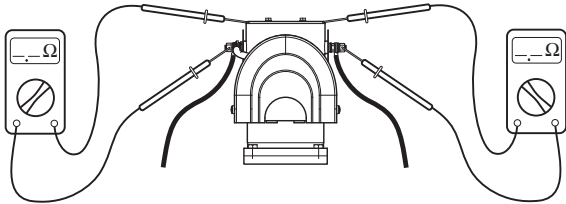
• Test 1. Fig.2.7.1

With the negative not connected and the positive cable connected but with battery switch off or fuse removed. Use a continuity tester to check for a connection between the -VE stud and motor body and also between +VE stud and motor body. In both cases the meter should give no indication of an electrical connection.

If a connection is measured between the +VE stud and the motor body, check installation for cables or wires touching the assembly or for damage to assembly.

If a connection is measured between the -VE stud and the motor body, remove any bonding straps attached to the assembly and check as before.

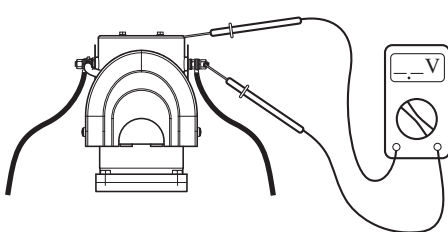
Fig. 2.7.1



• Test 2. Fig 2.7.2

With the battery applied: Use a voltmeter to test the voltage between the -VE motor stud and the thruster motor body. If the supply voltage (12 V/24 V) is measured, disconnect power immediately and inspect the assembly for faulty installation or damage.

Fig. 2.7.2



2.8 Installing control panel - all models

- A 63.5 mm (2 1/2") hole saw is required. Ensure there is sufficient depth for the control panel and access for the switch leads and plug (see saw template).

Fig. 2.8.1

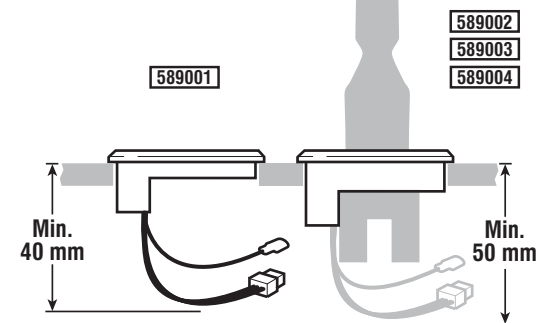
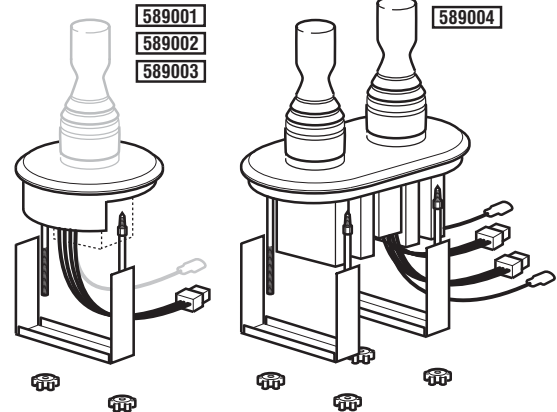
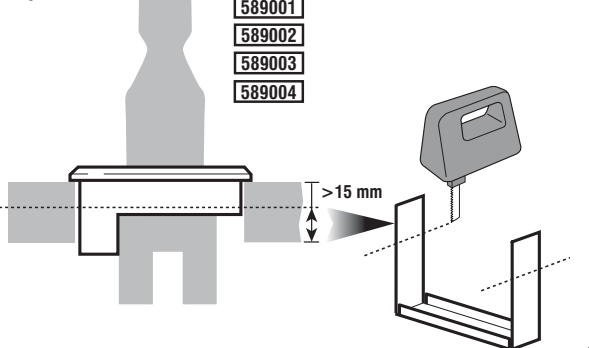


Fig. 2.8.2

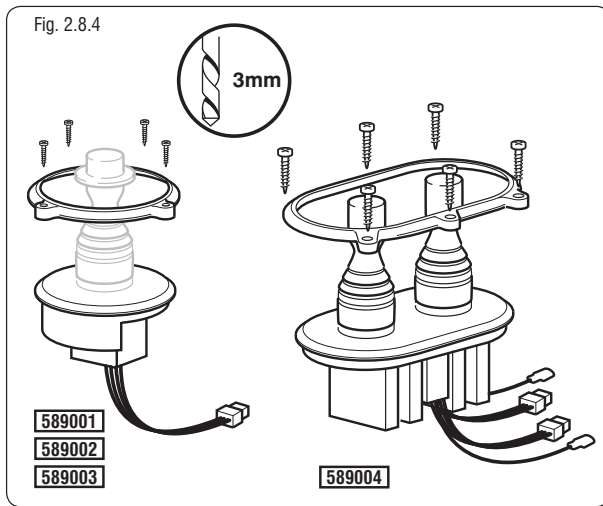


- The panel has an integral seal and can be clamped from the rear or with the bezel from the top. Trim clamp depending on panel thickness.

Fig. 2.8.3



- The small plug connects at the panel. If two or more panels are installed use the optional Y connectors (Sec 6.6).
- The auxiliary wire is used to connect an automatic battery switch. Please refer to the units instructions. If automatic battery switch not fitted, disregard auxiliary wire.



2.9 Final checks

Check list electrical

⊘ Check the power is OFF.

- Check motor connections are tight with rubber boots in place.
- The correct fuse is in place.
- Check all switch wires are connected to correct motor terminal.

Now the cables can be connected to the battery.

- Perform electrical check , Section 2.8.

Operation of electrical unit

⚠ The thruster must not be operated unless it is in water.

- Ensure batteries are fully charged before switching on the main power.
- When first operating the thruster, make sure you are not close to other vessels.

3. Operating your thruster

3.1 140TT 2.0 kW

The thruster can be operated using the Lewmar locking joystick (Part No. 589003) or any water proof momentary two direction switch with a 5 amp rating.

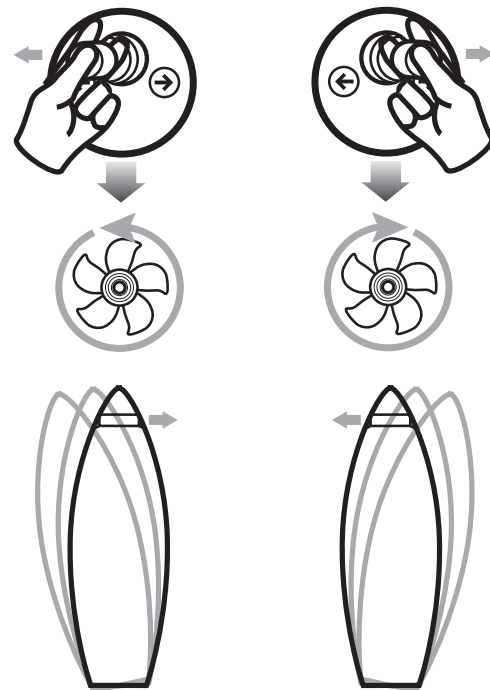
- Switch ON the battery switch.
- Lift the 'top hat' and move the joystick in the desired direction. When the boat movement has been achieved return the joystick to the central position (spring return).

⊘ DO NOT frequently move port to starboard on the joystick in quick succession as this could damage the electric motor.

⚠ Please ensure that you thoroughly understand the operation and safety requirements of the thruster.

⚠ Your thruster should not be operated close to swimmers, as a powerful suction of water is generated when in use.

Fig. 3.1.1



3.2 140TT 2.2 kW to 300TT 15.0 kW operation and safety features

Safety Features

- Lewmar control panel 589001 and 589002.

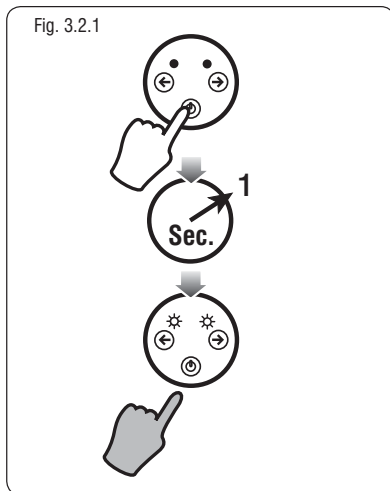
NOTE: If Thruster is operated constantly for 3 minutes it will power down. Panels will deactivate.

NOTE: Dual Thruster panel has same functions as single.

NOTE: The system is designed to automatically power down after no operation for 20 minutes.

- To activate the control panel press  and hold for 1 second (Fig 3.2.1).

Fig. 3.2.1

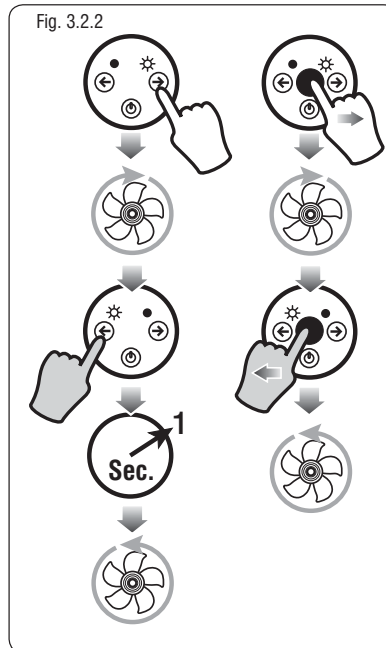


- Changing direction.**

Press the button or move the joystick for the direction you wish to thrust. Press the opposite button or move the joystick to change direction (Fig 3.2.2). After 1 second thruster activates.

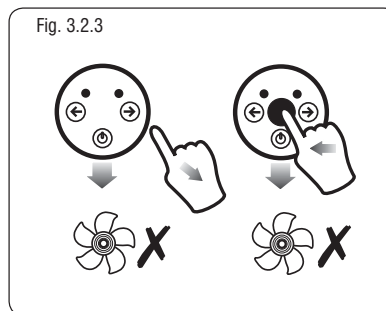
NOTE: If thermal cut-out is activated all power to the controls is disabled. Wait for unit to cool down.

Fig. 3.2.2



- To cancel either thruster direction stop pressing button or return joystick to central position (Fig 3.2.3).

Fig. 3.2.3

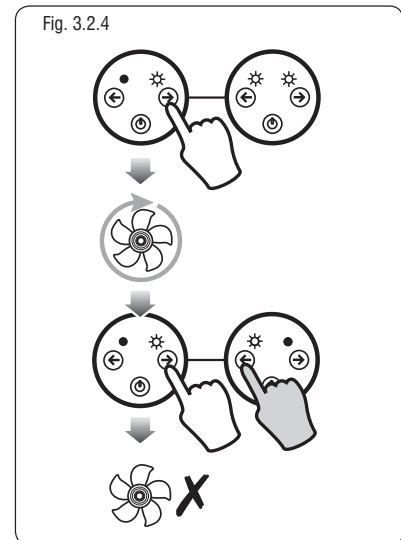


 **DO NOT** press both buttons at the same time.

- Additional controller**

Pressing opposite button on a second control panel when thruster is operating will cancel operation of thruster (Fig 3.2.4).

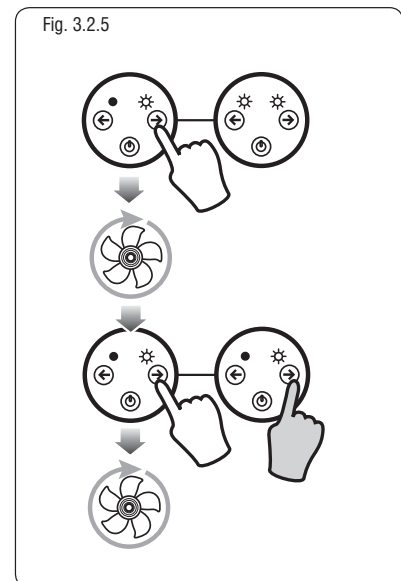
Fig. 3.2.4



- Additional controller**

Operating same direction button when still in operation on other control panel will have no effect (Fig 3.2.5).

Fig. 3.2.5



4. Servicing your thruster

4.1 Service schedule

NOTE: Thrusters are more likely to attract 'debris', so it is necessary to regularly check the tunnel.

⚠ Before working on unit check battery switch is off or remove the fuse.

New install:

- The anode should be checked after approximately 3 - 4 months to gauge an appropriate replacement schedule. .

At the annual boat service:

- Remove any debris from tunnel, propeller and hub.
- Replace the anode.
- If the propeller is damaged or heavily contaminated, replace it, best to be safe.
- Apply grease to exposed thruster seal and shaft.
- If hub is removed the tunnel gasket must be replaced.
- Inspect motor, ensure all leads are still tight.
- Check all bolts and nuts are to correct torque.
- Check the motor assembly is dry and that the compartment is water tight.
- Check and clean out thruster compartment.

Electric:

- Inspect electric motor, ensure all leads are still tight.
- Brush out carbon dust from top of electric motor especially on aluminium boats. Recommend qualified electrician.

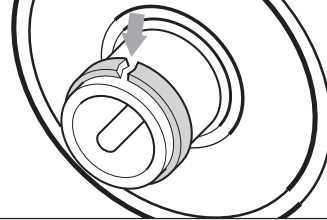
Hydraulic:

NOTE: Refer to hydraulic system supplier for service requirements.

4.2 Changing drive pin 140TT or 185TT

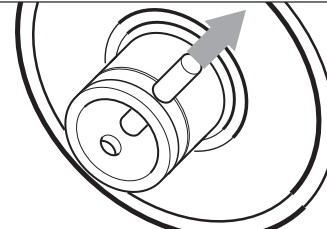
- Cut cable tie on shaft - (If Fitted)

Fig. 4.2.1



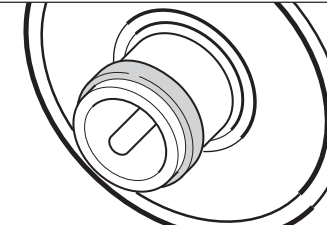
- Punch out pin parts.

Fig. 4.2.2



- Tap in new pin and secure with new plastic cable tie.

Fig. 4.2.3



5. Weight & specifications

5.1 Electric

Part Number	Model	Voltage V	Power		Gearbox Mtl	Tunnel (mm)	Propeller	Thrust		Weight	
			kW	hp				kgf	lbs	kg	lbs
591402	140TT 2.0	12	2.0	2.7	Bronze	140	Single 5 Blade	37	81	13	29
591401	140TT 2.2	12	2.2	3.0	Bronze	140	Single 5 Blade	42	92	13	29
591801	185TT 3.0	12	3.0	4.0	Bronze	185	Single 5 Blade	58	128	20	43
591802	185TT 3.0	24	3.0	4.0	Bronze	185	Single 5 Blade	58	128	20	43
591807	185TT 4.0	12	4.0	5.4	Bronze	185	Single 5 Blade	65	143	20	43
591808	185TT 4.0	24	4.0	5.4	Bronze	185	Single 5 Blade	65	143	20	43
591803	185TT 5.0	12	5.0	6.7	Bronze	185	Single 5 Blade	82	180	27	59
591804	185TT 5.0	24	5.0	6.7	Bronze	185	Single 5 Blade	82	180	27	59
591805	185TT 6.0	12	6.0	8.0	Bronze	185	Single 5 Blade	97	213	27	59
591806	185TT 6.0	24	6.0	8.0	Bronze	185	Single 5 Blade	97	213	27	59
591833	185TT 5.0	12 IP	5.0	6.7	Bronze	185	Single 5 Blade	82	180	27	59
591834	185TT 5.0	24 IP	5.0	6.7	Bronze	185	Single 5 Blade	82	180	27	59
591836	185TT 6.0	24 IP	6.0	8.0	Bronze	185	Single 5 Blade	97	213	27	59
592501	250TT 8.0	24	8.0	10.8	Bronze	250	Twin CR 5 Blade	140	308	46	102
592502	250TT 9.6	48	9.6	13.0	Bronze	250	Twin CR 5 Blade	170	374	50	110
592503	250TT 8.0	24	8.0	10.8	Aluminium	250	Twin CR 5 Blade	140	308	46	102
593001	300TT 10.8	24	10.8	14.5	Bronze	300	Twin CR 5 Blade	250	550	65	143
593002	300TT 15.0	48	15.0	20.0	Bronze	300	Twin CR 5 Blade	280	616	68	150
593003	300TT 10.8	24	10.8	14.5	Aluminium	300	Twin CR 5 Blade	250	550	65	143

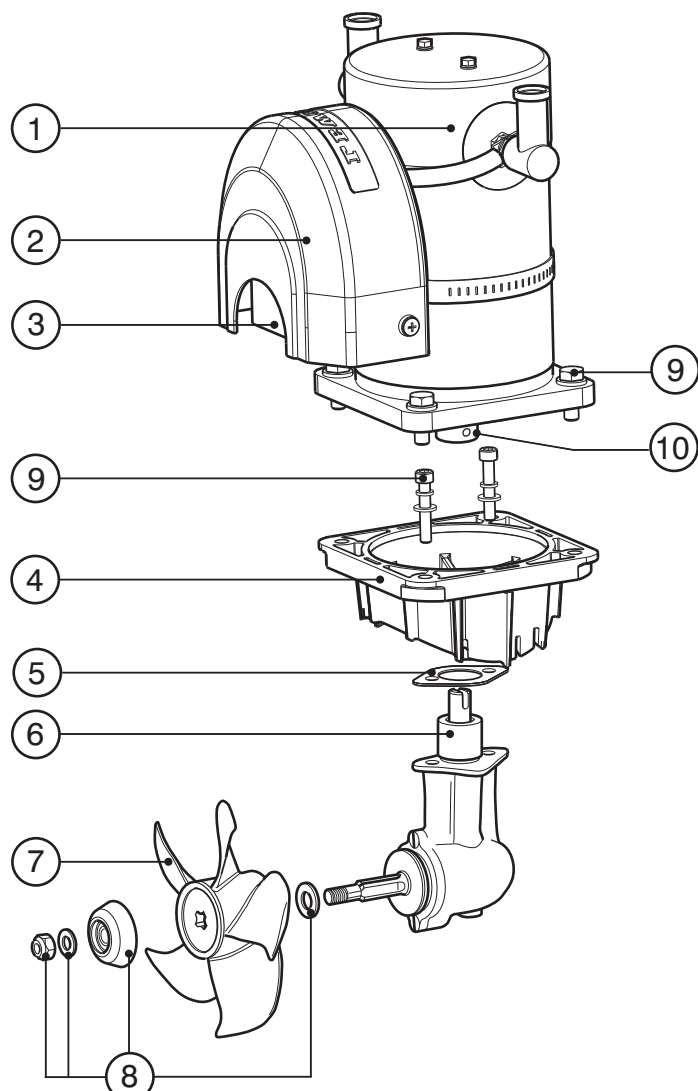
Part Number	Model	Voltage V	Fuse (A)	Fuse Part Number	Fuse Holder	
					Std - 589006	T2 - 589013
591402	140TT 2.0	12	200	589012	●	●
591401	140TT 2.2	12	200	589012	●	●
591801	185TT 3.0	12	250	589008	●	●
591802	185TT 3.0	24	130	589007	●	●
591807	185TT 4.0	12	400	589010		●
591808	185TT 4.0	24	130	589007	●	●
591803	185TT 5.0	12	400	589010		●
591804	185TT 5.0	24	130	589007	●	●
591805	185TT 6.0	12	500	589011		●
591806	185TT 6.0	24	325	589009	●	●
591833	185TT 5.0	12 IP	400	589010		●
591834	185TT 5.0	24 IP	130	589007	●	●
591836	185TT 6.0	24 IP	325	589009	●	●
592501	250TT 8.0	24	400	589010		●
592502	250TT 9.6	48	250	589008	●	●
592503	250TT 8.0	24	400	589010		●
593001	300TT 10.8	24	500	589011		●
593002	300TT 15.0	48	400	589010		●
593003	300TT 10.8	24	400	589010		●

5.2 Hydraulic

Model	kW	hp	Tunnel (mm)	Propeller/s	Thrust		Weight	
					kgf	lbs	kg	lbs
185TTH	7	10	185	Single 5 Blade	100	220	8	17.5
250TTH	15	20	250	Twin CR 5 Blade	200	240	13	28.5
300TTH	22.5	30	300	Twin CR 5 Blade	300	660	17	37.5

6. Parts list

GB

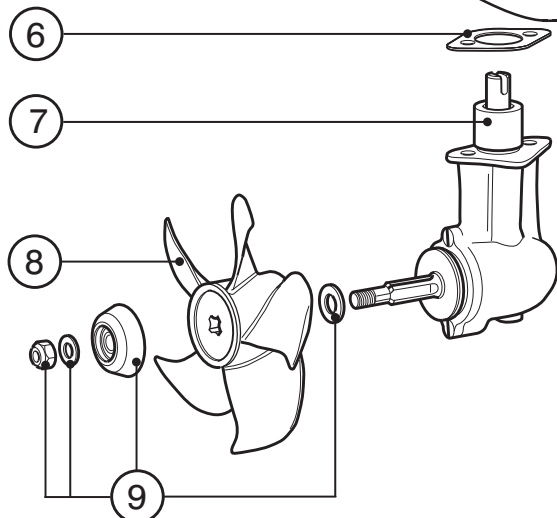
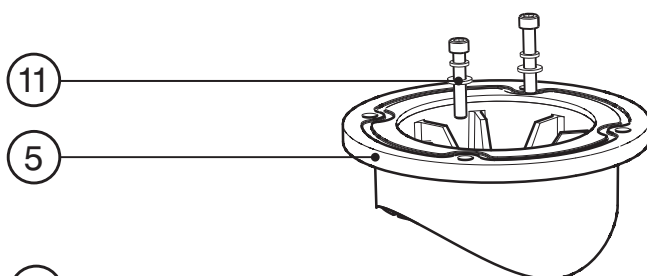
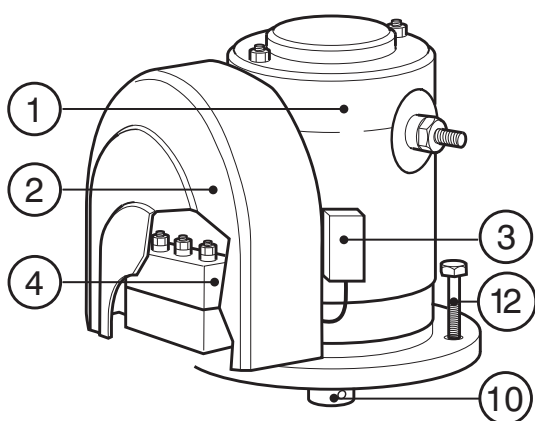


6.1 Model 140TT 2.0 kW 12 V

Item	Part No.	Description
1	581027	Motor Assembly
2	553034	Cover
3	B11126	Solenoid
	559039	Solenoid Loom
4	551052	Mounting Saddle
5	551035	Tunnel gasket
6	581001	Hub assembly
7	589151	Propeller
8	589150	Propeller anode kit
9	589152	Installation fixing kit
10	559018	Drive pin

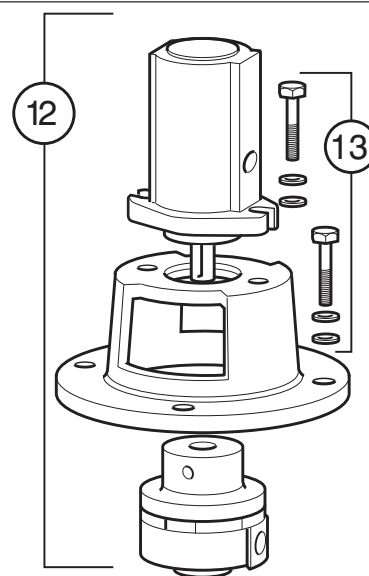
6.2 Model 140TT 2.2 kW 12 V

Item	Part No.	Description
1	581026	Motor Assembly
2	553034	Cover
3	B11126	Solenoid
	559003	Black Box
4	551052	Mounting Saddle
5	551035	Tunnel Gasket
6	581001	Hub Assembly
7	589151	Propeller
8	589150	Propeller Anode Kit
9	589152	Installation Fixings Kit
10	559018	Drive pin

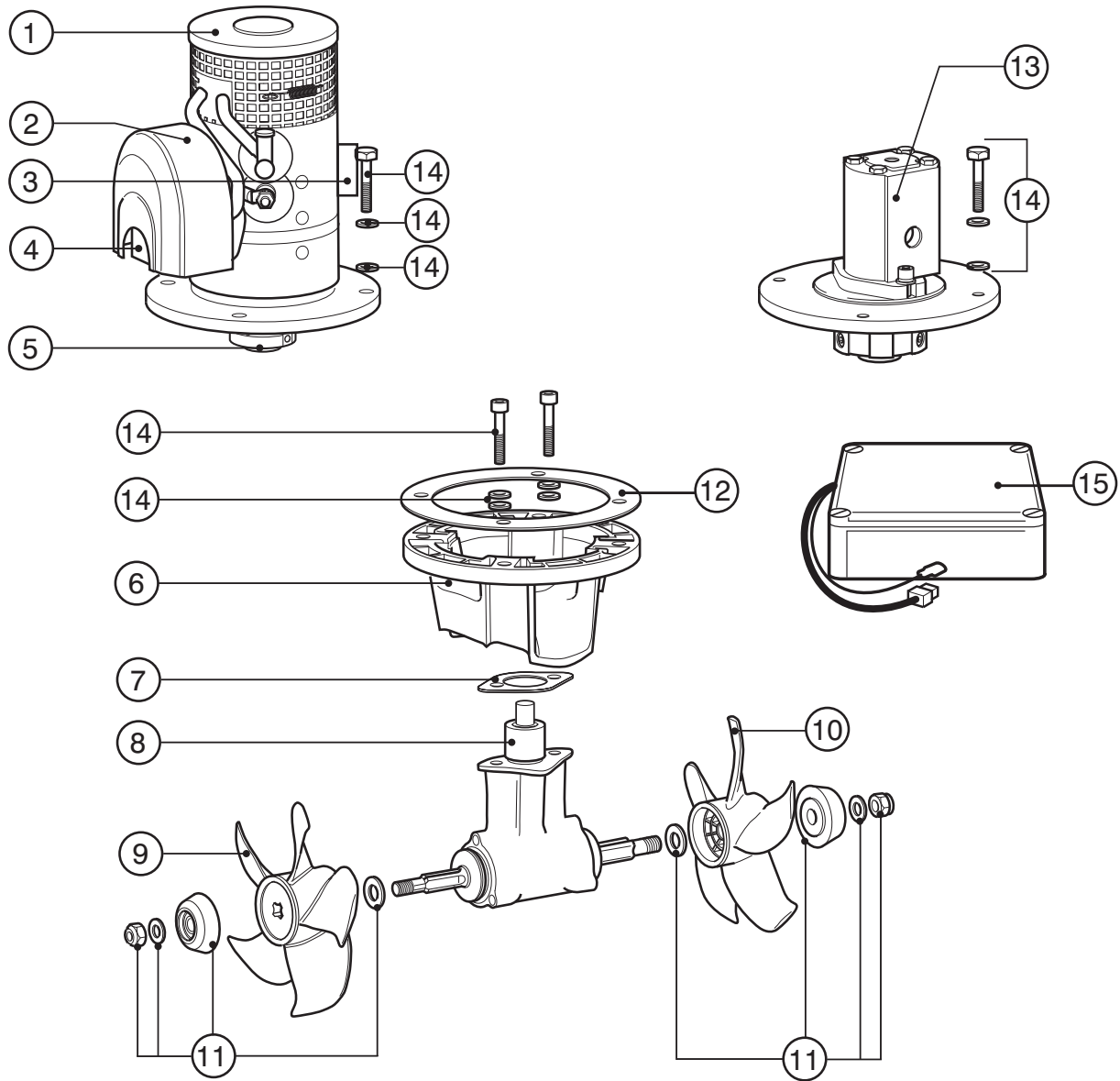


6.3 Model 185TT/H 3.0 to 6.0 kW 12 & 24 V

Item	Part No.	Description	kW	Volts
1	583026	Motor Assembly	3.0	12
	583027	Motor Assembly	3.0	24
	583032	Motor Assembly	4.0	12
	583033	Motor Assembly	4.0	24
	583028	Motor Assembly	5.0	12
	583029	Motor Assembly	5.0	24
	583030	Motor Assembly	6.0	12
	583031	Motor Assembly	6.0	24



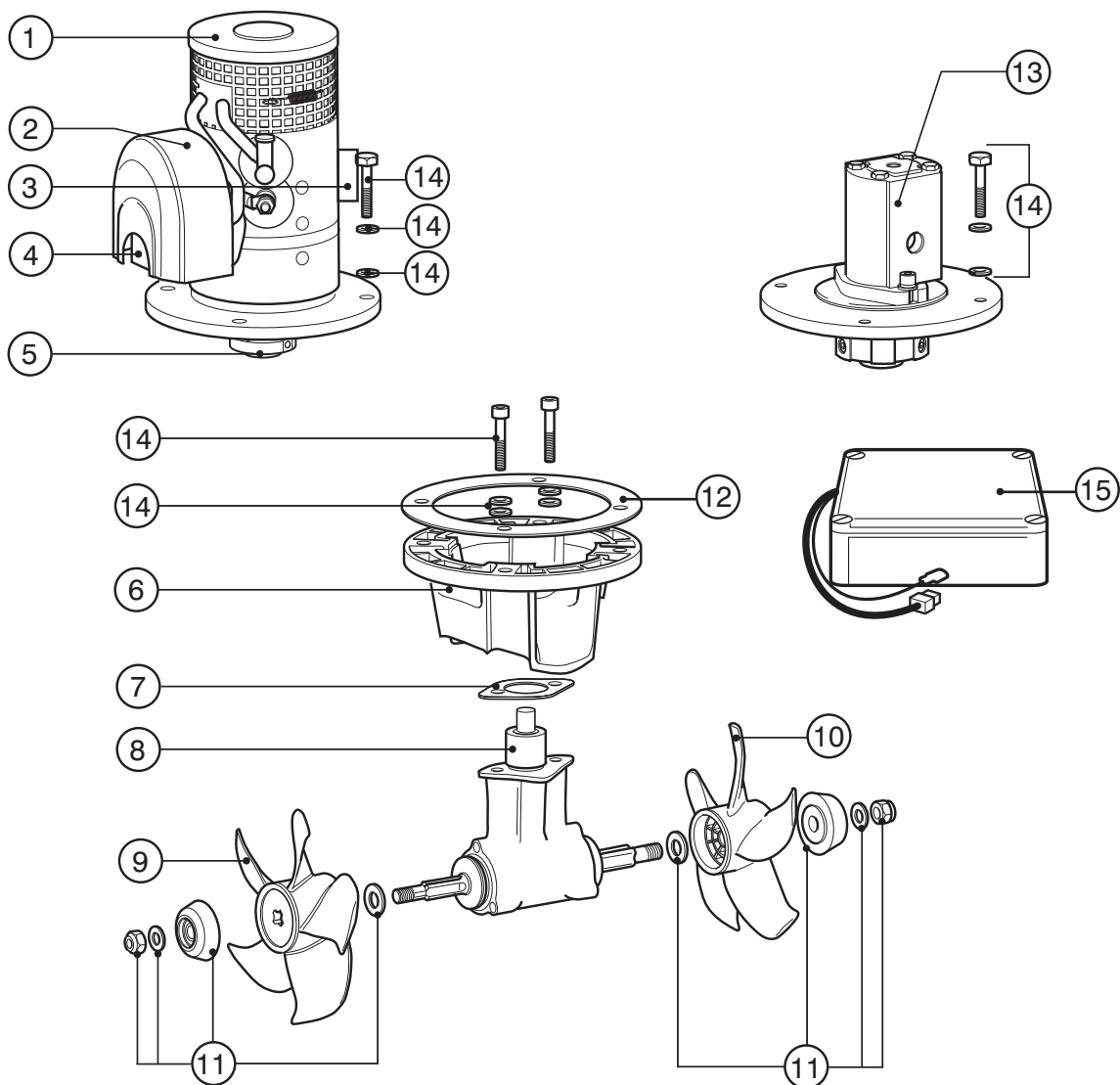
Item	Part No.	Description	kW	Volts
2	553034	Cover	3.0	12-24
	553036	Cover	4.0/5.0	12-24
	555034	Cover	6.0	12
3	559003	Black Box	All	All
	559020	Black Box	6.0	12
4	B11126	Solenoid	3.0	12
	B11127	Solenoid	3.0	24
	B11128	Solenoid	4.0/5.0	12
	B11129	Solenoid	4.0/5.0/6.0	24
	B11130	Solenoid	6.0	12
5	553071	Mounting Saddle	All	All
6	553035	Tunnel Gasket	All	All
7	583001	Hub - 2.2 Ratio	3.0	12-24
	583003	Hub - 1.5 Ratio	4.0-6.0	12-24
8	589351	Propeller	All	All
9	589350	Anode Kit	All	All
10	559017	Drive pin	All	All
11	589352	Installation Fixings Kit	3.0	12.24
	589355	Installation Fixings Kit	4.0-6.0	12-24
Hydraulic Only				
12	583040	Hydraulic Motor Assembly	5.0 cc/rev	
	583041	Hydraulic Motor Assembly	6.0 cc/rev	
13	589352	Installation Fixings Kit	All	All



6.4 Model 250TT/H 8.0 kW 24 V

Item	Part No.	Description
1	585026	Motor Assembly 8.0 kW 24 V
	585029	Motor Assembly 9.6 kW 48 V
2	553036	Cover
3	559003	Black Box
4	B11129	Solenoid
5	585014	Coupling
6	555025	Mounting Saddle
7	555035	Tunnel Gasket
8	585002	Hub
9	589551	Right Hand Propeller

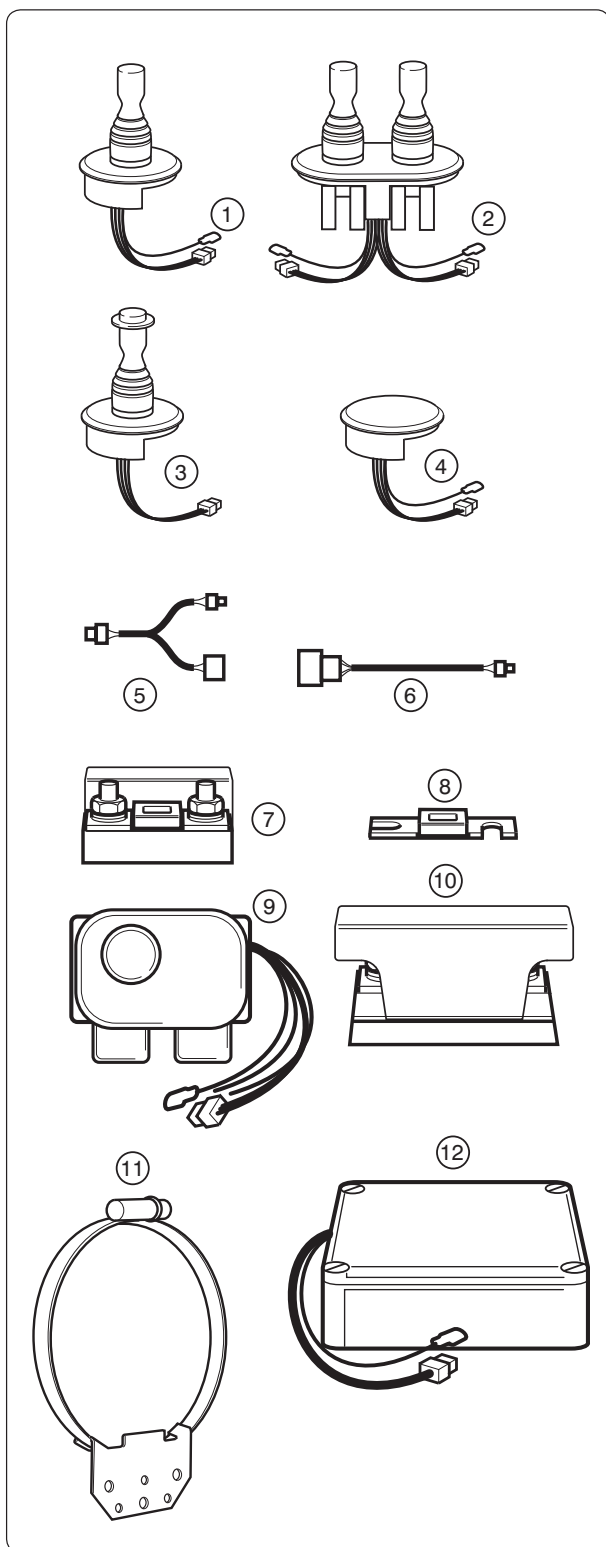
Item	Part No.	Description
10	589552	Left Hand Propeller
11	589550	Anode Kit
12	555038	Plastic Washer
14	589554	Installation Fixings Kit
15	589029	Parallel Switch Box 12/24 V (24 V ONLY)
	589030	Parallel Switch Box 24/48 V (48 V ONLY)
Hydraulic Only		
13	585040	Hydraulic Motor Assy. 26 cc/rev
	585041	Hydraulic Motor Assy. 16.8 cc/rev



6.5 Model 300TT/H 10.8 to 15.0 kW

Item	Part No.	Description	kW	Volts
1	587026	Motor Assembly	10.8	24
	587027	Motor Assembly	15.0	48
2	555034	Cover	All	All
3	559020	Black Box	All	All
4	B8429	Solenoid	10.8	24
5	585014	Coupling	All	All
6	557025	Mounting Saddle	All	All
7	557035	Tunnel Gasket	All	All
8	587001	Hub	All	All
9	589750	Right Hand Propeller	All	All
10	589751	Left Hand Propeller	All	All

Item	Part No.	Description	kW	Volts
11	589550	Anode Kit	All	All
12	555038	Plastic Washer	All	All
14	589752	Installation Fixing Kit	All	All
15	589031	300TT 10.8 kW ONLY Heavy Duty Parallel Switch Box 12/24 V	10.8	12-24
	589030	300TT 15.0 kW ONLY Heavy Duty Parallel Switch Box 24/48 V	15.0	24-48
Hydraulic Only				
13	587040	Hydraulic Motor Assembly	30.0 cc/rev	
	587041	Hydraulic Motor Assembly	26.0 cc/rev	
14	589752	Installation Fixings Kit	All	

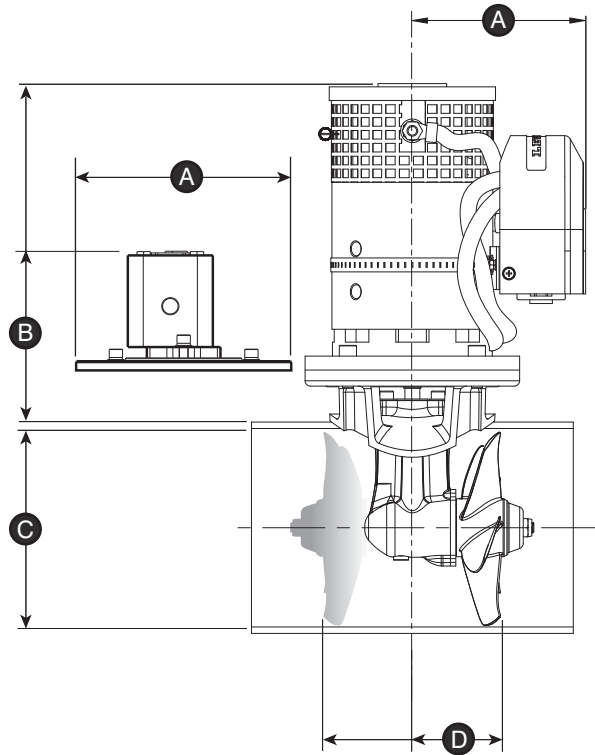


6.6 Accessories

Item	Part No.	Description
1	589002	Single Joystick Panel Controller (NOT 2.0 kW)
2	589004	Double Joystick Controller (NOT 2.0 kW)
3	589003	Locking Single Joystick Controller
4	589001	Touch Panel Controller (NOT 2.0 kW)
5	589025	Y Connector for Dual Controls
6	589016	7 m Control Cable & Connectors
	589017	10 m Control Cable & Connectors
	589018	14 m Control Cable & Connectors
	589019	18 m Control Cable & Connectors
	589020	22 m Control Cable & Connectors
7	589006	Fuse Holder
8	589007	130 A ANL Type Fuse
	589008	250 A ANL Type Fuse
	589009	325 A ANL Type Fuse
	589010	400 A ANL Type Fuse
	589011	500 A ANL Type Fuse
	589012	200 A ANL Type Fuse
9	589034	Automatic Battery Switch (NOT 140TT 2.0 kW)
10	589013	T2 Fuse Holder
11	589064	Motor Support Bracket Kit 185TT
	589065	Motor Support Bracket Kit 300TT
	589066	Motor Support Bracket Kit 250TT
12	589030	Parallel Switch Box 24 - 48 V
	589029	Parallel Switch Box 12 - 24 V
	589031	300TT Only Heavy Duty Parallel Switch Box 12 - 24 V

7. Dimensions

Fig. 7.1.1



7.1 Electric

Model	Voltage	Power	A		B		C		D	
			mm	in	mm	in	mm	in	mm	in
140TT 2.0	12 V	2.0 kW (2.7 hp)	123	4 ⁵ / ₆	235	9 ¹ / ₄	140	5 ¹ / ₂	73	2 ⁷ / ₈
140TT 2.2	12 V	2.2 kW (3.0 hp)	123	4 ⁵ / ₆	211	8 ⁵ / ₁₆	140	5 ¹ / ₂	73	2 ⁷ / ₈
185TT 3.0	12 V	3.0 kW (4.0 hp)	130	5 ¹ / ₈	271	10 ²¹ / ₃₂	185	7 ⁹ / ₃₂	85	3 ¹¹ / ₃₂
185TT 3.0	24 V	3.0 kW (4.0 hp)	130	5 ¹ / ₈	271	10 ²¹ / ₃₂	185	7 ⁹ / ₃₂	85	3 ¹¹ / ₃₂
185TT 4.0	12 V	4.0 kW (5.4 hp)	148	5 ¹³ / ₁₆	294	11 ⁹ / ₁₆	185	7 ⁹ / ₃₂	85	3 ¹¹ / ₃₂
185TT 4.0	24 V	4.0 kW (5.4 hp)	148	5 ¹³ / ₁₆	294	11 ⁹ / ₁₆	185	7 ⁹ / ₃₂	85	3 ¹¹ / ₃₂
185TT 5.0	12 V	5.0 kW (6.7 hp)	162	6 ³ / ₈	316	12 ⁷ / ₁₆	185	7 ⁹ / ₃₂	85	3 ¹¹ / ₃₂
185TT 5.0	24 V	5.0 kW (6.7 hp)	162	6 ³ / ₈	316	12 ⁷ / ₁₆	185	7 ⁹ / ₃₂	85	3 ¹¹ / ₃₂
185TT 6.0	12 V	6.0 kW (8.0 hp)	173	6 ¹³ / ₁₆	316	12 ⁷ / ₁₆	185	7 ⁹ / ₃₂	85	3 ¹¹ / ₃₂
185TT 6.0	24 V	6.0 kW (8.0 hp)	173	6 ¹³ / ₁₆	316	12 ⁷ / ₁₆	185	7 ⁹ / ₃₂	85	3 ¹¹ / ₃₂
250TT 8.0	24 V	8.0 kW (10.8 hp)	165	6 ¹ / ₂	405	15 ¹⁵ / ₁₆	250	9 ²⁷ / ₃₂	238	9 ³ / ₈
250TT 9.6	48 V	9.6 kW (13.0 hp)	165	6 ¹ / ₂	405	15 ¹⁵ / ₁₆	250	9 ²⁷ / ₃₂	238	9 ³ / ₈
300TT 10.8	24 V	10.8 kW (14.5 hp)	203	8	450	17 ²³ / ₃₂	300	11 ¹³ / ₁₆	320	12 ¹⁹ / ₃₂
300TT 15.0	48 V	15.0 kW (20 hp)	203	8	450	17 ²³ / ₃₂	300	11 ¹³ / ₁₆	320	12 ¹⁹ / ₃₂

7.2 Hydraulic

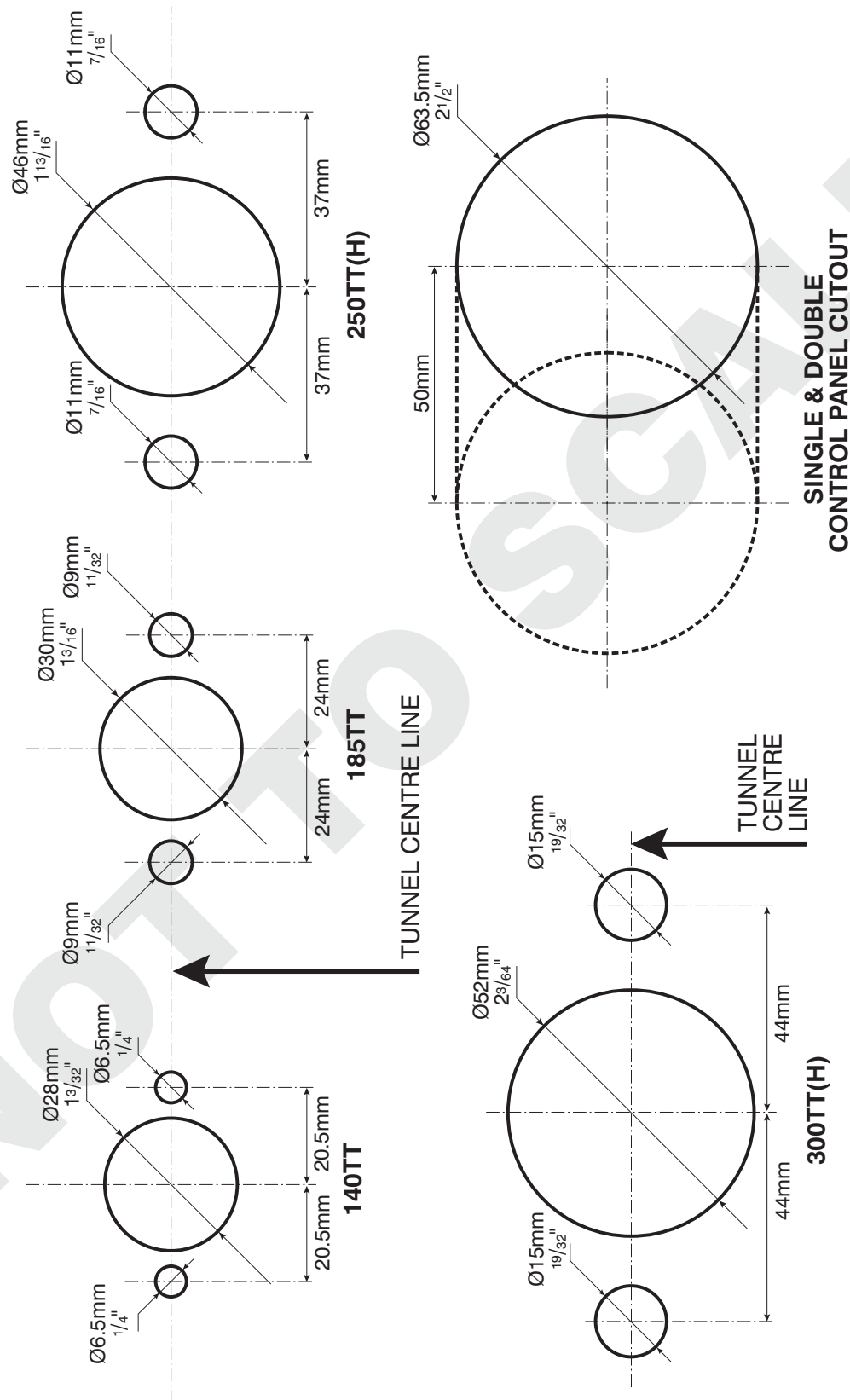
Model	kW	hp	A		B		C		D	
			mm	in	mm	in	mm	in	mm	in
185TTH	7	10	200	7 ⁷ / ₈	202	7 ¹⁵ / ₁₆	185	7 ⁹ / ₃₂	83	3 ⁹ / ₃₂
250TTH	15	20	258	10 ⁵ / ₃₂	234	9 ⁷ / ₃₂	250	9 ²⁷ / ₃₂	238	9 ³ / ₈
300TTH	22.5	30	258	10 ⁵ / ₃₂	256	10 ¹ / ₁₆	300	11 ¹³ / ₁₆	320	12 ¹⁹ / ₃₂

8. Fault finding

Fault Thrust in wrong direction?	Action Change contactor wires on motor solenoid (See section 2.1).
Fault Fuse keeps blowing?	Action - Wrong fuse fitted - check rating and replace. - Propeller restricted or jammed causing excessive load on motor - check and clear. Check that propeller washer is fitted see Section 6.
Fault Control Panel does not illuminate?	Check - Power - Hold  for 1 second. - Battery is connected. - Main switch ON, check fuse. - Control loom connections. - Long operation has tripped thermal switch. Wait 20 minutes for motor to cool and reset. DO NOT attempt to cool motor by any other means.
Fault Control panel illuminates but no thrust?	Action - Are batteries charged? - Check main motor connections are tight.
Fault Poor thrust or thrust in one direction only??	Action - Batteries not large enough or charged, cables not recommended size. Voltage at motor when running should be a minimum 10 V for 12 V and 21 V for 24 V units. - Blockage in tunnel/propeller jammed with debris, switch off main power, inspect and clear. - Propeller washers fitted wrong. See Sec.1.6 - Check motor brush springs are located properly, brushes should have good contact with the commutator.
Fault 140TT and 185TT ONLY - Motor turns but no drive?	Action DO NOT continue to run thruster. - Shear pin broken, remove 4 motor bolts, see Sec. 4.2, drive out old pin and replace with new pin. - Propeller blades broken. Replace with new.
Fault Thruster noisy and vibrating?	Action - Check propeller is not touching the tunnel wall. 140 - 185 models: Check hub height is correct, see section 7.

 If in doubt contact Lewmar.com

9. Cutting templates



10. Lewmar limited warranty

LIMITED WARRANTY and

KEY TERMS OF SUPPLY BY LEWMAR

Lewmar warrants that in normal usage and with proper maintenance its products will conform with their specification for a period of three years from the date of purchase by the end user, subject to the conditions, limitations and exceptions listed below. Any product, which proves to be defective in normal usage during that three-year period, will be repaired or, at Lewmar's option, replaced by Lewmar.

A CONDITIONS AND LIMITATIONS

- i Lewmar's liability shall be limited to the repair or replacement of any parts of the product which are defective in materials or workmanship.
- ii Responsibility for the selection of products appropriate for the use intended by the Buyer shall rest solely with the Buyer and Lewmar accepts no responsibility for any such selection.
- iii Lewmar shall not be liable in any way for Product failure, or any resulting loss or damage which arises from:
 - a use of a product in an application for which it was not designed or intended;
 - b corrosion, ultra violet degradation or wear and tear;
 - c a failure to service or maintain the product in accordance with Lewmar's recommendations;
 - d faulty or deficient installation of the product (unless conducted by Lewmar);
 - e any modification or alteration of the product;
 - f conditions that exceed the product's performance specifications or safe working loads.
- iv Product subject to a warranty claim must be returned to the Lewmar outlet which supplied the product for examination unless otherwise agreed by Lewmar in writing.
- v This warranty does not cover any incidental costs incurred for the investigation, removal, carriage, transport or installation of product.
- vi Service by anyone other than authorised Lewmar representatives shall void this warranty unless it accords with Lewmar guidelines and standards of workmanship.
- vii Lewmar's products are intended for use only in the marine environment. Buyers intending to use them for any other purpose should seek independent professional advice as to their suitability. Lewmar accepts no liability arising from such other use.

