

Index for Accessory 2

(Volume V)

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CLIENT : DAEWOO shipbuilding & marine eng. Co.,Ltd.
 HULL NO. : 5258
 ENGINE TYPE : HSD-MAN B&W 5S70MC

Subject:

M/E PNEUMATIC CONTROL SYSTEM

Note :

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HSD ENGINE Co.Ltd.



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1. FUNCTION OF THE ENGINE CONTROL SYSTEM

For plants equipped with a fixed-pitch propeller, the following modes of control are available ;

- A. CONTROL FROM CONTROL-ROOM
- B. BRIDGE CONTROL
- C. MANUAL CONTROL FROM THE ENGINE-SIDE CONSOLE

A. CONTROL FROM CONTROL- ROOM

All manually controllable valves must be in the positions shown on the diagram.

In the condition shown(STOP), stop switch(60) is actuated by the regulating handle causing valve(38) to give pilot signal to valves(25) and(117). Valve(25) leads working air to the puncture valve on each fuel pump, which relieves the high pressure of the fuel oil so that high-pressure oil is not supplied to the fuel valves. Valve(117) controls the pilot air supply to the starting air distributor. The stop switch is actuated when the regulating handle is in the stop slot, in the start slot, and in the range in between.

Start in AHEAD Direction

When start AHEAD is ordered from the bridge, the telegraph handle is to be moved to the field (in the AHEAD range) corresponding to the order.

Subsequently, the regulating handle is to be moved to the start slot by which an electrical signal is given to valve (90), which gives pilot signal to valve(33) causing, if the turning gear is disengaged, the pilot signal to reach valves(26) and (27). Air is thereby supplied to the starting air distributor and the main starting valve, causing the slow-turning valve to open.

Simultaneously, an electrical signal is led to valve(86) via the AHEAD switch in the telegraph handle, which gives pilot signal to valves(10), (14) and (34).



This causes reversing of the starting air distributor and the rollers for the fuel pumps, if these are not already in the correct position and if the engine rotates.

Option

If slow-turning equipment is installed and the engine has been stopped for more than 30 minutes, it is recommended to activate the manual slow-turning switch on the control room console, causing valve(28) to prevent actuation of the main starting valve. The switch should remain activated until the engine has turned at least one revolution, after which the normal start procedure continues, i.e. the main starting valve opens.

When the engine has reached the start level r/min by means of air, the regulating handle is to be moved to the required position in the graduated range of regulation, In this position, both the starting switch and the stop switch in the control handle are deactuated, and signals to following components are released.

In Stop Line

Valve(38) and, consequently, pilot signal to valves(25) and (117)

Thereby activation of the starting air distributor is cut off and the puncture valve is vented, allowing high-pressure fuel oil to reach the fuel valves.

In Starting Line

Valve(33) via valve(90), which cuts off pilot signal to valve(26) to cut off air supply to starting air distributor and valve(27) to close main starting valve, both delayed about 1 second by valve(32).

Then the starting air supply to the cylinders is cut off, and the engine will run on fuel. Thereafter the potentiometer(62) controls the speed-setting signal to the governor.



In Reversing Line

Valve(10) and (14) delayed 6 seconds by timing function of the regulating handle.

Repeated Start

In the event of failure to start, i.e if the engine stops after the starting sequence has finished, it is possible to increase the governor output at a new start attempt. This is to be done by activating switch(79) for cancelling of limiter in governor on the control room console during the start sequence at a repeated start, as described above.

Reversing to and Start ASTERN Direction

When start ASTERN is ordered from the bridge, the telegraph handle is to be moved to the field (in the ASTERN range) corresponding to the order.

The regulating handle is to be moved into stop position, and when the engine r/min has fallen to the reversing level, the regulating handle is to be moved to the start position, Hereby, an electrical signal is given to valve(90) as described in section 'Start in AHEAD Direction'.

Simultaneously, an electrical signal is given, via the ASTERN switch in the telegraph handle, to valve(88), which gives pilot signal to valves (11) and (15). This causes reversing of the starting air distributor and the fuel pump rollers.

B. BRIDGE CONTROL

Switch(80) is to be manually changed over from control-room to brige control, after which control is carried out only by means of the telegraph handle on the bridge.
(not shown in the diagram)

The necessary functions such as pre-set speed-setting, changing to fuel at start level r/min (if slow-turning has been ordered), and cancelling of limiter in the governor at repeated start are built in eletronically in the brige control system. The conversion into pneumatic signals is effected by means of solenoid valves(84),(86),



(88) and (90) for STOP, AHEAD, ASTERN and START, respectively.

The procedure outside the manoeuvring console takes place as described in section A 'Control from control- room'.

C. MANUAL CONTROL FROM THE ENGINE-SIDE CONSOLE

In the event of breakdown of the normal pneumatic manoeuvring system, the governor or its electronics, the engine can be operated from the engine-side manoeuvring console

Change-over from REMOTE to MANUAL is carried out by turning the impact handwheel, P, anticlockwise. Now the governor is disconnected from the fuel pumps. and the regulating handwheel on the engine-side console is connected to them. Furthermore, valve(100) has to be changed from REMOTE to MANUAL. Before changing over this valve, it has to be checked that valve(105) is in the required position.

Start is carried out by moving the regulating handwheel to START Position, and pushing start valve(101) down. When the starting level r/min has been reached, the start valve is released and the engine will running on fuel. Regulating the PPM up and down is carried out by turning the regulating handwheel.

The engine is stopped by actuating valve(102), which actuates the puncture valve on each fuel pump.

Reversing is carried out by operating valve(105), which reverses the rollers for the fuel pumps and the starting air distributor. Reversing of the rollers is only possible when STOP is ordered, and reversing of the starting air distributor only if it is not actuated.

Pneumatic safety devices :

K. SAFETY SYSTEM

L. PROTECTION ARRANGEMENTS FOR FUEL OIL HIGH-PRESSURE PIPES



K. SAFETY SYSTEM

The system is separately supplied with air via valve(16),and is controlled by the safety system(with separate power supply). In the event of shut-down, the safety system actuates valve(127). An air signal is than led to the puncture valve on each fuel pump, after which the engine stop.

The system is connected during all modes of enging control.

L. PROTECTION ARRANGEMENTS FOR FUEL OIL HIGH-PRESSURE PIPES(OPTION)

(Arrangements for each fuel pump)

If a leakage from the high-pressure pipes occurs, the oil is led to diaphragm(131) and, via the orifice and valve(133), to the drain. If the amount of oil increases to more than it is possible to lead through the orifice, valve(130)will be actuated, whereby the roller guide is lifted clear of the cam, and the oil supply from the pump concerned is stopped.



2. LIST OF PNEUMATIC COMPONENTS(I)

Pos. 1 : Ball valve

For manual cutting– off of control air supply.

Pos. 2 : Pressure transmitter

For alarm if control air supply pressure is too low.

Alarm point 5.5 bar

Pos. 3 : Ball valve

For manual cutting–off of air exhaust valve.

Pos. 4 : Pressure switch

For alarm if control air pressure is not vented during FINISHED WITH ENGINE.

Alarm point 0.5 bar

Pos. 6 : Pressure gauge

Indicates control air supply pressure.

Pos. 7 : Magnet switch

Activated when reversing cylinder(13) is in AHEAD position.

Pos. 8 : Magnet switch

Activated when reversing cylinder(13) is in ASTERN position.

Pos. 9 : Ball valve

For manual blocking of air supply to air cylinder(13).

Pos.10 : Two–position , three–way valve

Leads air to reversing cylinder(13) for reversing to AHEAD position

Pos.10 : Two–position , three–way valve

Leads air to reversing cylinder(13) for reversing to ASTERN position



Pos. 13 : Air cylinder

Reverses roller for the fuel pump to AHEAD and ASTERN, respectively.

Pos. 14 : Two-position, Three-way valve

Activates starting air distributor in AHEAD direction.

Pos. 15 : Two position, three-way valve

Activates starting air distributor in ASTERN direction.

Pos. 16 : Ball valve

For manual cutting-off of safety air supply.

Pos. 17 : Pressure switch

For alarm if safety air supply pressure is too low.

Alarm point 5.5 bar

Pos. 18 : Pressure switch/sensor

For alarm if safety air pressure is not vented during FINISHED WITH ENGINE

Alarm point 0.5bar

Pos. 19 : Pressure gauge

Indicates safety air supply pressure.

Pos. 20 : Air receive 60L

Reduces time lags in manoeuvring system.

Pos. 21 : Ball valve

For draining water from manoeuvring system.

Pos. 20 : Air receive 60L

Pos. 23 : Double non-return valve

Pos. 25 : Two-position, three-way valve

Controls puncture valves on fuel pumps.



Pos. 26 : Two-position, three-way valve

Prevents air inlet to starting air distributor in the event of leaking main starting Valve
Allows air to pass during start.

Pos. 27 : Two-position, five-way valve

Controls the main starting valve and if installed, slow-turning valve
(open or closed).

Pos. 28 : Two-position, three-way solenoid valve

Prevents supply air from opening main starting valve during slow-turning.

Pos. 29 : Double non-return valve

Pos. 30 : Double non-return valve

Pos. 31 : Double non-return valve

Pos. 32 : Throttle non-return valve

Delays venting of pilot signal to valves(26) and(27).

The delay is adjustable. The purpose of this delay is to ensure that those cylinders which are in the "starting air" position when changing to fuel oil will get their normal starting air supply. This ensures a good start of the engine.

Delay about 1 second.

Pos. 33 : Two-position, three-way valve

Leads pilot signal to valves(26) and (27)when turning gear is disengaged
and pilot signal is given during start.

Pos. 38 : Two-position,three-way valve

Leads pilot signal to valve(25) and valve (117) when STOP signal is received.

Pos.40 : Two-position, three-way solenoid valve

Change pilot signal to VIT-actuator(52) during STOP and ASTERN running.



Pos.41 : Switch

Gives signal to manoeuvring system when the change-over mechanism is in remote(bridge or control room)control mode.

Pos. 42 : Electrical governor actuator

Controls the amount of fuel injected.

Pos. 45 : Reducing valve

Leads pre-set control pressure to VIT-ACTUATOR(52) during AHEAD running and MANUAL control mode.

Pos. 48 : Switch

Resets shut-down function(in safety panel)when regulating handle is in STOP position during manual control mode.

Pos. 51 : Pressure gauge

Indicates control pressure to VIT-actuator(52).

Pos. 52 : VIT-Actuator

Adjusts injection lead in accordance with mep.

Pos. 53 : I/P Converter

Controls pilot pressure to VIT-actuator(52) during remote control mode.

Pos. 54 : Two-position, three-way valve

Changes signal to VIT-actuator(52) from remote control mode to manual control mode, respectively

Pos. 59 : Reducing valve

Leads pre-set control pressure to VIT-actuator(52) during STOP and ASTERN running.

Pos. 60 : Switch

Gives shut-down signal to governor when regulating handle is in STOP position (Switch S2 in control handle)



Pos. 61 : Switch

Resets shut-down function (in safety panel) when regulating handle is in STOP position. (Switch S1 in control handle)

Pos. 62 : Potentiometer

Regulates the speed-setting signal to governor during manual control from control handle.

Pos. 63 : Switch

The switch is activated when control handle is in STOP, START or any position in between and provides STOP signal to valve(84) (switch S3 in the control handle).

Pos. 64 : Switch

The switch is activated when control handle is in START position and provides START signal to valve(90) (switch S4 in the control handle).

Pos. 78 : Switch

Actuates slow-turning valve (28) if activated during control-room control.

Pos. 79 : Switch

Cancels limitation in governor if activated during control-room control.

Pos. 80 : Switch

Gives information to bridge control system, governor and safety system when engine is on control-room control or bridge control.

Pos. 83 : Pressure switch

Gives signal to manoeuvring system when engine is on remote control.

Pos. 84 : Two-position, three-way solenoid Valve

Gives pilot signal to Valve(38) when STOP is ordered from bridge or control room.



Pos. 86 : Two-position, three-way solenoid valve

Gives pilot signal to valve(10) and(14) when AHEAD is ordered from bridge or control room.

Pos. 88 : Two-position, three-way solenoid valve

Gives pilot signal to valve(11) and(15) when ASTERN is ordered from bridge or control room.

Pos. 90 : Two-position, three-way solenoid valve

Leads pilot signal to valve(33) when START is ordered from bridge or control room.

Pos. 100 : Two-position, five-way valve

Leads air to manual control system or to remote control systems.

Pos. 101 : Two-position, three-way valve, hand operated

Leads pilot signal to valves(25),(33),(102) and (117) and supplies air to valve(105) when actuated during manual control. Gives combined START and STOP signal when actuated during manual control.

Pos. 102 : Two-position, three-way valve, hand operated

Leads pilot signal to valves(25)and(117), and supplies air to valve(105), when actrated during control.

Pos. 103 : Double non-return valve

Pos. 104 : Throttle non-return valve

Keeps AHEAD or ASTERN signal actrated for 6 seconds after START during manual control.

Pos. 105 : Two-position, five-way valve, hand operated

Leads pilot signal to valves(10)and(11), corresponding to order (AHEAD or ASTERN), when reversing during manual control.



Pos. 106 : Pressure switch

Disconnects reset function and cancelling functions in remote control systems from safety system during manual control.

Pos. 107 : Pressure switch

Gives signal to manoeuvring system when engine is on manual control.

Pos. 114 : Switch

Gives signal to lamp on manoeuvring console when shut-off valve(118) is in service position.

Pos. 115 : Two-position, three-way valve

Blocks start possibility when turning gear is engaged.

Pos. 116 : Switch

Gives indication on bridge if turning gear is engaged.

Pos. 117 : Two-position, three-way valve

Controls air supply to valves(14) and(15) when stop signal is given.

Pos. 118 : Shut-off valve

For manual cutting-off of control air to starting air distributor.

Pos. 119 : Switch

Gives indication on bridge when starting air distributor is blocked.

Pos. 120 : Switch

Gives signal to lamps on manoeuvring console to indicate whether main starting valve is in SERVICE position.

Pos. 121 : Switch

Gives signal to lamps on manoeuvring console to indicate whether main starting valve is in SERVICE position or BLOCKED position, and gives signal to telegraph system/communication system when main starting valve is blocked.



Pos. 125 : Air receiver 20 L

Reduces time lags in safety system.

Pos. 126 : Ball Valve

For draining water from the safety system.

Pos. 127 : Two-position, three-way solenoid valve

Actuates puncture valve on fuel pumps when shut-down signal is given.
(from safety system)

Pos. 128 : Double non-return valve

Pos. 129 : Pressure switch

For alarm when lifting gear device for fuel pumps is activated.

Pos. 130 : Two-position, five-way valve

Actuates the lifting gear device in the event of leakage from high-pressure pipes.

Pos. 131 : Diaphragm

Controls valve (130).

Pos. 132 : Non-return valve

Drains diaphragm(131) if pressure exceeds 1 bar.

Pos. 137 : Non-return valve

Prevents back-flow of air from exhaust valve.

Pos. 138 : Pressure switch/sensor

For alarm if pressure is too low, Set point 5.5 bar.

Pos. 147 : Double non-return valve

Pos. 148 : Three-position, four-way valve

For manual actuation and re-setting of the lifting gear device.



Pos. 149 : Air cylinder (lifting gear device)

Lifts fuel pump roller guide off the cam.

Pos. 150 : Reduction unit

Reduces starting air pressure to 7 bar.

Pos. 151 : Pressure switch

- Cancels tacho failure alarms from safety system when STOP signal is active
- Alarm cut-out during STOP
- Activates solenoid valve(190) during STOP.

Pos. 167 : Pressure gauge

Pos. 176 : Switch

The switch is activated when telegraph handle is in AHEAD position (AHEAD signal is given to valve(86) via manoeuring handle during the start and stabilising period).

Pos. 177 : Switch

The switch is activated when telegraph handle is in ASTERN position (ASTERN signal is given to valve(88) via manoeuring handle during the start and stabilising period).

Pos. 179 : Ball valve

For manual blocking of the air supply to air cylinder(13).

Pos. 180 : Safety valve

Open at 8 bar

Pos. 181 : Throttle non-return valve(non-adjustable)

Delays venting of the air cylinder(13) when reversing ASTERN.

Pos. 182 : Safety valve

Open at 8 bar



Pos. 183 : Throttle non-return valve (non-adjustable)

Delays venting of the air cylinder(13) when reversing AHEAD.

Pos. 185 : Two-position, three-way valve

Leads air to reversing cylinder(13) for reversing to ASTERN position.

Pos. 186 : Two-position, three-way valve

Leads air to reversing cylinder(13) for reversing to AHEAD position.

Pos. 187 : Air receiver 60L

Reduces time lags in manoeuvring system.

Pos. 188 : Drain valve

For draining water from manoeuvring system.

Pos. 190 : Two-position, three-way solenoid valve

Disconnects sealing air supply during STOP.

Pos. 191 : DOUBLE NON RETURN VALVE

Pos. 201 : Non-return valve

Pos. 202 : Pressure gauge

Pos. 251 : 3Way test valve

Pos. 252 : Pressure gauge valve

Pos253 : Gauge valve

Pos. 301 : Throttle non return valve

Pos. 320 : Ball valve



3. LIST OF PNEUMATIC COMPONENTS(II)

				5S70MC	1/5
POS.NO.	MAKER PC.NO.	DESCRIPTION	Q'TY	REMARKS	PAGE
		MANOEUVRING HANDLE DIAGRAM	1SET	SENACO	23
		PNEUMATIC DIAGRAM	1SET	SENACO	24
		PRESSURE REDUCING UNIT			25
		AIR INLET UNIT	1SET	SENACO	26
1		BALL VALVE 1	(1)	ND 12	27
3		BALL VALVE 2	(1)	ND 12	27
16		BALL VALVE 3	(1)	ND 12	27
2, 17, 138		PRESSURE TRANSMITTER	(2)	TRAFAG(J)	28
4, 18		PRESSURE SWITCH	(3)	TRAFAG(J)	29
6, 19, 167		PRESSURE GAUGE	(3)	TEMPRESS 63M, (S)	30
251		3-WAY TEST VALVE	(3)	40D	31
		AIR RECEIVER FOR SAFETY AIR	1SET	SENACO	32
125		AIR RECEIVER	(1)	KUMKANG 20L (S)	32
21, 126		DRAIN VALVE WITH BRACKET	1SET	SENACO	33



				5S70MC	2/5
POS.NO.	MAKER PC.NO.	DESCRIPTION	Q'TY	REMARKS	PAGE
		SHUT DOWN SOLENOID VALVE UNIT	1SET	SENACO	34
127	372 357 222 0	3/2 WAY SOL. VALVE	(1)	REXROTH(J)	35
		TERMINAL PLATE	1SET	SENACO	36
		REVERSING VALVE UNIT	1SET	SENACO	37
10,11	371 076 030 0	3/2 WAY VALVE	(2)	REXROTH(J)	38
		AIR RECEIVER FOR CONTROL AIR	2SETS	SENACO	39
20,22		AIR RECEIVER	(2)	KUMKANG 60L (S)	39
60-64		MANEUVEROMG HANDLE(5KΩ TYPE)	1SET	SENACO	40
		ASSY'S OF NON RETURN VALVE	2SET	SENACO	41
29,30	534 017 000 0	DOUBLE NON-RETRUN VALVE	(2)	REXROTH(J)	41
		MAIN STARTING VALVE UNIT	1SET	SENACO	42
320		BALL VALVE	(1)	ND 12	27
27	371 075 000 0	5/2WAY VALVE	(1)	REXROTH(J)	43
28	372 351 222 0	3/2WAY SOLE. VALVE	(1)	REXROTH(J)	44



				5S70MC	3/5
POS.NO.	MAKER PC.NO.	DESCRIPTION	Q'TY	REMARKS	PAGE
		VALVE UNIT FOR AHEAD/ASTERN UNIT	1SET	SENACO	45
14, 15, 117	565 231 000 0	3/2WAY VALVE	(3)	REXROTH(J)	46
		UNIT FOR SEALING AIR CUT-OFF	1SET	SENACO	47
190	372 354 222 0	3/2WAY SOLENOID VALVE	(1)	REXROTH(J)	48
		SOLENOID VALVE BOX	1SET	SENACO	49
84,86 88,90	372 352 222 0	3/2WAY SOLENOID VALVE	(4)	REXROTH(J)	50
83	9B0 2077 750 02 15 58	PRESSURE SWITCH	(1)	TRAFAG(J)	51
		NON RETURN VALVE FOR STOP LINE	5SET	SENACO	52
128	434 208 000 0	DOUBLE NON RETURN VALVE	(5)	SENACO	52
		T/C SEALING AIR UNIT	1SET	SENACO	53
253		GAUGE VALVE	(1)		54
202		PRESSURE GAUGE	(1)	TEMPRESS(S)	55
201		NON-RETURN VALVE	(1)	SERTO(S)	56
		TAG PLATE	1SET		57



LIST OF PNEUMATIC COMPONENTS

(4/5)

(70MC,Star,Reversible,Alpha)

POS.NO.	MAKER PC.NO.	DESCRIPTION	Q'TY	REMARKS	DWG.NO.	PAGE
		EMERGENCY CONSOLE				
48	SZL-WL-E	LIMIT SWITCH	1	LG	13-014210	1A
41	SZL-WL-I	LIMIT SWITCH	1	LG	13-014209	2A
100, 105	363 129 000 0	5/2 WAY MANUAL VALVE	2	REXROTH	13-002581	3A
101	563 446 910 0	3/2 WAY MANUAL VALVE	1	REXROTH	13-002577	4A
102	563 446 912 0	3/2 WAY MANUAL VALVE	1	REXROTH	13-002579	5A
104, 301 49, 32	534 108 000 0	NON-RETURN VALVE	4	REXROTH	14-001744	6A
103, 191 31, 23	534 017 000 0	NON-RETURN VALVE	4	REXROTH	14-000100	7A
53	361 071 050 0 891 990 291 4 892 030 670 2	REGULATING VALVE	1	REXROTH	13-002527	8A
40	372 353 222 0 894 101 610 2	3/2 WAY SOLENOID VALVE	1	REXROTH	13-002586	9A
51		PRESSURE GAUGE	1	0-6K	13-002568	10A
59	535 022 201 0	REGULATING VALVE	1	REXROTH	14-000102	11A
25	565 201 000 565 442 000	3/2 WAY VALVE	1	REXROTH	13-000295	12A
33	371 020 000 0	3/2 WAY VALVE	1	REXROTH	13-000294	13A
106, 107	0820167	PRESSURE SWITCH	2	0.2 - 12bar SET 2bar	13-002650	14A



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(5/5)

(70MC, Star, Reversible, Alpha)

POS.NO.	MAKER PC.NO.	DESCRIPTION	Q'TY	REMARKS	DWG.NO.	PAGE
		STARTING AIR DISTRIBUTOR				
26	2x567 231 000 0 568 442 000 0	3/2 WAY VALVE	1	REXROTH	13-003643	15A
		ROLLER GUIDE REVERSING				
13		AIR CYLINDER	N	HAEWON	13-001006	16A
7, 8	894 041 060 2 322 064 356 2 894 101 612 2	MAGNETIC SWITCH	2N	REXROTH	14-001391	17A
180, 182		SAFETY VALVE	2N	KECO	14-000460	18A
181, 183		NON-RETURN VLAVE	2N	KECO	14-000503	19A
9, 179		BALL VALVE	2N		14-000505	20A
137		NON-RETURN VALVE	N		EN206A 10, 105	21A

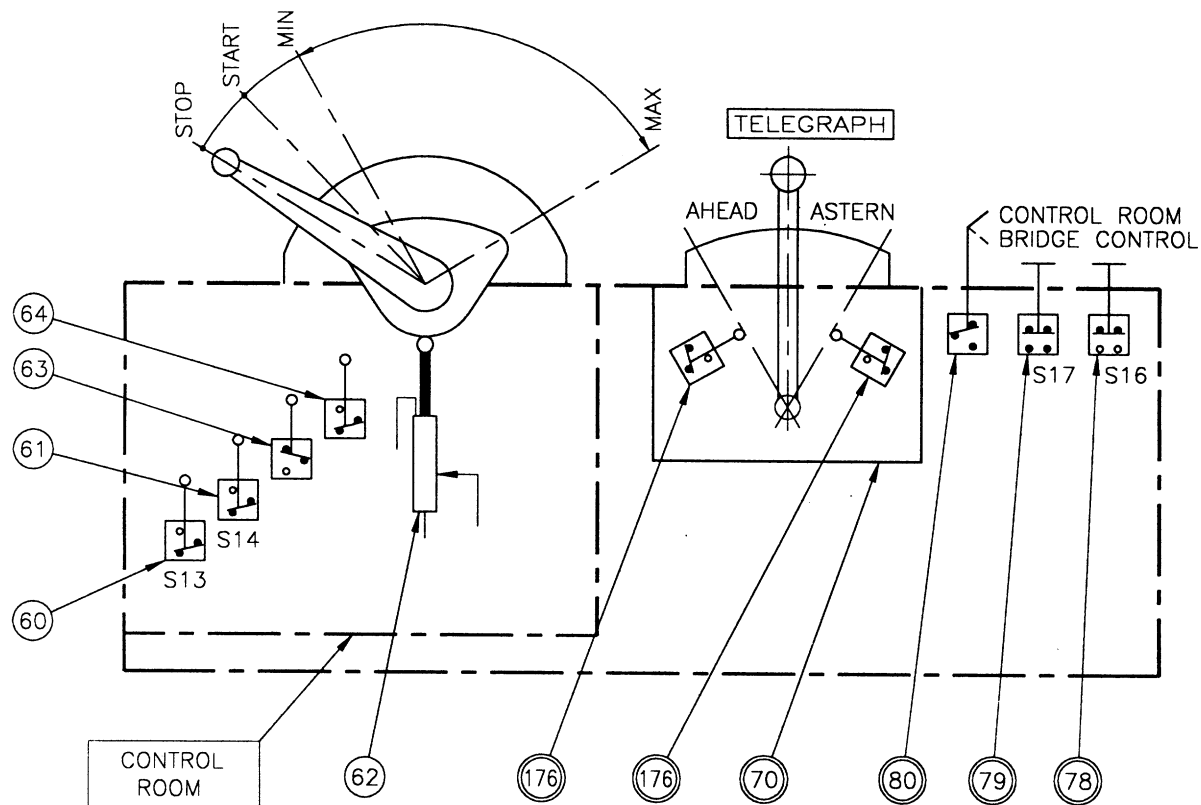
(* N = The number of cylinders)



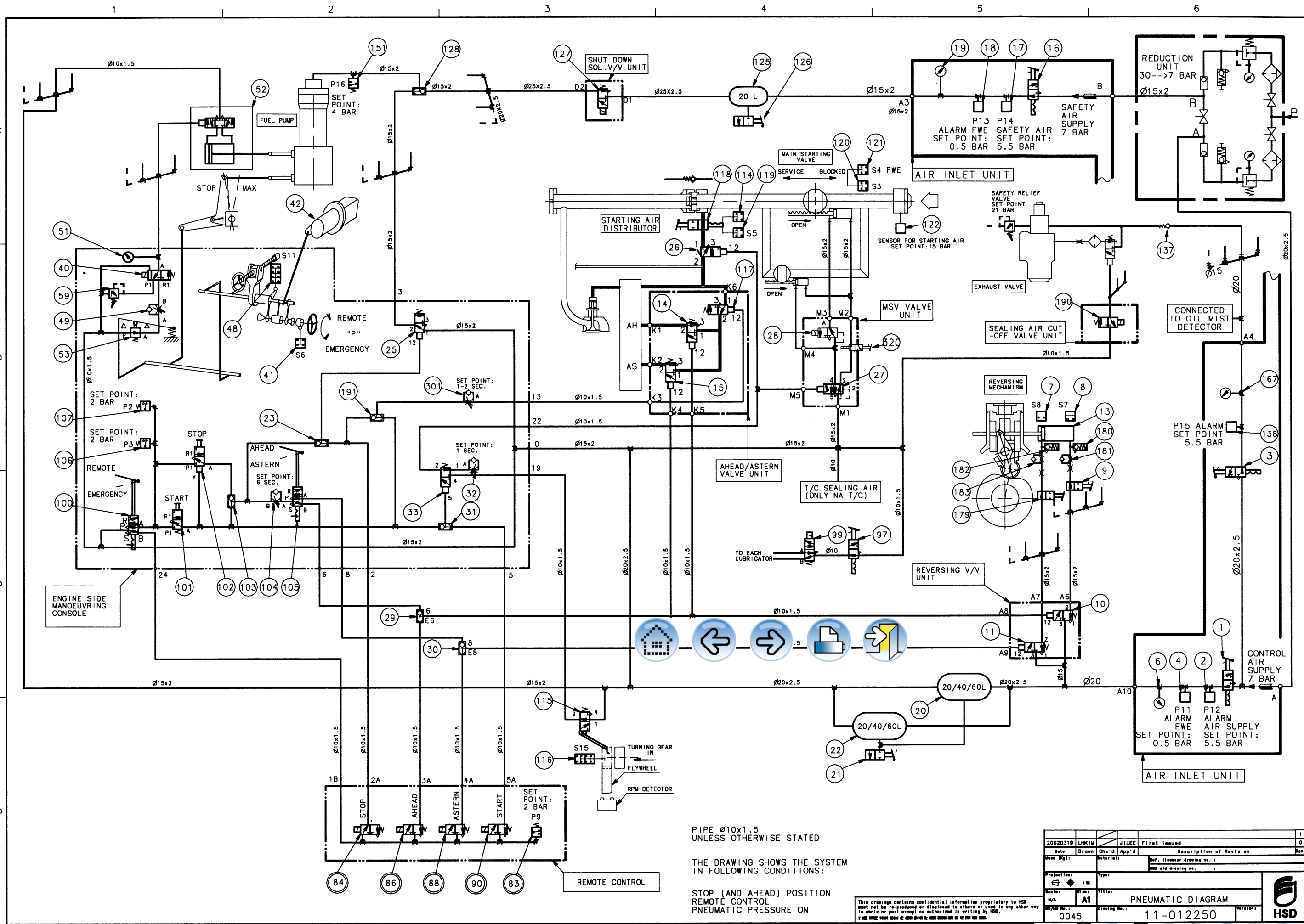
4. SPARE PART LIST

HSD B&W 5S70MC					1/1	
M/H PNEUMATATIC CONTROL SYSTEM					DATE	2003.03.26
SPEC. NO.		BOX.NO.			SHIP NO.	UNIQ 5258
NO.	DESCRIPTION	PART NO.	Q'TY		REMARK	REF. NO.
			WORKING	SPARE		
1	REPAIR KIT FOR 3/2 WAY VALVE	371 076 000 2	2	1		10,11
2	REPAIR KIT FOR 3/2 WAY VALVE	371 020 002 2	2	1		33,38
3	REPAIR KIT FOR 3/2 WAY SOLENOID VALVE	372 431 000 2	1	1		127
4	REPAIR KIT FOR 3/2 WAY SOLENOID VALVE	372 351 000 0	1	1		28
5	REPAIR KIT FOR 3/2 WAY SOLENOID VALVE	563 101 000 2	6	1		83-91 190,40
6	SPARE COIL	542 050 702 2	1	1		28, 127, 190, 40
7	REPAIR KIT FOR 5/2 WAY VALVE	371 075 000 2	1	1		27
8	DOUBLE CHECK VALVE	534 017 000 0	5	1		23, 29, 30, 31, 103
9	REPAIR KIT FOR THROTTLE NON RETURN VALVE	534 106 000 2	2	1		32
10	PEPAIR KIT FOR 3/2WAY VALVE	MM04904 264 18	1	1		25
11	REPAIR KIT FOR NON RETURN VALVE	899 504 482 4	7	1		128
12	PRESSURE GAUGE	63M10-1	3	1		6, 19, 167
13	LIMIT SWITCH	Z-15GQ	2	1		60
14	LIMIT SWITCH	Z-15GQ22	2	1		61
15	SPARE PARTS BOX		1	-		PAINTING:





	03.03.06	FIRST ISSUE	J.H.SON	Y.M.ANN	K.S.LIM
NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED
SENACO SENACO ELECTRO-PNEUTECH.CO.					
TYPE	SIMILAR LICENCE DRAWING NO.				
TITLE	MANOEUVRING HANDLE DIAGRAM			PROJECT	SCALE
DRAWN	CHECKED	APPROVED	MS/MG NO.	DRAWING NO.	
J.H.SOI	IN			3	



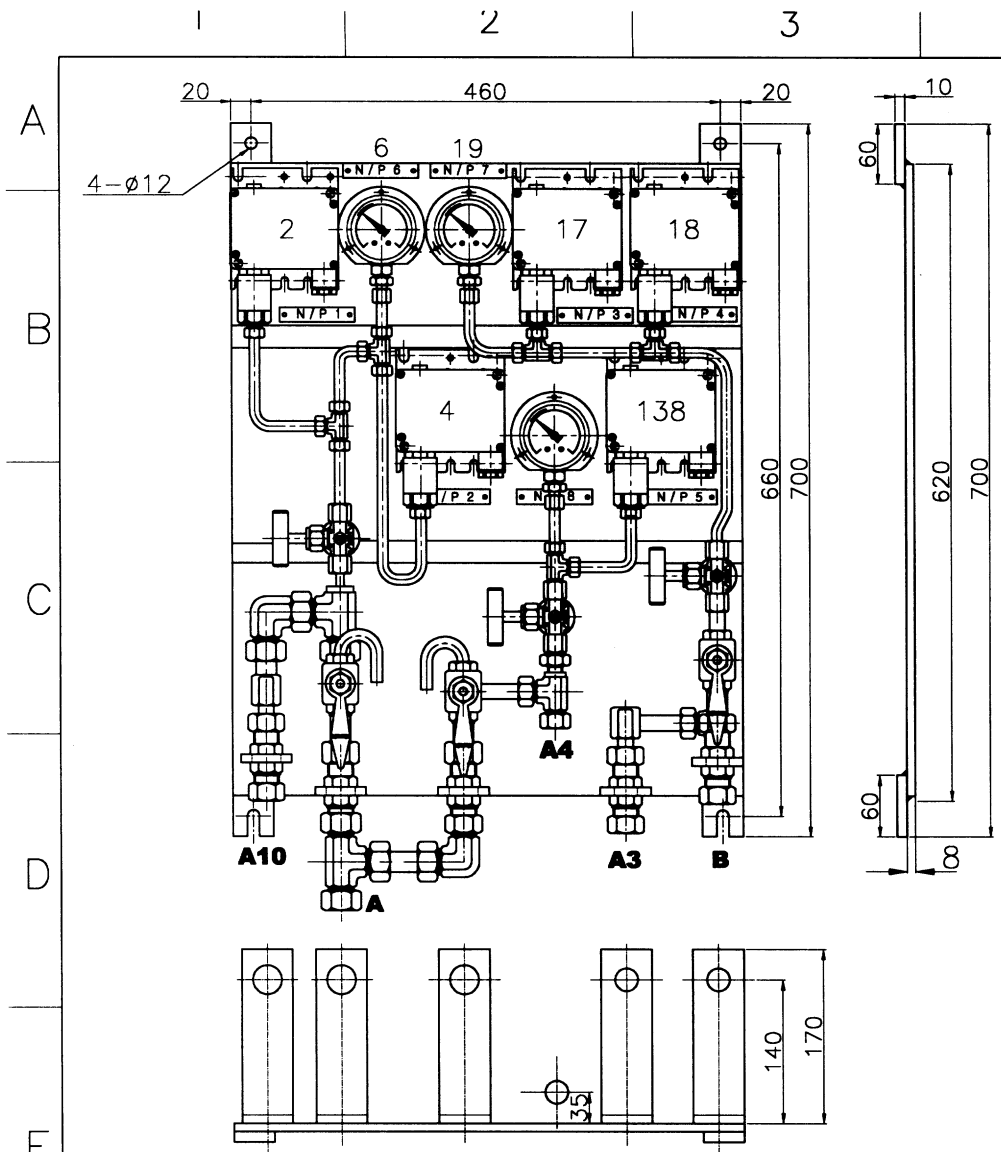
PIPE Ø10x1.5
UNLESS OTHERWISE STATED

THE DRAWING SHOWS THE SYSTEM
IN FOLLOWING CONDITIONS:

STOP (AND AHEAD) POSITION
REMOTE CONTROL
PNEUMATIC PRESSURE ON

This drawing contains confidential information proprietary to HSD
must not be re-produced or disclosed to others or used in any other way
in whole or part except as authorized in writing by HSD.
+ HSD cannot assume liability for errors or omissions on this drawing.

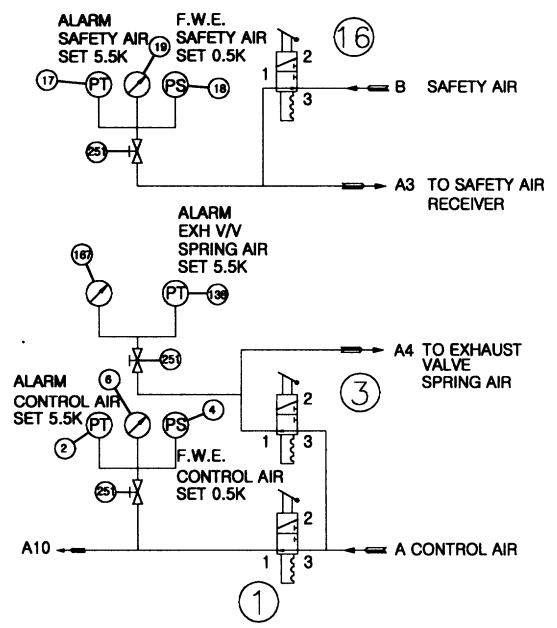
20020319	LSK/IM	JILEE	First issued	1
Date	Drawn	Chk'd	App'd	Rev
Description of Revision				
Material:				
Ref. Issued drawing no.:				
HSD old drawing no.:				
Projection:	Type:			
Scale:	Size:			
N/A	A1	PNEUMATIC DIAGRAM		
0045	Drawing No.:	11-012250		
HSD				



PIPING SIZE

- * PORT NO. : A,A4,A10 ----- 20 O.D CuT
- * PORT NO. : B,A3 ----- 15 O.D CuT

NO	DESCRIPTION	SIZE	MAT'L	Q'TY	WT(KG)	REMARK
----	-------------	------	-------	------	--------	--------



POS.NO.	N/P NO.	DESCRIPTION	MAKER	RANGE	REMARK
2	N/P 1	CONTROL AIR (ALARM)	TRAFAG	0 ~ 10	N10.0
4	N/P 2	CONTROL AIR (F.W.E.)	TRAFAG	0 ~ 4	S 4.0
17	N/P 3	SAFETY AIR (ALARM)	TRAFAG	0 ~ 10	N10.0
18	N/P 4	SAFETY AIR (F.W.E.)	TRAFAG	0 ~ 4	S 4.0
138	N/P 5	EXH. V/V SPRING AIR (ALARM)	TRAFAG	1 ~ 10	S 10
6	N/P 6	PRESS.GAUGE (CONTROL AIR)	TEMPRESS	0 ~ 16	63 M10-1
19	N/P 7	PRESS.GAUGE (SAFETY AIR)	TEMPRESS	0 ~ 16	63 M10-1
167	N/P 8	PRESS.GAUGE (SPRING AIR)	TEMPRESS	0 ~ 16	63 M10-1

NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED
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SENACO Hydro-Pneumatics Division

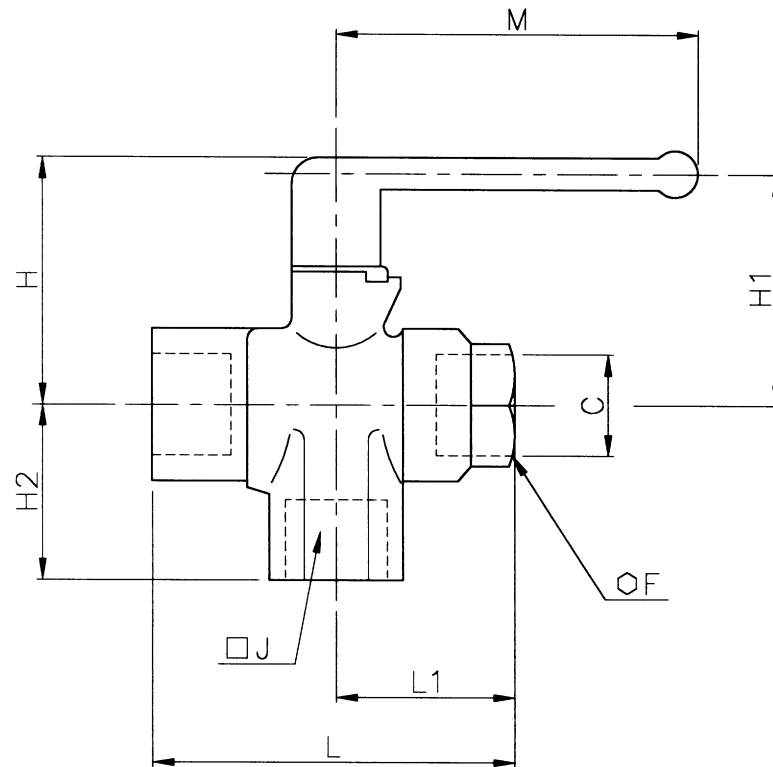
TYPE	SIMILAR LICENCE DRAWING NO.	0459267-2
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TITLE	PROJECT	SCALE
AIR INLET UNIT		

DRAWN	CHECKED	APPROVED	MS/MG NO.	DRAWING NO.
W.H.KIM	Y.M.CHOI	Y.S.JIN	45	13-000380-6



NO	DESCRIPTION	SIZE	MAT'L	Q'TY	WT(Kg)	REMARK



NOTE

1. MAKER : LEGRIS
2. MAX. PRESSURE : 40 bar
3. WORKING PRESSURE : 20 bar
4. APPLICABLE FLUID : CONTROL AIR

POS. NO.	C	ND	F	H	H1	H2	J	L	L1	M
1,3 16,320	G1/2	12	27	47	44	33	29	67	34	69

1	03.01.10	DWG. REV.	J.H.SON	Y.M.ANN	K.S.LIM
0	02.12.13	FIRST ISSUE	J.H.SON	Y.M.ANN	K.S.LIM
NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED

SENACO SENACO ELECTRO-PNEUTECH.CO.

ENGINE TYPE				SIMILAR LICENCE DRAWING NO.			
TITLE 3-WAY BALL VALVE					PROJECT	SCALE	
							
DRAWN	CHECKED	APPROVED	MS/MG NO.	DRAWING NO.			
J.H.SON		N		3		0	

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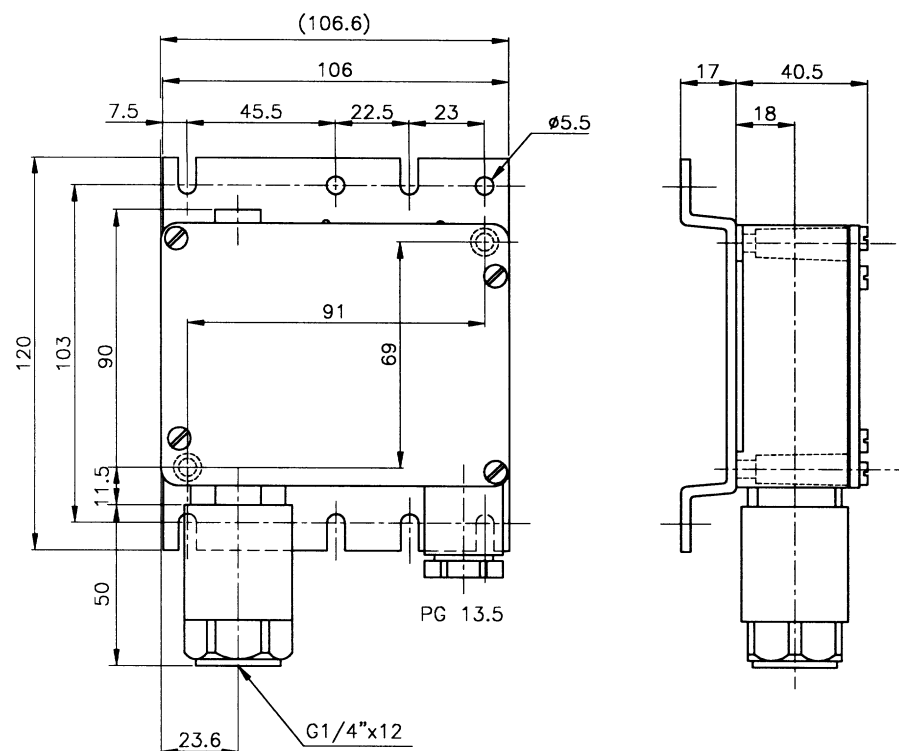
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TECHNICAL SPECIFICATION

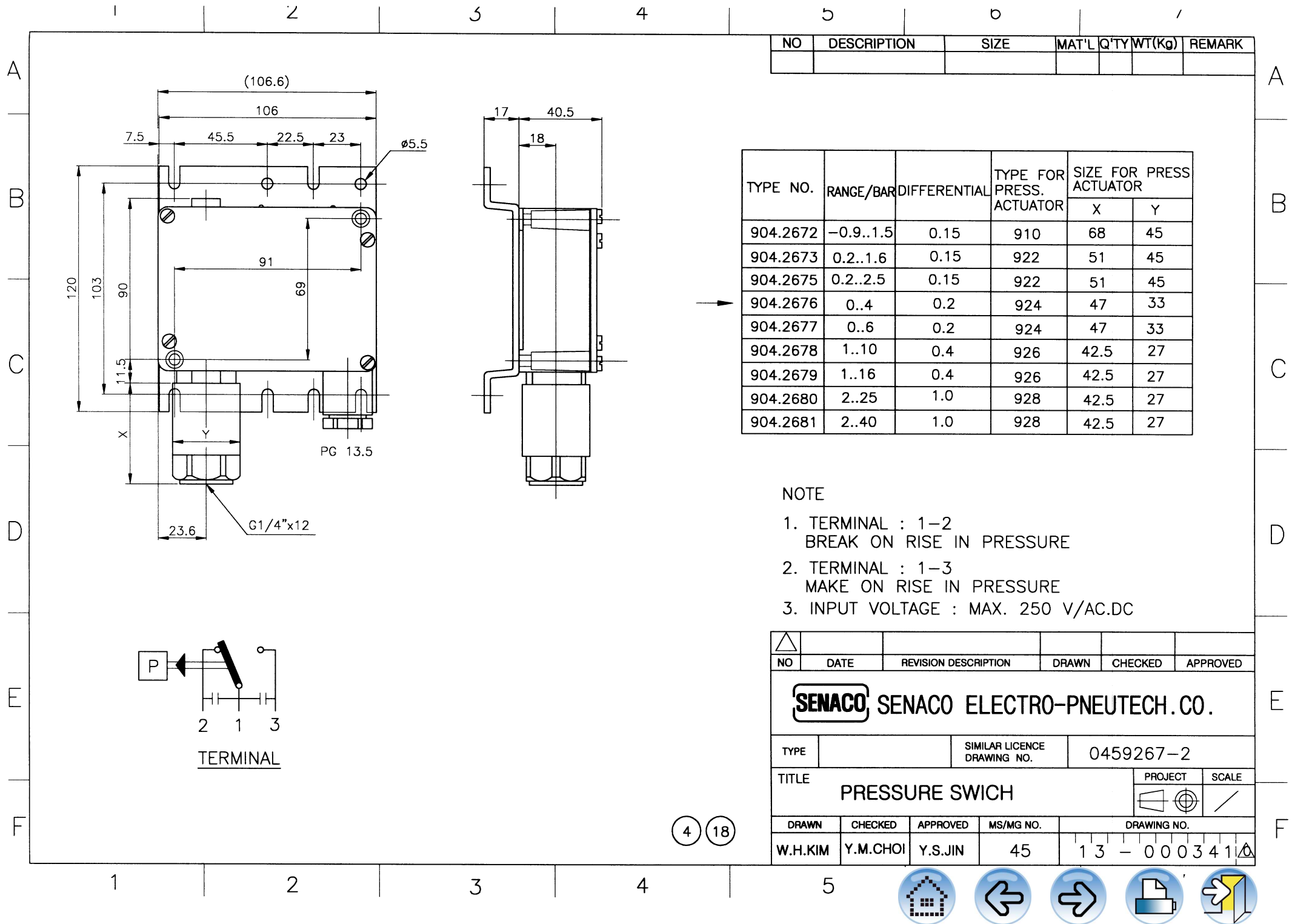
1. PRESSURE INPUT: RANGES BASED ON ATMOSPHERIC PRESSURE (SEE TABLE BELOW)
2. POWER SUPPLY: 10...36V D.C NOMINAL 24V D.C
3. PERMISSIBLE RIPPLE: $\leq 2.5V$
4. OUTPUT SIGNAL: 4-20 mA
5. RESOLUTION: INFINITE
6. THERMAL ZERO SHIFT: $\pm 0.02\%/K$ BETWEEN 0...70°C WITH RESPECT TO THE NOMINAL RANGE
7. THERMAL SPAN SHIFT: $\pm 0.02\%/K$ BETWEEN 0...70°C WITH RESPECT TO THE NOMINAL RANGE
8. NON LINEARITY : $\pm 0.5\%$ P<6BAR, 0.3% P 10BAR OF NOMINAL RANGE
9. HYSTERESIS: $\pm 0.1\%/V$ BETWEEN 10V AND 36V
10. SUPPLY VARIATION AFFECT: 0.01%/V BETWEEN 10V AND 36V
11. RESPONSE: ABOUT 5 MS
12. VOLTAGE TRANSIENTS: MAXIMUM POWER ABSORPTION 1 WS
13. HF-INTERFERENCE: THE INSTRUMENT IS PROTECTED AGAINST HF-INTERFERENCE BY-
14. SHORT CIRCUIT CURRENT: < 32 mA -VHF TRANSMITTERS
15. OPERATING TEMP. RANGE: 0...70°C
16. MEDIA TEMP. RANGE: 0...100°C
17. STORAGE TEMP. RANGE: -40...+85°C
18. HUMIDITY: 55°C AND 98% RELATIVE HUMIDITY (ACCORDING TO GL AND LLOYDS REGISTER)
19. VIBRATION: 6G FROM 1...2000HZ

RANGE IN BAR (RELATIVE PRESSURE)	MAX. OVER PRESSURE	TYPE NO.
0...1.0	3	8202.71.2210
0...1.6	6	8202.73.2210
0...2.5	6	8202.75.2210
0...4.0	15	8202.76.2210
0...6.0	15	8202.77.2210
0...10	32	8202.78.2210
0...16	32	8202.79.2210
0...25	80	8202.80.2210
0...40	80	8202.81.2210
0...60	200	8202.82.2210
0...100	200	8202.83.2210
0...160	320	8202.85.2210

② ①⑦ ①③⑧

△							
NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED		
SENACO SENACO ELECTRO-PNEUTECH.CO.							
TYPE			SIMILAR LICENCE DRAWING NO.	0459267-2			
TITLE			PROJECT		SCALE		
PRESSURE TRANSMITTER							
DRAWN	CHECKED	APPROVED	MS/MG NO.	DRAWING NO.			
W.H.KIM	Y.M.CHOI	Y.S.JIN	45	13-000340			