B EXCEPTIONS

Cover under this Warranty is limited to a period of one year from the date of purchase by the end user in the case of any of the following products or parts of products:

- Electric motors and associated electrical equipment
- Electronic controls
- Hydraulic pumps, valves and actuators
- Weather seals
- Products used in "Grand Prix" racing applications

C LIABILITY

- i Lewmar's liability under this warranty shall be to the exclusion of all other warranties or liabilities (to the extent permitted by law). In particular (but without limitation):
 - a Lewmar shall not be liable for:
 - Any loss of anticipated turnover or profit or indirect, consequential or economic loss;
 - Damages, costs or expenses payable to any third party;
 - Any damage to yachts or equipment;
 - Death or personal Injury (unless caused by Lewmar's negligence).

Some states and countries do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

- b Lewmar grants no other warranties regarding the fitness for purpose, use, nature or satisfactory quality of the products.
- ii Where applicable law does not permit a statutory or implied warranty to be excluded, then such warranty, if permitted by that state or country's law, shall be limited to a period of one year from the date of purchase by the end user. Some states and countries do not allow limitations on how long an implied warranty lasts, so this limitation may not apply to you.

D PROCEDURE

Notice of a claim for service under this warranty shall be made promptly and in writing by the end user to the Lewmar outlet which supplied the product or to Lewmar at Southmoor Lane, Havant, Hampshire, England PO9 1JJ.

E SEVERANCE CLAUSE

If any clause of this warranty is held by any court or other competent authority to be invalid or unenforceable in whole or in part, the validity of the remaining clauses of this warranty and the remainder of the clause in question shall not be affected.

F OTHER RIGHTS

This warranty gives you specific legal rights, and you may also have other legal rights, which vary, from state to state and country to country.

In the case of European States a Consumer customer (as defined nationally) has legal rights under the applicable national law governing the sale of Consumer Goods; this Warranty does not affect those rights.

G LAW

This warranty shall be governed by and read in accordance with the laws of England or the state or country in which the first end user is domiciled at the time of purchase of the product.

H DISPUTES

Any dispute arising under this warranty may, at the option of the end-user, be referred to alternative dispute resolution under the rules of the British Marine Federation or to the Courts of the State whose law shall govern the warranty or to the Courts of England and Wales.

The British Marine Federation may be contacted at Marine House, Thorpe Lea Road, Egham, England, TW20 8BF



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Lewmar V1-6 & Sport Windlass

65001201 Issue 1

GB

Owner's Installation,
Operation & Basic
Servicing Manual

D

Installations-, Betriebs-
und Wartungshandbuch

F

Manuel d'installation,
de fonctionnement
et d'entretien

E

Manual de Instalación,
Operación y Servicio

I

Guida all'installazione,
all'uso e alla
manutenzione

S

Bruksanvisning för
installation, drift
och service



LEWMAR®

www.lewmar.com

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1. Introduction

Dear Customer,
Thank you for choosing Lewmar.
Lewmar products are world renowned for their quality, technical innovation and proven performance. With a Lewmar product you will be provided with many years of outstanding service.

1.1 Product support

Lewmar products are supported by a worldwide network of distributors and Authorised Service Representatives. If you encounter any difficulties with this product, please contact your national distributor, or your local Lewmar dealer. Details are available at:

www.lewmar.com

1.2 CE Approvals

For CE approval certificates contact Lewmar.

1.3 Important information about this manual

Throughout this manual, you will see safety and product damage warnings. You must follow these warnings carefully to avoid possible injury or damage.

The type of warnings, what they look like, and how they are used in this manual are explained as follows:

⚠ WARNING!
This is a warning against anything which may cause injury to people if the warning is ignored. You are informed about what you must or must not do in order to reduce the risk of injury to yourself and others.

ⓘ SAFETY SYMBOL
When you see the safety symbol it means: "Do not..."; "Do not do this"; or "Do not let this happen".

1. Einleitung

Vielen Dank für die Wahl einer Lewmar Schotwisch. Lewmar Produkte sind weltweit bekannt für ihre Qualität, technische Innovation und bewiesene Leistungsfähigkeit. Mit einer Lewmar Schotwisch steht Ihnen für viele Jahre ein erstklassiger Service zur Verfügung.

1.1 Produktunterstützung

Lewmar Produkte werden durch ein weltweites Netz von Großhändlern und autorisierten Service Stationen betreut. Sollten Probleme mit diesem Produkt auftreten, bitten wir Sie, Ihren nationalen Großhändler oder Ihren lokalen Lewmar Händler anzusprechen. Details unter:

www.lewmar.com

1.2 CE Zulassung

Für ein CE Zertifikat kontaktieren Sie bitte Lewmar

1.3 Wichtige Informationen zu dieser Anleitung

In dieser Anleitung finden Sie Sicherheitshinweise und Informationen, um eine Beschädigung des Produktes zu vermeiden. Sie müssen diesen Anweisungen strikt folgen, um mögliche Verletzungen oder Schäden zu vermeiden.

Wie diese Warnungen beachtet werden müssen und wie sie in diesem Manual erklärt sind, wie folgt:

⚠ Warnung! Dies ist eine Warnung, die bei Nichtbeachten ernsthafte Verletzungen von Personen verursachen kann. Sie werden informiert, was Sie tun sollen oder nicht tun dürfen, um ein mögliches Verletzungsrisiko von Ihnen oder anderen Personen zu minimieren.

ⓘ Sicherheitszeichen Wenn Sie das Sicherheitszeichen sehen, meint dies: "Dies nicht..." "Vermeiden Sie dies" oder "Lassen Sie dies nicht geschehen"

1. Introduction

Cher Client,
Merci d'avoir choisi un guindeau Lewmar. Les produits Lewmar sont reconnus dans le monde entier pour leurs qualités, innovations techniques et leurs performances. Vous êtes assuré de nombreuses années de service exceptionnel.

1.1 Soutien Technique

Les produits Lewmar sont suivis par un réseau mondial de distributeurs et de sociétés de services agréés. Si vous rencontrez des difficultés avec ce produit, veuillez contacter votre distributeur national ou votre agent local.

Détails disponibles sur:

www.lewmar.com

1.2 Agrément CE

Pour obtenir les certificats CE veuillez contacter Lewmar.

1.3 Informations importantes à propos de ce manuel

Dans ce manuel vous allez voir des mises en garde de sécurité et des précautions d'emploi. Vous devez suivre attentivement ces instructions afin d'éviter de possibles accidents ou dommages.

Le type de mise en garde, leur représentation, et leur utilisation dans ce manuel sont expliquées comme suit:

⚠ ATTENTION!
Ceci est un signal d'attention contre toute chose pouvant entraîner un accident. Il vous informe de ce que vous devez, ou ne devez pas, faire pour réduire le risque de blessure pour vous ou pour les autres.

ⓘ Symbole de sécurité
Quand vous voyez le symbole de sécurité cela signifie: "Ne pas..."; "Ne faites pas cela"; ou "Ne pas laisser faire".

1. Introducción

Estimado cliente,
Gracias por escoger Lewmar. Los productos Lewmar están reconocidos mundialmente por su calidad, innovación técnica y rendimiento comprobado. Los productos Lewmar le recompensarán con muchos años de uso excelente.

1.1 Soporte de los productos

Los productos de Lewmar tienen el soporte de una red internacional de distribuidores y servicio técnico autorizado. Si encuentra algún problema con este producto, por favor contactar con su distribuidor nacional, o su distribuidor local de Lewmar. Los datos de contacto están disponibles en:

www.lewmar.com

1.2 Homologaciones CE

Para los certificados de homologación CE contactar con Lewmar.

1.3 Información importante a cerca de este manual

A lo largo de este manual encontrará advertencias a cerca de seguridad y daños del producto. Se deben seguir estas indicaciones cuidadosamente con el fin de evitar posibles lesiones o daños.

A continuación se explicará las diferentes advertencias que se puede encontrar así como la forma en que se expresan y su aplicaciones:

⚠ ADVERTENCIA!
Esta es una advertencia de cualquier cosa que pueda producir lesiones a la gente si se ignora. Se informa de lo que debe o no debe hacer para reducir el riesgo de lesiones a usted o otros.

ⓘ SIMBOLO DE SEGURIDAD
Cuando vea el símbolo de seguridad significa: "No hacer..."; "No haga esto"; o "No permita que esto ocurra".

1. Introduzione

Gentile Cliente,
grazie per aver scelto Lewmar. I prodotti Lewmar sono rinomati per la loro qualità, la tecnologia e le prestazioni elevate. Con un prodotto Lewmar si è sicuri di anni di affidabile funzionamento.

1.1 Assistenza

Tutti i prodotti Lewmar godono della rete di assistenza mondiale Lewmar. Per qualsiasi necessità, contattare direttamente il distributore locale o visitare il sito www.lewmar.com

1.2 Conformità CE

I certificati di conformità CE sono disponibili contattando Lewmar

1.3 Nota importante su questo manuale

In questa manuale sono presenti avvertimenti importanti per sicurezza e danni. Attenersi scrupolosamente ad esse.

Le avvertenze possono essere di due tipi, come spiegato di seguito:

⚠ PERICOLO! E' un avvertimento riguardante una situazione potenzialmente dannosa per le persone che può essere evitata con una particolare condotta. Indica cosa fare o non fare.

ⓘ SICUREZZA E' un avvertimento generico che indica cosa fare o non fare per evitare danni alle cose diretti o indiretti.

1. Introduktion

Bäste kund!
Vi tackar för att du valt en produkt från Lewmar! Lewmars produkter är kända över hela världen för sin höga kvalitet, långt framskridna teknik och beprövade prestanda. En produkt från Lewmar ger dig många års problemfri tillvaro.

1.1 Produktsupport

När du köper våra produkter får du också tillgång till vårt världsomspännande nätverk med distributörer och auktoriserade serviceverkstäder. Om du skulle få problem med produkten kontaktar du bara din lokala återförsäljare eller din distributören i ditt land. Information om detta hittar du på vår webbsida: www.lewmar.com

1.2 CE-märkning

Överensstämmelsedeklaration enligt EG kan beställas från Lewmar.

1.3 Viktig information om den här handboken

I den här handboken använder vi symboler för att markera viktig säkerhetsinformation. Läs och ta hänsyn till dessa varningar, för att undvika person- och sakskada. Här nedan följer en förklaring av de olika varningstyper som förekommer:

⚠ VARNING!
Detta är en varning för sådant som kan orsaka personskada, om varningen ignoreras. Du får här information om vad du skall eller inte skall göra för att minska risken för att du själv och andra skall skadas.

ⓘ Säkerhet
Säkerhetssymbolen betyder följande: "Gör inte...", "Gör inte så här", eller "Låt inte detta hända".

2. Safety Notices

⚠ WARNING!

IMPORTANT: Read these notes before continuing.

2.1 Windlass general

Classification Societies and Lewmar require that a vessel at anchor must have its chain/rode held by a chain stopper or equivalent strong point at all times!

At all times it is the responsibility of the boat user to ensure that the anchor and rode are properly stowed for the prevailing sea conditions. This is particularly important with high-speed powerboats, because an anchor accidentally deploying while under way can cause considerable damage. An anchor windlass is mounted in the most exposed position on a vessel and is thus subject to severe atmospheric attack resulting in a possibility of corrosion in excess of that experienced with most other items of deck equipment. As the windlass may only be used infrequently, the risk of corrosion is further increased. It is essential that the windlass is regularly examined, operated and given any necessary maintenance.

Please ensure that you thoroughly understand the operation and safety requirements of the windlass before commencing the installation. Only persons who are completely familiar with the controls and those who have been fully made aware of the correct use of the windlass should be allowed to use it. If there is any doubt of how to install or operate this unit please seek advice from a suitably qualified engineer.

- Windlasses used incorrectly could cause harm to equipment or crew.
- Windlasses should be used with care and treated with respect.
- Boating, like many other activities can be hazardous. Even the correct selection, maintenance and use of proper equipment cannot eliminate the potential for danger, serious injury or death.
- Lewmar windlasses are designed and supplied for anchor control in marine applications and are not to be used in conjunction with any other use.

2. Einleitung

⚠ WARNUNG!

WICHTIG : Vor dem Weiterarbeiten bitte folgende Hinweise lesen.

2.1 Ankerwinden generell

Alle Zertifizierungs- und Klassifizierungs Gesellschaften sowie auch Lewmar bestehen darauf, dass ein Schiff vor Anker liegend die Last seines Ankereschirres auf einen Kettenstopper entsprechend dimensioniert an einem dafür vorgesehene Platz zu jeder Zeit auffängt!

Zu jeder Zeit ist es in der Verantwortlichkeit des Schiffsführers sicher zu stellen, dass der Anker entsprechend der Seebedingungen gesichert ist. Dies ist besonders bei schnellen Motoryachten wichtig, wo ein Anker durch die Schiffsbewegungen ungesichert sehr gefährliche Bewegungen machen kann, die auch das Schiff beschädigen werden.

Eine Ankerwinde ist in der Regel am weitest vorlichen Punkt eines Schiffs montiert, wo die atmosphärischen Belastungen zu Korrosion und Abnutzungen führen können, wie sonst nur wenige Ausrüstungen an Bord. Da die Ankerwinde in der Regel nur sporadisch verwendet wird, ist dort das Risiko von Korrosionsbefall noch höher wird. Es ist besonders wichtig, dass Ankerwinden in regelmäßigen Abständen überprüft, benutzt und entsprechend gewartet und gepflegt wird.

Bitte stellen sie sicher, dass sie diese Anleitung komplett durchgelesen und verstanden haben, bevor sie mit der Montage oder dem Einsatz der Ankerwinde beginnen. Es sollten ausschließlich Personen die Ankerwinde bedienen dürfen, die über die sichere und korrekte Bedienung einer Ankerwinde belehrt wurden. Sollte ihnen die korrekte Montage der Ankerwinde nicht verständlich und/oder klar sein, dann wenden sie sich bitte an einen entsprechend qualifizierten Techniker.

- Falscher Einsatz und falsche Bedienung der Ankerwinde können zu Schäden an Personen und Ausrüstungen führen.
- Ankerwinden sollten umsichtig und mit Respekt bedient werden.
- Wassersport kann wie viele Aktivitäten gefährlich sein. Selbst eine korrekte Auswahl, Wartung und korrekter Einsatz entsprechender Ausrüstung kann die potentielle Gefahr, ernsthafte Verletzungen als auch tödliche Unfälle nicht eliminieren.
- Lewmar Ankerwinden werden für die Kontrolle von Ankereschirr zum Einsatz auf Schiffen designt und geliefert. Andere Einsatzzwecke sind ausdrücklich ausgeschlossen.

2. Introduction

⚠ RECOMMANDATIONS!

IMPORTANT : Veuillez lire ces instructions avant de poursuivre.

2.1 Guindeaux – Généralités

Les sociétés de classification et la société Lewmar exigent que les navires à l'ancre disposent d'une ligne de mouillage maintenue par un stoppeur de chaîne ou un autre point de fixation solide à tout instant!

En toutes circonstances, il est de la responsabilité de l'utilisateur de l'embarcation de s'assurer que l'ancre et la ligne de mouillage sont proprement armées pour les conditions de mer en vigueur. Cela est particulièrement important pour les bateaux à moteur à grande vitesse, car une ancre accidentellement larguée en cours de route peut provoquer des dégâts considérables. Un guindeau est situé dans la partie du navire la plus exposée, et donc, est soumis à des conditions atmosphériques sévères avec une exposition à la corrosion plus importante que celle subie par la plupart des autres éléments de l'équipement de pont. Le guindeau n'est pas toujours utilisé fréquemment, le risque de corrosion est accru. Il est essentiel que le guindeau soit régulièrement examiné, utilisé et entretenu. Assurez-vous que vous comprenez les conditions de fonctionnement et la sécurité du guindeau avant de commencer l'installation. Seules les personnes qui sont complètement familiarisées avec les commandes et ceux qui ont été pleinement informés de la bonne utilisation du guindeau doivent être autorisés à l'utiliser. S'il y a un doute sur la façon d'installer ou de faire fonctionner cet appareil vous êtes priés de demander conseil auprès d'un professionnel qualifié.

- L'utilisation incorrecte du guindeau peut entraîner des dommages à l'équipement ou l'équipage.
- Un guindeau doit être utilisé avec soin et traité avec respect.
- La navigation, comme beaucoup d'activités peut être dangereuse. Même un choix pertinent, ainsi que l'entretien et l'utilisation d'un équipement adéquat ne peut pas éliminer le danger potentiel, les blessures graves ou le risque de mort.
- Les guindeaux Lewmar sont conçus et fabriqués pour contrôler l'ancre dans les applications marines et ne doivent être utilisés pour un autre usage.

2. Introducción

⚠ ¡ADVERTENCIA!

IMPORTANTE : Lea estas notas antes de continuar.

2.1 Molinetes General

Las Sociedades de Clasificación y Lewmar requieren que una embarcación fondeada debe tener su cadena/cabo fijada con un freno de cadena o punto similar lo suficientemente fuerte, ¡en todo momento ! Es responsabilidad del usuario de la embarcación asegurar que tanto el ancla como el cabo están debidamente fijados para cualquier condición de tiempo. Esto es particularmente importante en barcos de motor pesados, porque puede causar graves daños. Un sistema de fondeo está situado en un lugar más expuesto en la embarcación y esta sujeto a ataques atmosféricos severos con el resultado de una posible corrosión por exceso como otros elementos del equipo de cubierta. Como un molinete puede ser utilizado de forma poco frecuente, el riesgo de corrosión es mucho mayor. Es esencial que el molinete sea regularmente examinado junto con un mantenimiento en profundidad. Por favor, asegúrese de que entiende las instrucciones de funcionamiento y medidas de seguridad requeridas por el molinete antes de empezar la instalación. Solo personas que están completamente familiarizadas con los controles y las que han sido completamente conscientes del correcto uso del molinete están autorizadas a usarlo. Si tiene cualquier duda de cómo instalar o manejar esta unidad, por favor póngase en contacto con un ingeniero cualificado.

- Los molinetes utilizados incorrectamente pueden causar daños tanto a equipos como tripulación.
- Los molinetes deben ser utilizados con precaución y tratados con respeto.
- Navegar, como muchas otras actividades pueden ser peligrosas. Incluso seleccionando el correcto, manteniéndolo y haciendo un uso adecuado del equipo no se elimina un potencial peligro, serios daños o la muerte.
- Los molinetes Lewmar están diseñados y suministrados para funcionar en aplicaciones marinas y no puede ser utilizados en relación con cualquier otro uso.

2. Introduzione

⚠ AVVERTIMENTI!

IMPORTANTE : prima di continuare, leggere la nota seguente.

2.1 Norme generiche

Le norme di sicurezza, gli enti certificatori e Lewmar richiedono tassativamente che, durante lo stazionamento all'ancora, il carico sia tenuto da una ferma catena o da un punto di fissaggio di elevata resistenza.

E' responsabilità dell'utilizzatore di assicurarsi che durante la navigazione l'ancora sia adeguatamente stivata e fissata. Questa precauzione è tanto più importante quanto maggiore è la velocità di navigazione e peggiori le condizioni del mare. In queste condizioni infatti un'ancora filata per errore durante la navigazione può avere effetti molto gravi.

Data la sua posizione e l'uso non sempre frequente, il salpa ancore è particolarmente esposto al rischio di ossidazione e corrosione, pertanto è necessario provvedere ad una costante ispezione delle sue parti ed alla dovuta manutenzione.

Assicurarsi di aver letto e compreso ogni parte del presente manuale prima di procedere con l'installazione e l'utilizzo. Solo le persone che conoscono come operare dovrebbero essere autorizzate all'uso del salpa ancore. In caso di dubbi circa l'installazione o l'uso rivolgersi sempre ad un consulente esperto.

- Salpa ancore utilizzati in modo inappropriato possono causare danni a persone e/o cose.
- Prestare la massima attenzione durante l'uso di apparecchiature potenti.
- Anche l'uso più accorto può essere fonte di danni, anche gravi.
- I prodotti Lewmar sono forniti esclusivamente per l'uso nautico diportistico, nessun altro utilizzo deve essere fatto.

2. Introduktion

⚠ VARNINGAR!

VIKTIGT : Läs dessa anvisningar innan ni fortsätter.

2.1 Ankarspel

Klassningssällskapen och Lewmar kräver att ett fartyg till ankars alltid har kättingen/linan låst med kättingstopp/linlås eller annan tillräckligt stark låsning!

Det är alltid befälhavaren ombord som ansvarar för att ankaret och kättingen/linan är stuvad på ett för rådande sjöförhållanden säkert sätt. Detta är särskilt viktigt på snabbgående motorbåtar, eftersom ett ankare som går i sjön under gång kan orsaka allvarliga skador. Ankarspel monteras på den mest utsatta platsen ombord och utsätts för svåra förhållanden, som kan leda till korrosion av en grad som man inte hittar på annan däcksutrustning. Eftersom ankarspel för det mesta inte används särskilt ofta blir risken för korrosion oftast större. Det är också därför det är viktigt att ankarspelet inspekteras och körs regelbundet och att underhållet sköts korrekt.

Se till att du förstår de drift- och säkerhetskrav som gäller för ankarspelet innan du påbörjar installationen. Låt endast personer med god kännedom om och vana vid den här typen av kontroller och som är fullt införstådda med hur spelet skall hanteras använda det. Vid tveksamheter om installation eller användning av spelet bör man alltid ta hjälp av kompetent tekniker.

- Felaktig hantering av ankarspel kan leda till skador på både besättning och utrustning.
- Ankarspel skall användas med iakttagande gällt sjömanskap och sunt förnuft.
- Båtlivet kan, precis som andra aktiviteter, vara farligt. Inte ens rätt val, underhåll och användning av utrustningen kan undanröja risken för fara, svår personskada och till och med dödsfall.
- Våra ankarspel är konstruerade och levererade för ankarhantering i marin miljö och skall inte användas i andra sammanhang.

2. Safety Notices

⚠ WARNING!

- Keep limbs, fingers, clothing and hair clear of windlass and anchor rope/chain and anchor during operation. Severe bodily harm would result.
- Ensure there are no swimmers or divers nearby when dropping anchor.
- When the Windlass is not in use the anchor must be tied off onto a cleat or equivalent strong point to prevent damage to the boat.
- Windlass must not be used as the sole means of securing the anchor to the bow fitting especially under storm conditions. Anchors should be independently secured to prevent accidental release.
- Classification Societies require that a vessel lying at anchor must have its anchor rope/chain secured to a suitable independent strong point.
- Do not use windlass for ANY purpose other than deployment and recovery of anchor.
- Do not wrap chain around a capstan barrel or drum where fitted.
- A circuit breaker/isolator should always be used with this windlass to protect the motor and cables from overheating and damage.
- Always switch off this windlass at the circuit breaker/isolator when not in use.
- It is the unavoidable responsibility of the owner or master or other responsible party to assess the risk of any operation on the vessel.
- Windlass must not be operated whilst under the influence of alcohol or drugs.

2.2 Fitting

- This equipment must be installed and operated in accordance with the instructions contained in this manual. Failure to do so could result in poor product performance, personal injury and/or damage to your boat.
- Consult the boat manufacturer if you have any doubt about the strength or suitability of the mounting location.

2.3 Electrical

- Make sure you have switched off the power before you start installing this product.
- This product requires installation by a suitably qualified electrical engineer.

2. Einleitung

⚠ WARNUNG!

- Halten sie alle Teile des Körpers wie Finger, Kleidung und Haare immer in notwendiger Distanz zur Ankerwinde und dem Ankergeschirr während des Ankermanövers. Nichtbefolgen kann in ernsthaften Verletzungen führen.
- Vergewissern sie sich, dass keine Schwimmer oder Taucher in der Nähe sind, bevor sie den Anker fallen lassen.
- Ist die Ankerwinde nicht in Betrieb, dann muss der Anker an einem dafür vorgesehenen Punkt (z.B. Klampe) gesichert werden, um einen Schaden am Schiff zu vermeiden.
- Die Ankerwinde kann nicht als Sicherung des Ankers im Bugbeschlag eingesetzt werden – speziell in schlechten Seebedingungen. Anker müssen separat zum Schutz vor versehentlichem Fieren des Ankers gesichert sein.
- Klassifizierungs-Gesellschaften fordern einen separaten und entsprechend ausgelegten Sicherungspunkt des Ankergeschirres während des Ankerns.
- Verwenden sie die Ankerwinde AUSSCHLIESSLICH zum Fieren und Heben des Ankers.
- Legen sie niemals Kette auf den eventuell vorhandenen Spillkopf.
- Eine entsprechende Sicherung muss immer zum Schutz vor Überlastung der Winde und Überhitzung der Kabel verwendet werden.
- Trennen sie immer die Ankerwinde vom Stromkreislauf, wenn sie nicht verwendet wird.
- Es ist immer und zu jeder Zeit in der Verantwortlichkeit des Schiffsführers oder Skippers, den Risiken entsprechend die Ausrüstung des Schiffes bedienen und benutzen zu lassen.
- Ankerwinden dürfen nicht durch Personen unter Alkohol- oder Drogeneinfluss eingesetzt werden.

2.2 Montage

- Diese Ausrüstung muss entsprechend dieser Anleitung montiert und bedient werden. Nichtbefolgen kann zu schlechter Leistung, Verletzungen an Personen und Schäden am Schiff führen.
- Dieses Produkt bedarf der Montage eines qualifizierten Elektro-Technikers.

2.3 Elektrik

- Stellen Sie sicher, dass das elektrische System an Bord abgeschaltet ist, BEVOR Sie mit der Montage beginnen.
- Sollten Sie unsicher sein, eine elektrische Installation fachgerecht zu erledigen, dann konsultieren Sie bitte einen geeigneten Fachmann.

2. Introduction

⚠ RECOMMENDATIONS!

- Gardez vos membres, doigts, vêtements et cheveux à l'écart du guindeau et la corde/chaîne. Vous risquez de vous blesser sévèrement.
- Vérifier qu'il n'y a pas de nageurs ou de plongeurs avant de jeter votre ancre.
- Quand le guindeau n'est pas en utilisation, l'ancre doit être fixée sur un taquet ou autre point de fixation solide pour ne pas endommager le bateau.
- Le guindeau ne doit pas être utilisé comme le seul moyen de sécuriser l'ancre au davier, surtout pendant une tempête. Les ancrs doivent être fixées indépendamment pour éviter leur largage accidentel.
- Les sociétés de classification demandent qu'un navire à l'ancre doit avoir son mouillage fixé à un point solide et indépendant.
- Utilisez votre guindeau UNIQUEMENT pour le largage et la récupération de l'ancre.
- N'entourer pas la chaîne autour d'un cabestan ou d'un tambour.
- Un coupe-circuit/disjoncteur doit toujours être utilisé avec le guindeau pour protéger les câbles du moteur de la surchauffe et de la dégradation.
- Eteignez toujours le guindeau au coupe-circuit/disjoncteur quand il est hors utilisation.
- Il est de la responsabilité inéluctable du propriétaire, le maître de bord ou toute autre partie responsable, d'évaluer le risque de toute opération sur le navire.
- Ne pas utiliser le guindeau sous l'influence de l'alcool ou la drogue.

2.2 Installation

- Cet équipement doit être installé et utilisé selon les consignes contenues dans ce manuel. Du non-respect des consignes peut résulter le mauvais fonctionnement du produit, des blessures, ou des dommages au bateau.
- Consulter le fabricant du bateau si vous avez des doutes sur la solidité ou la pertinence de l'emplacement de montage.

2.3 Electricité

- Vérifier que vous avez coupé le courant avant de commencer l'installation du produit.
- Ce produit nécessite une installation par un électricien qualifié.

2. Introducción

⚠ ¡ADVERTENCIA!

- Mantener extremidades, dedos, ropa y pelo alejado del molinete o del ancla, cabo o cadena durante su funcionamiento. Puede resultar severamente peligroso.
- Asegúrese de que no hay nadadores o buzos cerca de la calda del ancla.
- Cuando el molinete no este en uso el ancla debe estar fijada en una cornamusa o a un punto fuerte equivalente para prevenir daños en el barco.
- El molinete no debe utilizarse como único medio de asegurar el ancla al rodillo, especialmente en condiciones de tormenta. Las anclas deben ser aseguradas de forma independiente para evitar la liberación accidental.
- Las Sociedades de Clasificación requieren que un buque que permanezca anclado debe fijar su cabo cadena a un punto fijo, robusto e independiente.
- Do not use windlass for ANY purpose other than deployment and recovery of anchor.
- Do not wrap chain around a capstan barrel or drum where fitted.
- A circuit breaker/isolator should always be used with this windlass to protect the motor and cables from overheating and damage.
- Always switch off this windlass at the circuit breaker/isolator when not in use.
- It is the unavoidable responsibility of the owner or master or other responsible party to assess the risk of any operation on the vessel.
- Windlass must not be operated whilst under the influence of alcohol or drugs.

2.2 Montaje

- Este equipo debe ser instalado y utilizado de acuerdo con las instrucciones contenidas en este manual. Los fallos pueden resultar en un pobre rendimiento del producto, daños personales o daños en la embarcación.
- Consulte al constructor del barco si tiene cualquier duda acerca de la fuerza o idoneidad de la ubicación del montaje.

2.3 Electricidad

- Este seguro de que este apagado la corriente antes de empezar la instalación de este producto.
- Este producto requiere de la instalación por un ingeniero debidamente cualificado.

2. Introduzione

⚠ AVVERTIMENTI!

- Prestare la massima attenzione perché braccia, gambe, dita, capelli e vestiti non restino impigliati nella catena o nel barbotin.
- Prima di manovrare con il verricello assicurarsi che non ci siano persone in acqua nelle vicinanze.
- Quando il verricello non viene utilizzato l'ancora deve sempre essere fissata ad un punto solido per evitare danni.
- Il salpa ancora non deve mai essere utilizzato come punto di ormeggio. Il carico deve sempre essere tenuto da una apposita bitta o punto solido.
- Il verricello non deve essere utilizzato per funzioni differenti dal filare o salpare l'ancora.
- Sulla campana di tonneggio non deve essere mai utilizzata la catena.
- L'impianto deve sempre essere protetto da un interruttore magneto-termico adeguato.
- Isolare sempre il circuito tramite l'interruttore magneto-termico quando il salpa ancora non è in uso.
- La responsabilità di tutte le persone e delle operazioni è sempre del comandante o di chi ne fa le veci.

2.2 Installazione

- Questa attrezzatura deve sempre essere installata ed utilizzata come indicato nel presente manuale. Prestazioni ridotte e danni a persone e/o cose possono scaturire da una non corretta procedura.
- Consultare il costruttore della barca per accertarsi che la zona di applicazione del salpa ancora si a sufficientemente robusta.

2.3 Impianto elettrico

- Assicurarsi di avere isolato l'impianto elettrico prima di iniziare l'installazione.
- Questo prodotto deve essere installato da un tecnico qualificato.

2. Introduktion

⚠ VARNINGAR!

- Se till att du inte fastnar med kroppsdelar, fingrar, kläder eller hår i spelet, linan/kättingen eller ankaret när du använder ankarspelet. De skador som uppstår om du skulle fastna kan bli mycket svåra.
- Kontrollera alltid att inga badare eller dykare befinner sig i närheten du faller ankaret.
- Ankaret skall alltid vara surrat när det inte används, för att förhindra skador på båten pga ankarets rörelser vid t ex sjöhavning.
- Ankaret får inte vara surrat enbart i spelet, framför allt inte vid hård vind. Ankaret skall hållas surrat på ett sådant sätt att det inte kan gå i sjön oavsiktligt.
- Klassningssällskapen kräver att ett fartyg till ankars alltid har kättingen/linan låst med ett separat kättingstopp/linlås eller annan tillräckligt stark låsning.
- Ankarspel får inte användas till något annat än att sätta och låtta ankaret.
- Kättingen får inte läggas runt en capstan eller lintrumma.
- Spelet skall alltid anslutas elektriskt via brytare med överlastskydd, för att skydda motor och kablar för överhettning och annan skada pga av överlast.
- Brytaren skall alltid vara fränslagen när spelet inte används.
- Tänk på att det alltid är befälhavaren som ansvarar för säkerheten ombord.
- Ankarspelet får inte hanteras av person som är påverkad av alkohol eller andra droger.

2.2 Montering

- Den här utrustningen måste installeras och användas i enlighet med instruktionerna i den här handboken. Underlåtenhet att följa dessa instruktioner kan leda till bristfälligt funktion, personskada och/eller skada på din båt.
- Rådgör med den som byggt din båt om du har några funderingar kring hållfasthet och stabilitet på monteringsplatsen.

2.3 Elsystem

- Kontrollera att du brutit strömförsörjningen innan du påbörjar installationen.
- Det här ankarspelet skall kopplas in av kvalificerad elektriker.

3. Installation

3.1 Basic requirements

Each installation requires:

WINDLASS INSTALLATION

The following tools:

- An appropriate marine sealant

V1-3

- 10 mm (3/8") Drill
- 14 mm (9/16") Drill
- 75 mm (3") Hole Saw

V4-5

- 12 mm (7/16") Drill
- 77 & 90 mm (3" & 4 1/2") Hole Saw

V6

- 5 mm (3/16") Drill
- 12 mm (7/16") Drill
- 115 mm (4 1/2") Hole Saw

WIRING INSTALLATION

- Crimping Pliers/Wire Stripper
- Suitable electrical cable and crimp terminals

3.2 Accessories

Use only genuine Lewmar parts and accessories to ensure top performance and eliminate the risk of voiding your warranty. For replacement parts, please visit your dealer or the Lewmar web site.

3.3 Gypsy Suitability

Gypsies fitted to the V1-5 range of windlasses are ideally suited to handling our factory made Rope/Chain combination rodes, which consist of rope spliced to a chain tail. The V6 range is chain only. See Specifications section for details.

Ropes used must be windlass grade, medium lay nylon. Ropes from different manufacturers have wide variations in stretch and consistency in diameter. Therefore, rope and chain from other manufacturers may require some experimentation to determine the optimum size.

Should you have difficulty in matching a gypsy to your chain please consult your local agent or our international network of distributors.

3. Montage

3.1 Basis Anforderungen

Jede Montage bedarf:

ANKERWINDEN MONTAGE

Die folgenden Werkzeuge:

- Ein entsprechendes Marine Dichtmittel

V1-3

- 10mm Bohrer
- 14mm Bohrer
- 75mm Lochsäge

V4-5

- 12mm Bohrer
- 77 & 90mm Lochsäge

V6

- 5mm Bohrer
- 12mm Bohrer
- 115mm Lochsäge

KABELVERLEGUNG

- Crimp Zange/Abisolierzange
- Passende Crimp-Terminals und entsprechende Kabelgrößen

3.2 Zubehör

Verwenden sie ausschließlich original Lewmar Teile und -Zubehör um beste Leistung zu gewährleisten und das Risiko der Garantieabdeckung zu eliminieren. Für Austausch- und Ersatzteile wenden sie sich an ihren Lewmar-Partner oder besuchen www.lewmar.com

3.3 Kettennüsse

Kettennüsse der Serie V1-5 sind ideal designt zum Einsatz unserer eigenen Kettengeschirre mit Tauwerk und Kette, welche aus einer Ankerleine in das Kettenende eingespleisst bestehen. Die V6 Ankerwinde ist ausschließlich für Ketten. Weitere Informationen und Details finden sie in den Spezifikationen. Eingesetzte Tauwerke müssen für Ankerwinden hergestellt sein, Medium Lagen Nylon. Tauwerke verschiedener Hersteller weisen Unterschiede im Hinblick auf Dehnungsverhalten und Durchmesser auf. Daher kann das Ausprobieren zum Finden des korrekten Durchmessers notwendig sein.

Sollten sie Fragen zu dem korrekten Tauwerk für ihre Kettennuss haben, dann sprechen sie mit dem Lieferanten ihres Tauwerks.

3. Installation

3.1 Outils nécessaires

Chaque installation nécessite:

INSTALLATION DU GUINDEAU

Les outils suivants:

- Un mastic marin approprié

V1-3

- Foret 10 mm (3/8")
- Foret 14 mm (9/16")
- Scie-cloche 75 mm (3")

V4-5

- Foret 12 mm (7/16")
- Scie-cloche 77 & 90 mm (3" & 4 1/2")

V6

- Foret 5 mm (3/16")
- Foret 12 mm (7/16")
- Scie-cloche 115 mm (4 1/2")

INSTALLATION DES CÂBLES ÉLECTRIQUES

- Pince à sertir/outil à dénuder
- Câbles électriques et cosses à sertir adaptés

3.2 Accessoires

Utiliser seulement les pièces détachées et accessoires Lewmar pour garantir une meilleure performance et pour éliminer le risque d'annulation de garantie. Pour les pièces de remplacement, contactez votre distributeur Lewmar ou notre site web.

3.3 Conformité des barbotins

Les barbotins installés sur la gamme de guindeaux V1-5 sont conformes à nos combinaisons mixtes cordages/chânes fabriqués en usine, qui consistent en un cordage épissé à un maillon de chaîne. La gamme V6 est pour chaîne seulement. Voir les spécifications pour plus de détails.

Les cordages utilisés doivent être en nylon à trois torons. Selon les fabricants, les cordages peuvent varier beaucoup dans leur élasticité et constance de diamètre. Donc, les cordages et les chaînes d'autres fabricants peuvent nécessiter des essais afin de déterminer la taille optimale.

Si vous avez des difficultés à trouver un barbotin à votre chaîne, veuillez consulter votre agent ou notre réseau international de distributeurs.

3. Instalación

3.1 Requerimientos básicos

Cada instalación necesita:

INSTALACIÓN MOLINETE

Las siguientes herramientas:

- Un apropiado sellador marino

V1-3

- 10 mm (3/8") Agujero
- 14 mm (9/16") Agujero
- 75 mm (3") Sierra perforadora

V4-5

- 12 mm (7/16") Agujero
- 77 & 90 mm (3" & 4 1/2") Sierra perforadora

V6

- 5 mm (3/16") Agujero
- 12 mm (7/16") Agujero
- 115 mm (4 1/2") Sierra perforadora

INSTALACIÓN DEL CABLEADO

- Alicates de engaste / Pelacables
- Cable eléctrico adecuado y terminales

3.2 Accesorios

Utilice solo elementos y accesorios Lewmar genuinos para asegurar el máximo rendimiento y eliminar el riesgo de pérdida de garantía. Para cambiar repuestos, por favor visite a su proveedor o en la web de Lewmar.

3.3 Cabestrante

Los cabestrantes del rango V1-5 están hechos para trabajar tanto para cabo como para cadena, y pueden estar unidos por un cabo trenzado a uno de los eslabones. El modelo V6 solo acepta cadena. Véase los detalles de la sección Especificaciones.

Los cabos deben ser de grado de molinete o de Nylon Medium. Los cabos de los diferentes manufacturados tienen grandes variaciones de estiramiento y diámetro. Por eso, la cadena y el cabo de otros manufacturadores puede requerir varias pruebas para determinar la talla más optima.

Puede encontrarse con dificultades a la hora de hacer coincidir un barboten con su cadena, así que consulte a su agente o a la red de distribuidores internacionales.

3. Installazione

3.1 Indicazioni per l'installazione

Sono necessarie sempre:

INSTALLAZIONE MECCANICA

I seguenti attrezzi:

- Silicone o altro sigillante

V1-3

- punta da 10 mm
- punta da 14 mm
- punta a tazza da 75 mm

V4-5

- punta da 12 mm
- punta a tazza da 77 e 90 mm

V6

- punta da 5 mm
- punta da 12 mm
- punta a tazza da 115 mm

INSTALLAZIONE ELETTRICA

- Pinza per terminali e spellafili
- Cavo elettrico e terminali a pressare

3.2 Accessori

Utilizzare esclusivamente accessori e ricambi originali Lewmar, per assicurare prestazioni, durata e mantenere valida la garanzia. Per informazioni sui ricambi disponibili, rivolgersi al rivenditore locale o visitare il sito Lewmar.

3.3 Compatibilità barbotin

Tutti i barbotin utilizzati sui modelli da V1 a V5 sono adatti per combinazioni di cima e catena, comprese le giunzioni tra esse. Il modello V6 può essere utilizzato solo con catena. Vedere le tabelle specifiche per la scelta della catena compatibile.

La cima deve essere di tipo idoneo all'ormeggio, in nylon a media tenacità. Prodotti similari di fornitori differenti possono variare in tenacità e diametro. Prima di sostituire la cima, verificarne la compatibilità nella gola del barbotin. In caso di difficoltà nel reperimento di cima con caratteristiche compatibili, rivolgersi al distributore locale.

3. Installation

3.1 Grundläggande krav

Följande behövs för installationen:

ANKARSPEL

Verktyg:

- Lämpligt marint tätningsmedel

V1-3

- Borr på 10 mm
- Borr på 14 mm
- Hålsåg med diameter 75 mm

V4-5

- Borr på 12 mm
- Hålsågar med diameter 77 och 90 mm

V6

- Borr på 5 mm
- Borr på 12 mm
- Hålsåg med diameter 115 mm

Kabeldragning

- Kabelskotång/avisoleringsstång
- Lämplig kabel och passande kabelskor

3.2 Tillbehör

Använd bara reservdelar och tillbehör från Lewmar, så säkerställer du bästa tänkbara funktion och undanröjer risken att garantin upphör att gälla. Reservdelar köper du lämpligast hos din återförsäljare eller på vår webbsida.

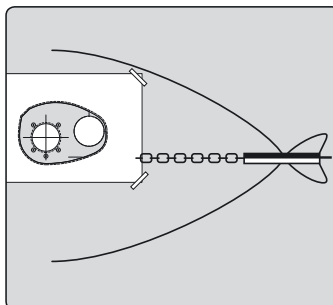
3.3 Kabelarets användningsområde

Kabelaren på ankarspelen i serierna V1 till V5 är idealiska för våra egna ankarlinor som är splitsade mot kätting i ena änden. Kabelaren på spelen i serie V6 är endast avsedda för kätting. Mer information finns i de tekniska specifikationerna.

Ankarlinan måste vara avsedd för ankarspel och tillverkad av medelgrov nylon. Linor från andra tillverkare varierar mycket vad gäller töjning och diameternoggrannhet. Det kan därför hända att man måste prova lina och kätting från andra tillverkare för att hitta optimal grovlek.

Om du har problem med att hitta ett kabelar som passar din kätting, kan du vända dig till din lokala återförsäljare för att få hjälp.

3. Installation



3.4 V1-6 Above deck preparation

IMPORTANT: Plan location carefully and allow for the following:

1. Make an accurate drilling template using the product dimensions from the dimension template and decide upon a position for it with reference to the vessel's bow roller and the chain locker below and the rotation of manual operating handle.

- If possible, select a flat area of deck.

2. Models V1-3

If the deck is not flat, a suitable mounting pad may be required to take up camber or sheer.

3. Models V4-5

If a pad is required for these models, care must be taken to ensure that the windlass base is parallel to the motor/gearbox mounting flange. Shims may be used, before the motor/gearbox is installed, to correct minor misalignment.

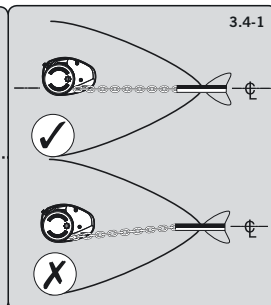
4. Model V6

If the deck is not flat, a suitable mounting pad may be required to take up camber or sheer.

- **NOTE:** If in doubt about the suitable construction of the pad consult a qualified marine engineer.

- **NOTE:** Decks that are thin, or of foam or balsa laminate construction, will require reinforcement in order to spread the loads that will be applied to the deck while the windlass is in use.

3. Montage



3.4 V1-6 Vorbereitungen auf Deck

WICHTIG: Planen sie sorgfältig den Montageort und ermöglichen folgende Punkte:

1. Erstellen sie ein akkurate Bohrschablone basierend auf den physischen Abmessungen der Tabelle und entscheiden sich damit für den gewünschten Montageort in Relation zur Bugrolle des Schiffes, dem Ankerkasten unter Deck und dem Radius der Kurbel im manuellen Notbetrieb auf der Winde.

- Wenn möglich wählen sie eine ebene Fläche an Deck

2. Modell V1-3

Wenn keine ebene Fläche vorhanden ist, dann kann der Einsatz eines Ausgleichskeils notwendig werden.

3. Modell V4-5

Sollte hier ein Ausgleichkeil notwendig sein, dann ist auf die Parallelität zwischen Deckseinheit und Motor/Getriebeeinheit zu achten. Ausgleichsscheiben helfen in diesen Fällen vor der endgültigen Montage der Motor/Getriebeeinheit, um auffällige Abweichungen aus zu gleichen.

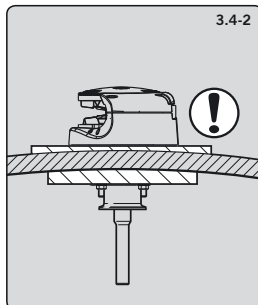
4. Modell V6

Wenn keine ebene Fläche vorhanden ist, dann kann der Einsatz eines Ausgleichskeils notwendig werden.

- **ANMERKUNG:** Sollten sie sich bei der Erstellung eines Ausgleichs nicht sicher sein, dann wenden sie sich an einen qualifizierten Schiffstechniker.

- **ANMERKUNG:** Dünne Decks oder solche mit Sandwich Kern (Schaum oder Balsaholz) benötigen zusätzliche Verstärkungen, um die auftretenden Lasten beim Einsatz der Ankerwinde in das Deck zu verteilen. Im Zweifel ziehen sie hier einen qualifizierten Schiffstechniker zu Rate.

3. Installation



3.4 V1-6 Préparation sur le pont

IMPORTANT : Prévoir l'endroit soigneusement et tenir compte des points suivants :

1. Faire un gabarit de forage précis en utilisant le gabarit de dimensions du produit. Décidez la position en tenant compte du réa de davier et du puits de chaîne en dessous ainsi que la rotation de la manivelle manuelle.

- Si possible, utiliser une partie plane du pont.

2. Modèles V1-3

Si le pont n'est pas plat, un bossage de montage sera peut être nécessaire.

3. Modèles V4-5

Si un bossage est nécessaire pour ces modèles, vérifiez soigneusement que la base du guindeau est parallèle à la bride de montage du moto-réducteur. Des cales de réglage peuvent être utilisées avant l'installation du moto-réducteur afin de corriger des désalignements mineurs.

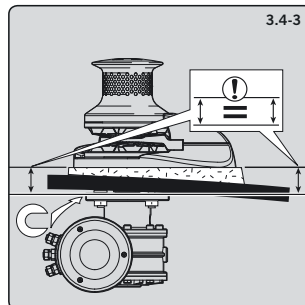
4. Modèle V6

Si le pont n'est pas plat, un bossage de montage sera peut être nécessaire.

- **REMARQUE:** Si vous avez des doutes sur la qualité de la construction du bossage, consultez un professionnel qualifié.

- **REMARQUE:** Les ponts trop minces, en mousse ou contreplaqué de balsa nécessitent un renforcement afin de répartir la charge sur le pont quand le guindeau est en utilisation.

3. Instalación



3.4 V1-6 Preparación sobre cubierta

IMPORTANTE: Planee la localización cuidadosamente y asegúrese de:

1. Haga un perforado ajustado de la plantilla utilizando las dimensiones del producto y decida la posición para el con referencia al rodillo de proa, el bloqueador de cadena y la rotación manual de la maneta.

- Si es posible, seleccione un area plana en cubierta.

2. Modelos V1-3

Si la cubierta no es plana, una cuña de montaje puede ser necesaria, para librar el posible angulo.

3. Modelos V4-5

Si para estos modelos es necesario una cuña, debe tenerse cuidado para garantizar que la base de molinete es paralela a la del motor/caja reductora. Las cuñas se pueden utilizar, antes de que el motor / caja reductora esté instalado, para corregir la desalineación de menor importancia.

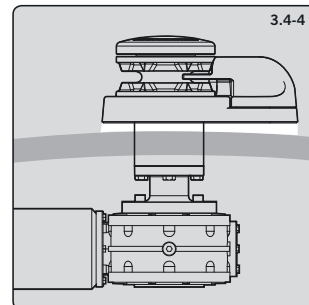
4. Model V6

Si la cubierta no es plana, una cuña de montaje adecuada puede ser necesaria para librar los posibles angulos.

- **NOTA:** En caso de duda acerca de la construcción adecuada de la plataforma de consultar a un ingeniero naval cualificado.

- **NOTA:** Las cubiertas que son finas, de espuma o de construcción de balsa de laminado, será necesario el refuerzo a fin de repartir las cargas que se aplicarán a la cubierta, mientras que el molinete está en uso.

3. Installazione



3.4 V1-6 Preparazione della coperta

IMPORTANTE: Verificare la zona di installazione anche per:

1. assicurarsi che la leva di sblocco della frizione sia libera di ruotare a 360°, che il barbotin lavori allineato al musone di prua ed al ferma catena se presente, che lo spazio sottostante sia sufficiente per il gruppo motore/riduttore.

- Se possibile, assicurarsi che la zona di installazione sia piana e con spessore costante.

2. Modelli V1-3

Se la superficie di appoggio non fosse piana, prevedere una base che compensi il dislivello.

3. Modelli V4-5

L'eventuale base di appoggio deve essere modellata in modo che il piano di appoggio del verricello sia perfettamente parallelo al piano di appoggio sottocoperta per motore e riduttore. Per differenze molto piccole sarà sufficiente applicare delle rondelle tra coperta e gruppo motore/riduttore.

4. Modelli V6

Se la superficie di appoggio non fosse piana, prevedere una base che compensi il dislivello.

- **NOTA:** Chiedere consulenza ad un tecnico qualificato in merito al materiale da utilizzare per la realizzazione della base di appoggio.

- **NOTA:** L'installazione in aree dove la coperta è particolarmente sottile oppure in presenza di sandwich di balsa o schiuma, sarà necessario prevedere adeguati rinforzi della zona di fissaggio.

3. Installation

3.4 Installationsförberedelser på däck

VIKTIGT! Välj monteringsplatsen noggrant och följ nedanstående riktlinjer:

1. Gör en noggrann hålltagningsmall för ankarspelet, baserat på angivna mått, och bestäm var det bäst skall monteras för att passa mot ankarstävullen, kättingboxen och spaken för manuell användning.

- Välj om möjligt en plats där däckets är så plant som möjligt.

Om däckets inte är plant, kan lämpligt mellanlägg behövas för att få jämn fördelning på krafterna.

3. Modellerna V4 till V5

Om du behöver ett mellanlägg till någon av dessa modeller skall du också tänka på att spelets bädd hamnar parallellt mot monteringsflänsen på motor/växel. Mindre injeringsfel kan kompenseras med shims innan motor/växel monteras.

4. Modell V6

Om däckets inte är plant, kan lämpligt mellanlägg behövas för att få jämn fördelning på krafterna.

- **Anm:** Rådfråga en kvalificerad båtbyggare vid tveksamheter om hur mellanläggen bör se ut.

- **Anm:** Tunna däck och laminatdäck fyllda med skum eller balsa måste förstärkas för att fördela de krafter som verkar på däckets när spelet används.

3. Installation

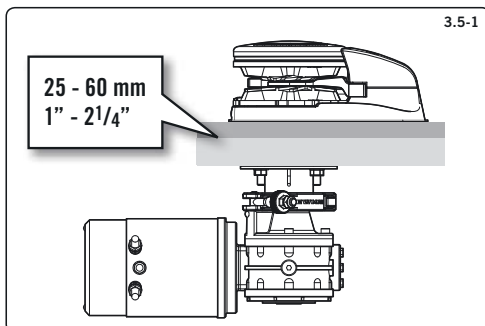
3. Montage

3. Installation

3. Instalación

3. Installazione

3. Installation



3.5 V1-6 Deck thickness

- The deck is an integral component of the windlass it has to secure the windlass and be strong enough to cope with the high torque stresses involved in recovering the anchor.

1. Models V1-3

- Lewmar recommends a minimum deck thickness of 25 mm (1"), M8 Studs suit deck and packing thickness of 25-60 mm (1" - 2 1/4").
- NOTE:** An optional extended version can be used on decks up to 140 mm thick.

2. Models V4-5

- Lewmar recommends a minimum deck thickness of 40 mm (1 1/2"). M10 studs suit deck and packing thickness of 40-66 mm (1 1/2" - 2 1/2").

3. Model V6

- Lewmar recommends a minimum deck thickness of 40 mm (1 1/2"). M10 studs suit deck and packing thickness of 40-56 mm (1 1/2" - 2 1/4").

3.5 V1-6 Deckstärke

- Das Deck ist ein in die Winde integriertes Bauteil, das die entstehenden und mit unter hohen Kräfte der Winde während des Ankermanövers aufnehmen muss. Es muss entsprechend kräftig und stabil ausgelegt sein.

1. Modelle V1-3

- Lewmar empfiehlt eine minimale Deckstärke von 25mm (1"), M8 Stehbolzen und Decksdichtung passen für Stärken von 25-60 mm (1" - 2 1/4").

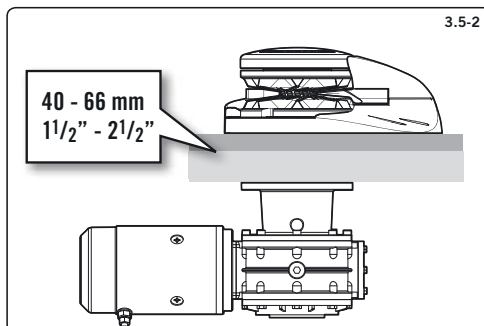
- ANMERKUNG:** Eine optionale Verlängerung kann den Einsatz bei Stärken bis 140mm ermöglichen.

2. Modelle V4-5

- Lewmar empfiehlt eine minimale Deckstärke von 40mm (1 1/2"). M10 Stehbolzen und Decksdichtung passen für Stärken von 40-66 mm (1 1/2" - 2 1/2").

3. Modell V6

- Lewmar empfiehlt eine minimale Deckstärke von 40mm (1 1/2"). M10 Stehbolzen und Decksdichtung passen für Stärken von 40-56 mm (1 1/2" - 2 1/4").



3.5 V1-6 Epaisseur du pont

- Le pont fait partie intégrale du guindeau, il sert à sécuriser le guindeau et doit être assez solide pour supporter l'effort de couple élevé lors de la récupération de l'ancre.

1. Modèles V1-3

- Lewmar conseille un pont d'une épaisseur minimum de 25mm (1"). Les goujons M8 sont appropriés aux ponts et garnitures de 25-60mm (1" - 2 1/4").

- REMARQUE:** En option, une version plus longue peut être utilisée sur des ponts d'une épaisseur jusqu'à 140mm.

2. Modèles V4-5

- Lewmar conseille un pont d'une épaisseur minimum de 40mm (1 1/2"). Les goujons M10 sont appropriés aux ponts et garnitures de 40-66mm (1 1/2" - 2 1/2").

3. Modèle V6

- Lewmar conseille un pont d'une épaisseur minimum de 40mm (1 1/2"). Les goujons M10 sont appropriés aux ponts et garnitures de 40-56mm (1 1/2" - 2 1/4").

3.5 Espesor de la cubierta V1-6

- La cubierta es un componente integral del Molinete y he de ser lo suficientemente fuerte para hacer frente al elevado par estrés que supone recuperar el ancla.

1. Modelos V1-3

- Lewmar recomienda un grosor mínimo de cubierta de 25 mm (1"). Tornillería de M8 y espesor de embalaje de 25-60 mm (1" - 2 1/4").

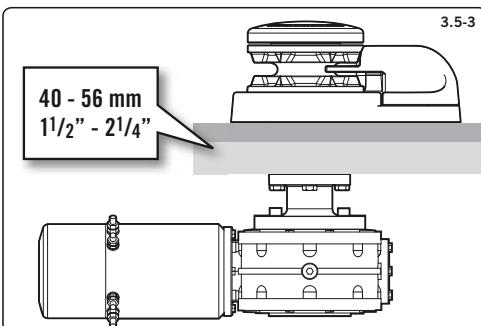
- NOTA:** Una versión extendida opcional se puede utilizar en las cubiertas de hasta 140 mm de espesor.

2. Modelos V4-5

- Lewmar recomienda un espesor de la cubierta mínima de 40 mm (1 1/2"). Tornillería de M10 y el grosor de la cubierta de embalaje de 40-66 mm (1 1/2" - 2 1/2").

3. Modelo V6

- Lewmar recomienda un espesor de la cubierta mínima de 40 mm (1 1/2"). Tornillería de M10 y el grosor de la cubierta de embalaje de 40-56 mm (1 1/2" - 2 1/4").



3.5 V1-6 Spessore della coperta

- La coperta sulla quale il verricello appoggia deve avere la stessa solidità e resistenza per resistere alle elevate sollecitazioni durante il recupero dell'ancora.

1. Modelli V1-3

- Lo spessore minimo della coperta in laminazione singola è di 25 mm I prigionieri M8 forniti di serie sono adatti a spessori compresi tra 25 e 60 mm.

- NOTA:** Possono essere utilizzati perni più lunghi fino ad un massimo di 140 mm di spessore coperta.

2. Modelli V4-5

- Lo spessore minimo della coperta in laminazione singola è di 40 mm I prigionieri M10 forniti di serie sono adatti a spessori compresi tra 40 e 66 mm.

3. Modello V6

- Lo spessore minimo della coperta in laminazione singola è di 40 mm I prigionieri M8 forniti di serie sono adatti a spessori compresi tra 40 e 56 mm.

3.5 Däckstjocklek

- Däcket skall ses som en integrerad del av ankarspelet, eftersom det utgör underlaget för spelet och måste vara så starkt att de klarar de krafter och den belastning som uppstår när spelet används.

1. Modellerna V1 till V3

- Vi rekommenderar en minsta däckstjocklek på 25 mm, M8-pinnbultar tillräckligt långa för däckets tjocklek och mellanlägg på 25-60 mm.

- Anm:** Vi har också en specialmodell för båtar med en däckstjocklek på upp till 140 mm.

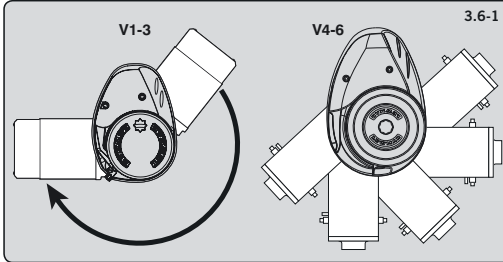
2. Modellerna V4 till V5

- Vi rekommenderar en minsta däckstjocklek på 40 mm (1 1/2"). M10-pinnbultar tillräckligt långa för däckets tjocklek och mellanlägg på 40-66 mm.

3. Modell V6

- Vi rekommenderar en minsta däckstjocklek på 40 mm. M10-pinnbultar tillräckligt långa för däckets tjocklek och mellanlägg på 40-56 mm.

3. Installation



3.6 V1-6 bellow deck preparation

IMPORTANT: The positioning of the motor/gearbox must be checked prior to cutting for deck/hull and bulkhead clearance.

1. Models V1-3

The motor/gearbox is connected by a fast fit clamp enabling it to be rotated and fixed in any position 360 degrees.

Models V4-5

The motor/gearbox is bolted via the through deck mounting bolts.

Models V6

The motor/gearbox is bolted directly to the base via a down tube.

• **NOTE:** In either case do not position motor/gearbox below rode/chain pipe fall area.

2. Models V1-5

Lead from the roller should be fed horizontally back to the top of the gypsy and along its centre line within $\pm 5^\circ$. There must be sufficient vertical fall for the chain or rope when hauling in.

⚠ **WARNING!** Failure to provide minimum vertical fall can cause jamming.

3. Model V6 (Chain Only)

Chain from the roller should be fed horizontally back to the top of the gypsy and along its centre line within $\pm 5^\circ$. There must be sufficient vertical fall for the chain when hauling in.

3. Montage

3.6 V1-6 Vorbereitungen unter Deck

WICHTIG: Die Positionierung der Motor/Getriebeeinheit muss vor dem Bohren und Sägen in Deck und/oder Rumpf sorgfältig auf entsprechenden Raum zu Schotten überprüft werden.

1. Modell V1-3

Die Motor/Getriebeeinheit wird mit dem FastFit Mechanismus montiert. Das ermöglicht das Drehen der Einheit in jede Position innerhalb von 360° .

Modell V4-5

Die Motor/Getriebeeinheit wird mit Bolzen durch Deck verschraubt und montiert.

Modell V6

Die Motor/Getriebeeinheit wird direkt an der Basis mittels des Schaftes verschraubt und montiert.

• **ANMERKUNG:** In jedem Falle positionieren sie die Motor/Getriebeeinheit niemals unterhalb der Kettenklüse oder dem Eintritt der Kette in den Ankerkasten.

2. Modell V1-5

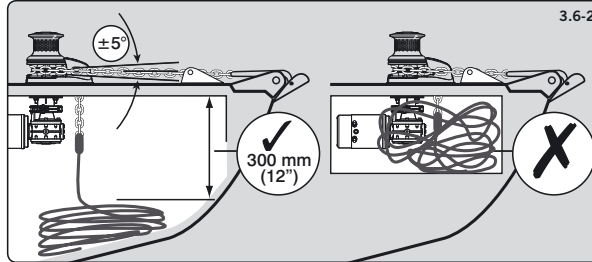
Ausgehend von der Bugrolle läuft die Kette horizontal auf die Kettennuss mit einer maximalen Winkelabweichung von $\pm 5^\circ$. Ausreichend vertikale Fallhöhe im Ankerkasten zum Einholen des Ankereschirrs ist sicher zu stellen.

⚠ **WARNUNG!** Zu geringe Fallhöhe im Ankerkasten führt zu verklemmen und verknoten des Ankereschirrs / der Ankerkette.

3. Modell V6 (Nur Kette)

Ausgehend von der Bugrolle läuft die Kette horizontal auf die Kettennuss mit einer maximalen Winkelabweichung von $\pm 5^\circ$. Ausreichend vertikale Fallhöhe im Ankerkasten zum Einholen der Ankerkette ist sicher zu stellen.

3. Installation



3.6 V1-6 Préparation sous le pont

IMPORTANT: Le positionnement du moto-réducteur doit être vérifié avant le découpage du gabarit pour prévenir les interférences d'encombrement avec le pont/coque et cloison.

1. Modèles V1-3

Le moto-réducteur est fixé par un montage rapide qui permet de le tourner à 360° et le fixer en toute position.

Modèles V4-5

Le moto-réducteur est verrouillé par les goudjons de montage à travers le pont.

Modèles V6

Le moto-réducteur est verrouillé directement sur la base via un tube de transmission.

• **REMARQUE:** dans les deux cas, ne pas positionner le moto-réducteur en dessous de l'écubier de chaîne.

2. Modèles V1-5

L'alignement partant du réa de davier doit passer horizontalement en arrière vers le haut du barbotin le long de sa ligne centrale à $\pm 5^\circ$. Il doit y avoir assez de hauteur dans le puits pour stocker entièrement le mouillage.

⚠ **ATTENTION!** Un manque de hauteur dans le puits de chaîne peut engendrer des blocages.

3. Modèle V6 (chaîne seulement)

L'alignement partant du réa de davier doit passer horizontalement en arrière vers le haut du barbotin le long de sa ligne centrale à $\pm 5^\circ$. Il doit y avoir assez de hauteur dans le puits pour stocker entièrement le mouillage.

3. Instalación

3.6 V1-6 preparación bajo cubierta

IMPORTANT: La posición del motor / caja reductora debe comprobarse antes del corte de cubierta / casco.

1. Modelos V1-3

El motor / caja reductora está conectado por una pinza de ajuste rápido que le permite ser girada y fijarse en cualquier posición de 360 grados.

Modelos V4-5

El motor / caja reductora se echa el cerrojo a través de la cubierta a través de pernos de montaje.

Modelos V6

El motor / caja reductora está atornillado directamente a la base a través de un tubo hacia abajo.

• **NOTA:** En cualquier caso, no coloquen el motor / caja reductora bajo el área de caída de cadena / fondeo

2. Modelos V1-5

Los Rodillos deben estar alineados de forma horizontal con la parte superior del barboten y a lo largo de la crujía con $\pm 5^\circ$. Debe haber suficiente caída vertical para la cadena o cabo cuando se caza.

⚠ **¡CUIDADO!** La no presencia de caída vertical mínima puede causar atascos.

3. Modelo V6 (Solo Cadena)

La cadena desde el roller debe estar alineado de forma horizontal hacia el barboten y a lo largo de la crujía con $\pm 5^\circ$. Debe haber suficiente caída vertical para la cadena o cabo cuando se caza."

3. Installazione

3.6 V1-6 Preparazione sotto coperta

IMPORTANT: Verificare la posizione e gli ingombri del gruppo motore/riduttore prima di forare la coperta.

1. Modelli V1-3

Il gruppo motore/riduttore è collegato all'unità di coperta mediante un sistema Fast Fit con ghiera e può essere fissato in varie posizioni sui 360° .

Modelli V4-5

Il gruppo motore/riduttore è fissato all'unità di coperta mediante gli stessi prigionieri e può essere ruotato in varie posizioni sui 360° .

Modello V6

Il gruppo motore/riduttore è fissato all'unità di coperta mediante una flangia apposita.

• **NOTA:** In nessun caso il motore deve trovarsi al di sotto del foro di passaggio della catena e se possibile posizionarlo il più distante possibile da questa.

2. Modelli V1-5

La catena deve entrare nel barbotin ad un'altezza compresa tra la metà e la faccia superiore dello stesso e con un angolo massimo rispetto alla linea mediana di $\pm 5^\circ$. Verificare che ci sia una caduta sufficiente tra barbotin e gavone dell'ancora anche ad ancora salpata.

⚠ **ATTENZIONE!** La mancanza di una altezza di caduta sufficiente sarà causa di bloccaggio della catena e di possibili rotture della conchiglia.

3. Modello V6 (solo catena)

La catena deve entrare nel barbotin ad un'altezza compresa tra la metà e la faccia superiore dello stesso e con un angolo massimo rispetto alla linea mediana di $\pm 5^\circ$. Verificare che ci sia una caduta sufficiente tra barbotin e gavone dell'ancora anche ad ancora salpata.

3. Installation

3.6 Installationsförberedelser under däck

VIKTIGT! Kontrollera utrymmet mellan däck, skrov och skott vid placeringen av växelhuset, innan du tar hål i däck.

1. Modellerna V1 till V3

Motor/växelhus ansluts med en enkel kontakt, som kan kopplas in i valfri vinkel.

Modellerna V4 till V5

Motor/växelhus dras fast med genomgående bult genom däck.

V6-modeller

Motor/växelhus bultas fast mot badden med ett genomgående rör.

• **Anm:** Motorn/växelhuset får inte i något av dessa fall placeras under kätting-/linröret.

2. Modellerna V1 till V5

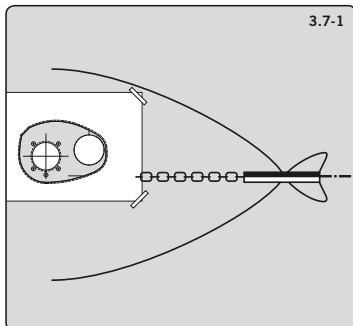
Linjen mellan rullen och kabelarets ovkant och längs dess centrumlinje skall vara horisontell $\pm 5^\circ$. Det måste finnas tillräckligt med vertikalt fall för kättingen/linan vid hemtagning.

⚠ **VARNING!** Otillräckligt med fallutrymme kan leda till att kättingen kommer i beknp.

3. Modell V6 (endast kätting)

Kättinge skall gå horisontellt från rullen till kabelarets och längs dess centrumlinje $\pm 5^\circ$. Det måste finnas tillräckligt med fallutrymme för kättingen vid hemtagning.

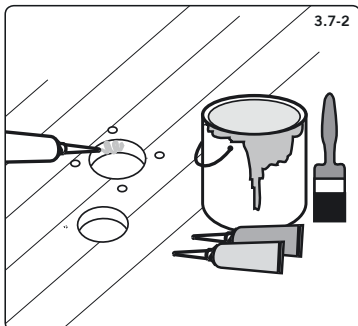
3. Installation



3.7 V1-6 above deck fitting

- Using your template and after you have checked all the above and below deck requirements cut the following holes.
- **Model V1-3**
Using a 10 mm ($3/8$ ") diameter drill, make the five holes for the mounting studs and sensor. With a 75 mm (3 ") diameter hole saw, make two holes for the rode and down tube to pass through.
 - **Models V4-6**
Using a 12 mm ($7/16$ ") diameter drill, make the five holes for the mounting studs and sensor. With a 115 mm ($4 1/2$ ") diameter hole saw, make two holes for the rode and down tube to pass through.
- When all the holes have been made, remove the template. To help avoid water absorption by the deck, apply an appropriate marine sealant to the freshly cut hole edges.
- Assemble and tighten studs into base until they bottom out in their holes. Some studs have a flat. Position the flats of the studs nearest the base of the windlass.

3. Montage



3.7 V1-6 Montage an Deck

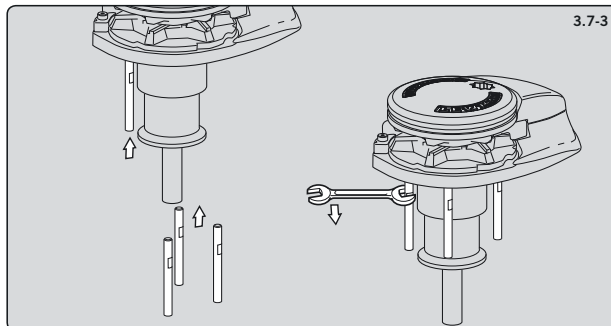
- Verwenden sie ihre Schablone zum Sägen und Bohren der notwendigen Löcher nach der Sicherstellung der oben aufgeführten Punkte auf und unter Deck.
- **Modell V1-3**
Mit dem 10mm Bohrer bringen sie die 5 Löcher für Montagebolzen und Zählwerksensor ein. Mit der 75mm Lochsäge die beiden Durchlässe für Kettenklüse und Antriebsschaft einbringen.
 - **Modell V4-6**
Mit dem 12mm Bohrer bringen sie die 5 Löcher für Montagebolzen und Zählwerksensor ein. Mit der 115mm Lochsäge die beiden Durchlässe für Kettenklüse und Antriebsschaft einbringen.
- Wenn alle Bohrungen eingebracht wurden entfernen sie die Schablone. Um das Eindringen von Wasser in die Deckstruktur zu verhindern versiegeln sie die frischen Ausschnitte mit entsprechendem Marine Dichtmittel.
- Drehen sie die Stehbolzen in die Deckseinheit ganz bis zum Ende ein. Die Bolzen besitzen nicht zentrische Flächen zum Schlüsselansatz. Drehen sie die Bolzen mit der Schlüsselfläche nahe zur Deckseinheit der Ankerwinde hin ein.

3. Installation

3.7 V1-6 Installation sur le pont

- En utilisant le gabarit et après avoir vérifié tous les critères sur et sous le pont, découper les trous suivants :
- **Modèles V1-3**
Utiliser un foret de 10mm ($3/8$ ") de diamètre, percer 5 trous pour les goudjons de montage et le capteur. Avec une scie-cloche de 75mm (3 ") de diamètre, percer deux trous pour faire passer le mouillage et le tube de transmission.
 - **Modèles V4-6**
Utiliser un foret de 12mm ($7/16$ ") de diamètre, percer 5 trous pour les goudjons de montage et le sonde. Avec une scie-cloche de 115mm ($4 1/2$ ") de diamètre, percer deux trous pour faire passer le mouillage et le tube de transmission.
- Quand tous les trous sont percés, enlever le gabarit. Pour éviter l'absorption de l'eau par le pont, appliquer un mastic marin approprié sur les bords des trous fraîchement découpés.
- Assemblez et serrez les goudjons dans l'embase jusqu'au fond. Certains goudjons ont une partie plane. Positionnez ces parties plane le plus près de l'embase du guideau

3. Instalación



3.7 V1-6 instalación por encima de cubierta

- Usando la plantilla y después de haber comprobado todo lo anterior y por debajo de los requisitos de la cubierta cortar los agujeros siguientes.
- **Modelo V1-3**
Usando un taladro de 10 mm ($3/8$ "), haga los cinco orificios para los pernos de montaje y el sensor. Con un agujero del diámetro 75 mm (3 "), hacer dos orificios para el caballo y hacia abajo para pasar a través del tubo.
 - **Modelos V4-6**
Usando el taladro de 12 mm ($7/16$ "), haga los cinco orificios para los pernos de montaje y el sensor. Con un agujero del diámetro 115mm ($4 1/2$ "), hacer dos orificios para el caballo y hacia abajo para pasar a través del tubo.
- Cuando todos los agujeros se han hecho, retire la plantilla. Para ayudar a evitar la absorción de agua por la cubierta, aplicar un sellador de marino apropiado en los bordes de los agujeros recién cortados.
- Montar y ajustar pernos en base hasta que lleguen al fondo en sus agujeros. Algunos pernos son de cabeza plana. Coloque la parte plana, lo más cerca posible de la base del Molinete.

3. Installazione

3.7 V1-6 Installazione in coperta

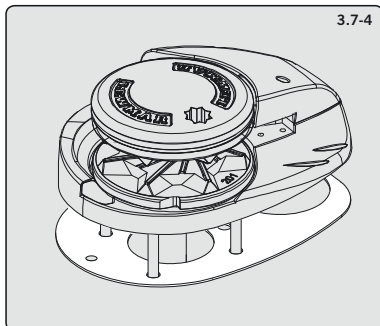
- Posizionare la dima dopo aver verificato ingombri e spessori e aver verificato la scala della dima con il verricello.
- **Modelli V1-3**
Utilizzando la punta da 10 mm praticare cinque fori per prigionieri e sensore conta catena. Con la punta a tazza da 75 mm, fare i due fori per passaggio asse motore e catena.
 - **Modelli V4-6**
Utilizzando la punta da 12 mm praticare cinque fori per prigionieri e sensore conta catena. Con la punta a tazza da 115 mm, fare i due fori per passaggio asse motore e catena.
- Rimuovere la dima solo dopo che tutti i fori sono stati effettuati. Applicare uno strato di sigillante all'interno di tutti i fori per prevenire l'infiltrazione di acqua nella struttura dalle pareti.
- Fissare i prigionieri alla base, il lato corto della filettatura va inserito nella base.

3. Installation

3.7 V1-6 ovan däck

- När alla ovan beskrivna kontroller utförts märker du upp de hål som skall tas upp, med hjälp av mallen.
- **Modellerna V1 till V3**
Borra de fem hålen för pinnbultarna och sensorn med ett borr på 10 mm. Gör sedan två hål med en hålsåg på 75 mm, för kättingen/linan och röret.
 - **Modellerna V4 till V6**
Borra de fem hålen för pinnbultarna och sensorn med ett borr på 12 mm. Gör sedan två hål med en hålsåg på 115 mm, för kättingen/linan och röret.
- Ta bort mallen när alla hål tagits upp. Tätat kanterna i de nyupptagna hålen med lämpligt marint tätningmedel.
- Dra i bultarna så att de bottnar i hålen i badden. Vissa av pinnbultarna är plana i änden. Dessa pinnbultar skall vara närmast ankarspelets bas.

3. Installation



4. Models V1-5

Place the base mat in position on the deck. Optionally, apply a suitable sealant to the base of the windlass, any mounting pad or around the studs.

Model V6

This model is not supplied with a base mat. Use sealant

- **NOTE:** If using silicone or other rubbery type sealant, it is advisable to allow curing of the sealant before final tightening of the mounting nuts.

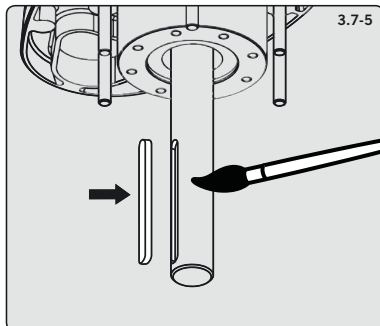
⊗ **DO NOT use a permanent adhesive/sealant, eg. 5200.**

5. Lightly coat the shaft with grease and ensure the drive key is in place before assembly to motor/gearbox.

3.8 V1-3 under deck fitting

- Lightly grease all moving parts.
1. Remove the Nyloc nut from the end of the Fast Fit clamp bolt and screw the bronze nut up to the end of the thread.
 2. Open up the Fast Fit clamp and offer the gearbox up to the above deck unit, sliding the shaft into the gearbox. Ensure the drive key is in place.

3. Montage



4. Modell V1-5

Platzieren sie die mitgelieferte Dichtung auf Deck und über den Bohrungen. Alternativ bringen sie Dichtmittel auf die Unterseite der Deckseinheit und/oder um die Stehbolzen herum auf.

Modell V6

Dieses Modell wird ohne Dichtung geliefert. Hier bitte Dichtmittel aufbringen.

- **ANMERKUNG:** Verwenden sie Silikon oder andere Gummi haltige Dichtmittel, dann muss das Dichtmittel vor der endgültigen Montage und dem Festziehen der Muttern unter Deck erst vollständig abgedungen sein.

⊗ **Verwenden sie NIEMALS permanente Klebstoffe/ Dichtmaterialien. Zum Beispiel 5200.**

5. Schmieren sie den Antriebsschaft mit wenig Fett und vergewissern sich über den korrekten Sitz der Passfeder, bevor die Motor/Getriebeeinheit angesetzt wird.

3.8 V1-3 Montage unter Deck

- Alle beweglichen Teile mit wenig Fett schmieren.
1. Lösen sie die selbst sichernde Mutter vom Ende des FastFit Klemmbolzen und drehen die Bronzemutter bis an das Ende des Bolzengewindes.
 2. Öffnen sie die FastFit Klemme und schieben die Motor/Getriebeeinheit über den Antriebsschaft hoch bis zur Deckseinheit. Vergewissern sie sich über den korrekten Sitz der Passfeder im Schaft.

3. Installation

4. Modèles V1-5

Positionner la semelle isolante sur le pont, ou, appliquer un mastic marin approprié sur la base du guindeau, le bossage de montage ou autour des goujons de montage.

Modèle V6

Ce modèle n'est pas fourni avec une semelle isolante. Utilisez un mastic.

- **REMARQUE:** Si vous utilisez un mastic en silicone ou en caoutchouc nous vous conseillons de le laisser durcir avant le serrage final des goujons de montage.

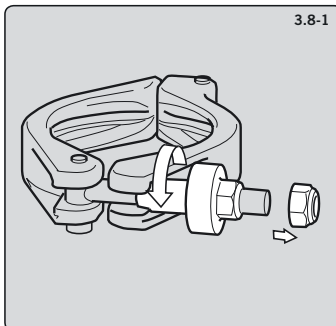
⊗ **NE PAS UTILISER un adhésif/ mastic permanent, ex. 5200.**

5. Graisser légèrement l'arbre et assurez vous que la clavette est en place avant de l'assembler au moto-réducteur.

3.8 V1-3 Installation sous le pont

- Graisser légèrement toutes les parties mobiles.
1. Enlever l'écrou Nyloc à l'extrémité du verrou de la bride Fast Fit et visser l'écrou en bronze jusqu'au bout du filetage.
 2. Ouvrir la bride Fast Fit et faire passer la boîte de vitesse jusqu'à l'unité du pont supérieur, faire glisser l'axe dans la boîte de vitesse. Vérifier que la clavette est en place.

3. Instalación



4. Modelos V1-5

Coloque la plantilla en la posición de base en la cubierta. Opcionalmente, aplicar un sellador adecuado en la base de los molinetes, cualquier montaje de la almohadilla o alrededor de los pernos.

Modelo V6

Este modelo no se suministra con una plantilla de base. Use sellador.

- **NOTA:** Si utiliza sellador de silicona o de otro tipo de goma, es aconsejable permitir el curado del sellador antes de apretar definitivamente las tuercas de montaje.

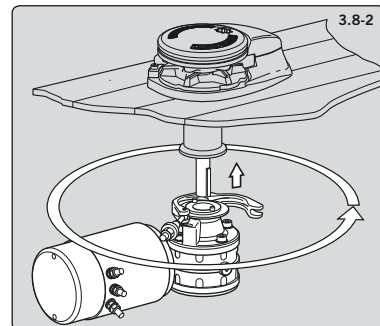
⊗ **No use un adhesivo permanente / sellador, por ejemplo. 5200.**

5. Cubra ligeramente el eje con grasa y garantice que la unidad se clave en su lugar antes del montaje de motor / caja reductora.

3.8 V1-3 montaje bajo cubierta

- Engrase ligeramente todas las piezas móviles.
1. Quite la tuerca de Nylon desde el final del perno de la abrazadera y tornillo de ajuste rápido de la tuerca de bronce hasta el final del hilo.
 2. Abra la abrazadera de ajuste rápido que ofrece la caja de cambios a la unidad por encima de la cubierta, deslizando el eje en la caja de cambios. Asegúrese de que la unidad se clave en su lugar.

3. Installazione



4. Modelli V1-5

Posizionare la guarnizione di base sulla coperta ed applicare un leggero strato di sigillante, particolarmente in prossimità del passaggio dei perni.

Modello V6

Per questa versione non viene fornita la guarnizione di base, utilizzare solo sigillante.

- **NOTA:** Dopo aver posizionato le parti, lasciare asciugare il sigillante prima del serraggio definitivo dei perni.

⊗ **NON utilizzare mai sigillanti permanenti o strutturali (tipo 5200)**

5. Ingrassare leggermente l'asse e verificare il posizionamento corretto della chiavetta prima di inserire il riduttore.

3.8 V1-3 Operazioni sotto coperta

- Lubrificare leggermente tutte le parti in movimento.
1. Rimuovere il dado autobloccante dalla vite di bloccaggio del Fast Fit e allentare al massimo il pomello in bronzo.
 2. Aprire la cravatta di fissaggio del Fast Fit e inserire il gruppo motore/riduttore nell'asse nella posizione desiderata. Verificare che la chiavetta sia in posizione.

3. Installation

4. Modellerna V1 till V5

Lägg bäddmattan på plats på däck. Alternativt kan du stryka ett lämpligt tätningsmedel på spelets bädd, eventuellt mellanlägg eller runt pinnbultarna.

Modell V6

Denna modell levereras inte med bäddmatta. Använd tätningsmedel.

- **Anm:** Om du använder silikon eller annat gummiiliknande tätningsmedel, bör du tänka på att man bör låta vissa sådana tätningsmedel hårdna innan muttrarna dras åt.

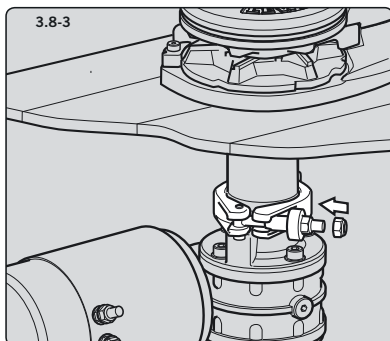
⊗ **ANVÄND INTE permanenttätningsmedel, såsom t ex 5200.**

5. Stryk ett tunt lager fett på axeln och kontrollera att kilen ligger på plats innan motorn/växelhuset monteras.

3.8 V1 till V3 under däck

- Stryk ett tunt lager fett på alla rörliga delar.
1. Ta bort nylocmuttern från tvingbulten och dra på bronsmuttern på hela gängen.
 2. Öppna tvingen och tryck upp växelhuset ovan däcksenheten, och tryck in axeln i växelhuset. Se till att kilen ligger i kilspåret när detta görs.

3. Installation



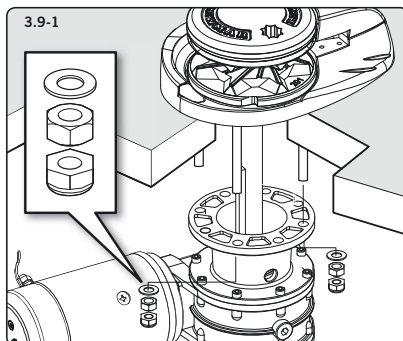
3. Slide the gearbox up the shaft and rotate it into a suitable position before finally pushing home onto the location dowels.

Swing the Fast Fit clamp shut and tighten up the bronze nut by hand. If required you can remove the plastic location plug holding the Fast Fit clamp in place and rotate the clamp around the gearbox flange to give a better location for tightening up the nut.

3.9 V4-5 under deck fitting

- Lightly grease all moving parts.
- 1. Ensure drive key is in place then gently slide the motor/gearbox up the drive shaft until it contacts the deck.
- **NOTE:** Position the motor/gearbox away from the rope/chain pipe fall.
- 2. Check the motor/gearbox and windlass mounting surfaces are parallel. Assemble the M8 nut first, secure with Loctite® threadlock to 43 Nm torque. Lock tightened nut with spanner and then secure with the M8 Nyloc nut.
- **NOTE:** If using silicone or other rubbery type sealant, it is advisable to allow curing of the sealant before final tightening of the mounting nuts.

3. Montage



3. Schieben sie das Getriebe über den Schaft und drehen es in die passende Position, bevor die Einheit endgültig auf die Zentrierbolzen gesetzt wird.

Schließen sie die FastFit Klemme und drehen die Bronzemutter per Hand an. Wo notwendig kann der Kunststoffhalter des FastFit abgenommen werden, um auch die Klemme auf dem Schaft für eine noch bessere Ausrichtung zum Anziehen der Mutter verdrehen zu können.

- Ziehen sie die Bronzemutter mit 15Nm an. Erst jetzt können sie die Bronze- mit der selbst sichernden Mutter.

3.9 V4-5 Montage unter Deck

- Streichen sie alle beweglichen Teile mit wenig Fett ein.
- 1. Vergewissern sie sich über den korrekten Sitz der Passfeder bevor sie die Motor/Getriebeeinheit vorsichtig bis zum Kontakt mit dem Deck auf die Antriebswelle schieben.
- **ANMERKUNG:** Positionieren sie die Motor/Getriebeeinheit frei von der Kettenklüse/dem Kettendurchlass.
- 2. Überprüfen sie die Parallelität zwischen Deckseinheit und Montageflansch des Antriebs. Verschrauben sie zuerst mit den M8 Muttern – Sicherung der Muttern mit Loctite® Gewindegewissung bei 43Nm Drehmoment. Kontern sie die Muttern unter Gegenhalten mit einer selbst sichernden Mutter.
- **ANMERKUNG:** Verwenden sie Silikon oder andere Gummi haltige Dichtmittel, dann muss das Dichtmittel vor der endgültigen Montage und dem Festziehen der Muttern unter Deck erst vollständig abgeunden sein.

3. Installation

3. Faites glisser la boîte de vitesse jusqu'à l'axe, tournez-la dans la meilleur position avant de la pousser finalement sur les trous des goujons.

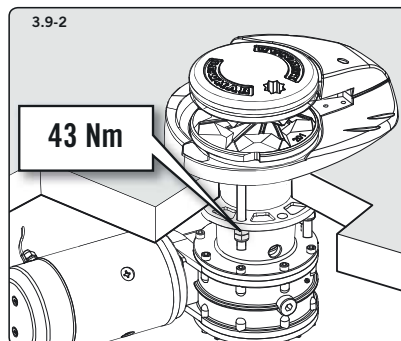
Fermer la bride Fast Fit et resserrer l'écrou de bronze à la main. Si nécessaire, vous pouvez enlever le bouchon en plastique qui tient la bride Fast Fit en place et la faire pivoter autour de la collerette de boîte de vitesses pour resserrer l'écrou dans la bonne position.

- Serrer l'écrou en bronze à 15 Nm (11 lb/pi) avant d'ajouter l'écrou Nyloc. Serrez l'écrou Nyloc derrière l'écrou bronze.

3.9 V4-5 Installation sur le pont inférieur

- Graisser légèrement toutes les pièces mobiles.
- 1. Assurer que la clavette est en place, puis glisser doucement le moto-réducteur jusqu'à l'arbre d'entraînement jusqu'à ce qu'il touche le pont.
- **REMARQUE:** positionner le moto-réducteur loin de la chute du corde/ chaîne.
- 2. Vérifiez que les surfaces de montage du moto-réducteur et du guindeau soient parallèles. Assembler l'écrou M8 en premier, le sécuriser avec le Loctite® Threadlock à 43 Nm de couple. Resserrer l'écrou avec une clé, puis fixez avec l'écrou M8 Nyloc.
- **REMARQUE:** Si vous utilisez un mastic silicone ou caoutchouc, il est conseillé de le laisser durcir avant le serrage final des goujons de montage.

3. Instalación



3. Deslice la caja de cambios hasta el eje y girar en una posición adecuada antes de que finalmente empujar a su lugar los pasadores de ubicación.

Gire la pinza del Fast Fit. Fast y apriete la tuerca de bronce de la mano. Si es necesario, puede extraer el tapón de plástico de la abrazadera de ajuste rápido en el lugar y girar la abrazadera alrededor de la brida de la caja reductora para dar una mejor ubicación para el endurecimiento de la tuerca.

- Apriete la tuerca de bronce a 15 Nm (11 lb / pie) antes de añadir la tuerca de Nylon. Apriete la tuerca de Nylon detrás de la tuerca de bronce.

3.9 V4-5 montaje bajo cubierta

- Engrase ligeramente todas las piezas móviles.
- 1. Asegúrese que la unidad se clave en su lugar a continuación, deslice suavemente el motor / caja reductora hasta que el eje de contacto con la cubierta.
- **NOTA:** Posición del motor / caja reductora lejos de la caída de la cadena.
- 2. Revise que el motor / caja reductora y la superficies de montaje del molinete son paralelas. Montar la tuerca M8 en primer lugar, asegurar con Loctite® para tuercas a 43 Nm. Apretar la tuerca de bloqueo con llave y seguro con la tuerca de la Nyloc M8.
- **NOTA:** Si utiliza sellador de silicona o de otro tipo de goma, es aconsejable permitir el curado del sellador antes de apretar definitivamente las tuercas de montaje.

3. Installazione

3. Ruotare leggermente il gruppo motore/riduttore per inserire la spina in uno dei fori presenti sul collo del fast Fit. Spingere fino a far combaciare le due facce.

Richiudere la cravatta del Fast Fit e avvitare il pomello in bronzo a mano. Se necessario, è possibile ruotare la cravatta per far cadere la chiusura in una posizione più accessibile.

- Serrare il pomello in bronzo a 15 Nm e poi avvitare e portare a faccia il dado autobloccante.

3.9 V4-5 Operazioni sotto coperta

- Lubrificare leggermente tutte le parti in movimento.
- 1. Assicurarsi che la chiavetta sia in posizione e poi inserire il gruppo motore/riduttore lungo l'asse fino a farlo poggiare sulla faccia inferiore della coperta.
- **NOTA:** Ricordarsi di posizionare il motore il più lontano possibile dal passaggio della catena.
- 2. Qualora i due piani di appoggio dell'unità di coperta e del motore non fossero paralleli ricordarsi di inserire degli spessori sui prigionieri. Posizionare rondelle e dadi M8 sui prigionieri, applicare Loctite® sulle filettature e poi serrare a 43 Nm. E' consigliabile applicare un secondo dado autobloccante per sicurezza.
- **NOTA:** lasciare seccare il silicone prima del fissaggio definitivo dei dadi.

3. Installation

3. Tryck upp växeln på axeln och vrid den till ett lämpligt läge innan du trycker fast den på knastren.

Stäng snabbfästet och dra åt bronsmuttern för hand. Vid behov kan du ta loss den plastplugg som håller snabbfästet på plats och vrida låset runt växelhustflänsen för att få ett bättre läge att dra muttern i.

- Dra bronsmuttern med 15 Nm, innan du drar dit nylocmuttern. Dra på nylocmuttern så att den ligger an mot bronsmuttern.

3.9 Montering av V4-5 under däck

- Stryk ett tunt lager fett på alla rörliga delar.
- 1. Kontrollera att kilen ligger på plats och tryck sedan försiktigt upp motor/växel på drivaxeln, så att den ligger an mot däck.
- **Anm:** Se till att motor/växel inte hamnar i vägen för kättingens/linans fallväg ner i kättingboxen.
- 2. Kontrollera att motor/växel och spelets monteringsyta är parallella. Dra först på M8-muttern och dra den med 43 Nm. Försegla muttern med Loctites gänglåsning och dra på nylocmuttern i stället M8.
- **Anm:** Om du använder silikon eller annat gummiaktande tättningsmedel, bör du tänka på att man bör låta vissa sådana tättningsmedel hårdna innan muttrarna dras åt.

3. Installation

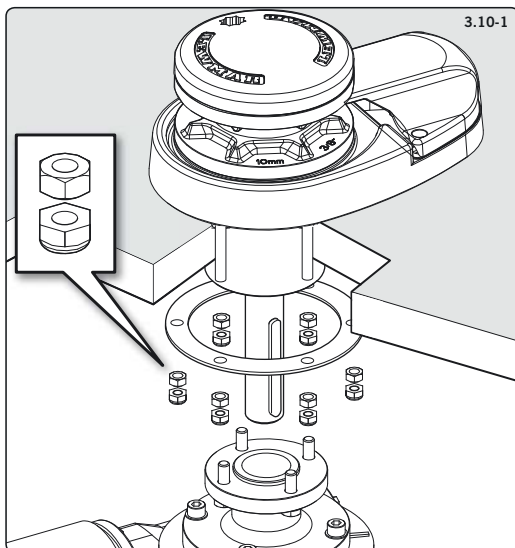
3. Montage

3. Installation

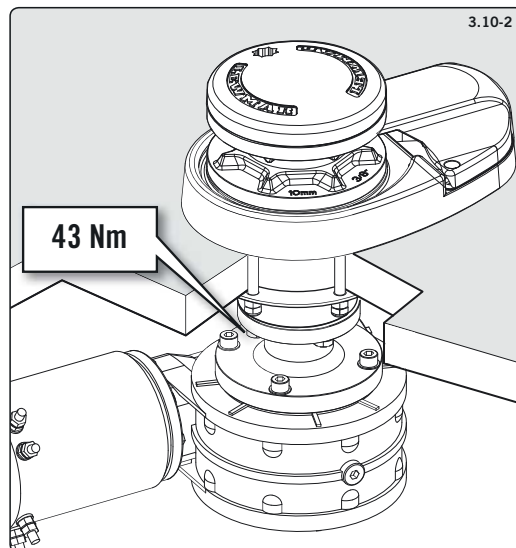
3. Instalación

3. Installazione

3. Installation



3.10-1



3.10-2

3.10 V6 under deck fitting

- Lightly grease all moving parts.
- 1. Slide the deck backing plate onto the windlass studs. Assemble the M10 nut first, secure with Loctite® threadlock to 43 Nm torque. Lock tightened nut with spanner and then secure with the M10 Nyloc nut.
- **NOTE:** If using silicone or other rubbery type sealant, it is advisable to allow curing of the sealant before final tightening of the mounting nuts.
- 2. Ensure drive key is in place then gently slide the motor/gearbox up the drive shaft until motor/gearbox mounting plate meets the windlass downtube. Assemble the M10 bolts secure with Loctite® threadlock to 43 Nm torque.
- **NOTE:** Position the motor/gearbox away from the rope/chain pipe fall.

3.10 Unter Deck Montage

- Streichen sie alle beweglichen Teile mit wenig Fett ein.
- 1. Schieben sie die Deckgegenplatten auf die Montagebolzen. Drehen sie erst die M10 Muttern auf – Sicherung der Muttern mit Loctite® Gewindefixierung bei 43Nm Drehmoment. Kontern sie die Muttern unter Gegenhalten mit einer selbst sichernden Mutter.
- **ANMERKUNG:** Verwenden sie Silikon oder andere Gummi haltige Dichtmittel, dann muss das Dichtmittel vor der endgültigen Montage und dem Festziehen der Muttern unter Deck erst vollständig abgeunden sein.
- 2. Vergewissern sie sich über den korrekten Sitz der Passfeder bevor sie die Motor/Getriebeeinheit vorsichtig bis zum Kontakt mit dem Gehäuse des Antriebes auf die Antriebswelle schieben. Sicherung der M10 Muttern mit Loctite® Gewindefixierung bei 43Nm Drehmoment.
- **ANMERKUNG:** Positionieren sie die Motor/Getriebeeinheit frei von der Kettenklüse/dem Kettendurchlass.

3.10 V6 installation sous le pont

- Graisser légèrement toutes les pièces mobiles.
- 1. Faites glisser la contre plaque du pont sur les goujons du guindeau. Assemblez l'écrou M10 en premier, le sécuriser avec le Loctite® Threadlock à 43 Nm de couple. Resserrer l'écrou avec une clé, puis sécuriser avec l'écrou M10 Nyloc.
- **REMARQUE:** Si vous utilisez un mastic silicone ou caoutchouc, il est conseillé de le laisser durcir avant le serrage final des goujons de montage.
- 2. S'assurer que la clavette est en place, puis glisser doucement le moto-réducteur jusqu'à ce qu'il touche le tube du guindeau. Assemblez les boulons M10 les sécuriser avec le Loctite® Threadlock à 43 Nm de couple.
- **REMARQUE:** positionner le moto-réducteur loin de la chute du corde/chaîne.

3.10 V6 montaje bajo cubierta

- Engrase ligeramente todas las piezas móviles.
- 1. Deslice la pletina trasera sobre los pernos. Una las tuercas de M10 primero, y asegúrenlos con Loctite® para rosas con 43 Nm. Fije con fuerza la tuerca con una llave de tubo y asegure la tuerca M10 de Nyloc.
- **NOTA:** Si utiliza silicona o otro sellador de goma, asegúrese de secar el sellador antes del ajuste final de las tuercas.
- 2. Asegúrese que el eje es encajado suavemente el motor/caja reductora. Ensamble los tornillos de M10 con Loctite® para rosas con una presión de 43 Nm.
- **NOTA:** Posicione el motor/caja reductora fuera del alcance de la caída de cabo/cadena.

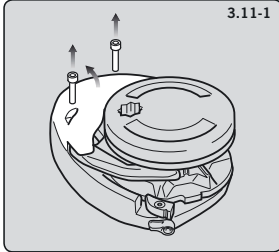
3.10 V6 Montaggio sotto coperta

- Ingrassare leggermente tutte le parti in movimento.
- 1. Inserire la controflangia sui prigionieri. Montare i dadi M10 normali applicando frenafilietti Loctite® e serrare a 43 Nm. In seguito avvitare e portare a faccia i dadi autobloccanti.
- **NOTA:** lasciare seccare il silicone prima del fissaggio definitivo dei dadi.
- 2. Assicurarsi che la chiavetta sia in posizione e poi inserire il gruppo motore/riduttore lungo l'asse fino a farlo poggiare sulla faccia inferiore del gruppo. Avvitare i dadi M10 applicando frenafilietti Loctite® e serrare a 43 Nm.
- **NOTA:** posizionare il motore il più possibile distante dal passaggio della catena.

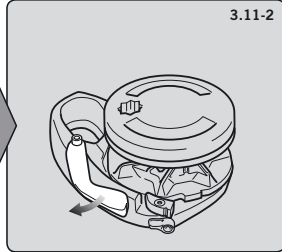
3.10 Montering av V6 under däck

- Stryk ett tunt lager fett på alla rörliga delar.
- 1. Tryck på däcksplattan på pinnbultarna på spelet. Dra först på M10-muttern och dra den med 43 Nm. Försegla muttern med Loctites gänglåsning och dra på nylocmuttern i stl M10.
- **Anm:** Om du använder silikon eller annat gummiliknande tättningsmedel, bör du tänka på att man bör låta vissa sådana tättningsmedel hårdna innan muttrarna dras åt.
- 2. Kontrollera att kilen sitter på plats och tryck försiktigt på motor/växel på drivaxeln så att monteringsplattan på motorn/växeln ligger an mot det nedåtriktade röret från spelet. Dra först på M10-muttrarna och dra dem med 43 Nm.
- **Anm:** Se till att motor/växel inte hamnar i vägen för kättingens/linans fallväg ner i kättingboxen.

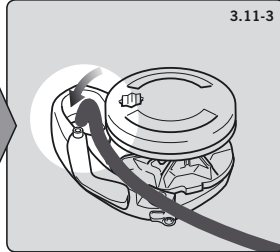
3. Installation



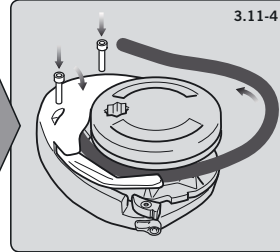
3. Montage



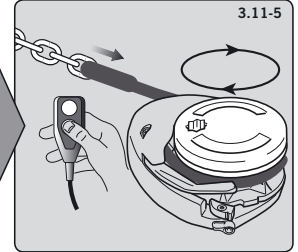
3. Installation



3. Instalación



3. Installazione



⚠ **WARNING!** Isolate the windlass using circuit breaker/isolator.

3.11 V1-6 loading rope/chain

- For safety and performance Lewmar recommends the use of matched Lewmar anchor rodes.

 - Remove cover.
 - Pull out control arm.
 - Feed anchor rope/chain into entry hole. Tie off to suitable strong point.
 - Replace cover. Release control arm and wrap rope/chain around gypsy.
 - Power load rest of anchor rope/chain.

Model V6 chain only

These models have the same loading procedure as above but do not have a control arm.

⚠ **WARNING!** Isolieren sie den Stromkreis durch Betätigung der Sicherung oder den Hauptschalter.

3.11 Einziehen Tauwerk/Kette

- Zur Sicherheit und bester Leistung empfiehlt Lewmar den Einsatz von vergleichbaren Ankergeschirren.

 - Entfernen der Abdeckung
 - Zurückziehen des Kontroll-Arms
 - Einführen des Kettengeschirrs in die Kettenklüse. Sicher an entsprechendem Punkt.
 - Aufsetzen der Abdeckung. Rückführen des Kontroll-Arms und Auflegen des Geschirrs auf die Kettenklüse.
 - Einholen des Geschirrs mit Motorkraft.

Model V6 – nur Kette

Dieses Modell hat die selbe Lade-prozedur wie oben, besitzt aber keinen Kontroll-Arm."

⚠ **ATTENTION!** Isoler le guindeau à l'aide du coupe-circuit/disjoncteur.

3.11 V1-6 chargement de la corde/chaîne

- Pour la sécurité et la performance, Lewmar recommande l'utilisation de lignes de mouillage d'ancre Lewmar.

 - Retirer le couvercle.
 - Ecartez le bras de contrôle.
 - Passer la corde/chaîne de l'ancre dans le trou d'entrée. Attacher à un point fixe solide.
 - Replacer le couvercle. Relâcher le bras de contrôle et tournez la corde/chaîne autour du barbotin.
 - Enrouler électriquement le reste de la corde/chaîne.

Modèle V6 chaîne seulement

Ces modèles ont la même procédure d'enroulement comme ci-dessus, mais ne disposent pas d'un bras de contrôle.

⚠ **¡ADVERTENCIA!** Aislar el molinete con interruptor / aislador.

3.11 V1-6 carga de cadena/cabo

- Para una seguridad y mayor rendimiento Lewmar recomienda utilizar rollers de ancla Lewmar.