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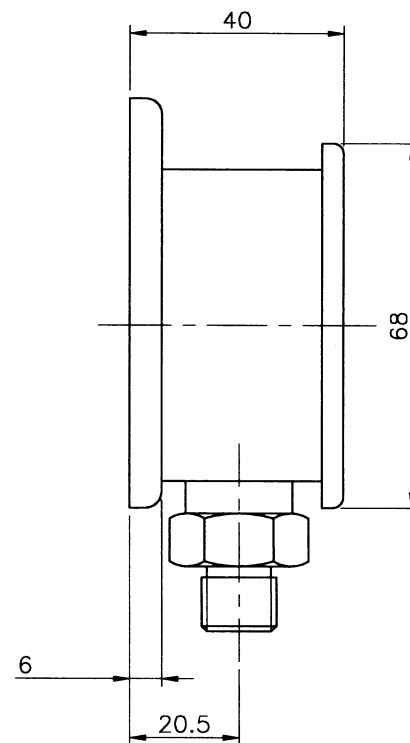
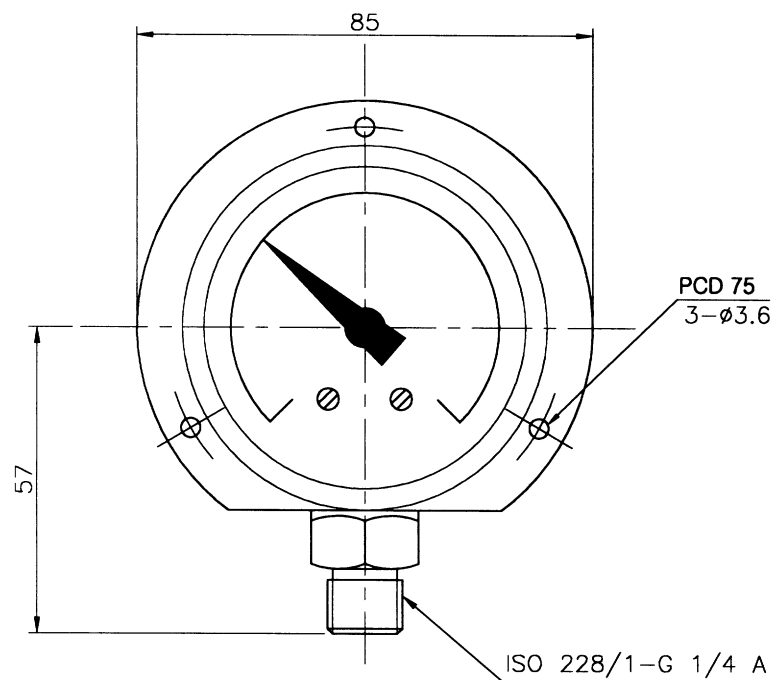
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- Make : Tempress A/S or similar
- Type : 63M10-1
Working pressure : max. 16Kg/cm²
Medium : air
Graduation : 0 ~ 16Kg/cm²
Green Mark : 6 ~ 8Kg/cm²

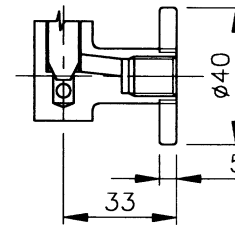
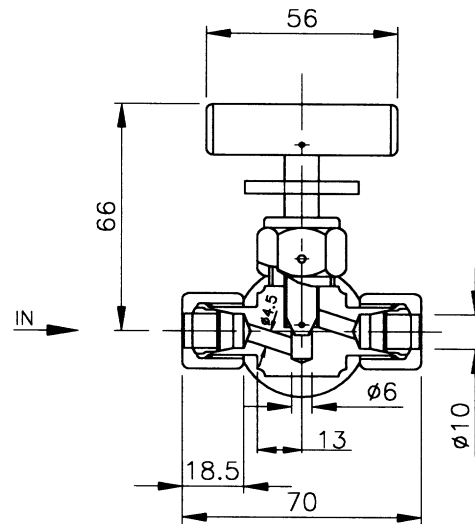
6 19 167

NO	DESCRIPTION	SIZE	MAT'L	Q'TY	WT(Kg)	REMARK

					
NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED
 SENACO ELECTRO-PNEUTECH.CO.					
TYPE	9K90MC-C	SIMILAR LICENCE DRAWING NO.			
TITLE				PROJECT	SCALE
PRESSURE GAUGE					
DRAWN	CHECKED	APPROVED	MS/MG NO.	DRAWING NO.	
Y.M.CHOI	S.H.KIM	Y.S.JIN	45	13 - 000320	



3-WAY TEST VALVE



1. MATERIAL : BRASS
2. WORKING PRESURE : 0 ~ 120 Kg/Cm²

251

NO	DESCRIPTION	SIZE	MAT'L	Q'TY	WT(Kg)	REMARK

△							
NO	DATE	REVISION DESCRIPTION		DRAWN	CHECKED	APPROVED	
 SENACO ELECTRO-PNEUTECH.CO.							
TYPE		SIMILAR LICENCE DRAWING NO.					
TITLE						PROJECT	SCALE
3-WAY TEST VALVE							
DRAWN	CHECKED	APPROVED	MS/MG NO.	DRAWING NO.			
S.J.OH	J.R.KIM	Y.H.RYU	45	14-000103-2			



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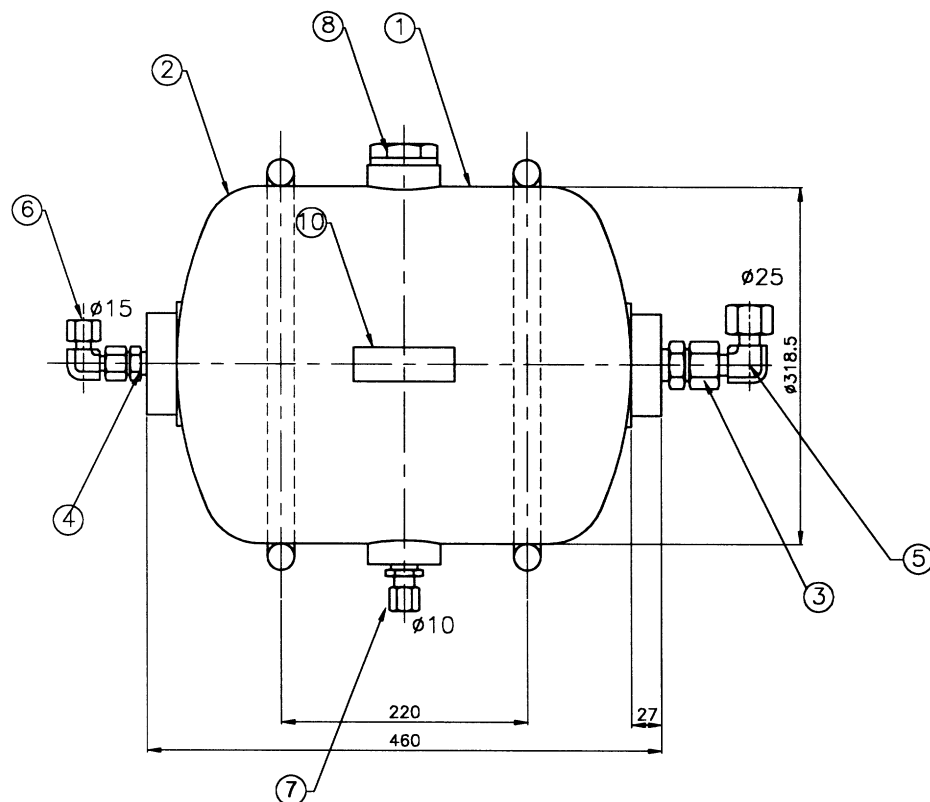
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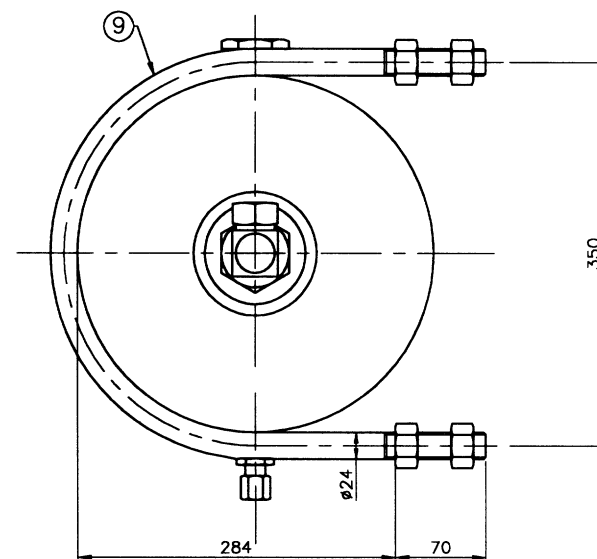
F



- Maker : Kumkang or similar
- Test press : 15Kg/cm²
- Name plate : AIR RECEIVER FOR SAFETY AIR

125

NO	DESCRIPTION	SIZE	MAT'L	Q'TY	WT(Kg)	REMARK
1	BODY	300A	STPG 38	1		
2	END CAP	SCH 20	STPG 38	2		
3	MALE CONNECTOR	25xPT3/4	BRASS	1		
4	MALE CONNECTOR	15xPT3/4	BRASS	1		
5	ADJUSTABLE ELBOW	ø25	BRASS	1		
6	ADJUSTABLE ELBOW	ø15	BRASS	1		
7	MALE CONNECTOR	ø10xPT1/2	S45C	1		
8	PLUG	PT 1/2	S45C	1		
9	U-BOLT	300A	8.8	2		
10	NAME PLATE		BRASS	1		
11						



1	2003.03.24	PLATE DELETE	M.S.JUNG	Y.M.ANN	K.S.LIM
NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED
SENACO SENACO ELECTRO-PNEUTECH.CO.					
TYPE	20L	SIMILAR LICENCE DRAWING NO.			
TITLE				PROJECT	SCALE
AIR RECEIVER FOR SAFETY AIR				□	□
DRAWN	CHECKED	APPROVED	MS/MG NO.	DRAWING NO.	
M.S.JUNG	Y.M.ANN	K.S.LIM		13 - 000309	



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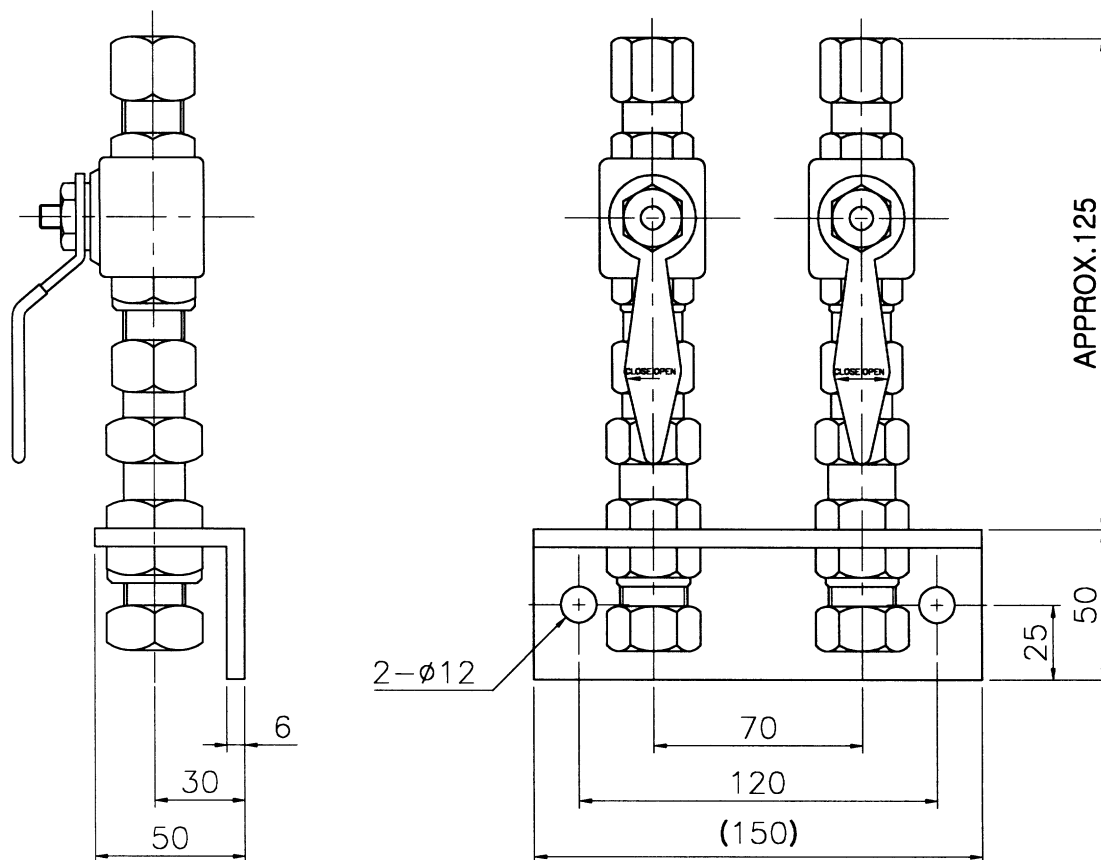
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NO	DESCRIPTION	SIZE	MAT'L	Q'TY	WT(Kg)	REMARK



APPROX. 125

2-Ø12

70

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(150)

25

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NOTE

1. POS.NO.: 21, 126
2. PORT SIZE : Ø10

NAME PLATE

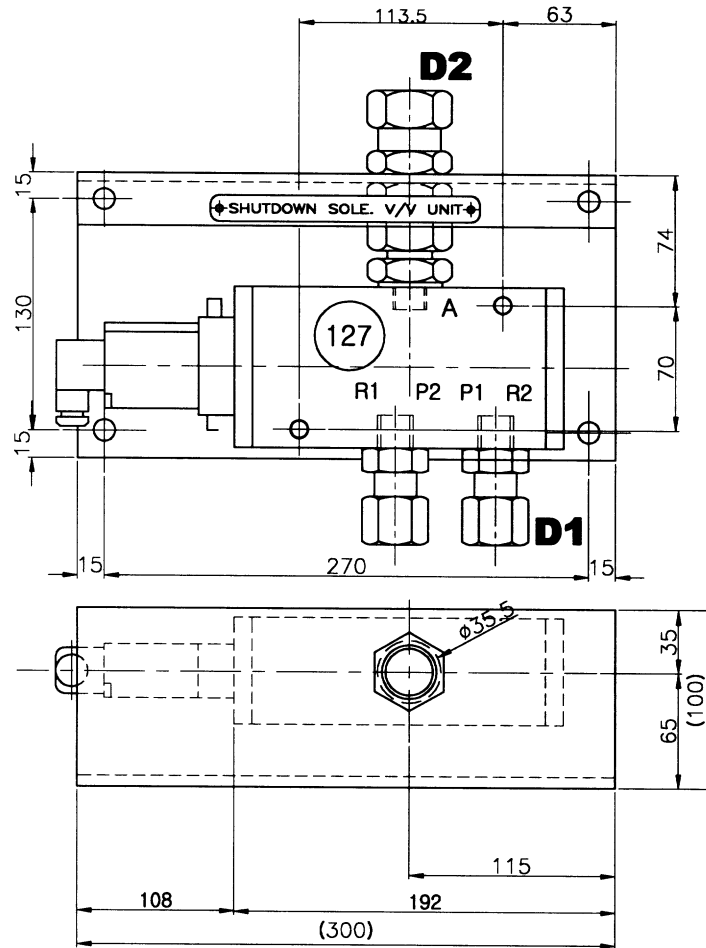
1. DRAIN V/V FOR CONTROL AIR RECEIVER
2. DRAIN V/V FOR SAFETY AIR RECEIVER

(21) (126)

△					
NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED
SENACO SENACO ELECTRO-PNEUTECH.CO.					
TYPE	9K90MC-C	SIMILAR LICENCE DRAWING NO.			
TITLE	DRAIN VALVE WITH BRACKET			PROJECT	SCALE
DRAWN	CHECKED	APPROVED	MS/MG NO.	DRAWING NO.	
S.J.OH	J.R.KIM	Y.H.RYU	45	13 - 000302	

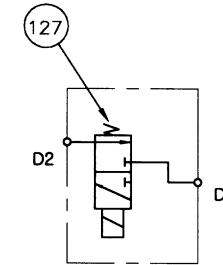
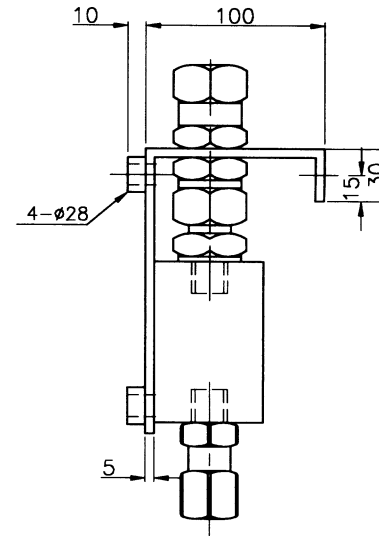
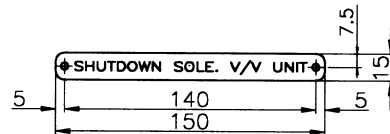


NO	DESCRIPTION	SIZE	MAT'L	Q'TY	WT(Kg)	REMARK



*** NAME PLATE**

1. 기입 문자 높이 : 6mm
2. 문자는 애칭하여 흑색 도색할 것



NOTE

1. PORT SIZE : D1 : $\phi 25$, D2 : $\phi 25$
2. POS.NO. : 127
3. NAME PLATE : (*)참조

					
NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED
 SENACO ELECTRO-PNEUTECH.CO.					
TYPE			SIMILAR LICENCE DRAWING NO.		
TITLE				PROJECT	SCALE
SHUTDOWN SOLE. V/V UNIT					
DRAWN	CHECKED	APPROVED	MS/MG NO.	DRAWING NO.	
S.J.OH	J.R.KIM	Y.H.RYU	45	13 - 000300A	

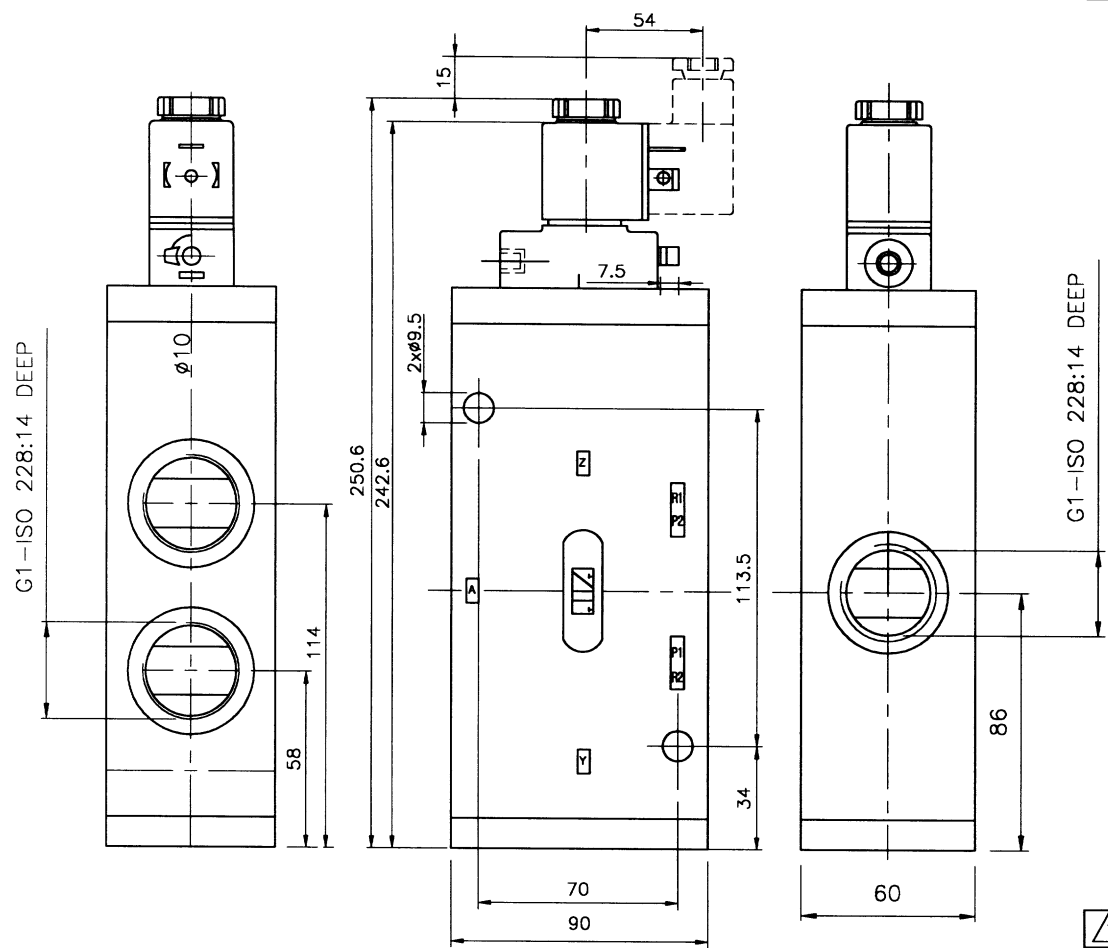


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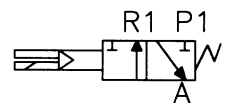
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NO	DESCRIPTION	SIZE	MAT'L	Q'TY	WT(Kg)	REMARK



NOTE

- 1. MAKER : WESTING HOUSE
- 2. TYPE :372 357 222 0
- 3. PORT THREAD : SRG 1"
- 4. TEMPERATURE : -25° TO +50°
- 5. WORKING PRESSURE RANGE : 2.5bar TO 10bar
- 6. VOLTAGE : DC 24V 0.45A
- 7. PROTECTION WITH EL.CONNECTOR : IP65
- 8. DUTY CYCLE : 100% ED
- 9. EL.CONNECTOR TYPE :894 100 030 2
- * POS.NO. : 127



127

↑	02.10.16	TYPE REV.	J.H.SON	Y.M.ANN	K.S.LIM
NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED
SENACO SENACO ELECTRO-PNEUTECH.CO.					
TYPE			SIMILAR LICENCE DRAWING NO.		
TITLE 3/2-WAY SOLE.VALVE				PROJECT	SCALE
					
DRAWN	CHECKED	APPROVED	MS/MG NO.	DRAWING NO.	
W.H.KIM	Y.M.CHOI	Y.S.JIN		13 - 000301	

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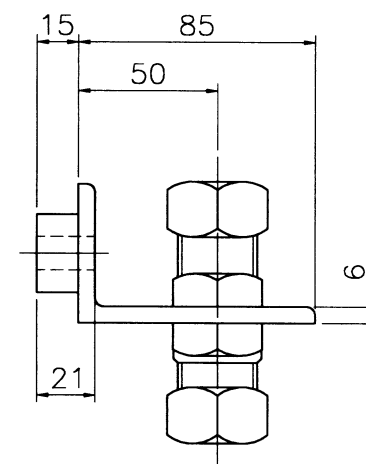
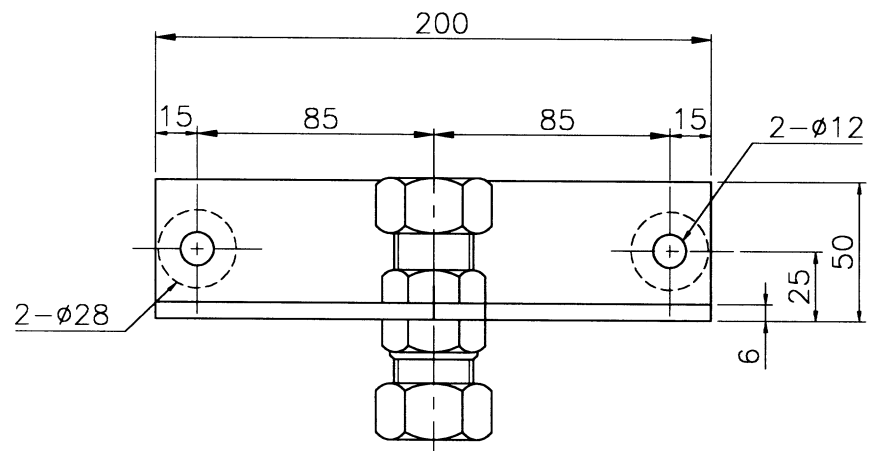
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PORT NO.	PIPE SIZE	DESCRIPTION
P	25A	FOR AIR SUPPLY

△					
NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED
SENACO SENACO ELECTRO-PNEUTECH.CO.					
TYPE			SIMILAR LICENCE DRAWING NO.		
TITLE TERMINAL PLATE				PROJECT □	SCALE □
DRAWN	CHECKED	APPROVED	MS/MG NO.	DRAWING NO.	
Y.M.CHOI	S.H.KIM	Y.S.JIN	45	1 3 - 0 0 0 3 2 1 - 1	

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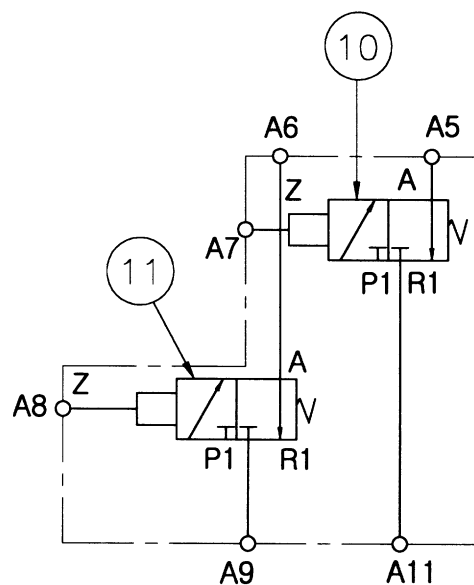
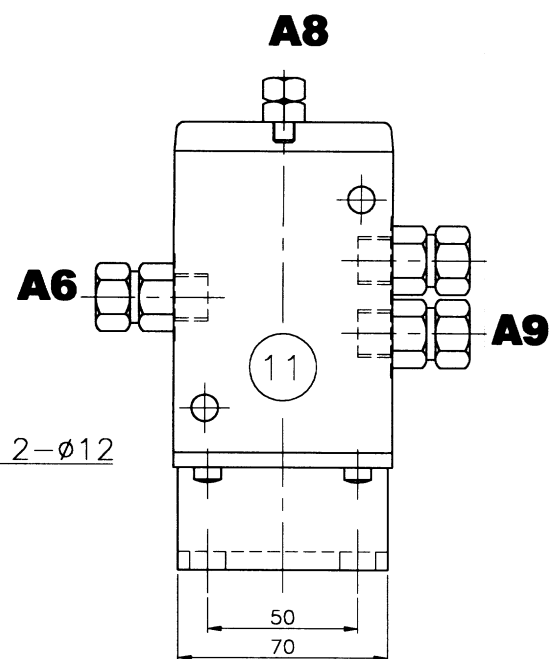
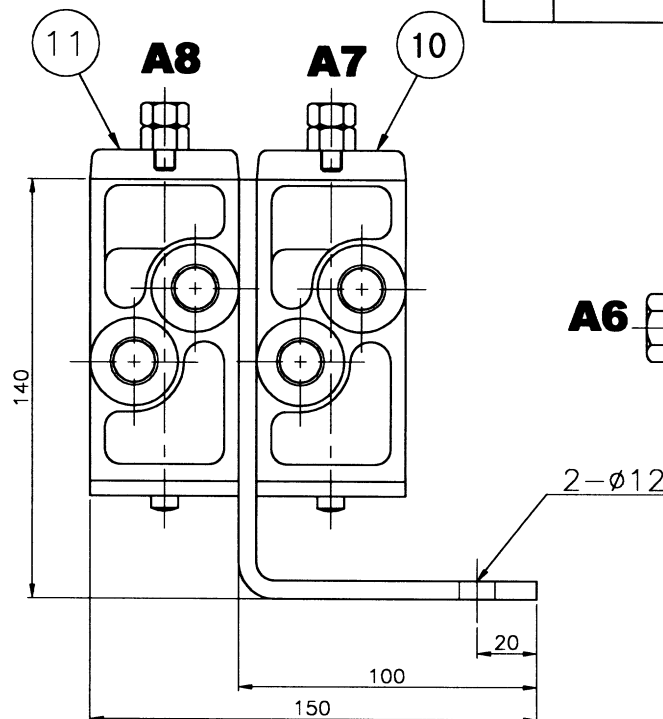
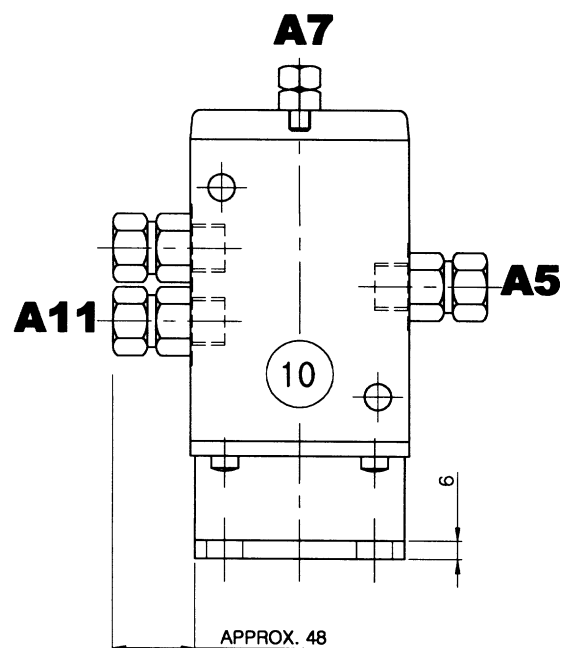
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POS.NO.	10			11		
PORT NO.	A6	A8	A9	A5	A7	A11
PIPING SIZE	Ø15	Ø10	Ø15	Ø15	Ø10	Ø15

					
NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED
SENACO SENACO ELECTRO-PNEUTECH.CO.					
TYPE			SIMILAR LICENCE DRAWING NO.		
TITLE REVERSING VALVE UNIT				PROJECT	SCALE
				 	
DRAWN	CHECKED	APPROVED	MS/MG NO.	DRAWING NO.	
S.J.OH	J.R.KIM	Y.H.RYU		13 - 000299	



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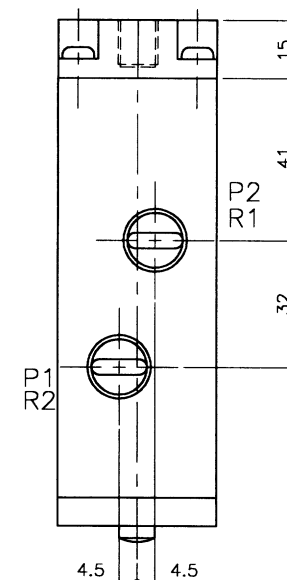
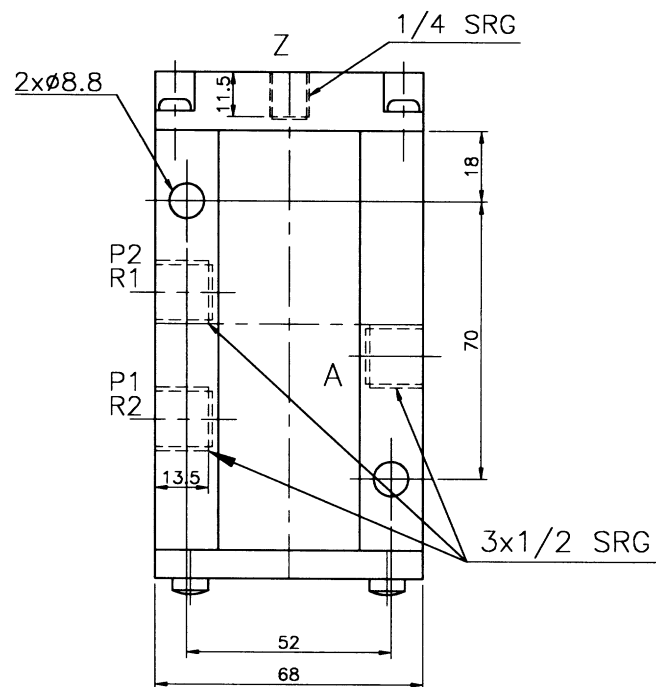
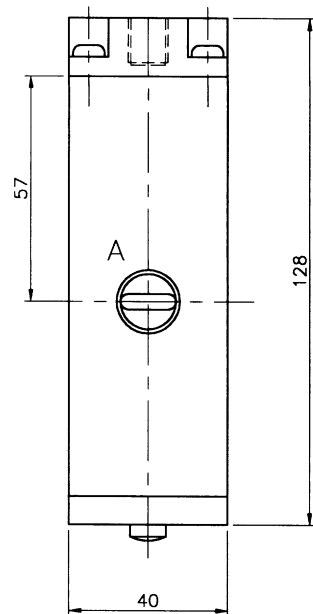
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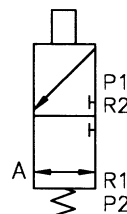
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NO	DESCRIPTION	SIZE	MAT'L	Q'TY	WT(Kg)	REMARK



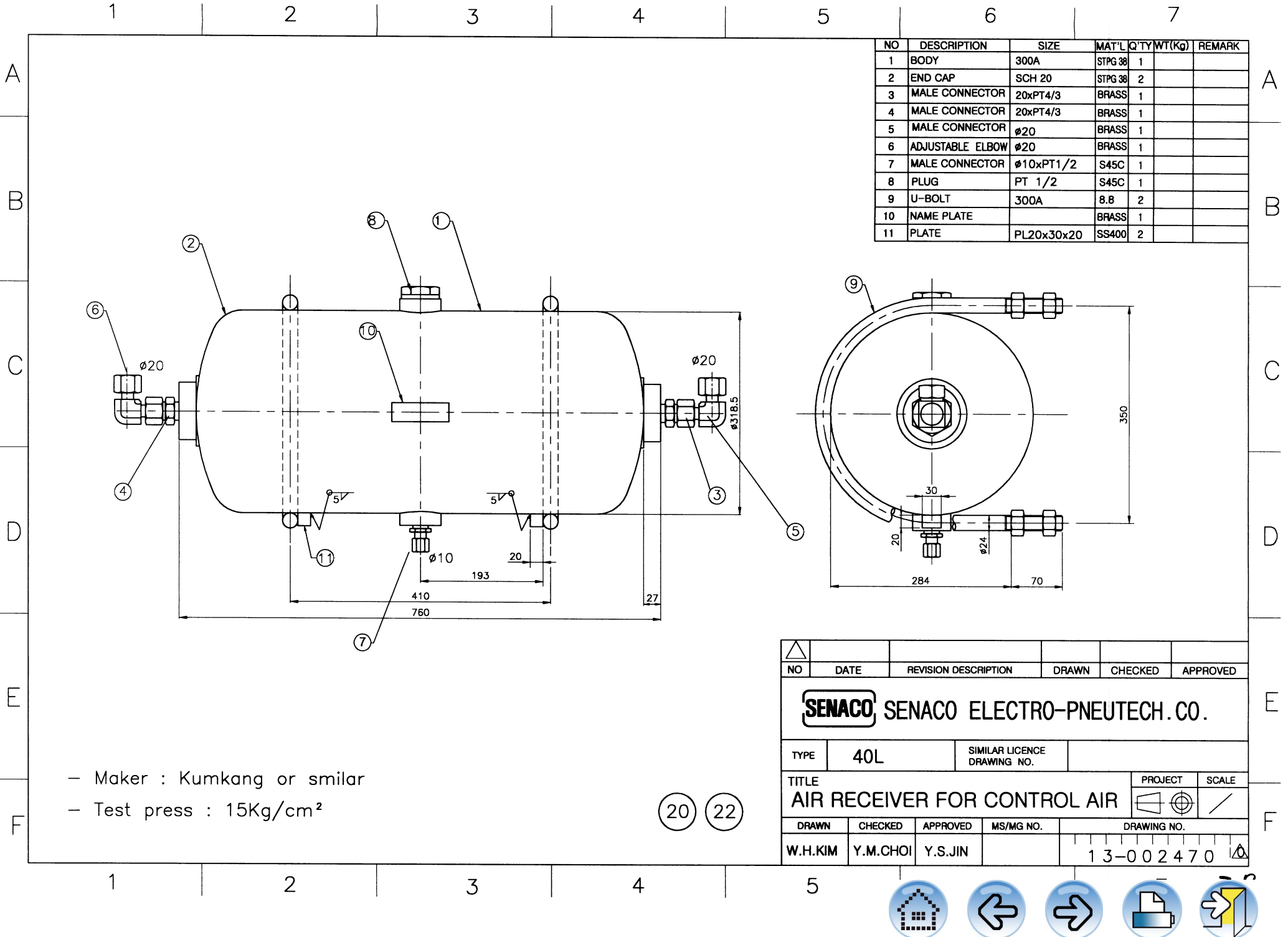
- Make : Westing house or similar
- Type : 371 076 030 0
- Max. working pressure : 10bar
- Temperature : -15° to +80°C
- Medium : air
- Min. pressure at port Z : 2bar

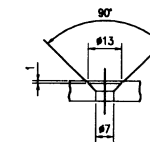
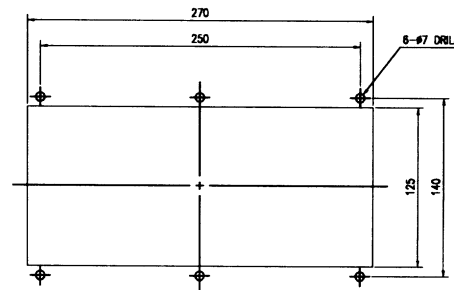
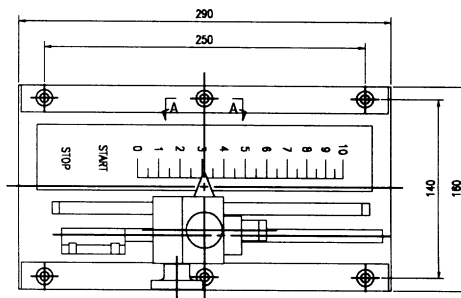


10 11

					
NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED
SENACO SENACO ELECTRO-PNEUTECH.CO.					
TYPE			SIMILAR LICENCE DRAWING NO.	1430999-7	
TITLE 3/2-Way valve				PROJECT	SCALE
					
DRAWN	CHECKED	APPROVED	MS/MG NO.	DRAWING NO.	
S.J.OH	J.R.KIM	Y.H.RYU	45	1 3 - 0 0 0 2 9 7	

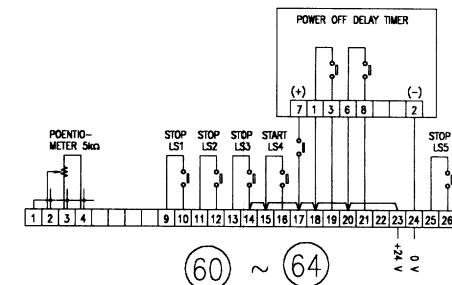
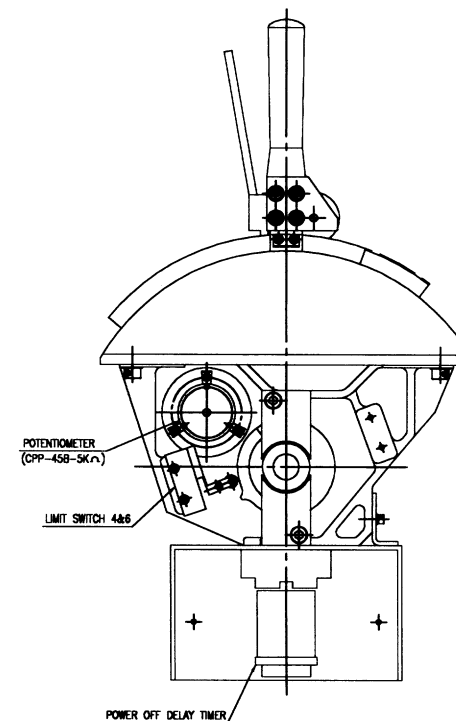
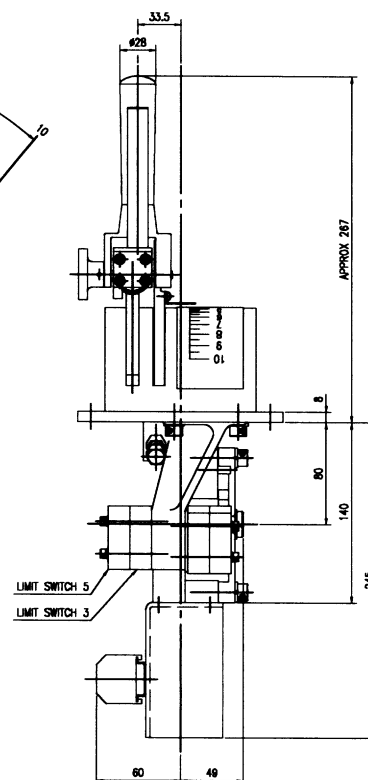
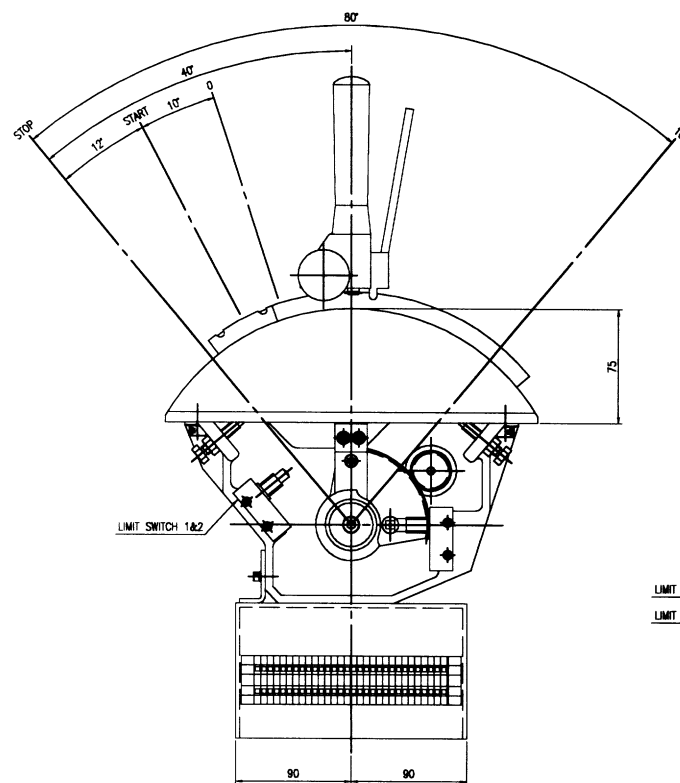






SECTION A-A

PANEL CUT



STOP	START	0	1	2	3	4	5	6	7	8	9	10
LS1	ON											
LS2	ON											
LS3	ON											
LS4	ON											
LS5	ON											
LS6	ON											

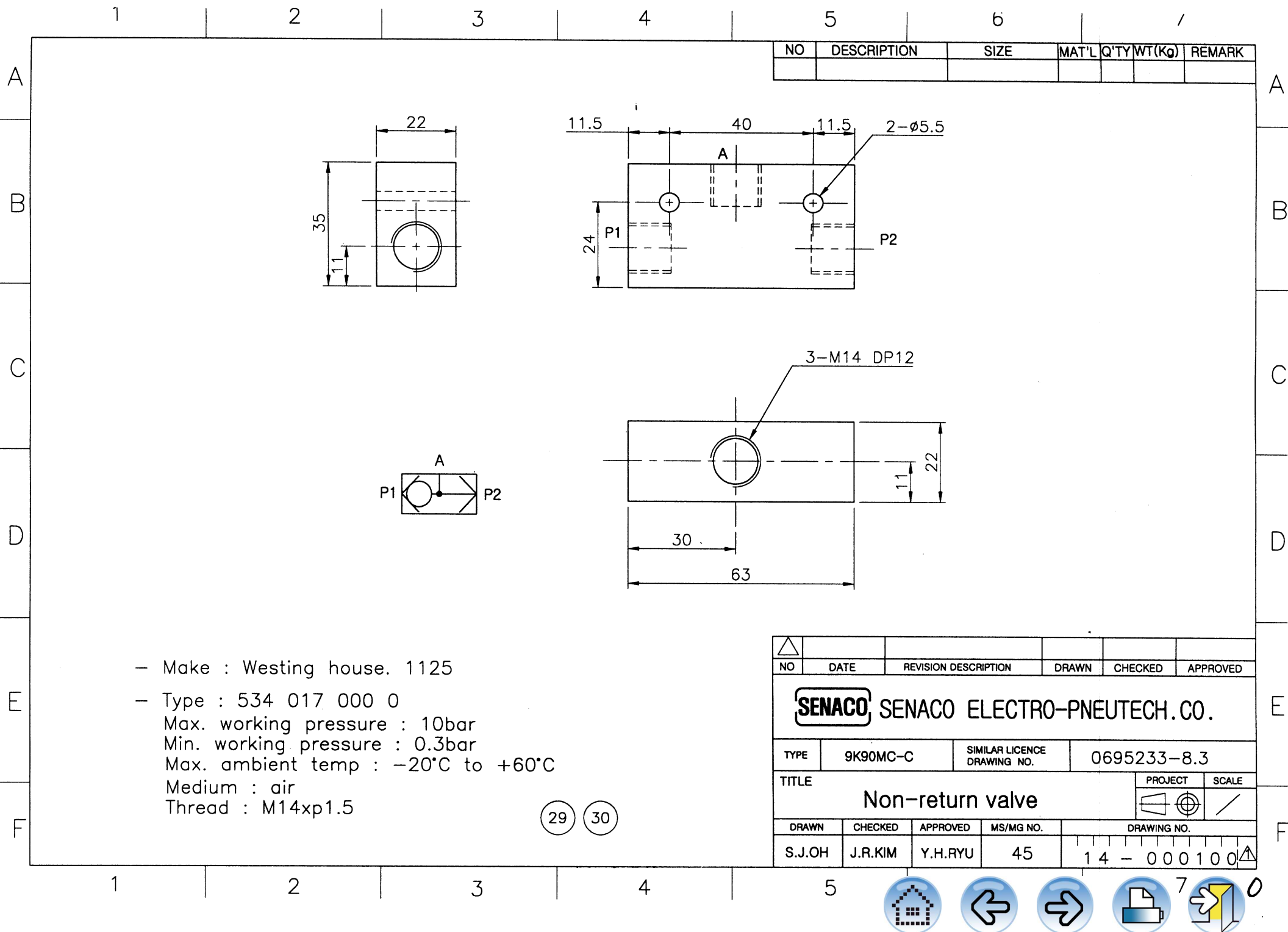
NOTE

1. SURROUNDING TEMP : -20°C ~ +70°C
2. HANDLE ANGLE/POTENTIOMETER ANGLE : 80°/320°
3. WORKING VOLTAGE : 24V $\pm$ 20%

	02.03.15	FIRST ISSUE	J.H.SON	Y.M.ANN	K.S.LIM
NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED
SENACO SENACO ELECTRO-PNEUTECH.CO.					
TYPE		SIMILAR LICENCE DRAWING NO.			
TITLE SMC-01 MANEUVERING HANDLE ASS'Y				PROJECT	SCALE
					
DRAWN	CHECKED	APPROVED	MS/IMG NO.	DRAWING NO.	

본 도면은 당사와 자선이므로 무단복제, 무단변경, 무단배포를 금하며, 도면내 명/부품번호의 무단사용은 법적 행위에 관계하여 법적 처벌을 받습니다.