 - Desmonte la tapa.
 - Saque el brazo de control.
 - Coloque el cabo/cadena en la entrada el agujero. Fije en extremo a un punto fijo.
 - Monte la tapa, coloque el brazo de control y abrace el cabo/cadena alrededor del barboten.
 - Encienda y recoja el resto del cabo/cadena.

Modelo V6 solo cadena

Estos modelos tienen el mismo proceso de instalación como arriba pero no tienen brazo de control.

⚠ **ATTENZIONE!** Isolare sempre elettricamente il verricello prima di qualunque operazione.

3.11 V1-6 Inserimento catena

- Per garantire prestazioni e affidabilità, raccomandiamo l'utilizzo di catena calibrata della misura corretta.

 - Rimuovere la conchiglia di copertura.
 - Sollevarlo lo spingi catena se presente.
 - Inserire la catena nel foro del passaggio e fissare ad un punto sicuro.
 - Posizionare la conchiglia. Avvolgere la catena sul barbotin e rilasciare lo spingi catena.
 - Recuperare tutta la catena utilizzando il motore.

Modello V6 (solo catena)

Come sopra ad eccezione delle note sullo spingi catena che non è mai presente.

⚠ **"WARNING!** Koppla från ankarspelet elektriskt.

3.11 Montering av lina/kätting på V1-6

- Vi rekommenderar att du använder kätting och lina från Lewmar, så att du får högsta tänkbara säkerhet och bästa funktion.

 - Demontera höljet.
 - Dra ut kontrollarmen.
 - Mata in ankarlinan/kättingen genom ingångshålet. Lägg fast på en tillräckligt kraftig pällare eller liknande.
 - Återmontera höljet. Frigör styrarmen och lägg lina/kättingen runt kabelare.
 - Kör in resten av lina/kättingen.

Endast modell V6

Dessa modeller tas i drift på samma sätt som ovan beskrivna modeller, men är inte försedda med någon styrarm.

4. Electrical Wiring

4.1 Electric cable selection

Lewmar recommends the installer source and install cable that meets the requirements of the standards and regulations relevant to the installation and codes of practice.

The cable table gives recommended cable sizes based on total length of cable required, from the battery, following the route of the cables.

DO NOT confuse cable length with the length of the vessel!

- Windlass performance is directly related to cable size and length. Voltage drop over the complete wiring run must not exceed 10%.

4.2 Wiring

Plan the installation to suit the controls and give the operator a full view of the windlass. The wiring system should be of the fully insulated type, which avoids possible electrolytic corrosion problems. We recommend the use of type III stranded, tinned copper wire with copper crimp terminals. Most modern installations are negative return (negative ground) but polarity should be checked.

Overload protection, in the form of the circuit breaker/fuse supplied, must be built into the windlass wiring circuit.

- **NOTE:** The circuit breaker should be positioned close to the battery in a dry, readily accessible place.
- The breaker must be manually reset should an overload occur that causes it to trip to the off position.

WARNING!

- If you are not sure you understand these guidelines, seek professional help. Ensure that the installation complies with USCG, ABYC, NMMA or other local regulations.

4. Elektrische Montage

4.1 Auswahl elektrische Kabel

Lewmar rät dringend zur ausschließlichen Verwendung von Versorgungs- und Schaltkabeln, die den Standards und Anforderungen der entsprechenden Regularien und Richtlinien entsprechen. Die Kabeltabelle gibt Empfehlungen zu Kabelquerschnitten basierend auf Kabellängen ausgehend von der Batterie dem Verlauf folgend.

Verwechseln sie NICHT die Kabellänge mit der Schiffslänge!

- Die Leistung der Ankerwinde ist direkt von dem Kabelquerschnitt und der Lauflänge des Kabels abhängig. Der Spannungsverlust über das Kabelsystem darf 10% nicht überschreiten.

4.2 Verkabelung

Planen sie die Montage der Schaltungen entsprechend so, dass ein freier Blick auf die Ankerwinde bei Bedienung gewährleistet ist. Die Verkabelung sollte ein separat gesicherter Kreislauf sein, um eventuell elektrolytische Korrosion ausschließen zu können. Wir empfehlen den Einsatz von Typ III adrigem, verzinnem Kupferkabel mit Kupfer Crimp-Terminals. Die meisten modernen Installationen sind negativ geerdet. Die Polarität sollte sichergestellt und überprüft werden.

Ein Überlastschutz in Form eines Sicherungsautomaten/ einer Sicherung muss in den Kreislauf integriert werden.

- **ANMERKUNG:** Der Hauptschalter sollte so nah wie möglich zur Batterie an einem trockenen und leicht zugänglichen Ort montiert werden.
- Der Sicherungsautomat muss manuell zurück setzbar sein, um nach einem eventuellen Auslösen wieder aktiviert werden zu können.

WARNUNG!

- Sollten sie die Anleitung bis hier nicht vollständig verstanden haben, dann sprechen sie mit einem qualifizierten Elektrotechniker für entsprechende Hilfe. Stellen sie sicher, dass die Montage entsprechend der USCG, ABYC, NMMA oder anderen lokalen Regularien durchgeführt wird.

4. Installation Electrique

4.1 La sélection du câble électrique.

Lewmar recommande que la source électrique et le câble d'installation répondent aux exigences des normes et des règlements en vigueur propres à l'installation et des codes de pratique. Le tableau donne les tailles de câbles recommandées, basées sur la longueur totale de câble nécessaire depuis la batterie, en suivant le parcours des câbles.

NE PAS CONFondre longueur de câble avec la longueur du navire!

- La performance du guindeau est directement liée à la taille et la longueur de câble. La baisse de tension sur la totalité du câblage ne doit pas dépasser 10%.

4.2 Câblage

Planifier l'installation en fonction des commandes, pour donner à l'opérateur une vue complète du guindeau. Le système de câblage doit être entièrement isolé, ce qui évite d'éventuels problèmes de corrosion électrolytique. Nous recommandons l'utilisation de câble de type 3 fils en cuivre-étain avec terminaisons à cosse à sertir en cuivre. La plupart des installations modernes sont à la masse de polarité négative, mais la polarité doit être vérifiée.

La protection contre les surcharges, sous la forme du disjoncteur/fusibles fournis, doit être intégrée dans le circuit de câblage du guindeau.

- **REMARQUE:** Le coupe-circuit doit être placé près de la batterie dans un endroit sec et facilement accessible.
- Le disjoncteur doit être remis manuellement si une surcharge le disjoncte.

RECOMMANDATIONS!

- Si vous n'êtes pas sûr de bien comprendre ces directives, consultez un professionnel. Veiller à ce que l'installation satisfasse aux normes USCG, ABYC, NMMA ou d'autres réglementations locales.

4. Cableado Eléctrico

4.1 Selección del cable eléctrico

Lewmar recomienda la instalación de la fuente e instalar cable que cumpla con los requisitos de las normas y reglamentos pertinentes a la instalación y códigos de práctica. La tabla de cable, recomienda los tamaños de cable basado en la longitud total del cable necesario hasta la batería, siguiendo el recorrido de los cables.

No hay que confundir la longitud del cable con la longitud del barco!

- El rendimiento del molinete, está directamente relacionado con el tamaño de cable y la longitud. La caída de tensión a lo largo del recorrido total del cableado no debe superar el 10%.

4.2 Cableado

Planee la instalación para adaptarse a los controles y para dar al operador una vista completa del molinete. El sistema de cableado debe ser de tipo totalmente aislados, lo que evita posibles problemas de corrosión electrolytica. Se recomienda el uso de cable tipo III, alambre de cobre y terminales de estañado de cobre. La mayoría de instalaciones modernas son de rendimiento negativo (negativo a tierra), pero la polaridad debe estar marcada.

La protección de sobrecarga, en la forma del disyuntor o fusible suministrado, debe ser construida en el circuito de cableado del molinete.

- **NOTA:** El interruptor debe colocarse cerca de la batería en un lugar seco, de fácil acceso.
- El interruptor debe restablecer manualmente y producir una sobrecarga que hace que viaje a la posición de apagado.

¡ADVERTENCIA!

- Si usted no está seguro de que entiende estas directrices, busque ayuda profesional. Asegúrese de que la instalación cumple con USCG, ABYC, NMMA o regulaciones locales.

4. Impianto elettrico

4.1 Scelta dei cavi

Lewmar raccomanda di affidarsi sempre ad un tecnico qualificato per il calcolo delle sezioni dei cavi e degli assorbimenti nell'impianto di bordo.

La tabella indica la sezione dei cavi consigliata, tenendo conto della distanza tra batteria e motore. Tale distanza deve essere quella reale percorsa dai cavi.

NON confondere la lunghezza dei cavi con la distanza teorica!

- Le prestazioni dei verricelli elettrici sono strettamente correlate al dimensionamento dei cavi. La caduta di tensione lungo tutta la linea non deve mai superare il 10%.

4.2 Connessioni

Pianificare tutte le possibili connessioni ed i passaggi prima di iniziare l'operazione. L'impianto deve essere del tipo totalmente isolato. Lewmar raccomanda treccia di rame isolata di tipo III e terminali in rame. L'isolamento appropriato eviterà fenomeni di corrosione per correnti galvaniche. Impianti con negativo comune possono essere utilizzati con particolare attenzione alla polarità. Una protezione dai sovraccarichi, mediante fusibile o magneto-termico, deve assolutamente essere prevista.

- **NOTA:** La posizione ideale per il magneto-termico è vicino alle batterie, in luogo asciutto e facilmente accessibile.
- Questo permetterà una facile riattivazione dell'interruttore in caso di intervento di sicurezza.

AVVERTIMENTI!

- In caso di dubbi, consultare un tecnico specializzato. Gli impianti elettrici di bordo devono rispettare le norme locali come USCG, ABYC, NMMA.

4. Kabeldragning

4.1 Kabeldimensionering

Vi rekommenderar att installationskabeln dimensioneras efter gällande standarder och bestämmelser. Rekommendationerna i tabellen baseras på kabelns totala längd från batteriet fram till ankarspelet.

Förutsätt inte att kabellängden är lika med båtens längd!

- Ankarspelets funktion är direkt beroende av kabelns tvärsnittsarea och längd. Spänningsfallet över hela kabellängden får inte överstiga 10%.

4.2 Kabeldragning

Planera installationen så att den passar kontrollenheter och operatören får full kontroll över spelet. Kabeln skall vara en helisolerad, skyddad mot elektrolytisk korrosion. Vi rekommenderar användning av tvinnad kopparledare av standardtyp klass III, med kabelskor av koppar. De flesta moderna installationer är minusjordade, men för säkerhets skull bör polariteten kontrolleras.

Överlastskyddet, dvs den medlevererade kretsbrytaren/säkringen, skall byggas in i kretsen.

- **ANM:** Kretsbrytaren bör installeras i ett torrt och lättåtkomligt utrymme, så nära batteriet som möjligt.
- Brytaren återställs manuellt efter aktivering pga överlast.

VARNINGAR!

- Begär professionell hjälp om du inte förstår dessa riktlinjer. Installationen måste utföras i enlighet med tillämpliga regler och föreskrifter.

4. Electrical Wiring

4.3 Control switch installation

Follow the mounting instructions supplied with the switch.

- **NOTE:** In a multi station installation all switches must be wired in a parallel circuit.

4. Elektrische Montage

4.3 Anschluss der Schaltkabel

Folgen sie den Anweisungen, die mit den verschiedenen Schaltern geliefert wird.

- **ANMERKUNG:** Bei mehreren Schaltstellen müssen alle Schalter in einem parallelen Kreislauf geschaltet werden.

4. Installation Electrique

4.3 Installation de l'interrupteur de control

Suivez les instructions de montage fournies avec l'interrupteur.

- **REMARQUE:** Dans une installation multi-station tous les interrupteurs doivent être câblés en circuit parallèle.

4. Cableado Eléctrico

4.3 Instalación del interruptor de control

Siga las instrucciones de montaje suministrado con el interruptor.

- **NOTA:** En una instalación de estación de conmutadores múltiples deben ser conectadas en un circuito en paralelo.

4. Impianto elettrico

4.3 Installazione dei comandi

Seguire le istruzioni allegate al comando

- **NOTA:** In un sistema multi stazione, tutti i comandi devono essere collegati in parallelo.

4. Kabeldragning

4.3 Installation av huvudbrytare

Följ de monteringsinstruktioner som levereras med brytaren.

- **ANM:** Tänk på att alla brytare i installationer med flera enheter skall vara kopplade parallellt.

Model	Voltage	Cable sizing for length of cable run	Circuit breaker	Contacttor	Control Box
Modell	Volt	Kabelquerschnitt für Kabelllauf	Stromunterbrecher	Relais	Control Box
Modèle	Voltage	Taille de câble sur la longueur du câblage	Coupe circuit	Relais	Boitier de relais
Modelo	Voltage	Seccion del cable segun la distancia	Termoresistencia	Contacttor	Caja de Control
Modello	Tensione	Misura dei cavi in base alla lunghezza effettiva	Magneto-termico	Solenoid	Control Box
Modell	Spänning	Kabel dimensionering för kabellängd	Kretsbrytare	Kontaktor	Kontrollbox

	V	0 - 7 m	0 - 23 ft	7 - 15 m	23 - 50 ft	15 - 22 m	50 - 73 ft	A		
V1/Sport	12	10 mm ²	6 AWG	25 mm ²	4 AWG	35 mm ²	0 AWG	90 A (68000349)	68000318	68000129
V2/Sport	12	10 mm ²	6 AWG	25 mm ²	4 AWG	35 mm ²	0 AWG	90 A (68000349)	68000318	68000129
V2/Sport	24	6 mm ²	10 AWG	6 mm ²	8 AWG	10 mm ²	8 AWG	50 A (68000348)	68000319	68000130
V3/Sport	12	16 mm ²	6 AWG	25 mm ²	2 AWG	35 mm ²	0 AWG	110 A (68000350)	68000318	68000129
V3/Sport	24	10 mm ²	8 AWG	16 mm ²	6 AWG	25 mm ²	4 AWG	90 A (68000349)	68000319	68000130
V4	12	25 mm ²	3 AWG	35 mm ²	0 AWG	50 mm ²	0 AWG	150 A (68000351)	68000320	18000200
V4	24	10 mm ²	8 AWG	16 mm ²	4 AWG	25 mm ²	2 AWG	110 A (68000350)	68000321	18000237
V5	12	25 mm ²	3 AWG	35 mm ²	0 AWG	50 mm ²	0 AWG	150 A (68000359)	68000318	68000128
V5	24	10 mm ²	8 AWG	16 mm ²	4 AWG	25 mm ²	2 AWG	110 A (68000350)	68000318	68000130
V6	24	25 mm ²	2 AWG	35 mm ²	0 AWG	50 mm ²	0 AWG	150 A (68000351)	68000321	18000237

Wireless remote 3 button windlass only	Wireless remote 5 button windlass and thruster
Kabellose Fernbedienung 3 Funktionen nur Ankerwinde	Kabellose Fernbedienung 3 Funktionen nur Ankerwinde
Télécommande sans fil à 3 boutons pour le guindeau uniquement.	Télécommande sans fil à 3 boutons pour le guindeau et le propulseur
Control remoto sin cables de tres botones para molinete	Control remoto sin cables de cinco botones para molinete y hélice de proa
Radiocomando a 3 tasti per verricello	Radiocomando a 5 tasti per verricello e thruster
Trådlösfjärrkontroll med 3 knappar endast för ankarspel	Trådlösfjärrkontroll med 5 knappar för ankarspel och bogpropeller
68000867	68000868

- **NOTE:** Wireless remote also available.
- **NOTE:** Wireless remote can only be used if a contactor is fitted. See wireless remote instructions for wiring details.

- **ANMERKUNG:** Drahtlose Fernbedienungen sind ebenfalls lieferbar
- **ANMERKUNG:** Drahtlose Fernbedienungen können nur zusammen mit einem Relais geschaltet werden. Siehe Anleitungen für drahtlose Fernbedienungen.

- **REMARQUE:** Télécommande sans fil également disponible.
- **REMARQUE:** Une télécommande sans fil peut être utilisée seulement si un relais est monté. Voir les instructions de télécommande sans fil pour les détails de câblage.

- **NOTA:** El mando a distancia inalámbrico también está disponible.
- **NOTA:** El mando a distancia inalámbrico sólo puede utilizarse si se instala un contactor. Ver las instrucciones de control remoto inalámbrico para más detalles de cableado.

- **NOTA:** Comandi radio sono disponibili e installabili.
- **NOTA:** L'utilizzo di un comando radio richiede la connessione tramite un solenoide. Fare riferimento al manuale del comando per i dettagli delle connessioni.

- **ANM:** Det finns även trådlös fjärrkontroll.
- **ANM:** Trådlös fjärrkontroll förutsätter att systemet kompletteras med en kontaktor. I de instruktioner som levereras med fjärrkontrollen finns fullständig information.

4. Electrical Wiring

4.4 V1-6 wiring diagram

- Installation instructions are supplied separately with any accessories.

4. Elektrische Montage

4.4 V1-6 Schaltplan

- Montageanleitungen werden mit anderem Zubehör separat geliefert

4. Installation Electrique

4.4 V1-6 Schéma de câblage

- Les instructions d'installation sont fournies séparément avec tous les accessoires.

4. Cableado Eléctrico

4.4 V1-6 Diagrama de cableado

- Las instrucciones de instalación se suministran por separado con los accesorios.

4. Impianto elettrico

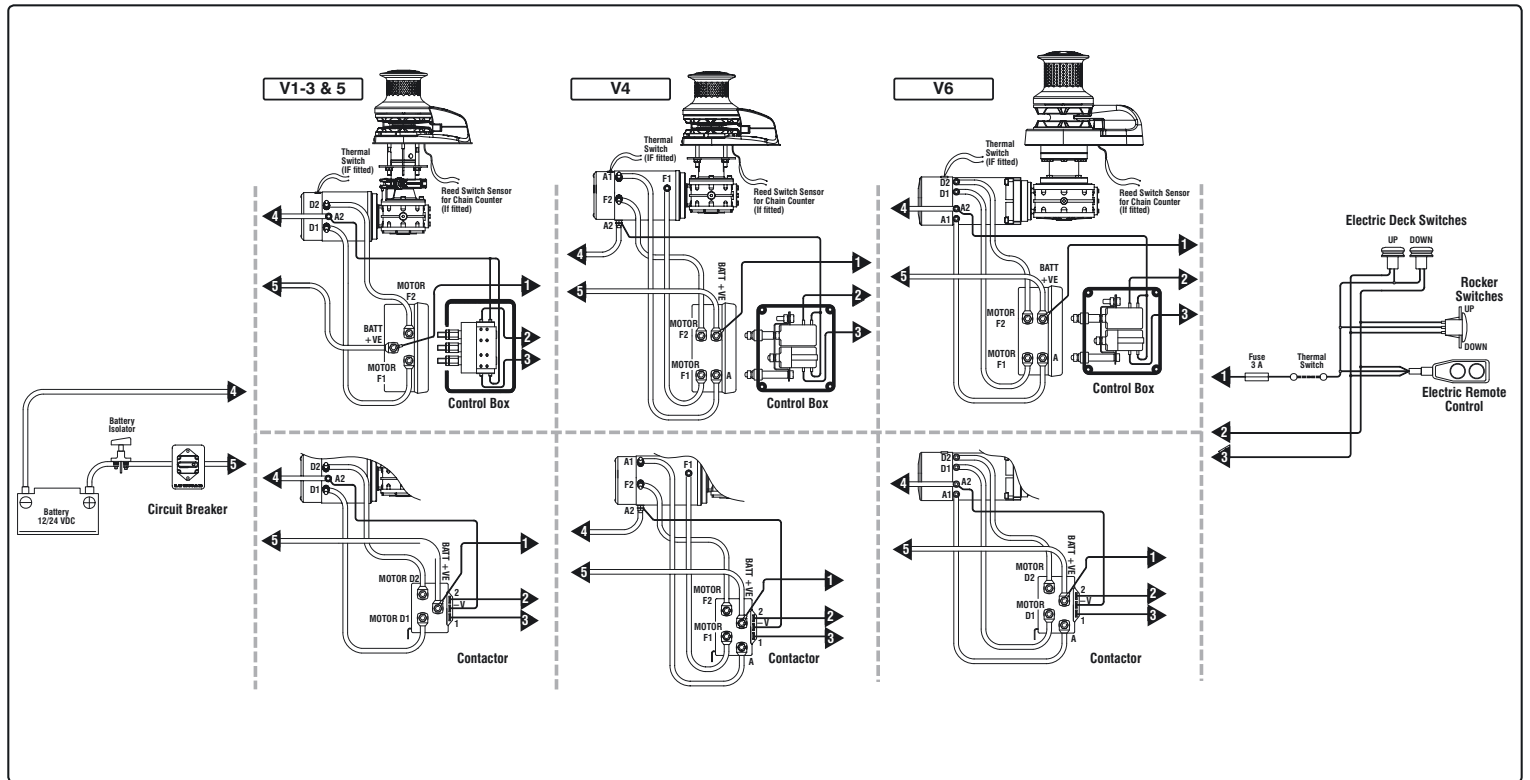
4.4 V1-6 Connessioni accessori

- Istruzioni dettagliate sono fornite con ogni accessorio originale.

4. Kabeldragning

4.4 Kopplingsschema för V1-6

- Installationsinstruktioner levereras separat med all extratrustning.



- **NOTE:** Motor connections
D1 = F1
D2 = F2
- Switch wire thickness:
1.5 mm² (16 AWG)

- **ANMERKUNG:** Motor Anschlüsse
D1 = F1
D2 = F2
- Querschnitt Schaltkabel
1.5mm² (16 AWG)

- **REMARQUE:** Les connexions au moteur
D1 = F1
D2 = F2
- La section du fil de l'interrupteur:
1.5 mm² (16 AWG)

- **NOTA:** las conexiones del motor
D1 = F1
D2 = F2
- Espesor de cable del interruptor:
1.5 mm² (16 AWG)

- **NOTA:** Collegamenti al motore
D1 = F1
D2 = F2
- Cavi del comando:
1.5 mm² (16 AWG)

- **ANM:** Motoranslutningar
D1 = F1
D2 = F2
- Brytarkabelns tvärsnittsarea:
1.5 mm²

5. Hydraulic System

5.1 Installation

• **NOTE:** Hydraulic system installation is NOT covered in this publication. Lewmar hydraulic windlasses have been designed for ease of installation and follow a straightforward hydraulic and mechanical installation procedure. Windlass unit should be connected to a hydraulic powerpack with directional control valve installed to control the windlass movement. Fig 5.1-1 shows a typical hydraulic circuit for a V6 windlass. The purpose of this manual is to provide the reader with sufficient information to install and operate a hydraulic windlass. It assumes the reader will be familiar with sailing craft, marine hydraulics and mechanical installation and safety requirements. If in any doubt consult a qualified marine engineer.

⚠ WARNING!

- The installation of hydraulic systems requires a high level of cleanliness. The ingress of dirt will dangerously impair the safe operation of the system and cause premature wear of hydraulic components.

5.2 Hydraulic motor/gearbox

The hydraulic motor/gearbox consists of a high torque hydraulic motor fitted to a 7:1 90 degree gearbox. The hydraulic motors have a maximum pressure rating of 180 bar and can be used with an oil supply of up to 57 l/min. The motor gearboxes are not self sustaining. A dual Pilot Operated Check Valve (POCV) must be installed in the system to temporarily sustain any load. The POVCV can be line mounted (as shown in Fig 5.1-1) or modular type if for example a CETOP 3 directional valve is being used.

- **NOTE:** To permanently sustain a load a Chain Stopper must be used.

5. Hydraulisches System

5.1 Montage

• **ANMERKUNG:** Die Montage eines hydraulischen Systems ist in dieser Anleitung NICHT enthalten. Lewmar Hydraulik Ankerwinden wurden für einfachste Montage und zur Befolgung unkomplizierter hydraulischen und mechanischen Installationsprozesse designed. Die Ankerwinde sollte an ein hydraulisches Powerpack angeschlossen sein, das ein direktionales Kontroll-Ventil zur Kontrolle der Ankerwindenbewegungen besitzt. Fig 5.1-1 zeigt eine typische Hydraulikinstallation einer V6 Ankerwinde. Der Inhalt dieser Anleitung soll Ihnen eine ausreichende Übersicht zur Montage und Bedienung einer hydraulischen Ankerwinde bieten. Wir setzen voraus, dass der Leser den Umgang mit einem Schiff, Marine Hydraulik, mechanischen Montagen und die notwendigen Sicherheitsbestimmungen beherrscht. Sollten Sie sich nicht sicher sein, dann wenden Sie sich bitte an einen qualifizierten Techniker.

⚠ WARNING!

- Die Montage eines hydraulischen Systems bedarf höchster Sauberkeit. Eindringen von Schmutz in das System gefährdet den sicheren Umgang und Einsatz des Systems und bedeutet erhöhte Abnutzung der hydraulischen Komponenten.

5.2 Hydraulische Motor/Getriebeeinheit

Die hydraulische Motor/Getriebeeinheit besteht aus einem Hochdruck Hydraulikmotor, der auf einem 7:1 90° Getriebe angeflanscht ist. Die hydraulischen Motoren arbeiten mit einem Maximaldruck von 180bar bei bis zu 57/Min Fluss. Die Motoren sind nicht selbst sperrend. Ein Dual Pilot Operated Check-Ventil (POCV) muss zur vorübergehenden Entlastung des Motors eingesetzt werden. Das POCV kann in-Line eingesetzt (siehe Abbildung 5.1-1) oder modular innerhalb eines CETOP 3 Directional Ventils geschaltet werden.

- **ANMERKUNG:** Für permanente Entlastung der Ankerwinde muss ein separater Kettenstopper verwendet werden.

5. Système hydraulique

5.1 Installation

• **REMARQUE:** l'installation hydraulique n'est pas couverte dans cette publication. Les guindeaux hydrauliques de Lewmar ont été conçus pour une facilité de montage avec une procédure d'installation hydraulique et mécanique simple. L'unité guindeau doit être connectée à une centrale hydraulique avec valve de contrôle directionnelle installée pour contrôler les rotations du guindeau. Fig. 5.1-1 montre un circuit hydraulique typique pour un guindeau V6. Le but de ce manuel est de fournir au lecteur des renseignements suffisants pour installer et faire fonctionner un guindeau hydraulique. Il est présumé que le lecteur sera familier avec les embarcations à voile, l'installation de l'hydraulique et la mécanique maritime ainsi que les exigences de sécurité. En cas de doute, consulter un professionnel qualifié.

⚠ RECOMMANDATIONS!

- L'installation des systèmes hydrauliques nécessite un haut niveau de propreté. La pénétration des saletés compromettra dangereusement la bonne utilisation du système et provoquera une usure prématurée des composants hydrauliques.

5.2 Moteur hydraulique/boîte de vitesses

Le moteur hydraulique/boîte de vitesses est composé d'un moteur hydraulique à couple élevé accouplé à une boîte de vitesse de 7:1 à 90 degrés. Les moteurs hydrauliques ont une pression nominale maximale de 180 bar et peuvent être utilisés avec une alimentation en huile pouvant aller jusqu'à 57 l/min. Les boîtes d'engrenage du moteur ne sont pas auto-lubrifiées. Un dispositif de vanne à double commande hydraulique doit être installé dans le système pour maintenir temporairement toute charge. Ce dispositif peut être monté en ligne (comme dans la figure 5.1-1) ou de type modulaire, si par exemple une valve directionnelle CETOP 3 est utilisée.

- **REMARQUE:** Pour maintenir en permanence la charge, un stoppeur de chaîne doit être utilisé.

5. Sistema hidráulico

5.1 Instalación

• **NOTA:** la instalación del sistema hidráulico no se aborda en esta publicación. Los molinetes hidráulicos Lewmar se han diseñado para facilitar la instalación y seguir un sencillo procedimiento de instalación hidráulica y mecánica. El molinete debe ser conectado a una unidad Powerpack hidráulica con válvula de control direccional, instalado para controlar el movimiento de molinete. Fig. 5.1-1 muestra un circuito hidráulico típico de un molinete V6. El propósito de este manual es proporcionar al lector información suficiente para instalar y operar un molinete hidráulico. Se supone que el lector estará familiarizado con las embarcaciones de vela, la hidráulica marina, la instalación mecánica y requisitos de seguridad. Si tiene alguna duda consulte a un ingeniero naval cualificado.

⚠ ¡ADVERTENCIA!

- La instalación de sistemas hidráulicos requiere un alto nivel de limpieza. La penetración de la suciedad es peligroso para el funcionamiento seguro del sistema y puede provocar un desgaste prematuro de los componentes hidráulicos.

5.2 Motor/Caja reductora hidráulica

El motor hidráulico / caja reductora se compone de un elevado par motor hidráulico instalado en una caja de cambios 7:1 90 grados. Los motores hidráulicos tienen una clasificación de presión máxima de 180 bary se puede utilizar con un suministro de aceite de hasta 57 l/min. Las cajas reductoras de motor no es de auto sostenimiento. Un doble Válvula pilotada de retención (POCV) debe estar instalada en el sistema para mantener temporalmente cualquier carga. El POCV puede ser montado en línea (como se muestra en la figura 5.1-1) o de tipo modular, por ejemplo un 3 CETOP.

- **NOTA:** Para mantener permanentemente una carga en la cadena debe ser utilizado un stopper.

5. Impianto idraulico

5.1 Versioni idrauliche

• **NOTA:** Gli impianti di alimentazione idraulica non sono trattati nel presente manuale. I prodotti idraulici Lewmar sono progettati per assicurare una facile integrazione ed installazione e la procedura di connessione idraulica è semplice e lineare. I verricelli idraulici necessitano di una fonte di alimentazione e di un gruppo valvole che ne controlli il movimento. Fig 5.1-1 mostra una installazione tipica di V6 idraulico. Questo manuale si limita a fornire informazioni sulle connessioni e l'utilizzo di un salpa ancore idraulico. Non verranno fornite indicazioni sull'impianto di bordo, né sulle precauzioni nell'uso di attrezzature idrauliche. In caso di dubbio consultare un tecnico qualificato.

⚠ AVVERTIMENTI!

- Gli impianti idraulici richiedono una pulizia estrema, qualunque impurità all'interno dei tubi può causare malfunzionamenti, usura precoce o blocco del sistema.

5.2 Gruppo motore/riduttore idraulico

Il gruppo motore/riduttore idraulico è composto da un riduttore angolare ad elevato rapporto e da un motore idraulico. Il motore idraulico richiede pressioni e portata elevati fino a 180bar con 57 l/min. Il gruppo motore/riduttore non è autobloccante. Per ottenere quest funzione è necessario utilizzare una apposita valvola di ritegno (POCV). La valvola di ritegno può essere montata in linea nel circuito (Fig 5.1) oppure in modulo se le valvole direzionali sono, ad esempio, del tipo CETOP 3.

- **NOTA:** Anche in caso di valvola di ritegno il carico dell'ancoraggio non deve essere tenuto dal verricello ma da apposito blocca catena.

5. Hydraulsystem

5.1 Installation

• **ANM:** Installation av hydraulsystem beskrivs inte i de här instruktionerna. Lewmars hydrauliska ankarspel är konstruerat för att kunna installeras relativt enkelt, både hydrauliskt och mekaniskt. Spelet skall kopplas ihop med hydraulmotor med rikttningsventil för manövrering av spelet. I figur 5.1-1 visas en vanlig hydraulkrets för ankarspelet V6. Syftet med den här handboken är att förse läsaren med den information som behövs för att installera och använda ett hydrauliskt ankarspel. Vi har förutsatt att läsaren har goda kunskaper om segelbåtar, installation av marin hydraulik och mekanik, men också om tillämpliga säkerhetskrav. Kontakta en kunnig yrkesinstallatör vid eventuella tveksamheter.

⚠ VARNINGAR!

- Renhet är högprioriterad vid installation av hydraulsystem. Smuts som tränger in i systemet kan påverka systemets funktion och därmed säkerheten, men också förda slitage av hydraulkomponenterna.

5.2 Hydraulmotor/växel

Hydraulmotor/växeln är en hydraulmotor med högt moment och en 7:1-växel i 90 grader. Hydraulmotorerna är klassade för ett maxtryck på 180 bar och klarar ett flöde på upp till 57 l/min. Växlarna är inte självbärande. En dubbel, pilotstyrd backventil måste installeras i systemet. Denna backventil kan monteras i röret (se figur 5.1-1) eller som modulenheter om t ex en CETOP3-rikttningsventil används.

- **ANM:** Systemet måste också kompletteras med en kättningsstopp för permanent avlastning.

5. Hydraulic System

5. Hydraulisches System

5. Système hydraulique

5. Sistema hidráulico

5. Impianto idraulico

5. Hydraulsystem

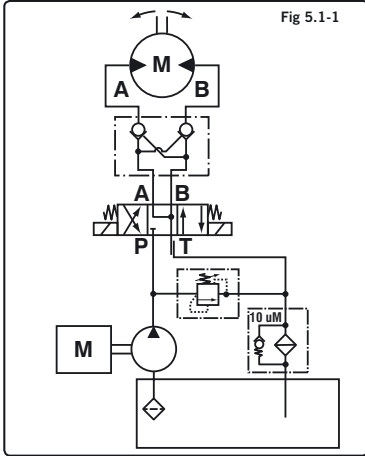
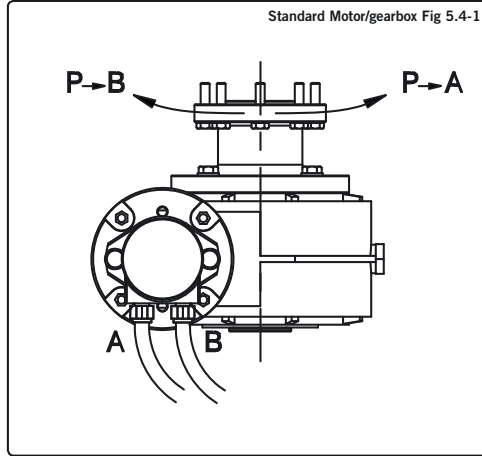


Fig 5.1-1



Standard Motor/gearbox Fig 5.4-1

5.3 Hose types

For reliable operation and safety it is essential to use reinforced braid hose for connecting to the motor A and B ports which conforms to SAE100R2A or DIN 20 021 Part 2.

The recommended hose sizes are:

- Up to 30 l/min + 1/2" (13 mm) bore diameter.
- Up to 40 l/min + 5/8" (16 mm) bore diameter.
- Up to 57 l/min + 3/4" (19 mm) bore diameter.
- Ref: 3.78 litres = 1 US gallon
- 4.54 litres = 1 Imperial gallon

5.4 Motor ports - standard motor/gearbox

The location of the ports for the standard motor/gearbox is shown in Fig 5.4-1 (no drain connection).

- The Lewmar hydraulic motor ports are: A & B ports 1/2" BSP.
- **NOTE:** Refer to your installed hydraulic system manual for hydraulic drives.

5.3 Schlauch Typen

Zum zuverlässigen Einsatz und zur Sicherheit ist es unbedingt notwendig, verstärkte Schläuche zur Verbindung der A & B Leitungen mit dem Motor her zu stellen, die entsprechend der Spezifikationen SAE100R2A oder DIN 20 021 Part 2 gefertigt sind.

Die empfohlenen Schlauchgrößen sind:

- Bis zu 30L/Min + 1/2" (13mm) Innendurchmesser
- Bis zu 40L/Min + 5/8" (16mm) Innendurchmesser
- Bis zu 57L/Min + 3/4" (19mm) Innendurchmesser
- Richtlinie: 3.78 Liter = 1 US Gallone
- 4.54 Liter = 1 Imperiale Gallone

5.4 Motor Ports = Standard Motor/Getriebeeinheit

Die Position der Ports einer standard Motor/Getriebeeinheit wird in Abbildung 5.4-1 (keine Drainage) verdeutlicht.

- Der Lewmar Hydraulikmotor besitzt 1/2" BSP Anschlüsse für A & B Anschlüsse
- **ANMERKUNG:** Informationen zu ihrem hydraulischen Antrieb entnehmen sie bitte dem speziellen Manual des Hydraulik-Systems.

5.3 Type de Tuyaux

Pour un fonctionnement fiable et une bonne sécurité, il est essentiel d'utiliser des tuyaux tressés renforcés pour la connexion aux entrées A et B du moteur, conforme aux SAE100R2A ou DIN 20 021 2ème partie.

Les tailles de tuyaux recommandées sont:

- Jusqu'à 30 l/min + 1/2" (13 mm) diamètre de section.
- Jusqu'à 40 l/min + 5/8" (16 mm) diamètre de section.
- Jusqu'à 57 l/min + 3/4" (19 mm) diamètre de section.
- Réf: 3.78 litres = 1 gallon US
- 4.54 litres = 1 gallon impérial

5.4 Entrée Moteur - moto-réducteurs standard

L'emplacement des entrées pour le moto-réducteurs standard est montré dans la figure 5.4-1 (pas de connexion de vidange).

- Les entrées du moteur hydraulique Lewmar sont: des entrées A & B 1/2" BSP.
- **REMARQUE:** Reportez-vous au guide du système hydraulique pour l'entraînement hydraulique.

5.3 Tipos de manguera

Para un funcionamiento fiable y de seguridad, es esencial usar manguera reforzada trenzada para conectar con el motor A y B, los puertos que se ajuste a SAE100R2A o DIN 20 021 Parte 2.

El tamaño de la manguera recomendado es:

- Hasta 30 l/min + 1/2" (13 mm) diámetro interior.
- Hasta 40 l/min + 5/8" (16 mm) diámetro interior.
- Hasta 57 l/min + 3/4" (19 mm) diámetro interior.
- Ref: 3.78 litros = 1 galón EE.UU.
- 4.54 litros = 1 galón imperial

5.4 Los puertos de motor - estándar de motor / caja reductora

La ubicación de los puertos estándar para el motor / caja reductora se muestra en la figura 5.4-1 (sin conexión de drenaje).

- Los puertos de motor hidráulico Lewmar son: A & B en los puertos de 1/2" BSP.
- **NOTA:** Consulte su manual de sistema hidráulico instalado para las unidades hidráulicas.

5.3 Connessioni idrauliche

E' indispensabile utilizzare tubazioni ad alta resistenza per le connessioni di alimentazione (A e B), conformi ai requisiti SAE100R2A o DIN 20 021 Parte 2.

Le tubazioni devono rispettare queste misure:

- fino a 30 l/min + 1/2" (13 mm) diametro utile.
- fino a 40 l/min + 5/8" (16 mm) diametro utile.
- fino a 57 l/min + 3/4" (19 mm) diametro utile.
- Comparazioni: 3.78 litri = 1 US gallon
- 4.54 litri = 1 Imperial gallon

5.4 Connessioni motore - versione Standard

La posizione degli ingressi per la versione Standard è indicata in Fig. 5.4.1. La tubazione di drenaggio non è richiesta.

- Le connessioni dei motori sono 1/2" BSP.
- **NOTA:** Fare sempre riferimento al manuale dell'impianto di bordo per dettagli sui valori e l'installazione.

5.3 Slang

Säkerhet och tillförlitlig drift förutsätter att man väljer armerad slang som uppfyller kraven i SAE100R2A eller DIN 20 021 del 2 används till motorportarna A och B.

Rekommenderade slangdimensioner:

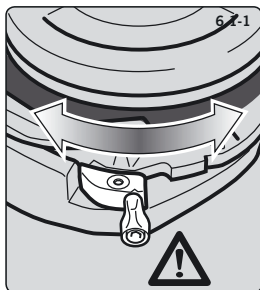
- Upp till 30 l/min – invändig slangdiameter på minst 13 mm
- Upp till 40 l/min – invändig slangdiameter på minst 16 mm
- Upp till 57 l/min – invändig slangdiameter på minst 19 mm
- Förklaringar: 1 USA-gallon = 3,78 liter. 1 brittisk gallon = 4,54 liter

5.4 Motorportar – standardmotor/växel

Portarna placering på standardmotor/växel visas i figur 5.4-1 (ingen dränanslutning).

- Portarna på Lewmars hydraulmotorer: Portarna A och B – 1/2" BSP.
- **ANM:** Hydraulpumpar beskrivs i det installerade systemets handbok.

6. Operation



6.1 V1-6 braked anchor free-fall

⚠ **WARNING!** Isolate the windlass using circuit breaker/isolator.

Use this method for quicker anchor deployment and to save battery power.

1. Models V1-3

Check fall-safe pawl is in vertical disengaged position and held clear by fall safe lever.

2. Models V4-5

Check pawl is in disengaged position.

Models V6 & V-Sport

This model has no fall-safe pawl.

Gypsy only

3. Release any anchor locks and when safe rotate handle anti-clockwise until anchor pays out.

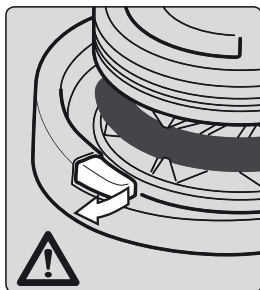
4. Adjust rate of fall with handle. Once paid out fully tighten gypsy drive cap.

Gypsy/drum

5. Place a Lewmar handle into the drum top nut and operate as gypsy version above.

⚠ **WARNING!** Always remove winch handle after use.

6. Bedienung



6.1 V1-6 Gebremstes Anker fieren

⚠ **Warnung!** Isolieren sie den Stromkreis immer durch Betätigung der Sicherung oder den Hauptschalter nach dem Gebrauch.

Wenden sie folgende Methode für schnelleres Ankern und zum Sparen von Batteriekapazität an.

1. Modell V1-3

Stellen sie sicher, dass die Fall-Safe Sperrklinke ist vertikal und gelöst & gesichert in dieser Stellung.

2. Modell V4-5

Stellen sie sicher, dass die Kettennuss Sperre gelöst und gesichert ist.

Modell V6 & V Sport

Diese Einheiten besitzen keine Kettennuss Sicherung.

Nur Kettenspill

3. Entsperren sie alle Sicherungen. Wenn sie ganz sicher sind, dann drehen sie die Kurbel gegen den Uhrzeigersinn bis der Anker sich selber über die Bugrolle abfiert.

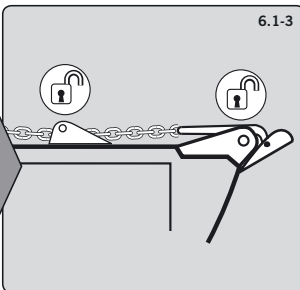
4. Bestimmen sie die Geschwindigkeit mit den Kurbelumdrehungen. Wenn der Anker komplett gefiert ist, dann ziehen sie die Topkappe wieder fest an.

Ketten&Verholspill

5. Setzen sie eine Lewmar Kurbel in die Topkappe der Verholtrommel ein und verfahren nach dem selben Prinzip wie oben (Nur Kettenspill) aufgeführt.

⚠ **WARNING!** Nehmen sie die Winskurbel immer nach dem Gebrauch aus der Ankerwinde.

6. Opération



6.1 V1-6 la chute libre contrôlée de l'ancre

⚠ **ATTENTION!** Isoler le guindeau à l'aide du coupe-circuit/disjoncteur.

Utilisez cette méthode pour le largage rapide de l'ancre et pour économiser la batterie.

1. Modèles V1-3

Vérifier que le doigt de blocage est en position verticale et maintenu à l'écart par un levier de sécurité.

2. Modèles V4-5

Vérifier que le doigt de blocage est désengagé.

Modèles V6 & V-Sport

Ce modèle n'a pas de doigt de blocage.

Barbotin seul

3. Libérer tous les bloqueurs de chaîne, et quand en sécurité, tournez la manivelle dans le sens contraire des aiguilles d'une montre jusqu'à ce que l'ancre descende.

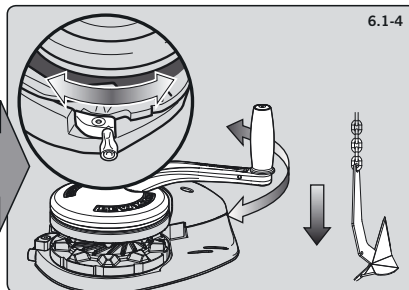
4. Réglez la vitesse de la chute avec la manivelle. Une fois complètement larguée, serrez la flasque du barbotin.

Barbotin/tambour

5. Placez une manivelle Lewmar sur la flasque du tambour et utilisez en version barbotin comme ci-dessus.

⚠ **ATTENTION!** Toujours enlever la manivelle de winch après utilisation.

6. Operación



6.1 V1-6 frenos de anclaje de caída libre

⚠ **¡ADVERTENCIA!** Aislar el molinete con interruptor / aislador.

Utilice este método para el despliegue rápido de anclaje y para ahorrar batería.

1. Modelos V1-3

Compruebe que la palanca de caída de seguridad esta en posición de desconexión.

2. Modelos V4-5

Compruebe que la palanca esta en posición de desconexión.

Modelos V6 & V-Sport

Este modelo no tiene trinquete de caída de seguridad.

Solo Barboten

3. Desconecte cualquier stoper de ancla y cuando gire la maneta en sentido antihorario hasta que el ancla caiga.

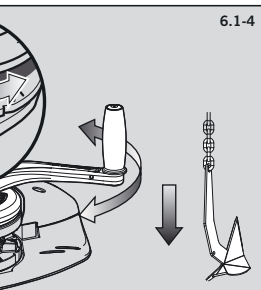
4. Ajuste el ratio de caída con la maneta. una vez finalice, apriete con fuerza la tapa del barboten.

Barboten/Campana

5. Coloque una maneta Lewmar en la hendidura de la campana y mueva el barboten como la versión superior.

⚠ **¡ADVERTENCIA!** Retire siempre la maneta después de su uso.

6. Utilizzo



6.1 V1-6 Utilizzo della frizione

⚠ **ATTENZIONE!** Isolare sempre elettricamente il verricello prima di qualunque operazione.

Utilizzare il seguente metodo per una filata più rapida e minor consumo di corrente:

1. Modelli V1-3

Verificare che il fermo di sicurezza sia aperto e verificare la posizione corretta della leva di bloccaggio (rossa).

2. Modelli V4-5

Verificare che il fermo di sicurezza sia aperto.

Modelli V6 e V-Sport

Questi modelli non hanno fermo di sicurezza.

Modelli solo barbotin

3. Liberare il ferma catena o lo stroppo di sicurezza. Ruotare in senso antiorario, mediante la manovella winch, il blocco superiore fino a quando la catena inizia a scorrere.

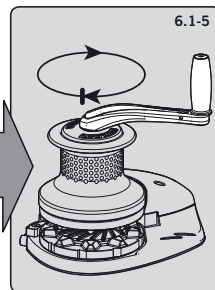
4. Regolare la velocità di discesa agendo sulla manovella winch. Una volta filata la quantità desiderata, serrare con forza il blocco superiore.

Modelli con campana

5. Liberare il ferma catena o lo stroppo di sicurezza. Ruotare in senso anti-orario, mediante la manovella winch, la parte superiore della campana fino a quando la catena inizia a scorrere. Procedere come descritto sopra.

⚠ **ATTENZIONE!** Rimuovere sempre la manovella winch quando non in uso.

6. Användning



6.1 Broms för ankring med fri fällning

⚠ **“WARNING!”** Koppla från ankarspelet elektriskt.

Välj den här metoden för att ankra snabbare och spara batteri.

1. Modellerna V1 till V3

Kontrollera att fällningsspärren är i vertikalt läge och hålls undan av fällningsarmen.

2. Modellerna V4 till V5

Kontrollera att spärren är urkopplad.

Modellerna V6 och V-Sport

Den här modellen har ingen fällningsspärr.

Bara kabelar

3. Lossa eventuella ankarsurpringar och vrid spaken moturs tills ankarkinan/kåttingen börjar löpa ut.

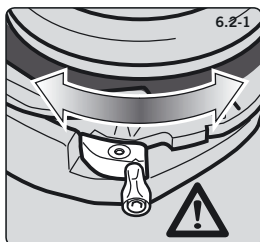
4. Justera fällhastigheten med hjälp av spaken. Läs kabelaret när du släppt ut önskad längd ankarkåtting/lina.

Kabelar/trumma

5. Sätt ett vinschhandtag i uttaget på trummans ovansida och använd den på samma sätt som ovanstående kabelar.

⚠ **WARNING!** Ta alltid bort handtaget när du är klar.

6. Operation



6.2 Power up/down

⚠ **WARNING!** Check Fall-Safe pawl is disengaged and held clear by Fall-Safe lever - Except Sport & V6.

To release anchor.

1. Models V1-3

Check fall-safe pawl is in vertical disengaged position and held clear by fall safe lever.

2. Models V4-5

Check pawl is in disengaged position.

V6 & V-Sport versions

Operate as below, this model has no fall-safe pawl.

3. Release any anchor locks.

4. When safe, operate DOWN control.

To retrieve anchor.

• Retrieving the anchor is the reverse to the above.

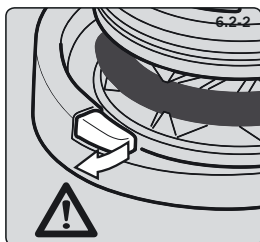
• **NOTE:** Models V1-3 fall-safe does not need to be disengaged during retrieval as it acts as a ratchet.

• When safe, operate the UP control. When anchor has been retrieved and stowed, the fall-safe pawl should be left engaged.

• **NOTE:** Remember, on models V1-3 the fall-safe does need to be disengaged before anchor can be let go again.

• Once anchor is retrieved, ensure it is adequately secured to an independent strong point.

6. Bedienung



6.2 Motorisiertes Heben und Fieren

⚠ **WARNING!** Überprüfen sie, dass die Fall-Safe Sperre gelöst ist und halten sie sich frei von der Sperre – ausgenommen V-Sport & V6.

Fieren des Ankers.

1. Modell V1-3

Stellen sie sicher, dass die Fall-Safe Sperrklinke ist vertikal und gelöst & gesichert in dieser Stellung.

2. Modell V4-5

Stellen sie sicher, dass die Kettennuss Sperre gelöst und gesichert ist.

Modell V6 & V Sport

Diese Einheiten besitzen keine Kettennuss Sicherung. Bedienung wie unten aufgeführt.

3. Entsperren sie alle Sicherungen. Wenn sie ganz sicher sind, dann drehen sie die Kurbel gegen den Uhrzeigersinn bis der Anker sich selber über die Bugrolle abfiert.

4. Wenn sie sich sicher sind, dann betätigen sie den DOWN Taster/Schalter.

Heben des Ankers.

• Um den Anker zu heben, verfahren sie umgekehrt zur obigen Beschreibung.

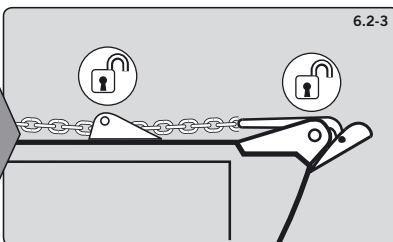
• **ANMERKUNG:** Die Fall-Safe Sperren der Modelle V1-3 müssen nicht bedient werden. Sie haben eine Ratschenfunktion.

• Wenn sie sich sicher sind, dann betätigen sie den UP Taster/Schalter. Wenn der Anker vollständig gehoben ist, dann sollte die Fall-Safe Sperre eingerastet bleiben.

• **ANMERKUNG:** Beachten sie, dass bei den Modellen V1-3 in diesem Verfahren die Fall-Safe Sperre nicht bedient werden muss.

• Ist der Anker vollständig eingeholt, dann muss er an einem adäquaten Punkt separat gesichert werden.

6. Opération



6.2 Opération montée/descente

⚠ **ATTENTION!** Vérifier que le doigt de blocage est désengagé et tenu à l'écart par un levier de sécurité - sauf pour V6 & V-Sport.