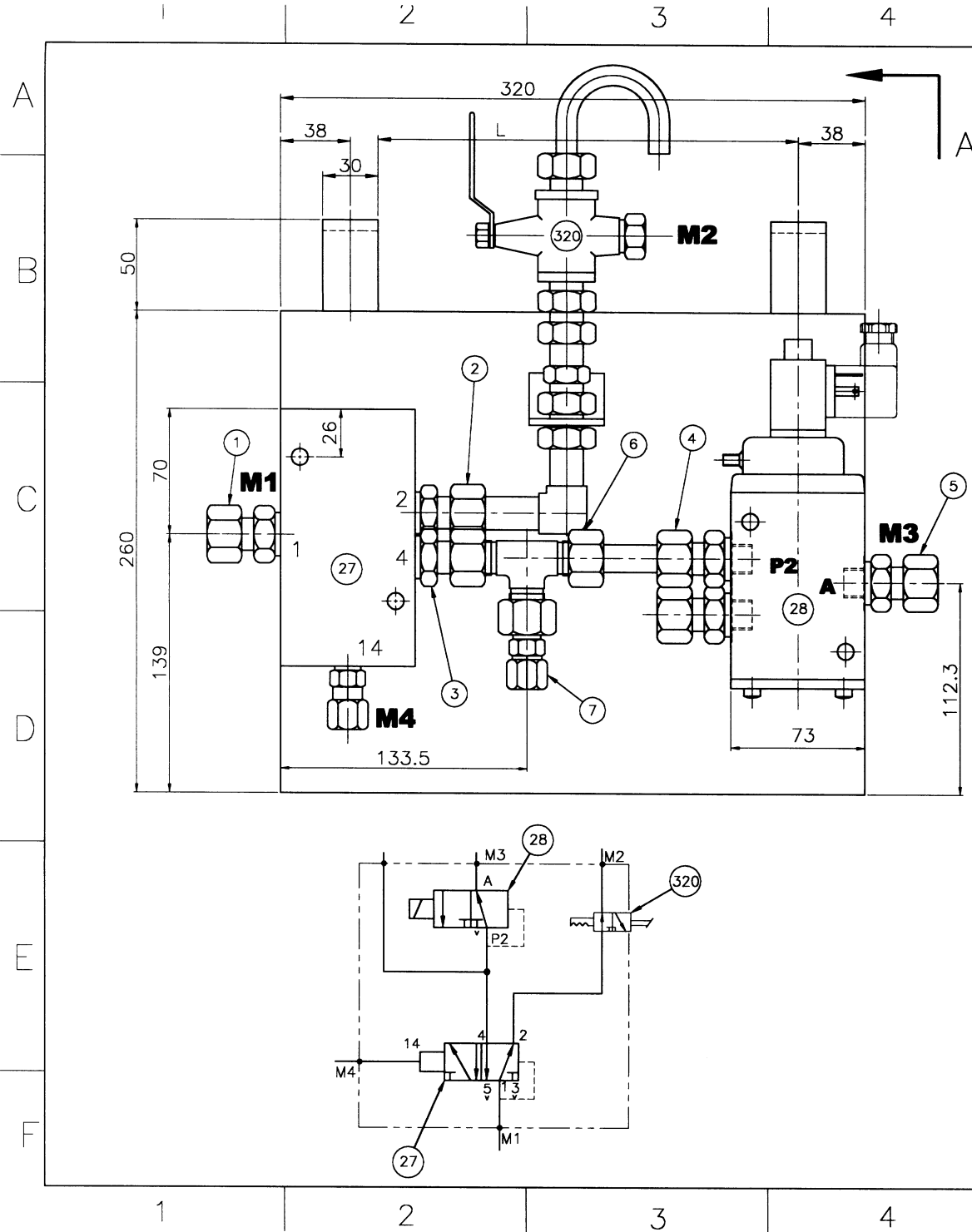




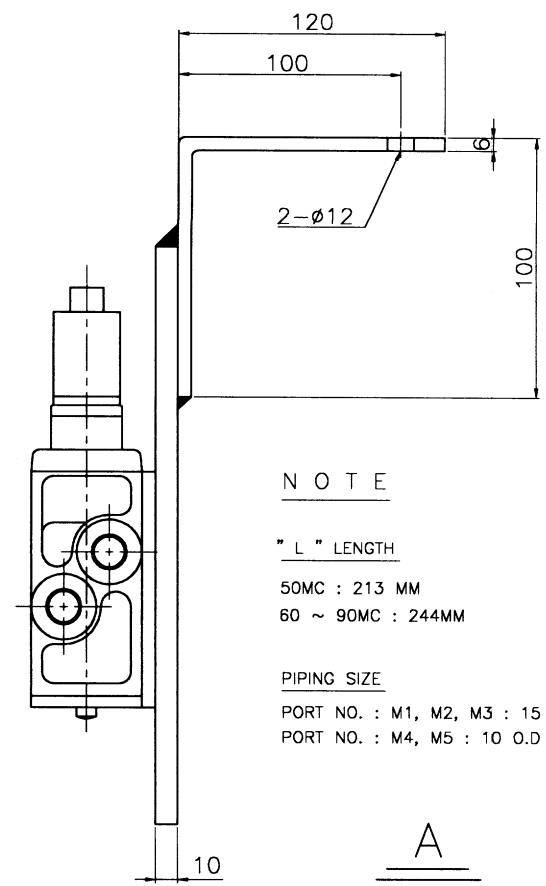
- Make : Westing house. 1125
- Type : 534 017 000 0
Max. working pressure : 10bar
Min. working pressure : 0.3bar
Max. ambient temp : -20°C to +60°C
Medium : air
Thread : M14xp1.5

(29) (30)

△					
NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED
SENACO SENACO ELECTRO-PNEUTECH.CO.					
TYPE	9K90MC-C	SIMILAR LICENCE DRAWING NO.	0695233-8.3		
TITLE				PROJECT	SCALE
Non-return valve					
DRAWN	CHECKED	APPROVED	MS/MG NO.	DRAWING NO.	
S.J.OH	J.R.KIM	Y.H.RYU	45	14 - 000100	



NO	DESCRIPTION	SIZE	MAT'L	Q'TY	WT(Kg)	REMARK



NOTE

" L " LENGTH

50MC : 213 MM

60 ~ 90MC : 244MM

PIPING SIZE

PORT NO. : M1, M2, M3 : 15 O.D CuT

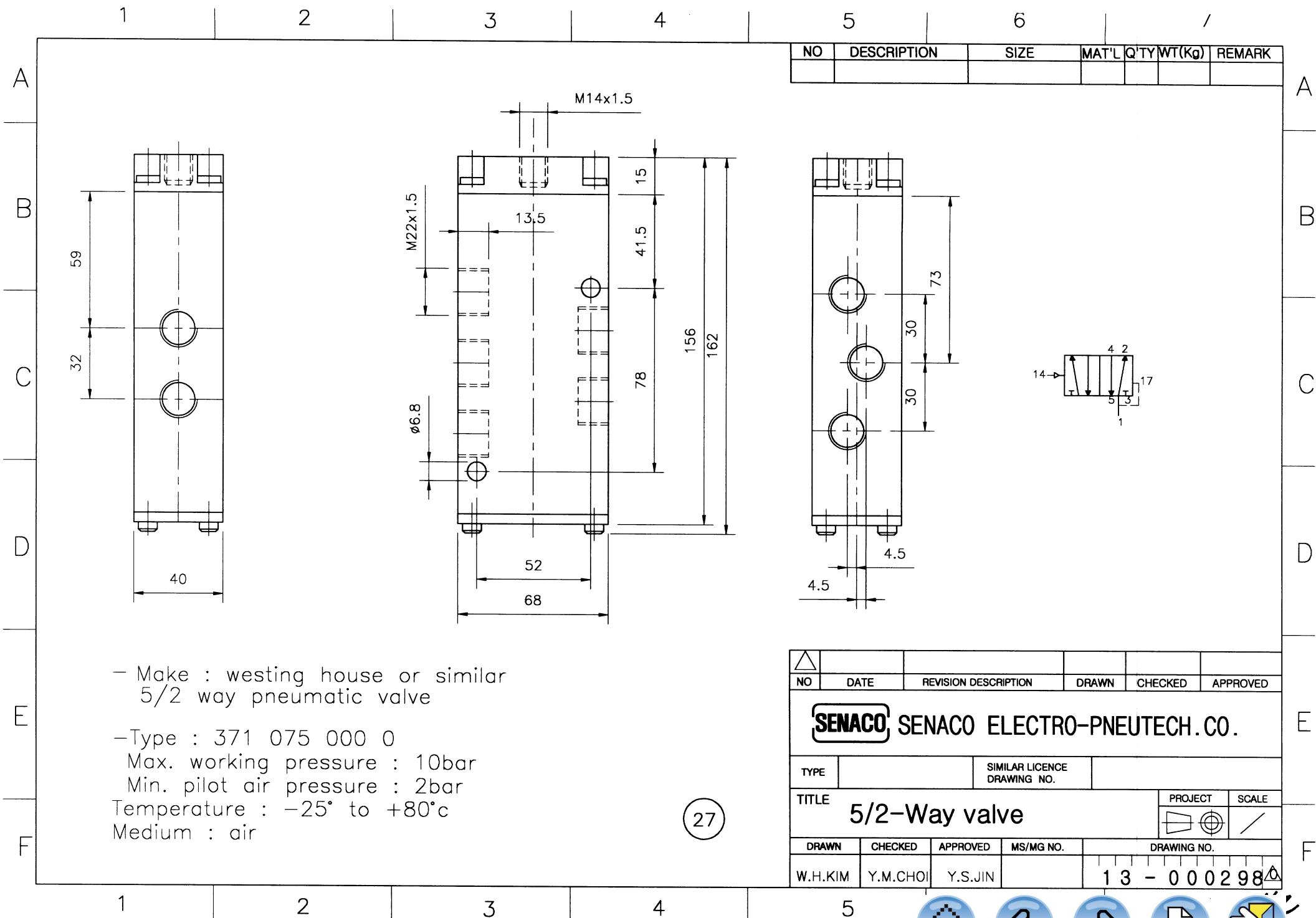
PORT NO. : M4, M5 : 10 O.D CuT

NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED

SENACO SENACO ELECTRO-PNEUTECH.CO.	
TYPE	SIMILAR LICENCE DRAWING NO.
TITLE MAIN STARTING VALVE UNIT	PROJECT
SCALE 	

DRAWN E.J.KIM	CHECKED J.H.SON	APPROVED Y.S.JIN	MS/MG NO. 45	DRAWING NO. 13-000303-3
------------------	--------------------	---------------------	-----------------	----------------------------





- Make : westing house or similar
5/2 way pneumatic valve

-Type : 371 075 000 0
Max. working pressure : 10bar
Min. pilot air pressure : 2bar
Temperature : -25° to +80°c
Medium : air

(27)

NO	DESCRIPTION	SIZE	MAT'L	Q'TY	WT(Kg)	REMARK

△	NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED

SENACO SENACO ELECTRO-PNEUTECH.CO.	
TYPE	SIMILAR LICENCE DRAWING NO.
TITLE	
5/2-Way valve	
PROJECT	
SCALE	
DRAWN	CHECKED
APPROVED	MS/MG NO.
W.H.KIM	Y.M.CHOI
Y.S.JIN	DRAWING NO.
13	000298



1

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A

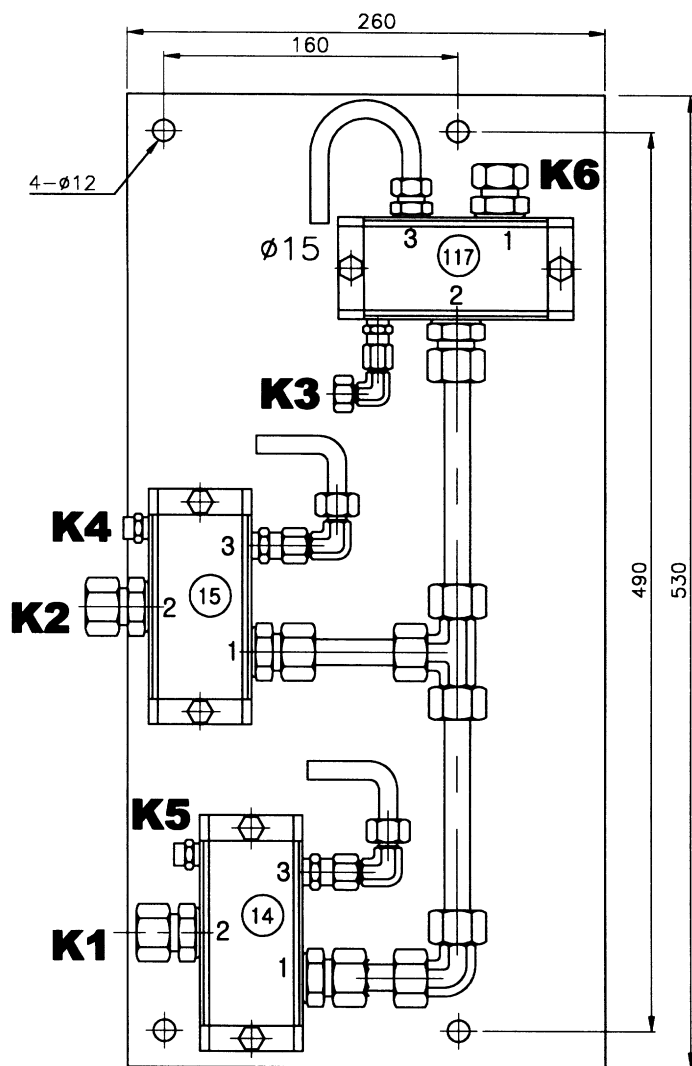
B

C

D

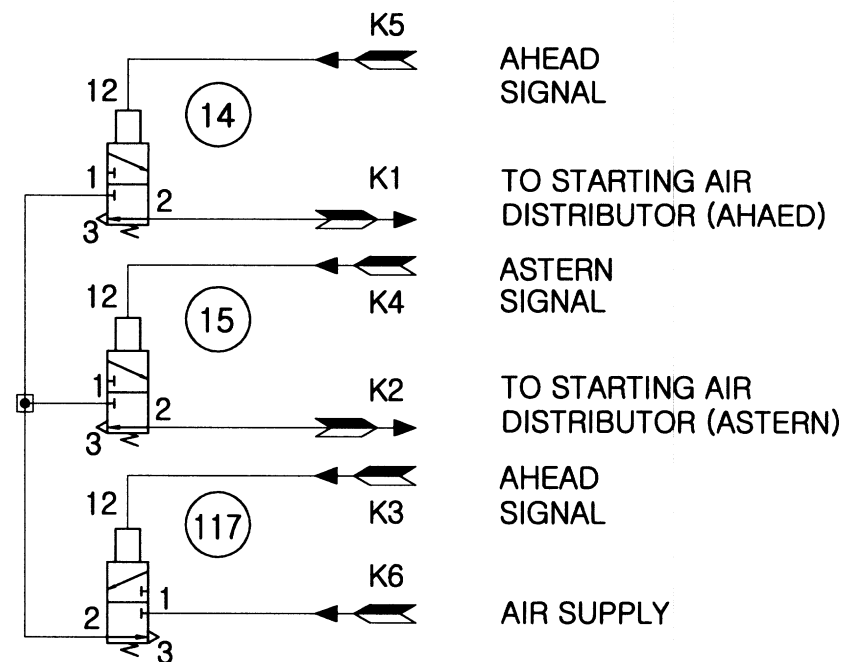
E

F



POS. NO.	DISCRIPTION	MAKER	RANGE	TYPE
14	3/2 WAY VALVE	MACMAN		565 231 0000
15	3/2 WAY VALVE	MACMAN		565 231 0000
117	3/2 WAY VALVE	MACMAN		565 231 0000

NO	DESCRIPTION	SIZE	MAT'L	Q'TY	WT(Kg)	REMARK
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PIPING SIZE

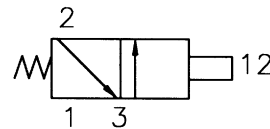
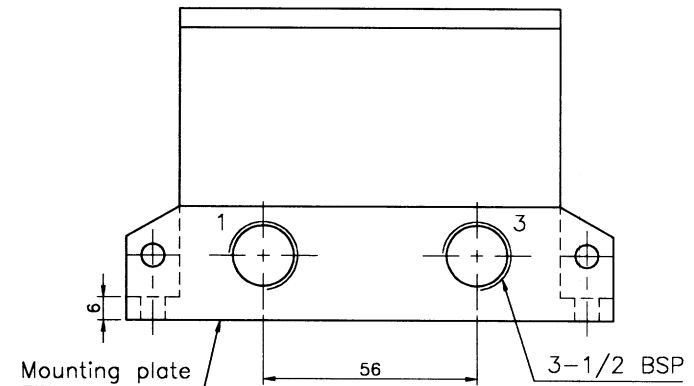
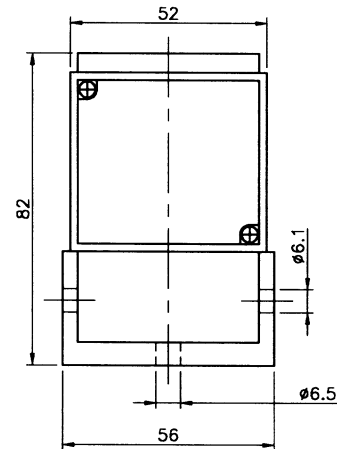
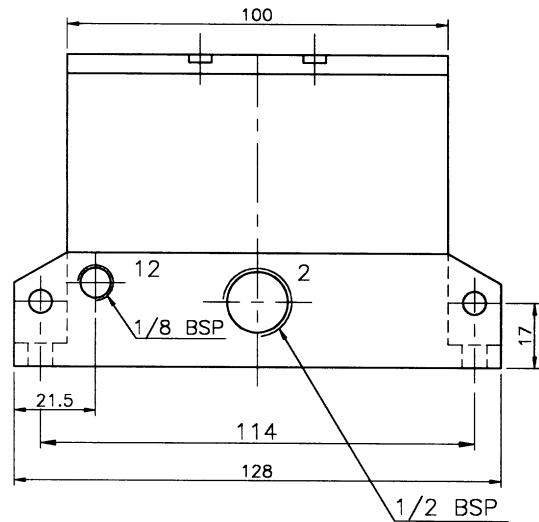
PORT NO. K1, K2, K6 : 15A

PORT NO. K3, K4, K5 : ø10

△							
NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED		
SENACO SENACO ELECTRO-PNEUTECH.CO.							
TYPE	70MC-C		SIMILAR LICENCE		DRAWING NO.		
TITLE						PROJECT	SCALE
VALVE UNIT FOR AHEAD / ASTERN UNIT1							
DRAWN	CHECKED	APPROVED	MS/MG NO.	DRAWING NO.			
J. E. KIM	K. S. LIM	Y. S. JIN	45	13-000665-1			



NO	DESCRIPTION	SIZE	MAT'L	Q'TY	WT(Kg)	REMARK



- Make : 1076 Mecman
 - Type : 565 231 000 0
565 442 000 0 (Mountig plate)
- Working pressure : 10bar
(Only at normely closed finction)
Control pressure : 5.5 ~ 10 bar
Medium : Air

14 15 117

					
NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED
SENACO SENACO ELECTRO-PNEUTECH.CO.					
TYPE		SIMILAR LICENCE DRAWING NO.	1380603-8.0		
TITLE 3/2-Way valve				PROJECT	SCALE
					
DRAWN	CHECKED	APPROVED	MS/MG NO.	DRAWING NO.	
S.J.OH	J.R.KIM	Y.H.RYU	45	13-000339 	

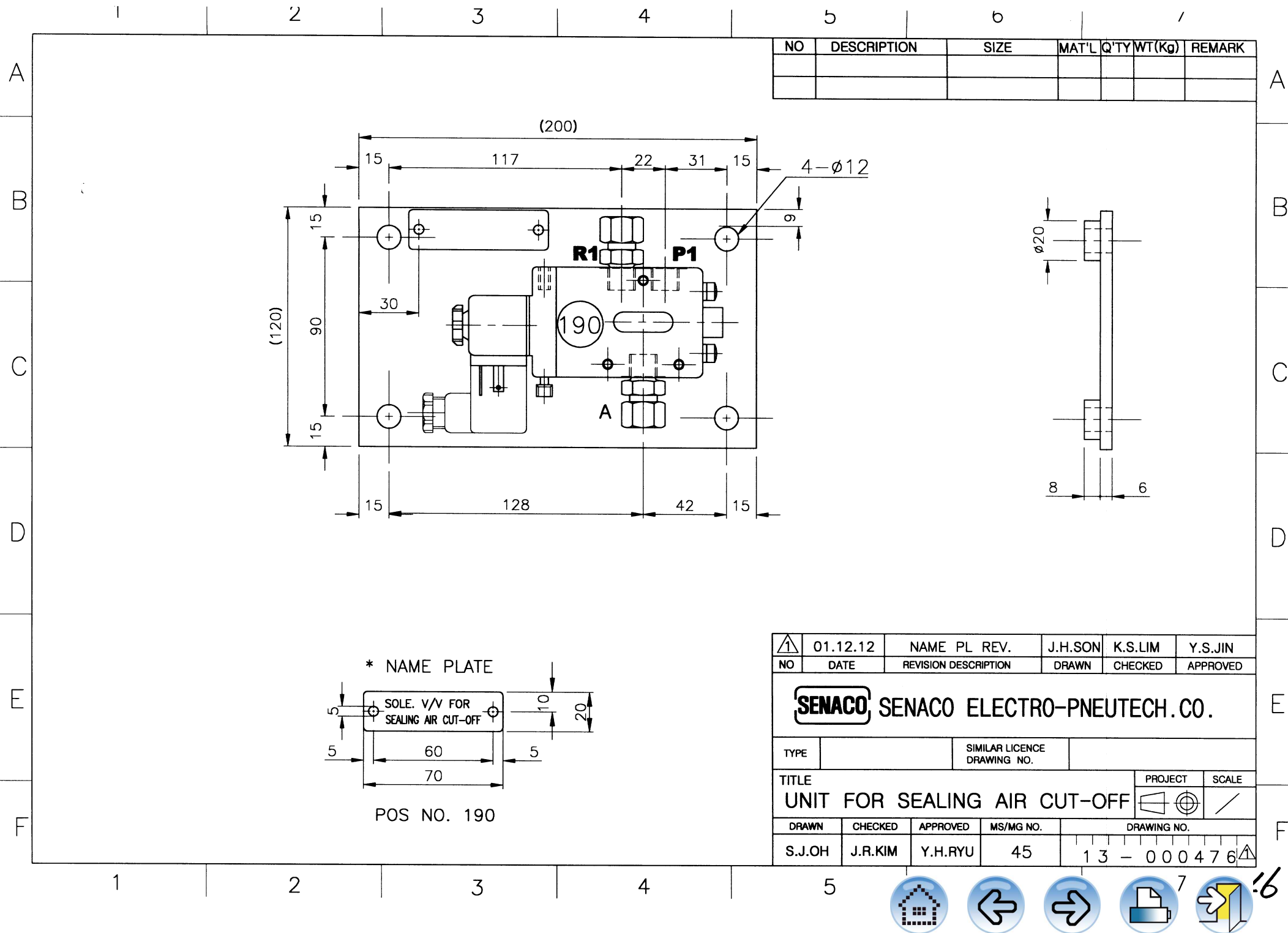
SENACO SENACO ELECTRO-PNEUTECH.CO.

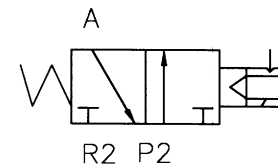
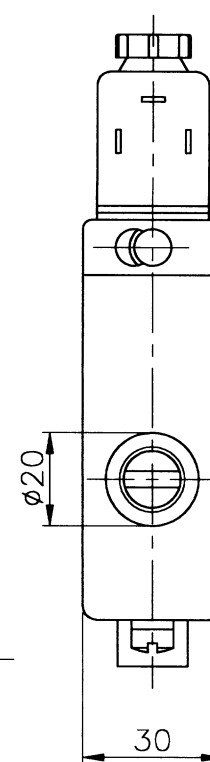
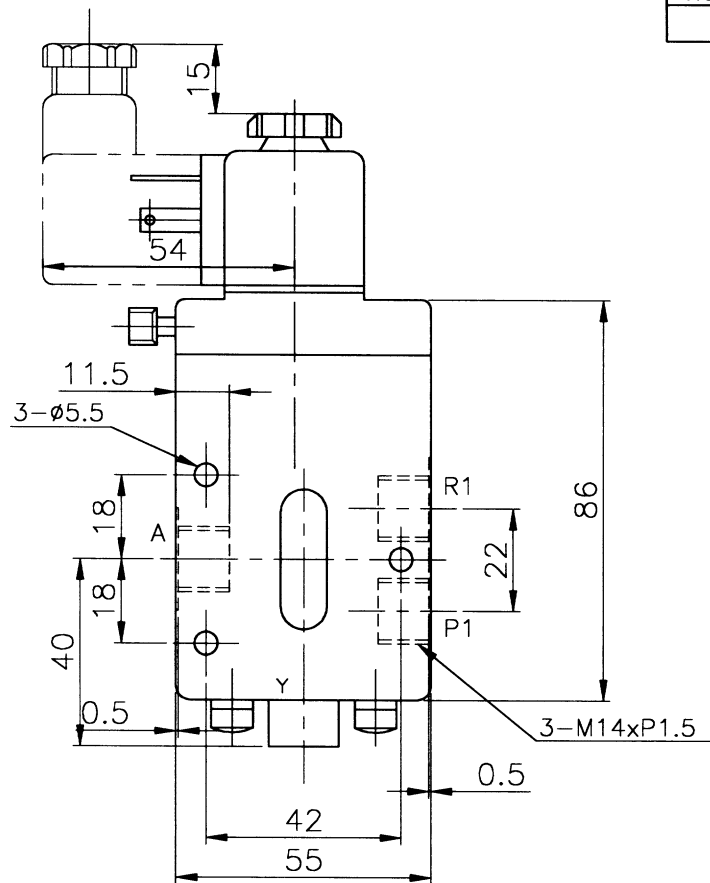
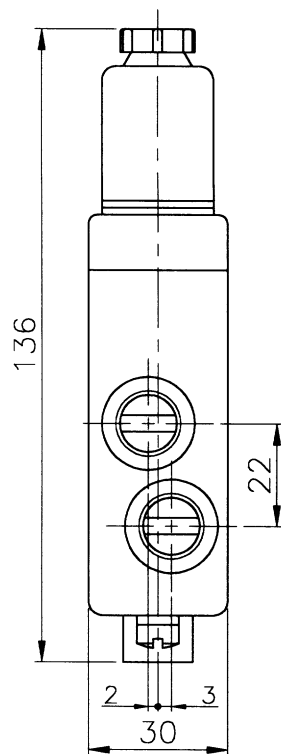
TYPE	SIMILAR LICENCE DRAWING NO.	1380603-8.0
------	--------------------------------	-------------

TITLE	PROJECT	SCALE
		

DRAWN	CHECKED	APPROVED	MS/MG NO.	DRAWING NO.
S.J.OH	J.R.KIM	Y.H.RYU	45	13 - 000339 







- Type : 372 354 222 0
 Max. working pressure : 10bar
 Nominal diameter : ND 7
 Temperature : -25°C to 80°C
 Medium : air
 Connection : M14xP1.5
 Voltage : 24V DC
 Nominal current : 0.36A
 Protection : IP65

Angle connection :
 - Type : 894 101 610 2

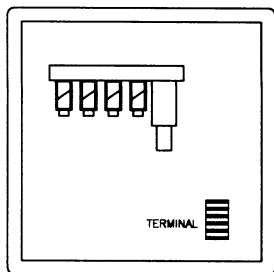
190

NO	DESCRIPTION	SIZE	MAT'L	Q'TY	WT(Kg)	REMARK

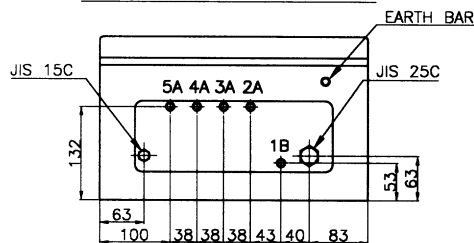
	02.07.02	FIRST ISSUE	J.H.SON	Y.M.ANN	K.S.LIM
NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED
 SENACO ELECTRO-PNEUTECH.CO.					
TYPE			SIMILAR LICENCE DRAWING NO.		
TITLE 3/2-Way solenoid valve				PROJECT	SCALE
				 	
DRAWN	CHECKED	APPROVED	MS/MG NO.	DRAWING NO.	
J.H.SON	Y.M.ANN	K.S.LIM	45	13 - 0003194	



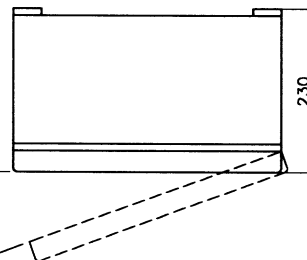
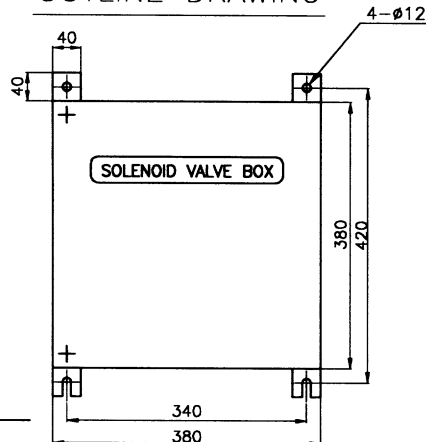
ARRANGEMENT OF DEVICE



VIEWED FROM "X"

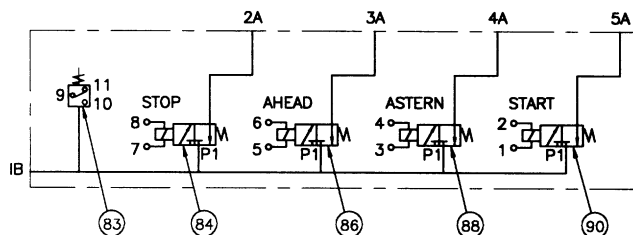


OUTLINE DRAWING

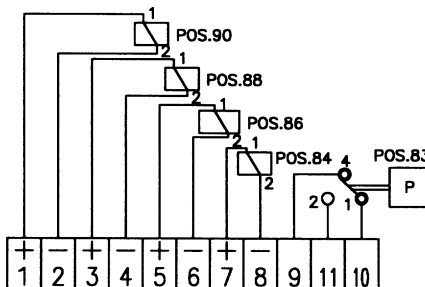


MAX. WORKING PRESSURE : 6 BAR
SOLENOID VALVE
- VOLTAGE : 24V DC +/- 20%
- CURRENT CONSUMPTION : 190mA PER SOLENOID
- AMBIENT TEMPERATURE : 253...343K
- RATING : 100%
PRESSURE SWITCH
- RANGE : 0 ~ 10BAR
- MAX. VOLTAGE : 60V DC AND AC
- MAX. CURRENT : DC 2.5A, AC 5.0A
CABINET
- PROTECTION : IP54
- CABLE ENTRY : 1PC-JIS 15c
1PC-JIS 25c
- PNEUMATIC CONNECTION : FOR TUBES 10 O.D.
- MATERIAL : STEEL

Q'TY	DESIGNATION	POS.NO.	TYPE
1	3/2 WAY SOLENOID VLAVE	90	372 352 222 0
1	3/2 WAY SOLENOID VLAVE	88	372 352 222 0
1	3/2 WAY SOLENOID VLAVE	86	372 352 222 0
1	3/2 WAY SOLENOID VLAVE	84	372 352 222 0
1	PRESSURE SWITCH TRAFAG(PICO)	83	980.2077.750.02.15.58

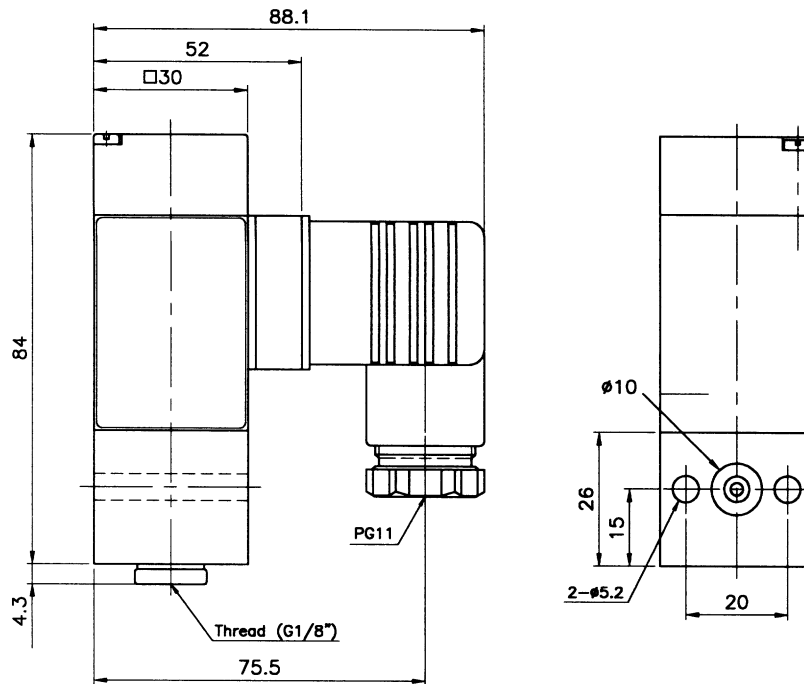


SCHEMATIC DIAGRAM



TERMINALS

	02.08.23	FIRST ISSUE	J.H.SON	Y.M.ANN	K.S.LIM
NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED
 SENACO ELECTRO-PNEUTECH.CO.					
TYPE			SIMILAR LICENCE DRAWING NO.		
TITLE SOLENOID VALVE BOX			PROJECT		SCALE
					
DRAWN	CHECKED	APPROVED	MS/MG NO.	DRAWING NO.	
J.H.SON	Y.M.ANN	K.S.LIM		13-000311-7	



Ordering number	Type	Range	Sensor
PST 3.4	9BO.2074.750.02.15.58	-0.6 ~ +3.4 BAR	Bellow
PST 6	9BO.2077.750.02.15.58	0 - 6.0 BAR	Bellow
PST 10	9BO.2078.751.02.15.58	1 - 10 BAR	Bellow
PST 16	9BO.2079.751.02.15.58	1 - 16 BAR	Bellow
PST 25	9BO.2080.752.02.15.58	2 - 25 BAR	Bellow
PST 40	9BO.2081.752.02.15.58	4 - 40 BAR	Bellow

NO	DESCRIPTION	SIZE	MAT'L	Q'TY	WT(Kg)	REMARK

SPECIFICATIONS

- Accuracy : 0.5% of full scale
- Nominal temperature : -25'~+85'c
- Vibration : 4g(25~2000Hz)
- Protection : IP65
- Housing material : AlMgSi1 anodized

△	2003.04.02	SIZE CHANGE	M.S.JUNG	Y.M.ANN	K.S.LIM
△	2002.2.28	FIRST ISSUE	M.S.JUNG	Y.M.ANN	K.S.LIM
NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED

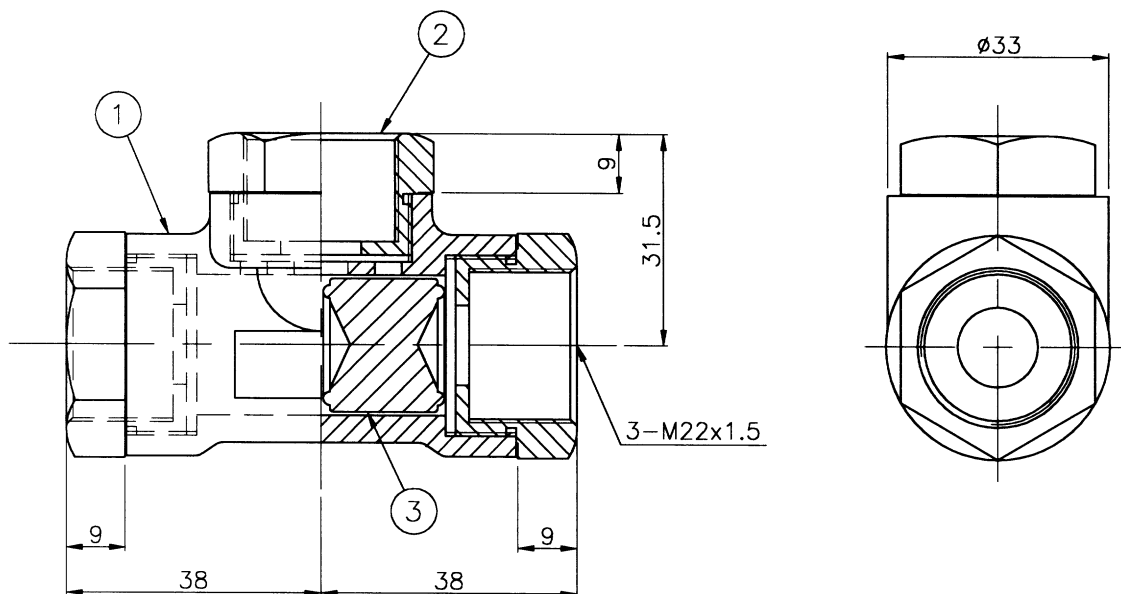
SENACO SENACO ELECTRO-PNEUTECH.CO.

TYPE			SIMILAR LICENCE DRAWING NO.			
TITLE PRESSURE SWITCH				PROJECT	SCALE	
						
DRAWN	CHECKED	APPROVED	MS/MG NO.	DRAWING NO.		
M.S.JUNG	K.S.LIM	Y.S.JIN	45	1 3 - 0 0 0 3 4 1 - 2 		

(83)



NO	DESCRIPTION	PC NO.	MAT'L	Q'TY	WT(Kg)	REMARK
1	HOUSING	434 208 010 4	ZDC2	1		
2	CAP	893 183 020 4	SS400	3		
3	VALVE	899 504 482 4	NBR	1		



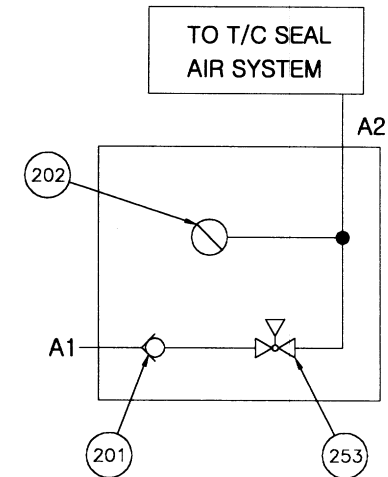
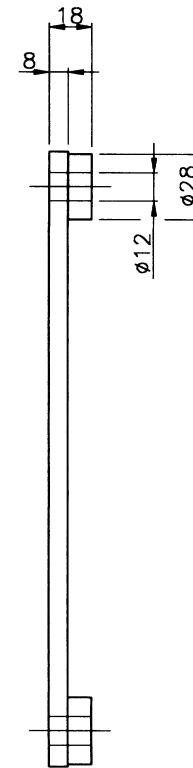
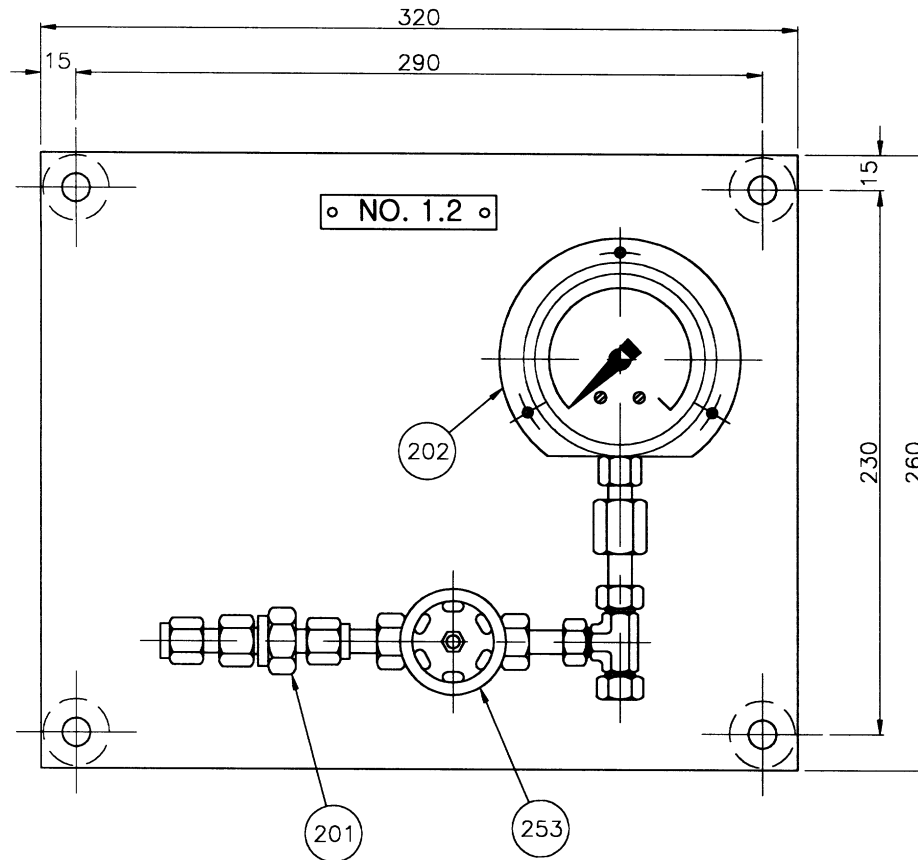
NOTE.

1. TYPE : 434 208 000 0
2. WORKING TEMPERATURE : -40°C - $+80^{\circ}\text{C}$
3. MAX. PRESSURE : 10 BAR
4. MEDIUM : AIR

128

02.02.25	FIRST ISSUE	J.H.SON	Y.M.ANN	K.S.KIM
NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED
SENACO SENACO ELECTRO-PNEUTECH.CO.				
TYPE	SIMILAR LICENCE DRAWING NO.			
TITLE			PROJECT	SCALE
DOUBLE NON RETURN VALVE				
DRAWN	CHECKED	APPROVED	MS/MG NO.	DRAWING NO.
J.H.SON	K	4	1 3	1 3

NO	DESCRIPTION	SIZE	MAT'L	Q'TY	WT(Kg)	REMARK



NAME PLATE

1. NO.1 T/C SEAL. AIR. OPERATION RANGE : 0.3~0.5 Kg/Cm²
2. NO.2 T/C SEAL. AIR. OPERATION RANGE : 0.3~0.5 Kg/Cm²

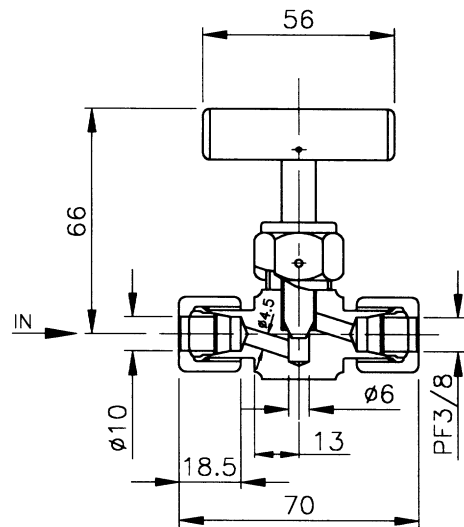
PIPNG SIZE

PORT NO.:A1,A2:10 O.D Cut

△	02.02.25	FIRST ISSUE	J.H.SON	Y.M.ANN	K.S.KIM
NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED
SENACO SENACO ELECTRO-PNEUTECH.CO.					
TYPE			SIMILAR LICENCE DRAWING NO.		
TITLE				PROJECT	SCALE
T/C SEALING AIR UNIT					
DRAWN	CHECKED	APPROVED	MS/MG NO.	DRAWING NO.	
J.H.SON			1		



GAUGE VALVE

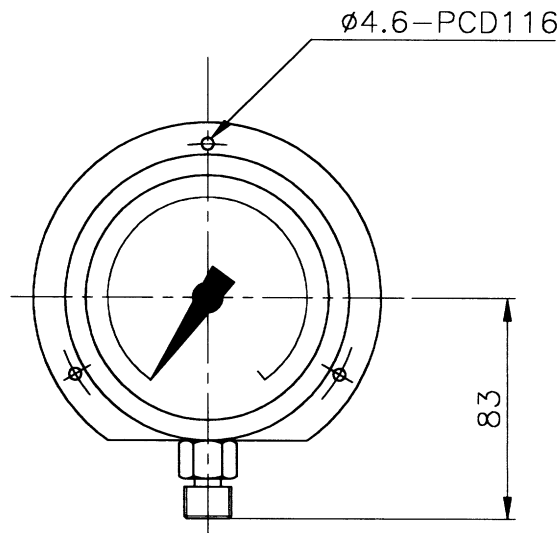
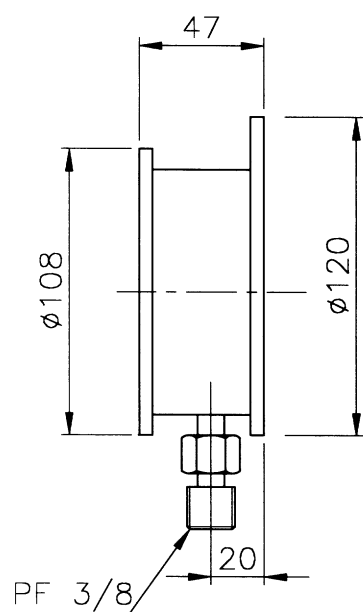


1. MATERIAL : BRASS
2. WORKING PRESURE : 0 ~ 120 Kg/Cm²

(253)

△					
NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED
SENACO SENACO ELECTRO-PNEUTECH.CO.					
TYPE		SIMILAR LICENCE DRAWING NO.			
TITLE				PROJECT	SCALE
GAUGE VALVE					
DRAWN	CHECKED	APPROVED	MS/MG NO.	DRAWING NO.	
S.J.OH	J.R.KIM	Y.H.RYU	45	14-000103-1	





-NOTE-

- 1.MAKER : Tempress or similar
- 2.TYPE : 100M10-1 (0~4Kg/cm²)
- 3.BLACK EPOXY ENAMELLED STEEL CASE
WITH STAINLESS STEEL FRONT
- 4.MIN.SPAN : 1BAR
- 5.MAX.SPAN : 1600BAR
- 6.SAFETY BLOW OUT PLUG LOCATED
IN REAR OF CASE
- * GREEN MARK : 0.3 ~ 0.5Kg/cm²

△					
NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED
SENACO Hydro-Pneumatics Division					
TYPE		SIMILAR LICENCE DRAWING NO.			
TITLE				PROJECT	SCALE
PRESSURE GAUGE					
DRAWN	CHECKED	APPROVED	MS/MG NO.	DRAWING NO.	
W.H.KIM	Y.M.CHOI	Y.S.JIN		14-001079	

202



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A

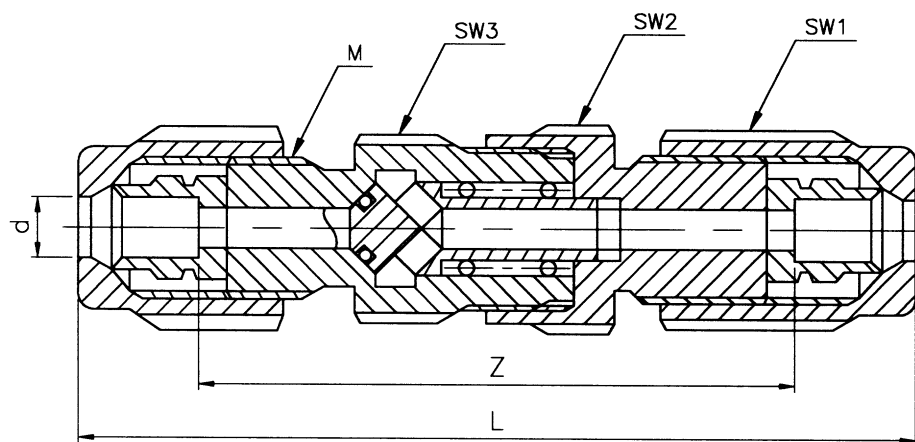
B

C

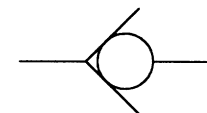
D

E

F



SYMBOL

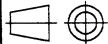


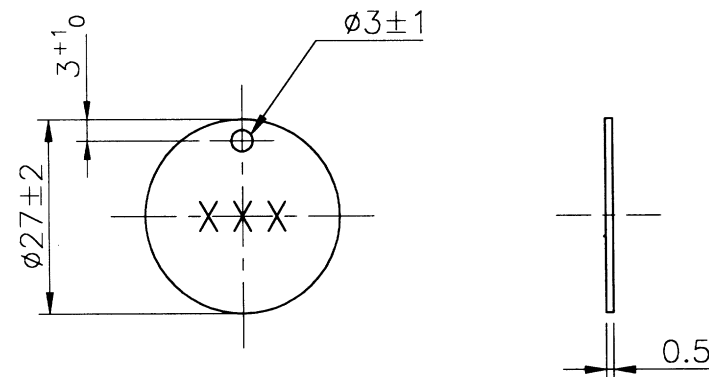
No.	L	Z	SW1	SW2	SW3	d	M	MAKER No.
001	60	44	14	17	14	8	M12x1	
002	70.5	50.5	17	22	19	10	M14x1	020 801 230 100
003	81	55	24	27	22	12	M20x1.5	020 801 230 150

NO		DATE		REVISION DESCRIPTION		DRAWN		CHECKED		APPROVED			
SENACO ELECTRO-PNEUTECH.CO.													
TYPE				SIMILAR LICENCE DRAWING NO.									
TITLE										PROJECT		SCALE	
NON - RETURN VALVE													
DRAWN		CHECKED		APPROVED		MS/MG NO.		DRAWING NO.					
W.H.KIM		Y.M.CHOI		Y.S.JIN		45		23 - 000542					

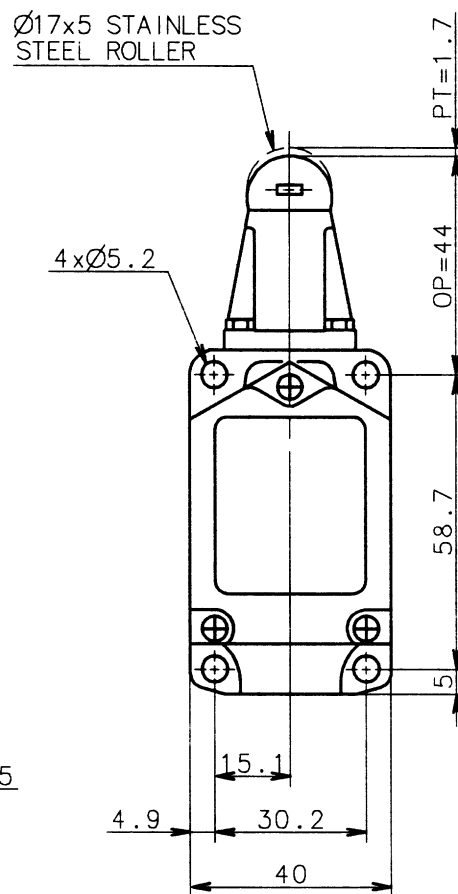
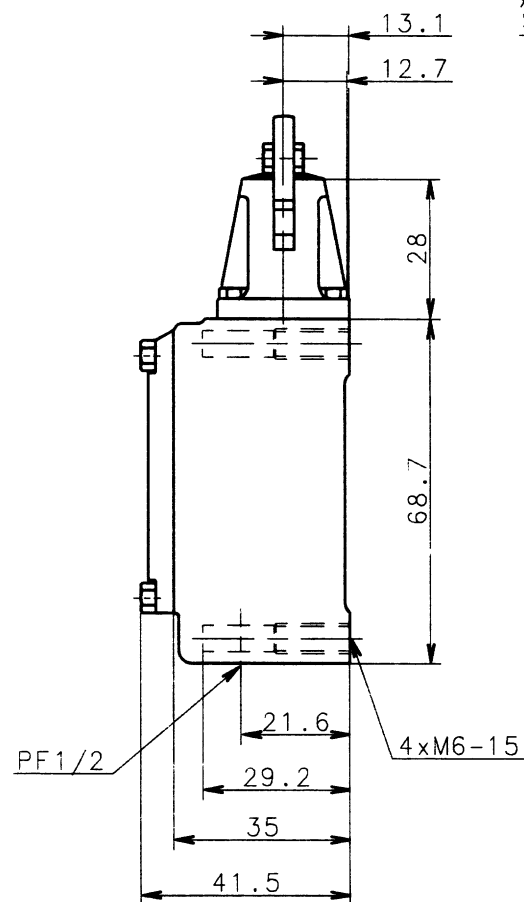
(201)



					
NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED
SENACO SENACO ELECTRO-PNEUTECH.CO.					
TYPE		SIMILAR LICENCE DRAWING NO.	1231650-8		
TITLE				PROJECT	SCALE
TAGPLATE COMPONENTS					
DRAWN	CHECKED	APPROVED	MS/MG NO.	DRAWING NO.	
S.J.OH	J.R.KIM	Y.H.RYU	45	1 3 - 0 0 0 3 8 1 - 2 	

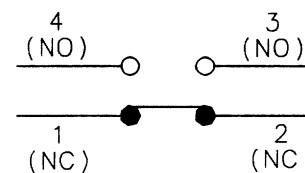


- Pneumatic diagram의 모든 tag plate를 공급하며 각 component 공급시에는 fastening wire로 부착하여 공급한다. (재질 SUS)
- To be marked with 5~7mm size of type

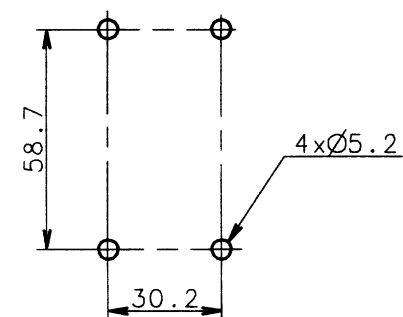


TYPE : WLD 2 OR SZL-WL-E

CONTACT CONFIGURATION



MOUNTING HOLE

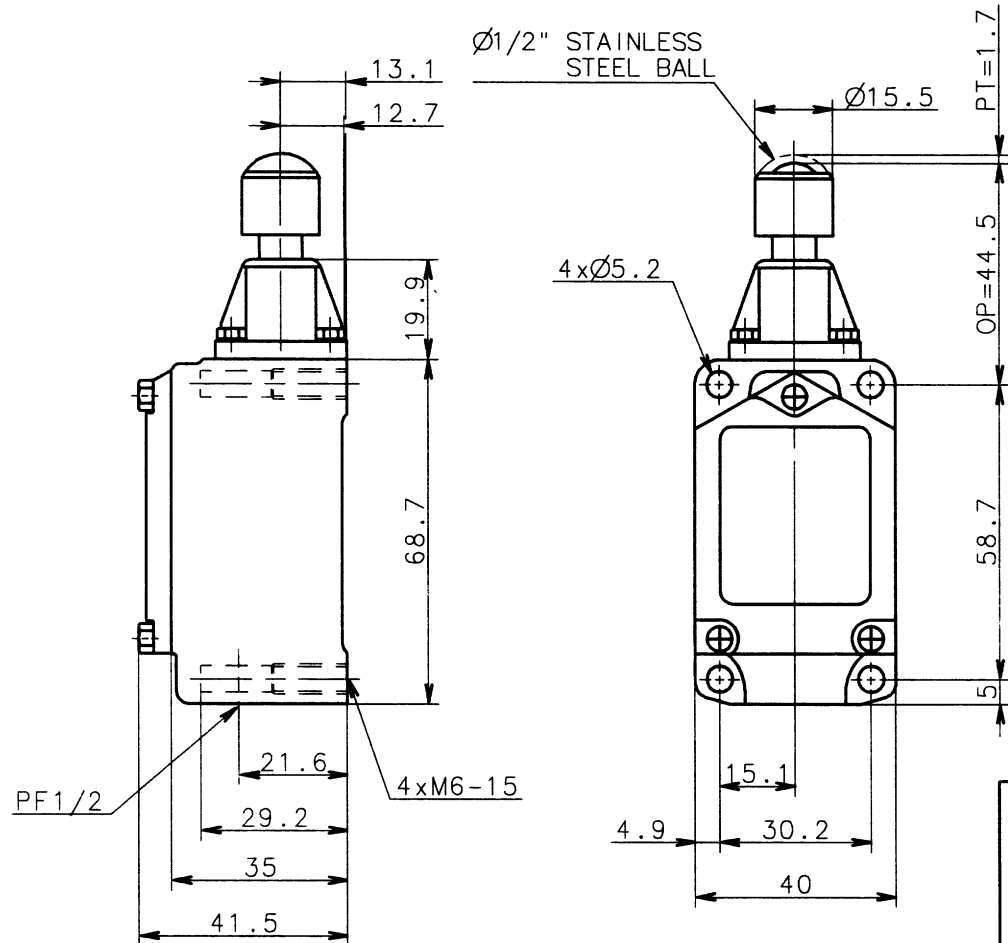


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[illegible][illegible]

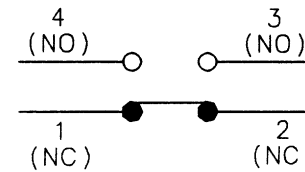
CAN Drawing - do not correct by hand

A
B
C
D

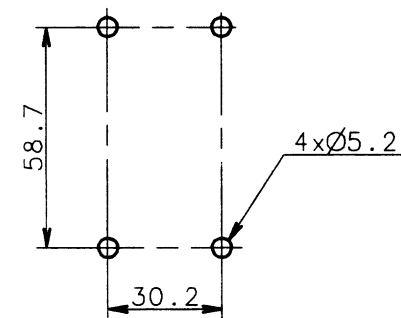


TYPE : WLD 3 OR SZL-WL-1

CONTACT CONFIGURATION



MOUNTING HOLE



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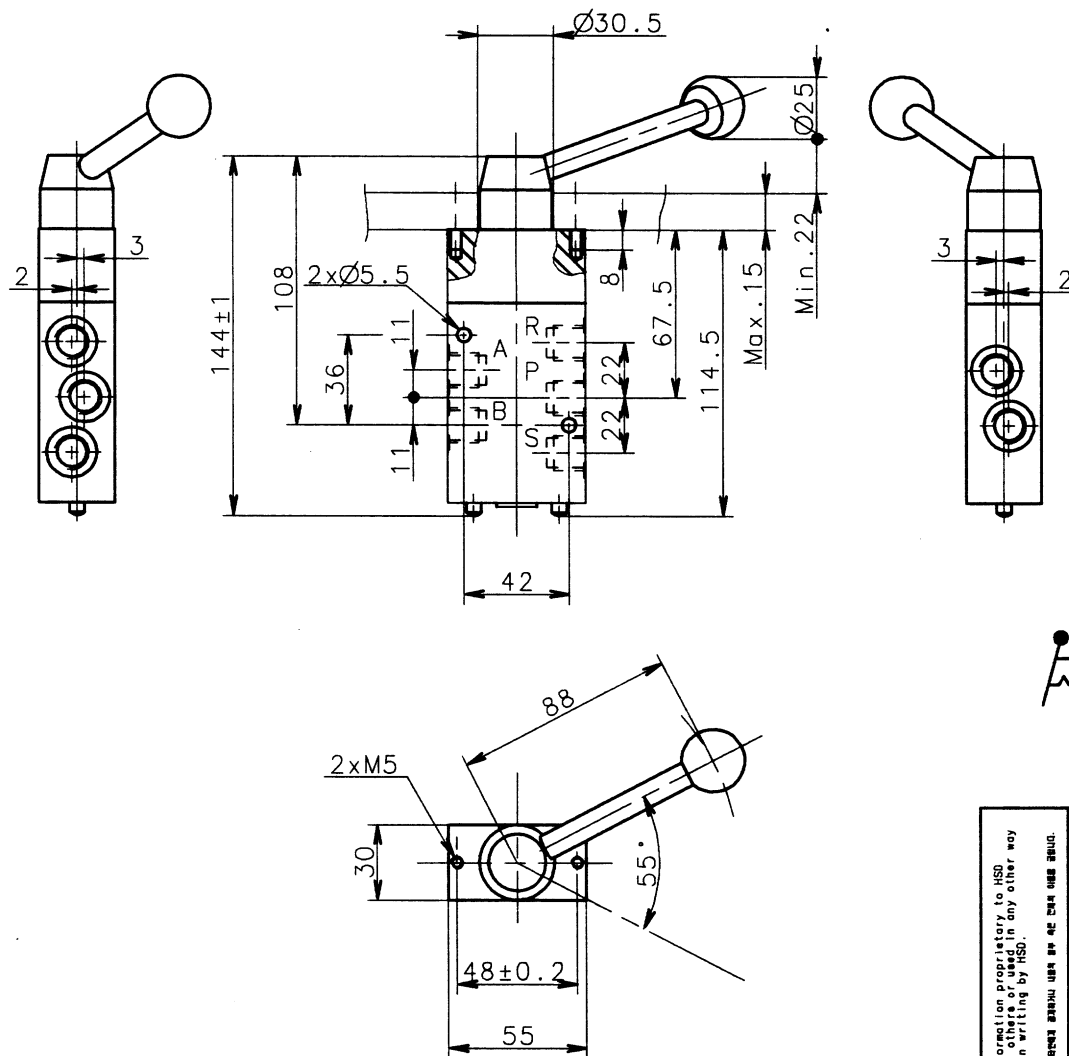
본 도면은 HSD의 기밀 정보로, 무단으로 복제, 배포, 또는 다른 형태로 사용될 수 없습니다. HSD의 서면 동의 없이는 전체 또는 일부가 재현되거나 공개되어서는 안 됩니다.

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CAO Drawing - do not correct by hand



A
B
C
D

Make or similar: WESTINGHOUSE 1125

Type: 363 129 000 0

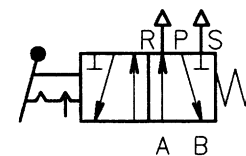
Max. working pressure: 10 bar

Thread A-B-R-P-S M14x1.5

Medium: Air

Max. ambient temp.: -15 - +80°C

Nominal diameter: 7mm



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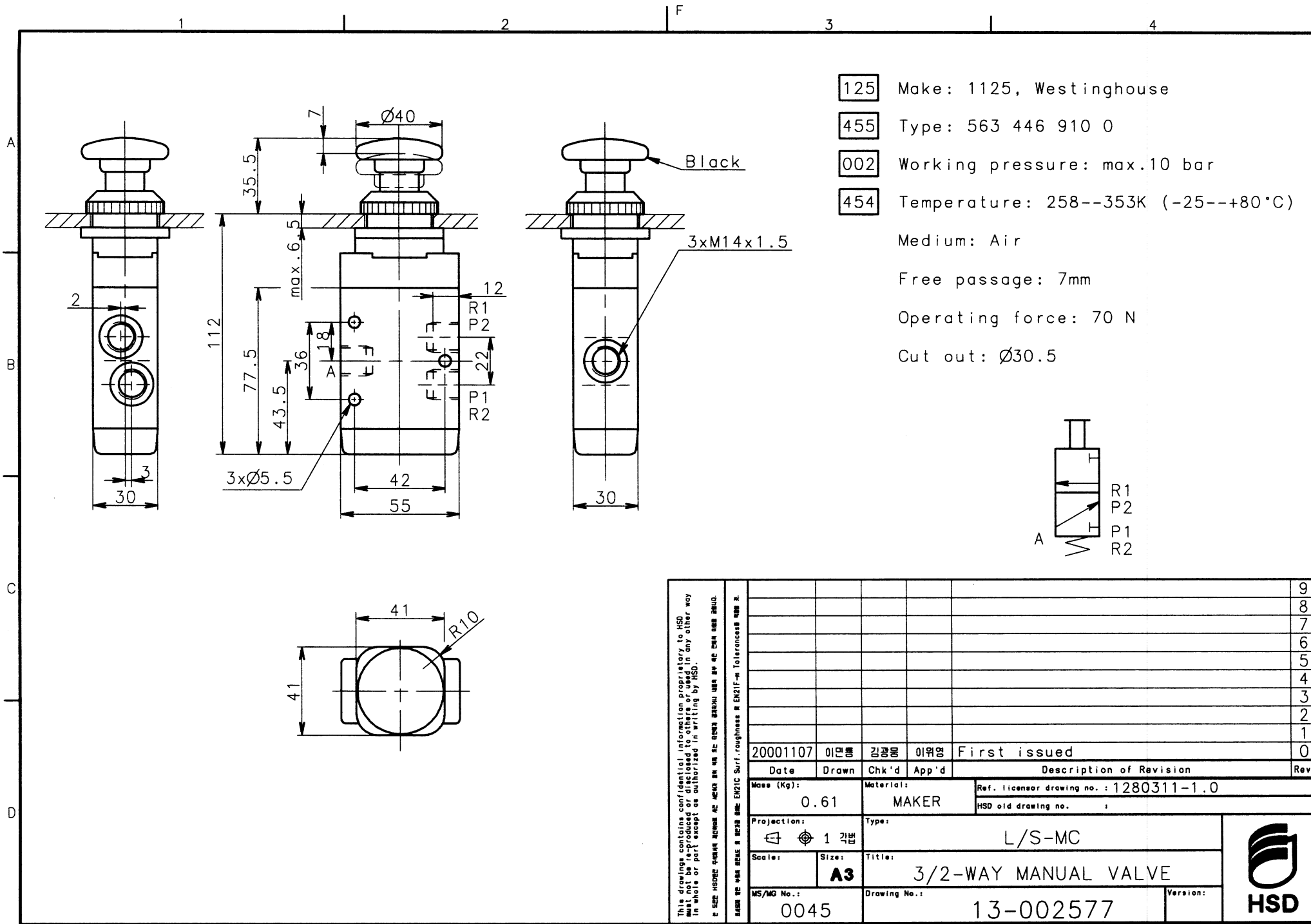
이 도면은 HSD의 기밀 정보이며, 무단으로 복제, 배포, 또는 다른 용도로 사용될 수 없습니다. HSD의 서면 허락 없이는 전체 또는 일부가 재현되거나 다른 용도로 사용될 수 없습니다.

20001107	이민종	김정영	이위영	First issued	9
Date	Drawn	Chk'd	App'd	Description of Revision	Rev.
Mass (Kg):	000	Material:	00000	Ref. licensor drawing no. : 0653687-5.3	8
Projection:	1 각법	Type:	L/S-MC	HSD old drawing no. :	7
Scale:	A3	Title:	5/2-Way manual valve		6
MS/MG No.:	0045	Drawing No.:	13-002581	Version:	5
					4
					3
					2
					1
					0



CAD Drawing - do not correct by hand



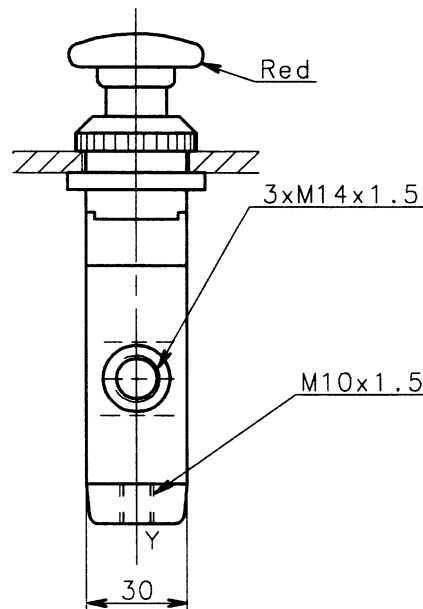
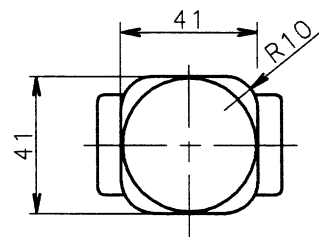
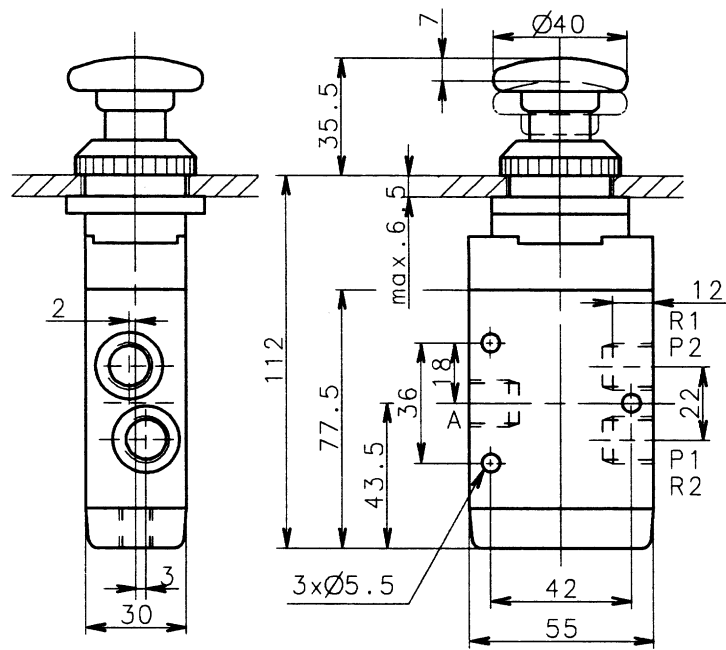


- 125 Make: 1125, Westinghouse
- 455 Type: 563 446 910 0
- 002 Working pressure: max.10 bar
- 454 Temperature: 258--353K (-25--+80°C)
- Medium: Air
- Free passage: 7mm
- Operating force: 70 N
- Cut out: Ø30.5

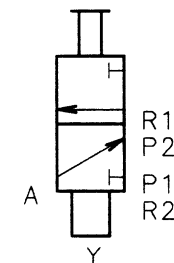
This drawing contains confidential information proprietary to HSD and must not be reproduced or disclosed to others or used in any other way in whole or part except as authorized in writing by HSD.					9
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					0
20001107 이만홍 김광웅 이우영 First issued					0
Date	Drawn	Chk'd	App'd	Description of Revision	Rev.
Mass (Kg): 0.61		Material: MAKER		Ref. licensor drawing no. : 1280311-1.0	
Projection: 1 각법		Type: L/S-MC		HSD old drawing no. :	
Scale: A3		Title: 3/2-WAY MANUAL VALVE			
MS/MG No.: 0045		Drawing No.: 13-002577		Version:	



A
B
C
D



- 125 Make: 1125, Westinghouse
- 455 Type: 563 446 912 0
- 002 Working pressure: max.10 bar
- 454 Temperature: 258--353K (-25--+80°C)
- Medium: Air
- Free passage: 7mm
- Operating force: 70 N
- Min.pressure at port Y: 2.5 bar
- Cut out: $\varnothing 30.5$



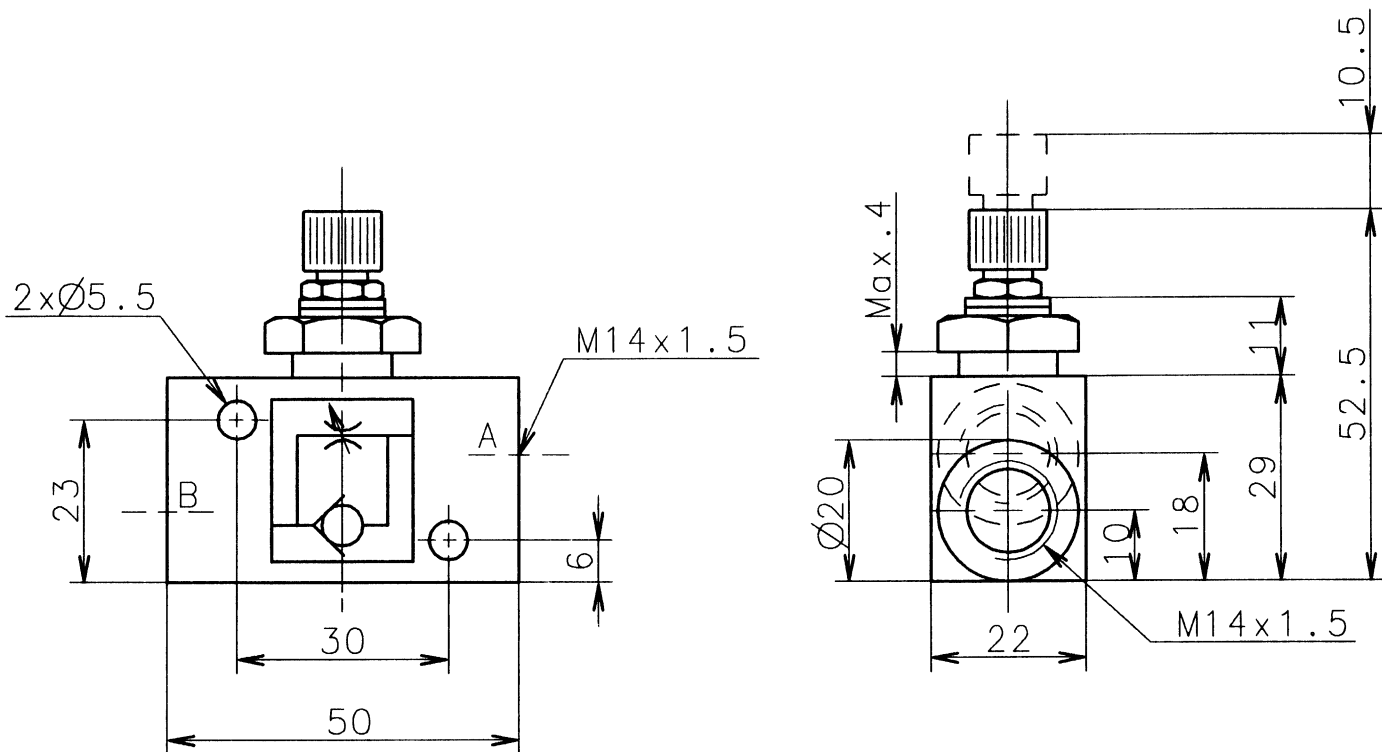
This drawing contains confidential information proprietary to HSD must not be re-produced or disclosed to others or used in any other way in whole or part except as authorized in writing by HSD.					9
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20001107 이만봉 김광명 이우영 First issued					0
Date	Drawn	Chk'd	App'd	Description of Revision	Rev.
Mass (Kg): 0.68		Material: MAKER		Ref. licensor drawing no. : 1280312-3.0	
Projection: 1 각법		Type: L/S-MC		HSD old drawing no. :	
Scale: A3		Title: 3/2-WAY MANUAL VALVE			
MS/MG No.: 0045		Drawing No.: 13-002579		Version:	



ISO Drawing - do not correct by hand



No.	Drawing no.	Description	Q'ty	Material	Weight	Size



Make or similar: Westinghouse 1125

Type: 534 108 000 0
Medium: Air. Working pressure 10 bar.
Ambient temperature: -25°C --> +80°C



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표시된 모든 부위의 치수는 EN21C Surf. roughness R EN21F-m Tolerances를 적용함 것.

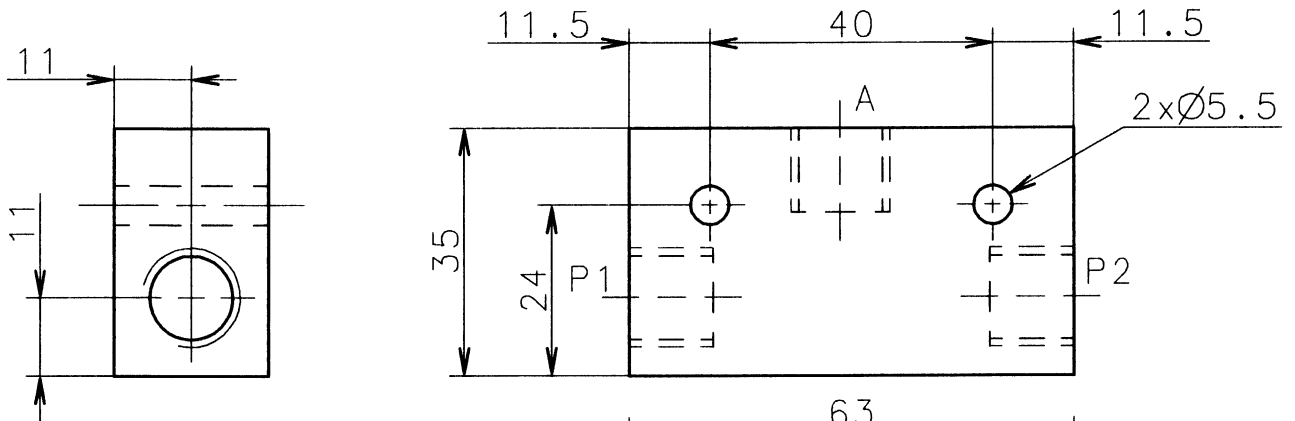
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20001107	이민영	김광영	이위영	First issued		0
Date	Drawn	Chk'd	App'd	Description of Revision		Rev.
Mass (Kg):	0.085	Material:	MAKER	Ref. licensor drawing no. : 1300308-1.1		
				HSD old drawing no. :		
Projection:	1 각법	Type:	L/S-MC			
Scale:		Size:	A4	Title:	Non-return valve	
MS/MG No.:	0045	Drawing No.:	14-001744	Version:		



CAD Drawing - do not correct by hand



No.	Drawing no.	Description	Q'ty	Material	Weight	Size



Make: WESTINGHOUSE, 1125

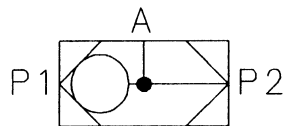
Type: 534 017 000 0

Working pressure: Max. 10 bar
Min. 0.3 bar

Max. ambient temp. -20 to +60°C

Medium: Air

Thread: M14x1.5



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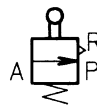
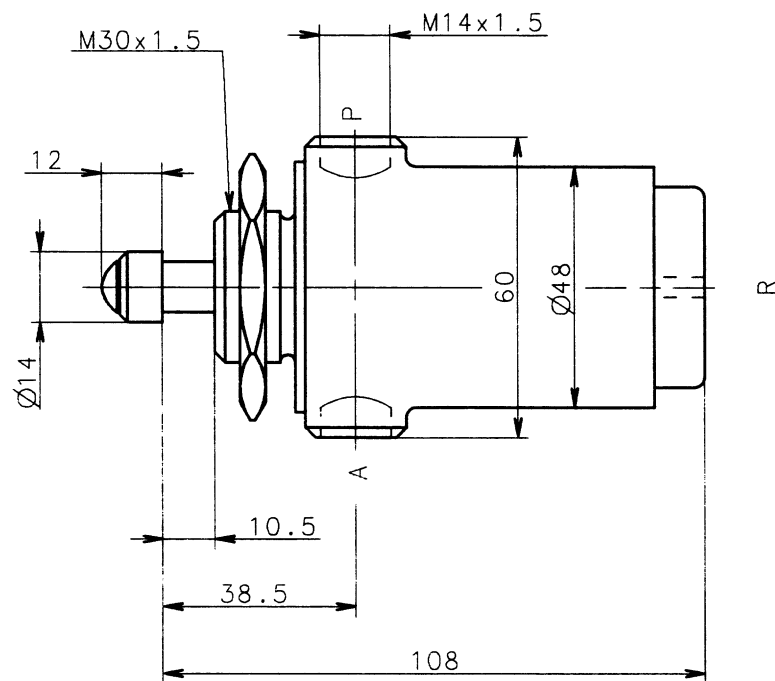
표시된 모든 부재의 표면도 및 치수값을 공하는 EN21C Surf.roughness 및 EN21F-m Tolerances를 적용할 것.

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Date	Drawn	Chk'd	App'd	Description of Revision		Rev.
Mass (Kg):		Material:		Ref. licensor drawing no. : 0695233-8		
				HSD old drawing no. :		
Projection:		Type:				
 1 각법						
Scale:	Size:	Title:				
	A4	NON RETURN VALVE				
MS/MG No.:		Drawing No.:			Version:	
0045		14-000100				
						 HSD



CAD Drawing - do not correct by hand





Make: Westinghouse 1125

Type: valve 361 071 050 0

nut 891 990 291 4

ball 892 030 670 2

Temperature: -25°C - +70°C

Working pressure: max. 10 bar

Operating force: 19 kp

Regulating range: 0.1-5.1 bar

Working stroke: 7.5mm

Medium: air

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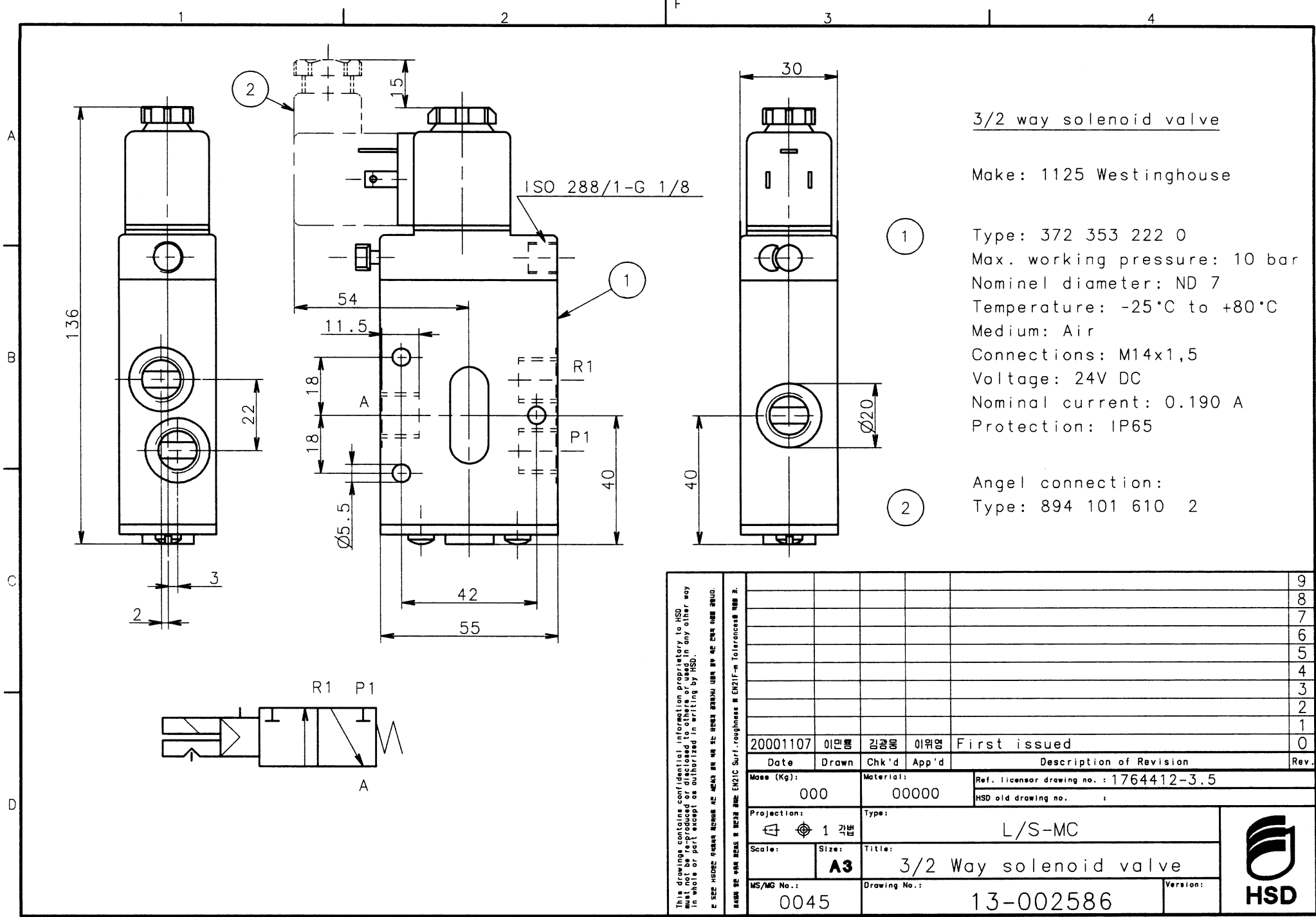
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20001107	이민봉	김영웅	이위영	First issued	9
Date	Drawn	Chk'd	App'd	Description of Revision	Rev.
Mass (Kg):	1	Material:		Ref. licensor drawing no. : 1380722-4.1	
				HSD old drawing no. :	
Projection:	1 각법	Type:	L/S-MC		
Scale:	A3	Title:	Regulating valve		
MS/MG No.:	0045	Drawing No.:	13-002527	Version:	



Original Drawing - do not correct by hand

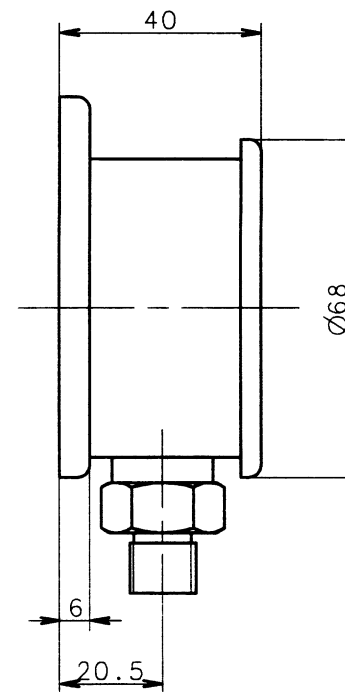
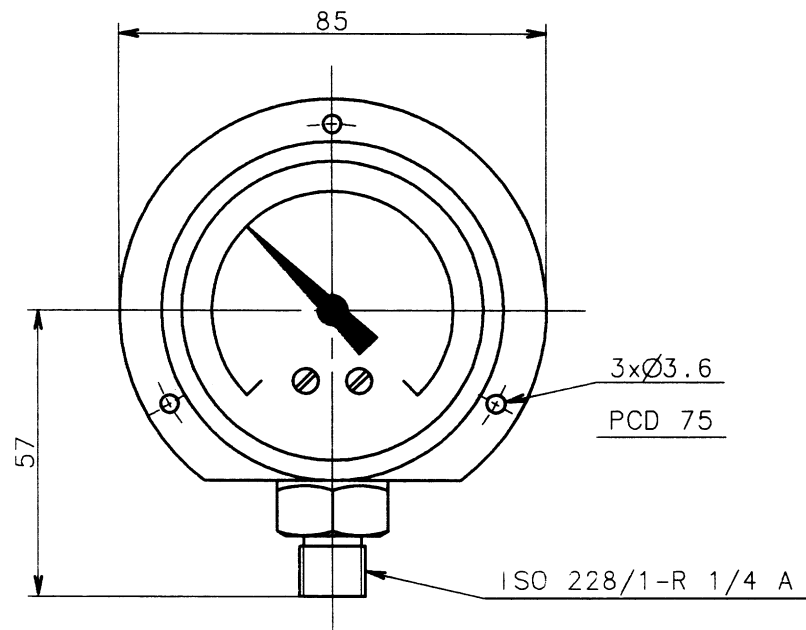




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 HSD의 사전 서면 동의 없이 이 도면을 무단으로 복제, 배포, 또는 다른 용도로 사용해서는 안 됩니다.

CAD Drawing - do not correct by hand





Working pressure: max. 6 bar

Medium: Air

Graduation: 0-6 bar

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중요한 정보: 이 도면은 HSD의 기밀 정보이며, HSD의 서면 허가 없이는 전체 또는 일부가 재현되거나 다른 용도로 사용될 수 없습니다.

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20001107	이민복	김광영	이위영	First issued		0
Date	Drawn	Chk'd	App'd	Description of Revision		Rev.
Mass (Kg):		Material:		Ref. licensor drawing no. : 1300638-7.2		
0.25		MAKER		HSD old drawing no. :		
Projection:		Type:		L/S-MC		
 1 각법						
Scale:		Size:		PRESSURE GAUGE		
		A3				
MS/MG No.:		Drawing No.:		Version:		
0045		13-002568				


HSD

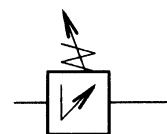
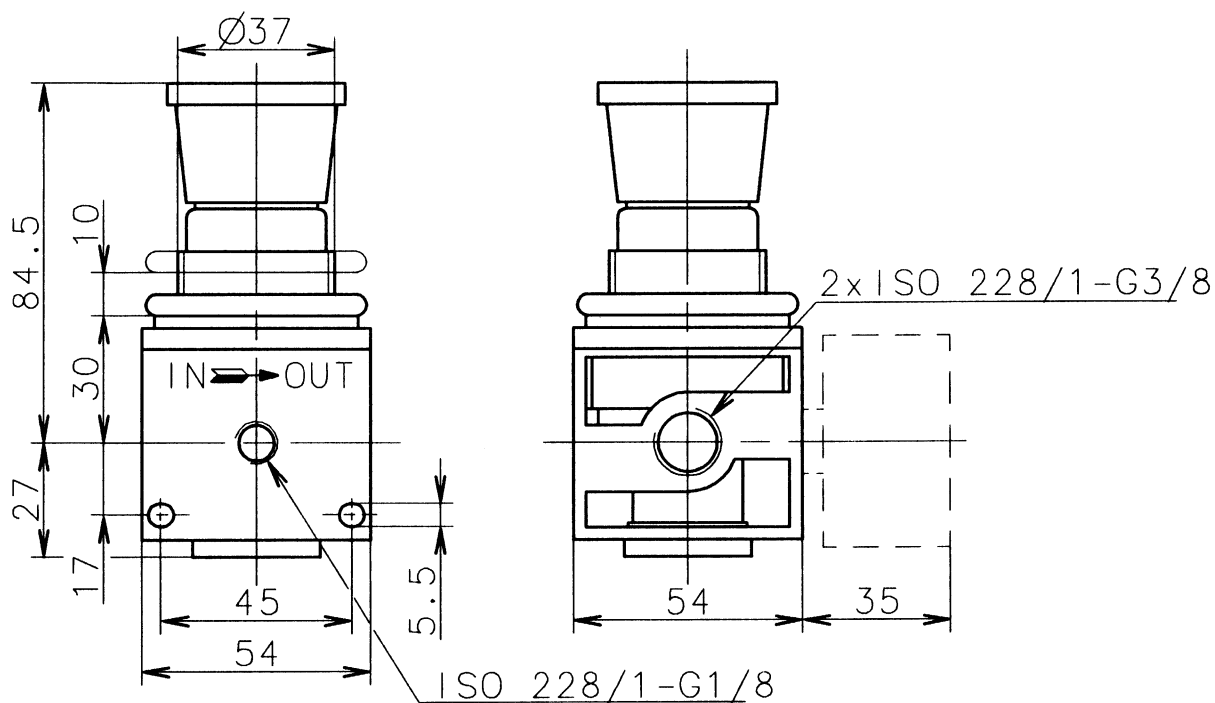
CAD Drawing - do not correct by hand



Old Drawing - do not correct by hand



No.	Drawing no.	Description	Q'ty	Material	Weight	Size

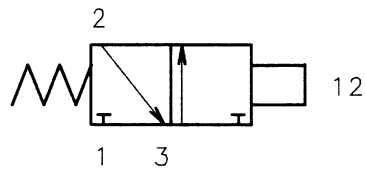
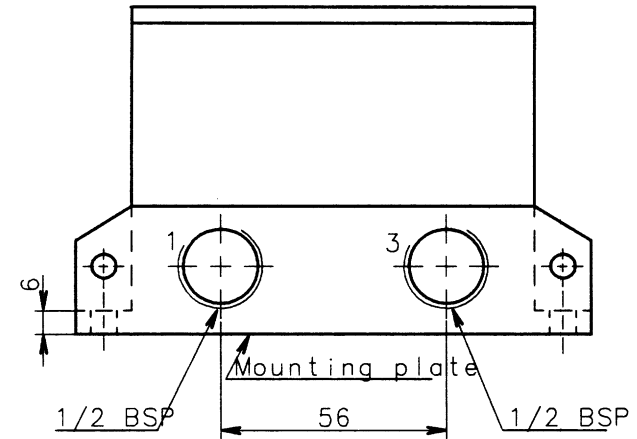
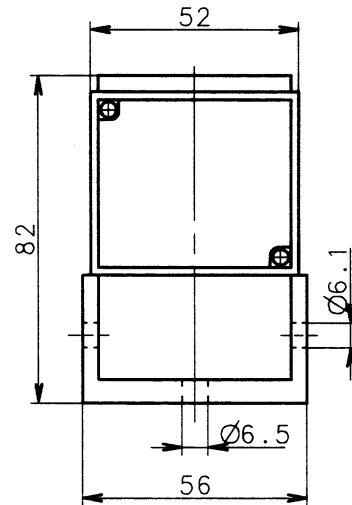
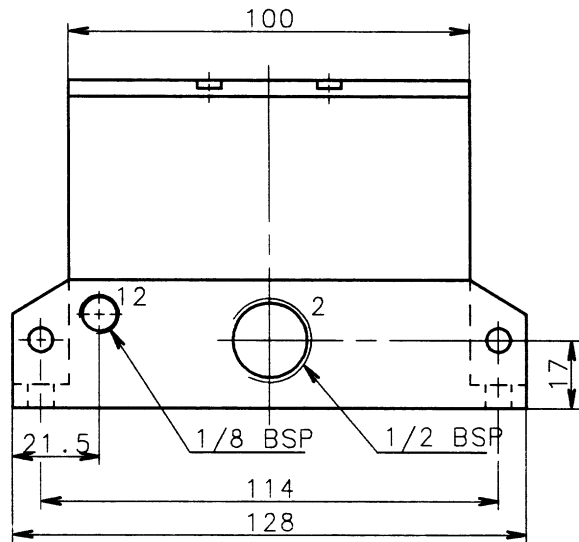


Make or similar: 1125 Medium Air 0,5-10bar -
Type : 535 022 201 0 Max ambient temperature
-20°C+80°C

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	20000630	LHKIM	LHKIM	KSLEE	First issued		0
Date	Drawn	Chk'd	App'd	Description of Revision	Rev.		
Mass (Kg):		Material:		Ref. licensor drawing no. :			
				HSD old drawing no. :			
Projection:		Type:					
1 각법							
Scale:	Size:	Title:					
	A4	REGULATING VALVE					
MS/MG No.:		Drawing No.:		Version:			
0045		14-000102					



No.	Drawing no.	Description	Q'ty	Material	Weight	Size



Make: 1076 Mecman

Type: 565-201 000 +
565-442 000 (Mounting plate)

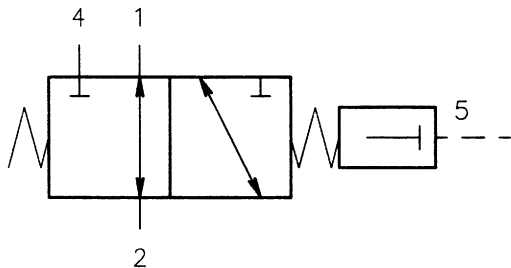
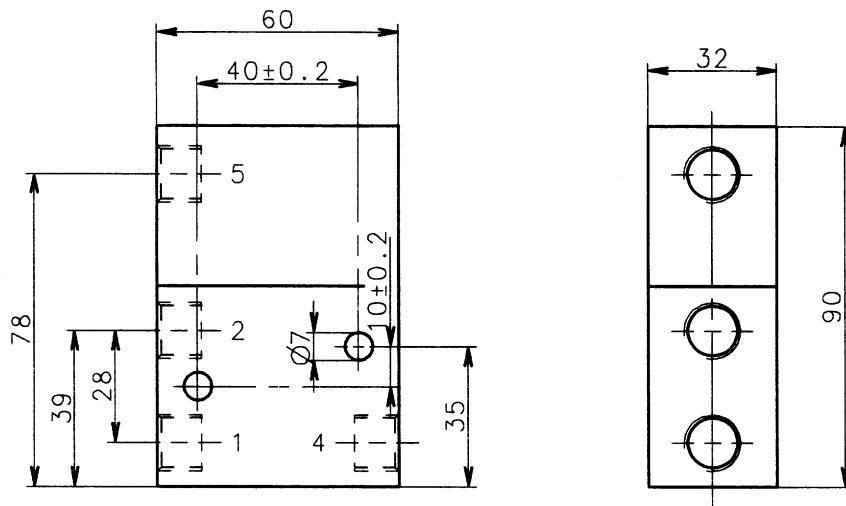
Working pressure: 10 bar
Control pressure: 3-10 bar
Medium: Air

This drawing contains confidential information proprietary to HSD. It must not be reproduced or disclosed to others or used in any other way without the written consent of HSD.								9
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20000710				LHKIM	LHKIM	KSLEE	First issued	0
Date	Drawn	Chk'd	App'd	Description of Revision				Rev.
Mass (Kg):				Material:		Ref. licensor drawing no. : 1380603-8		
						HSD old drawing no. :		
Projection:				Type:				
Scale:				Size:		Title:		
				A3		3/2 WAY VALVE		
MS/MG No.:				Drawing No.:		Version:		
0045				13-000295				



CAUTION - do not correct by hand



A
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D

No.	Drawing no.	Description	Q'ty	Material	Weight	Size

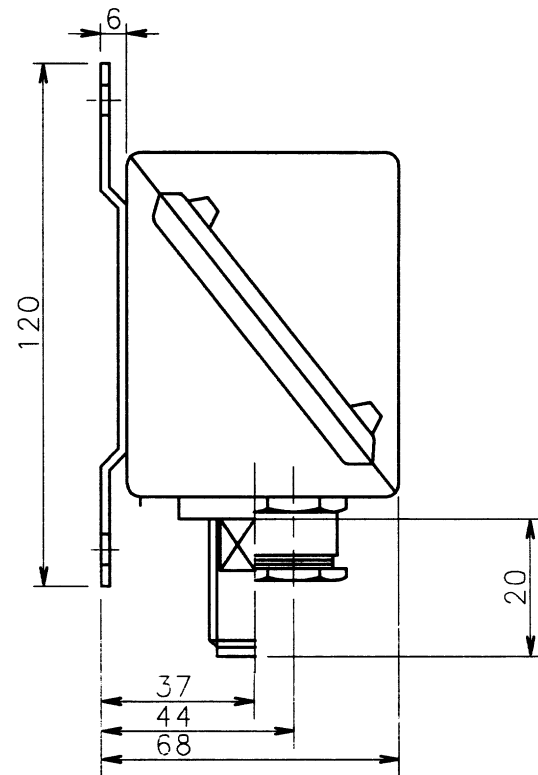
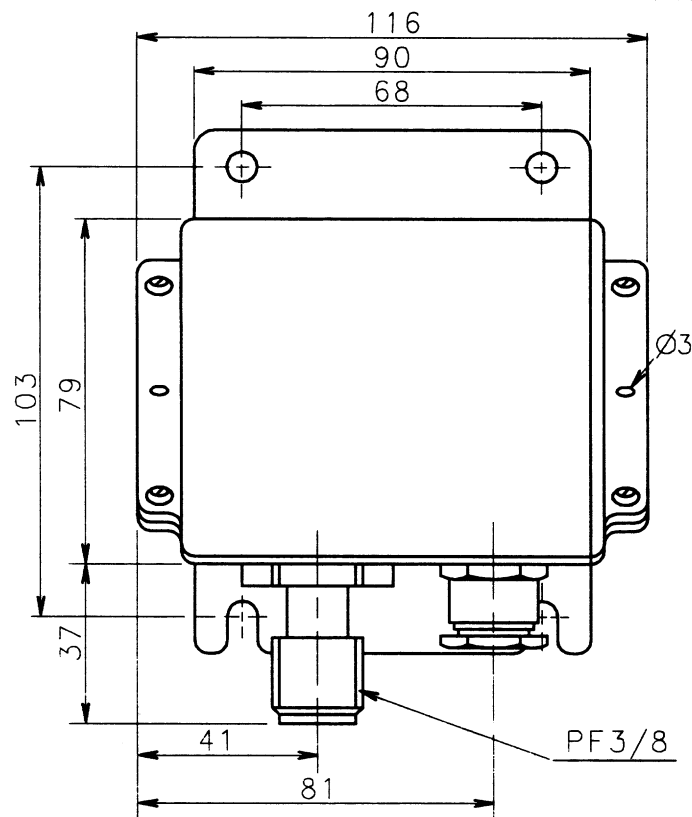
MAKE: WESTINGHOUSE
TYPE: 371 020 000 0
PIPE CONNECTION: M14x1.5
MEDIUM: AIR
MAX. AMBIENT TEMPERATURE: 70°C
MAX. PRESSURE: 10 Kp/cm²

This drawing contains confidential information proprietary to HSD. It must not be re-produced or disclosed to others or used in any other way in whole or part except as authorized in writing by HSD.					9	
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	20000710 LHKIM LHKIM KSLEE First issued				0	
Date		Drawn	Chk'd	App'd	Description of Revision	Rev.
Mass (Kg):		Material:		Ref. licensor drawing no. : 0691286-7		
Projection:		Type:		HSD old drawing no. :		
Scale:		Size:		Title:		
MS/MG No.:		Drawing No.:		Version:		
0045		13-000294		3/2 WAY VALVE		



CAD Drawing - do not correct by hand





Make or similar: 1051, Herion-Werke KG

Type: 0820167

Working pressure: 0.2 - 12 bar

Max. pressure: 30 bar

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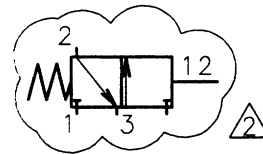
This drawing contains confidential information proprietary to HSD. It must not be reproduced or disclosed to others or used in any other way without the written authorization of HSD.

20001107	이민홍	김광영	이위영	First issued	9
Date	Drawn	Chk'd	App'd	Description of Revision	Rev.
Mass (Kg):	0.3	Material:	MAKER	Ref. licensor drawing no. : 0699025-2.4	8
Projection:	1 각법	Type:	L/S-MC	HSD old drawing no. : 123-6000039-1	7
Scale:	A3	Title:	Pressure switch		6
MS/MG No.:	0045	Drawing No.:	13-002650	Version:	5
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CAD Drawing - do not correct by hand

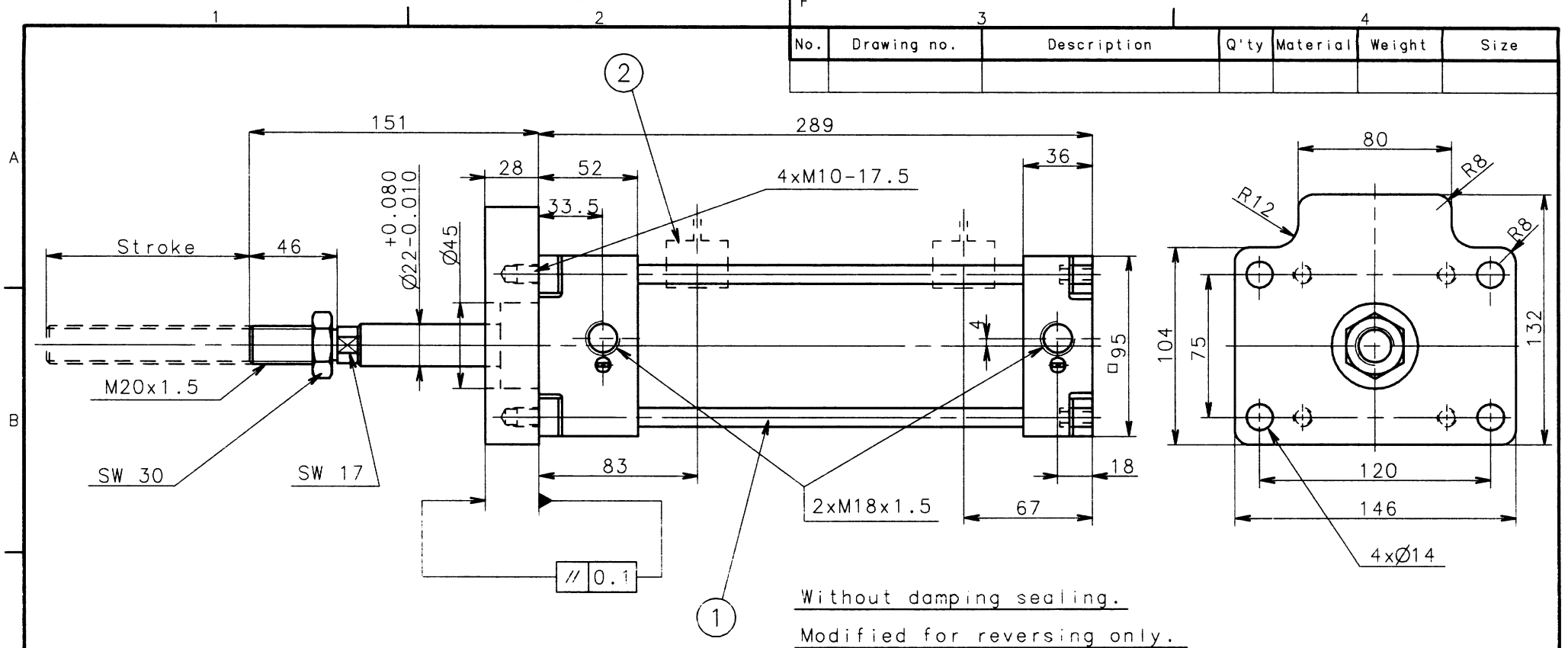




With PMS No. Name plate(see dwg.14-012041)
 -PMS No.는 BM/POR 참조할것.
 -Name plate는 입고시 유실되지 않도록 본체에
 단단히 묶어서 입고시킬것.

1000





Air.cyl.type: 322 064 191 0

Piston: Ø80

Stroke: 140 $\begin{matrix} +2.5 \\ -0.1 \end{matrix}$

Working pressure max.10 bar

Ambient temp.: -25°/ +75°C

Damping screws to be secured by loctite in the full open position.