Pour larguer l'ancre.

1. Modèles V1-3

Vérifier que le doigt de blocage est en position verticale et maintenu à l'écart par un levier de sécurité.

2. Modèles V4-5

Vérifier que le doigt de blocage est en position désengagée.

Versions V6 & V-Sport

Utiliser comme ci-dessous, ce modèle n'a pas de doigt de blocage.

3. Libérer tous les bloqueurs de chaîne.

4. Ensuite, faire fonctionner le contrôle DOWN/descente.

Pour remonter l'ancre.

• La récupération de l'ancre se fait à l'inverse de ci-dessus.

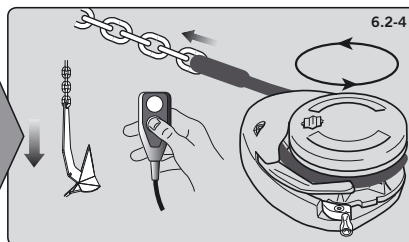
• **REMARQUE:** Sur les modèles V1-3 le doigt de blocage n'a pas besoin d'être désengagé pendant la remontée, car il agit comme un cliquet.

• Lorsque tout est sécurisé, actionner le contrôle UP/montée. Lorsque l'ancre a été remontée et rangée, le doigt de blocage fall-safe doit être engagé.

• **REMARQUE:** N'oubliez pas que sur les modèles V1-3 le doigt de blocage n'a pas besoin d'être désengagé avant que l'ancre soit relâchée.

• Une fois que l'ancre est remontée, vérifiez qu'elle est sécurisée à un point d'attache solide et indépendant.

6. Operación



6.2 Encender o apagar

⚠ **¡ADVERTENCIA!** Compruebe que el trinquete. Caída esta desconectado y que permanece claro, excepto en el modelo V6 & V-Sport.

Para soltar el ancla.

1. Modelos V1-3

Compruebe que la palanca de caída de seguridad esta en posición de desconexión.

2. Modelos V4-5

Compruebe que la palanca esta en posición de desconexión.

Versiones V6 & V-Sport

Operar como abajo, este modelo no tiene caída trinquete de seguridad.

3. Desconecte cualquier stopper de ancla.

4. Cuando sea seguro, encienda el control ABAJO.

Para recuperar el ancla.

• Para recuperar el ancla opere a la inversa de lo anterior.

• **NOTA:** los modelos V1-3 triquete-caída no tiene que ser desconectado durante la recuperación, ya que actúa como un trinquete.

• Cuando sea seguro, operar el control ARRIBA. Cuando el ancla se ha recuperado y estibado, el trinquete-caída de seguridad debe quedar conectado.

• **NOTA:** Recuerde que en los modelos V1-3, la caída de seguridad tiene que ser desconectado antes de anclaje se pueden soltar de nuevo.

• Una vez se recupera el ancla, asegúrese de que está suficientemente garantizado a un punto de fuerza independiente.

6. Utilizzo

6.2 Utilizzo del motore

⚠ **ATTENZIONE!** Verificare attentamente che il fermo di sicurezza sia disinserito durante la discesa e quando all'ormeggio. Non presente su V Sport e V6.

Per filare l'ancora.

1. Modelli V1-3

Verificare che il fermo di sicurezza sia aperto e verificare la posizione corretta della leva di bloccaggio (rossa).

2. Modelli V4-5

Verificare che il fermo di sicurezza sia aperto.

Modelli V6 e V-Sport

Questi modelli non hanno fermo di sicurezza.

3. Liberare il fermo catena o lo stoppo di sicurezza.

4. Verificare che nessuno sia in prossimità del verricello o nella direzione di filata. Premere il tasto di discesa. Quando la catena è in tensione utilizzare sempre il fermo catena o lo stoppo di sicurezza, mai il fermo di sicurezza.

Per recuperare l'ancora.

• Verificare che nessuno sia in prossimità del verricello e che l'equipaggio sia pronto ad operare.

• **NOTA:** Modelli V1-3 il fermo di sicurezza può essere chiuso durante il recupero.

• Quando pronti, premere il tasto di recupero. Quando l'ancora è a bordo, fissare con il fermo catena, lo stoppo o il fermo di sicurezza.

• **NOTA:** Ricordarsi di non utilizzare mai il motore in discesa se il fermo di sicurezza è inserito.

• Non navigare mai con la catena fermata solo dal verricello.

6. Användning

6.2 Start/stopp

⚠ **VARNING!** Kontrollera att fällskyddsspärren är frikopplad och låst med fällarmen – utom modellerna Sport och V6.

Ankring

1. Modellerna V1 till V3

Kontrollera att fällningsspärren är i vertikalt läge och hålls undan av fällningsarmen.

2. Modellerna V4 till V5

Kontrollera att spärren är urkopplad. Denna modell har ingen fällningsspärr. Använd den enligt nedanstående beskrivning.

Modellerna V6 och V-Sport

Denna modell har ingen fällningsspärr. Använd den enligt nedanstående beskrivning.

3. Lossa eventuella ankarsurmmingar.

4. Kör ut ankaret med hjälp av knappen DOWN när det säkert att ankra.

Hemtagning av ankaret

• Hemtagningen av ankaret görs i omvänd ordning mot ovan beskrivs ankringsprocedur.

• **ANM:** Modellerna V1 till V3 med fällskydd behöver inte frikopplas vid hemtagning, eftersom funktionen kan liknas vid den i ett spärrblock.

• Kör upp ankaret med hjälp av kontrollenheten. När ankaret tagits hem och surrats skall fällskyddsspärren lämnas aktiveras.

• **ANM:** Kom ihåg att fällskyddet på modellerna V1 till V3 inte behöver frikopplas före ankring.

• Surra ankaret på en tillräckligt kraftig anordning när det väl är ombord.

6. Operation

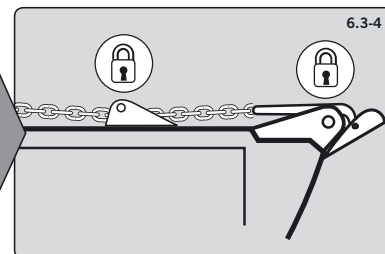
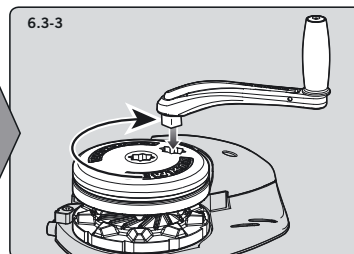
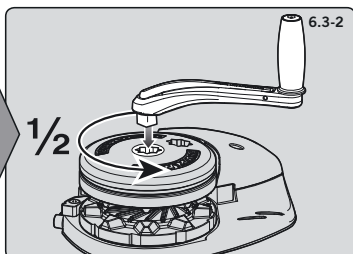
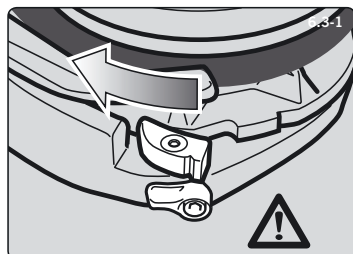
6. Bedienung

6. Opération

6. Operación

6. Utilizzo

6. Användning



⚠ **WARNING!** Isolate the winch using circuit breaker/isolator.

⚠ **Warnung!** Isolieren Sie den Stromkreis immer durch Betätigung der Sicherung oder den Hauptschalter nach dem Gebrauch.

⚠ **ATTENTION!** Isoler le guindeau à l'aide du coupe-circuit/disjoncteur.

⚠ **¡ADVERTENCIA!** Aislar el molinete con interruptor / aislador.

⚠ **ATTENZIONE!** Isolare sempre elettricamente il verricello prima di qualunque operazione.

⚠ **“VARNING!”** Koppla från ankarspelet elektriskt.

6.3 V1-3 manual recovery

- **Gypsy only (optional manual recovery Kit No.66840054)**
 - **Gypsy/drum (optional manual recovery Kit No.66840056)**
 - **Sport versions**
These units have no manual recovery.
1. Engage fall safe pawl.
 2. Place a Lewmar winch handle into gypsy drive cap/drum top nut and rotate anti-clockwise by half a turn.
 3. Remove handle and place into the bi-square in the cap and rotate clockwise.
 4. Once anchor is retrieved, ensure it is adequately secured to an independent strong point.
- **Gypsy/drum versions**
These units use emergency manual recovery attachment 66840056. See document 66300003 RevA for fitting and operating instructions.

6.3 V1-V3 Handnotbetrieb

- **Nur Kettenspill (optional Handnotbetrieb Kit Nr. 66840054)**
 - **Ketten- & Verholspill (optional Handnotbetrieb Kit Nr. 66840056)**
 - **Sport-Versionen**
Hier ist kein Handnotbetrieb nachrüstbar
1. Rasten Sie die Fall-Safe Sperre ein
 2. Setzen Sie eine Lewmar Kurbel in die Abdeckung der Kettenmuss/die Verholwinde ein und drehen gegen den Uhrzeigersinn für eine halbe Umdrehung.
 3. Nehmen Sie die Kurbel ab, setzen Sie in den Stern der Kappe ein, und drehen mit dem Uhrzeigersinn.
 4. Ist der Anker vollständig eingeholt, dann sichern Sie ihn an einem adäquaten und separaten Punkt an Bord.
- **Ketten- & Verholspill Versionen**
Diese Typen verwenden den speziellen Handnotbetrieb #66840056. Siehe Anleitung 66300003 RevA zur Montage und Bedienungsanleitung.

6.3 V1-3 La remontée manuelle

- **Barbotin seul (en option - Kit de remontée manuelle No.66840054)**
 - **Barbotin / tambour (en option - Kit de remontée manuelle No.66840056)**
 - **Versions Sport**
Ces unités n'ont pas de remontée manuelle.
1. Engager le doigt de blocage.
 2. Placer une manivelle de winch Lewmar dans la flasque du barbotin/poupée et tourner dans le sens inverse des aiguilles d'une montre d'un demi-tour.
 3. Retirer la manivelle et la placer dans le bi-carré et tourner dans le sens des aiguilles d'une montre.
 4. Une fois l'ancre remontée, assurez-vous qu'elle est sécurisée sur une point d'attache solide et indépendant.
- **Versions Barbotin/tambour**
Ces appareils utilisent la pièce de remontée d'urgence manuelle N° 66840056. Voir la documentation N°66300003 RevA pour le montage et les instructions d'utilisation.

6.3 V1-3 Recuperación Manual

- **Solo Barboten (Kit de recuperación manual opcional No.66840054)**
 - **Barboten/Campana (Kit de recuperación manual opcional No.66840056)**
 - **Versión Sport**
Estas unidades no tienen la recuperación manual.
1. Conecte la palanca de trinquet-caída.
 2. Coloque una maneta Lewmar en la hendidura de la campana y mueva el barboten media vuelta en sentido anti-horario.
 3. Desmonte la maneta y colóquela en el borde de la tapa girándola en sentido horario.
 4. Una vez se recupera el ancla, asegúrese de que está suficientemente garantizado a un punto de fuerza independiente.
- **Versión Barboten/Campana**
Estas unidades de uso manual pueden tener recuperación de emergencia 66840056. Véa el documento 66300003 RevA para tortillería y instrucciones de manejo.

6.3 V1-3 recupero manuale

- **Versione solo barbotin (necessario kit opzionale No.66840054)**
 - **Versione con campana (necessario kit opzionale No.66840056)**
 - **Versione Sport, recupero manuale non disponibile**
1. Inserire fermo di sicurezza
 2. Posizionare manovella winch sul barbotin o sulla campana e ruotare mezzo giro in senso anti-orario per sbloccare la frizione.
 3. Rimuovere la manovella winch ed inserirla nel kit di recupero, ruotare in senso orario fino al totale recupero.
 4. Una volta recuperata tutta la catena, bloccarla con ferma catena o stroppo di sicurezza.
- **Versioni con campana**
Su questi modelli il kit di recupero non può essere lasciato in posizione ma deve sempre essere rimosso al termine delle operazioni. Istruzioni per installazione e utilizzo sono allegate al kit.

6.3 Manuell hemtagning, modellerna V1 till V3

- **Endast kabelar (tillbehörssats nr 66840054)**
 - **Kabelar/trumma (tillbehörssats nr 66840056)**
 - **Sportmodellerna**
Dessa är inte försedda med anordning för manuell hemtagning.
1. Aktivera spärrhaken.
 2. Sätt i ett vinschhandtag i kabelare/trummans toppmutter och vrid ett halvt varv moturs.
 3. Ta loss handtaget och sätt det i handtagsuttaget i ovan delen och vrid medurs.
 4. Surra ankaret på en tillräckligt kraftig anordning när det väl är ombord.
- **Modeller med kabelar/trumma**
Dessa enheter är försedda med tillbehöret 66840056 för manuell hemtagning. Monterings- och driftinstruktioner finns i dokument 66300003, ver A.

6. Operation

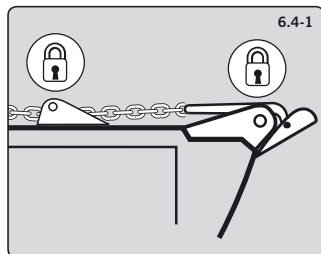
6. Bedienung

6. Opération

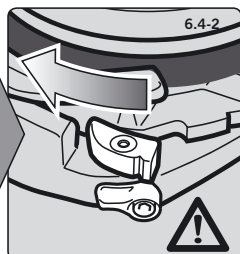
6. Operación

6. Utilizzo

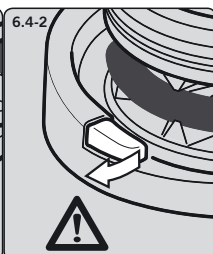
6. Användning



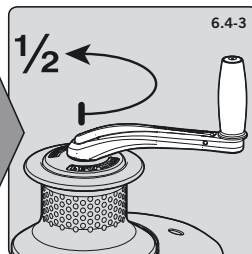
6.4-1



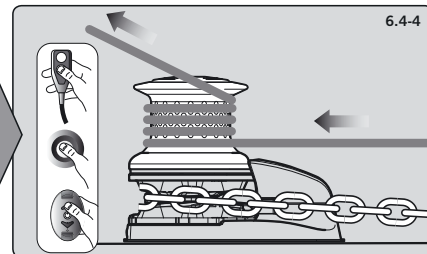
6.4-2



6.4-2



6.4-3



6.4-4

6.4 V2-6 Independent warping

- **NOTE:** V6 do not have Fall-Safe.
- **Gypsy/drum only**
- 1. Lock anchor chain before warping.
- 2. **Models V2-3**
Engage fall safe pawl.
- Models V4-5**
Check pawl is in disengaged position.
- 3. Place a Lewmar winch handle into top nut. Disengage clutch by turning anti-clockwise by half a turn.
- Remove handle.
- 4. When safe, operate the drum.
- If warping speed is too fast, ease tension in rope.
- When finished re-engage clutch by tightening the drum top nut.

⚠ **WARNING!** Always remove winch handle after use.

⊘ **DO NOT** wrap chain around the capstan drum.

6.4 Separate Bedienung

- **ANMERKUNG:** V6 besitzt keinen Fall Safe.
- **Nur Ketten/Verholspill**
- 1. Festssetzen der Ankerkette vor Verholspill Nutzung
- 2. **Modell V2-3**
Einschalten der Fall Safe Sperrklinke
- Modell V4-5**
Prüfen sie das korrekte Einrasten der Sperre
- 3. Setzen sie eine Lewmar Winskurbel in die Topkappe. Entsperren sie die die Kupplung mit einer halben Umdrehung der Topkappe gegen den Uhrzeigersinn.
- Nehmen sie die Winskurbel ab.
- 4. Wenn sie Sicherheit feststellen konnten, bedienen sie die Trommel
- Ist die Leinengeschwindigkeit zu hoch, dann reduzieren sie die Spannung der Leine auf der Trommel
- Nach der Nutzung drehen sie die Topkappe zum Einschalten der Kupplung wieder fest an.

⚠ **WARNING!** Nehmen sie die Winskurbel immer nach dem Gebrauch aus der Ankerwinde.

⚠ **NIEMALS** Kette auf die Verholtrummel legen!

6.4 V2-6 Utilisation de la poupée indépendante

- **REMARQUE:** V6 n'a pas de doigt de blocage.
- **Barbotin/tambour seul**
- 1. Verrouiller la chaîne d'ancre avant d'utiliser la poupée.
- 2. **Modèles V2-3**
Engager le doigt de blocage.
- Modèles V4-5**
Vérifier que le doigt de blocage est désengagé.
- 3. Placer une manivelle de winch Lewmar dans le bi-carré central du dessus. Désengager l'embrayage en tournant dans le sens inverse des aiguilles d'une montre d'un demi-tour.
- Retirer la manivelle.
- 4. Lorsque tout est sécurisé, faire fonctionner la poupée.
- Si la vitesse d'utilisation est trop rapide, choquer la tension dans le cordage.
- Lorsque vous avez terminé, réengager l'embrayage en resserrant l'écrou du tambour de dessus.

⚠ **ATTENTION!** Toujours enlever la manivelle de winch après utilisation.

⚠ **NE PAS** enrouler la chaîne autour du tambour du cabestan.

6.4 V2-6 Deformaciones

- **NOTA:** V6 no tiene caída de seguridad.
- **Solo Barboten/Campana**
- 1. Bloquee la cadena.
- 2. **Modelos V2-3**
Conecte el trinquete de caída de seguridad.
- Modelos V4-5**
Compruebe que el trinquete esta en la posición de desconexión.
- 3. Coloque la maneta de Lewmar en la hendidura. Soltar el embrague hacia la izquierda girando media vuelta.
- Quitar la maneta.
- 4. Cuando sea seguro, operar la campana.
- Si la velocidad de deformación es demasiado rápida, aliviar la tensión del cabo.
- Cuando termine de utilizar el embrague, apriete el tambor con la tuerca superior.

⚠ **¡ADVERTENCIA!** Retire siempre la maneta después de su uso.

⊘ **NO** rodee la cadena alrededor de la campana de cabestrante.

6.4 V2-6 Funzionamento tonneggio indipendente

- **NOTA:** V6 non ha fermo di sicurezza.
- **Solo per versioni con campana**
- 1. Bloccare la catena.
- 2. **Modelli V2-3**
Bloccare il barbotin con il fermo di sicurezza.
- Modelli V4-5**
Verificare che il fermo di sicurezza sia libero.
- 3. Posizionare manovella winch sul barbotin o sulla campana e ruotare mezzo giro in senso anti-orario per sbloccare la frizione.
- Rimuovere la manovella dopo l'uso.
- 4. Verificare che nessuno sia in prossimità del verricello e che la cima sia libera. Azionare il motore.
- Se la velocità fosse troppo elevata, diminuire la tensione della cima sulla campana per permetterne lo slittamento.
- Al termine delle operazioni, bloccare la frizione con forza.

⚠ **ATTENZIONE!** Rimuovere sempre la manovella winch quando non in uso.

⊘ **NON** avvolgere mai catena o cavo d'acciaio sulla campana.

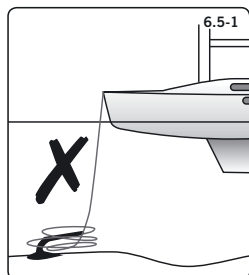
6.4 Oberoende varpning, modellerna V2 till V6

- **ANM:** Modell V6 är inte försedd med funktionen Fall-Safe.
- Endast kabelar/trumma
- 1. Lås ankarkättingen innan varpning påbörjas.
- 2. **Modellerna V2 till V3**
Aktivera spärrhaken.
- Modellerna V4 till V5**
Kontrollera att spärren är urkopplad.
- 3. Sätt fast ett vinschhandtag i toppmuttern. Frikoppla genom att vrida handtaget ett halvt varv moturs.
- Ta bort handtaget.
- 4. Använd trumman när det är säkert att göra det.
- Minska kraften i linan om varpningen går för fort.
- Aktivera kopplingen genom att dra åt trummans toppmuttern när du är klar.

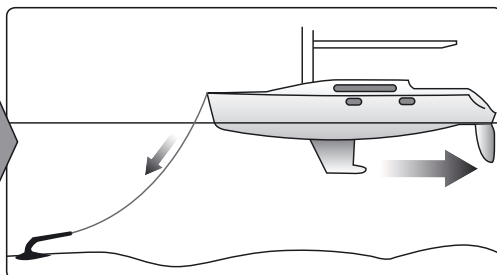
⚠ **WARNING!** Ta alltid bort handtaget när du är klar.

⊘ Kättingen får **INTE** läggas runt capstantrumman.

6. Operation



6. Bedienung

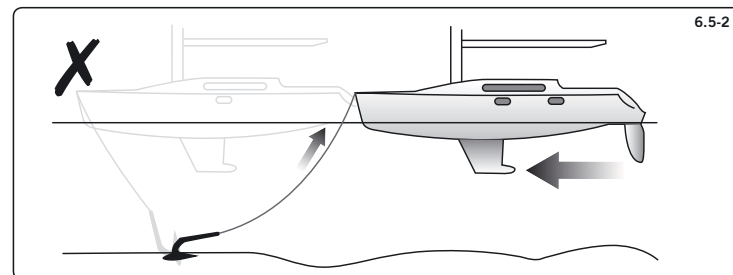


6. Opération

6. Operación

6. Utilizzo

6. Användning



6.5 Operating tips

- Vessels at anchor will snub on the rode and this can cause slippage or apply excessive loads to the windlass.

⊗ When retrieving anchor do not overload or stall in windlass.

⊗ To prevent damage the fall-safe pawl **MUST NOT** be left to take the entire force from the anchor rode while at anchor. The rode should be secured directly to a bollard, sampson post or cleat and a chain secured by a chain stopper.

- When anchoring, power rode out allowing the vessel to take up stern away preventing the rode tangling with anchor. Use this method for mooring stern first to a jetty.
- To aid recovery, under power, move vessel towards anchor but not over and beyond, as this can cause damage to topside.
- As anchor approaches the vessel use careful adjustments of controls to avoid damaging vessel.
- Scope:** As a guide it is recommended that the depth of chain to rope is 7 to 1 at anchor.

6.5 Bedienungstipps

- Schiffe vor Anker bewegen sich und können so ein Rutschen des Ankergeschirrs oder extreme Rücklasten auf der Ankerwinde verursachen.

⊗ Beim Heben des Ankers die Winde nicht überlasten oder blockieren.

⊗ Zum Schutz vor Beschädigung der Ankerwinde darf die Fall-Safe Sperre **NIEMALS** als Kettenstopper vor Anker liegend verwendet werden. Das Ankergeschirr muss während des Ankerns immer auf einem dafür vorgesehenen Kettenstopper festgesetzt oder im Falle einer Ankertrosse einer Klampe belegt werden.

- Zum Ankern Fieren sie die Ketten entsprechend frühzeitig unter achteraus Fahrt zum Schutz vor Verdrehen der Kette mit dem Anker und sicherem Eingraben. Genau so sollten sie beim Anlegen mit dem Heck voran verfahren.
- Zur Unterstützung der Ankerwinde beim Einholen des Ankers folgen sie der Kette mit kleiner Fahrt. Beachten sie, dass sie niemals auf oder über den Anker hinaus fahren – zum Schutz des Schiffes.
- Ist der Anker fast eingeholt und nähert sich dem Schiff, dann heben sie das Geschirr kontrolliert zum Schutz vor Beschädigungen des Schiffes.
- Hinweis:** Wir empfehlen ein Verhältnis von 7 zu 1 der Kettentiefe zu Tauwerk.

6.5 Conseils d'utilisation

- Les bateaux à l'ancre peuvent tirer sur la ligne de mouillage et provoquer des dérapages ou appliquer des charges excessives sur le guindeau.

⊗ Lors de la récupération de l'ancre, ne pas surcharger ni laisser trop de mou sur la ligne de mouillage.

⊗ Pour éviter les dégâts, le doigt de blocage ne doit pas prendre toute la charge de la ligne de mouillage. La ligne de mouillage doit être sécurisée directement à une bête d'amarrage ou un taquet et la chaîne sécurisée par un stoppeur de chaîne.

- Sur ancre, larguer progressivement la ligne de mouillage pour éviter que la ligne de mouillage ne s'emmêle à l'ancre. Utilisez cette méthode pour l'amarrage par l'arrière sur une jetée.
- Pour faciliter la récupération, au moteur, avancez le navire vers l'ancre mais pas au-dessus ou au-delà de l'ancre, car cela peut causer des dommages à la coque.
- Quand l'ancre se rapproche du bateau, effectuez des ajustements minutieux des contrôles pour éviter d'endommager le bateau.
- Longueur de mouillage:** À titre indicatif, il est recommandé de larguer 7 fois la hauteur d'eau.

6.5 Consejos de funcionamiento

- Cuando un buque esta fondeado puede forzar la roda y esto puede causar deslizamiento o aplicar cargas excesivas en el molinete.

⊗ Cuando deje caer el ancla no la sobrecargue toda en el mismo lugar.

⊗ Para prevenir daños el trinquete de caída libre **NO DEBE** estar quitado forzando de sobremanera el fondeo. El fondeo debe ser asegurado directamente a un noray o cornamusa y la cadena asegurada en un bloqueador de cadena.

- Cuando Ancla, deslice el fondeo lejos del buque permitiendo que la proa quede libre para prevenir roces entre el ancla y la cadena. Utilice este método para el amarre de popa a un muelle.
- Para ayudar a la recuperación, bajo el poder, haga avanzar el buque hacia el ancla, pero no más allá de esta, ya que esto puede causar daños.
- Cuando el ancla se acerque al barco use cuidadosamente los controles para evitar daños en el casco.
- Ámbito de aplicación:** Como guía, se recomienda que la profundidad de la cadena a la cuerda es de 7 a 1 en el ancla.

6.5 Note per l'utilizzo

- Durante l'ormeggio, il carico sulla catena può essere molto elevato a causa della corrente, del vento e delle onde. Questo può danneggiare il verricello.

⊗ Se durante il recupero il verricello dovesse bloccarsi, slittare o andare in protezione, verificarne la causa prima di procedere.

⊗ Durante l'ormeggio il fermo di sicurezza **NON** deve essere mai utilizzato per trattenere il carico proveniente dalla catena. Per questo scopo vanno utilizzati appositi ferma catena o stroppi di sicurezza.

- Filando la catena conviene posizionarsi contro vento o dare leggermente motore indietro per evitare che la catena cada sull'ancora.
- Durante il recupero, posizionarsi sempre con i motori sulla verticale dell'ancora. Questo permetterà un recupero più facile e allungherà la durata del verricello.
- Quando l'ancora sta per arrivare a bordo, rallentare il recupero e verificare di non andare con lo scafo sopra.
- Per un ormeggio ottimale, la quantità di catena filata deve essere sempre almeno 1/7 del totale cima+catena.

6.5 Tips

- Fartyg till ankars kommer att hänga i linan/kättingen, vilket kan orsaka skavning och för hög belastning på ankarspelet.

⊗ Överlasta inte ankarspelet vid hemtagning.

⊗ Du får **INTE** låta spärrhaken ta upp belastningen från ankarlinan/kättingen när du ligger för ankar. Lina skall surras på pallare, knap eller annat linlås och kätting låsas med kättingstopp.

- Du kan med fördel backa ut linan/kättingen vid ankring, så riskerar du inte att linan/kättingen snor in sig i ankaret. Denna metod kan också användas vid tilläggning med aktern mot bryggan.
- Vid hemtagning kan du med fördel köra sakta fram för att underlätta hemtagningen, dock utan att gå förbi ankingspunkten.
- Justera hemtagningshastigheten och iakttag allmän försiktighet vid hemtagning för att undvika skador på båten.
- Riktlinjer för ankring Generellt gäller att ankarlinans/kättingens längd bör vara 7 gånger ankingsdjupet.

7. Servicing

⚠ **WARNING!** Isolate the windlass using circuit breaker/isolator.

⚠ **WARNING!** Ensure rode is adequately secured to an independent strong point.

7.1 Servicing schedule

Regularly:

- Wash down the windlass using fresh water.
- Examine all electrical connections for corrosion, clean and lightly grease.
- Check anchor locker drain to avoid water damage to motor/gearbox.
- If anchor locker fills with water, check motor is dry and free of rust.
- Check anchor rode splice for wear.
- Check gypsy as it is a high wear item and will last longer if properly used. When re-assembling the cone and gypsy, add a small smear of grease to the contact surfaces.
- Check mounting studs after first two or three recoveries and regularly thereafter.

Annually:

- Check electric cables for damage. Repair/renew as required.
- Strip the above deck components, clean and lightly grease.
- Check motor/gearbox for corrosion, clean and repaint with a suitable marine grade oil based enamel paint.
- Remove electric motor cover and blow dust away from brushes using foot pump or similar taking care not to breathe any dust.

7. Wartung

⚠ **Warnung!** Isolieren sie den Stromkreis immer durch Betätigung der Sicherung oder den Hauptschalter nach dem Gebrauch.

⚠ **WARNING!** Versichern sie sich, dass das Ankergeschirr während des Ankerns an einem adäquaten und dafür vorgesehenen Punkt belegt wird.

7.1 Service Intervalle

Regelmäßig

- Abwaschen der Ankerwinde mit Süßwasser
- Überprüfen sie alle elektrischen Pole nach Korrosion. Reinigen und mit Polfett pflegen
- Überprüfen sie die Ankerkasten Drainage auf Funktion zum Schutz des Antriebs durch Wasser.
- War der Ankerkasten mit Wasser gefüllt, prüfen sie, ob der Motor trocken und rostfrei ist.
- Überprüfen sie den Spleiß von Ankertrosse in die Kette auf Abnutzung
- Überprüfen sie die Kettennuss auf Abnutzung. Beim Zusammenbau des Kupplungskonus / der Verhøltrommel applizieren sie einen leichten Fettfilm auf die Kontaktflächen.
- Überprüfen sie die Montagebolzen durch Deck nach den ersten 2 oder 3 Ankermanövern auf festen Sitz. Später dann regelmäßig.

Jährlich:

- Überprüfen der Elektrik auf Beschädigung. Reparatur/ Erneuerung wo notwendig.
- Zerlegen der Deckseinheit. Reinigen und leicht einfetten.
- Überprüfen der Antriebseinheit auf Korrosion. Reinigen und Anstrich nachbessern mit Marine Grade Öl basierter Lackfarbe.
- Abnehmen des Motorgehäuses. Ausblasen sie den Staub der Kohlebürsten mit einer Fußpumpe oder ähnlichem. Achten sie darauf, dass der Staub nicht eingeatmet wird!

7. Service

⚠ **ATTENTION!** Isoler le guindeau à l'aide du coupe-circuit/disjoncteur.

⚠ **ATTENTION!** Vérifier que la ligne de mouillage est sécurisée à un point d'attache solide et indépendant.

7.1 Planning d'entretien

Régulièrement:

- Rincer le guindeau à l'eau fraîche.
- Examiner toutes les connexions électriques contre la corrosion, nettoyer et légèrement graisser.
- Vérifier les dalots de puits à chaîne pour éviter de noyer le moteur/boîte de vitesses.
- Si le puits à chaîne se remplit d'eau, vérifiez que le moteur est sec et n'a pas de rouille.
- Vérifier l'épissure de la ligne de mouillage contre le ragage.
- Vérifier le barbotin car cet élément est exposé à une usure importante. Il durera plus longtemps s'il est correctement utilisé. Lors du réassemblage du cône de friction et du barbotin, ajouter une touche de graisse sur les surfaces de contact.
- Vérifier les goujons de montage après les deux ou trois premières récupérations et régulièrement par la suite.

Chaque année:

- Vérifier les câbles électriques pour les dégradations. Réparer/ renouveler si besoin.
- Enlever les composants sur le pont, nettoyer et graisser légèrement.
- Vérifier le moteur/ boîte de vitesses contre la corrosion, nettoyer et repeindre avec une peinture marine d'email à base d'huile.
- Enlever le couvercle de moteur électrique et souffler la poussière des charbons en utilisant une pompe à pied ou similaire en prenant soin de ne pas respirer la poussière.

7. Revisión

⚠ **¡ADVERTENCIA!** Aislar el molinete con interruptor / aislador.

⚠ **ADVERTENCIA** Asegúrese de que el fondeo está asegurado a un punto fuerte e independiente.

7.1 Prestación de servicios

Regularmente:

- Lave el molinete con agua fresca.
- Examine todas las conexiones eléctricas de la corrosión, limpiando y engrasando ligeramente.
- Compruebe las uniones entre el molinete y motor/caja reductora para evitar daños por corrosión.
- Si la junta se llena de agua, verifique que el motor está seco y libre de óxido.
- Compruebe la gaza del fondeo para prevenir su posible desgaste.
- Compruebe que el barboten no tiene excesivo desgaste y durará durante más tiempo si es utilizado correctamente. Cuando reensamble el cono y el barboten, agregue una pequeña cantidad de grasa entre el contacto de las superficies.
- Compruebe los tornillos de montaje después de las dos o tres primeras izadas y después regularmente.

Anualmente:

- Compruebe los cables eléctricos dañados. Repárelos o cámbielos si es necesario.
- Desmontar los componentes bajo cubierta, límpielos y engráselos ligeramente.
- Compruebe la corrosión del motor/caja, límpielo y pintelo con un correspondiente aceite/pintura esmaltada de grado marino.
- Quite la tapa de motor eléctrico y soplar el polvo de los cepillos de uso con una bomba de pie o similar teniendo cuidado de no respirar el polvo.

7. Manutenzione

⚠ **ATTENZIONE!** Isolare sempre elettricamente il verricello prima di qualunque operazione.

⚠ **ATTENZIONE!** Non lasciare mai la catena in tensione sul verricello.

7.1 Manutenzione ordinaria

Con regolarità:

- Lavare il verricello con acqua dolce.
- Verificare tutte le connessioni elettriche a vista, sostituire se corrose, pulire e coprire con grasso.
- Verificare lo scarico del gavone ancora per evitare che l'acqua ristagni nella zona del motore.
- Verificare eventuali segni di corrosione sulla carcassa del motore.
- Controllare l'usura della impiombatura tra cima e catena.
- Verificare lo stato delle gole del barbotin. Porre uno strato leggero di grasso su asse e coni frizione, evitando di sporcare eccessivamente le parti di contatto.
- Serrare i dadi di fissaggio del verricello dopo i primi utilizzi ed in seguito almeno due volte per stagione.

Annualmente:

- Verificare lo stato dei cavi elettrici ed eventualmente sostituire quelli danneggiati.
- Smontare tutti gli elementi del verricello in coperta, lavare e lubrificare con grasso.
- Se presenti segni di corrosione sulla carcassa del motore, pulire, rimuovere e verniciare con pittura a olio.
- Rimuovere la calotta posteriore del motore e pulire le spazzole soffiando con una pompa a mano. Non respirare la polvere presente.

7. Service

⚠ **"WARNING!"** Koppla från ankarspelet elektriskt.

⚠ **WARNING!** Försäkra dig om att linan/kättingen är surrad på ett sjömannamässigt sätt.

7.1 Servicing schema

Regulbundet:

- Tvätta ren ankarspelet med färskvatten.
- Kontrollera alla elektriska anslutningar avseende korrosion, rengör och smörj vid behov.
- Kontrollera dräneringen från kättingboxen, för att undvika fuktskador på motor/växel.
- Om kättingboxen skulle fyllas med vatten skall motorn kontrolleras, torkas och rengöras från eventuell rost.
- Kontrollera linans/kättingens infästning på ankaret avseende slitage.
- Kontrollera kabelarett avseende slitage. Använd kabelarett på rätt sätt så håller det längre. Stryk ett tunt lager fett på kontaktytorna vid montering av konan och kabelarett.
- Kontrollera monteringsbultarna (pinnbultar) efter två eller tre ankringar och därefter med jämna mellanrum.

Årsunderhåll

- Kontroll av elkablar avseende skada. Reparerar/byt efter behov.
- Demontera ovan beskrivna däckskomponenter, rengör och smörj försiktigt.
- Kontrollera motor/växel avseende korrosion, rengör och bättringsmåla efter behov med oljebaserad emaljfärg avsedd för marin miljö.
- Ta loss kåpan från elmotorn och blås rent från damm kring borstarna med hjälp av en fotpump eller liknande. Var försiktig så att du inte andas in koldammet.

7. Servicing

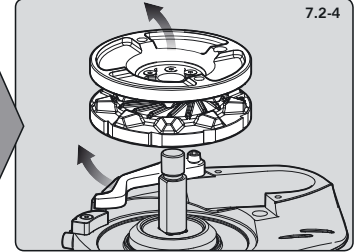
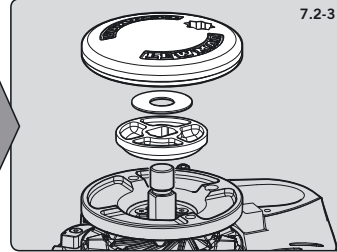
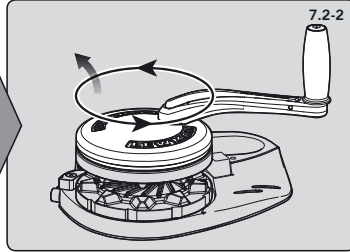
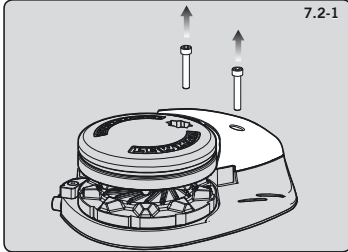
7. Wartung

7. Service

7. Revisión

7. Manutenzione

7. Service



⚠ **WARNING!** Isolate the windlass using circuit breaker/isolator.

⚠ **Warnung!** Isolieren sie den Stromkreis immer durch Betätigung der Sicherung oder den Hauptschalter nach dem Gebrauch.

⚠ **ATTENTION!** Isoler le guindeau à l'aide du coupe-circuit/disjoncteur.

⚠ **¡ADVERTENCIA!** Aislar el molinete con interruptor / aislador.

⚠ **ATTENZIONE!** Isolare sempre elettricamente il verricello prima di qualunque operazione.

⚠ **"VARNING!"** Koppla från ankarspelet elektriskt.

7.2 V1-6 gypsy replacement/service

- Illustrations based on V1-3.
- 1. Remove chain pipe cover screws using 5 mm Allen key.
- 2. Place winch handle into gypsy drive cap, rotate anti-clockwise and remove.
- 3. Remove washer and top cone.
- 4. Pull control arm back to clear gypsy and remove gypsy assembly.
- Wash with clean water - DO NOT JET WASH.
- **NOTE:** Model V6 does not have a control arm.
- Assemble in reverse order greasing threads of chain pipe and washer and stripper screw. When re-assembling the cone and gypsy, add a small smear of grease to the contact surfaces.

7.3 Manual recovery gypsy replacement

- Proceed as 7.2.

7.4 Gypsy/drum replacement

- Proceed as 7.2 except place the winch handle into the drum top nut and remove drum assembly to get to gypsy.

7.2 V1-6 Kettennuss Austausch/Service

- Illustration basiert auf V1-3
- 1. Entfernen der Kettenklöse durch Herausdrehen der 5mm Imbußschrauben
- 2. Setzen sie eine Winchkurbel in die Topkappe ein. Abnehmen durch Drehen gegen den Uhrzeigersinn
- 3. Abnehmen der Zwischenscheibe und des Topkonus
- 4. Ziehen sie den Kontroll-Arm zurück zum freisetzen der Kettennuss und ziehen diese nach oben von der Welle ab.
- Abwaschen mit Süßwasser – VERWENDEN SIE KEINEN HOCHDRUCKREINIGER!
- **ANMERKUNG:** Modell V6 besitzt keinen Kontroll-Arm
- Zusammenbau in umgekehrter Reihenfolge mit Einfetten aller Gewinde und Schrauben vor dem Eindrehen. Im Verlauf des Zusammenbaus fetten sie die Kontaktflächen der Kettennuss und der Kupplung mit einem leichten Film.

7.3 Austausch Kettennuss mit manuellem Betrieb

- Vorgehensweise wie 7.2

7.4 Ketten/Verholspill Austausch

- Vorgehensweise wie 7.2 – ausnehmlich Abnahme der Topmutter des Verholspills zur Abnahme der Trommel und für Zugang zur Kettennuss.

7.2 V1-6 Barbotin - remplacement/service

- illustrations basées sur V1-3.
- 1. Retirer les vis du couvercle d'écubier en utilisant une clé Allen de 5 mm.
- 2. Placer la manivelle de winch dans la flasque du barbotin, tourner dans le sens inverse des aiguille d'une montre et l'enlever.
- 3. Retirer la rondelle et le cône du dessus.
- 4. Reculer le bras de contrôle afin de dégager le barbotin et enlever l'assemblage barbotin.
- Rincer à l'eau fraîche - NE PAS LAVER AU JET.
- **REMARQUE:** Le modèle V6 n'a pas de bras de contrôle.
- Monter dans l'ordre inverse en graissant les filetages des vis d'écubier, la rondelle et la vis du guide. Lors du réassemblage du cône et barbotin, ajouter une touche de graisse sur les surfaces de contact.

7.3 Remplacement du barbotin de récupération manuelle

- Procéder comme pour 7.2.

7.4 Remplacement du Barbotin/tambour

- Procéder comme 7.2 mais, placer la manivelle dans la flasque du dessus du tambour et enlever l'assemblage du tambour pour accéder au barbotin.

7.2 V1-6 barboten - servicio/recambio

- Ilustraciones basadas en los modelos V1-3.
- 1. Desmonte la tapa con los tornillos utilizando una llave allen de 5mm.
- 2. Coloque la maneta en la hendidura del barboten, girar hacia la izquierda y quitar.
- 3. Retirar la arandela y el cono superior.
- 4. Tire del brazo hacia atrás para dejar libre el barboten y quitelo.
- Lavar con agua limpia - NO LIMPIAR CON AGUA A PRESIÓN.
- **NOTA:** El modelo V6 no tiene brazo de control.
- Ensamble de forma contraria, engrasando los hilos de la tapa, la arandela y los tornillos de ensamble. Cuando reensamble el cono y el barboten, añada una ligera capa de grasa en las superficies de contacto.

7.3 Barboten con Recuperación manual - repuestos

- Siga los pasos 7.2.

7.4 Barboten/Campana - repuestos

- Siga los pasos 7.2, excepto colocando la maneta de winche en la campana y quitando la campana para acceder al barboten.

7.2 V1-6 Manutenzione e sostituzione barbotin

- Le illustrazioni si riferiscono ai modelli V1-3.
- 1. Rimuovere la conchiglia allentando le viti a brugola.
- 2. Mediante la manovella winch, rimuovere il cappello del barbotin ruotando in senso anti-orario.
- 3. Rimuovere l'anello di nylon e il cono superiore della frizione.
- 4. Sollevare lo spingicatena per liberare il barbotin e rimuoverlo sollevando.
- Lavare con acqua corrente. NON UTILIZZATE ACQUA A PRESSIONE.
- **NOTA:** Il modello V6 non ha spingicatena.
- Riassemblare procedendo in ordine inverso, ricordandosi di lubrificare con grasso le filettature e tutte le parti in movimento tra loro.

7.3 Versioni con kit di recupero manuale

- Stessa procedura come 7.2.

7.4 Versione con campana

- Procedere come descritto al punto 7.2, tranne che la parte da svitare con la manovella winch è la parte superiore della campana e che il cono superiore è parte integrante della campana.

7.2 Byte av och service på kabelar på modellerna V1 till V6

- Bilderna visar V1 till V3.
- 1. Lossa insexskruvarna (5 mm) som håller kättingröret på plats.
- 2. Sätt ett vinschhandtag i kabelarlocket, vrid moturs och ta loss.
- 3. Ta loss brickan och över konan.
- 4. Dra kontrollarmen bakåt så att kabelarett går fritt och lyft av kabelarenheten.
- Tvätta med rent vatten – ANVÄND INTE HÖGTRYCKSTVÄTT.
- **ANM:** Det finns ingen kontrollarm på modell V6.
- Smörj kättingrörets gänga, brickan och skruven med fett och återmontera enheten i omvänd ordning. Stryk ett tunt lager fett på kontaktytorna vid monteringen av konan och kabelarett.

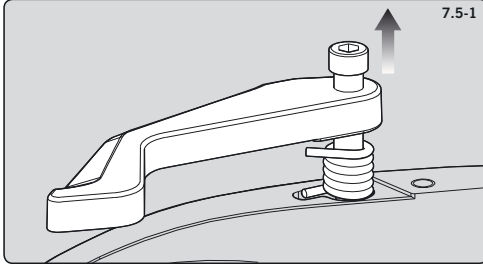
7.3 Byte av kabelar på vinsch med manuell hemtagning

- Följ instruktionerna under punkt 7.2.

7.4 Byte av kabelar/trumma

- Följ instruktionerna under punkt 7.2, förutom det att vinschhandtaget skall placeras i toppmuttern på trumman, för att man skall komma åt kabelarett.

7. Servicing



⚠ **WARNING!** Isolate the windlass using circuit breaker/isolator.

⚠ **WARNING!** Ensure rode is adequately secured to an independent strong point.

7.5 V1-5 control arm replacement/service

- Remove gypsy, proceed as sec. 7.2.
- 1. Unscrew control arm shoulder screw using a 4 mm Allen key.
- Remove control arm and torsion spring from the base plate.
- Wash with clean water (Not Jetwash). Replace components, (if necessary) and assemble in reverse order.

7.6 V1-3 fall-safe pawl and lever replacement/service

- **NOTE:** V-Sport & V4-6 do not have fall-safe.
- Remove gypsy, proceed as sec. 7.2.
- 1. Turn fall-safe lever so it is horizontal and remove shoulder screw.
- Lift fall-safe pawl and spring, fall safe lever and spacer.
- Replace components and assemble in reverse order.
- 2. Remove screw from inner edge of fall-safe pawl.
- Lift off pawl and replace components.

7. Wartung

⚠ **Warnung!** Isolieren sie den Stromkreis immer durch Betätigung der Sicherung oder den Hauptschalter nach dem Gebrauch.

⚠ **WARNING!** Versichern sie sich, dass das Ankergeschirr während des Ankerns an einem adäquaten und dafür vorgesehenen Punkt belegt wird.

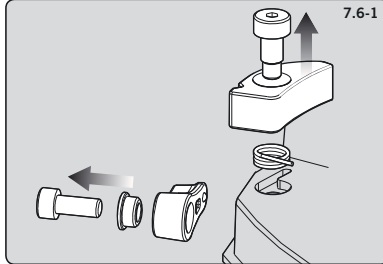
7.5 V1-5 Control Arm Austausch/Wartung

- Wincschtrommel abnehmen wie in 7.2 beschrieben.
- 1. Demontage der Abdeckung des Control Arms durch Herausdrehen der Schraube mit einem 4mm Imbußschlüssel.
- Abnehmen des Control Arms und der Feder von der Windenbasis.
- Waschen der Teile mit Süßwasser (kein Hochdruckreiniger). Austausch der Komponenten (wo notwendig) und Zusammenbau in umgekehrter Reihenfolge.

7.6 V1-3 Fall-Safe Sperre & V4-6 OHNE Fall-Safe Sperre

- Kettennuss abnehmen und verfahren wie in 7.2 beschrieben.
- 1. Drehen sie die Sperre horizontal und demontieren die Abdeckung durch Herausdrehen der Schraube.
- Nehmen sie die Fall-Safe Sperre mit Feder, Sperrhebel und Spacer ab.
- Austausch der Teile und Zusammenbau in umgekehrter Reihenfolge.
- 2. Drehen sie die Schraube aus der Fall-Safe aus der Innenseite der Sperre.
- Nehmen sie die Sperre ab und tauschen die Teile aus.

7. Service



⚠ **ATTENTION!** Isoler le guindeau à l'aide du coupe-circuit/disjoncteur.

⚠ **ATTENTION!** Vérifier que la ligne de mouillage est sécurisée à un point d'attache solide et indépendant.

7.5 V1-5 Bras de contrôle - remplacement/service

- Enlever le barbotin, procédez comme pour 7.2.
- 1. Dévisser la vis d'épaulement du bras de contrôle en utilisant une clé Allen de 4 mm.
- Retirer le bras de contrôle et ressort de torsion de la plaque de base.
- Rincer à l'eau fraîche (pas de Jet). Remplacer les composants, (si nécessaire) et réassembler dans l'ordre inverse.

7.6 V1-3 Doigt de blocage et levier - remplacement/service

- **REMARQUE:** V-Sport & V4-6 ne disposent pas de doigt de blocage.
- Enlever le barbotin, procédez comme pour 7.2.
- 1. Tourner le levier pour qu'il soit à l'horizontal et enlever la vis d'épaulement.
- Soulever le doigt de blocage, le levier et l'entretoise.
- Remplacer les composants et les assembler dans l'ordre inverse.
- 2. Retirer la vis du bord intérieur du doigt de blocage.
- Enlever le doigt de blocage et remplacer les composants.

7. Revisión

⚠ **¡ADVERTENCIA!** Aislar el molinete con interruptor / aislador.

⚠ **ADVERTENCIA** Asegúrese de que el fondeo está asegurado a un punto fuerte e independiente.

7.5 V1-5 Brazo de control - servicio/recambio

- Desmonte el barboten, siguiendo los pasos 7.2.
- 1. Desatornille el codo del brazo de control utilizando una llave allen de 4mm.
- Desmonte el brazo de control y el muelle de torsión de su base.
- Limpíelo con agua fresca (No a presión). Sustituya los componentes, (si es necesario) y móntelos en orden inverso.

7.6 V1-3 Trinquete de caída libre y leva - servicio/recambio

- **NOTA:** V-Sport & V4-6 no tienen este sistema de leva
- Desmonte el barboten, y siga los pasos 7.2.
- 1. Gire la leva horizontal y desmonte el tornillo del codo.
- Levante el trinquete y el muelle, la leva y la arandela.
- Sustituya los componentes y móntelos en sentido contrario.
- 2. Desmonte el tornillo de la cara interna de trinquete.
- Despegue el trinquete y sustituya componentes.

7. Manutenzione

⚠ **ATTENZIONE!** Isolare sempre elettricamente il verricello prima di qualunque operazione.

⚠ **ATTENZIONE!** Non lasciare mai la catena in tensione sul verricello.

7.5 V1-5 Manutenzione e sostituzione spingicatena

- Rimuovere il barbotin come descritto al punto 7.2.
- 1. Svitare la vite di fissaggio del supporto spingicatena con una chiave a brucola da 4mm.
- Rimuovere il braccetto e la molla di richiamo dal verricello.
- Lavare con acqua corrente. Riposizionare i componenti, sostituendo quelli danneggiati.

7.6 V1-3 Manutenzione e sostituzione fermo di sicurezza

- **NOTA:** I modelli Sport, V4, V5 e V6 non hanno fermo di sicurezza.
- Rimuovere il barbotin come descritto al punto 7.2.
- 1. Posizionare la leva di bloccaggio rossa in posizione orizzontale e rimuovere la vite di fissaggio.
- Sfilare tutti i componenti.
- Lavare con acqua corrente e riposizionare i componenti, sostituendo quelli danneggiati.
- 2. Avvitare la vite di fissaggio verificando che non sia troppo serrata.
- Verificare che i componenti si muovano liberamente.

7. Service

⚠ **"WARNING!"** Koppla från ankarspelet elektriskt.

⚠ **WARNING!** Försäkra dig om att linan/kättingen är surrad på ett sjömannamässigt sätt.

7.5 Byte av/service på kontrollarm på modellerna V1 till V5

- Ta loss kabelare enligt instruktionerna i punkt 7.2.
- 1. Skruva loss kontrollarmens ledskruv (4 mm insex).
- Ta loss kontrollarmen och torsionsfjädern från bottenplattan.
- Tvätta med rent vatten (ej högttryckstvätt). Komponenterna bytes efter behov och återmonteras i omvänd ordning.