This drawing contains confidential information proprietary to HSD. It must not be reproduced or disclosed to others or used in any other way without the prior written consent of HSD.	20001002					김종환	강종기	이위영	Replaced 3C07568-1,123-3001304-0	9
	Date					Drawn	Chk'd	App'd	Description of Revision	8
	Mass (Kg):		Material:			Ref. licensor drawing no. : 3138711-2.1				7
						HSD old drawing no. :				6
	Projection:		Type:			L/S70MC - MC-C				5
	 1 각법									4
	Scale:		Size:		Title:					3
	1:2		A3		AIR CYLINDER				2	
	MS/MG No.:		Drawing No.:			13-001006		Version:		1
										0

HSD										9
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13-001006

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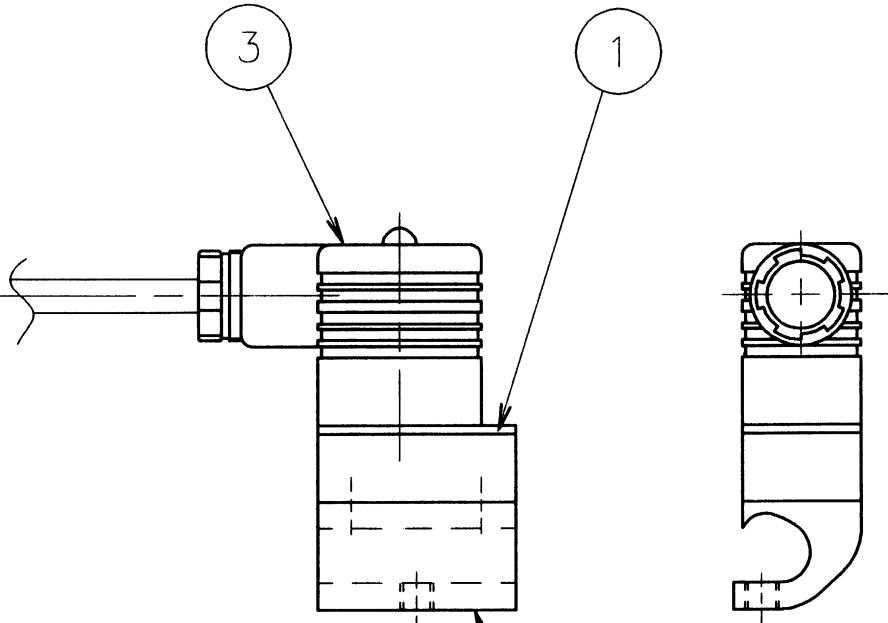
0

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CAU Drawing - do not correct by hand



No.	Drawing no.	Description	Q'ty	Material	Weight	Size
 Maker:Rexroth Cable gland:Pg 9 Cable:VCTF 2Cx0.75mm² x1.5m With PMS No. Name plate(see dwg.14-012041) -PMS No.는 BM/POR 참조할것. -Name plate는 입고시 유실되지 않도록 본체에 단단히 묶어서 입고시킬것. △ 1						

						9
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						2
20011112	안재성	김광웅	이위영	Note 추가 (PMS No.name plate 추가)		1
20001023	이만룡	김광웅	이위영	First issued		0
Date	Drawn	Chk'd	App'd	Description of Revision		Rev.
Mass (Kg):		Material:		Ref. licenser drawing no. :		
				HSD old drawing no. : 124-3001412-0		
Projection:		Type:				
  1 각법		L/S-MC				
Scale:	Size:	Title:				
	A4	MAGNETIC SWITCH ASS'Y				
MS/MG No.:		Drawing No.:			Version:	
0030		14-001391				

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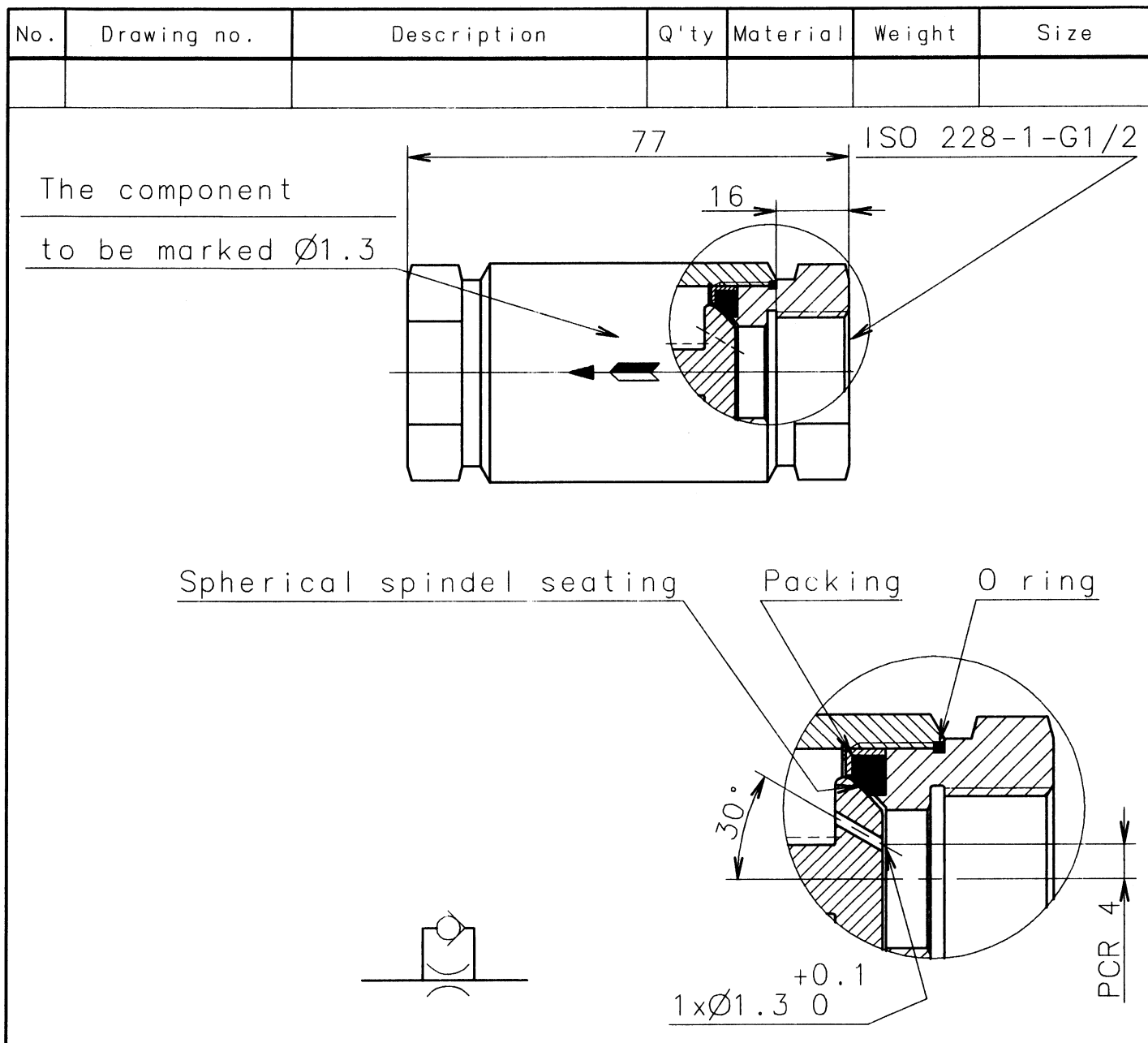
본 도면은 HSD의 기밀 정보이며, 무단으로 복제, 배포, 또는 타인에게 공개하거나, 인출, 또는 본 도면의 내용을 임의로 변경하는 행위는 법적으로 금지되어 있습니다.

표시된 모든 부위의 표면도 및 열처리금 규격은 EN21C Surf.roughness R EN21F-m Tolerances를 적용함 것.



CAD Drawing - do not correct by hand





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20001002	김종환	강흥기	이위영	Replaced 4C10542-0, 124-3002159-0		0
Date	Drawn	Chk'd	App'd	Description of Revision		Rev.
Mass (Kg): 0.410		Material:		Ref. licensor drawing no. : 1768620-5.1		
Projection: 1 각법		Type: L/S70MC		HSD old drawing no. :		
Scale: 1:1	Size: A4	Title: NON-RETURN VALVE				
MS/MG No.:		Drawing No.:			Version:	
		14-000503				

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본 도면은 HSD의 기밀 정보로 사내 사용용이며 외부에 공개하거나 다른 곳에 배포하는 것은 엄격히 금지되어 있습니다.

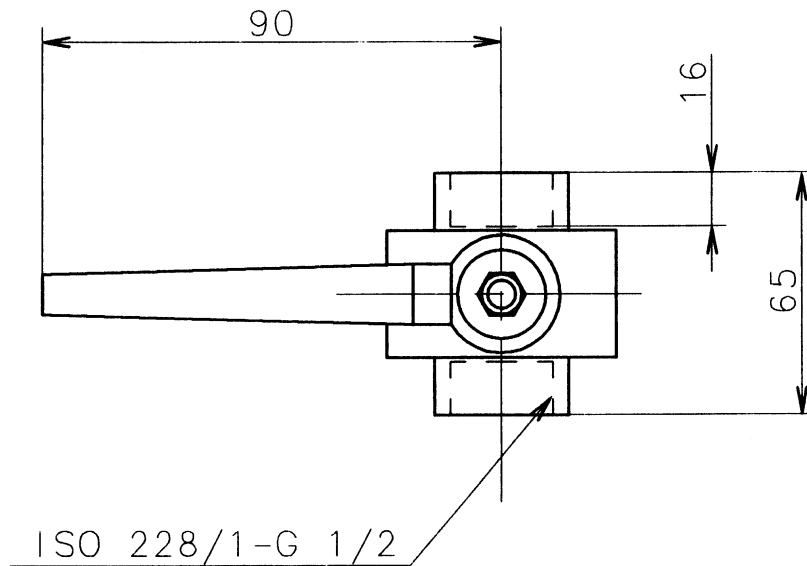
표준과 다른 규격의 치수나 재질은 EN21C Surf. roughness R EN21F-m Tolerances를 적용합니다.



CAD Drawing - do not correct by hand



No.	Drawing no.	Description	Q'ty	Material	Weight	Size



Make or similar: 1307

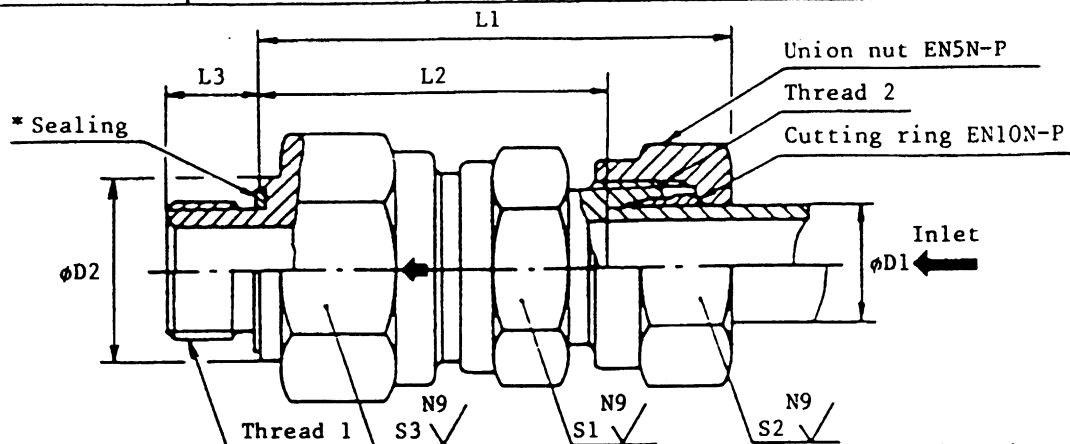
Type : Omega 12431 DN15

This drawing contains confidential information proprietary to HSD must not be re-produced or disclosed to others or used in any other way in whole or part except as authorized in writing by HSD. 본 도면은 HSD의 기밀정보로 취급되며, 무단으로 복제, 배포, 또는 타인에게 공개하거나, 인출, 철거, 훼손, 변형의 이용을 금합니다. 타사/타사의 명칭, 표지, 로고, 기타는 EN21C Surf. roughness R EN21F-m Tolerances를 적용함.						9
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	20001002	김종환	강흥기	이위영	Replaced 4C01818-1, 124-3000096-1	
Date	Drawn	Chk'd	App'd	Description of Revision		Rev.
Mass (Kg): 0,350		Material: MAKER		Ref. licensor drawing no. : 1423177-7.3		
Projection: 1 각법		Type:		HSD old drawing no. :		
Scale: 1:2	Size: A4	Title: BALL VALVE				
MS/MG No.:		Drawing No.: 14-000505				



CAD Drawing - do not correct by hand

Approved	Amended	Replaced by:	Replaces	Page No:
800630	GEW 880426			1 (1)



												Dimensions in mm				
Designation	Pipe D1	Thread 1.	2.	S1	S2	S3	L1 ≈	L2	L3	D2	Work. pressure	Opening pressure	Union nut EN5 N-P	Cut. ring EN10 N-P	Sealing material *	
ISO 228/1-												bar	bar			
6,210	6	G1/8A	M12x1,5	17	14	17	41	26,5	8	14	100	1	6,2	3		
12,110	12	G3/8A	M18x1,5	27	22	30	55	40,5	12	22	100	1	12,1	7	as	
22,210	22	G3/4A	M30x2	41	36	46	72	56	16	32	100	1	22,2	10,5	4710	
6,310	6	G1/4A	M14x1,5	19	17	19	46	31,5	12	19	400	1	6,3	3		
8,210	8	G1/4A	M14x1,5	19	17	19	43	28,5	12	19	100	1	8,2	5		
10,105	10	G1/4A	M16x1,5	22	19	24	53	38,5	12	19	100	0,5	10,1	6,0		
25,105	25	G1A	M36x2	46	46	50	78,5	54,5	18	40	250	0,5	25,1	11		
25,110	25	G1A	M36x2	46	46	50	78,5	54,5	18	40	250	1	25,1	11	as	
30,115	30	G1 1/4A	M42x2	60	50	60	90,5	64	20	50	250	1,5	30,1	13,0	5560	
10,202	10	G3/8A	M18x1,5	22	22	24	54	38	12	22	400	0,2	10,2	6		
16,105	16	G1/2A	M24x1,5	32	30	36	64	46	14	27	400	0,5	16,1	9		
16,110	16	G1/2A	M24x1,5	32	30	36	64	46	14	27	400	1	16,1	9		
20,105	20	G3/4A	M30x2	41	36	46	71,5	50	16	32	400	0,5	20,1	10		
20,110	20	G3/4A	M30x2	41	36	46	71,5	50	16	32	400	1	20,1	10		

Material : as S14A

*Sealing materials: as 4710 (~ Perbunan N) for variants according to the table.
As 5560 (~ Viton) for variants according to the table

Surface treatment: cadmium plated

Execution : with sealing, union nut and cutting ring

Media : fuel oil and lubricating oil

Temperature : max. 75°C for valves with sealing material 4710 (~ Perbunan N).
Max. 150°C for valves with sealing material 5560 (~ Viton)

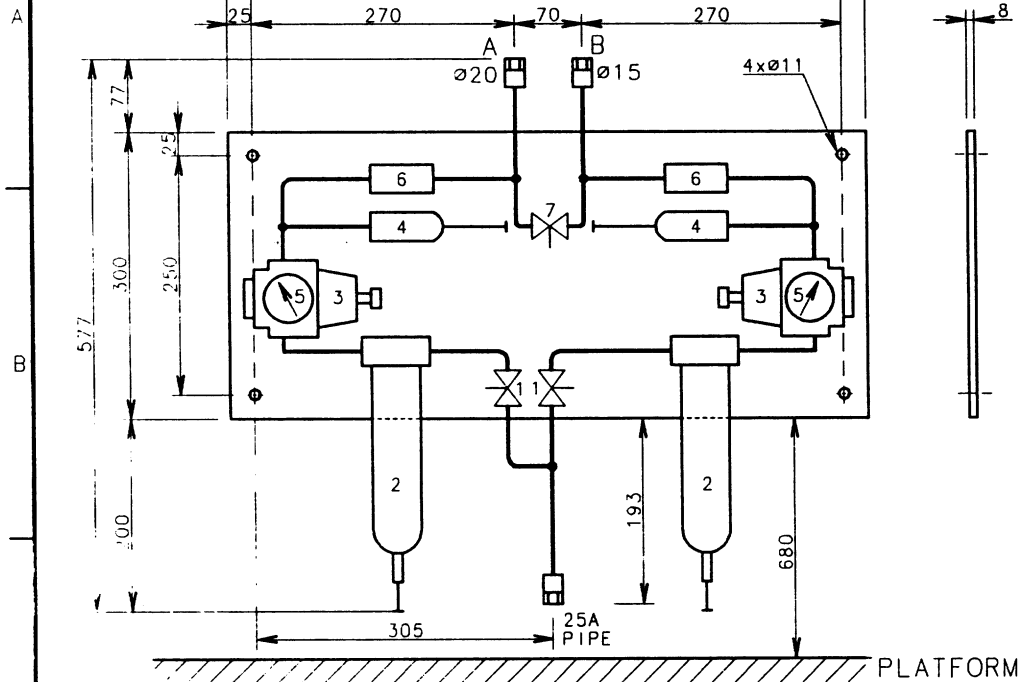
Tolerances : thread 1 ~ EN48D, page 2 (~ ISO 228/1-class A, 1982). 1)
Thread 2 ~ EN48H, page 21.-22. (6H) and 21.2 - 22.2 (6g). 1)
S1, S2 and S3 ~ EN4V 1)

1) See in the SB-standard book

Masses : appear from the BWEDS system

Designation : a non-return valve with ISO 228/1-G1/8A thread for pipes
D1 = 6mm, sealing material 4710 (~ Perbunan), opening pressure = 1 bar, and working pressure = 100 bar, is specified:

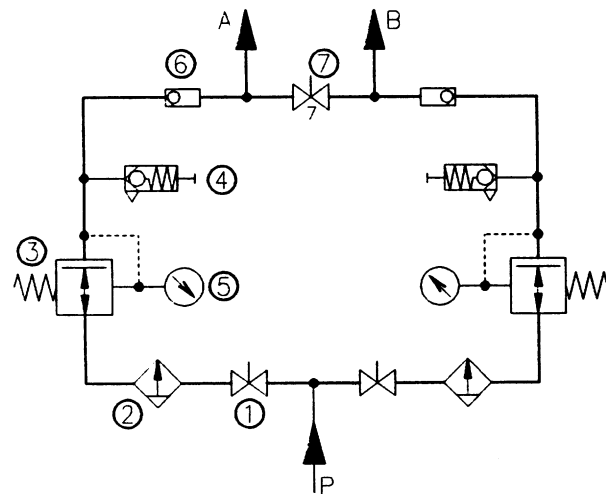




NO.	DESCRIPTION	PIECR-NR	Q'TY	REMARK
1	CUT OFF COCK	352 034 310 0	2	
2	FILTER	AE 121 010 0	2	
3	PRESSURE REDUCING VALVE	535 021 541 0	2	
4	SAFETY VALVE	134 607 003 0	2	
5	PRESSURE GAUGE	353 019 010 0	2	
6	CHECK VALVE	534 098 140 0	2	
7	CUT OFF COCK	352 032 350 0	1	

TECHNICAL DATA

SUPPLY PRESSURE	MAX.	30 bar.
OUTLET PRESSURE	MIN.	1.0 bar.
OUTLET PRESSURE	MAX.	10.0 bar.
OUTLET PRESSURE	ADJUSTED	7 bar.
FLOW RATE		
SUPPLY PRESURE	30 bar.	4000 NI/min
SUPPLY PRESURE	15 bar.	2000 NI/min
SAFETY VALVE		
RESPONSE PRESSURE		8.5 bar
FILTER POROSITY		25um
AMBIENT TEMPERATURE		273K 353K
ADMISSIBLE MEDIUM		COMPRESSED AIR
WEIGHT		36 Kg



This drawing contains confidential information proprietary to HSD must not be re-produced or disclosed to others or used in any other way in whole or part except as authorized in writing by HSD.

이 도면은 HSD의 기밀 정보로, 무단으로 복제, 배포, 또는 다른 형태로 사용될 수 없습니다. HSD의 서면 허가 없이는 전체 또는 부분적으로 재현하거나 다른 용도로 사용할 수 없습니다.

20030425	전미자	이재원	이경선	치수 변경	9
20030109	전미자	이재원	이재원	PLATFORM LOCATION ADDED	8
20020912	전미자	이재원	이재원	치수 변경	7
20020424	전미자	김광환	이정일	VALVE TYPE 변경	6
20020308	전미자	김광환	이정일	First issued	5
Date	Drawn	Chk'd	App'd	Description of Revision	Rev.
Mass (Kg):	Material:	Ref. licensor drawing no. :			
		HSD old drawing no. :			
Projection:	Type:				
Scale:	Size:	Title:			
	A3	PRESSURE REDUCING UNIT			
MS/MG No.:	Drawing No.:	Version:			
	13-015600	4			

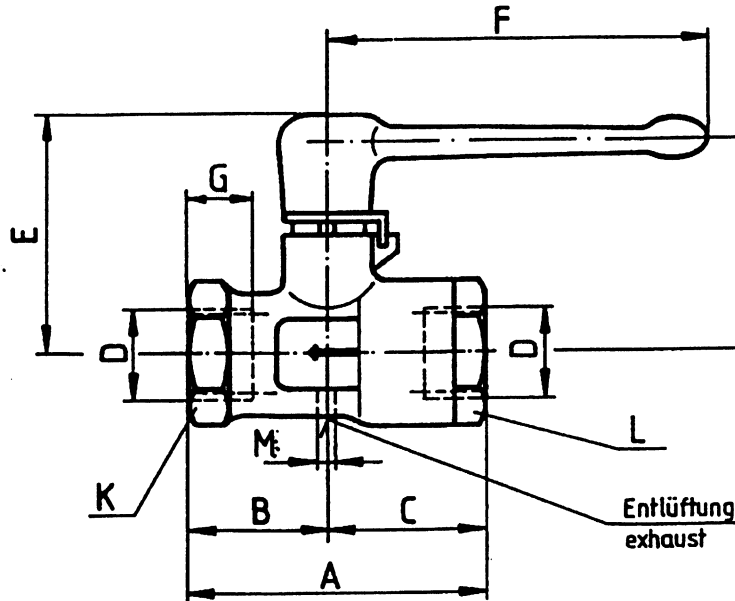


CAD Drawing - do not correct by hand

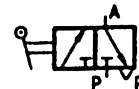
Absperrhahn cut-off-cock

352 034 ..0 0

Einbaumaße:
outline dimensions:

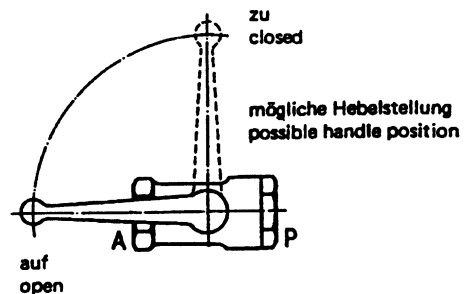
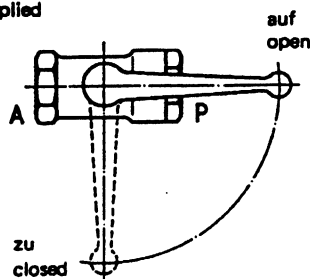


Sinnbild
symbol



Hebelausschlag:
handle-position:

werksseitige Auslieferung
condition as supplied



Technische Daten:
technical data:

Betriebsdruck max.
Zulässiges Medium
Thermischer Anwendungsbereich

working pressure max.
admissible medium
ambient temperature

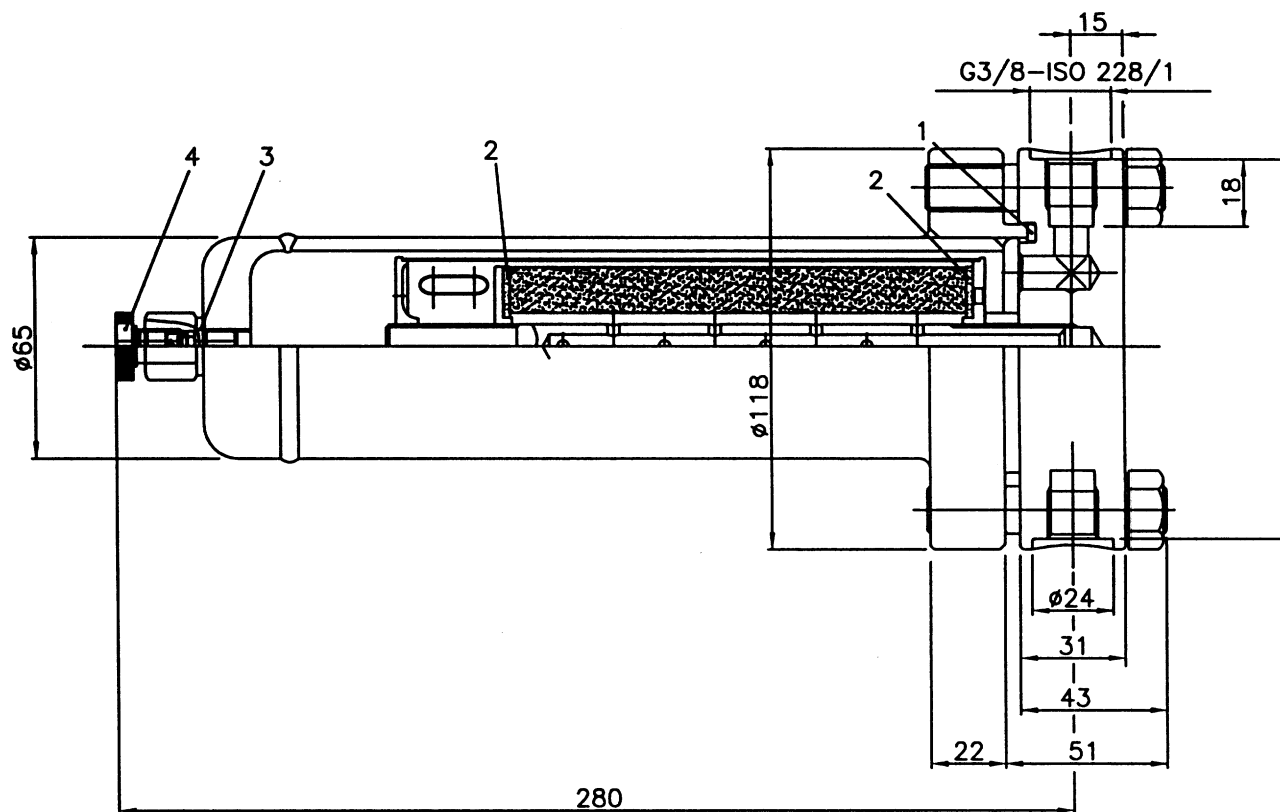
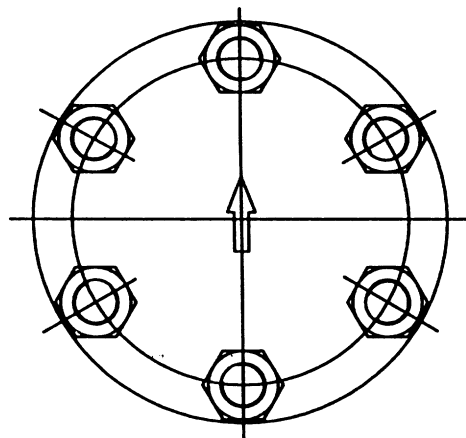
40 bar
Druckluft/compressed air
253 K ... 353 K

Bestellnummer type-number	Nennweite nominal diameter NW	Gewindeanschluß connection thread D	A	B	C	E	F	G	H	K	L	M
352 034 010 0	4	R 1/8"	45	20	25	35	48	10	29	—	14	1,5
352 034 110 0	7	R 1/4"	59	27	32	46	70	13	43	24	24	2
352 034 210 0	10	R 3/8"	59	27	32	46	70	13	43	24	24	2
352 034 310 0	13	R 1/2"	66	33	33	47	70	16	44	27	27	2
352 034 410 0	18	R 3/4"	78	39	39	63	108	18	54	32	38	2,5
352 034 510 0	23	R 1"	88	44	44	67	108	19	57	41	46	3

Mannesmann Rexroth Pneumatik GmbH
Marine Technique / Schiffstechnik
Bartweg 13, D-3000 Hannover 91
Telefon (0511) 21 36 - 213
Telefax (0511) 21 36 269, Telex 9 21 415-73

**MANNESMANN
REXROTH**
Pneumatik





TECHNICAL DATA

FLOW RATE	: 4100 NL/min
WORKING PRESSURE	: 50 bar
ADMISSIBLE MEDIUM	: COMPRESSED AIR
POROSITY	: 25 μ m
CONNECTIONS	: G3/8-ISO 228/1
PAINTING	: GREY
WEIGHT	: 6.3 kg

SPARE PARTS KIT

1. Sealing ring
2. Felt pad
3. Sealing ring
4. Drain valve

SYMBOL



	03.02.11	FIRST ISSUE	J.H.SON	Y.M.ANN	K.S.LIM
NO	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED
SENACOSENACO ELECTRO-PNEUTECH.CO.					
TYPE	AE 121 010 0		SIMILAR LICENCE DRAWING NO.		
TITLE				PROJECT	SCALE
LINE FILTER					
DRAWN	ED			DRA	
J.H.SO	NN				

Classic Series

Servo regulator 535 021, G 1/2 - G 1

engineering
mannesmann
Rexroth

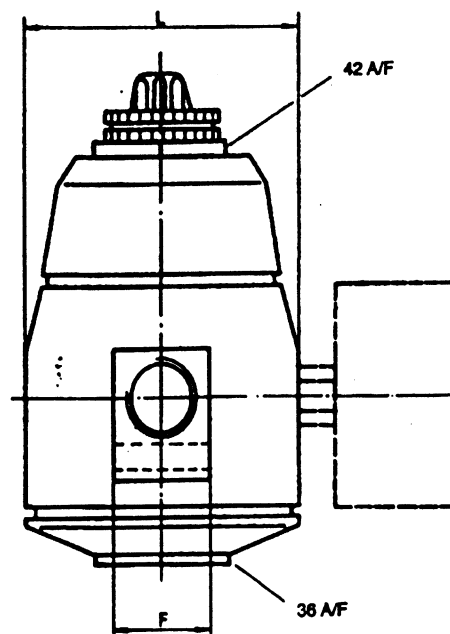
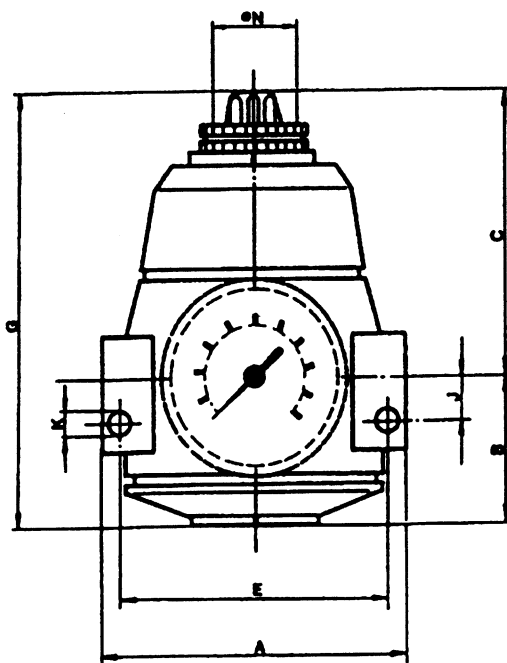
Technical Data

Type	Servocontrolled regulator, self-relieving
Max. primary pressure	20 bar
Secondary pressure	0,5 - 10 bar
Nominal flow Q_n at primary pressure = 8 bar, secondary pressure = 6 bar and $\Delta p = 1$ bar	See table +5° C to +50° C 0° C to +50° C
Ambient temperature range	Compressed air See table
Medium	
Weight	
Connection for pressure gauge	G 1/8 ISO 228/1
Materials	Body Zn-diecasting



Symbol	Threaded ports ISO 228/1	Nominal flow Q_n [l/min.]	Weight [kg]	Code number With pressure gauge
	G 1/2	3000	1,4	535 021 441 0
	G 3/4	6400	1,4	535 021 541 0
	G 1	7450	1,6	535 021 641 0

Pressure gauges see Accessories.



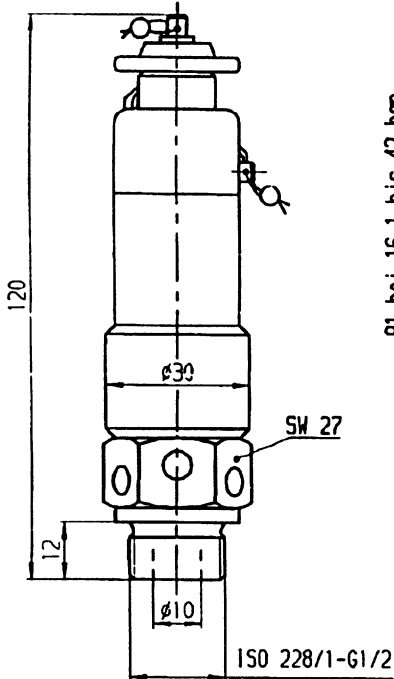
Threaded ports ISO 228/1	A	B	C	E	F	G	J	K	L	N
G 1/2, G 3/4	95	45	95	85	35,5	140	21	6,2	77	32,5
G 1	95	49,5	99,5	85	40,5	149	25,5	6,2	77	32,5



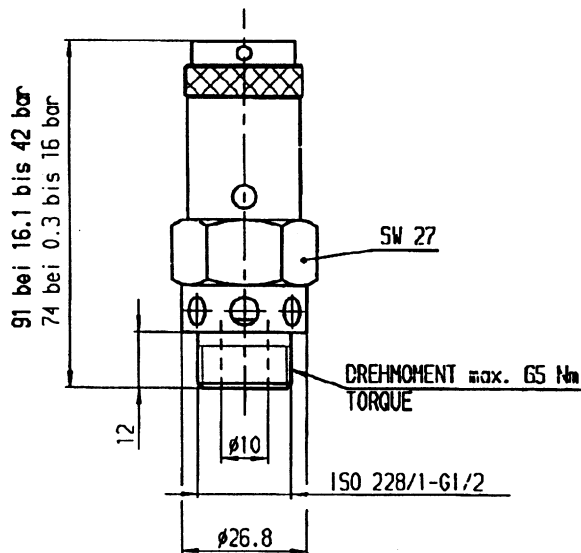
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① ALTE BAUFORM OLD TYPE OF CONSTRUCTION ①



NEUE BAUFORM AB DEM 01.01.1995 NEW TYPE OF CONSTRUCTION ①



TECHNISCHE DATEN TECHNICAL DATA

BETRIEBSDRUCK : MAX. 20 BAR
SERVICE PRESSURE :
THERM. ANWENDUNGSBEREICH : -10°C BIS + 180°C
THERM. RANGE OF APPLICATION :
MEDIUM : LUFT, AIR
EINBAULAGE : BELIEBIG
MOUNTING POS. : AS DESIRED
NENNWEITE : NW 10
NOMINAL WIDTH :
WERKSTOFF : MESSING MIT VITONDICHTUNG
MATERIAL : BRASS WITH VITON GASKET

DIE ANGEGEBENEN LEISTUNGEN WERDEN BEI 10% DRUCKANSTIEG ÜBER DEM ANSPRECHDRUCK P₀ ERREICHT. GEMESSEN BEI 20°C.
THE INDICATED PERFORMANCE ARE OBTAINED, IF THE REACTION PRESSURE P₀ IS 10% HIGHER THAN THE ADJUSTED PRESSURE. MEASURED AT 20°C.
BAUTEILE GEPRÜFT NACH AD-MERKBLATT A2

BEZEICHNUNG PIECE-NUMBER	ANSPRECHDRUCK P ₀ =bar OPENING PRESSURE	ABLASELEISTUNG NL/min QUANTITY OF FLOW	BEZEICHNUNG PIECE-NUMBER	ANSPRECHDRUCK P ₀ =bar OPENING PRESSURE	ABLASELEISTUNG NL/min QUANTITY OF FLOW
134 607 000 0	3.5	1833	134 607 010 0	5.5	2667
134 607 001 0	4.0	2050	134 607 011 0	10.0	4559
134 607 002 0	5.0	2467	134 607 012 0	10.5	4767
134 607 003 0	8.5	3917	134 607 013 0	6.5	3083
134 607 004 0	9.0	4133	134 607 014 0	12.0	5395 ①
134 607 005 0	11.0	4978	134 607 015 0	12.5	5600 ①
134 607 006 0	6.0	2888			
134 607 007 0	8.0	3717			
134 607 008 0	20.0	8783			
134 607 009 0	7.0	3305			

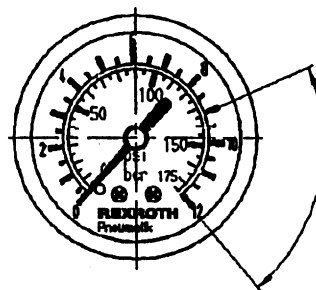
GENERAL TOLERANCES					
RANGE OF NOMINAL DIMENSIONS (mm)					
CLASS	≤50	>50 ≤180	>180 ≤400	>400	
I	0.5	1	1.5	2	13°
II	1	2	3	4	
III	2	3.5	5	6.5	

1) TOLERANCE CLASS APPLIED CROSS-MARKED

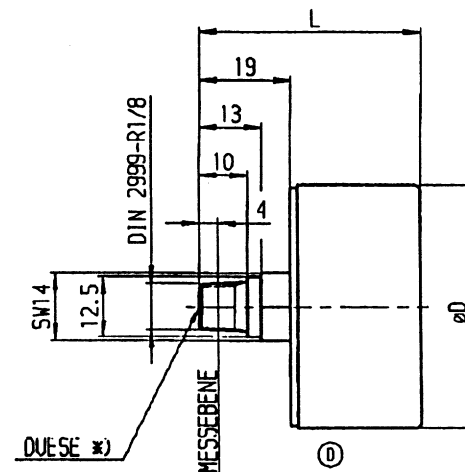
DATE		SIGNATURE		MANNESMANN REXROTH	
12-10-94		GRABER		Pneumatik	
12-10-94		SCHLINGENKAMP		PNEUMATIC SAFETY VALVE	
12-10-94		LEHNER		SICHERHEITSVENTIL	
12-10-94		STOSSBERG		08. FEB. 2001	
12-10-94		STOSSBERG		STANDARDIZATION	
12-10-94		STOSSBERG		PRODUCT IDENTIFICATION NO.	
12-10-94		STOSSBERG		134 607 000 0	
12-10-94		STOSSBERG		CODE FOR DOC. POS. SHEET	
12-10-94		STOSSBERG		605	
12-10-94		STOSSBERG		REPLACEMENT FOR	
12-10-94		STOSSBERG		ZCHN. GL. NR. VON 25.2.72	

DIE ERFINDER HAT KEIN RECHT AN DER PATENTIERUNG DIESER VERFAHRENS-
 ANORDNUNG, WEIL SIE KEIN NEUES, SONDERN NUR EIN BEKANNTES VERFAHREN
 VERBESSERT.

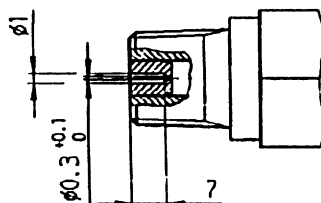
TEIL-NR.	ANZEIGENBEREICH		øD	L
	bar	psi		
353 019 010 0	0 BIS 12	0 BIS 175	50 *	46
353 019 011 0	0 BIS 6	0 BIS 87	50	46
353 019 012 0	0 BIS 3	0 BIS 43,5	50	46
353 019 013 0	0 BIS 4	0 BIS 58,5	50	46
353 019 014 0	0 BIS 16	0 BIS 233,5	50	46
353 019 015 0	0 BIS 1,6	0 BIS 23,5	50	46
353 019 019 0	0 BIS 12	0 BIS 175	50	46



BEI ABWANDLUNG 353 019 019 0 IST DER bar-BEREICH (ZAHLEN U. SKALA) ROT



*) LAGE DER DUESE
2,1



AUSFUEHRUNG:

ZIFFERBLATT : WEISS

BESCHRIFTUNG : SCHWARZ bar
ROT psi

SKALENBILD ENTSPRECHEND DEM ANZEIGEBEREICH

GENERAL TOLERANCES						
CLASS	RANGE OF NOMINAL DIMENSIONS (mm)					A
	1)	≤50	>50 ≤180	>180 ≤400	>400	
1		0.5	1	1.5	2	13°
11		1	2	3	4	
111		2	3.5	5	6.5	

1) TOLERANCE CLASS APPLIED CROSSMARKED

[illegible]

Control Valves

Check valves M5 - G 2

Technical Data

Type	Poppet valve
Working pressure range	See table
Nominal flow rate Q_n at 6 bar, $\Delta p = 1$ bar	See table
Ambient temperature range	See table
Medium	Compressed air, lubricated or non-lubricated
Weight	See table

Materials	Body Seals	Brass NBR
-----------	---------------	--------------



Code No.

ND	Fig.	Ports	Ambient temperature range	Working pressure [bar]	Q_n [l/min.]	Weight [kg]	Code no.
2	1	M 5	-25°C to +80°C	0,2 to 10	80	0,006	534 003 000 0
4	2	G 1/8	-15°C to +60°C	0,5 to 15	230	0,072	534 098 100 0
8	2	G 1/4	-15°C to +60°C	0,5 to 15	1050	0,168	534 098 110 0
10	2	G 3/8	-15°C to +60°C	0,5 to 15	1650	0,263	534 098 120 0
12	2	G 1/2	-15°C to +60°C	0,5 to 15	2200	0,283	534 098 130 0
20	2	G 3/4	-15°C to +60°C	0,5 to 15	6200	0,620	534 098 140 0
25	3	G 1	-20°C to +70°C	0,25 to 16	18 209	1,600	534 050 000 0
25	4	G 1	-15°C to +110°C	0,5 to 12	-	0,270	534 097 030 0
32	4	G 1 1/4	-15°C to +110°C	0,5 to 10	-	0,380	534 097 040 0
38	4	G 1 1/2	-15°C to +110°C	0,5 to 10	-	0,650	534 097 050 0
50	4	G 2	-15°C to +110°C	0,5 to 10	-	0,850	534 097 060 0

* To ISO 228/1.

Fig. 1

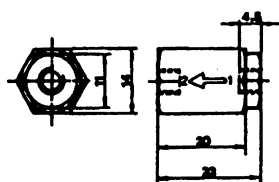


Fig. 2

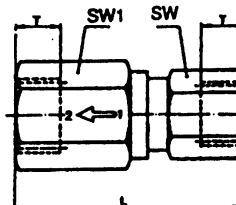


Fig. 3

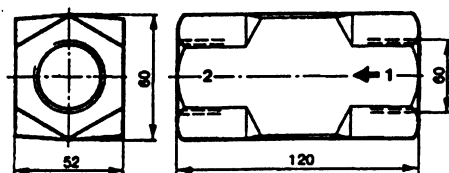
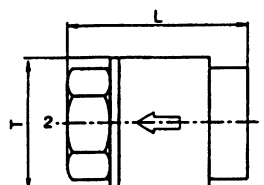


Fig. 4



ND	Fig.	L	T	SW	SW1
2	1	-	-	-	-
4	2	44	8	17	17
8	2	57	10	22	24
10	2	66	10	27	30
12	2	76	14	27	30
20	2	89,5	16	36	41
25	3	-	-	-	-
25	4	60	47,5	-	-
32	4	65	59	-	-
38	4	74	70	-	-
50	4	80	86,5	-	-



Shut Off Valves

1/4 - turn stop cock, non-relieving (2/2 - function) G 1/4 - G 2

mannesmann
Rexroth

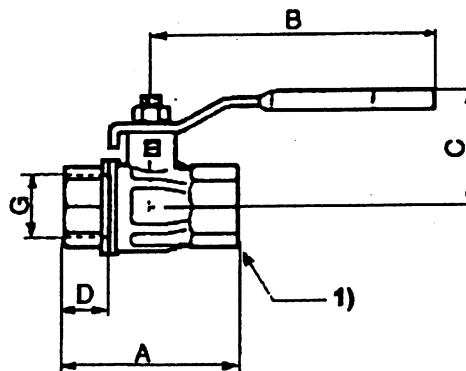


Type	Ball valve
Working pressure max.	See table
Nominal diameter ND	See table
Ambient temperature range	-20° C to +150° C
Medium	Compressed air, lubricated or non-lubricated
Weight	See table

Materials	Body Hand lever Seals	Brass, nickel plated Plastic covered steel, blue Teflon
-----------	-----------------------------	---



Symbol	ND	Threaded ports ISO 228/1	Working pressure max. [bar]	Weight [kg]	Code no.
	7	G 1/4	30	0,14	352 032 150 0
	10	G 3/8	30	0,14	352 032 250 0
	15	G 1/2	30	0,20	352 032 350 0
	20	G 3/4	30	0,32	352 032 450 0
	25	G 1	30	0,49	352 032 550 0
	32	G 1 1/4	25	0,90	352 032 650 0
	40	G 1 1/2	25	1,35	352 032 750 0
	50	G 2	25	1,80	352 032 850 0



ND	Thread G	A	B	C	D	1) SW
10	G 1/4	51,5	100	45	11	20
10	G 3/8	51,5	100	45	12	20
15	G 1/2	55	100	50	13,5	25
20	G 3/4	57,5	120	62	12,5	31
25	G 1	69,5	120	64	15	38
32	G 1 1/4	81,5	153	80	17	48
40	G 1 1/2	95	153	86	18	54
50	G 2	113	162	98	22	66





CLIENT : DAEWOO shipbuilding & marine eng. Co.,Ltd.
 HULL NO. : 5258
 ENGINE TYPE : HSD - MAN B&W 5S70MC(MK 6)

Subject:

M/E WIRING DIAGRAM & CABLE ROUTE PLAN

Note : 1. M/E WIRING DIAGRAM : DWG. NO. 14-013707-3 , 27 SHEETS

2. M/E CABLE ROUTE PLAN : DWG. NO. 13-017635-3, 5 SHEETS

REV. 2

1. PT FOR EXH. VALVE SPRING AIR INLET (ALARM) IS ADDED (PAGE 8)
2. PS FOR T/V DAMPER IS ADDED (PAGE 15)
3. MIP SYSTEM IS ADDED (PAGE 24)

5					
4					
3	TO BE REVISED (PAGE 9,16,19)	2003.04.09			
2	SEE ABOVE NOTES	2003.03.21	J. T. YUN		J. I. LEE
1	GOVERNOR & BMS MAKER CHANGED FORM STL. TO NABCO	2002.12.16	J. T. YUN		J. I. LEE
0	FIRST ISSUED	2002.11.21	J. T. YUN		J. I. LEE
REV.	DESCRIPTION	DATED	Prepared	Reviewed	Approved
DESIGN TEAM 2			Documentation No.		
Tel. +82 55 260 6607 Fax. +82 55 260 6640			EA01-1258		
HSD ENGINE Co., Ltd.					



Main Engine Wiring Diagram

NOTE : Rev. 2

1-1.PT FOR EXH. VALVE SPRING AIR INLET(ALARM) IS ADDED(PAGE 8)

1-2.PS FOR T/V DAMPER IS ADDED

1-3.MIP IS ADDED

△					
③	2003.04.02	TO BE REVISED(PAGE 9,16,19)			M.J.JEON J.T.YUN K.S.LEE
②	2003.01.03	SEE ABOVE NOTES			M.J.JEON J.T.YUN J.I.LEE
①	2002.12.16	GOVERNOR & BMS MAKER CHANGED FROM STL TO NABCO			M.J.JEON J.T.YUN J.I.LEE
REV.	DATE	DESCRIPTION			PREP'D CHEC'D APPR'D
CLASS.		DNV		PROJECT NAME	UNIQ 5258
ENGINE TYPE		5S70MC		PROJECT NO.	DML1-1258
PREP'D	CHEC'D	APPR'D	M/S NO.	00	DESCRIPTION WIRING DIA. CONF'D
M.J.JEON	J.T.YUN	J.I.LEE	SHIPYARD	D.S.M.E.CO, LTD	
021121	021121	021121	HULL NO.	HN.5258	



1. SCOPE

1-1 SCOPE OF SUPPLY

- A) — — — : MATERIAL TO BE PROVIDED BY SHIP YARD
- B) ————— : MATERIAL TO BE PROVIDED BY ENGINE BUILDER
- C) -----➤ (TO ECR) : CABLING TO BE PROVIDED BY SHIP YARD

1-2 ELECTRIC CABLES AND CABLE WAYS REMOVED FOR TRANSPORTATION AFTER SHOP TRIAL SHOULD BE RESTORED BY SHIP YARD.

1-3 THE SIZE AND QUANTITY OF CABLE GLANDS FOR HULL SIDE ON MAIN JUNCTION BOXES SHOULD BE INFORMED US BY SHIP YARD WITH THE DRAWING APPROVED.



2 . SYMBOL LIST

PS,P	PRESSURE SWITCH
PT	PRESSURE TRANSMITTER
PDS	PRESSURE DIFFERENCE SWITCH
PDT	PRESSURE DIFFERENCE TRANSMITTER
TS	TEMPRATURE SWITCH
TE	TEMPERATURE ELEMENT (Pt-100 Ω)
TH	TEMPERATURE ELEMENT (THERMOCOUPLE)
ZS,S	POSITION SWITCH (LIMIT SWITCH)
GT	GAUGING TRANSMITTER (LOAD TRANSMITTER)
ST	SPEED TRANSMITTER
ZV,SV	POSITION VALVE (SOL. VALVE)
CX	CONTROL UNCLASSIFIED
OMD	OIL MIST DETECTOR
AS	ANALYSIS SWITCH
XS	UNCLASSIFIED SWITCH
IND-BOX	LOCAL CONTROL BOX
FS	FLOW SWITCH
LS	LEVEL SWITCH
FE	FLOW ELEMENT
HS	HAND SWITCH (MANUAL SWITCH)
ETG	TELEGRAPH GONG
ACT	GOVERNOR ACTUATOR
ETU	E/S TELEGRAPH RECEIVER
SOL-BOX	SOLENOID VALVE BOX FOR REMOTE CONTROL
TGM	TURNING GEAR MOTOR
ABM	AUX. BLOWER MOTOR
ME-JB	MAIN ENGINE JUNCTION BOX
JB	JOINT BOX



3 . CABLE TYPE (IN ACCORDANCE WITH JIS C 3410/IEC 60332-3)

AT THE WIRING DIAGRAM, THE CABLE TYPE OF THE WIRING AT ENGINE SIDE ARE TO BE SPECIFIED BY ABRIDGED LETTERS AT INDICATED AT THE BELOW TABLE. THIS CABLE IS FRAME RETARDMENT CABLE.

BUT, IN CASE THE SPECIAL WIRE IS EMPLOYED, IT IS NOTED AT EACH WIRING DIAGRAM.

ABRIDGED	KIND OF CABLE	NO. OF CONDUCTOR	CABLE SIZE (mm ²)	GLAND SIZE	TYPE OF CABLE
LM2	L-FA-MPYC	2	1	15	L-FA-MPYC 250V, FLAME REDARDANT, ETHYLENE PROPYLENE RUBBER INSULATED, PVC SHEATHED, STEEL WIRE BRAIDED CABLE
LM4		4	1	15	
LM7		7	1	20	
LM12		12	1	25	
LM19		19	1	25	
LM27		27	1	30	
LM37		37	1	30	
LM44		44	1	35	
LM77		77	1	45	
LMS2	L-FA-MPYCS	2	1	15	COMMON SHIELD CABLE
LMS4		4	1	15	
LMS7		7	1	20	

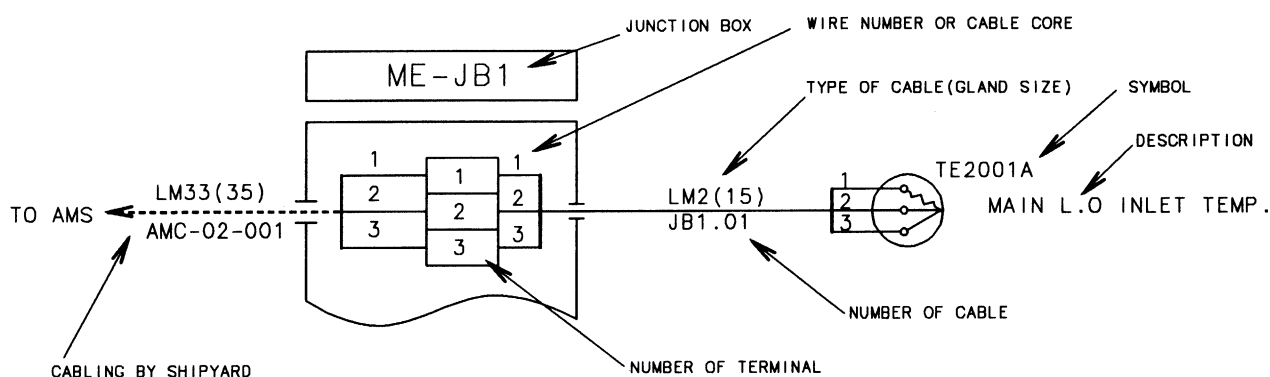
4 . APPARATUSES AND DEVICE USED FOR WIRING OF ENGINE SIDE

4-1. THE CABLES ARE TO BE EMPLOYED AS ENGINE MAKER'S STANDARD.
PLEASE SEE EATH WIRING DIAGRAM.