7.6 Byte a/service på spärrhake på modellerna V1 till V3

- **ANM:** V-Sport och V4 till V6 har inte denna fällningsfunktion.
- Ta loss kabelare enligt instruktionerna i punkt 7.2.
- 1. Ställ fjällarmen horisontellt och ta oss ledskruven.
- Lyft spärrhaken och fjädern, fjällarmen och mellanlagget.
- Byt komponenterna efter behov och återmontera i omvänd ordning.
- 2. Ta loss skruven från spärrhakens innerkant.
- Lyft av haken och byt ut komponenterna.

Optional Manual Recovery Kit

Kit No.	Kit Description	Items Included (Qty.)
66000060	Cap Kit	22(1)
66000624	V1/2/3 Base	3(1), 10(1), 34(1)
66000625	Chain Pipe Cover	11(1), 34(2)
66000626	Fastener Kit	1(1), 2(1), 4(3), 5(1), 8(1), 14(2)
66000627	Drive Kit	1(1), 2(1), 3(1), 4(3), 5(1), 14(1), 15(2), 17(1), 35(1)
66000628	Manual Recovery Pawl Kit (Fall Safe)	12(1), 18(1), 19(1), 28(1), 29(1), 33(1)
66000629	Motor Gearbox	30(1)
66000631	Mounting Kit (Metric)	9(1), 16(1), 28(1), 26(4), 27(4)
66000632	Fast Fit Assembly	36(1), 37(1)
66000633	Deck Spacer Kit	13(1), 32(4)
66200076	Sensor & Magnet Kit	21(1), Magnet(1)
66810030	Control Arm Kit	7(1), 8(1), 23(1)
66810065	Motor Gearbox Kit	17(1), 30(1), 36(1), 37(1)
66840054	Manual Recovery Kit	4(1), 24(1), 25(1)
68000360	V Range Gypsy & Stripper Kit (000)	31(1), Magnet(1)
68000361	V Range Gypsy & Stripper Kit (001)	31a(1), Magnet(1)
68000362	V Range Gypsy & Stripper Kit (002)	31b(1), Magnet(1)
68000840	V Range Gypsy & Stripper Kit (006)	31c(1), Magnet(1)

7. Servicing

7. Wartung

7. Service

7. Revisión

7. Manutenzione

7. Service

7.8 V2 & V3 Parts list

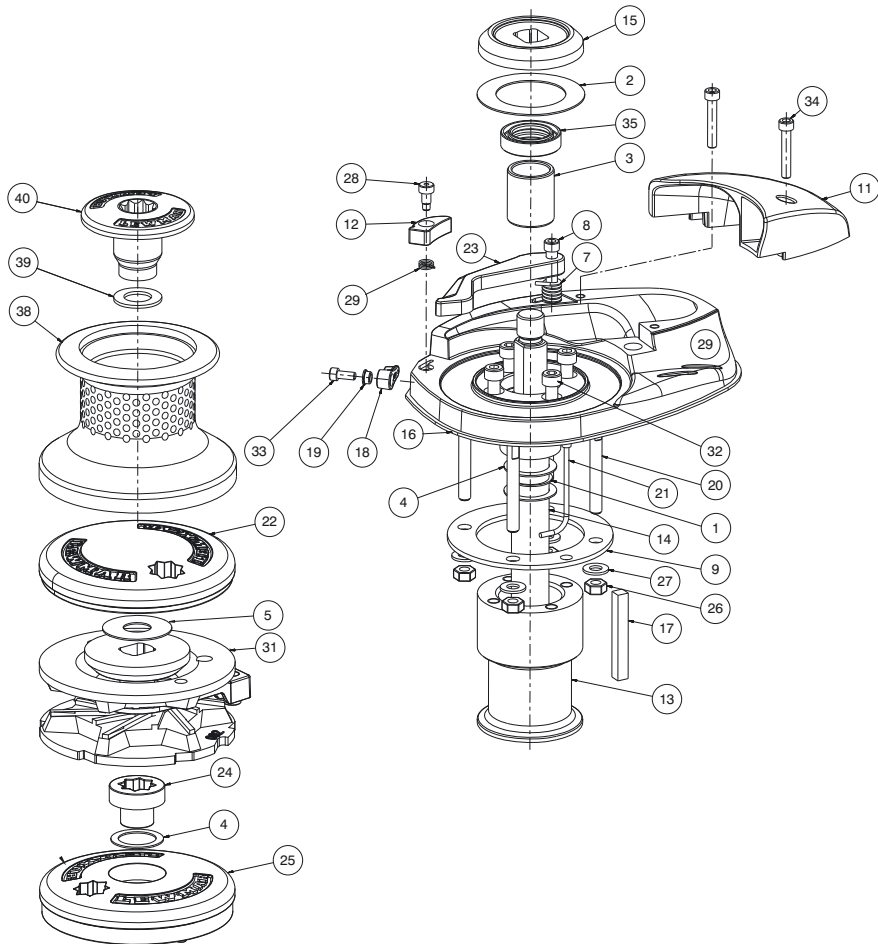
7.8 V2 & V3 Teileliste

7.8 Liste des pièces V2 & V3

7.8 V2 & V3 Lista de piezas

7.8 V2 - V3 codici

7.8 Reservdelslista – V2 och V3



Kit No.	DESCRIPTION	Items Included (Qty.)
66000060	Cap Kit	22(1), 5(1)
66000624	V1/2/3 Base	3(1), 10(1), 35(1)
66000625	Chain Pipe Cover	11(1), 34(2)
66000626	Fastener Kit	1(1), 2(1), 4(3), 5(1), 6(1), 8(1), 17(1), 28(1), 33(1), 34(2)
66000641	Drive Kit V2/3 Gypsy Only	1(1), 2(1), 3(1), 4(3), 5(1), 14(1), 15(2), 17(1), 35(1)
66000628	Manual Recovery Pawl Kit (Fall Safe)	12(1), 18(1), 19(1), 28(1), 29(1), 33(1)
66000640	Drum Kit V2/3 Fast Fit	38(1), 39(1), 40(1)
66000655	Drum Top Nut	39(1), 40(1)
66000642	Drive Kit V2/3 Gypsy Drum	1(1), 2(1), 3(1), 4(3), 5(1), 14(1), 15(2), 17(1), 35(1)
66000631	Mounting Kit (Metric)	9(1), 16(1), 20(1), 26(4), 27(4)
66000632	Fast Fit Assembly	36(1), 37(1)
66000633	Deck Spacer Kit	13(1), 32(4)
66200076	Sensor & Magnet Kit	21(1), Magnet(1)
66810030	Control Arm Kit	7(1), 8(1), 23(1)
66810065	Motor Gearbox Kit	17(1), 30(1), 36(1), 37(1)
66840054	Manual Recovery Kit (Gypsy Only)	4(1), 24(1), 25(1)
68000360	V Range Gypsy & Stripper Kit (000)	31(1), Magnet(1)
68000361	V Range Gypsy & Stripper Kit (001)	31(1), Magnet(1)
68000362	V Range Gypsy & Stripper Kit (002)	31(1), Magnet(1)
68000363	V Range Gypsy & Stripper Kit (003)	31(1), Magnet(1)
68000813	12 V V2 Fast-Fit Motor Gearbox Assembly	30(1), 36(1), 37(1)
68000814	24 V V2 Fast-Fit Motor Gearbox Assembly	30(1), 36(1), 37(1)
68000815	12 V V3 Fast-Fit Motor Gearbox Assembly	30(1), 36(1), 37(1)
68000816	24 V V3 Fast-Fit Motor Gearbox Assembly	30(1), 36(1), 37(1)
68000817	12 V V2 M/O Ride Motor Gearbox Assembly	30(1), 36(1), 37(1)
68000818	24 V V2 M/O Ride Motor Gearbox Assembly	30(1), 36(1), 37(1)
68000819	12 V V3 M/O Ride Motor Gearbox Assembly	30(1), 36(1), 37(1)
68000820	24 V V3 M/O Ride Motor Gearbox Assembly	30(1), 36(1), 37(1)
66840056	V2/3 Gypsy/Drum Manual Recovery Kit	Not Shown

7. Servicing

7. Wartung

7. Service

7. Revisión

7. Manutenzione

7. Service

7.9 V4 & V5 Parts list

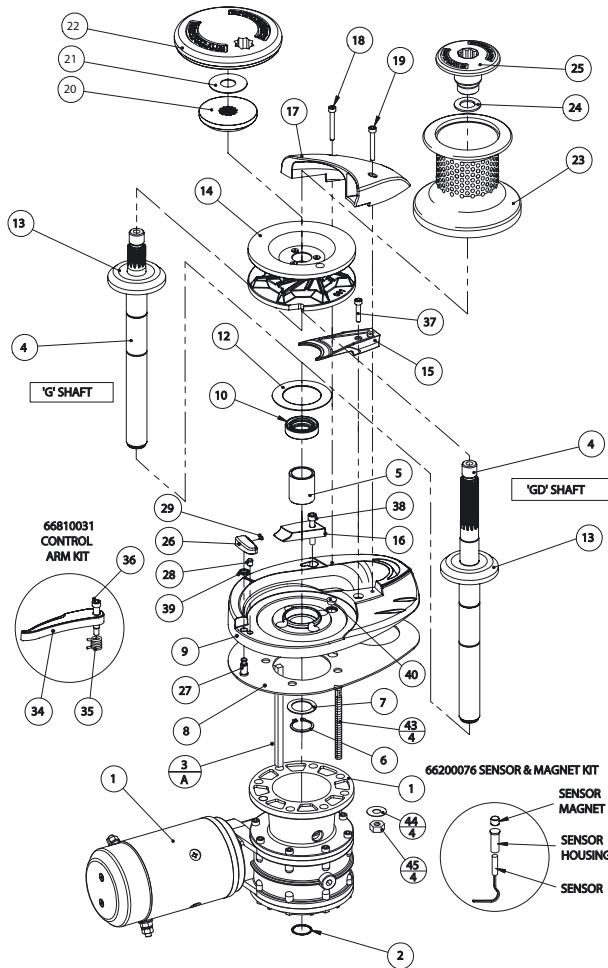
7.9 V4 & V5 Teileliste

7.9 Liste des pièces V4 & V5

7.9 V4 & V5 Lista de piezas

7.9 V4 - V5 codici

7.9 Reservdelistsla – v4 och v5



Kit No.	Kit Description	Items Included (Qty.)
66000065	Drum Top Nut	24(1), 25(1)
66000070	Fastener/Drive	2(1), 3A(1), 38(1), 6(1), 7(1), 18(1), 19(1), 21(1), 24(1), 28(1), 29(1), 32(4), 33(8), 37(1), 38(1), 40(5), 43(4), 44(4), 45(4), Hex Keys 2, 4, 5 & 6 mm
66000071	Mainshaft Assembly, Gypsy/Drum	4A(1), 13(1)
66000072	Mainshaft Assembly, Gypsy Only	4B(1), 13(1)
66000073	Bearing/Seal	5(1), 8(1), 12(1), 12A(1)
66000075	Stripper/Pawl	15(1), 16(1), 26(1), 28(1), 29(1), 37(1), 38(1), 39(1), Hex Keys 2, 4, 5 & 6 mm
66000076	Base	5(1), 9(1)
66000077	Chain Pipe Cover	17(1), 18(1), 19(1), Hex Key 5 mm
66000079	Spacer	38(1), 30(1), 31(1), 32(4), 33(8)
66810030	Control Arm Kit	34(1), 35(1), 36(1), Hex Keys 4, 5 & 6 mm
66200076	Optional Sensor & Magnet	Sensor(1), Magnet(1) & Housing(1)

7. Servicing

7. Wartung

7. Service

7. Revisión

7. Manutenzione

7. Service

7.10 V6 Parts list

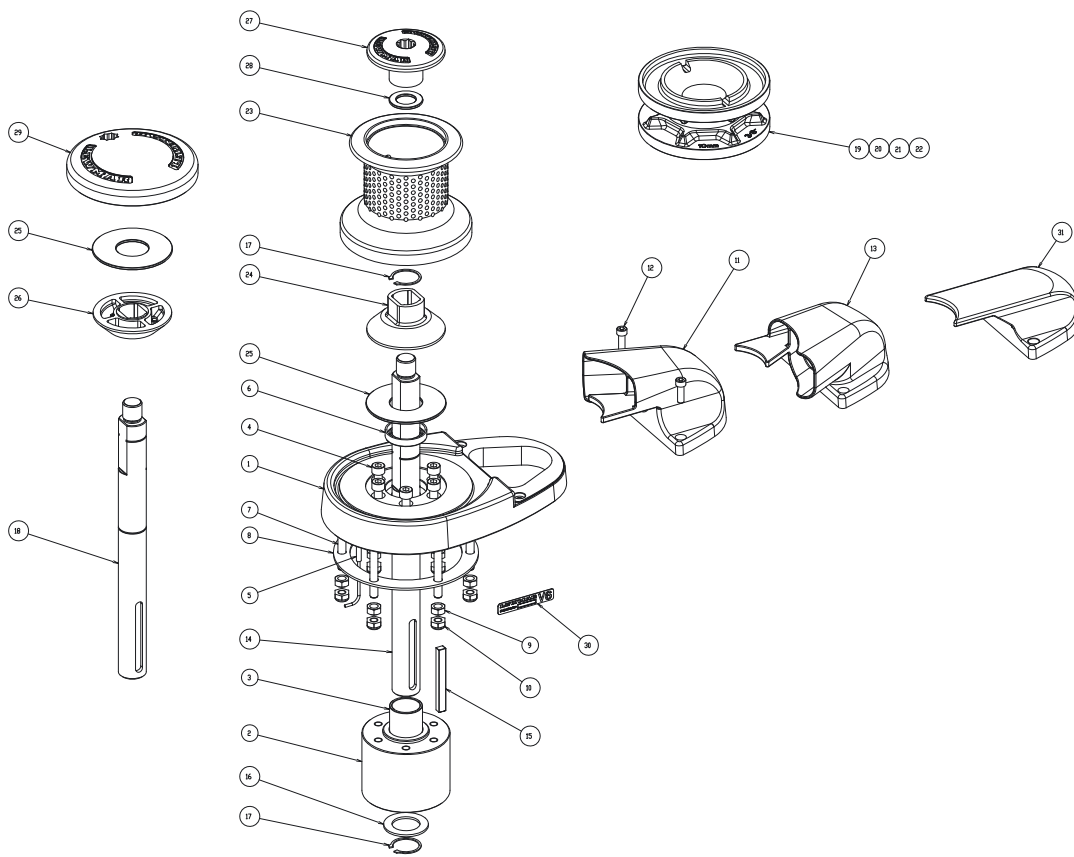
7.10 V6 Teileliste

7.10 Liste des pièces V6

7.10 V6 Lista de piezas

7.10 V6 codici

7.10 Reservdelista – V6



Kit No.	Kit Description	Items Included (Qty.)
66000692	Blank Cover with Stripper	31(1), 12(2)
66000688	Top Cap (Gypsy Only)	29(1), 25(1)
66000687	Top Nut (Gypsy/Drum)	27(1), 28(1)
66000686	Cone (Gypsy Only)	24(1), 25(1)
66000684	Drum	23(1)
66000683	14 mm Gypsy	22(1)
66000682	1/2" Gypsy	21(1)
66000681	12 mm Gypsy	20(1)
66000680	10 mm Gypsy	19(1)
66000679	Mainshaft (Gypsy Only)	18(1), 15(1), 16(1), 17(2)
66000678	Mainshaft (Gypsy/Drum)	14(1), 15(1), 16(1), 17(2)
66000677	R/H Chain Cover	13(1), 12(2)
66000676	L/H Chain Cover	11(1), 12(2)
66000675	Mounting	7(6), 8(1), 9(6), 10(6)
66000674	Base	1(1), 2(1), 3(1), 4(6), 5(1), 6(1)

8. Specifications

8. Technische Daten

8. Spécifications

8. Especificaciones

8. Specifiche

8. Tekniska specifikationer

8.2 V4-5 dimensions

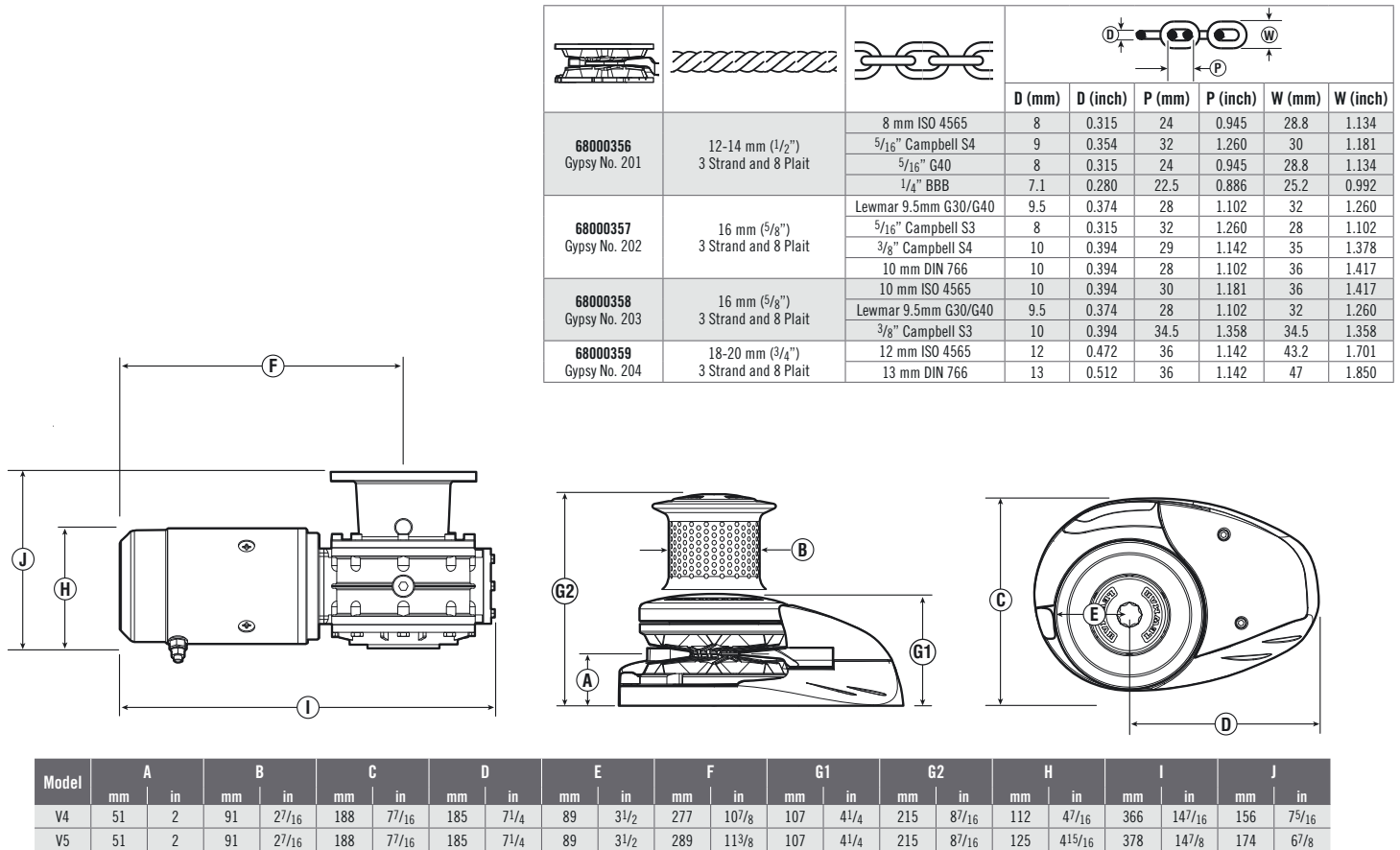
8.2 V4-5 Abmessungen

8.2 Dimensions V4-5

8.2 V4-5 Dimensiones

8.2 V4-5 dimensioni

8.2 Mått – V4 och V5



8. Specifications

8. Technische Daten

8. Spécifications

8. Especificaciones

8. Specifiche

8. Tekniska specifikationer

8.3 V6 dimensions

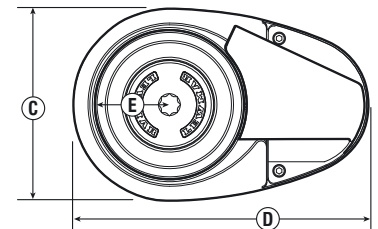
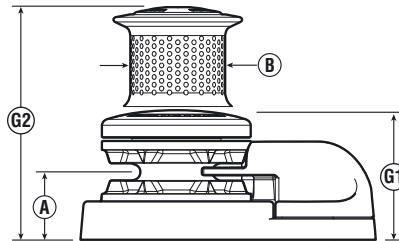
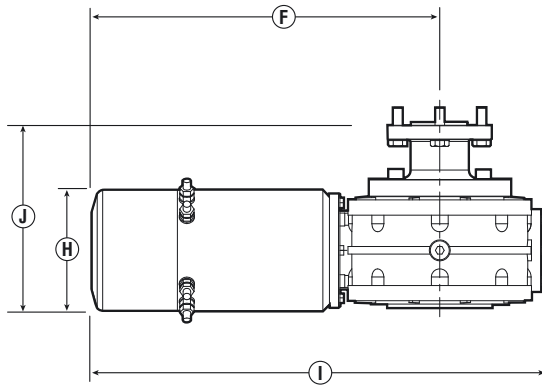
8.3 V6 Abmessungen

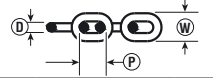
8.3 Dimensions V6

8.3 V6 Dimensiones

8.3 V6 dimensioni

8.3 Mått – V6



							
		D (mm)	D (inch)	P (mm)	P (inch)	W (mm)	W (inch)
68000903 10 mm Gypsy Kit	10 mm ISO 4565	10	0.394	30	1.181	36	1.417
	10 mm DIN 766	10	0.394	28	1.102	36	0.394
	3/8" ISO G4	10	0.394	31	1.220	35	0.394
	Lewmar 9.5 mm G30/G40	9.5	0.374	28	1.102	32	1.260
68000904 12 mm Gypsy Kit	11 mm Short Link	11	0.433	33	1.299	39	0.433
	Lewmar 12 mm G30/G40	12	0.472	36	1.417	40.5	0.472
	7/16" ISO G4	11.8	0.464	35.5	1.400	40.1	0.464
	13 mm DIN 766	13	0.512	36	1.417	47	0.512
68000906 1/2" Gypsy Kit	1/2" ISO ACCO G4	13.2	0.519	40.4	1.590	45.7	0.519
	Lewmar 12 mm G30/G40	12	0.472	36	1.417	40.5	0.472
68000905 14 mm Gypsy Kit	Lewmar 14 mm G30/G40	14	0.551	42	1.654	49	0.551
	14 mm DIN 766	14	0.551	41	1.614	50	0.511

Model	A		B		C		D		E		F		G1		G2		H		I		J	
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
V6	77	3 1/32	105	4 1/8	212	8 11/32	326	12 7/8	82	3 7/32	366	14 3/8	145	5 3/4	257	10 1/8	122	4 13/16	484	19	193	7 5/8

8. Specifications

8.4 V1-6 deck template guide

DO NOT use this template as a cutter. It is supplied as a guide only. Check before drilling holes.

8. Technische Daten

8.4 V1-6 Deckschablonen Richtlinie

Verwenden sie NICHT die Schablonen zum Aufriss der notwendigen Bohrungen & Ausschnitte. Die Schablonen sind NUR RICHTLINIEN! Prüfen sie die Maße BEVOR sie mit den Arbeiten beginnen.

8. Spécifications

8.4 Guide gabarit de pont V1-6

VERIFIER avant de percer des trous, ce gabarit est fourni à titre indicatif seulement.

8. Especificaciones

8.4 V1-6 Guía plantilla de cubierta

NO utilice la plantilla como cutter. Solo es para guiar. Compruebe antes de hacer los agujeros.

8. Specifiche

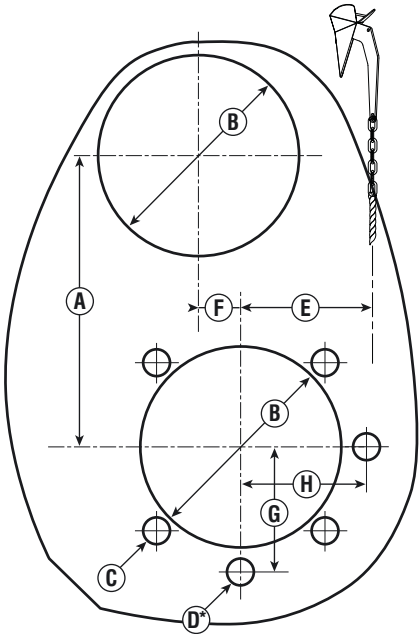
8.4 V1-6 dima foratura coperta

NON utilizzare questa dima per forare, verificare sempre la corretta dimensione utilizzando il verricello.

8. Tekniska specifikationer

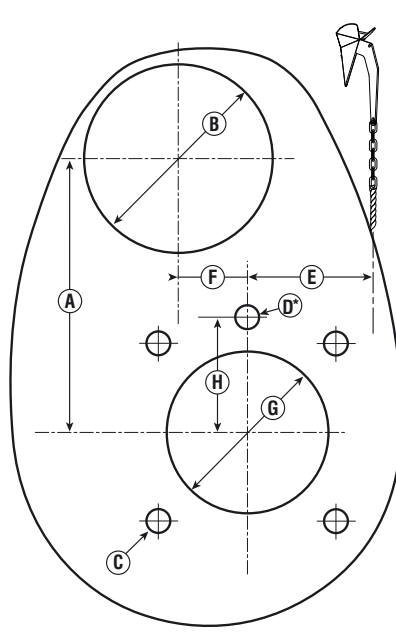
8.4 Däcksmall – V1 till V6

Använd INTE den här mallen för håltagning. Den är endast avsedd att användas som riktlinje. Kontrollera alltid innan du borrar hålen.



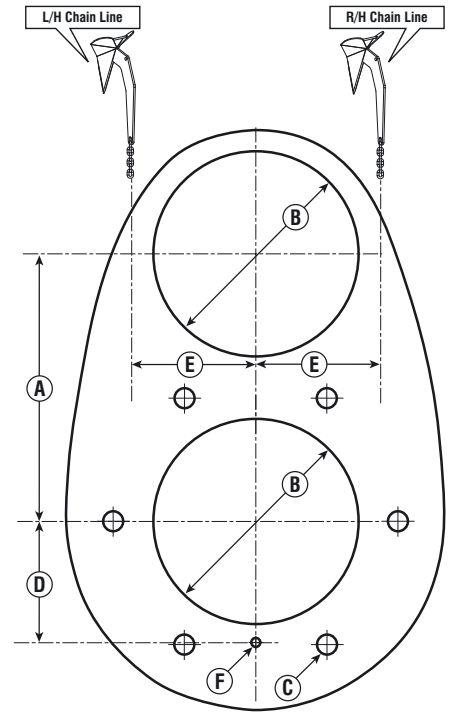
*Optional hole for anchor sensor

*Optional Bohrung für Anker-Sensor



*Trou optionnel pour le capteur d'ancre

*Agujero opcional para del ancla



* foro per sensore contametri

*Valfritt hål för ankar sensor

V1-3			
A	110 mm (4 ⁵ / ₁₆ "	E	50 mm (2")
B	Ø75 mm (3")	F	16 mm (5 ⁸ / ₁₆ "
C	5 x Ø10 mm (3 ⁸ / ₁₆ ") PCD 90 mm (3 ⁹ / ₁₆ ")	G	47.5 mm (1 ⁷ / ₈ ")
D*	Ø14 mm (9 ¹ / ₁₆ ")	H	47.5 mm (1 ⁷ / ₈ ")

V4-5			
A	131 mm (5 ¹ / ₈ ")	E	60 mm (2 ³ / ₈ ")
B	Ø90 mm (3 ⁹ / ₁₆ ")	F	33 mm (1 ⁵ / ₁₆ ")
C	4 x Ø10 mm (3 ⁸ / ₁₆ ") PCD (45°) 120 mm (4 ³ / ₄ ")	G	Ø77 mm (3")
D*	Ø12 mm (1 ¹ / ₂ ")	H	55 mm (2 ¹ / ₁₆ ")

V6			
A	150 mm (5 ⁷ / ₈ ")	D	68 mm (2 ¹¹ / ₁₆ ")
B	Ø115 mm (4 ¹ / ₂ ")	E	70 mm (2 ³ / ₄ ")
C	6 x Ø11 mm (7 ¹ / ₁₆ ") PCD 160 mm (6 ⁵ / ₁₆ ")	F	Ø5 mm (3 ¹ / ₁₆ ")

8. Specifications

8. Technische Daten

8. Spécifications

8. Especificaciones

8. Specifiche

8. Tekniska specifikationer

8.5 Electric specifications

8.5 Elektrische Spezifikationen

8.5 Caractéristiques électriques

8.5 Especificaciones eléctricas

8.5 Caratteristiche elettriche

8.5 Elspecificationer

Model	Power Option	Motor	Typical Max. Pull		Maximum Line Speed		Typical Working Load		Normal Current Draw	Total Weight Gypsy Only		Total Weight Gypsy/Drum		Circuit Breaker
Modell	Leitungsoptionen	Motor	Typische maximale Zugkraft		Maximale Leinengeschwindigkeit		Typische Arbeitslast		Normaler Stromverbrauch	Gesamtgewicht Nur Kettenspill		Gesamtgewicht Ketten/Verholspill		Stromkreisunterbrecher/Sicherungsautoma
Modèle	Option puissance	Moteur	Traction maximum		Vitesse maximum		Charge maximum		Consommation	Poids total barbotin seul		Poids total barbotin/tambour		Coupe circuit
Modelo	Opción de Potencia	Motor	Típico Tiro Max.		Máxima Velocidad de Línea		Carga de Trabajo Típica		Flujo de Corriente	Peso Total Solo Borboten		Peso Total Borboten/Campana		Disyuntor
Modello	Potenza	Motore	Capacità di tiro max		Velocità di recupero max		Capacità di tiro continua		Assorbimento	Peso versione solo barbotin		Peso versione con campana		Protezione elettrica
Modell	Drivalternativ	Motor	Normal max dragkraft		Max linhastighet		Normal arbetslast		Normal driftström	Total vikt Endast kabelar		Total vikt Kabelar/trumma		Kretsbytare
	V	W	kg	lb	m/min	ft/min	kg	lb	A	kg	lb	kg	lb	A
V1	12	700	454	1000	19	65	113	250	80	19	42	-	-	90
V1 M0	12	700	454	1000	19	65	113	250	80	19	42	22	48.5	90
V2	12	700	650	1433	21	69	163	358	80	19	42	22	48.5	90
V2	24	900	760	1675	24	79	180	396	45	19	42	24.5	54	50
V3	12	1000	890	1962	28	92	215	473	85	21.5	47	24.5	54	110
V3	24	1000	1020	2248	30	98	243	535	60	21.5	47	36	79	90
V4	12	1600	1360	2998	25	82	136	300	125	29	64	36	79	150
V4	24	2000	1600	3528	27	90	136	300	70	29	64	38	84	110
V5	12	2000	1860	4100	27	90	136	300	120	31	68	38	84	150
V5	24	2000	2000	4410	29	97	136	300	60	31	68	63	139	110
V6	24	2000	1800	3960	16	52	450	990	60	60	132	-	-	150

9. Trouble shooting

9.1 Electric windlass

1. Anchor rode pays out independently while windlass is not in use.
- This problem is a result of not securing the anchor rode combined with the gypsy drive cap being slack. Tighten the gypsy drive cap using the winch handle and always secure the anchor rode independently of the windlass when not in use.
2. Failure to operate or sluggish operation.
- The majority of these problems are electrical in nature. It is essential that the proper voltage be maintained. The proper voltage on a 12 Volt system is 13.5 Volts (24 Volt system is 26.5 Volts), constant low voltage will damage motor.
- Ensure electrical cable size is large enough to handle the current draw and keep voltage drop within acceptable limits.
- Check control switches, connections, battery condition, isolator switch, fuse and motor for operation failure.

9.2 Hydraulic windlass

Hydraulic leak

The following are possible causes for hydraulic oil leakage from hydraulic drive unit:

- Excessive pressure.
- Dirt obstructing a seal.
- Loose or badly fitted connections.
- Damaged or broken components.

When an hydraulic oil leak is detected, identify the true cause of the leakage before remedial action is taken.

⚠ WARNING!

- Do not attempt to remove hydraulic components or repair the hydraulic system whilst pressured. To prevent accidental operation, switch off power before removing any system component.

9.3 Hydraulic question & answer

Windlass will not start

1. No power to Commander
- Check unit is switched on
- Check electrical connections to Commander
- Check fuses & safety cut-outs

9. Fehlersuche

9.1 Elektrische Ankerwinde

1. Das Ankerschirr kann unabhängig gefiert werden, wenn die Winde nicht im Einsatz ist.
- Dies ist das Ergebnis von ungesichertem Ankerschirr in Verbindung mit Rutschen der Kettennuss unter Schocklasten. Drehen sie die Topkappe mit einer Winkskurbel fest an und sichern sie IMMER das Ankerschirr unabhängig von der Ankerwinde, wenn die Winde nicht im Einsatz ist.
2. Fehlerhafte Bedienung und ruckartiger Betrieb der Winde
- Die Hauptsache dieser Indizien ist elektrischer Natur. Es ist wichtig, die korrekte Spannung anliegen zu haben. Die korrekte Spannung bei 12V Systemen liegt bei 13,5 Volt (24V Systeme besitzen 26,5V). Konstante Unterspannung wird den Motor beschädigen.
- Vergewissern sie sich, dass die Kabelquerschnitte groß genug dimensioniert sind, und dass der Spannungsverlust im akzeptablen Rahmen verbleibt.
- Prüfen sie die Schalter, Kontakte, Batteriezustand, Hauptschalter/ Sicherung und Motor auf Funktionalität und korrekten Zustand.

9.2 Hydraulische Ankerwinden

Hydraulische Leckagen

Die folgenden Möglichkeiten können eine Öl-Leckage des Motors hervorrufen:

- Überdruck
- Schmutz und Staub, die die Dichtung angreifen
- Lose oder schlecht montierte Komponenten
- Beschädigte oder gebrochene Komponenten

Wenn sie eine Leckage feststellen, dann identifizieren sie erst den wirklichen Grund dafür – bevor sie mit einer eventuellen Reparatur beginnen.

⚠ WARNING!

- Nehmen sie niemals hydraulische Komponenten ab oder reparieren das System, ohne komplett das System zu entlasten. Um Unfälle und Verletzungen vor zu beugen, trennen sie immer die elektrische Versorgung zuverlässig bevor sie mit den Arbeiten beginnen.

9. Resolution de problemes

9.1 Guindeau électrique

1. La ligne de mouillage se déroule de façon autonome quand le guindeau n'est pas en usage.
- Ce problème se produit lorsque la ligne de mouillage n'est pas sécurisée et la flasque du barbotin est desserrée. Serrer la flasque du barbotin en utilisant la manivelle de winch et toujours sécuriser la ligne de mouillage indépendamment du guindeau quand il n'est pas utilisé.
2. Panne de fonctionnement ou opération lente.
- La majorité de ces problèmes sont de nature électrique. Il est essentiel que le bon voltage soit maintenu. La bonne tension sur un système de 12 volts est de 13,5 volts (un système de 24 volts est de 26,5 Volts), une basse tension constante endommagera le moteur.
- Veiller à ce que la taille du câble électrique soit adéquate pour gérer la consommation de courant et garder la chute de tension dans des limites acceptables.
- Vérifiez les interrupteurs de commande, les connexions, l'état de la batterie, le coupe circuit, le fusible et le moteur en cas de panne.

9.2 Guindeau hydraulique

Fuite hydraulique

Les causes possibles de fuites d'huile hydraulique de l'unité d'entraînement sont les suivantes:

- Une pression excessive.
 - Les salissures bloquent un joint.
 - Un mauvais contact ou une connexion mal installée.
 - Des éléments endommagés ou cassés.
- Quand une fuite d'huile hydraulique est détectée, essayez d'identifier la véritable cause de la fuite avant que des mesures correctives ne soient prises.

⚠ RECOMMANDATIONS!

- N'essayez pas de retirer les composants hydrauliques ou de réparer le système hydraulique sous pression. Pour empêcher le fonctionnement accidentel, mettez hors tension avant de retirer tout élément du système.

9.3 Hydraulique - questions et réponses

Le guindeau ne démarre pas

1. Pas de puissance à la centrale Commander
- Vérifier que l'unité est allumée
- Vérifier les connexions électriques vers la centrale Commander

9. Resolución de problemas

9.1 Molinete Eléctrico

1. El fondeo permanece de forma independiente mientras el molinete no está en uso
- Este problema es el resultado de no asegurar que el fondeo y el barboten tiene holgura. Apriete la tapa del barboten utilizando una maneta y siempre asegure el fondeo con de forma independiente cuando el molinete no este en uso.
2. Fallos en el funcionamiento o movimientos perezosos.
- La mayoría de estos problemas son de naturaleza eléctrica. Es esencial tener un correcto voltaje y que sea mantenido. El voltaje correcto en un sistema de 12 V es de 13,5 Volts (en sistemas de 24V es de 26,5V), un voltaje bajo constante puede dañar el motor.
- Asegúrese de que el tamaño del cableado es el correcto para la tensión del sistema y compruebe que el voltaje cae bajo límites aceptables.
- Compruebe las botoneras, conexiones, condición de las baterías, aislador, fusible y si el motor tiene fallos.

9.2 Molinete Hidráulico.

Fuga hidráulica

Las siguientes son posibles causas de fugas hidráulicas del motor:

- Excesiva presión.
 - La suciedad obstruye las juntas.
 - Conexiones flojas o mal conectadas.
 - Roturas o Daños en los componentes.
- Cuando una fuga hidráulica es detectada, identifique la causa real de la fuga antes de hacer alguna acción.

⚠ ¡ADVERTENCIA!

- No intente desmontar componentes hidráulicos o reparar un sistema hidráulico bajo presión. Para prevenir accidentes, apague el sistema antes de quitar cualquier componente.

9.3 Preguntas y respuestas hidráulicas

El molinete no se enciende

1. No llega energía a la Commander
- Compruebe que la unidad está encendida
- Compruebe que las conexiones eléctricas de la Commander
- Compruebe el fusible y los cortes de corriente segura.

9. Individuazione guasti

9.1 Verricelli elettrici

1. La catena si svolge anche quando il verricello non è in uso.
- Questo problema si presenta se non è utilizzato lo stropio di sicurezza o il fermacatena. Provare a serrare maggiormente il cappello del barbotin con la manovella winch. Per una questione di sicurezza, ricordarsi sempre di fissare la catena o l'ancora quando non in uso.
2. Il motore non si avvia o gira lento
- La maggior parte di questi problemi è di natura elettrica. Verificare la tensione alla batteria e la caduta di tensione nell'impianto. La tensione rilevata ai poli del motore deve essere di 13,5 V per impianti a 12V e di 26,5V per impianti a 24V. Tensioni inferiori per lunghi periodi provocheranno danni al motore. h. La sezione dei cavi insufficiente, provocando cadute di tensioni notevoli, provoca malfunzionamenti, guasti e surriscaldamenti.
- Verificare l'impianto, comandi, connessioni, fusibili, staccabatterie e batterie possono tutti essere causa di malfunzionamenti del verricello anche se apparentemente funzionanti.

9.2 Verricelli idraulici

Perdite di olio

Un sistema efficiente non deve presentare alcuna perdita o trafileggio. Queste le cause principali di trafileggi di olio idraulico:

- Pressione eccessiva
 - Impurità nell'olio
 - Connessioni lente o danneggiate
 - Fessurazioni dei tubi o delle connessioni
- In caso di perdite di olio, ricercare subito l'origine della perdita che a volte può essere anche molto distante da dove il trafileggio viene notato.

⚠ AVVERTIMENTI!

- Non rimuovere mai nessuna parte dell'impianto se questo è ancora in pressione. Per evitare danni a persone e cose, disattivare l'alimentazione elettrica della centralina prima di operare su qualsiasi componente.

9.3 Verricelli idraulici - Domande frequenti

Il verricello non parte

1. Mancanza di alimentazione alla centralina

9. Felsökning

9.1 Elektriska ankarspel

1. Ankarlinan löper ut fritt om ankarspelet inte används.
- Detta problem kan uppstå om ankarlinan inte är säkrad, samtidigt som kabeldrivlocket är löst. Dra fast locket med hjälp av vinschhandtaget och säkra alltid ankarlinan på annan punkt än på ankarspelet när det inte används.
2. Spelet fungerar inte eller går inte jämnt.
- De flesta problem av denna typ är elfel. Det är därför väsentligt att rätt spänning upprätthålls. Rätt spänning i ett 12-voltssystem är 13,5 volt och i ett 24-voltssystem 26,5 volt. Konstant låg spänning kan skada motorn.
- Kabelns tvärsnittsarea skall vara tillräckligt stor, dvs så stor att den klarar den aktuella strömmen utan att spänningsfallet över kabeln blir för stort.
- Brytare, anslutningar, batteri, huvudbrytare, säkring och motor skall hållas i gott skick.

9.2 Hydrauliskt ankarspel

Hydrauloljläckage

Följande kan orsaka oljläckage från hydraulsystemet:

- För högt tryck
 - Otäta packningar och tätningar
 - Lösa eller felaktigt monterade kopplingar
 - Skadade och trasiga komponenter
- Identifiera den faktiska orsaken till eventuella läckage innan du vidtar någon åtgärd.

⚠ VARNINGAR!

- Försök inte ta loss hydraulkomponenter eller reparera hydraulsystemet när systemet är trycksatt. Ta för vana att bryta strömförsörjningen, för att förhindra oavsiktligt start av systemet, innan du demonterar någon systemkomponent.

9.3 Frågor och svar om hydraulik

Ankarspelet startar inte.

1. Ingen strömförsörjning till kontrollenheten
- Kontrollera att strömförsörjningen är påslagen

9. Trouble shooting

- Insufficient hydraulic fluid
- Check Commander fluid level.
- Incorrect electrical or hydraulic connections
- Refer to your Lewmar Commander manual
- See the button sheet for correct function identification.

Windlass motor is running but the windlass is not working

- Check the drive between the gypsy and capstan (friction drive or dog drive).
- Check the drive shaft between the hydraulic motor and windlass gearbox.

Windlass runs very slowly

- Check sufficient flow is being provided by the hydraulic system as windlass speed is directly related to hydraulic oil flow.
- Refer to lewmar Commander fault finding.
- Hydraulic pipes connected to the wrong motor port.
- Swap hydraulic connections on the winch motor.
- Deck switch connected to wrong function.
- Refer to Lewmar Commander manual.

Windlass does not pull sufficient load

- Check sufficient flow is being provided by the hydraulic system as windlass speed is directly related to hydraulic oil flow.
- Refer to lewmar Commander fault finding.
- Hydraulic pipes connected to wrong Commander function.
- Refer to Commander manual. Examine the Button Sheet to identify correct function.
- Sharp bends or kinks in the hydraulic pipes starving the winch of fluid.
- Check pipe runs for sharp bends or kinks.
- Minimum bend radius is 6" (150 mm).
- System pressure too low.
- Refer to fault diagnostic charts in the Commander manual.

9. Fehlersuche

9.3 Hydraulik Frage & Antwort

Ankerwinde startet nicht

- Kein Strom am Commander
- Prüfen sie, ob der Commander eingeschaltet ist
- Prüfen sie die Anschlüsse und Verbindungen mit dem elektrischen System auf korrekte Ausführung & Funktion
- Prüfen sie die Sicherungen & Sicherheitsabschaltungen
- Zu geringer hydraulischer Fluss
- Ölstand im Commander überprüfen
- Falsche elektrische oder hydraulische Verbindungen
- Siehe Lewmar Commander Manual
- Siehe Schalter-Schema zur Identifikation der korrekten Funktion

Motor der Ankerwinde läuft aber die Winde dreht nicht

- Überprüfen sie die Kupplung zwischen Verholspill und Kettennuss (Konuskupplung oder Mitnehmer)
- Überprüfen sie die Verbindung von der Antriebswelle des hydraulischen Motors zu Ankerwinde

Ankerwinde läuft langsam

- Überprüfen sie ausreichenden Fluss des hydraulischen Systems, da die Geschwindigkeit, da diese direkt mit der Flussrate in Verbindung steht.
- Siehe Lewmar Commander Fehlersuche
- Hydraulische Leitungen an den falschen Ports des Motors angeschlossen
- Tauschen der Anschlüsse am Motor der Winde
- Decktaster an falsche Funktion angeschlossen
- Siehe Lewmar Commander Manual

Ankerwinde besitzt zu geringe Zugkraft

- Überprüfen sie ausreichenden Fluss des hydraulischen Systems, da die Geschwindigkeit, da diese direkt mit der Flussrate in Verbindung steht.
- Siehe Lewmar Commander Fehlersuche
- Hydraulische Schläuche an falsche Commander Funktion angeschlossen
- Siehe Lewmar Commander Manual. Siehe Button Sheet zur Identifikation der korrekten Funktion.
- Scharfe Radien oder Knicke reduzieren die Flussrate
- Überprüfen sie die Leitungen auf Knicke und scharfe Biegungen/Radien
- Minimaler Radius ist 6"/150mm
- Systemdruck zu gering.
- Siehe Fehlersuche Tabelle zur Diagnose im Commander Manual

9. Resolution de problemes

- Vérifier les fusibles et les disjoncteurs
- Insuffisance de liquide hydraulique
- Vérifier le niveau de liquide de la centrale Commander.
- Mauvaises connexions électriques ou hydrauliques
- Reportez-vous à votre manuel de la centrale Commander Lewmar
- Voir le panneau de contrôles pour l'identification du bon fonctionnement

Le moteur du guindeau fonctionne, mais le guindeau ne fonctionne pas

- Vérifier la transmission, le barbotin et le cabestan (transmission à cône de friction ou transmission à crabot).
- Vérifier l'arbre d'entraînement entre le moteur hydraulique et la boîte de vitesse du guindeau.

Le guindeau fonctionne très lentement

- Vérifier qu'il y a un débit suffisant fourni par le système hydraulique puisque la vitesse du guindeau est directement liée au débit d'huile hydraulique.
- Reportez-vous à la page de recherches d'erreurs du manuel de la centrale Commander Lewmar.
- Tuyaux hydrauliques connectés aux mauvaises entrées du moteur.
- Echanger les connexions hydrauliques sur le moteur du guindeau.
- L'interrupteur du pont connecté à la mauvaise fonction.
- Reportez-vous au manuel de la centrale Commander Lewmar.

Le guindeau ne tire pas une charge suffisante

- Vérifier qu'il y a un débit suffisant fourni par le système hydraulique puisque la vitesse du guindeau est directement liée au débit d'huile hydraulique.
- Reportez-vous à la page de recherches d'erreurs du manuel de la centrale Commander Lewmar.
- Tuyaux hydrauliques connectés aux mauvaises fonctions de la centrale Commander.
- Reportez-vous au manuel de la centrale Commander Lewmar. Examinez le panneau de contrôles pour l'identification correcte des fonctions.
- Des virages aigus ou des courbures dans les tuyaux hydrauliques qui ne permettent pas le liquide de parvenir au guindeau.
- Vérifiez les tuyaux pour des virages aigus ou des courbures.
- Le rayon minimum de courbure est de 6" (150 mm).
- Pression système trop faible.
- Reportez-vous au diagnostics d'erreurs de manuel de la centrale Commander Lewmar.

9. Resolución de problemas

- Insuficiente fluido hidráulico
- Compruebe el nivel de aceite en la Commander.
- Incorrecta conexión, eléctrica o hidráulica
- Consulte su manual Lewmar acerca de su Commander
- Revise el esquema del pulsador para identificar las funciones.

El motor del molinete esta funcionando pero el molinete no trabaja.

- Compruebe el eje entre el barboten y el cabestrante (unidad de disco de fricción).
- Compruebe el eje entre el motor hidráulico y la caja reductora.

El molinete trabaja muy despacio.

- Compruebe que el sistema da suficiente caudal al sistema ya que la velocidad del molinete depende del caudal proporcionado.
- Consulte la lista de fallos del manual Lewmar Commander.
- La conexión de los tubos hidráulicos esta en un puerto equivocado.
- Intercambie las conexiones hidráulicas en el motor.
- Pulsador de cubierta conectado a una función errónea.
- Consulte el manual Lewmar Commander.

El molinete no tira con suficiente fuerza.

- Compruebe que el sistema da suficiente caudal al sistema ya que la velocidad del molinete depende del caudal proporcionado.
- Consulte la lista de fallos del manual Lewmar Commander.
- La conexión de los tubos hidráulicos esta en un puerto equivocado.
- Consulte el manual Lewmar Commander. Examine la hoja del pulsador para identificar la función correcta.
- Curvas pronunciadas o pliegues en los tubos hidráulicos evitan una buena alimentación al motor hidráulico.
- Compruebe que las conexiones trabajan sin curvas pronunciadas o pliegues.
- Mínimo radio de flexión de 150mm (6").
- Presión del caudal demasiado bajo.
- Consulte la lista de averías del manual Lewmar Commander.

9. Individuazione guasti

- Verificare gli interruttori
- Verificare le connessioni
- Verificare fusibili di protezione e staccabatterie
- Livello olio basso
- Verificare il livello dell'olio nella centralina
- Comando inefficace
- Verificare le connessioni elettriche e idrauliche
- Verificare che il comando sia connesso al gruppo valvole corretto

Il motore funziona ma il verricello non si avvia

- Verificare la connessione meccanica tra riduttore e asse
- Verificare la connessione meccanica tra motore e riduttore

Il verricello funziona ma molto lentamente

- Verificare che la centralina fornisca una portata sufficiente e che il serbatoio sia pieno, la velocità di rotazione è direttamente correlata alla quantità di olio fornita.
- Fare riferimento al manuale dell'impianto
- Verificare che i tubi di alimentazione siano connessi agli ingressi corretti.
- Invertire i tubi di alimentazione sul motore
- Controllare che il gruppo valvole utilizzato abbia le caratteristiche corrette per il verricello
- Fare riferimento al manuale dell'impianto

Il verricello funziona ma ha poca potenza

- Verificare che la centralina fornisca una pressione sufficiente e che il serbatoio sia pieno. La presenza di aria nell'impianto provoca rallentamenti o blocchi temporanei.
- Fare riferimento al manuale dell'impianto
- Controllare che il gruppo valvole utilizzato abbia le caratteristiche corrette per il verricello
- Fare riferimento al manuale dell'impianto. Controllare che il comando sia collegato al gruppo valvole previsto.
- Controllare che non ci siano pieghe o compressioni nei tubi
- Seguire il percorso dei tubi per verificare che non siano piegati o schiacciati
- Eliminare ogni curva con raggio inferiore a 15 cm
- Controllare la pressione di esercizio
- Fare riferimento al manuale dell'impianto per la localizzazione del manometro e tabella valori corretti.

9. Felsökning

- Kontrollera kontrollenhetens elektriska inkoppling
- Kontrollera säkring och eventuella nödstopp
- Otillräckligt med hydraulvätska
- Kontrollera vätskenivån
- Fel i el- eller hydraulanslutningar
- Se kontrollenhetens handbok
- Se knappschemat och identifiera knapparnas funktion

Ankarspelets motor går, men spelet arbetar inte

- Kontrollera drivningen mellan kabelare och capstan (friktions- eller klokoppling).
- Kontrollera drivaxeln mellan hydraulmotorn och växelhuset.

Ankarspelet går väldigt långsamt

- Kontrollera att systemflödet är korrekt. Ankarspelets varvtal står nämligen i direkt proportion till hydrauloljeflödet.
- Se även Commander-enhetens felsökningsschema.
- Hydraulrören kan vara anslutna till fel portar på motorn.
- Skifta anslutningarna på motorn.
- Däckskontakten kan vara ansluten till fel funktion.
- Se kontrollenhetens handbok.

Spelet har inte tillräckligt med kraft.

- Kontrollera att systemflödet är korrekt. Ankarspelets varvtal står nämligen i direkt proportion till hydrauloljeflödet.
- Se även Commander-enhetens felsökningsschema.
- Hydraulrören är anslutna till fel Commander-funktion.
- Se kontrollenhetens handbok. Identifiera korrekt funktion i knappschemat.
- Tvåra krökar eller kinkar på hydraulrören respektive slangarna gör att flödet till spelet stryps.
- Kontrollera rördragningen avseende tvåra krökar och slangar avseende kinkar.
- Minsta krökningsradie är 150 mm.
- Systemtrycket är för lågt.
- Se felsökningsschemat i Commander-handboken.

10. Warranty

10.1 Limited Warranty and Key Terms of Supply by Lewmar

Lewmar warrants that in normal private pleasure boat usage and with proper maintenance its products will conform with their specification for a period of three years from the date of purchase by the end user, subject to the conditions, limitations and exceptions listed below. Any product, which proves to be defective in normal usage during that three-year period, will be repaired or, at Lewmar's option, replaced by Lewmar.

A CONDITIONS AND LIMITATIONS

- i Lewmar's liability shall be limited to the repair or replacement of any parts of the product which are defective in materials or workmanship.
- ii Responsibility for the selection of products appropriate for the use intended by the Buyer shall rest solely with the Buyer and Lewmar accepts no responsibility for any such selection.
- iii Lewmar shall not be liable in any way for Product failure, or any resulting loss or damage that arises from:
 - a. use of a product in an application for which it was not designed or intended;
 - b. corrosion, ultra violet degradation or wear and tear;
 - c. a failure to service or maintain the product in accordance with Lewmar's recommendations;
 - d. faulty or deficient installation of the product (unless conducted by Lewmar);
 - e. any modification or alteration of the product;
 - f. conditions that exceed the product's performance specifications or safe working loads.
 - g. Abuse
 - iv Product subject to a warranty claim must be returned to the Lewmar outlet that supplied the product for examination unless otherwise approved by Lewmar in writing.
 - v This warranty does not cover any incidental costs incurred for the investigation, removal, carriage, transport or installation of product.
 - vi Service by anyone other than authorized Lewmar representatives shall void this warranty unless it accords with Lewmar guidelines and standards of workmanship.
 - vii Lewmar's products are intended for use only in the marine environment. Buyers intending to use them for any other purpose should seek independent professional advice as to their suitability. Lewmar accepts no liability arising from such other use.

B EXCEPTIONS

Cover under this Warranty is limited to a period of one year from the date of purchase by the end user in the case of any of the following products or parts of products:

- Electric motors and associated electrical equipment
- Electronic controls
- Hydraulic pumps, valves and actuators
- Hatch & Portlight weather seals
- Products used in "Grand Prix" racing applications
- Products used in commercial or charter applications
- Anchor rode

C LIABILITY

- i Lewmar's liability under this warranty shall be to the exclusion of all other warranties or liabilities (to the extent permitted by law). In particular (but without limitation):
 - a. Lewmar shall not be liable for:
 - Any loss of anticipated turnover or profit or indirect, consequential or economic loss;
 - Damages, costs or expenses payable to any third party;
 - Any damage to yachts or equipment;
 - Death or personal injury (unless caused by Lewmar's negligence).
- Some states and countries do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you
- b. Lewmar grants no other warranties regarding the fitness for purpose, use, nature or satisfactory quality of the products.
- ii Where applicable law does not permit a statutory or implied warranty to be excluded, then such warranty, if permitted by that state or country's law, shall be limited to a period of one year from the date of purchase by the end user. Some states and countries do not allow limitations on how long an implied warranty lasts, so this limitation may not apply to you.

D PROCEDURE

Notice of a claim for service under this warranty shall be made promptly and in writing by the end user to the Lewmar outlet that supplied the product or to Lewmar Limited at Southmoor Lane, Havant, Hampshire PO9 1JJ, England.

E SEVERANCE CLAUSE

If any clause of this warranty is held by any court or other competent authority to be invalid or unenforceable in whole or in part, the validity of the remaining clauses of this warranty and the remainder of the clause in question shall not be affected.

F OTHER RIGHTS

This warranty gives you specific legal rights, and you may also have other legal rights, which vary from state to state and country to country.

In the case of European States a Consumer customer (as defined nationally) has legal rights under the applicable national law governing the sale of Consumer Goods; this Warranty does not affect those rights.

G LAW

This warranty shall be governed by and read in accordance with the laws of England or the state or country in which the first end user is domiciled at the time of purchase of the product.

H DISPUTES

Any dispute arising under this warranty may, at the option of the end-user, be referred to alternative dispute resolution under the rules of the British Marine Federation or to the Courts of the State whose law shall govern the warranty or to the Courts of England and Wales.

The British Marine Federation may be contacted at Marine House, Thorpe Lea Road, Egham, England, TW20 8BF

10. GEWÄHRLEISTUNG

10.1 GEWÄHRLEISTUNG UND LIEFERBEDINGUNGEN VON LEWMAR

Lewmar garantiert für einen Zeitraum von drei Jahren ab Kaufdatum – den normalen Gebrauch der Produkte vorausgesetzt –, dass seine Produkte keine Herstellungs- oder Materialfehler aufweisen. Diese Gewährleistung erfolgt zu den Bedingungen und mit den Beschränkungen und Ausnahmen, die nachstehend aufgeführt sind. Teile, die sich bei normalem Gebrauch während der dreijährigen Garantiezeit als fehlerhaft erweisen, werden von Lewmar repariert oder aufgrund Lewmars Entscheidung ausgetauscht.

A BEDINGUNGEN UND EINSCHRÄNKUNGEN

- i Die Haftung von Lewmar ist auf die Reparatur oder den Austausch der Teile beschränkt, die Material- oder Herstellungsfehler aufweisen.
- ii Die Feststellung, ob das Material für die vom Käufer bezweckte Verwendungsart geeignet ist, fällt unter die alleinige Verantwortung des Käufers. Lewmar übernimmt keine Haftung im Zusammenhang mit einer solchen Eignungsfeststellung.
- iii Lewmar kann nicht haftbar gemacht werden für:
 - a. Versagen, Verlust oder Schäden aufgrund der Nutzung der Produkte in Anwendungen, für die sie nicht bestimmt sind.
 - b. Versagen, Verlust oder Schäden durch Korrosion, UVZersetzung oder normalen Verschleiß.
 - c. Versagen, Verlust oder Schäden durch Wartung, die nicht gemäß den Empfehlungen von Lewmar vorgenommen wird.
 - d. Versagen, Verlust oder Schäden durch fehlerhafte oder falsche Installation des Produkts (sofern nicht durch Lewmar durchgeführt).
 - e. Versagen, Verlust oder Schäden durch Änderungen jeglicher Art des Produkts.
 - f. Versagen, Verlust oder Schäden durch Überbeanspruchung der Produkte.
 - iv Produkte, für die Garantieansprüche geltend gemacht werden, müssen an die Lewmar-Niederlassung, die das Produkt geliefert hat, zwecks Prüfung zurückgesandt werden, es sei denn, dass Lewmar schriftlich eine andere Vereinbarung bestätigt hat.
 - v Lewmar übernimmt keine Frachtkosten oder Kosten für Installationsarbeiten (Ein- und Ausbau) sowie Kosten für die Untersuchung in Zusammenhang mit einem Garantieanspruch.
 - vi Diese Garantie verfällt, wenn andere Personen als zugelassene Lewmar-Vertreter Servicearbeiten in Bezug auf die Produkte durchführen, es sei denn, dass diese Arbeiten den Richtlinien und Herstellungsstandards von Lewmar entsprechen.
 - vii Lewmar Produkte sind ausschließlich für den Einsatz im Wassersport-Bereich konzipiert. Käufer, die diese Produkte für jeglichen anderen Zweck benutzen wollen, sollten sich hinsichtlich einer solchen Eignung an einen unabhängigen Sachverständigen wenden. Lewmar unterliegt dabei keiner Haftung durch den Gebrauch, den Lewmar nicht ausdrücklich gebilligt hat.

B AUSNAHMEN

Die Garantie ist in folgenden Fällen auf die Dauer eines Jahres ab Kaufdatum befristet:

- Elektrische Motoren und elektrische Ausrüstung
- Elektronische Steuerungen
- Hydraulische Pumpen, Ventile und Drehzahlregler
- Wetterdichtungen
- Produkte im „Grand Prix“-Einsatz

C HAFTUNG

- i Die Haftung seitens Lewmar schließt alle anderen Garantien und Verantwortlichkeiten (im gesetzlich zulässigen Rahmen) aus. Insbesondere (jedoch ohne Einschränkung):

haftet Lewmar nicht für:

- entgangenen erwarteten Umsatz oder Gewinn oder indirekte Schäden, Folgeschäden oder wirtschaftliche Schäden.
- Schäden, Kosten oder Aufwendungen, die an Dritte zahlbar sind.
- Schäden an Yachten oder Ausrüstung.
- Tod oder Personenschäden (ausgenommen verursacht durch Fahrlässigkeit von Lewmar). Einige Staaten und Länder gestatten keinen Ausschluss oder keine Beschränkung des Schadenersatzes für Aufwendungen bei Vertragserfüllung oder Folgeschäden. In diesen Fällen gelten die oben genannten Einschränkungen oder Ausschlussbedingungen möglicherweise nicht.
- b. Lewmar gewährt keine Garantie bezüglich der Eignung der Produkte hinsichtlich der vom Käufer bezweckten Nutzung, des Gebrauchs, der Art oder der befriedigenden Qualität der Produkte.
- ii Wenn die geltenden Gesetze des betreffenden Landes den Ausschluss von Garantien nicht erlauben, wird die Garantie, falls die Gesetze dies zulassen, auf ein (1) Jahr ab dem Kaufdatum beschränkt. Einige Staaten und Länder gestatten keine Beschränkung der gesetzlichen Gewährleistung. In diesen Fällen gelten diese Einschränkungen möglicherweise nicht.

D VORGEHENSWEISE

Die Geltendmachung von Gewährleistungsansprüchen im Rahmen dieser Garantie ist vom Endabnehmer unverzüglich und in schriftlicher Form gegenüber der Lewmar-Niederlassung, die das Produkt geliefert hat, oder Lewmar Limited in Southmoor Lane, Havant, Hampshire, PO9 1JJ, Großbritannien, anzuzeigen.

E ABTRENNBARKEIT EINZELNER BESTIMMUNGEN

Falls eine oder mehrere dieser Garantiebestimmungen von einer zuständigen Behörde ganz oder teilweise für nicht gültig oder nicht einklagbar erachtet werden, mindert dies nicht die Gültigkeit der übrigen Bestimmungen dieser Garantie und des Rests der betreffenden Bestimmung.

F SONSTIGE RECHTE

Aufgrund dieser Garantie haben Sie bestimmte gesetzliche Rechte. Darüber hinaus stehen Ihnen gegebenenfalls je nach Land verschiedene sonstige gesetzliche Rechte zu. Bei Endverbrauchern aus den Mitgliedsstaaten der Europäischen Union (gemäß der rechtlichen Definition des jeweiligen Landes) gelten die Rechte aus den entsprechenden nationalen Gesetzen, die den Verkauf von Konsumgütern regeln. Diese Rechte werden durch diese Garantie in keiner Weise eingeschränkt.

G GERICHTSSTAND

Für diese Garantie ist englisches Recht oder das Recht desjenigen Landes maßgeblich, in dem der erste Endkunde seinen Wohnsitz zum Zeitpunkt des Kaufes dieses Produkts hatte.

H STREITFALL

Streitfälle, die sich im Rahmen dieser Garantie ergeben, können nach Wahl des Endabnehmers an ein alternatives Verfahren zur Streitklärung gemäß den Bestimmungen der British Marine Federation oder an ein Gericht desjenigen Landes, dessen Gesetz für diese Gewährleistung Anwendung finden, oder an ein Gericht in England oder Wales überwiesen werden. Die Anschrift der British Marine Federation lautet: Marine House, Thorpe Lea Road, Egham, TW20 8BF, Großbritannien.

10. Limites de garantie

10.1 Limites de garantie et Conditions de Fourniture par Lewmar

Lewmar garantit qu'avec une utilisation normale et un entretien correct, ses produits seront conformes à leur spécification pendant une période de trois ans à partir de la date d'achat par l'utilisateur final, sous réserve des conditions, restrictions et exceptions détaillées ci-dessous. Tout produit qui se trouve être défectueux lors d'une utilisation normale, Durant cette période de trois ans, sera réparé ou, au choix de Lewmar, remplacé par Lewmar.

A CONDITIONS ET RESTRICTIONS

- La responsabilité de Lewmar sera limitée à la réparation ou au remplacement de toutes les pièces du produit qui sont défectueuses dues aux matériaux ou à la fabrication.
- L'Acheteur est seul responsable de la sélection appropriée des produits pour l'usage prévu par lui-même et Lewmar décline toute responsabilité d'une telle sélection.
- Lewmar ne sera en aucune façon responsable de la défaillance du Produit ou de toute perte ou dommage qui en résultent et qui proviennent de:
 - l'utilisation du produit dans une application pour laquelle il n'est pas conçu ou prévu ;
 - la corrosion et la dégradation causées par les ultra violets ou l'usure normale ;
 - un manquement à la révision ou l'entretien du produit conformément aux recommandations de Lewmar.
 - un montage défectueux ou déficient du produit (à moins d'avoir été effectué par Lewmar) ;
 - toute modification ou transformation du produit ;
 - des conditions supérieures aux spécifications de performance du produit ou charges maximales d'utilisation.
- Le produit faisant l'objet d'une réclamation au titre de la garantie doit être retourné pour examen au point de vente Lewmar qui l'a fourni, sauf avis contraire par écrit de Lewmar.
- Cette garantie ne couvre pas les coûts annexes contractés lors de l'étude, retrait, transport ou montage du produit.
- La révision par toute autre personne que les représentants agréés Lewmar annulera cette garantie à moins qu'elle ne soit en accord avec les indications et critères de fabrication de Lewmar.
- Les produits Lewmar sont prévus pour un usage dans un milieu maritime uniquement. Les Acheteurs prévoyant de les utiliser dans un but autre devraient demander conseil à un professionnel indépendant quant à leur adéquation. Lewmar décline toute responsabilité pour toute autre utilisation.

B EXCEPTIONS

La couverture sous cette Garantie est limitée à une période de un an à partir de la date d'achat par l'utilisateur final pour tous les produits ou pièces de produits suivants :

- Moteurs électriques et équipements électriques Associés
- Commandes électroniques
- Pompes hydrauliques, soupapes et actionneurs
- Caoutchoucs d'étanchéité
- Produits utilisés dans des régates "Grand Prix"

C RESPONSABILITE

- La responsabilité de Lewmar sous cette garantie sera à l'exclusion de toutes autres garanties ou responsabilités (dans la mesure permise par la loi). En particulier (mais sans restriction) :

a. Lewmar ne sera pas responsable de :

- Toute perte de chiffre d'affaires prévu, de bénéfices ou de perte économique indirecte ou conséquente ;
- Dommages et intérêts, coûts ou frais payables à n'importe quel tiers ;
- Tout dommage aux yachts ou à l'équipement;
- Décès ou Atteinte à la personne (à moins d'avoir été causé par la négligence de Lewmar).

Certains états ou pays ne permettent pas l'exclusion ou la restriction des dommages accessoires ou indirects, dans ce cas la restriction ou exclusion ci-dessus peut ne pas vous concerner.

b. Lewmar n'accorde pas d'autres garanties concernant l'adéquation, l'utilisation, la nature ou la qualité satisfaisante des produits.

- Lorsque la loi applicable ne permet pas qu'une garantie implicite ou légale soit exclue, alors une telle garantie, si permise par la loi de cet état ou pays, sera limitée à une période de un an à partir de la date d'achat par l'utilisateur final. Certains états ou pays ne permettent pas de restrictions sur la durée d'une garantie implicite, dans ce cas cette restriction peut ne pas vous concerner.

D PROCEDURE

La notification d'une réclamation au titre de la garantie devra être effectuée par l'utilisateur final rapidement et par écrit , au point de vente Lewmar qui a fourni le produit ou à Lewmar Limited, Southmoor Lane, Havant, Hampshire, Angleterre PO9 1JJ.

E CLAUSE DE RUPTURE

Si toute clause de cette garantie est reconnue caduque ou inapplicable dans sa totalité ou en partie par tout tribunal ou autre autorité compétente, la validité des clauses restantes de cette garantie et de l'autre partie de la clause en question ne sera pas affectée.

F AUTRES DROITS

Cette garantie vous donne des droits légaux spécifiques. Vous pouvez également avoir d'autres droits légaux qui varient d'états à états et de pays à pays.

Dans le cas des Etats européens, un client Consommateur (comme défini au niveau national) dispose de droits légaux au titre de la loi nationale applicable régissant la vente de Biens de Consommation ; cette Garantie n'affecte pas ces droits.

G DROIT

Cette garantie sera régie par et lu conformément aux lois de l'Angleterre ou de l'état ou pays dans lequel le premier utilisateur final est domicilié lors de l'achat du produit.

H LITIGES

Tout litige survenant durant cette garantie peut, au choix de l'utilisateur final, être soumis soit à la médiation de litige selon les règlements de la British Marine Federation soit aux Tribunaux de l'Etat don't la loi régira cette garantie, soit encore aux Tribunaux d'Angleterre et du Pays de Galle.

La British Marine Federation peut être contactée à l'adresse suivante : Marine House, Thorpe Lea Road, Egham, Angleterre, TW20 8BF.

10. Garantía Limitada

10.1 Garantía Limitada y Condiciones de Suministro de Lewmar

Lewmar garantiza que con un uso normal y con el mantenimiento correcto, sus productos se conformarán con sus especificaciones durante un periodo de tres años desde la fecha de compra por el usuario final, sujeto a las condiciones, limitaciones y excepciones enumeradas aquí. Cualquier producto, que se demuestre ser defectuoso con el uso normal durante ese periodo de tres años, se reparará o, según decida Lewmar, será reemplazado por Lewmar.

A CONDICIONES Y LIMITACIONES

- La responsabilidad legal de Lewmar será limitada a la reparación o la sustitución de cualquier parte del producto que sea defectuosa en materiales o fabricación.
- La responsabilidad de la selección de los productos adecuados para el uso deseado por el Comprador será solamente del Comprador y Lewmar no acepta ninguna responsabilidad de tal selección.
- Lewmar no podrá ser declarada responsable de ningún defecto en el producto, ni de ninguna pérdida ni daño causados por:
 - del uso de un producto en una aplicación para lo cual no fue diseñada ni destinada;
 - de la corrosión, la degradación de rayos ultravioletas o del desgaste;
 - del incumplimiento en el servicio o en el mantenimiento del producto de acuerdo con las recomendaciones de Lewmar;
 - de la mala o deficiente instalación del producto (a no ser que fuera efectuada por Lewmar);
 - de cualquier modificación o transformación del producto;
 - de condiciones que rebasan las especificaciones del rendimiento del producto o las cargas de trabajo.
- Cualquier producto sujeto a una petición de garantía se debe devolver al distribuidor Lewmar que lo suministró para su inspección a no ser que Lewmar se haya acordado de otra manera por escrito.
- Esta garantía no cubre los gastos accesorios incurridos debido a la investigación, el traslado, el porte, el transporte o la instalación del producto.
- El servicio al producto por alguien que no sea un representante autorizado de Lewmar invalidará esta garantía a no ser que esté de acuerdo con los principios y criterios de fabricación de Lewmar.
- Los productos Lewmar son destinados al uso en el ambiente marino exclusivamente. Los Compradores que pretenden utilizarlos para cualquier otro fin deben consultar un experto independiente sobre su conveniencia. Lewmar no acepta responsabilidad ninguna como resultado de tal otro uso.

B EXCEPCIONES

- Cobertura bajo esta Garantía es limitada a un periodo de un año desde la fecha de compra por el usuario final en el caso de cualquier de los siguientes productos o partes de los productos:
- Motores eléctricos y sus equipos eléctricos Asociados
 - Controls electrónicos
 - Bombas, válvulas y actuadores hidráulicos
 - Juntas de estanqueidad
 - Los productos que se usan en regatas o aplicaciones "Grand Prix"

C RESPONSABILIDAD LEGAL

- La responsabilidad legal de Lewmar bajo esta garantía será con la exclusión de otras garantías o responsabilidades (hasta el punto que se permite por ley). En particular (pero sin limitación a):

Lewmar no será responsable:

- Any loss of anticipated turnover or profit or indirect, consequential or economic loss ;
- de cualquier pérdida de facturación o beneficios previstos ni de las pérdidas económicas indirectas;
- de los daños, los costes o los gastos a favor de terceros;
- de cualquier daño a yates o equipos;
- de la muerte o los daños personales (a no ser que fuera causado por una negligencia por parte de Lewmar).
- Algunos estados y países no permiten la exclusión o limitación de daños accesorios o indirectos, así que la limitación o exclusión citada anteriormente puede ser no aplicable en este caso.
- Lewmar no concede ninguna garantía mas con respecto a la conveniencia de la intención, del uso, de la naturaleza o de la calidad satisfactoria de los productos.
- En el caso de que la ley aplicable no permite excluir a una garantía estatutaria o implícita, entonces tal garantía, si se lo permite la ley de ese estado o país, será limitada a un periodo de un año desde la fecha de compra por el usuario final. Algunos estados y países no permiten limitaciones de duración de una garantía implícita, así que esta limitación puede ser no aplicable en este caso.

D PROCEDIMIENTO

Notificación de una petición para servicio bajo esta garantía se hará lo antes posible y por escrito por el usuario final al distribuidor Lewmar que suministró el producto o a Lewmar Limited en la siguiente dirección : Southmoor Lane, Havant, Hampshire PO9 1JJ, England.

E CLAUSULA DE SEPARABILIDAD

Si cualquier clausula de esta garantía fuese declarada inválida o inaplicable en su totalidad o en parte por un tribunal u otra autoridad competente, la validez de las demás clausulas de este garantía y el resto de la clausula en cuestión no se verá afectada.

F OTROS DERECHOS

Esta garantía le otorga ciertos derechos legales específicos, y podría disponer de otros derechos legales también que varían de un estado a otro y de un país a otro.
En el caso de los Estados Europeos un cliente Consumidor (como se lo define nacionalmente) dispone de ciertos derechos legales bajo el ley nacional aplicable que rige la venta de Bienes de Consumo; este Garantía no afecta esos derechos.

G LEY

Esta garantía se registrará por y se interpretará de acuerdo con los leyes de Inglaterra o el estado o país en lo cual el primer usuario final está domiciliado en el momento de comprar el producto.

H LITIGIOS

Cualquier litigio que surge bajo esta garantía se puede remitir, si el usuario final así decide, a una resolución alternativa de litigios bajo las reglas de la Federación Marina de Gran Bretaña (the British Marine Federation) o a los Tribunales del Estado cuyo ley registrará la garantía o a los Tribunales de Inglaterra y Gales.

Se puede ponerse en contacto con The British Marine Federation (la Federación Marina de Gran Bretaña) en la siguiente dirección : Marine House, Thorpe Lea Road, Egham, England, TW20 8BF

10. Garanzia

10.1 Condizioni di garanzia delle forniture Lewmar

La Lewmar garantisce che, con un utilizzo normale ed un'adeguata manutenzione, i suoi prodotti resteranno conformi alle loro specifiche per un periodo di tre anni dalla data d'acquisto da parte del consumatore finale, con le condizioni, limitazioni ed eccezioni elencate qui di seguito. Qualsiasi prodotto che si dimostra difettoso con un utilizzo normale durante il periodo di tre anni, sarà riparato o sostituito dalla Lewmar, a scelta della stessa.

A CONDIZIONI E LIMITAZIONI

- i La responsabilità della Lewmar sarà limitata alla riparazione o sostituzione di qualsiasi parte del prodotto che risulti difettosa nel materiale o nella lavorazione.
 - ii La responsabilità per la scelta dei prodotti adeguati all'uso che il Compratore intende farne rimane solamente a carico del Compratore e la Lewmar non accetta alcuna responsabilità per tale scelta.
 - iii La Lewmar non sarà responsabile in alcun modo per il guasto del Prodotto, o qualsiasi perdita o danno che ne derivi, risultante da:
 - a. uso di un prodotto in un impiego per il quale non era stato progettato od inteso;
 - b. corrosione, deterioramento ultra-violetto o logorio fisico;
 - c. mancanza di revisione o manutenzione del prodotto secondo le raccomandazioni della Lewmar;
 - d. installazione errata o difettosa del prodotto (salvo che sia stata effettuata dalla Lewmar);
 - e. qualsiasi modifica o cambiamento al prodotto;
 - f. condizioni che eccedono le specifiche di prestazione del prodotto od i carichi di lavoro di sicurezza.
 - iv Il prodotto soggetto ad un reclamo in base alla garanzia deve essere reso al punto di vendita Lewmar che lo ha fornito, per essere esaminato, salvo che non sia diversamente concordato per iscritto con la Lewmar.
 - v Questa garanzia non copre alcun costo accessorio sostenuto per l'esame, la rimozione, il trasporto o l'installazione del prodotto.
 - vi La manutenzione effettuata da persone diverse dai rappresentanti autorizzati della Lewmar renderà nulla questa garanzia, salvo che sia eseguita secondo le istruzioni e gli standard di lavorazione della Lewmar.
 - vii I prodotti della Lewmar sono progettati per essere utilizzati solo nell'ambiente marino. Compratori che intendano utilizzarli per qualsiasi altro scopo dovrebbero ricorrere alla consulenza di esperti indipendenti riguardo alla loro adeguatezza. La Lewmar non accetta alcuna responsabilità derivante da tale diverso uso.
- B ECCEZIONI**
- La copertura di questa Garanzia è limitata ad un periodo di un anno dalla data di acquisto da parte dell'utente finale per quanto riguarda i seguenti prodotti o parti di prodotti

- Motori elettrici ed associata attrezzatura elettrica
- Controlli elettronici
- Pompe idrauliche, valvole ed attuatori
- Guarnizioni e parti in gomma
- Qualsiasi prodotto che venga utilizzato in competizioni professionistiche e non.

C RESPONSABILITÀ

- i La responsabilità della Lewmar in base a questa garanzia sarà esclusiva di qualsiasi altra garanzia o responsabilità (nella misura permessa dalla legge). In particolare (ma senza essere limitato a):
 - a. La Lewmar non sarà responsabile per:
 - Qualsiasi perdita di fatturato od utili previsti o perdite economiche indirette o conseguenti;
 - Danni, costi o spese pagabili a qualsiasi terza parte;
 - Qualsiasi danno a yacht od attrezzature;
 - b. Morte o lesioni personali (salvo che siano causate da negligenza della Lewmar). Alcuni stati e paesi non permettono l'esclusione o la limitazione di danni indiretti o conseguenti, pertanto i limiti di cui sopra potrebbero non applicarsi nel vostro caso.
- ii Ove la legge applicabile non permette di escludere una garanzia di legge od implicita, tale garanzia, se permessa dalla legge di quello stato o paese, sarà limitata al periodo di un anno dalla data d'acquisto da parte dell'utente finale. Alcuni stati e paesi non permettono limiti sulla durata di una garanzia implicita, pertanto questo limite potrebbe non applicarsi nel vostro caso.

D PROCEDURA

La notifica di una richiesta di prestazione in base a questa garanzia sarà effettuata prontamente e per iscritto dall'utente finale al punto di vendita Lewmar che ha fornito il prodotto od alla Lewmar Limited, Southmoor Lane, Havant, Hampshire PO9 1JJ, England.

E CLAUSOLA DI SEPARAZIONE

Se qualsiasi clausola di questa garanzia dovesse essere ritenuta non valida o non applicabile, in tutto od in parte, da un tribunale od altra autorità competente, resteranno valide le restanti clausole di questa garanzia e la parte rimanente della clausola in questione.

F ALTRI DIRITTI

Questa garanzia vi dà diritti legali specifici e potreste anche avere altri diritti legali, che possono variare da stato a stato e da paese a paese. Nel caso di uno Stato della Unione Europea, un cliente Consumatore (come definito a livello nazionale) ha diritti legali in base alla legge nazionale applicabile alla vendita di Beni di Consumo; questa Garanzia non intacca quei diritti.

G LEGGE APPLICABILE

Questa garanzia sarà regolata ed interpretata secondo le leggi Inglesi o dello stato o paese in cui il primo utente finale sia domiciliato al momento dell'acquisto del prodotto.

H CONTROVERSIE

Qualsiasi controversia derivante da questa garanzia potrà, a scelta dell'utente finale, essere riferita a sistemi alternativi di risoluzione delle controversie in base alle regole della British Maritime Federation od ai Tribunali dello Stato le cui leggi regoleranno la garanzia od ai Tribunali di Inghilterra e Galles. La British Marine Federation può essere contattata al seguente indirizzo: Marine House, Thorpe Lea Road, Egham, England, TW20 8BF

10. Garanti

10.1 Lewmars garanti och leveransvillkor

Lewmar garanterar att företagets produkter, vid normal användning och rätt skötsel, uppfyller respektive produktspecifikation under en period på tre år från den dag slutanvändaren köpt produkten, med förbehåll för villkor, begränsningar och undantag enligt nedanstående lista. Produkt som vid normal användning visar sig vara defect under ovannämnda treårsperiod kommer att repareras eller bytas ut av Lewmar, efter Lewmars eget gottfinnande.

A VILLKOR OCH BEGRÄNSNINGAR

- i Lewmars ansvar skall begränsas till reparation eller byte av den del av produkten som är behäftad med material- eller tillverkningsfel.
- ii Köparen bär ensam ansvaret för valet av produkt till en viss tillämpning, och Lewmar kan inte hållas ansvarigt för sådant val.
- iii Lewmar kan inte på något sätt hållas ansvarigt för produktfel, skada eller förlust som uppstår pga att:
 - a. produkten används på ett sätt som den inte är konstruerad eller avsedd för,
 - b. korrosion, ultraviolett strålning eller slitage,
 - c. underlåtenhet att göra service och underhåll på produkten i enlighet med Lewmars rekommendationer,
 - d. felaktigt eller bristfälligt installation av produkten (om den inte utförts av Lewmar),
 - e. ombyggnad eller ändring av produkten eller
 - f. förhållanden som ligger utanför produktens driftspecifikationer eller belastningsbegränsningar.
- iv Produkt som omfattas av ett garantianspråk skall returneras till den Lewmar-leverantör som levererar produkten, för inspektion, om inte annat skriftligen överenskommits med Lewmar.
- v Denna garanti omfattar inte kostnader för utredning, demontering, transport eller installation av produkten.
- vi Service utförd av annan än auktoriserad Lewmar representant innebär att garantin upphör att gälla, med mindre servicen överensstämmer med Lewmars riktlinjer och standarder för yrkesskicklighet.
- vii Lewmars produkter är endast avsedda för användning i marin miljö. Köpare som har för avsikt att använda produkterna i annat syfte bör begära professionell hjälp efter behov. Lewmar påtar sig inget som helst ansvar för sådan användning.

B UNDANTAG

- Denna garanti gäller, för följande produkter och delar av produkter, under en period på ett år från det datum slutanvändaren köpt produkten:
- Elmotorer och tillhörande elutrustning
 - Elektronik
 - Hydraulpumpar, ventiler och styrdon
 - Tätningar
 - Produkter som används i Grand-Prix-tävlingar.

C ANSVAR

- i Lewmars ansvar enligt den här garantin skall gälla före all annan garanti och ansvar, i den utsträckning lagen så medger. Detta gäller särskilt, dock utan att begränsas därtill,
 - a. att Lewmar inte kan hållas ansvarigt för:
 - eventuell förlust av förväntad avkastning eller vinst eller indirekt ekonomisk förlust eller följdförlust,
 - skada, kostnad eller utgift som förfaller till tredje part,
 - skada på båt eller utrustning eller
 - dödsfall eller personskada, med mindre den orsakats av Lewmars försumlighet. I vissa länder/stater tilläts inte undantag i form av begränsat ansvar för olycksfallseller följdsador, varför ovannämnda begränsning kanske inte gäller dig.
 - b. Lewmar utfärdar ingen annan garanti om produktens lämplighet i ett visst syfte, användning, typ eller tillfredsställande kvalitet.
 - ii Om tillämplig lag inte medger att lagstadgad eller underförstådd garanti undantas, skall sådan garanti, om så medges i den statens eller det landets lag, begränsas till en period på ett år från det datum slutanvändaren köpt produkten. I vissa stater och länder tilläts inte att begränsningar avseende en fastställd garanti gäller, varför ovannämnda begränsning kanske inte gäller för dig.

D FÖRFARANDE

Användaren skall skriftligen ställa eventuellt anspråk på garantiservice snarast möjligt till den Lewmarförsäljare som levererar produkten eller till Lewmar Limited på Southmoor Lane, Havant, Hampshire, England PO9 1JJ.

E GILTIGHETSKLAUSUL

Om en domstol eller annan behörig myndighet finner att en klausul i den här garantin, i sin helhet eller delvis är ogiltig eller ogenomförbar, skall giltigheten i övriga klausuler i den här garantin och resterande del av den aktuella klausulen inte påverkas.

F ÖVRIGA RÄTTIGHETER

Den här garantin ger dig specifika juridiska rättigheter, men du kan också ha andra juridiska rättigheter som kan vara olika i olika länder och stater.

I europeiska stater har konsumentkunder, enligt nationell definition, juridiska rättigheter enligt tillämplig nationell konsumentköplag. Den här garantin påverkar inte sådana rättigheter

G LAGSTIFTNING

Den här garantin är underställd och skall tolkas i enlighet med lagstiftningen i England eller den stat eller det land där den förste slutanvändaren är bosatt när produkten köps.

H TVISTELÖSNING

Eventuell tvist som uppstår pga den här garantin kan, efter slutanvändarens val, hänvisas till alternativ tvistelösning enligt British Marine Federations regelverk, hos domstol i den stat vars lagstiftning garantin skall följa eller hos domstol i England och Wales. British Marine Federation kan kontaktas på adressen Marine House, Thorpe Lea Road, Egham, England, TW20 8BF.

⚠ WARNING!
This manual forms part of the product and **MUST BE** kept with boat documents.

⚠ Bitte beachten Sie! Dieses Handbuch ist bestandteil der Winde und muss mit den Boots Dokumenten mitgeführt werden.

⚠ ATTENTION!
Ce guide fait partie de votre équipement et doit être conservé avec les documents de bord.

⚠ AVISO! Este manual forma parte del producto y SE DEBE guardar con los documentos de la embarcación.

⚠ ATTENZIONE! Questo manuale è parte integrante del prodotto e deve essere tenuto a bordo, sempre a disposizione.

⚠ OBSERVERA!
Den här handboken utgör en del av produkten och skall därför förvaras tillsammans med övrig omborddokumentation.

To the best of our knowledge, the information in this manual was correct when it went to press. However, Lewmar cannot accept liability for any inaccuracies or omissions it may contain. In addition, our policy of continuous product improvement may change specifications without notice. As a result, Lewmar cannot accept liability for any differences between the product and the manual.

Nach unserem besten Wissen und Gewissen war die Information in diesem Manual korrekt, als dies in Druck ging. Lewmar ist nicht verantwortlich für Irrtümer oder Versäumnisse, die eventuell enthalten sind. Zusätzlich, aufgrund unserer ständigen Produktweiterentwicklung, können sich Details oder Spezifikationen ohne Ankündigung ändern. Daraus resultierend kann Lewmar nicht zur Verantwortung gezogen werden, sollten Unterschiede zwischen Manual und Produkt bestehen.

A notre connaissances, les informations contenues dans ce manuel étaient correctes au moment de la mise en impression. Toutefois, Lewmar ne peut pas être tenu responsable des imprécisions ou omissions éventuelles. De plus le développement permanent de nos produits peut changer la spécification sans avis. Par conséquent, Lewmar ne peut être tenu responsable de différences entre le produit et ce manuel.

Que sepamos, la información contenida en este manual fue correcta en el momento de imprimir. Sin embargo, Lewmar no aceptará responsabilidad de cualquier imprecisión u omisión que pueda haber. Además, nuestra política de mejora continua de los productos puede cambiar las especificaciones sin notificación. Como resultado, Lewmar no aceptará responsabilidad de cualquier diferencia entre el producto y el manual.

Per quanto di ns. conoscenza le informazioni contenute in questo manuale sono corrette ed aggiornate al momento di andare in stampa. In ogni caso Lewmar non può essere ritenuta responsabile per inesattezze o omissioni. Inoltre, a causa della continua evoluzione e miglioramento dei ns prodotti, il presente manuale potrebbe non corrispondere al prodotto attualmente in commercio.

Informationen i den här handboken var, såvitt vi kan bedöma, korrekt vid tryckningen. Lewmar påtar sig emellertid inget ansvar för eventuella felaktigheter eller brister i handboken. Dessutom är vår policy att ständigt arbeta på att förbättra våra produkter, vilket kan leda till förändringar inför utan föregående meddelande därom. Därför kan Lewmar inte påta sig något ansvar för skillnader mellan produkten och beskrivningen i handboken.

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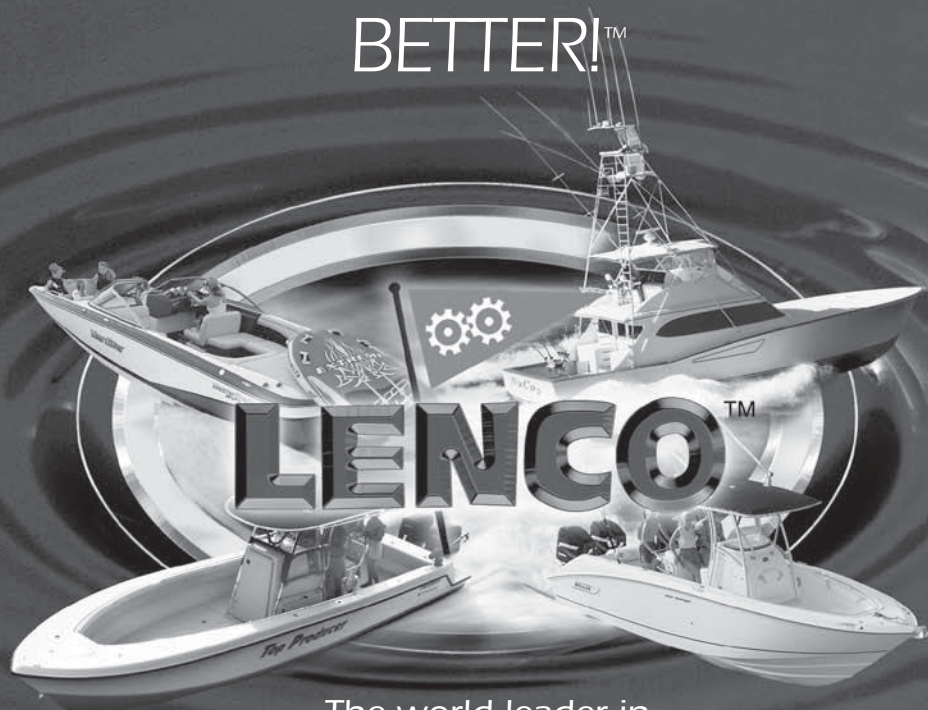
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WE MAKE
THE BEST BOATS
BETTER!™



The world leader in
trim tab, trolling motor and hatch lift innovation.



OWNER'S MANUAL

Featuring NEW waterproof Deutsch connectors!

Lenco power explained...

The entire Lenco Actuator is fully submersible, maintenance-free and sealed for life

Corrosion proof, water tight Vandar top cap and mounts stand up to severe loads

Buna-N SBR O-ring ensures absolute water-tight seal

Tough, high-torque motor easily transfers 750 lbs (340.18 kg)
Available in 12- or 24-volt motor.

Precision molded, powdered metal, high alloy gears provide high accuracy, high wear resistance, and high strength for long life

Buna-N SBR O-ring ensures absolute water-tight seal

Ballscrew rotates freely on 12 ball bearings at both ends of its stroke so there's no need for complicated limit switches and clutches

Dual Nitrile Buna SBR O-ring sealed for maximum protection

Stainless steel ram will not flex, even under extreme loads

Corrosion proof Vandar mounts always look great

6 foot leads with Deutsch connectors

Top cap gland seal sheaths the actuator cable outer jacket as well as both internal conductors for maximum waterproofing

High-impact, ultraviolet resistant Nylon 66, 50% glass fiber reinforced thermoplastic housing

Self-locking stainless steel ball screw locks into position and will not drift

CE All Lenco products are CE certified

Electro-polished solid 316 stainless steel billet end for Extreme Duty, Heavy Duty, and High Performance applications



CONGRATULATIONS!

You have just purchased the finest, performance trim tab system in the world! Welcome to the future.

Lenco Trim Tabs make the single most important difference in the way your boat rides and performs. Lenco Trim Tabs make your boat ride smoother, drier, faster, and safer with increased fuel efficiency whether on a small skiff or a mega-yacht. Lenco's ball screw design is more reliable, twice as powerful and features an instant response, making them very user friendly compared to typical hydraulic trim tabs. Lenco Trim Tabs are oil free and are environmentally friendly. Our goal is to manufacture products that simply make boating more enjoyable.



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Trim Tab Operation

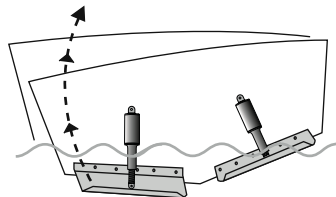
The Lenco Tactile Switch is based on the position of the bow.



Without Trim Tabs



With Trim Tabs



When the tabs are lowered, the water flow is redirected creating an upward force at the stern of the boat.

Lenco Trim Tab kits include two stainless steel planes, two electromechanical actuators and all mounting hardware for installation. (See available switch options on page 16.) The trim tabs operate independently of one another to provide optimal performance by redirecting water flow at the transom of the boat. Lenco Trim Tabs have been designed to improve the overall attitude of a boat. If used properly, Lenco Trim Tabs improve the ride, reduce drag, increase speed and improve the fuel efficiency of your boat.

The operation of Lenco Trim Tabs is basic. The two stainless steel planes are mounted with the actuators on the transom of the boat. When the tabs are lowered, the water flow is redirected creating an upward force at the stern of the boat. When the stern rises, the bow will lower.

Since Lenco actuators are electromechanical, they provide an immediate response at the touch of the switch. The Lenco switch is based on the position of the bow. The left side of the switch controls the starboard tab. The right side of the switch controls the port tab. The system is set up this way to minimize the guesswork while underway. To lower the starboard bow, press the right (starboard) switch where it reads DOWN. To lower the port bow, press the left (port) switch where it reads DOWN.

Since all boats are different in weight, length, speed and performance, it takes practice to understand how your boat reacts with trim tabs installed. Lenco Trim Tabs allow your boat to get on plane faster and continue planing at lower speeds. This improves visibility and the overall safety of your boat. When making adjustments with the trim tabs, use short momentary taps of the switch.

To become knowledgeable on how your boat performs with Lenco Trim Tabs, remember, practice makes perfect.

Lenco electromechanical actuators provide an instant response. When making adjustments, use short momentary taps of the switch.

SPECIAL CONDITIONS

HEAD SEA

Head Sea — Lower both tabs slightly by pressing BOW DOWN on both sides. This brings bow down while maintaining speed. This adjustment allows the hull of the boat to absorb the impact of the waves, resulting in a more efficient and smoother ride.

FOLLOWING SEA

Following Sea — Make sure the tabs are fully retracted by pressing BOW UP on both sides. This brings both tabs to a fully retracted position decreasing lift in the stern, allowing the bow to rise. If tabs are deployed, the bow may dig.

WINDY CHOP

Windy Chop — To raise the windward side of the boat press BOW UP on that side. If this is not sufficient, press BOW DOWN on the leeward side of the boat. Do not over trim when attempting this. This allows the windward side of the boat to rise and minimizes spray.

SHALLOW WATER HOLE SHOT

Shallow Water/Hole Shot — Lower both tabs completely down by pressing BOW DOWN on both sides. This provides lift in the stern of the boat and keeps the bow down. As you throttle up and speed increases, raise tabs by pressing BOW UP on both sides.

UNEVEN LOAD

Uneven Load — If one side of the boat is higher than the other while running, press BOW DOWN on the switch on that side. This lowers the tab on the listing side (low side) to bring the boat level.

PORPOISING

Porpoising — To stop porpoising, press BOW DOWN on both sides of the switch. The tabs need only to be deployed slightly to correct this adverse situation.

SAFETY

While the boat is underway, do not move one tab up or down significantly; this may cause listing.

While at higher speeds, do not over trim. This causes the bow to lower quickly, resulting in a reduction of speed and may cause the boat to veer.

When in following seas or when running an inlet, the tabs should be fully retracted. This allows for optimal performance.

While operating trim tabs, use caution. Improper use of trim tabs may cause accidents and/or injury.



Trim Tab System Parts & Troubleshooting

1	Stainless steel blade with hinge	#20141-001 (B-9x12 dimensions of tab)
2	Electromechanical Actuator	#101, #101 XD, #101 XDS, #102 XD
3	Upper mounting bracket	#15085-001 (116)
4	Space saver upper mounting bracket (optional)	#50225-001 (117)
5	Lower mounting bracket	#50014-001 (119)
6	RetroFit Kit bracket	#15085-001 (116)
7	(Qty. 2) 5/16 #18 X 1-3/4" large hex head bolt and 5/16	#10250-001
8	#123 L.E.D. Indicator Switch w/Retractor (optional)	#15070-001 (123SC)
9	124SSR Standard solid state Tactile Switch w/ Retractor (optional)	#15069-001 (124SSR)
10	#123 DR Dual Actuator L.E.D. Indicator Switch w/Retractor (optional)	#15071-001 (123DRSC)
11	Shim kit (optional)	#50015-002 (118S)
12	(Qty. 26) 1-1/4" (3.17 cm) stainless steel sheet metal screw kit	#10002-001 (Kit #1)
13	(Qty. 6) 20 X 7/8" (2.22 x .63 cm) stainless steel screws, (Qty 6) flat washers and (Qty. 6) 1/4" (.63 cm) lock nuts	Kit #4

Troubleshooting Guide for Trim Tabs

Trim tabs do not work together, independently or intermittently.

Solution Sequence:

- 1) Inspect fuse at fuse panel.
Replace if necessary.
- 2) Verify that all connections at switch control box are tight and in place.
- 3) Make sure that switch assembly has a solid ground.
- 4) If the actuator cables were spliced inside the transom, inspect joint for positive connection.
- 5) If, after following steps stated above, the actuators still do not operate properly — STOP and call the factory for further assistance at 772-288-2662.

Additional Information

- Check electrical connections behind switch and make sure ground wire is in place.
- The addition of a zinc anode will deter electrolysis. It is important that the zinc is in contact with the trim tab blade.
- To discourage any marine growth on tab or actuator, antifouling paint can be applied. When applying paint to the actuator, make sure it is fully retracted. Do not paint the stainless ram above the area that is exposed when retracted.
- If tabs malfunction or tabs become stuck in the down position while underway, remove pin or bolt at the lower mounting bracket.
- To reposition the actuator turn stainless steel ram clockwise and reattach.

Trim Tab Installation Instructions

Trim Tab Installation Instructions

Warning: The following instructions contain important safety information and should be followed carefully. Failure to do so may result in injury and will void warranty.

Please read through the instructions in their entirety prior to beginning installation!

TOOLS AND MATERIALS LIST

- Electric drill
 - Wire crimper/cutter
 - Tape measure
 - 3/16" & 3/8" drill bits
(.48 & .95 cm)
 - 7/16" (1.11 cm) wrench
 - Small hammer
 - 4' (1.22 m) level
 - Straight edge
 - 3M 5200 adhesive caulking
 - 2" (5.08 cm) hole saw
 - #2 & #3 Phillips screwdrivers
 - 3M 5200 adhesive caulking
1. To begin, determine where the Lenco Trim Tab Kit will be installed.
Note: When laying out the desired tab location, hold the tab against the transom with the bottom of the hinge knuckle 3/8" (.95 cm) from the bottom of the transom, approximately 1" to 4" (2.54 to 10.56 cm) in from the chine, and in line with the hull. When mounting the hinge to the hull make sure that the inside corner of the hinge knuckle is no closer than 2" (5.08 cm) to the left or right of any strake edge. The hinge may overlap a strake edge as long as any corner of the hinge knuckle is no closer than 2" (5.08 cm) to the left or right of the strake edge. (see Fig.1). Transfer (trace) the screw hole pattern onto the transom for drilling, see step 2.
 2. Using the 3/16" (.48 cm) drill bit, drill the previously marked hole locations to a depth of 1-1/4" (3.17 cm).

Note: When drilling out the screw hole pattern for the trim tab hinge you may drill through the transom, however the screws when installed with 3M 5200 adhesive caulking will seal the holes. All supplied screws and fasteners are stainless steel. Do not use any other type of alloy.

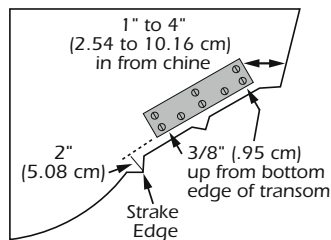
Mount the trim tab hinge to the transom using provided #14 x 1-1/4" (3.17 cm) stainless steel metal screws. We recommend using 3M 5200 adhesive caulking to bed the hinge and screws. **DO NOT OVERTIGHTEN.**

3. Attach the lower mounting bracket to the tab with the bolts, washers, and nylon lock nuts provided., Attach the upper bracket to the actuator using the 5/16-18 X 1-3/4" (4.45 cm) large hex head bolt and 5/16-18 hex nut provided. Attach the actuator to the lower bracket using the 5/16-18 X 1-3/4" (4.45 cm) large hex head bolt and 5/16-18 hex (.79) nut provided.

In order to properly position the upper bracket against the transom, you must lift the trim tab so that the trailing edge is approximately

Note: Performance tabs should be mounted with the tapered end facing toward the center of the boat.

Fig. 1



Trim Tab Installation Instructions

5/8" (1.59 cm) (for a 9" trim tab) and 3/4" (1.9) (for a 12" trim tab) above the straight edge when held to the hull (see Fig. 2). When the trim tab is at the appropriate level, transfer (trace) the outer shape of the upper bracket onto the transom. The upper bracket should be marked where it lays naturally against the transom to prevent binding during travel. (Do not adjust the upper bracket to the right or left, as this will cause binding, instead just allow the bracket to come to rest in it's natural position).

Remove the actuator from the lower bracket. Remove the upper bracket from the actuator and align to the previously marked location to mark the upper screw hole locations and cable hole location. Using the 3/16" (.48 cm) drill bit, drill the previously marked screw hole locations to a depth of 1-1/4" (3.17 cm).

Note: When drilling out the screw hole pattern for the trim tab hinge you may drill through the transom, however the screws when installed with 3M 5200 adhesive caulking will seal the holes when installed. All supplied screws and fasteners are stainless steel. Do not use any other type of alloy.

4. Warning: With some installations, fuel, water tanks and/or other systems may prevent the actuator cable from entering the hull through the upper mounting bracket. Be sure to check inside the hull before drilling the 3/8" (.95 cm) cable hole.