4-2. TERMINAL BOARDS AND TERMINALS

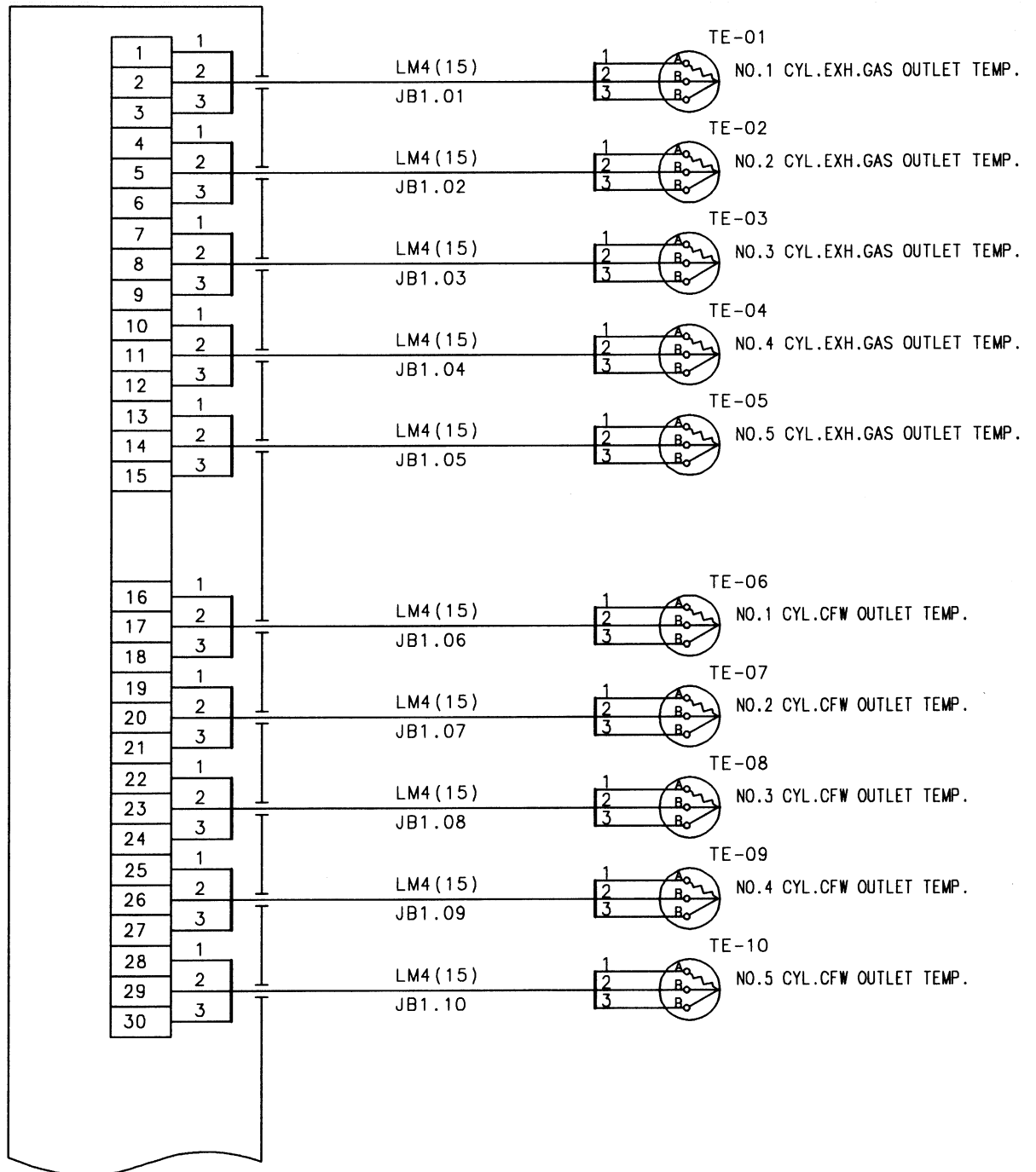
- 1) KS V 8823 "C-20" TERMINAL BOARDS ARE EMPLOYED 1.25 AND 2mm² CABLES.
- 2) KS V 8823 "R1.25-4" TERMINAL IS EMPLOYED FOR 1.25 CABLES AND "R2-4" FOR 2.0 mm²

5 . WIRING AND CONNECTIONS

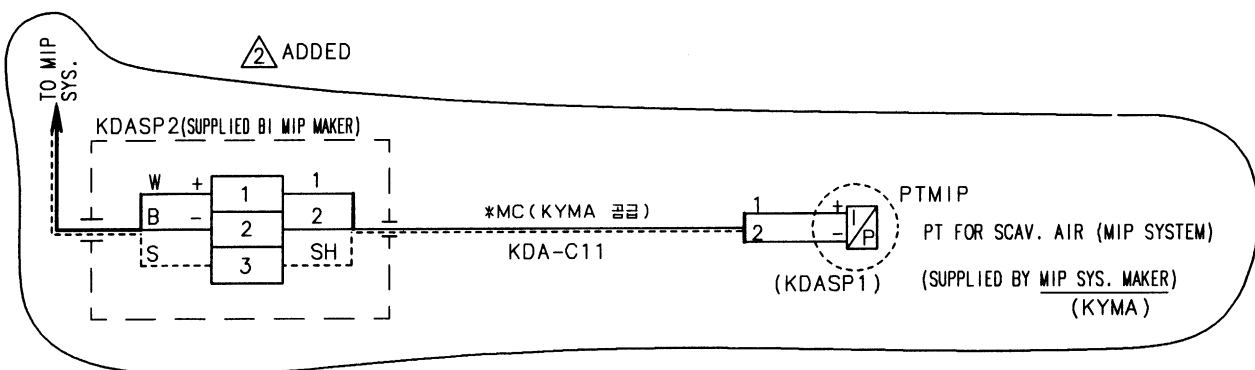
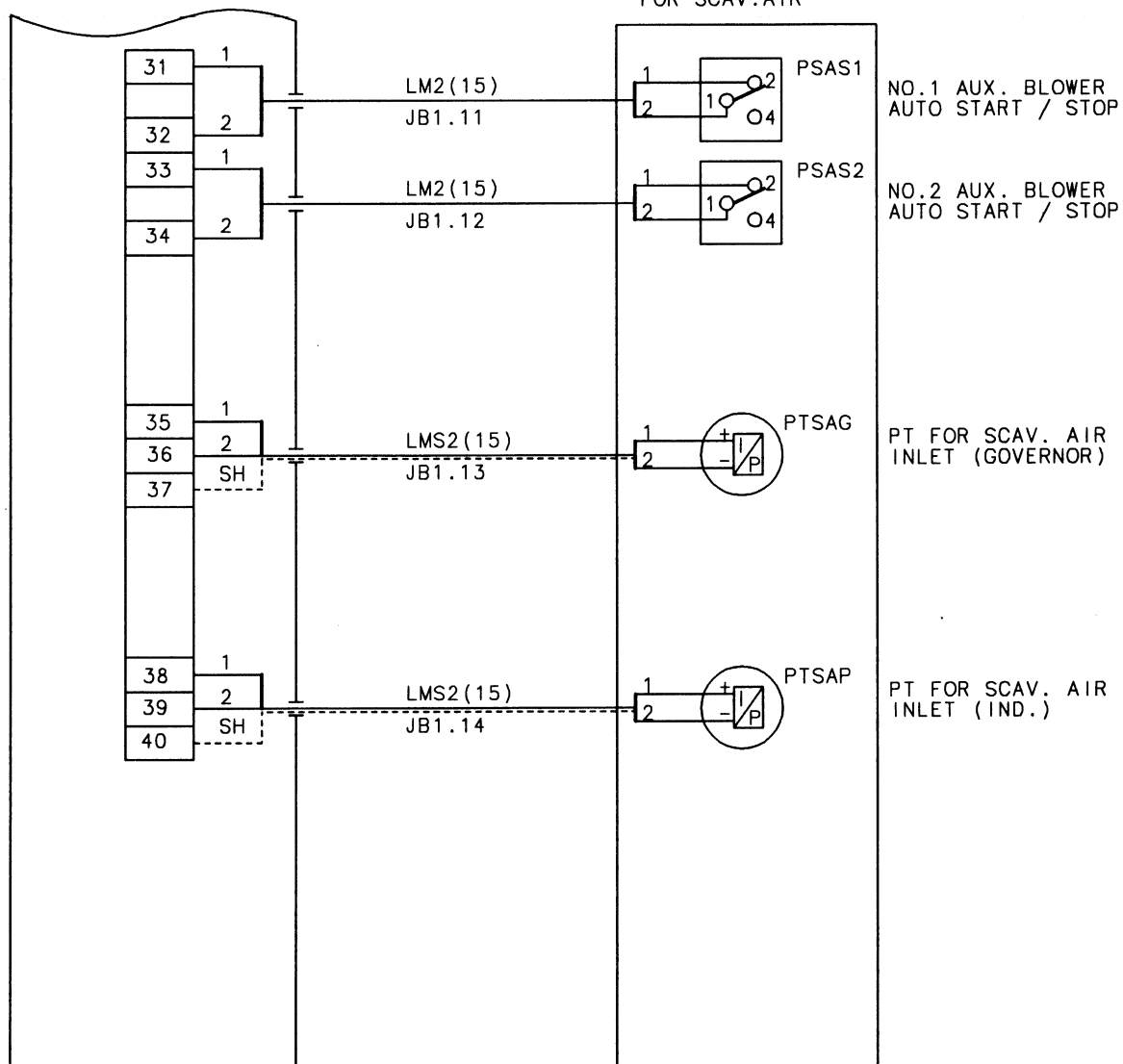


ME - JB1

1 OF 2

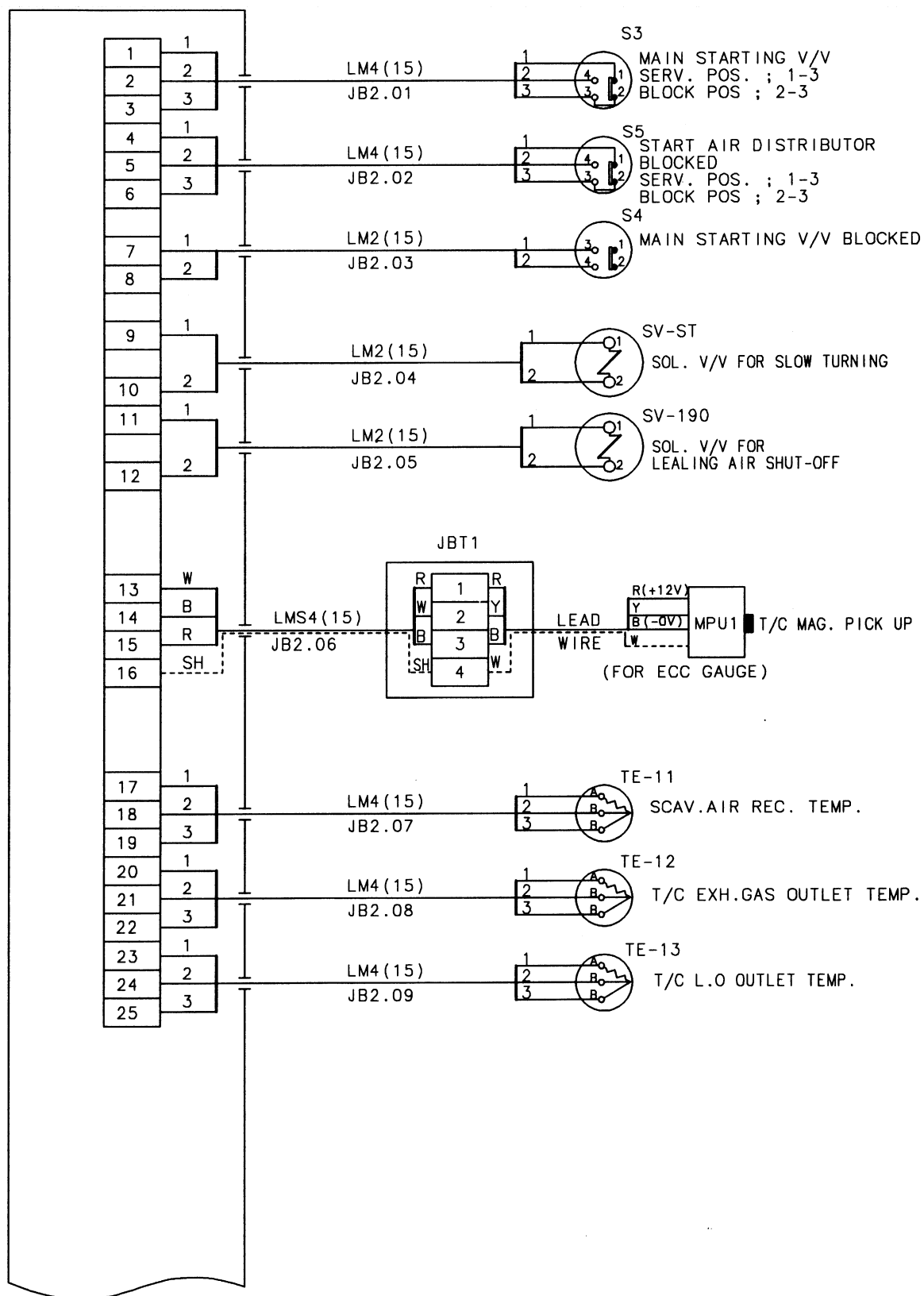


ME - JB1 2 OF 2

PRESS. PANEL
FOR SCAV. AIR

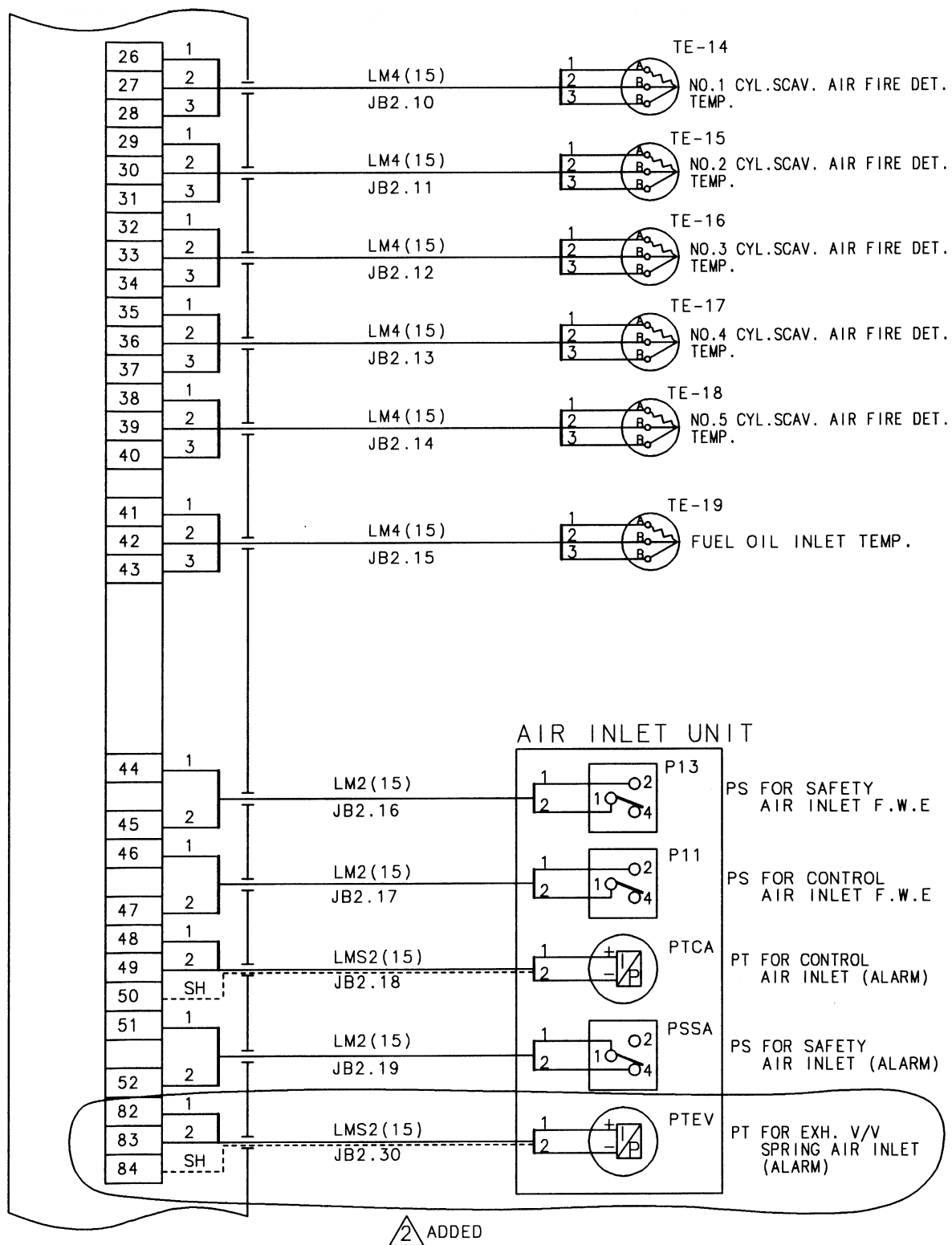
ME - JB2

1 OF 3



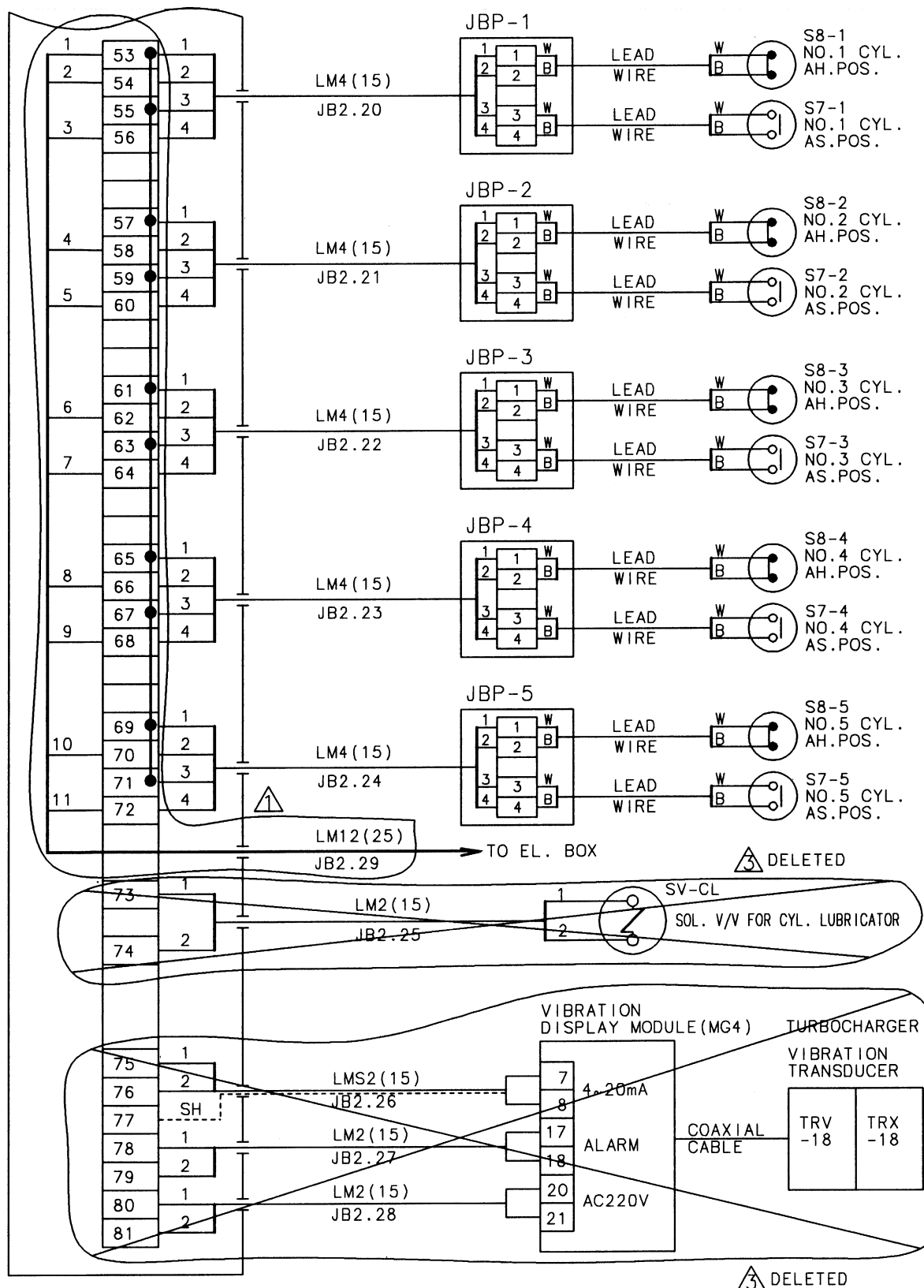
ME - JB2

2 OF 3



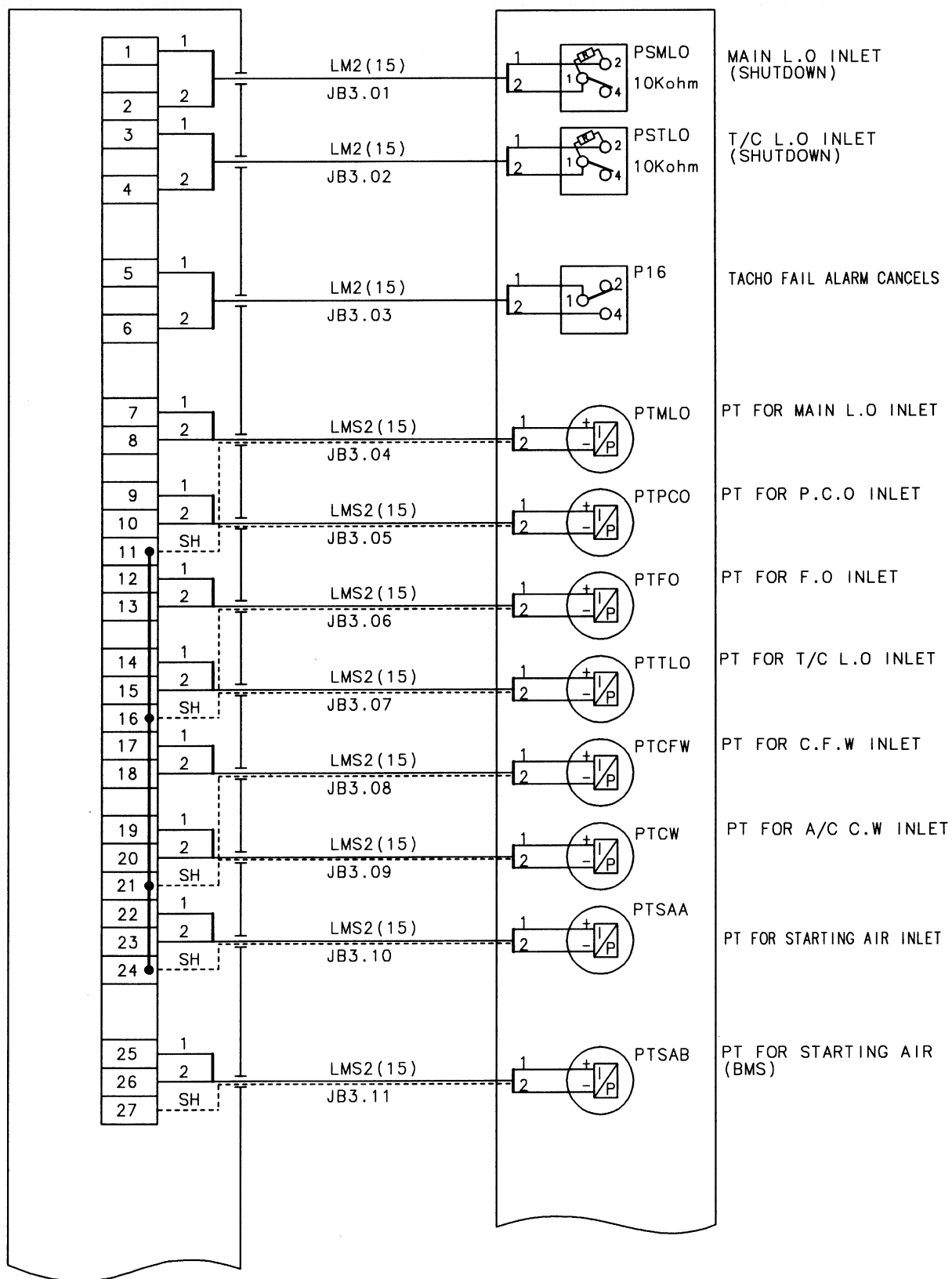
ME - JB2

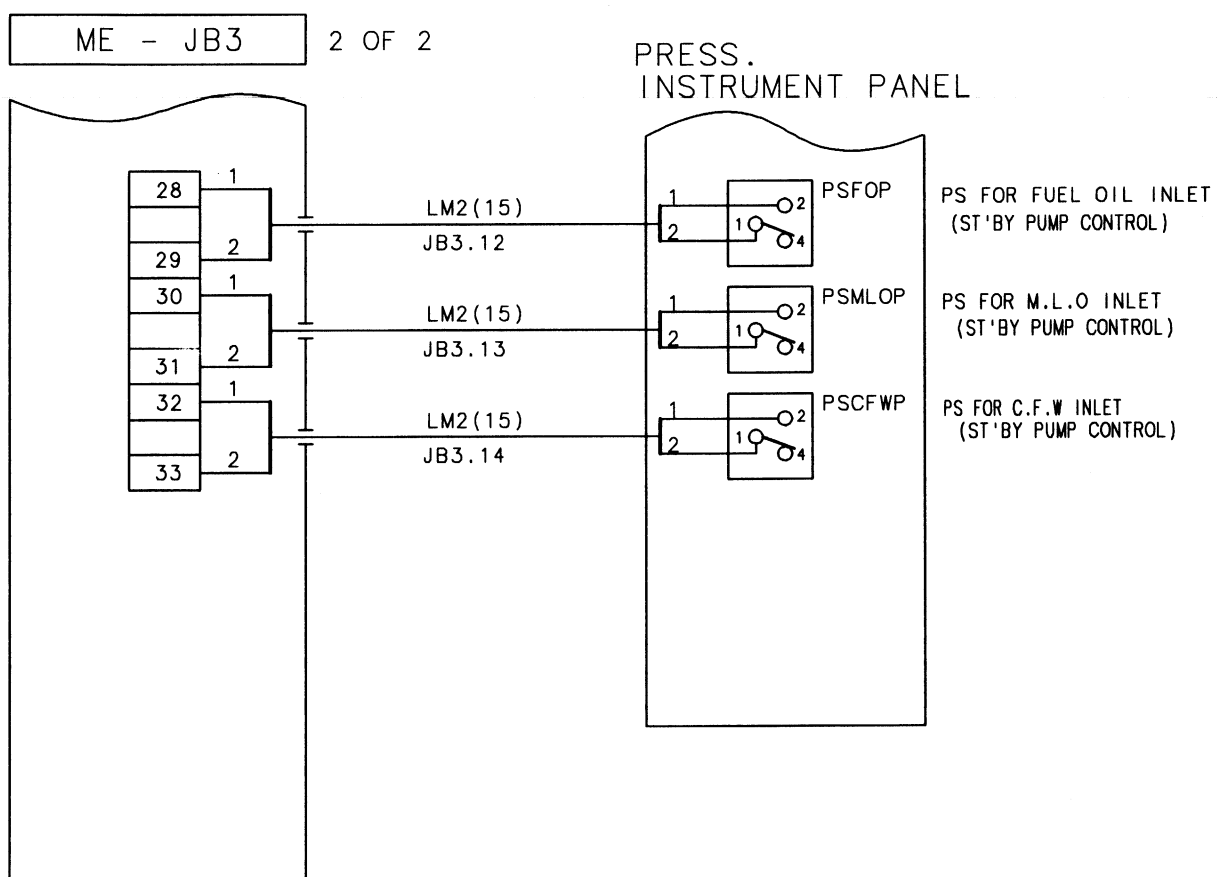
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ME - JB3

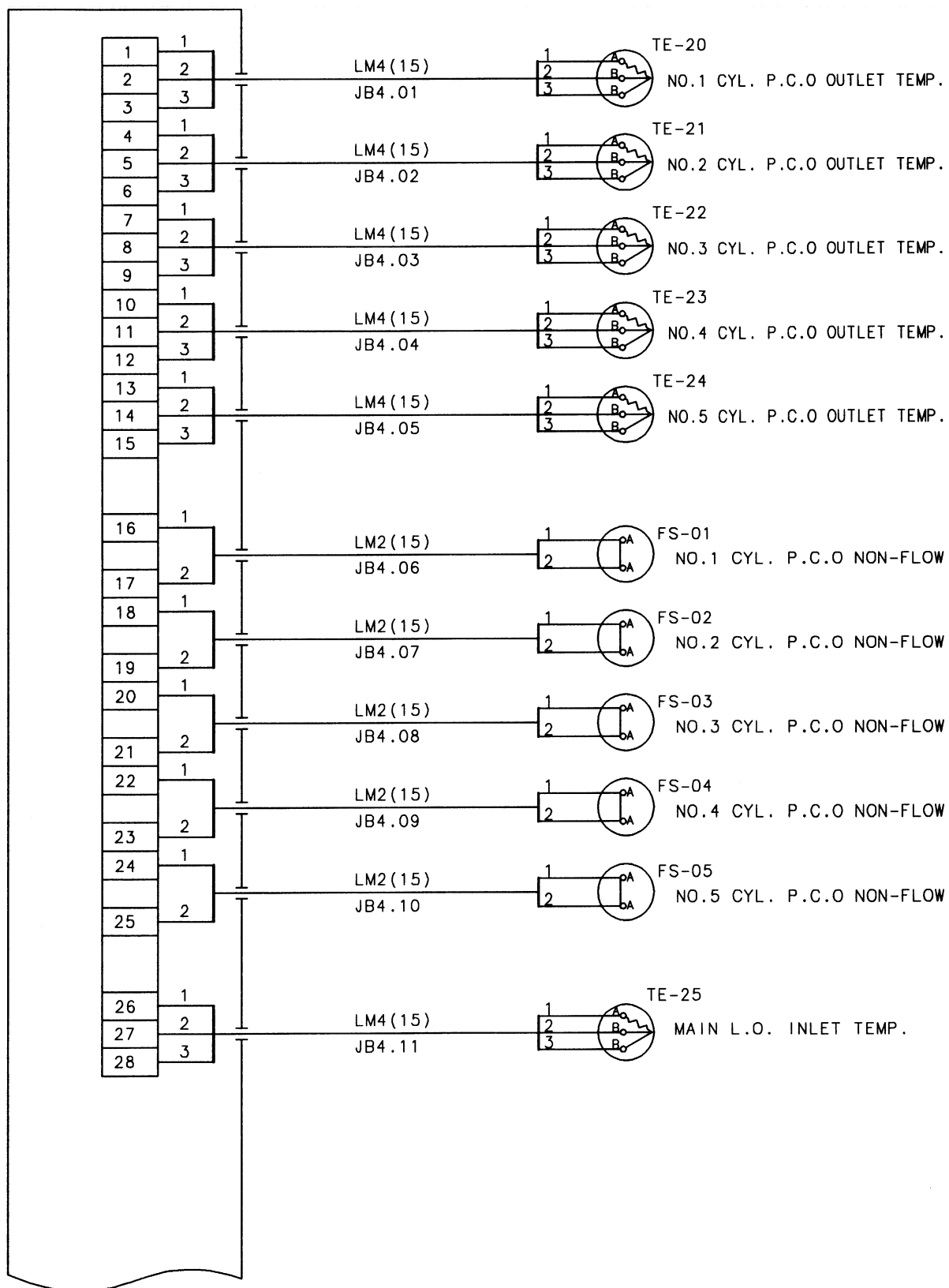
1 OF 2

PRESS.
INSTRUMENT PANEL



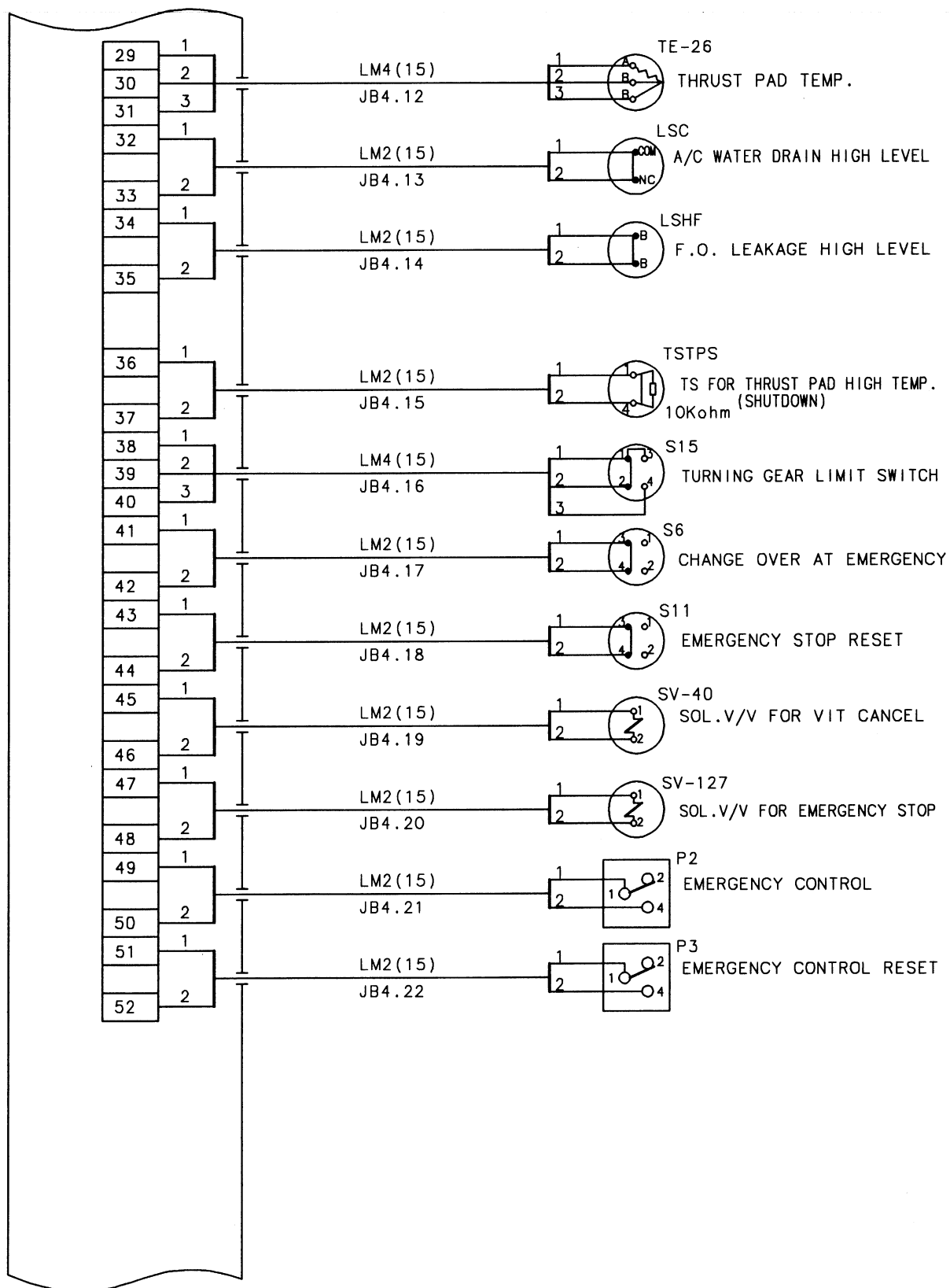
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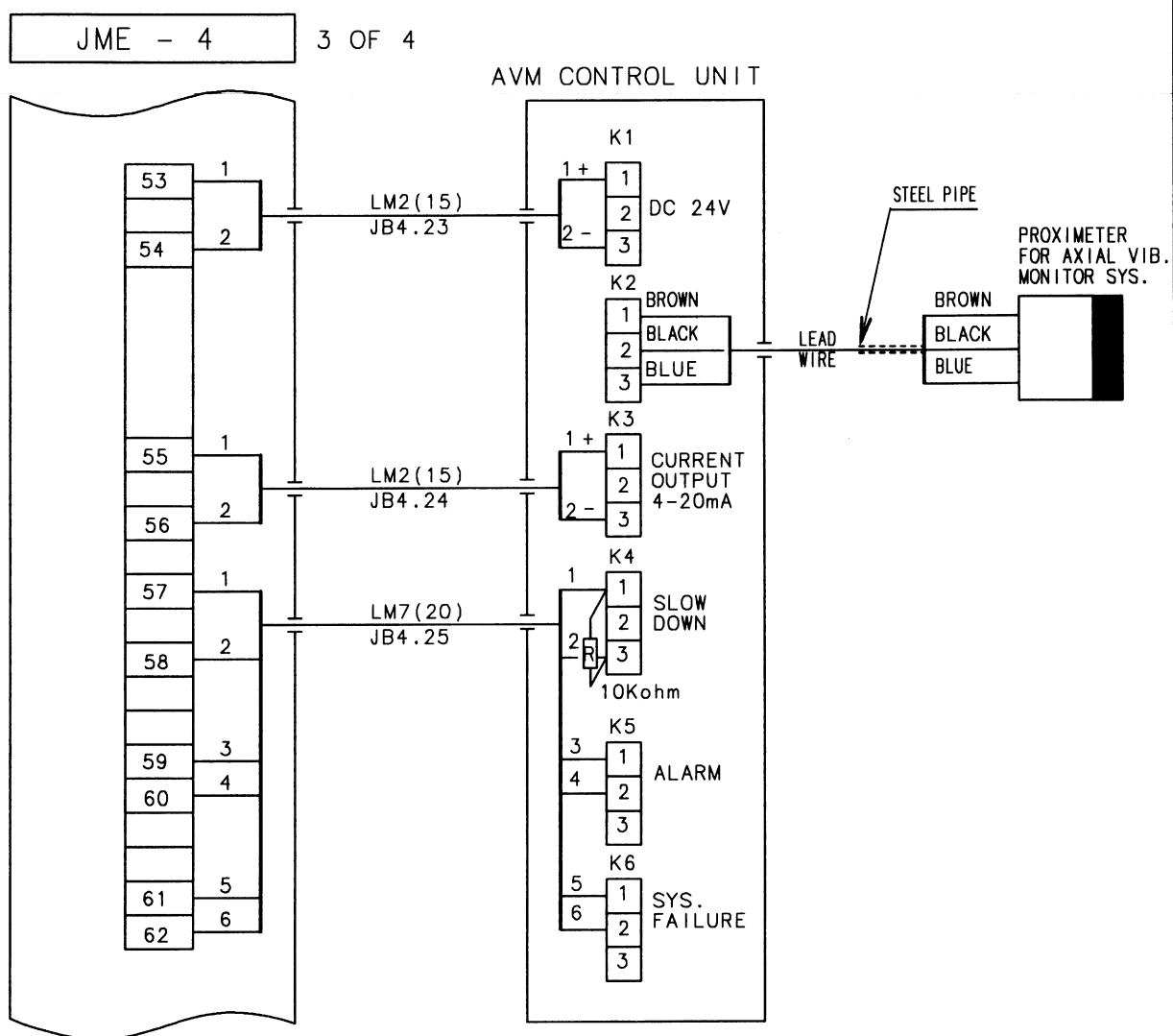
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ME - JB4

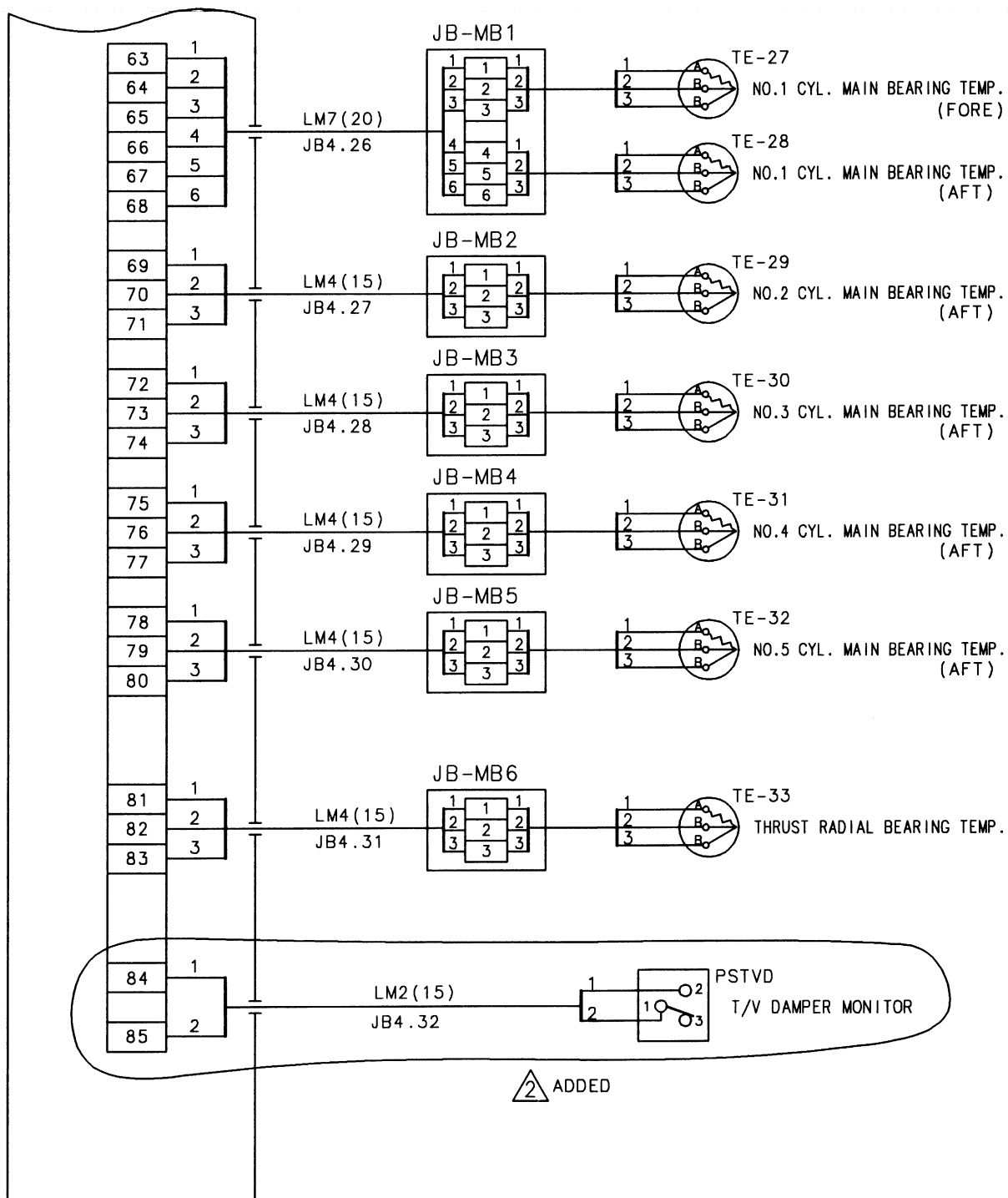
2 OF 4





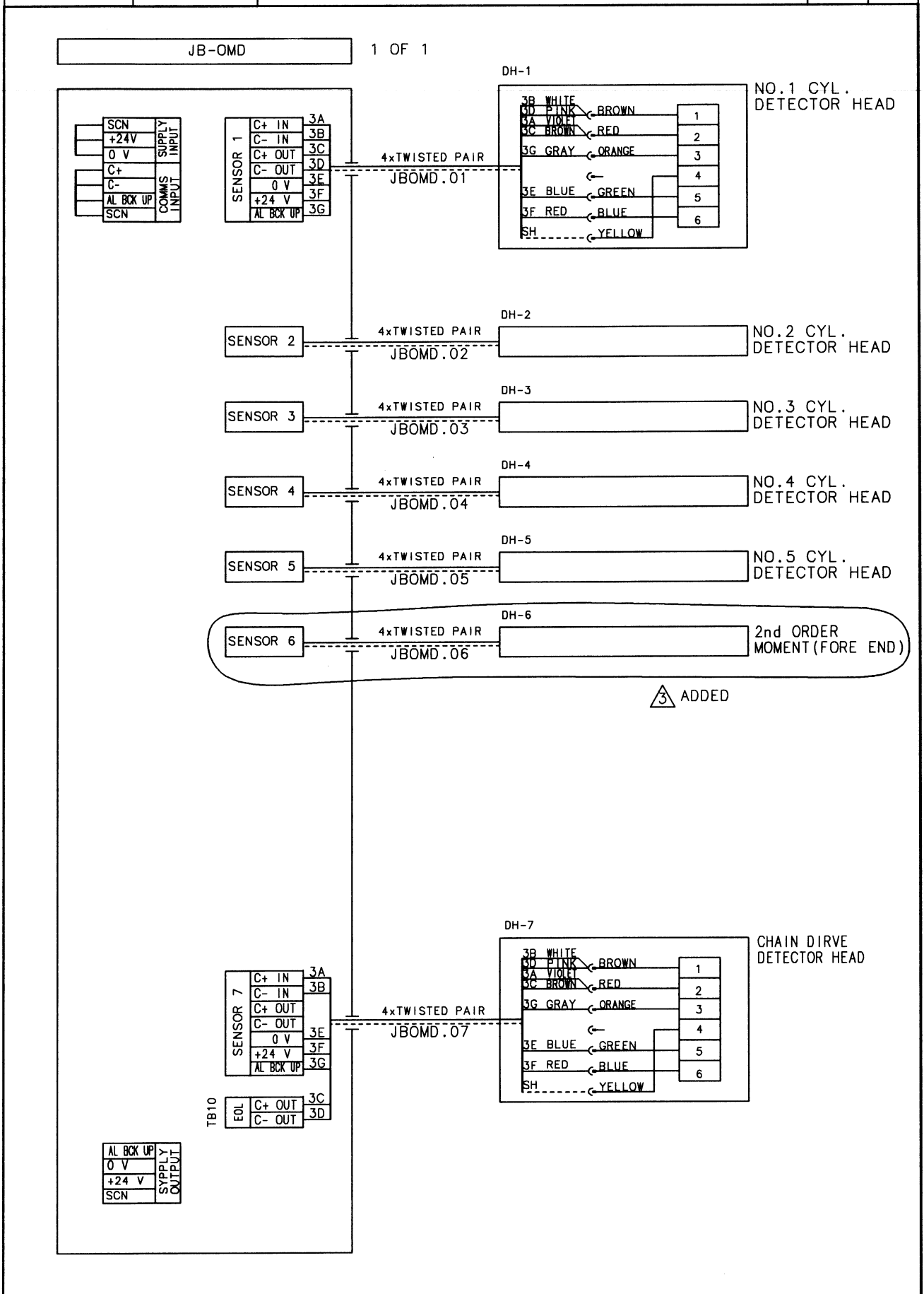
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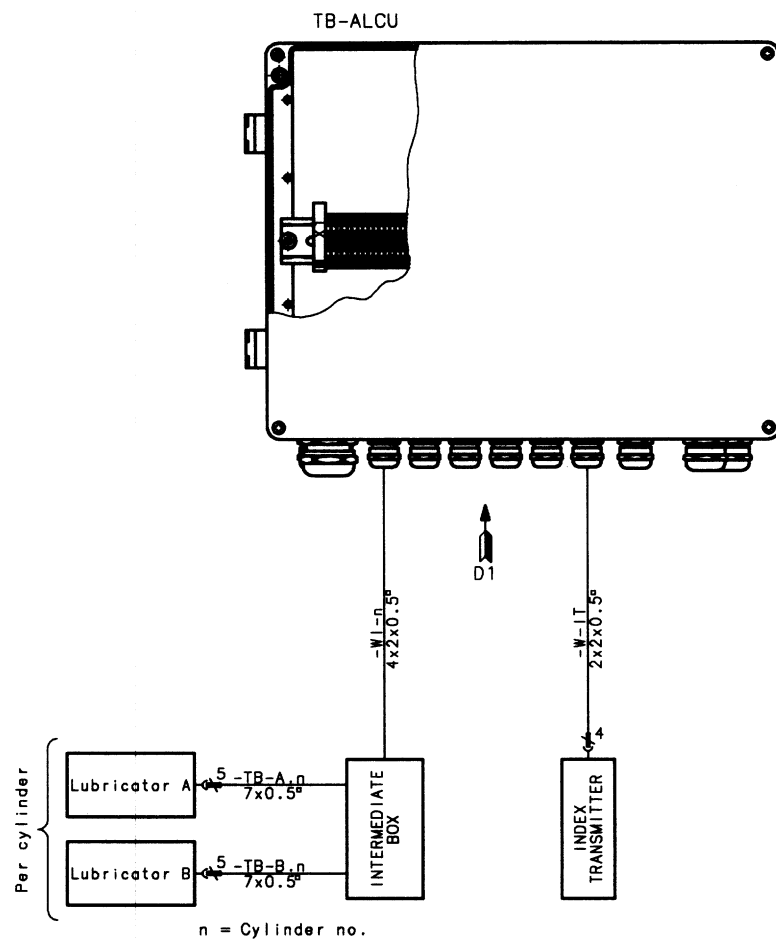
4 OF 4



△ ADDED



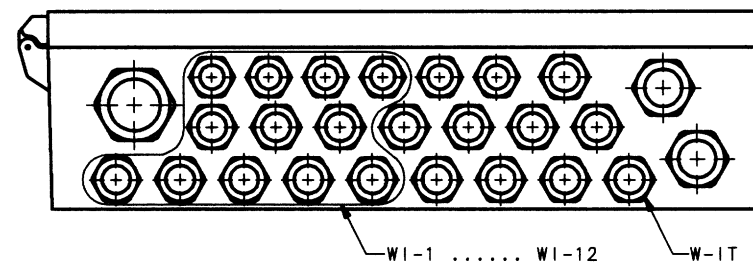




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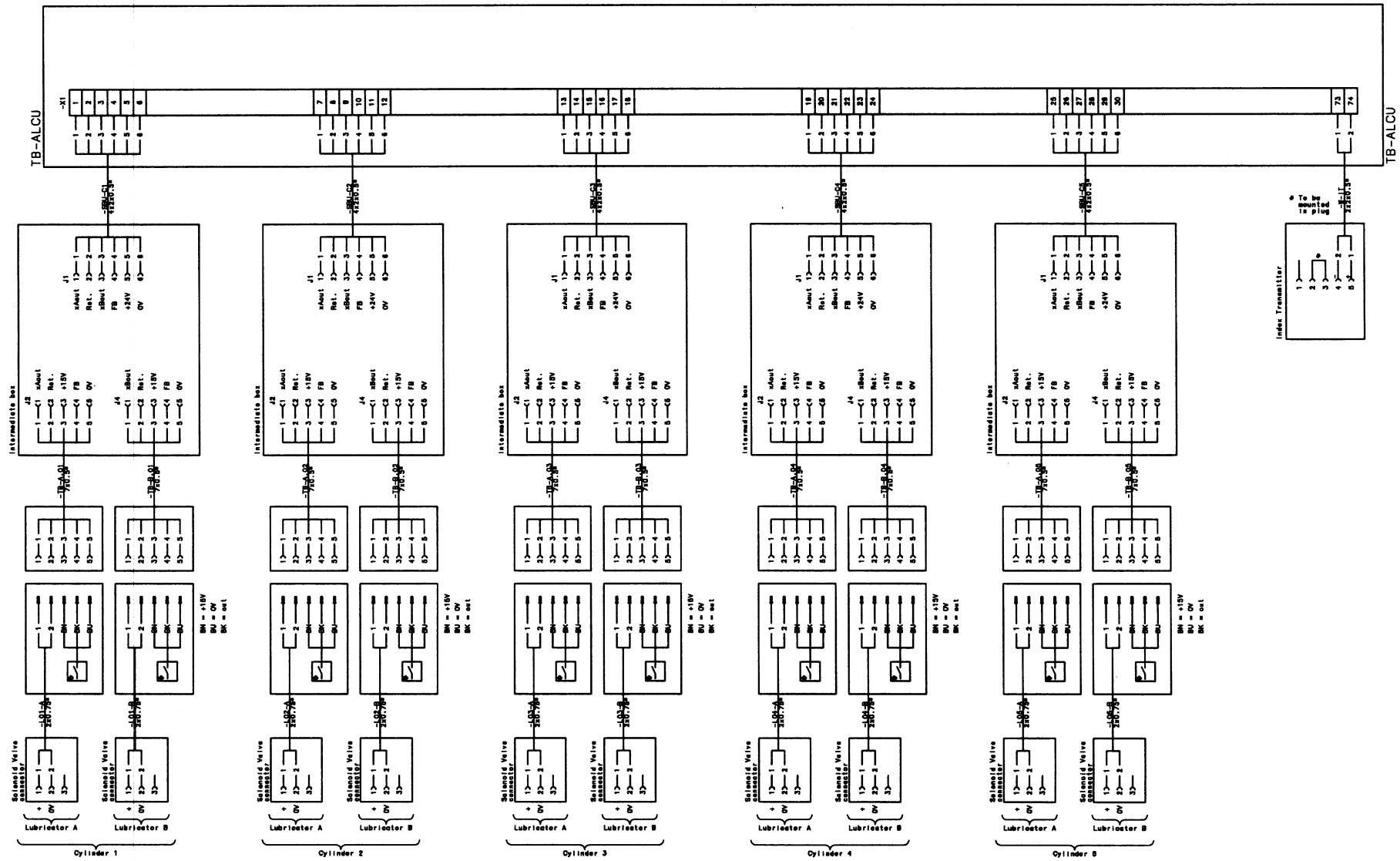
1. 모든 CABLE 끝단에는 CABLE FERULE를 적용할 것.
2. 모든 CABLE 끝단에는 ID TAG를 부착할 것.
3. 모든 CALBE의 시작과 끝에는 CABLE MARKER를 부착할 것.