If all is clear, Using the 3/8" (.95 cm) drill bit., drill the previously marked cable hole completely through the transom. Insert the actuator cable through the appropriate hole in the upper bracket until it reaches the actuator. Insert the actuator cable through the gland seal until it

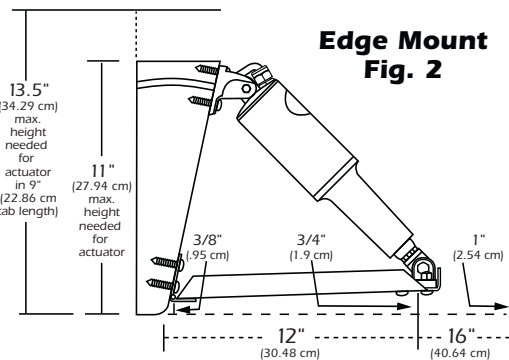
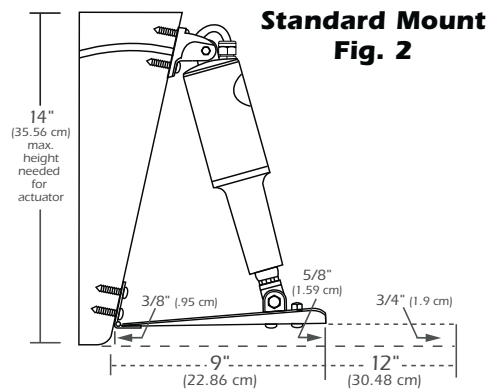
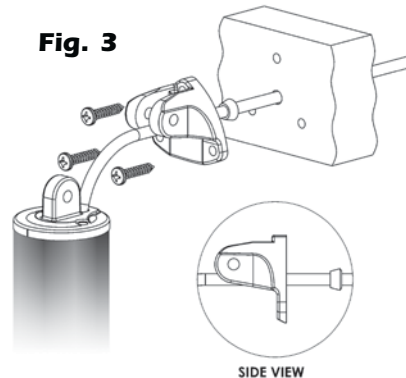


Fig. 3



reaches the upper bracket.

Note: For appropriate orientation of upper bracket and gland seal, (see Fig 3).

Continued on page 10.

Trim Tab Installation Instructions

Installation Instructions continued from page 9.

Insert the actuator cable through the transom. With the actuator loosely supported, start the provided #14 x 1-1/4" (3.17 cm) stainless steel metal screws through the upper bracket and into the transom. **MAKING SURE TO LEAVE THE SCREWS ONLY PARTIALLY INSTALLED.**

Insert the actuator clevis (mounting ear) into the top bracket and hold in the approximate installed location. Pass the actuator cable through the transom removing slack on the cable until it is snug. Remove the actuator from the upper bracket and finish installing the previously started #14 x 1-1/4" (3.17 cm) stainless steel metal screws through the upper bracket and into the transom. We recommend using 3M 5200 adhesive caulking to bed the upper bracket and screws. **DO NOT OVERTIGHTEN.**

Attach the actuator to the upper bracket using the 5/16-18 X 1 3/4" (4.45 cm) large hex head bolt and 5/16-18 (.79 cm) hex nut provided. If, however, you are prevented from drilling a hole through the transom at the bracket location, using the 3/8" (.95 cm) drill bit, simply drill a 3/8" (.95 cm) hole 4" to 5" (10.16 to 12.7 cm) above the waterline and insert the cable. Cover the hole and cable with a clamshell vent sealed with 3M 5200 for a waterproof and finished effect.

Assemble actuator connector ends as instructed in Actuator Deutsch Connector Instructions insert card provided.

5. At the helm, determine where the tactile switch will be installed, locate the template on page 27 and secure to helm, cut a circular opening using a 2" (5.08 cm) hole saw. Before cutting, make sure the area inside

the helm is clear of wires and other equipment that could be damaged. Using the template on page 35, drill four 3/16" (.48 cm) holes through the helm.

Secure the switch with the nylon nuts provided. When mounting the black control box, keep in mind that there is a 30" (76.2cm) lead that attaches to the back of the tactile switch. Make sure control box is mounted on a vertical surface with wires facing down toward the deck.

6. Following the trim tab switch wiring diagram, connect the actuators or the actuator extension cables to the switch control box. Be very careful of sharp edges that may damage the cable. Remember the left switch controls the right starboard tab and the right switch controls the left port tab.

**Please follow the instructions and drawings carefully.
Call the Lenco Service Department at 772-288-2662 for technical assistance.**





Lenco Trim Tabs, Switches and Bennett RetroFit Kits carry a 3-year limited warranty from the date of original purchase.

When possible, please refer to our troubleshooting guide on our website, <http://www.lencomarine.com> prior to processing your claim with the Lenco factory.

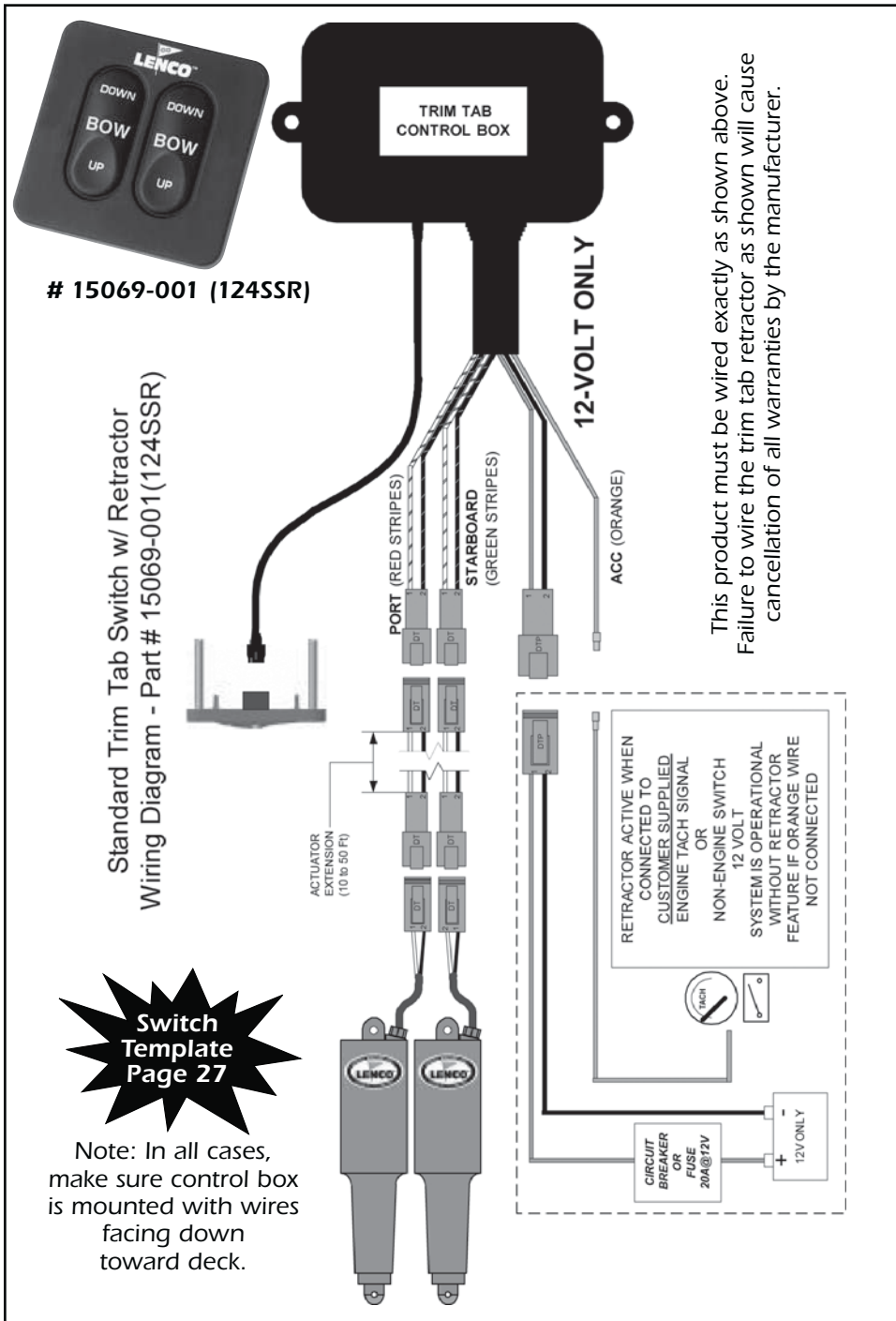
1. Call Lenco Marine at 772-288-2662, and ask for customer service. Give the technician a brief description of the product and the problem. Once the tech determines that the product is eligible for repair or replacement, they will issue you an RMA number (Return Merchandise Authorization). **Claims will not be processed without an RMA number.**
2. Return product and paperwork to Lenco Marine with the following information: name, telephone number, description of problem, proof of purchase to verify warranty. Proof of purchase and warranty info can consist of the following:
 - A. Bill of sale from place of purchase
 - B. Retail boat purchase bill of sale
3. Mark the outside of the package with the RMA number and return it to Lenco Marine Customer Service Department at 4700 SE Municipal Court, Stuart, FL 34997 for processing. Once received, our Customer Service Department will make every effort to process your return quickly. Should time restraints prohibit you from sending in the merchandise first, or you need an immediate

replacement, you will be required to secure the replacement part with a credit card prior to shipment (Visa, MasterCard, American Express, Discover). Lenco Marine ships all warranty items UPS ground. Costs for upgrades in shipping are the responsibility of the customer. Lenco Marine warranties all trim tabs, switches or Bennett RetroFit Kits for a period of 3 years from the date of original purchase. If any part of a Lenco Trim Tab, switch or Bennett RetroFit Kit fails due to manufacturing defects or workmanship within a period of 3 years from the date of original purchase, Lenco Marine will repair or replace the part(s) without charge at our discretion. No haul out, labor or miscellaneous charges are covered under this warranty. Warranty is not transferable.

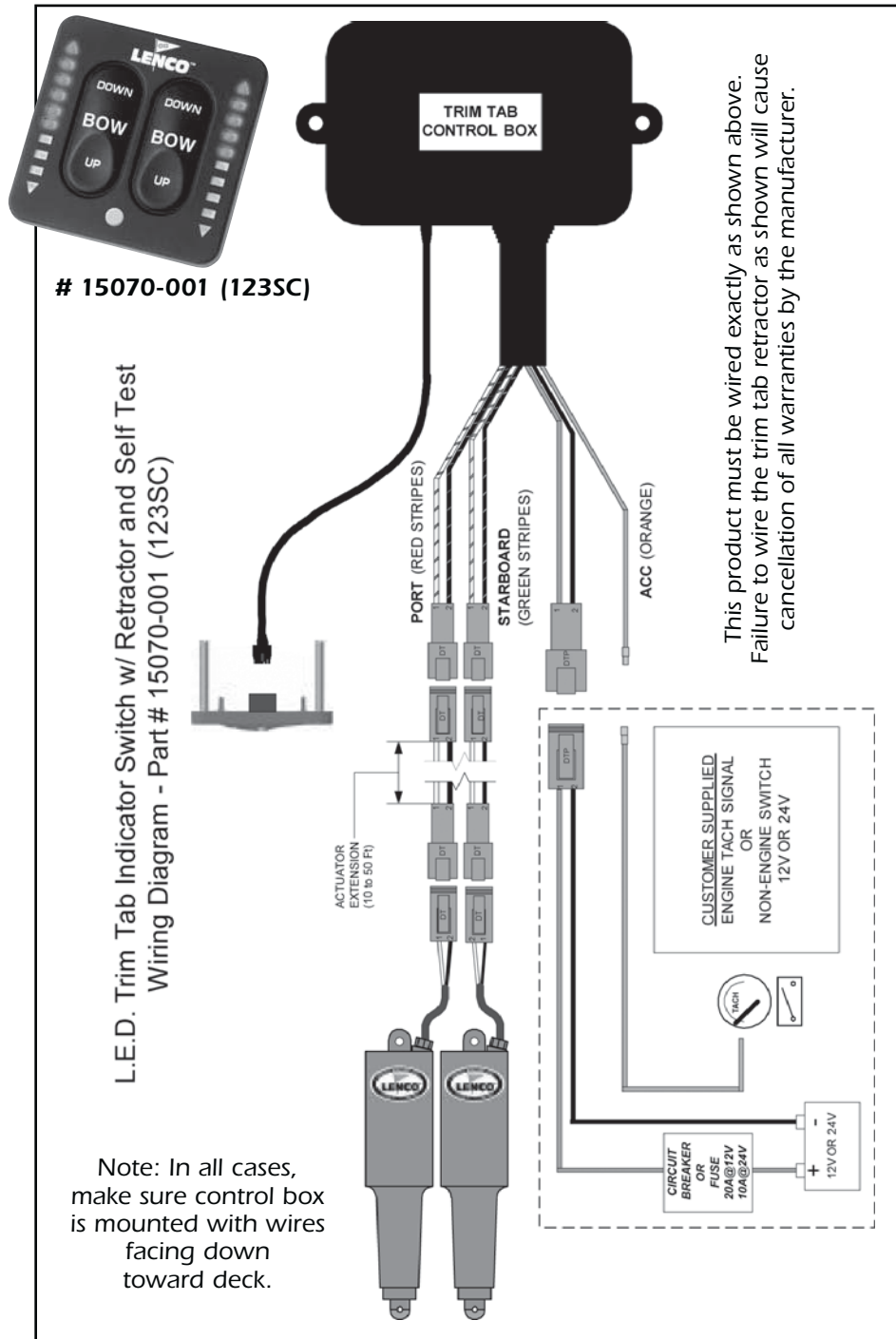
The foregoing is in lieu of any and all other warranties, expressed or implied, including any warranty of merchantability or fitness for a particular purpose. There are no other warranties which extend beyond that set forth above. Lenco Marine reserves the right to void any warranty claim if the part is opened or repair was attempted, without prior authorization from Lenco Marine.

Lenco Marine, Inc.
Phone: 772-288-2662
Fax: 772-288-2566
www.lencomarine.com
4700 SE Municipal Court
Stuart, FL 34997

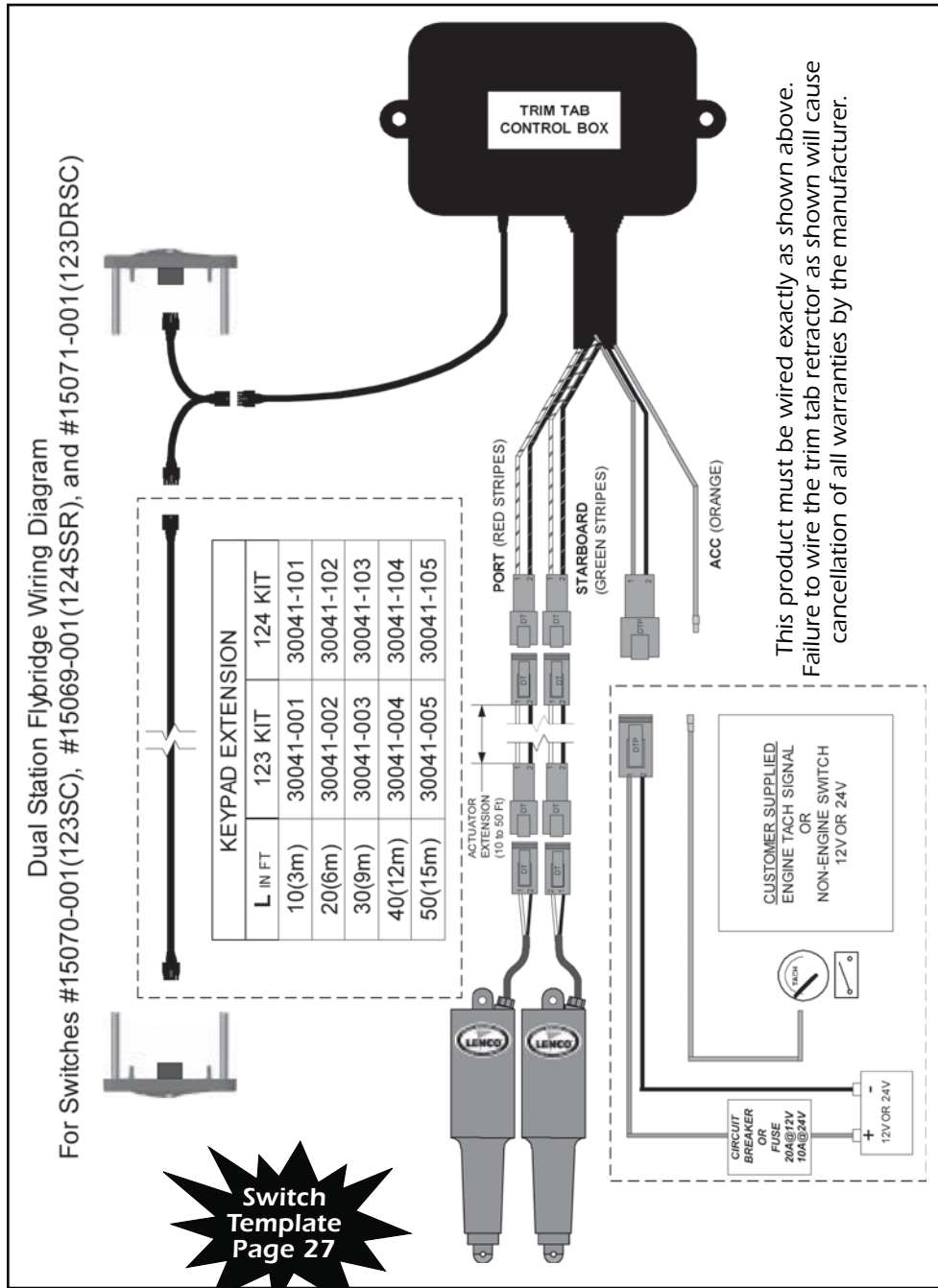
Switch Wiring #15069-001 (124SSR)



Switch Wiring #15070-001 (123SC)



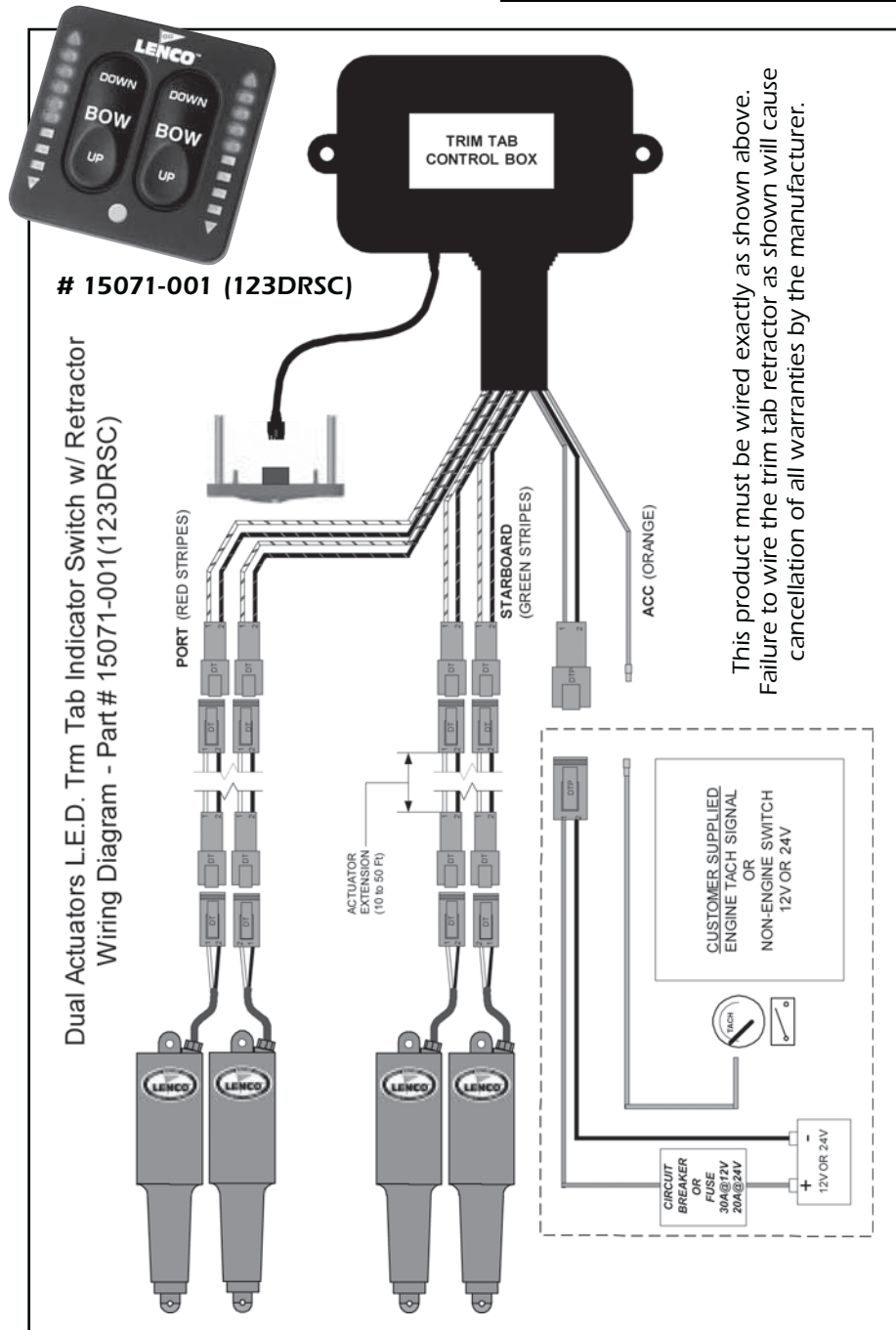
Dual Station Switch Wiring



Note: In all cases, make sure control box is mounted with wires facing down toward deck.



Dual Actuator Switch Wiring



Note: In all cases, make
sure control box is
mounted with wires facing
down toward deck.

Optional Switches

Complete your trim tab system with the latest switch technology — totally waterproof, maintenance-free, easy-to-install tactile switches.

Lenco Switch Options

#15069-001 (124SSR) – Standard Tactile Switch w/Retractor for all single actuator 12-volt trim tab systems

#15070-001 (123SC) - L.E.D. Indicator Tactile Switch w/Retractor and Self-Check for all single actuator 12- or 24-volt trim tab systems

#15071-001 (123 DRSC) - Dual Actuators L.E.D. Indicator Tactile Switch w/ Retractor and Self-Check

#10225-001 (125)- For Air Boats and Hatch Lifts.

Lenco switches feature:	124 SSR	123 SC	123 DRSC
1) Self-Check feature at power-up			
2) Self-contained, sealed keypad			
3) Self-contained, sealed control box			
4) Fade/smudge-proof, laser engraved graphics			
5) Plug & play switch wiring harness connectors			
6) Built-in Retract feature returns tabs to a fully retracted position when power or tach signal is removed			
7) 2 high-intensity L.E.D. indicator displays show the exact position of your trim tabs at all times			
8) Photo eye reads ambient light and adjusts the L.E.D. indicator display intensity for optimum viewing in all light conditions			
9) Backlit keypad graphics for optimum night viewing			
10) 24-volt compatibility			



NEW! Waterproof
Plug & Play
Deutsch Connections



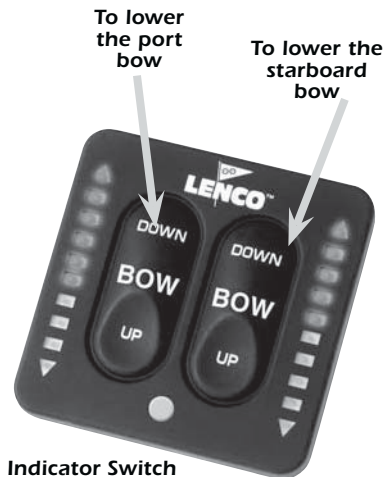
Lenco Marine

SWITCH OPERATION

The operation of the indicator switch is based on the position of the bow. To lower the starboard bow, press the right (starboard) side of the switch where it reads Down. This lowers the port tab. To lower the port bow, press the left (port) side of the switch where it reads Down. This lowers the starboard tab. The L.E.D. displays on the sides of the display show how far that tab has moved.

When the on/off switch is turned on at the helm or the engine's tachometer circuit becomes active, the L.E.D. displays on the indicator switch light from top to bottom and immediately extinguish from

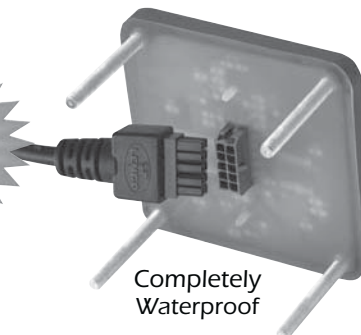
bottom to top to indicate self test at power up. If there is a problem with an actuator connection the L.E.D. displays shows every other light red "ON" at the side that has the problem. After self test is complete (1 to 2 seconds) the L.E.D. displays show one up arrow on each side of the switch. This shows that both tabs are fully retracted. While functioning the tabs, the L.E.D. displays indicate the position of the tabs by lighting up the further they are pressed down. As the switch is pressed up, the lights go out. When power is removed from the switch or the engine stops (if accessory wired to tach), the tabs retract from any position before powering down.



Indicator Switch
with Retractor
#15070-001 (123SC)



Standard Switch
#15069-001
(124SSR)



Completely
Waterproof

Electric RetroFit Kit for Bennett Trim Tabs Installation Instructions

Lenco Marine's RetroFit Kit is designed as a direct replacement for the Bennett 4-ring standard trim tab actuator.

Note: Bennett Joystick Control can not be retrofitted to the Lenco Actuators.

These instructions should be followed completely. If you experience any problems not covered, please call the Lenco Marine customer service line at 772-288-2662.

- 1) Disconnect the Bennett hydraulic pump unit (HPU) and drain as much of the hydraulic fluid as possible into a container for proper disposal later. Remember that automatic transmission fluid (ATF) is to be disposed of only at an approved collection site in your area; do not discard in the regular trash.
- 2) Remove the Bennett trim tab cylinder from the boat transom and remove the hydraulic line at the connection. It helps to have several rags handy to soak up the oil. Remove and discard old hydraulic lines.
- 3) Disconnect the Bennett cylinder from the trim tab plane by tapping out the small black pin at the base of the cylinder where it attaches to the plane. You will first have to remove one screw from the lower bracket as this holds the pin in place. Do not remove the lower bracket, as you will need it later.
- 4) Insert the actuator cable through the appropriate hole in the upper bracket until it reaches the actuator. Insert the actuator cable through the gland seal until it reaches the upper bracket.

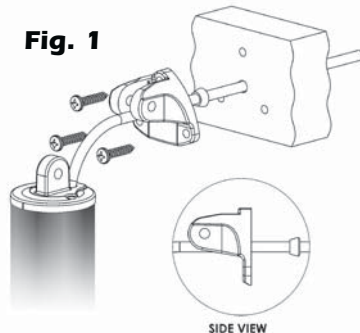
Note: For appropriate orientation of upper bracket and gland seal, (see Fig 1).

You will need to clean mounting surfaces on the transom with a cleaning solvent such as mineral spirits or alcohol to remove all oils and dirt before final mounting.

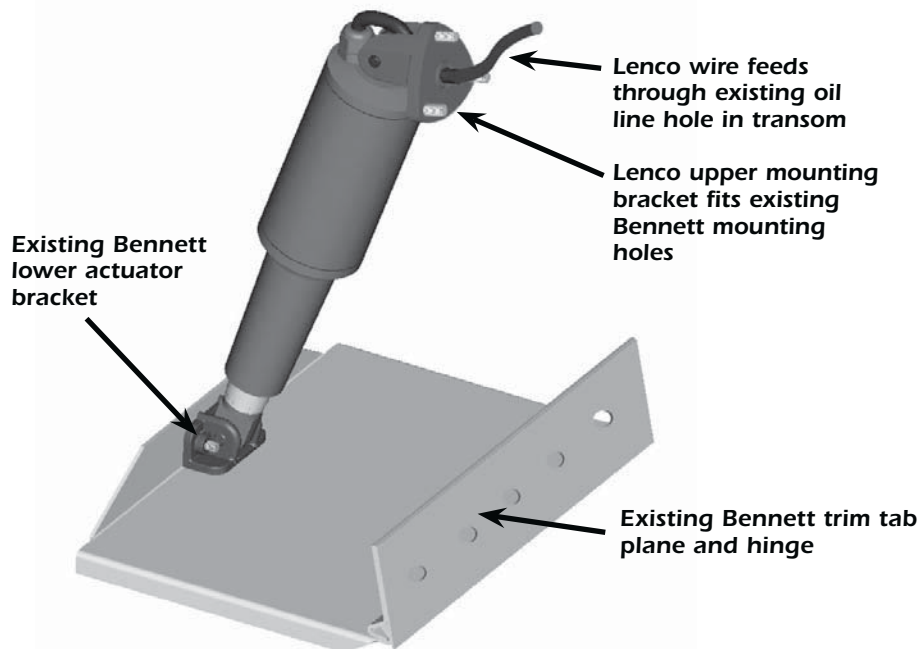
Insert the actuator cable through the transom. With the actuator loosely supported, bed the upper bracket and screws with 3M 5200 adhesive caulking. Start the provided #14 x 1-1/4" (3.17 cm) stainless steel metal screws through the upper bracket and into the transom. **MAKE SURE TO LEAVE THE SCREWS ONLY PARTIALLY INSTALLED.**

Insert the actuator clevis (mounting ear) into the top bracket and hold in the approximate installed location. Pass the actuator cable through the transom removing slack on the cable until it is snug. Remove the actuator from the upper bracket and finish installing the previously started #14 x 1-1/4" (3.17 cm) stainless steel metal screws through the upper bracket and into the transom. We

Fig. 1



RetroFit Kit for Bennett Trim Tabs Installation Instructions



recommend using 3M 5200 adhesive caulking to bed the upper bracket and screws.
DO NOT OVERTIGHTEN.

Attach the actuator to the upper bracket using the 5/16-18 X 1-3/4" (4.45 cm) large hex head bolt and 5/16-18 (.79 cm) hex nut provided.

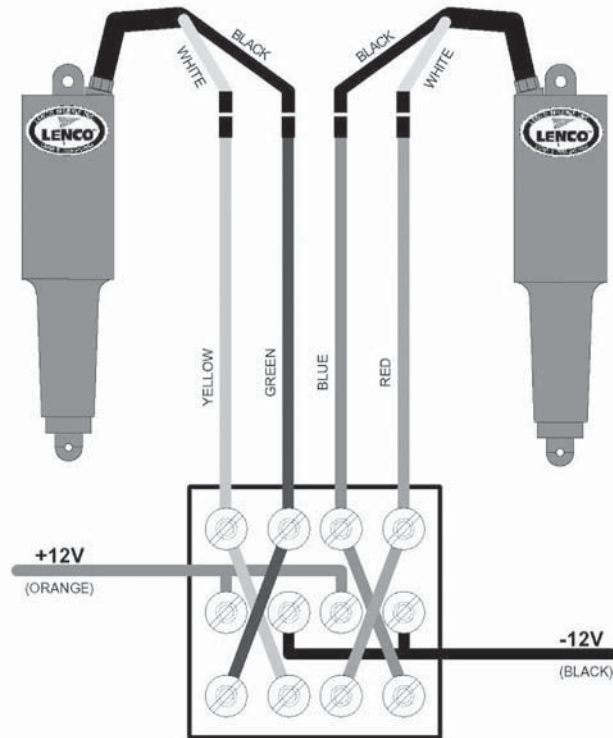
- 6) You are now ready to attach the Lenco Actuator to the blade. First insert the pin part way through the hole in the Bennett lower bracket and insert through one of the four black washers provided in the kit. Place the actuator into the bracket and tap the pin through. Continue through the second washer and other side of the bracket. Replace the bracket screw removed in step 3. This will lock the pin in place and prevent it from falling out.

- 7) Now you will need to hook up the Lenco Actuator wires inside the bilge/rigging area. First cut the wire connector from the Bennett wire harness where the pump used to be. Strip the four harness wires and connect to the four Lenco wires using the heat shrink butt splices provided in the kit. Make sure to use the proper crimping tool and then heat all connections for a tight waterproof seal. Tie-wrap or secure in some fashion to a dry location to help prevent the connectors from getting too wet. For further wiring information, see wiring instructions and diagram on next page.

Please follow the instructions and drawings carefully. Call the Lenco Service Department at 772-288-2662 for technical assistance.

RetroFit Kit for Bennett Trim Tabs Wiring Instructions

Wiring Instructions for Electric RetroFit Kit for Bennett Trim Tabs



- 1) Remove all wires and all jumpers (brass strips) on Bennett factory switch and discard.
- 2) Now find the 12-volt negative at the helm/console. Connect the black wire from the switch to this source. The Lenco system requires that a negative (-) wire be attached at the switch as per the wiring diagram. The 12-volt positive (+) should already be at the switch from the previous system. Simply reconnect it as per the wiring diagram.
- 3) Test the trim tabs for proper operation. Remember that the right switch controls the left trim tab and the left controls the right.

BOW DOWN should extend the tabs while BOW UP should retract them. If for some reason this does not work as described in the above text, recheck all the wiring for a misplaced wire. If still not fully operational, refer to the trim tab troubleshooting guide on page 7 for further instructions.

Use caution when using Lenco Trim Tabs for the first time. The response time is faster than the Bennett system.

Try small taps of the switch until you become accustomed to the new trim tabs.



Upgrading and Retrofitting

Standard Tab to Troll'n Tab

A 9x12 trim tab can be upgraded to 9x12 Troll'n Tab.

Standard Tab Blade Upgrade

For a larger trim tab blade a 9x12 blade can be retrofitted with a 12x12 blade.

Edge Mount Kit Upgrade

Since the placement of the upper bracket is lower then a standard mount, an edge mount can be retrofitted only with another edge mount trim tab.

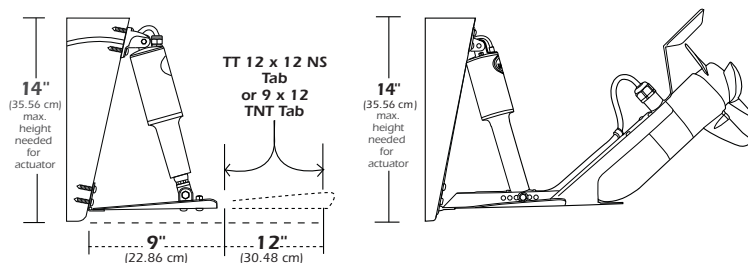
Edge Mount Tab to Troll'n Tab

A 12x12E trim tab can be upgraded to a 12x12 Troll'n Tab.

Note: In order to utilize the same mounting holes when upgrading from trim tabs to Troll'n Tabs, the trim tabs have to have been mounted with the hinges at least 3/8" (.95 cm) from transom bottom as recommended in Lenco installation instructions.

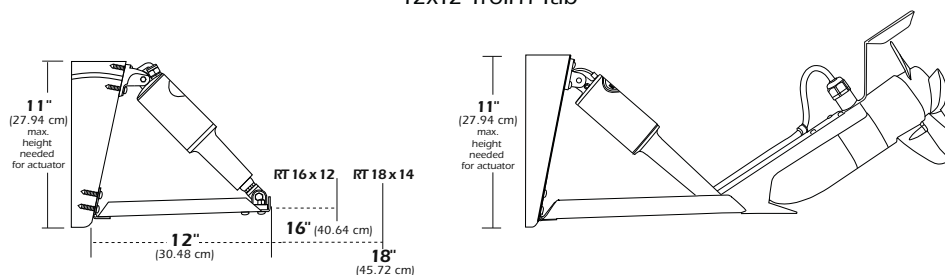
Standard Mount Kit # 15001-101 (TT 9x12 NS)

Can be upgraded to a 12" tab or a 9x12 Troll'n Tab

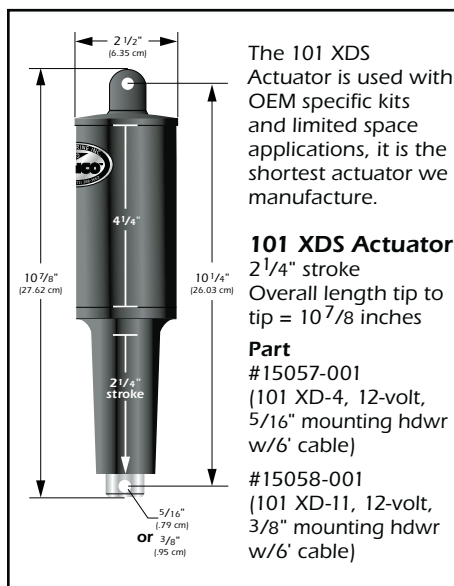
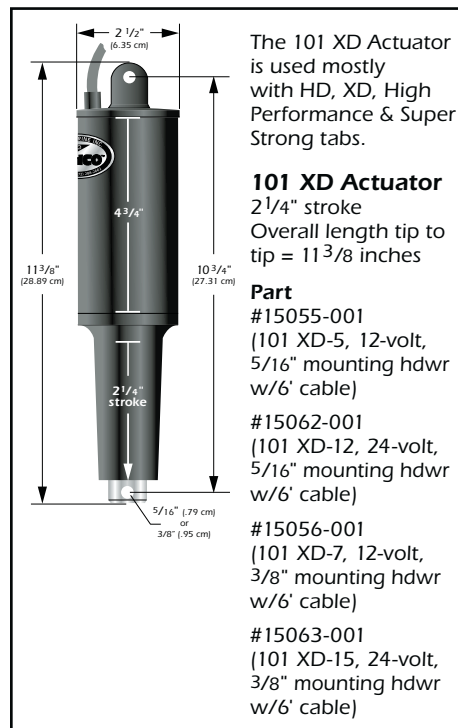
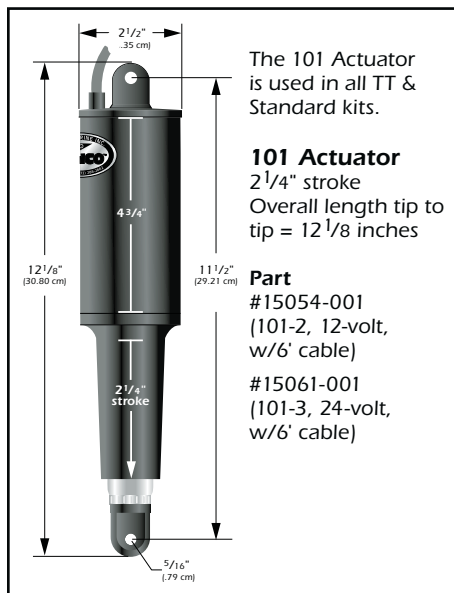


Edge Mount Kit #15016-101 (TT 12x12 ENS)

Can be upgraded to a 16" or 18" tab or a 12x12 Troll'n Tab



Actuators



The entire Lenco Actuator is fully submersible, maintenance-free and sealed for life.





Lenco Hatch Lifts carry a 2-year limited warranty from the date of original purchase.

When possible, please refer to our troubleshooting guide on our website, <http://www.lencomarine.com> prior to processing your claim with the Lenco factory.

1. Call Lenco Marine at 772-288-2662, and ask for customer service. Give the technician a brief description of the product and the problem. Once the tech determines that the product is eligible for repair or replacement, they will issue you an RMA number (Return Merchandise Authorization).

Claims will not be processed without an RMA number.

2. Return product and paperwork to Lenco Marine with the following information: name, telephone number, description of problem, proof of purchase to verify warranty. Proof of purchase and warranty info can consist of the following:
 - A. Bill of sale from place of purchase
 - B. Retail boat purchase bill of sale
3. Mark the outside of the package with the RMA number and return it to Lenco Marine Customer Service Department at 4700 SE Municipal Court, Stuart, FL 34997 for processing. Once received, our Customer Service Department will make every effort to process your return quickly. Should time restraints prohibit you from sending in the merchandise first, or you need

an immediate replacement, you will be required to secure the replacement part with a credit card prior to shipment (Visa, MasterCard, American Express, Discover). Lenco Marine ships all warranty items UPS ground. Costs for upgrades in shipping are the responsibility of the customer. Lenco Marine warrants all Hatch Lifts for a period of 2 years from the date of original purchase. If any part of a Lenco Hatch Lift fails due to manufacturing defects or workmanship within a period of 2 years from the date of original purchase, Lenco Marine will repair or replace the part(s) without charge at our discretion. No haul out, labor or miscellaneous charges are covered under this warranty. Warranty is not transferable.

Trim Tab customers please see separate warranty policy. The foregoing is in lieu of any and all other warranties, expressed or implied, including any warranty of merchantability or fitness for a particular purpose. There are no other warranties which extend beyond that set forth above. Lenco Marine reserves the right to void any warranty claim if the part is opened or repair was attempted without prior authorization from Lenco Marine.

Lenco Marine Inc.
Phone: 772-288-2662
Fax: 772-288-2566
www.lencomarine.com
4700 SE Municipal Court
Stuart, FL 34997

Lenco Hatch Lift Installation/Operation

Due to the many different variables involved with the numerous applications for Lenco hatch lifts, installation is never the same. Here are some general guidelines that can be of assistance:

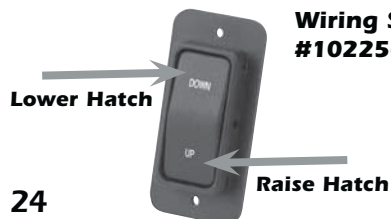
- The actuator is most powerful when it is installed vertically at 90 degrees.
- Lifting capabilities decrease the closer the upper or lower mount is located to the hinge.
- The further from a vertical position the less lifting capability. When retracted, **Do Not position hatch lift at an angle less than 45 degrees.**
- Dual actuator systems are recommended for hatches over 500 pounds (226.79 kg) of force.
- Lenco hatch lifts are designed around a ball screw that spins freely when hatch is fully open or closed.
- For installation, it is important that the hatch lift is able to disengage itself at the fully retracted position.
- The ram must be allowed to free spin at both ends of its stroke or it will continue to push or pull against any resistance potentially damaging the hatch lift or the hatch itself.
- Failure to make accurate measure could cause damage to hatch lift or the hatch itself.
- Lenco hatch lifts are fully submersible and will not drift.
- Lenco hatch lifts are offered in both 12 and 24 volts.

OPERATION

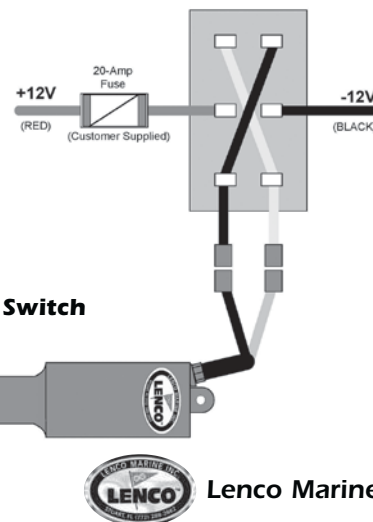
The function of the Lenco Hatch Lift system is simple. Since the hatch lift is based around a ball screw it is able to push a heavy load and remain at a constant position. To raise a load, extend the hatch lift by pressing on the upper part of the switch. To lower a load, retract the hatch lift by pressing the lower part of the switch. In case of power failure, Lenco hatch lifts are supplied with two clevis pins at the mounting brackets. To pull this pin out while the hatch is closed, you must rig it to a point outside of the hatch.

S = Short. All part numbers ending in S have the same stroke but in a 4" (10.16 cm) shorter length.

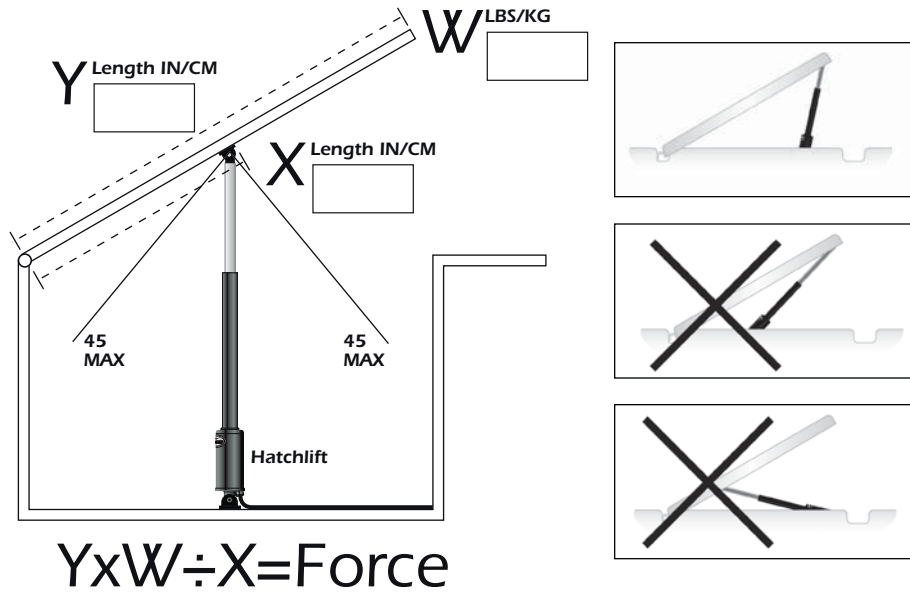
Part Number	L. O. A. Retracted	Approx. Stroke	L. O. A. Extended
HL-400	15"	4"	19"
HL-800S	21"	8"	29"
HL-800	25"	8"	33"
HL-1200S	25"	12"	37"
HL-1200	29"	12"	41"
HL-1600S	29"	16"	45"
HL-1600	33"	16"	49"
HL-2000S	33"	20"	53"
HL-2000	37"	20"	57"
HL-2400S	37"	24"	61"
HL-2400	41"	24"	65"



**Wiring Single Rocker Switch
#10225-001 (125)**



Lenco Hatch Lift Mounting



- Follow the chart above to figure out load on the hatch lift. Maximum load is 500 lbs. (226.79 kg)

Y = Total length of hatch

X = Length from the hinge to the hatch lift mounting point

W = Weight of the hatch to be lifted

- Determine the angle of the hatch lift mount. Do not exceed 45 degrees from center.
- Mount the hatch lift on the desired location as per the above instructions.

Important: It may be necessary to shim the upper or lower mounting bracket up or down so the hatch does

not bind when fully closed. The hatch lift does not stop pulling until it has reached its fully closed position. If the hatch fully closes before the hatch lift is fully retracted, it will cause damage to the lift or the mounting hardware. Shim the hatch lift with stainless washers for small amounts of length. Use Lenco part #118S for lengths greater than 1/8" (3 mm).

- Wire to switch according to the hatch lift wiring diagram in the owners manual supplied with the hatch lift.

SYSTEM PARTS

1	Hatch Lift (electromechanical actuator)	#s HL-400, HL-800, HL-800s, HL-1200, HL-1200S, HL-1600, HL-1600S, HL-2000, HL-2000S, HL-2400, HL-2400S
2	Mounting brackets	#50014-001 (119), #50015-001 (118)
3	Clevis pins	#60101-001 (121SS)
4	Single rocker switch	#10225-101 (125) (optional)
5	Slide bracket	#70381-001 (HLSB) (optional)

Product Summary

Standard Trim Tab Kits

- Standard trim tab kits include: two #101 actuators with extension harnesses and Deutsch connectors, two stainless steel blades, and all mounting hardware. See switch selections on page 16 for available options
- Available in standard mount and edge mount (space saver mount)
- Sizes range from 9" x 9" to 12" x 40". Measurements taken L x W



Performance Tab Kits

Standard Performance

- Standard performance tab kit includes: two #101 actuators with extension harnesses and Deutsch connectors, two 12-gauge electro-polished stainless steel blades and all mounting hardware
- Available in sizes: RT 9x9 NS, RT 9x12 NS, RT 12x9 NS, RT 12x12 NS, RT 14x12 NS, RT 16x12 NS and RT 18x14 NS

Heavy Duty Performance

- Heavy duty performance tab kit includes: two #101 XD actuators with extension harnesses and Deutsch connectors, two 12-gauge electro-polished stainless steel blades w/transom back plates and heavy duty hinge with 1/4" (.64 cm) hinge pin
- Available in sizes: RT 12x12 HDNS, RT 16x12 HDNS, RT 18x14 HDNS
- Customer supplied mounting hardware

Extreme Duty Performance

- Extreme duty performance tab kit includes: two #101 XD actuators (RT 17x12 XDNS), four #101 XD actuators (RT 19x14 XDNS & RT 24 x 14 XDNS) on two 10-gauge electro-polished stainless steel blades w/transom back plates and super duty hinge with 3/8" (.95 cm) hinge pin
- Actuator extension harnesses sold separately in choice of 5 lengths
- Customer supplied mounting hardware
- Available in sizes: RT 17x12 XDNS, RT 19x14 XDNS, and RT 24x14 XDNS

Switches: See selections on page 16 for available options

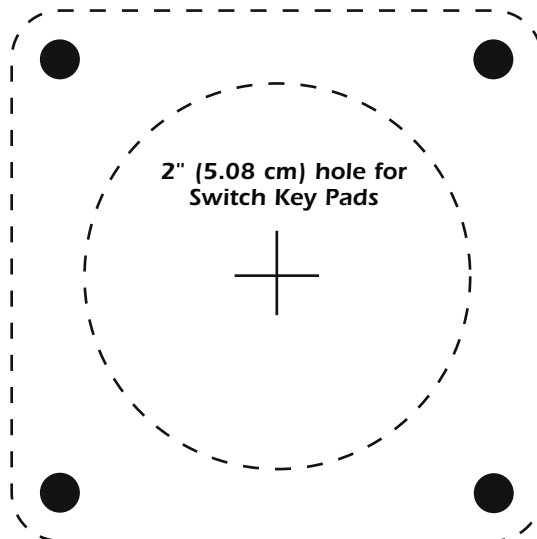


Product Summary/Switch Template

High Performance Tabs - Single & Dual Actuator

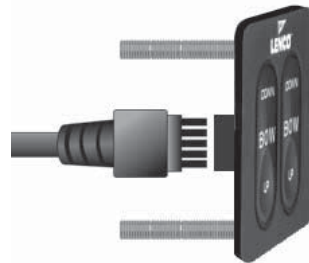
- High performance tab kit includes: two 12-volt Extreme Duty Actuators with 316 SS billet ram with 3/8" (.95 cm) SS bolts, two 7-gauge flat-304 electro-polished stainless blades.
- Full transom back plate with adjustable C-channel, 3/8" (.95 cm) bolts and super duty hinge with 3/8" (.95 cm) hinge pin
- Actuator extension harnesses sold separately in choice of 5 lengths
- Customer supplied mounting hardware
- Available in sizes: Single Actuator System: #15048-101 (14" x 12"), #15049-101 (18" x 12")
Dual Actuator System : #15050-101 (21" x 14"), #15051-101 (25" x 14")

High Performance Tabs - Single & Dual Actuator



Tactile Switch Connection

Mount control box within 30" (76.2) of keypad.
Control box wire harness is 30" (76.2) length



Switch Template

Remove the template from the owner's manual by cutting around the dashed rectangular perimeter line.

Align the 3/16" (.48 cm) drill bit with each of the four black circles and drill straight down through the helm, providing

clearance for the mounting hardware provided with the switch.

Align the centering bit of a 2" (5.08 cm) hole saw with the cross hairs in the center of the 2" (5.08 cm) dashed circular perimeter and drill straight down through the helm, providing additional clearance for switch and electrical connection.

DON'T WORRY...



we've got your back.



Lenco Marine Inc., 4700 Municipal Court ■ Stuart, Florida 34997
772-288-2662 ■ 772-288-2566 fax ■ www.lencomarine.com