428 Viewed from D1.



ENGINE RELATED CABLING



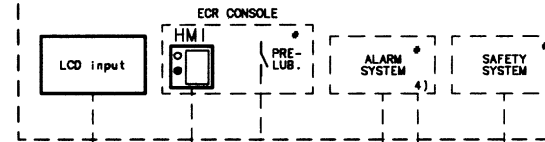
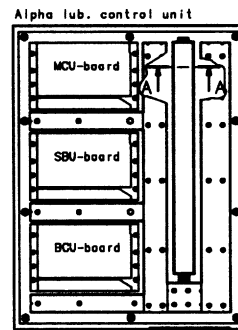
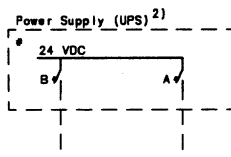
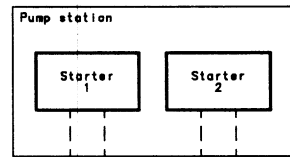


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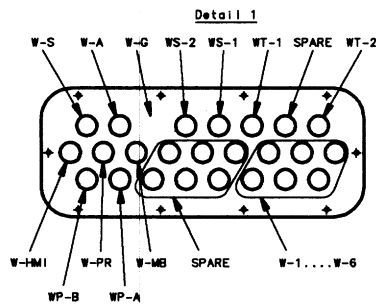
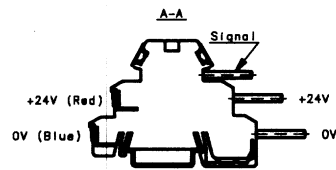
- 모든 CABLE 끝에는 CABLE FERULE를 적용할 것.
- 모든 CABLE 끝에는 ID TAG를 부착할 것.
- 모든 CABLE의 시작과 끝에는 CABLE MARKER를 부착할 것.

ENGINE RELATED CABLING



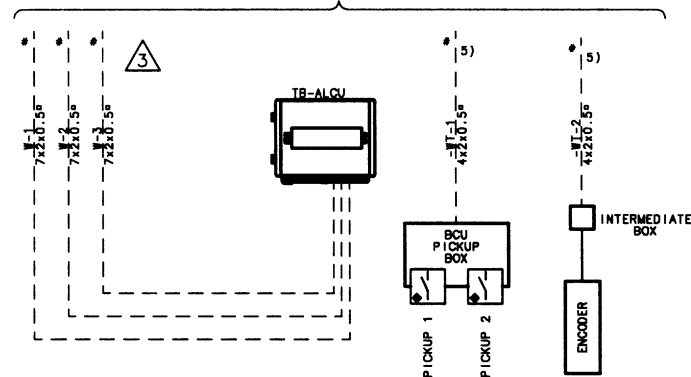
Control room
Engine room

Yard supply

Hull side
Engine side

NOTE:

- 모든 CABLE 끝단에는 CABLE FERULE를 적용할 것.
- 모든 CABLE 끝단에는 ID TAG를 부착할 것.
- 모든 CALBE의 시작과 끝에는 CABLE MARKER를 부착할 것.



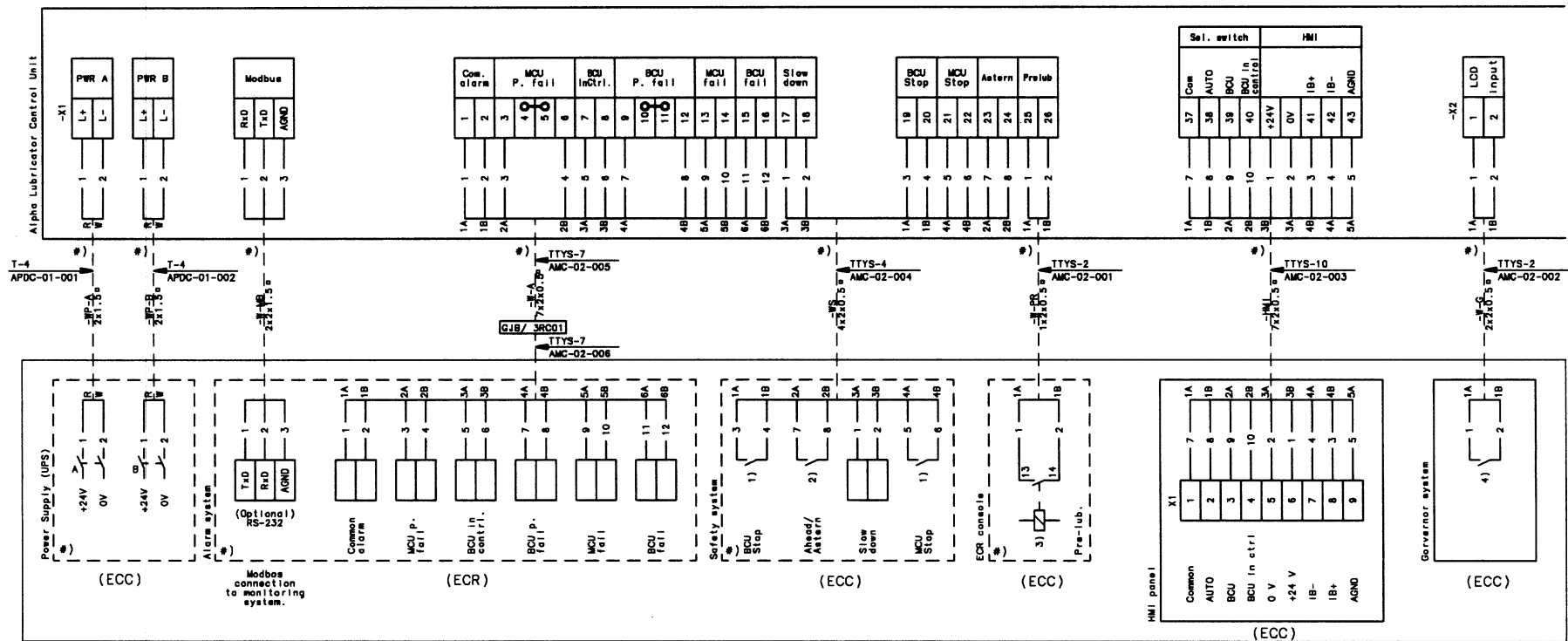
Note:

- 440V/380V connection according to pump station specification.
- Power supply requirements: 24VDC, $\pm 20\%$
Voltage to be constant up to $1.5 \times I_N$
Breaker size 16A.
- Table for 24V power cable quadrate:

1.5	for 0 to 25m
2.5	for 25 to 70m
4.0	for 70 to 150m
- Optional.
- Cable: Twisted pair
pair individually screened.

YARD RELATED CABLING





- 1) Contact to be closed in STOP position.
- 2) Contact to be closed in ASTERN.
- 3) Relay to be activated and contact closed, when auxiliary blower (s) are running.
Relay: Yard supply.
- 4) LCD input to be potential free contact open in normal condition

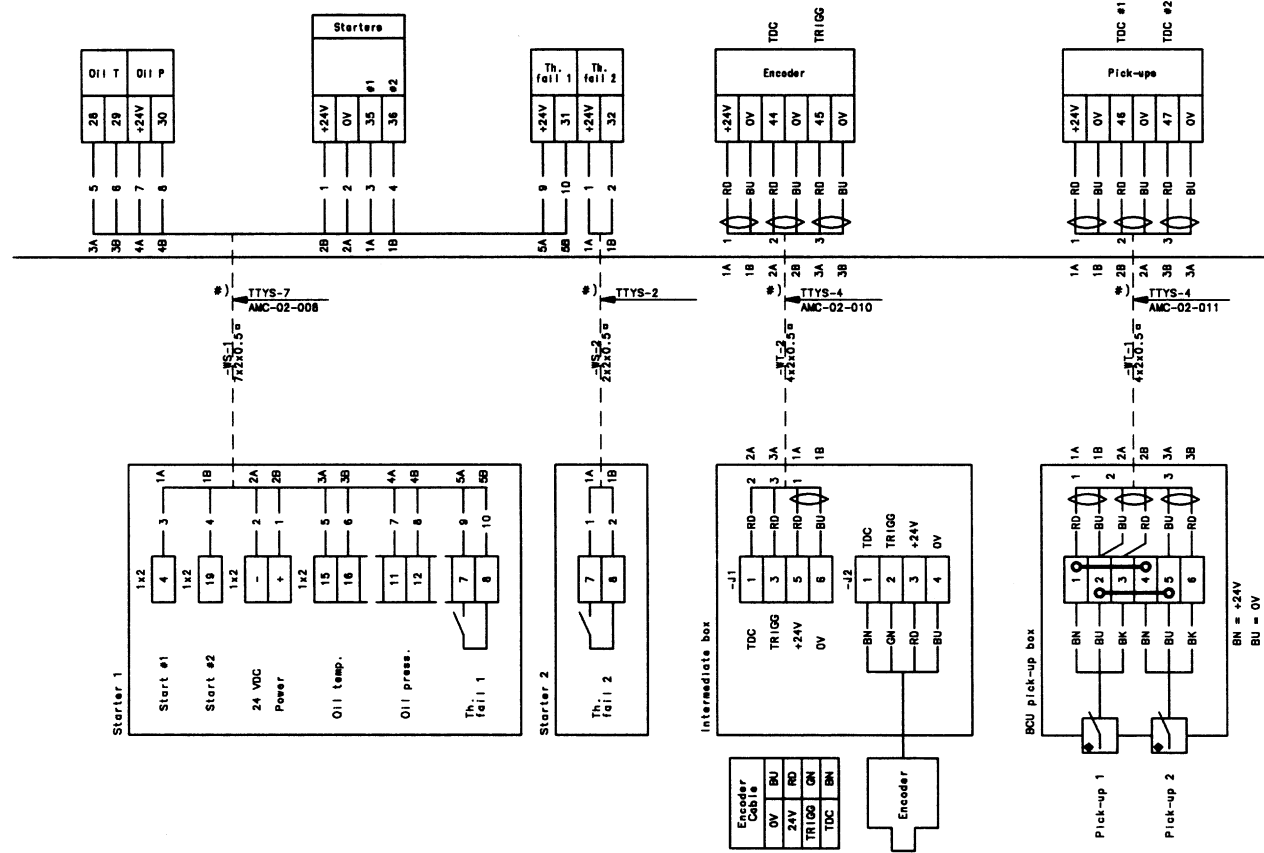
#) YARD SUPPLY

NOTE:

1. 모든 CABLE 끝단에는 CABLE FERULE를 착용할 것.
2. 모든 CABLE 끝단에는 ID TAG를 부착할 것.
3. 모든 CABLE의 시작과 끝에는 CABLE MARKER를 부착할 것.

YARD RELATED CABLING





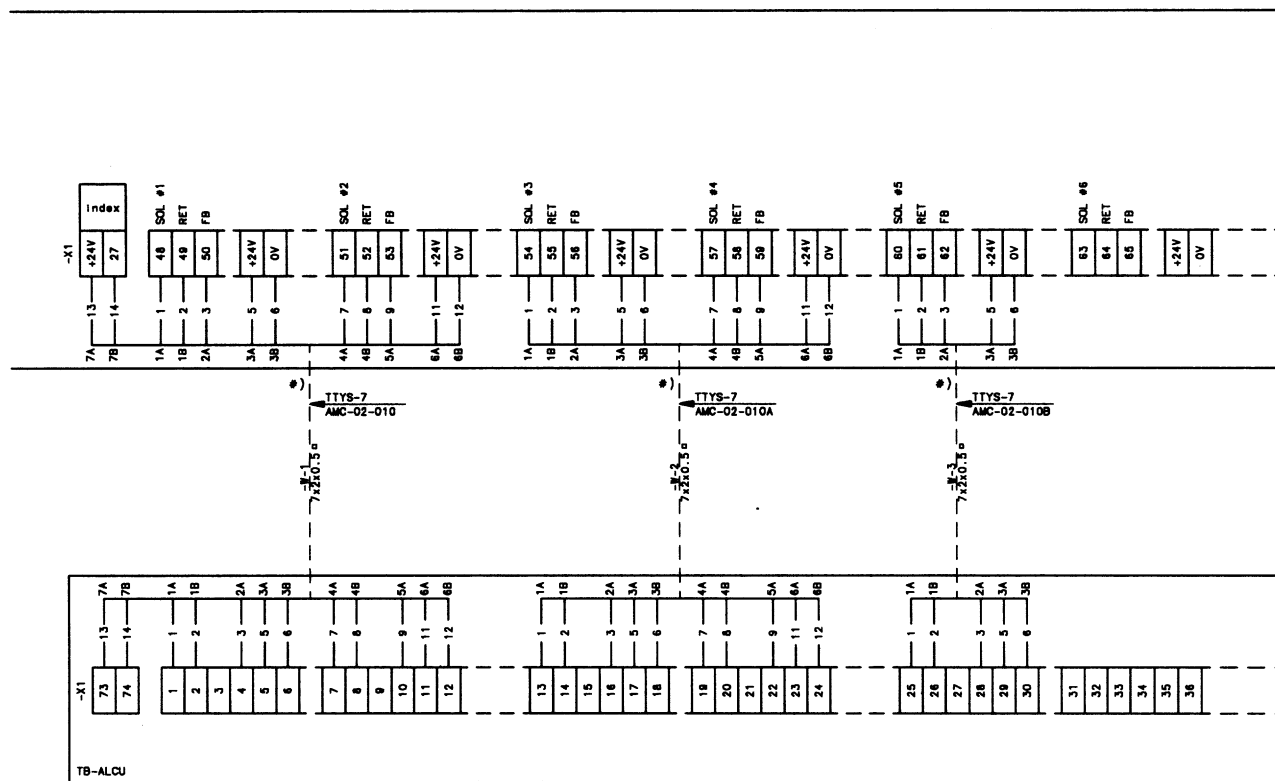
#) YARD SUPPLY

YARD RELATED CABLING

NOTE:

- 모든 CABLE 끝단에는 CABLE FERULE를 조립할 것.
- 모든 CABLE 끝단에는 ID TAG를 부착할 것.
- 모든 CALBE의 시작과 끝에는 CABLE MARKER를 부착할 것.





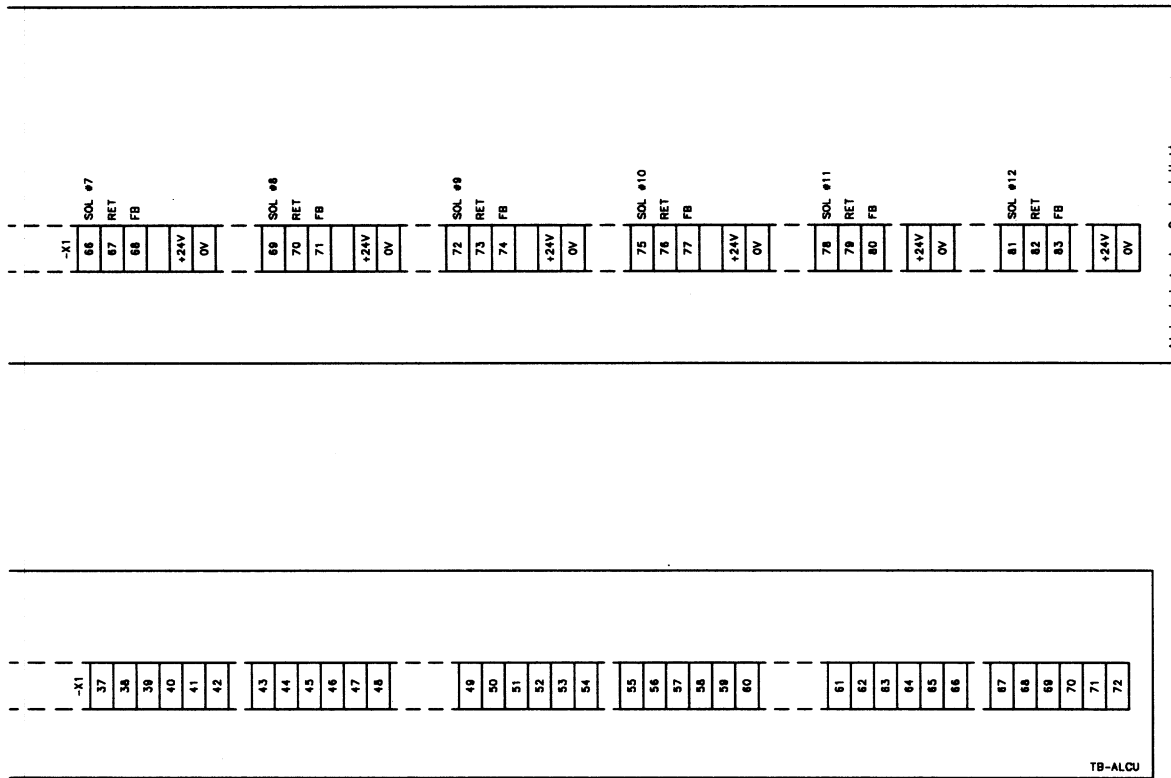
#) YARD SUPPLY

NOTE :

- 모든 CABLE 끝단에는 CABLE FERULE를 적용할 것.
- 모든 CABLE 끝단에는 ID TAG를 부착할 것.
- 모든 CALBE의 시작과 끝에는 CABLE MARKER를 부착할 것.

YARD RELATED CABLING



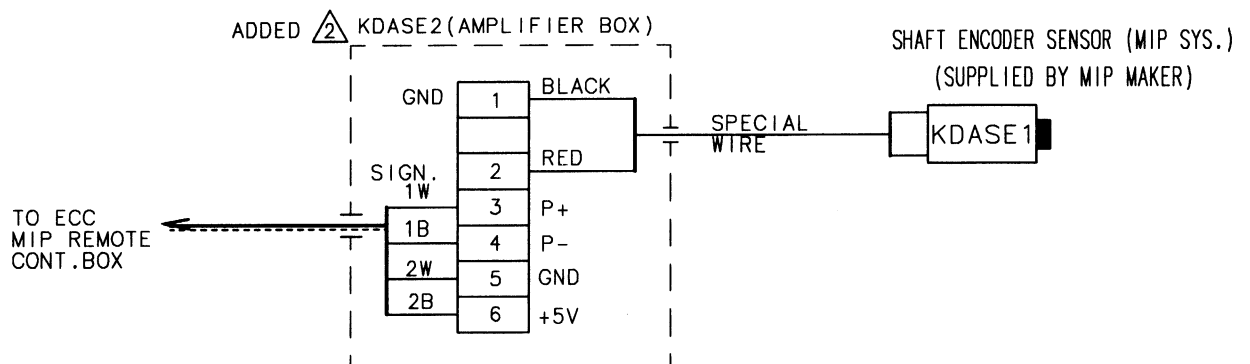
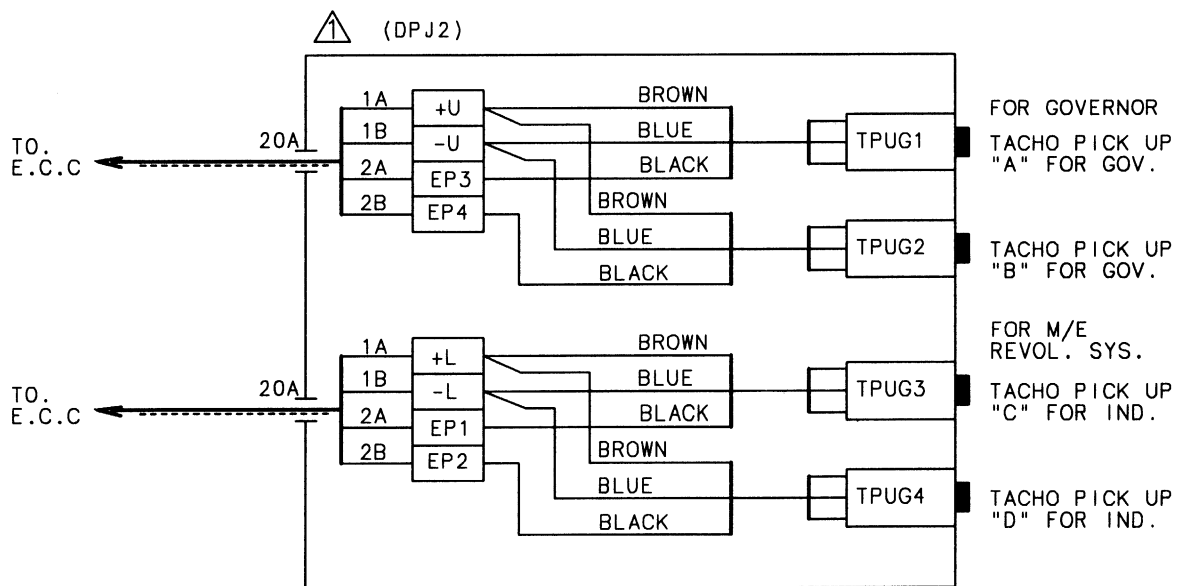
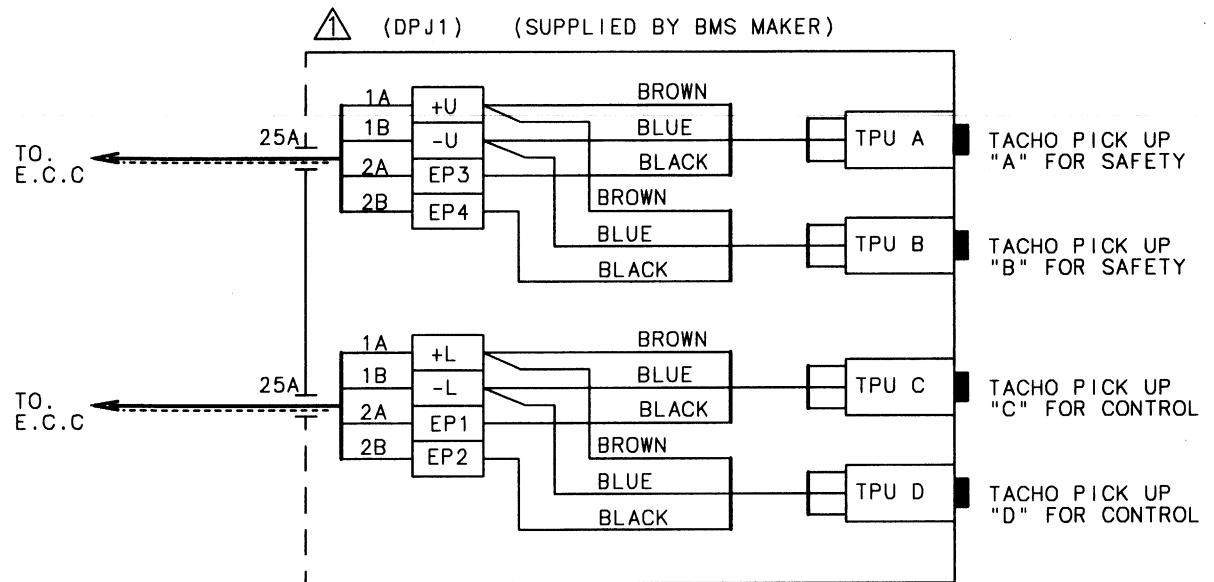


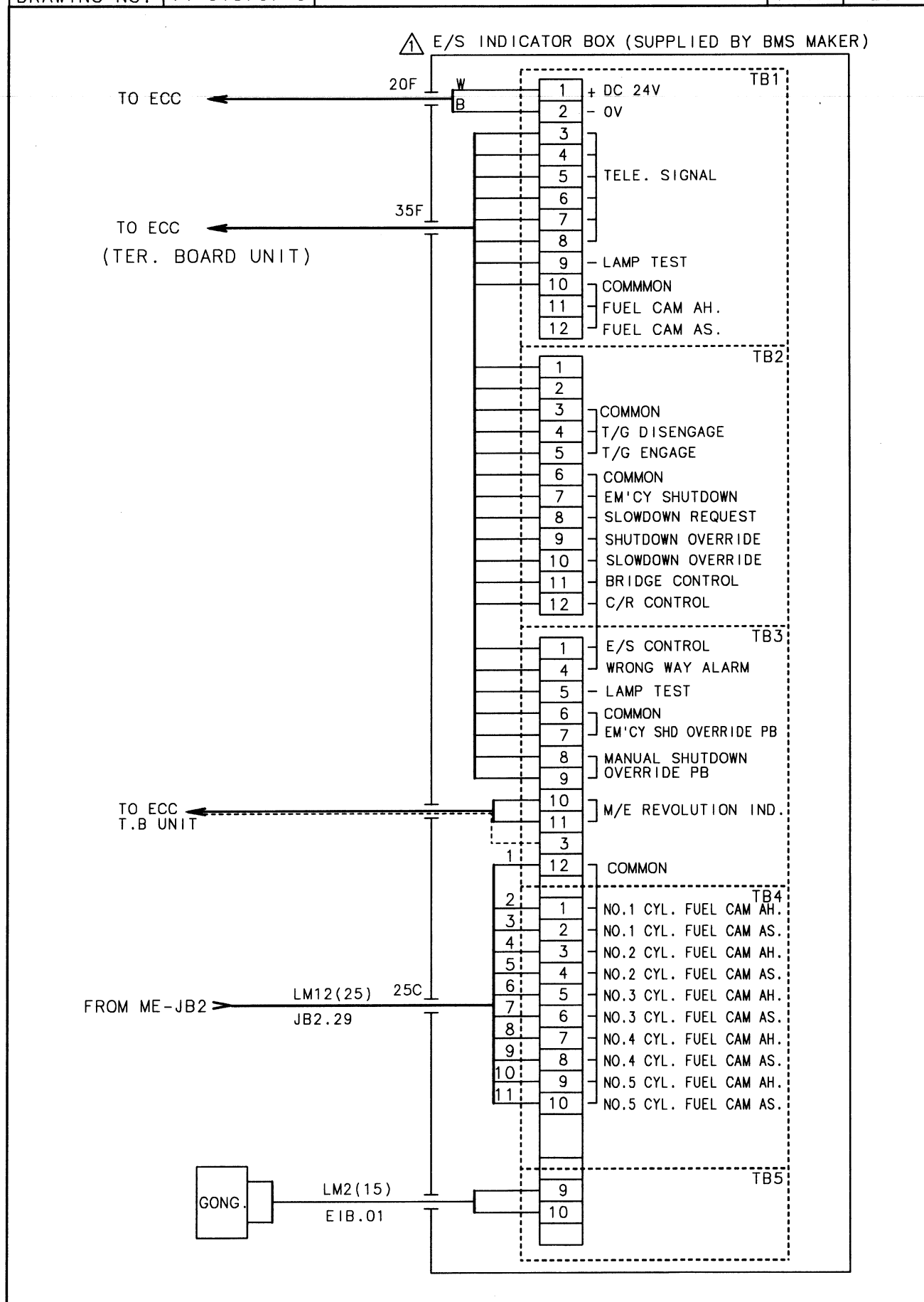
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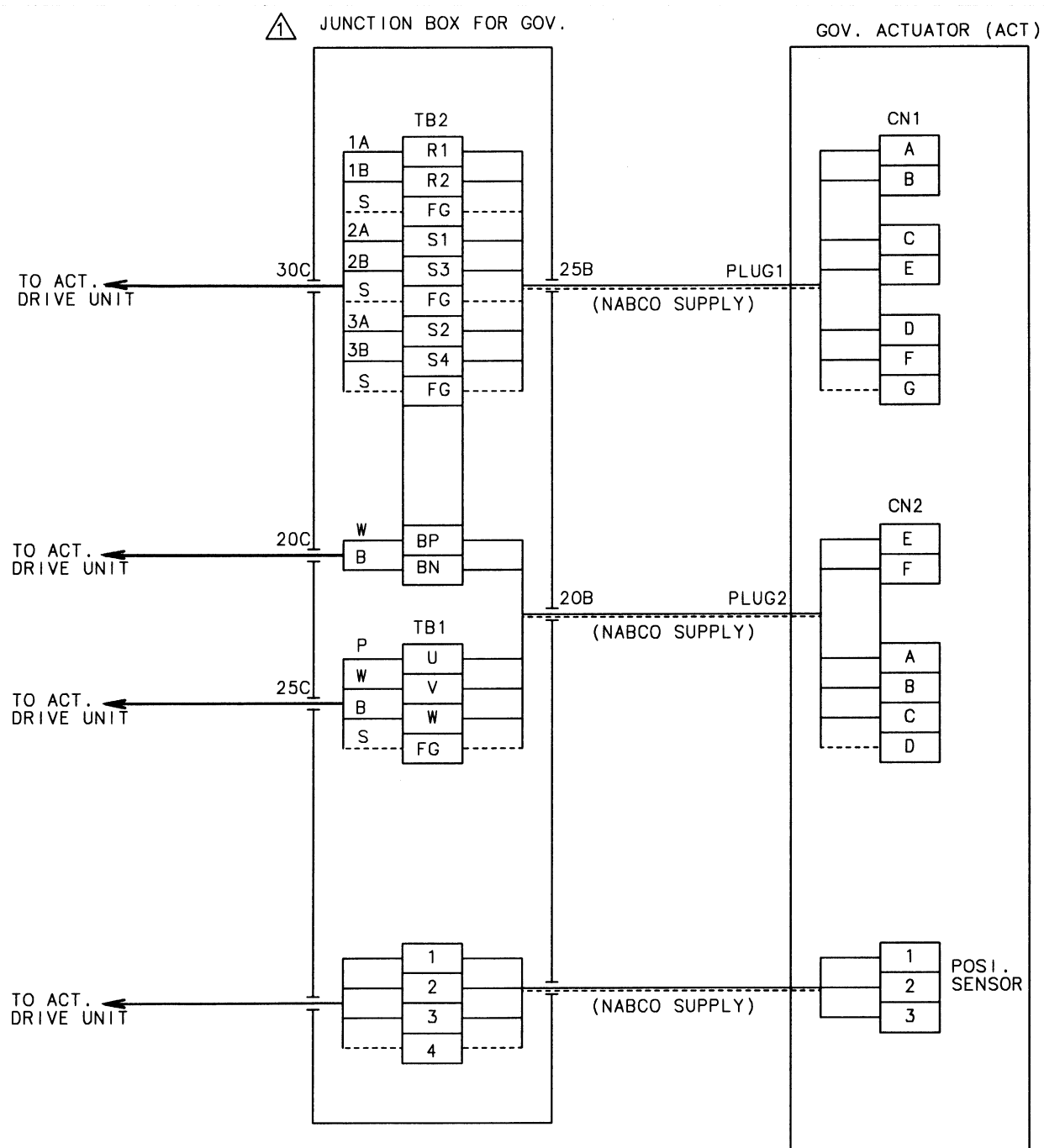
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2. 모든 CABLE 끝단에는 ID TAG를 부착할 것.
3. 모든 CALBE의 시작과 끝에는 CABLE MARKER를 부착할 것.

YARD RELATED CABLING

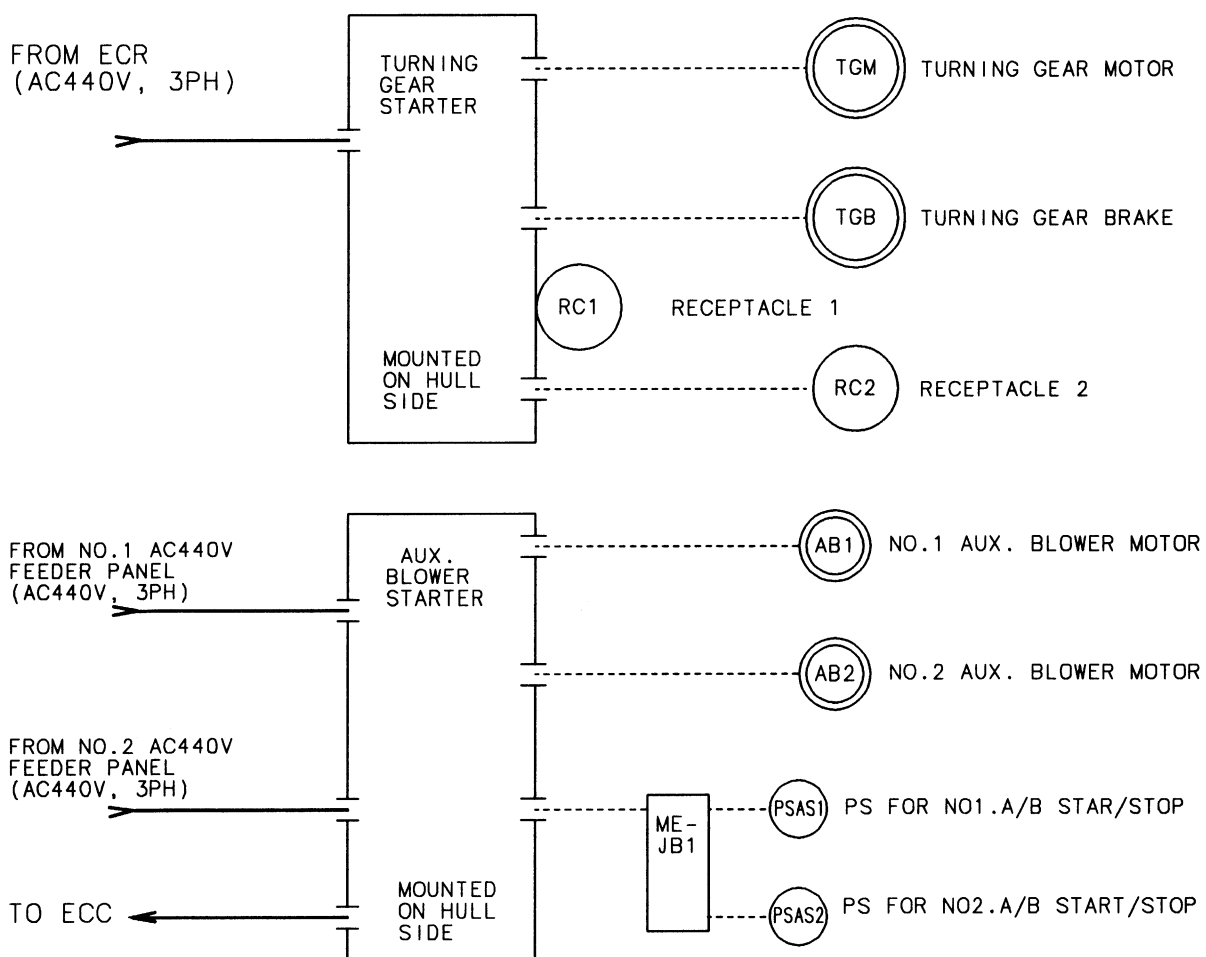
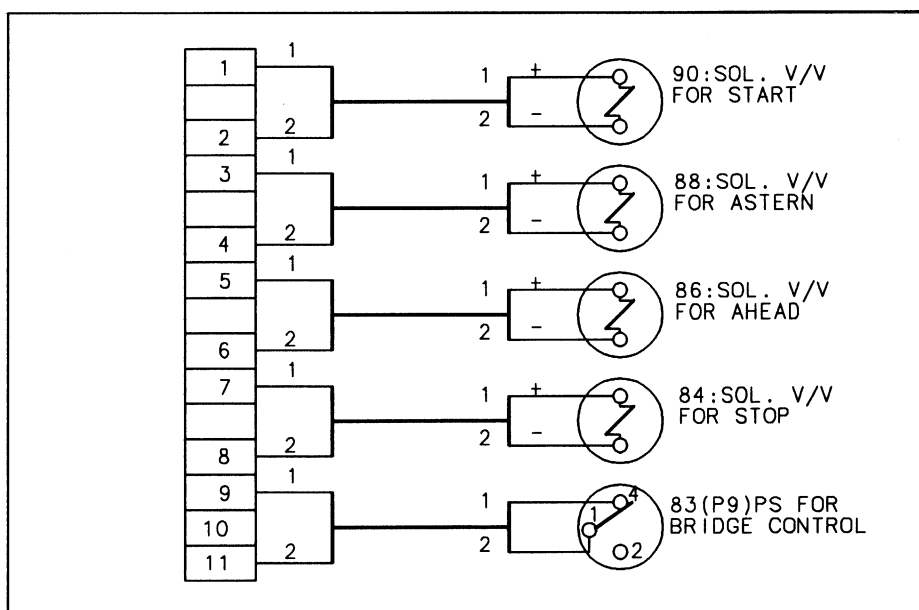




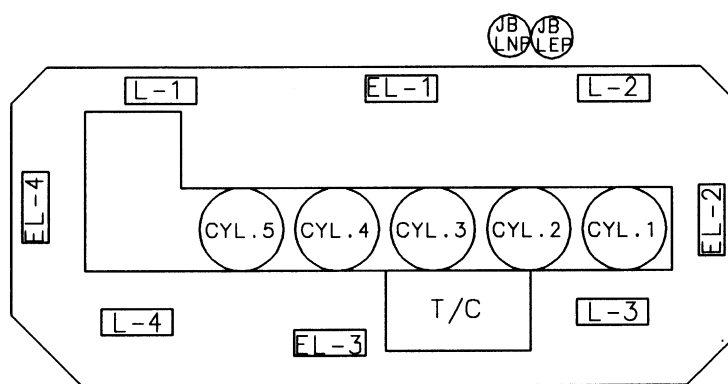




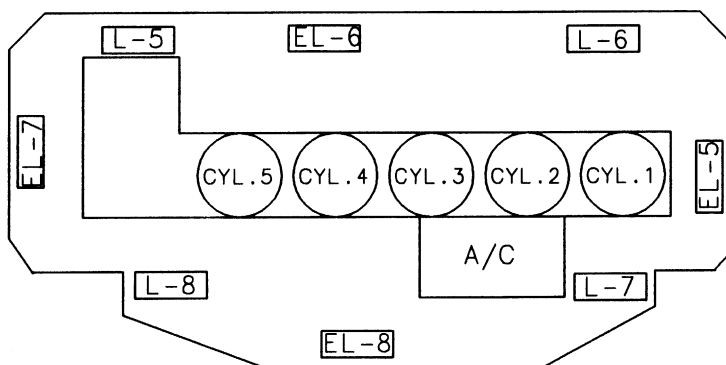
REMOTE SOLENOID V/V BOX (PNEU. BOX)



ARRANGEMENT OF LIGHTING FOR MAIN ENGINE



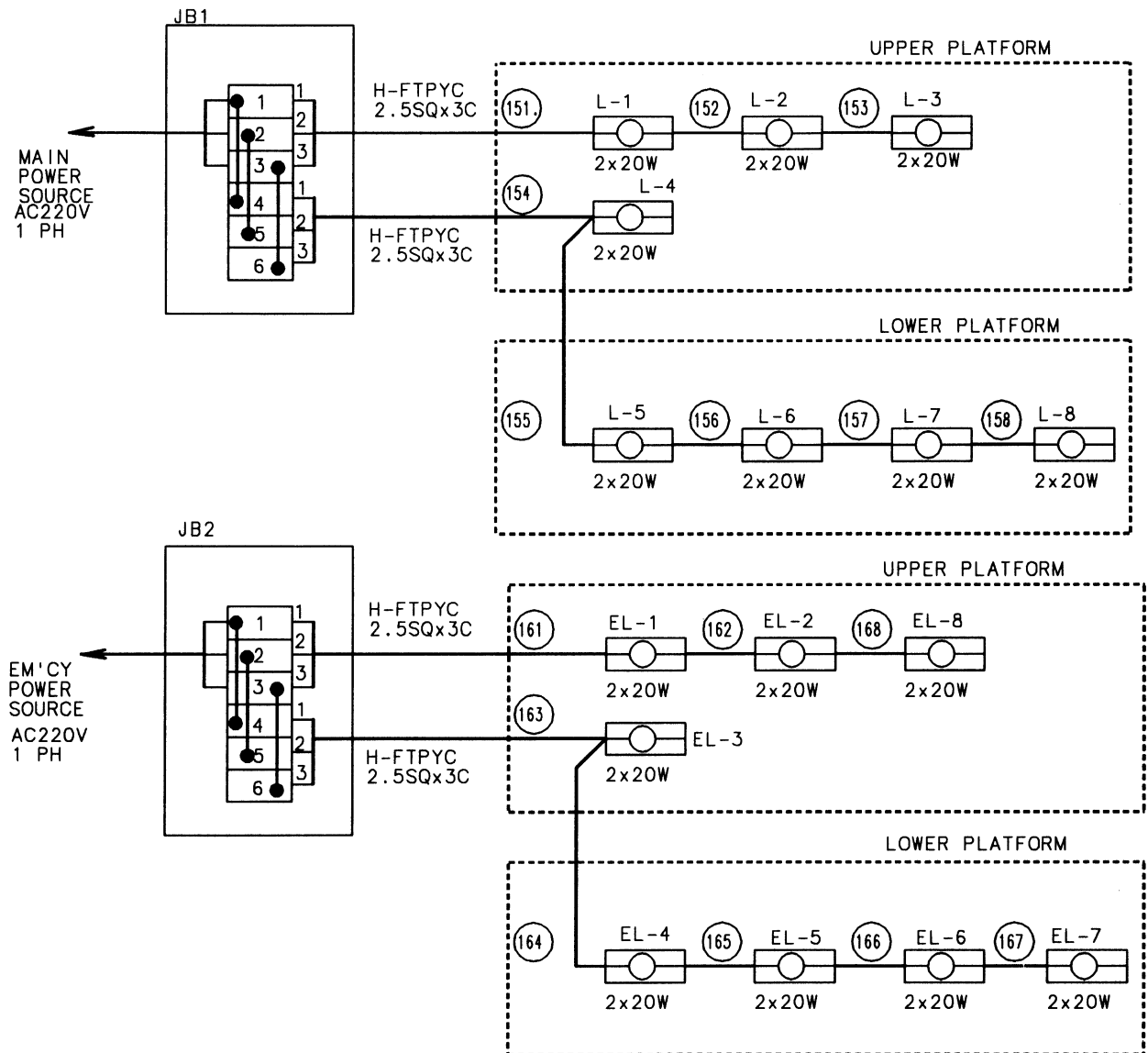
UPPER PLATFORM



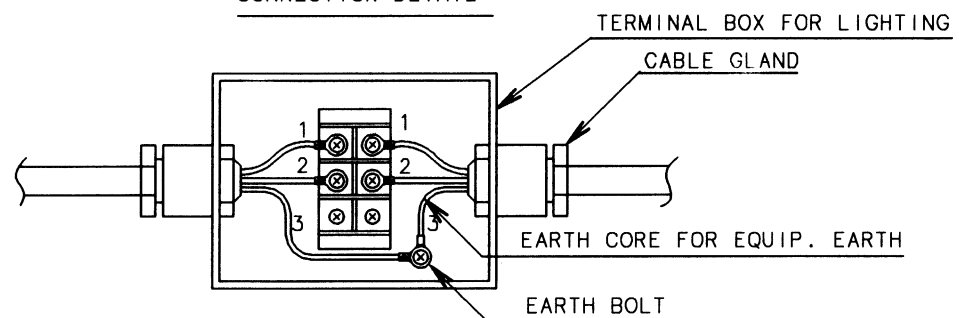
LOWER PLATFORM



LIGHTING FOR MAIN ENGINE



CONNECTION DETAIL



Main Engine Cable Route Plan

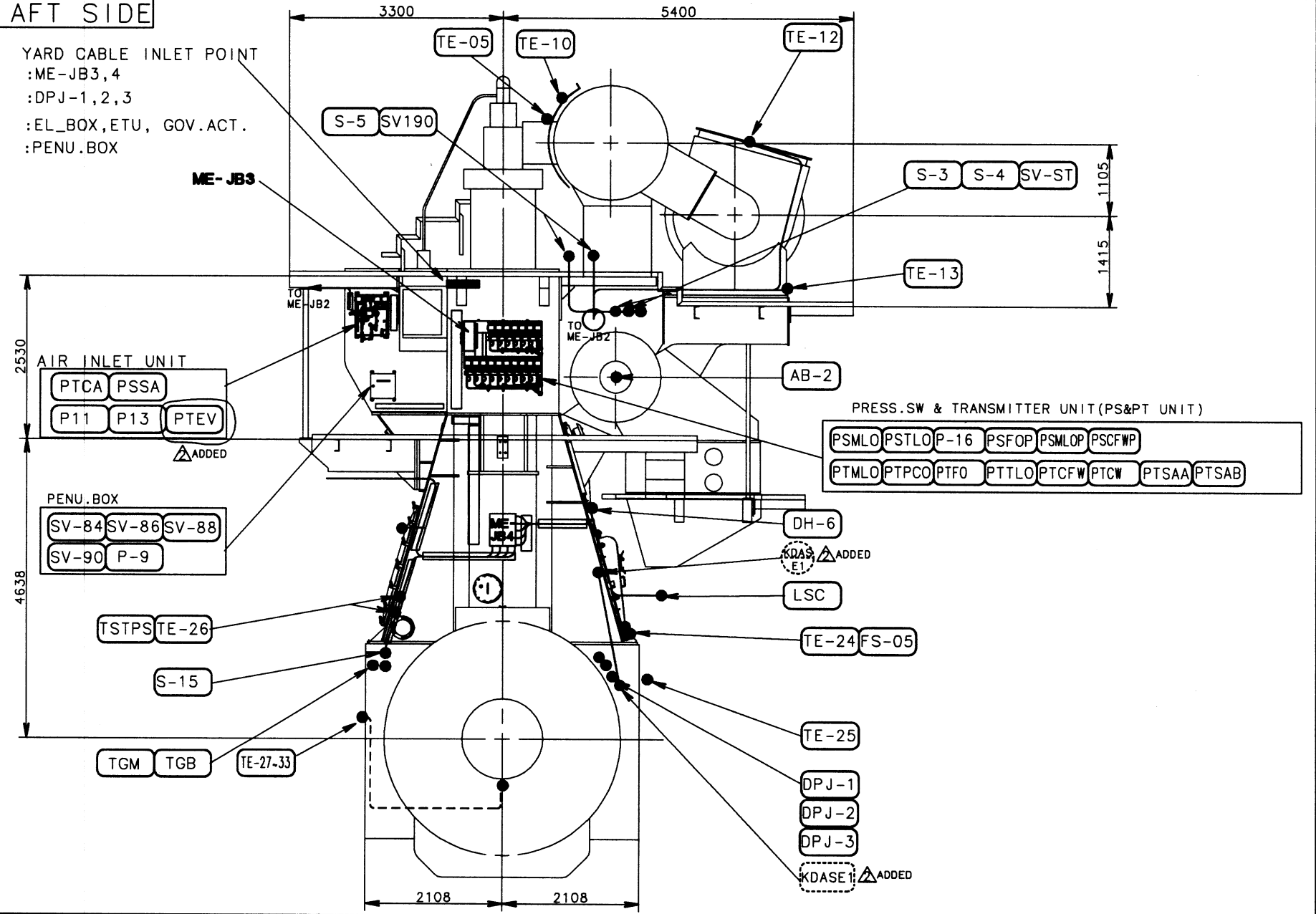
NOTE :

△							
③	2003.04.02	TO BE REVISED(PAGE 3,4)	M.J.JEON	J.T.YUN	K.S.LEE		
②	2003.01.03	TO BE REVISED	M.J.JEON	J.T.YUN	J.I.LEE		
①	2002.12.16	GOVERNOR & BMS MAKER CHANGED FROM STL TO NABCO (PAGE 3,4)	M.J.JEON	J.T.YUN	J.I.LEE		
REV.	DATE	DESCRIPTION	PREP'D	CHEC'D	APPR'D		
CLASS.		DNV	PROJECT NAME		UNIQ 5258		
ENGINE TYPE		5S70MC	PROJECT NO.		DML1-1258		
PREP'D	CHEC'D	APPR'D	M/S NO.	00	DESCRIPTION	WIRING DIA.	CONF'D
M.J.JEON	J.T.YUN	J.I.LEE	SHIPYARD	D.S.M.E.CO, LTD			
021121	021121	021121	HULL NO.	HN.5258			

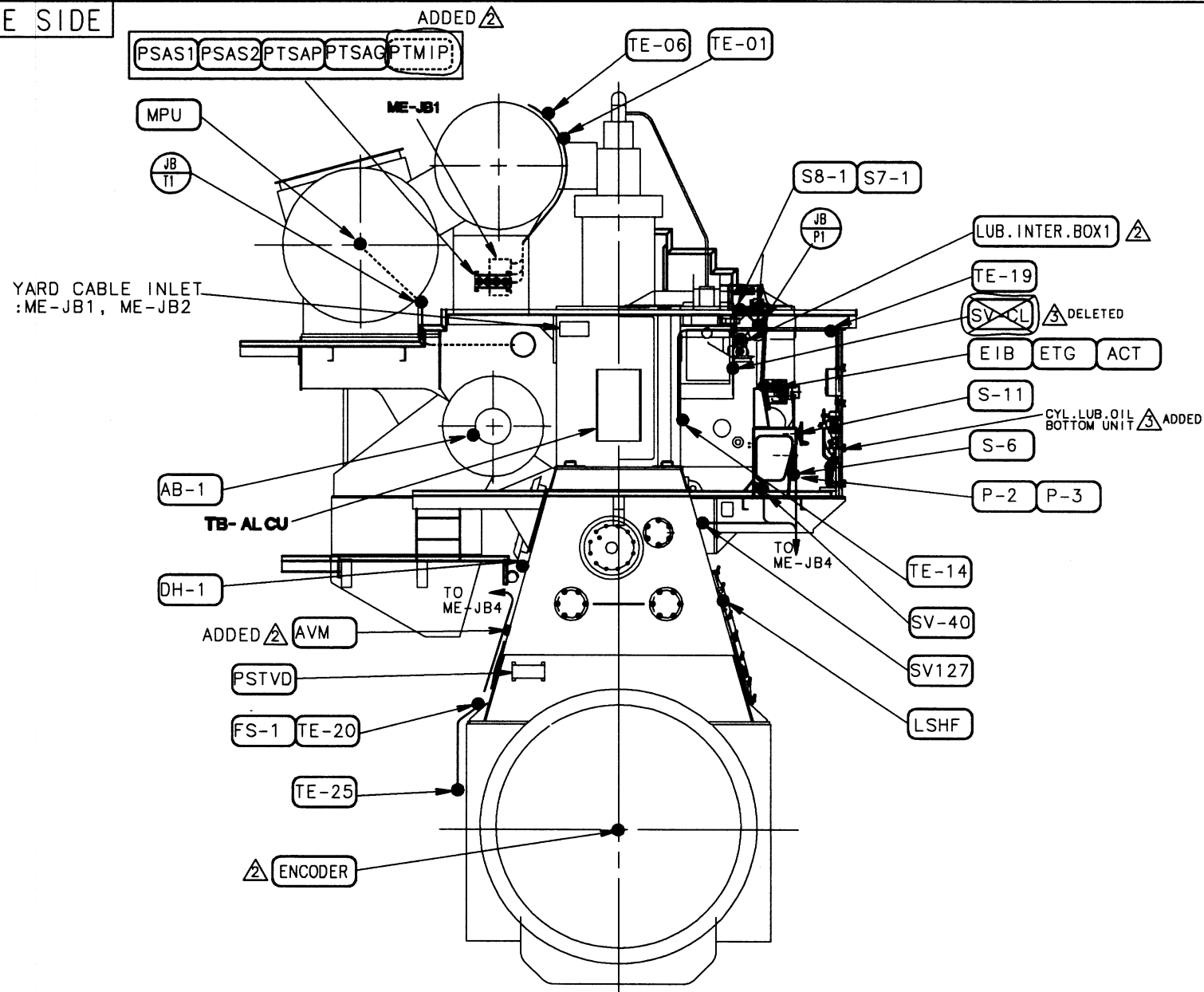


AFT SIDE

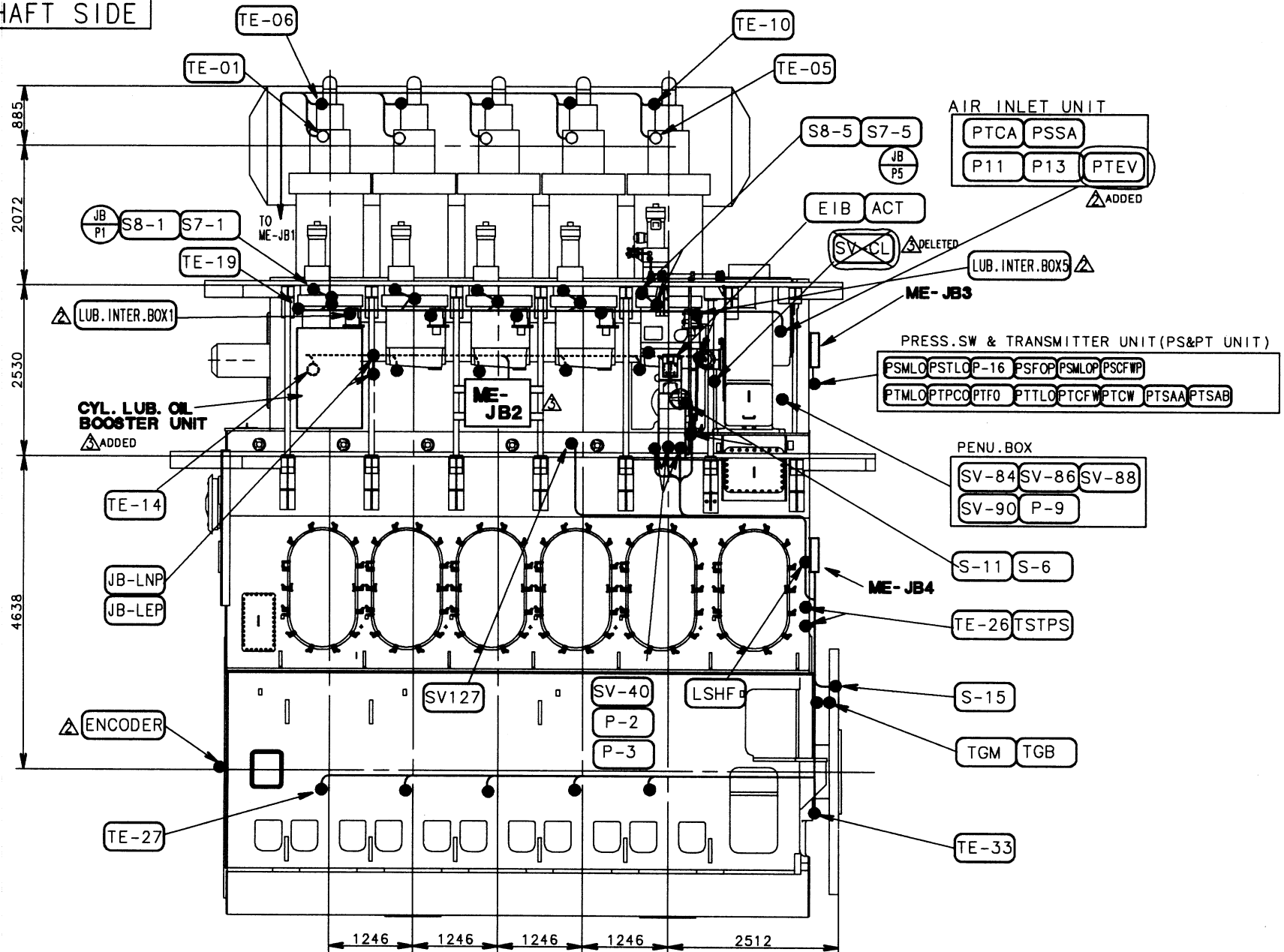
YARD CABLE INLET POINT
 :ME-JB3,4
 :DPJ-1,2,3
 :EL_BOX,ETU, GOV.ACT.
 :PENU.BOX



FORE SIDE

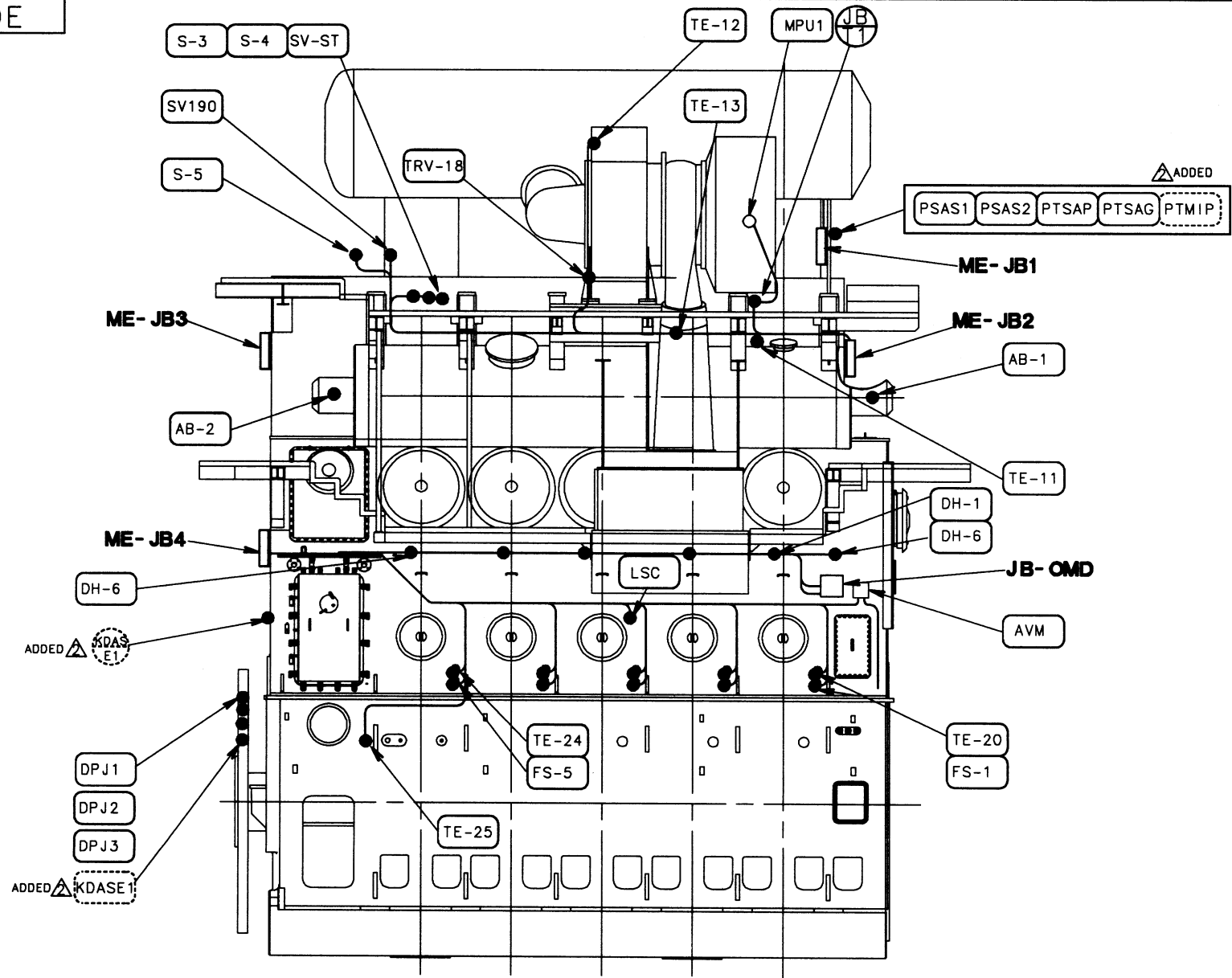


CAMSHAFT SIDE



EXHAUST SIDE

AFTER





Mk 6 OIL MIST DETECTOR

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

59812-120

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CHAPTER 1

DESCRIPTION AND OPERATION

1.1 INTRODUCTION

This manual covers the Mk 6 Oil Mist Detector (OMD). High temperatures, in excess of 200 deg C that occur on bearing surfaces under initial failure conditions, can lead to a rapid generation of oil vapour. When the hot vapour contacts the relatively cooler atmosphere of the crankcase it condenses into a fine mist, with typical particle sizes of around 0.5 to 5 microns in diameter. When the density of these particles reaches between 30 to 50 mg/litre (depending upon the type of oil) an explosive condition exists. Using optical measuring techniques, oil mist density can be measured at levels as low as 0.05 mg/litre.

Oil Mist Detection techniques have been used to monitor diesel engine crankcases for potential explosive conditions and early detection of bearing failures. The systems available rely mainly on analysing the optical density of oil mist samples drawn from the crankcase compartments, through pipes to the detector. While these systems proved successful in the past, engine design has improved significantly over the years and oil mist detection techniques have improved substantially to maintain adequate protection.

The Mk 6 OMD provides the following design improvements:

- Elimination of sample pipes
- Significant reduction in scanning time
- Relocating system controls and display to the control room
- Multi engine capability

1.2 PRINCIPLE

The Graviner Mk 6 OMD (Figure 1) retains the differential measuring system long established by Graviner and unique to Graviner, which enables high sensitivity to be used while maintaining the maximum false alarm rejection. It still uses optical sensing, but light scatter instead of obscuration. This enables very small detectors to be used. These are rugged and are designed to be engine mounted using standard oil mist detector ports. As they each have their own means of sample acquisition no sample pipes are required. Multiple internal light sources ensure that a single failure will not cause the loss of a detector. Modular construction means that a faulty detector can be replaced in a matter of minutes.

1.3 DESCRIPTION (Refer to Figure 2)

The Graviner Mark 6 OMD system can comprise up to 64 detectors directly mounted on the crankcases of up to 8 engines. A full system has a scan time of 1.2 seconds but with alarm priorities that enable the system to respond to an alarm as it occurs.

Each detector has a cable connecting it directly to an engine mounted junction box, which is in turn connected by two cables to the control/display unit in the control room or other appropriate location. The system uses digital data transmission technology which means all system displays and controls are located on the control unit which is designed to be mounted within the Engine Control Room. This eliminates the need to enter the machinery space in alarm conditions.

The system comprises three main components:

- Detectors
- Engine Junction Boxes
- Control Unit



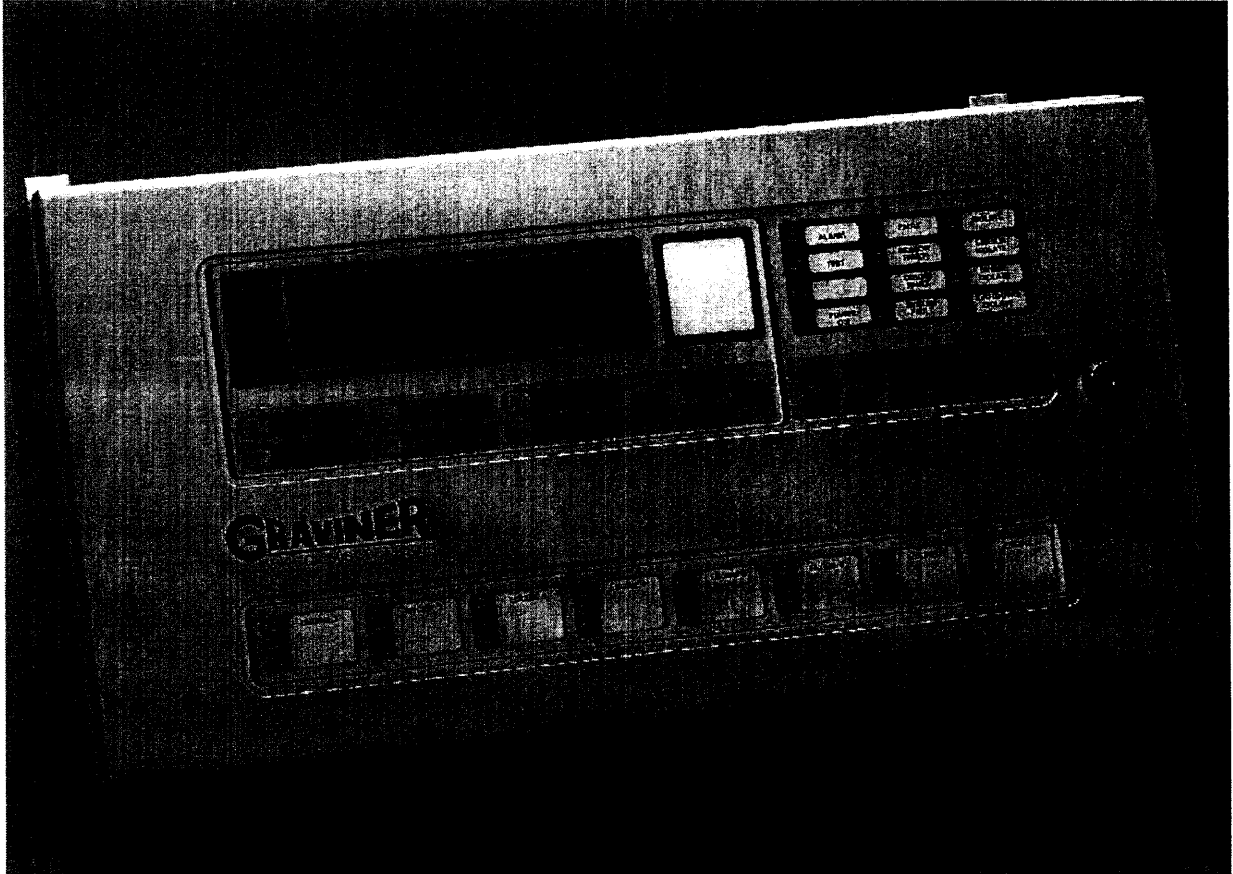


Figure 1: View of Mk6 OMD Control Unit

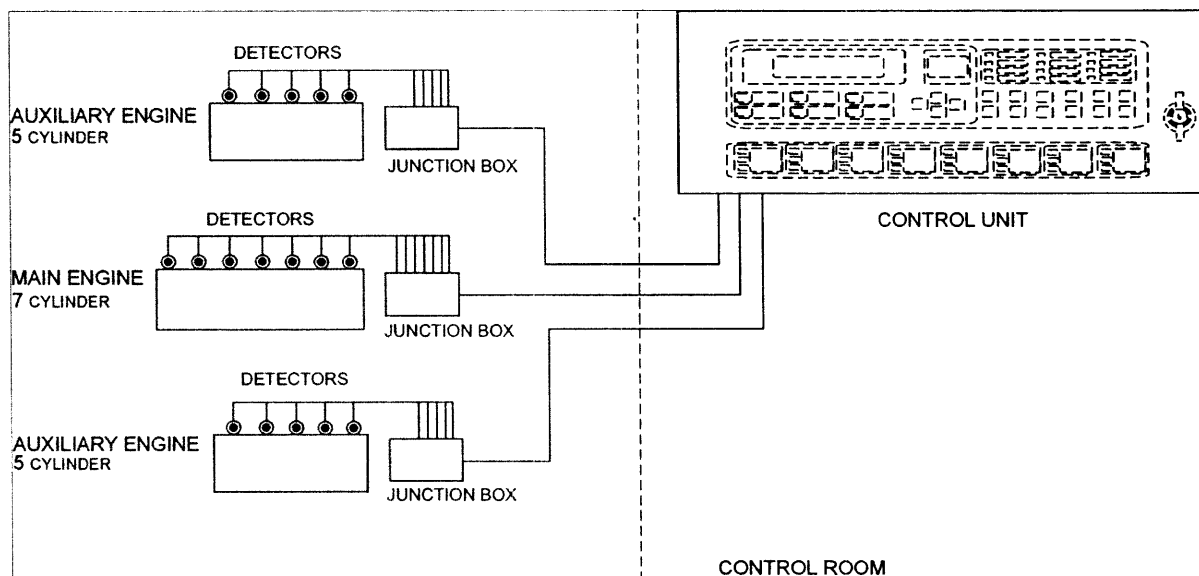


Figure 2: Oil Mist Detection System

1.4 OPERATION

Each detector continually monitors the oil mist density in the crankspace to which it is connected. In addition, it self checks for any internal faults. The control unit sequentially scans this information in digital form, including the address of the detector.

The control unit separates the information according to engine group. For each engine it carries out the average mist density calculation and the deviation of each reading from the average it then compares the average and all deviations to the pre-set alarm levels for each engine.

The control unit incorporates a Liquid Crystal Display (LCD) which constantly displays the average oil mist density reading for each engine. It also enables the individual readings of each detector on an engine and the average to be displayed on demand and automatically under alarm conditions.

As an aid to system commissioning and routine operation, both average and deviation alarm levels are also displayed for each engine.

The software can be simply configured on site for both 2 and 4 stroke engines or a combination of both. It can also be adjusted to accommodate varying mist levels within a single crankspace, e.g. the higher levels normally found in a 2 stroke gear case. The software is menu driven and provides a logical route to all functions. It has three operating levels:

- User
- Engineer
- Service

The user function is essentially for interrogation only and does not allow any adjustments to be made to alarm settings or system configuration.

The Engineer menu is password protected and allows access to most functions and the full range of settings. The only function denied is resetting of the event and history logs.

The Service menu is also password protected (different from the engineer menu) and allows access to all functions. This is only available to authorised Kidde Fire Protection Ltd personnel and authorised service agents.



In the interest of safety, all system controls and alarm displays/outputs are located on the control unit. However to aid fault finding each detector is fitted with 3 indicator lights:

Green	power on
Red	alarm
Amber	fault

Each detector also has an access to its address set switch.

As all detectors operate independently, the loss of one by either failure or the need to clean does not affect the operation of the rest of the system. Individual detectors, or engine groups, can be isolated from the rest of the system for maintenance while the rest of the system remains in operation.

1.5 SYSTEM FUNCTION, CONTROLS AND DISPLAYS

The control unit interrogates each detector in turn, notes its address and the oil mist density signal value. It then sorts this data into engine groups.

For each engine the average oil mist density is calculated and stored. Each detector signal is then compared in turn with the stored average. A positive difference (the deviation) is then compared with a pre-set, but adjustable reference (the deviation alarm level) for that engine (or detector). If it is greater than the reference a deviation alarm is given.

The stored average level is also compared with a preset reference (the average alarm level) and an average alarm is given if the reference is exceeded.

1.5.1 Controls

The controls, situated below the display, enable the following:

Alarm **ACCEPT**, selection of **MAIN DISPLAY**, selection of **MAIN MENU**, system **RESET** after alarm, selection of **ENGINE DISPLAY** and **HOLD** (during alarm) and system **TEST** menu.

Also located in the display area are the software navigation keys ie. ▲ (cursor up), ▼ (cursor down), ► (cursor right), ◄ (cursor left), ↵ (enter), ⏪ (quit) and a set of numerical inputs, 0-9.

Operation of the navigation keys is accompanied by an audio signal. The MAIN DISPLAY and MAIN MENU keys allow fast return to the normal display or the main menu from anywhere in the software.

The keypad keys are:

▼	indicating a downward action
▲	indicating an upward action
◄	indicating a leftward action
►	indicating a rightward action
⏪	indicating a cancelling action
↵	initiating an action
ACCEPT	indicating an acceptance of an event
0 - 9	indicating a number between 0 and 9

1.5.2 Main LCD Display

This provides visual access to all the data required to operate the system and displays the software pages for system configuration and fault analysis. On the main display and the engine display, the left hand vertical scale shows oil mist density in mg/l. In addition the main display shows the average alarm setting for each engine.

On the engine display, both the deviation alarm(s) and the average alarm settings are displayed. Under normal operating conditions, the main display page shows the average oil mist density for all engines and the relevant average alarm settings. It also shows the time, the date and **NORMAL**.



The engine display control calls up the individual engine cylinder readings and the average. It also displays the deviation and average alarm settings. The ▲/▼ keys allow each engine in the system to be displayed in turn.

The **MAIN DISPLAY** key always returns the display to this page from anywhere in the software.

The **MAIN MENU** key allows access to all the user/engineer and service menus. At the bottom of each displayed page the active navigation keys for that page are shown.

1.5.3 Engine Alarm Indicators

Each of the eight engine alarm indicator sets show the status of that engine ie. Alarm, Fault and Isolate.

This display is designed to be a backup to the main LCD.

1.5.4 Main Alarm Indicators

This light display consists of alarm indicators for all the individual alarm, fault and isolate conditions. Its function is to provide back up indication in the unlikely event of the loss of the main LCD display.

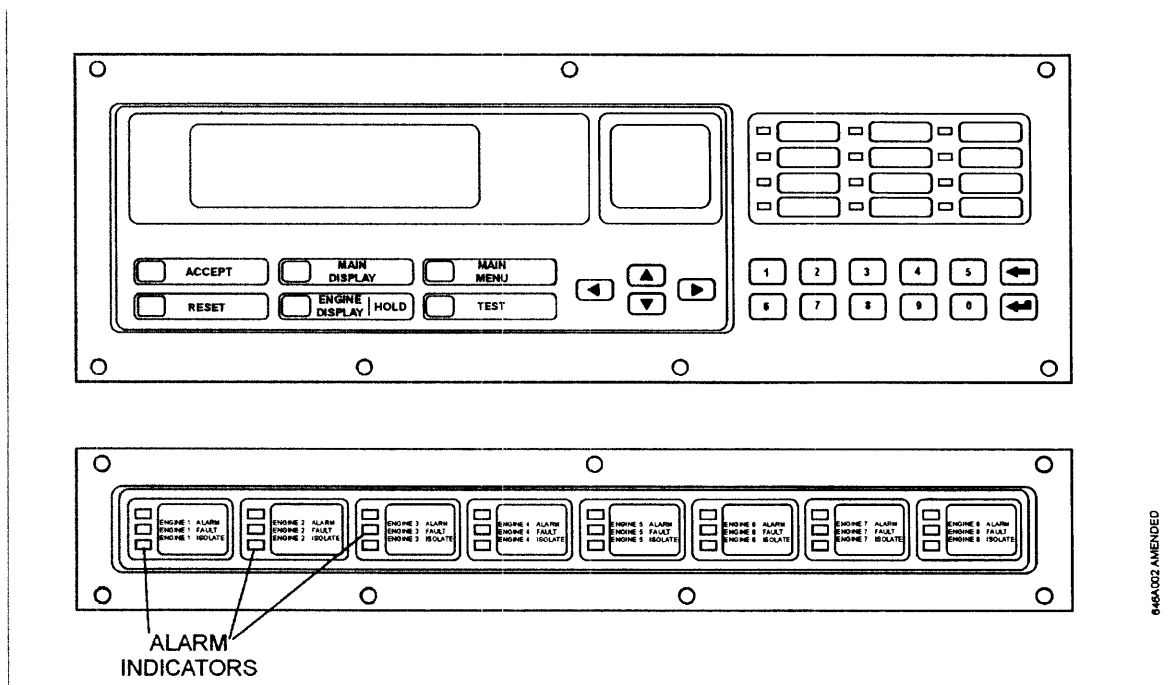


Figure 3: Display and Controls



CHAPTER 2

INSTALLATION AND COMMISSIONING

2.1 INSTALLATION

All connections to the Control Unit and Junction Box must be carried out in accordance with Appendix C Sheet 1. For cable specification refer to Appendix C Sheet 2.

2.1.1 Control Unit

The control unit is designed for either bulkhead or panel mounting, and must be installed in a control room or similar environment.

For bulkhead mounting fix to a rigid structure using the four M6 mounting flanges at the rear of the unit.

For panel mounting a bezel, part number 35100-K187 can be supplied (refer to Figure 4).

The position of the control unit must be sited for optimum visibility of the display. Sufficient space must be left around the control unit to allow the fitting of glands and routing of the cables, and to facilitate easy access to all aspects of the control unit. A minimum of 750 mm must be allowed at the front of the control unit to allow the door to be opened.

2.1.2 Detector

Each detector is mounted to an individual crankcase via a $\frac{3}{4}$ inch BSP threaded hole.

The detector should be located at the upper part of the crankcase wall NOT in the direct line of the oil throw. On smaller engines it is permissible to mount the detector on the crankcase door if desired or installation dictates. The detector must be fitted at a maximum of plus or minus 10 degrees from the vertical. Horizontally the detector must be mounted level or with the detector body inclined towards the engine to ensure oil drainage.

Each detector is then connected via either a straight or 90° bend cable assembly to its relevant junction box.

2.1.3 Junction Box

The junction box is designed for on-engine mounting and it is recommended that the box is installed as near centre of the engine as possible to minimise detector cable lengths. Mounting is via the four M6 locating holes in the box. Sufficient space must be left around the junction box to allow access to the cable glands and the routing of the cables and to facilitate easy access to all aspects of the junction box. The wiring connections to the junction box must be made in accordance with the label on the inside of the box lid (refer to Figure 5).

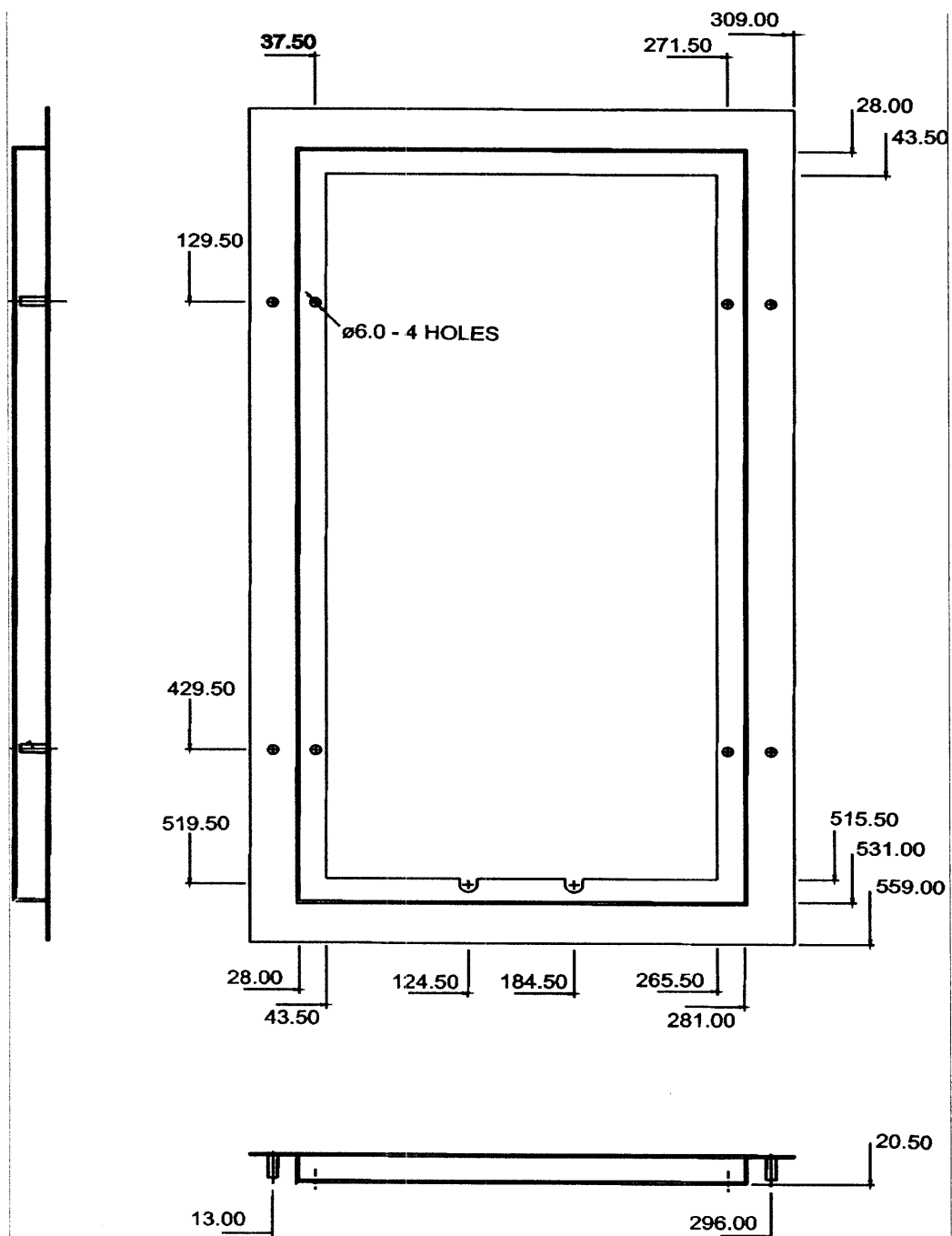
2.1.4 Cables

Cables, part numbers 43682-K108-XX (5 to 25 m) and 43682-K109-XX (5 to 25 m) are available.

XX = Length of the Cable

00 = 5 m	05 = 17.5 m
01 = 7.5 m	06 = 20 m
02 = 10 m	07 = 22.5 m
03 = 12.5 m	08 = 25 m
04 = 15 m	





ALL DIMENSIONS IN mm

Figure 4: Bezel 35100-K187



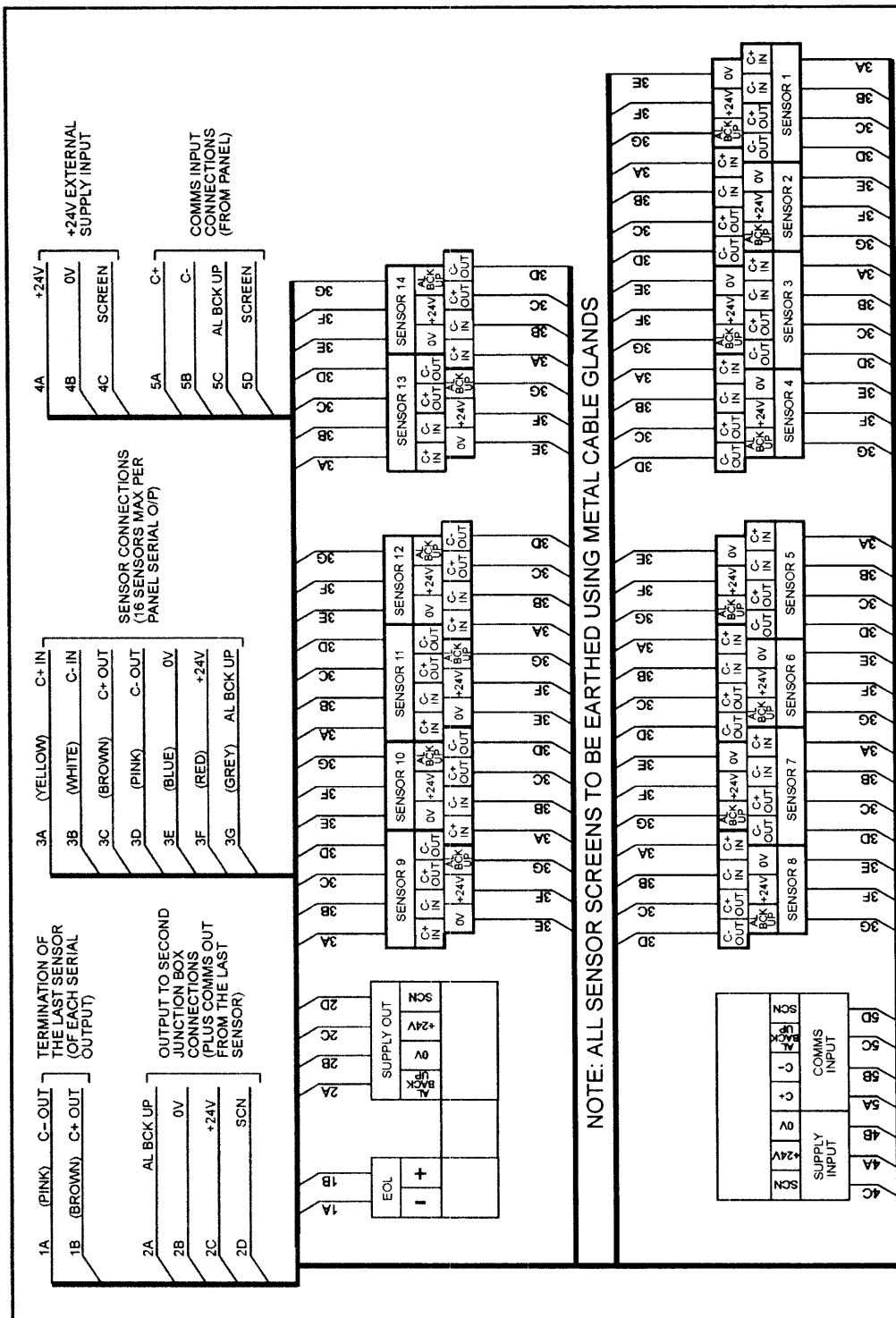


Figure 5: Junction Box External Connections Label



2.2 SYSTEM CHECKS PRIOR TO SWITCH ON

- 2.2.1 Ensure all detectors fitted to the engine are locked tightly in place by means of the lock nut supplied.
- 2.2.2 Ensure that the detectors are correctly addressed and the switch window label has been fitted (refer to para 2.3.4. Set Detector Address).
- 2.2.3 Check that the detector cables are correctly terminated in the junction box and that the screens are made off correctly in the glands, e.g. the detector that is addressed 01 is connected to the detector 1 position in the junction box, and the detector addressed 02 is connected to the detector 2 position in the junction box etc.
- 2.2.4 Ensure that the Communication and Junction Box power supply cables are connected correctly in the junction box (refer to Figure 5).
- 2.2.5 Check the cable run of the Communication and Junction Box power supply cables back from the junction box to the Control Unit to ensure that they are not damaged.
- 2.2.6 Ensure that the Communication and Junction Box power supply cables are connected correctly in the Control Unit (refer to Figure 6).
- 2.2.7 Ensure that the Engine Slowdown, Main Alarm and Fault Alarm relays are connected correctly in the Control Unit (refer to Figure 6).
- 2.2.8 Ensure that the supply input cable is connected correctly to the Control Unit (refer to Figure 6).
- 2.2.9 Ensure that the input voltage is 24V D.C. +30%, - 25%
- 2.2.10 Check the location and function of the main controls on the front of the Control Unit (refer to Figure 3).
- 2.2.11 When all of the above have been checked and are satisfactory the system is ready to switch on.

2.3 SYSTEM CONFIGURATION AND COMMISSIONING

2.3.1 System Menus

2.3.1.1 Main Menu - User

When the Main Menu - User is selected, four sub-menus appear on the screen as follows: System Status, Test, Event log and History Log.

System Status

When the System Status menu is selected, two sub-menus appear on the screen as follows: Engine Status and Detector Status.

Engine Status

This menu will show the average alarm level as set in the engineer configuration menu, the maximum average level that has been reached, if the engine slow down relay and engine are isolated, if the engine system has any general faults and finally the number of detectors configured for this engine.

If more than one engine is configured, press the ← key once then by using the ▲ and ▼ keys highlight the next engine to be checked and press the ↵ key.



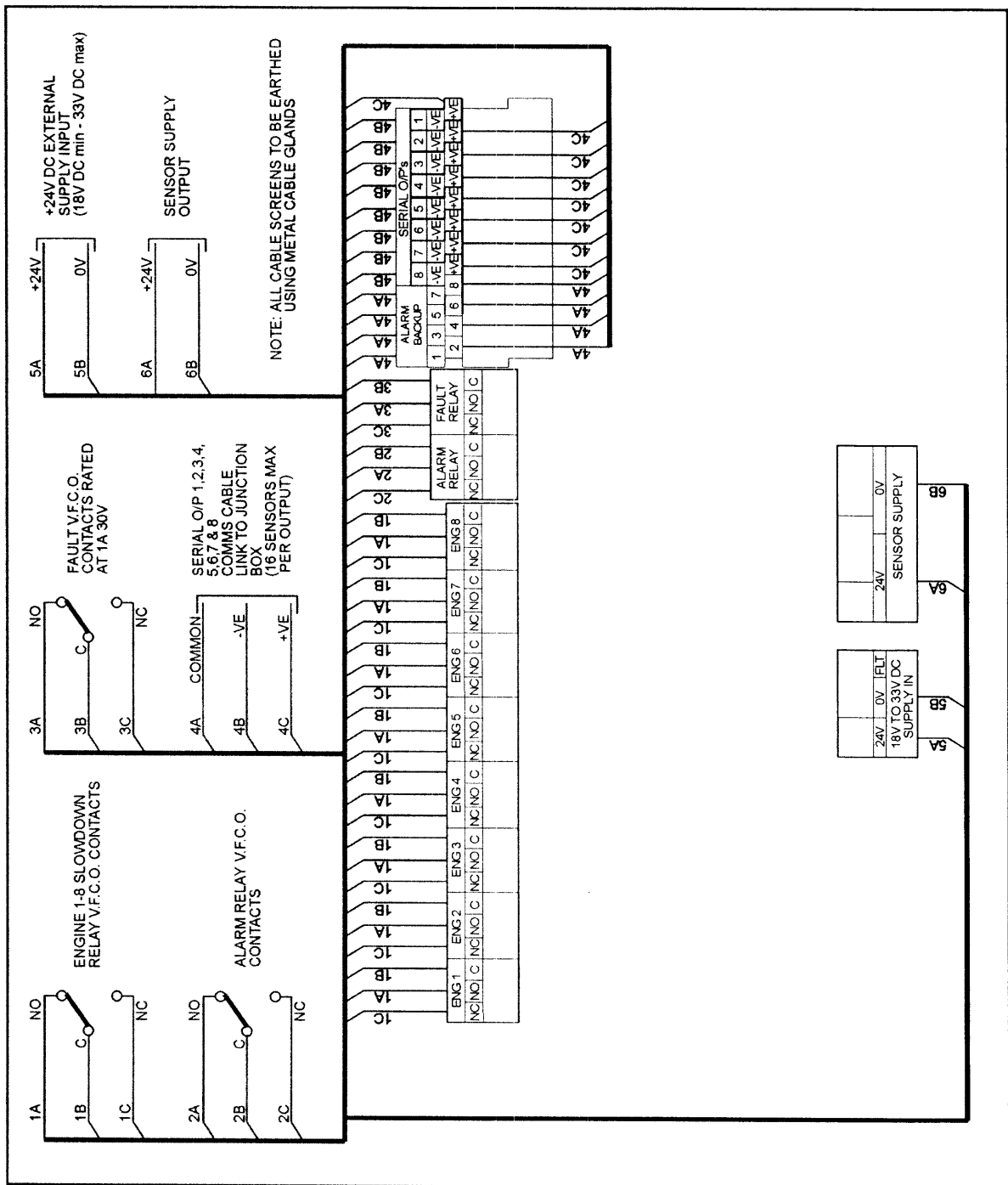


Figure 6: Control Unit External Connections Label



Detector Status

When the detector sub-menu is selected four more menu options appear on the screen as follows:

Detector Level

This gives the actual oil mist density reading for each detector.

Detector Status

This gives the following information for each detector: maximum oil mist density, set deviation alarm level, whether the detector is isolated, if the detector has a comms fault and also the light average.

Detector Faults

Will reveal with each detector selected if the detector has a fan, light, optic, watchdog or address fault.

Detector Offsets

This menu cannot be used at this level.

Test

When the Test menu is selected it provides access to the test sub-menus. Refer to para 2.5 for more information on how to test the system.

Event Log

When the Event Log sub-menu is selected three more menu options appear on the screen as follows:

List all events

This will allow the last 256 events to be interrogated

List by event

This allows events of a specific type to be interrogated

List by date

Allows events from a user specified time and date only to be interrogated.

History Log

When the History Log menu is selected, four more menu options appear on the screen as follows:

List by Engine

Lists each engine's detector readings.

List by Level

This allows a mg/l reading to be entered and, when entered, shows all detectors that have had readings that are higher.

List from Date

Allows the end-user to interrogate from a specific time and date.



History Sample Level

Allows a level between 0.00 to 1.99 mg/l, any detector level that varies by more than the set sample limit will be stored in the History Log .

2.3.1.2 Main Menu - Engineer (Refer to Figure 7)

When selected a prompt for a password will appear. Enter 012345 then press the ↵ key, the main menu - engineer is displayed with 7 menu options as follows: Configure System, System Status, Isolate, Test, Event Log, History Log, Cancel Password.

Configure System

This menu allows the system to be programmed via on screen prompts. Refer to Figure 7 for software flow charts.

It allows the engineer to configure the system for the following:

1. The number of engines and the number of detectors per engine.
2. To name each engine individually.
3. Set the average and deviation alarm levels.
4. Time and date.
5. Unique password. Password must be minimum 2 digits, maximum 6 digits.
6. Allows individual detector offsets to be stored.

When the programming in each section is complete, press the ← key once. The words **Save Configuration Data** will appear for a few seconds at the bottom of the display. Allow these words to disappear before moving on to the next section to be programmed.

System Status

This is the same as the user menu, except that it has a third sub-menu which is STATUS. This, when selected, allows the configuration to be erased.

Isolate

This allows either all the detectors on one engine, a single detector or an engine shut down relay to be isolated.

Test

Accesses the test menus. Refer to Para 2.5 for more information on how to test the system.

Event Log

As user menu.

History Log

As user menu.

Cancel Password.

When selected, returns to the normal display.



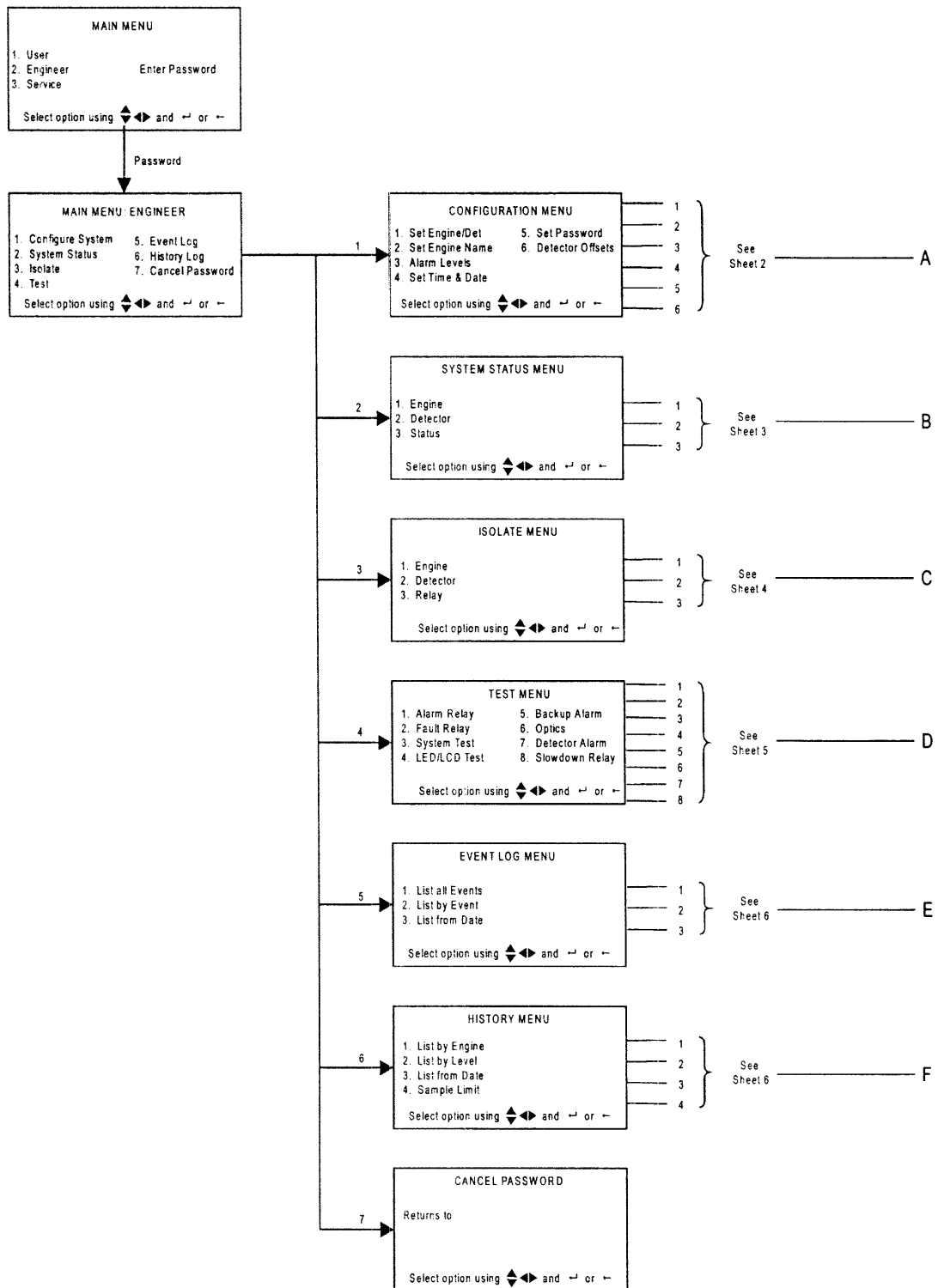


Figure 7: OMD Engineer Menu Schematic
Sheet 1



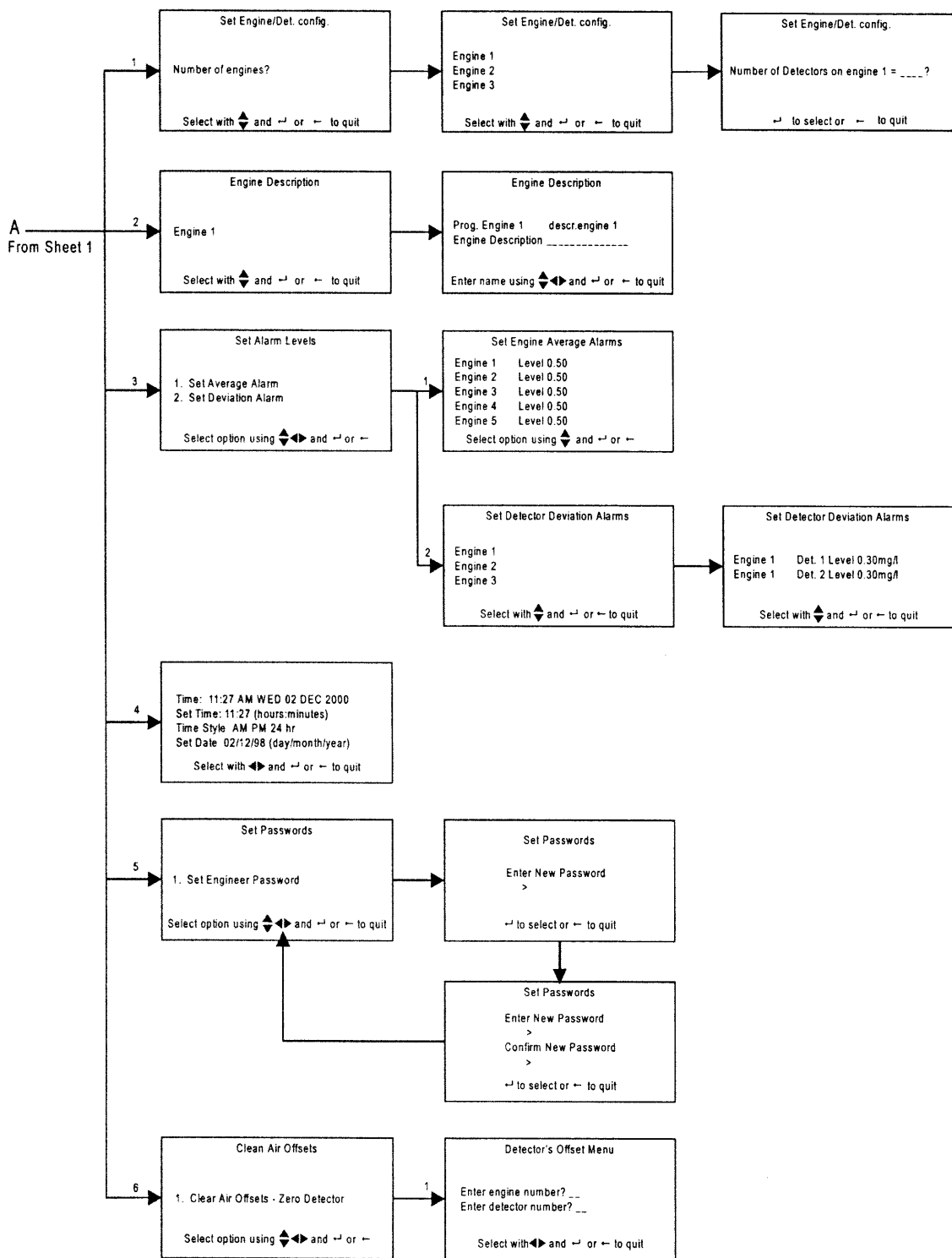


Figure 7: OMD Engineer Menu Schematic
Sheet 2



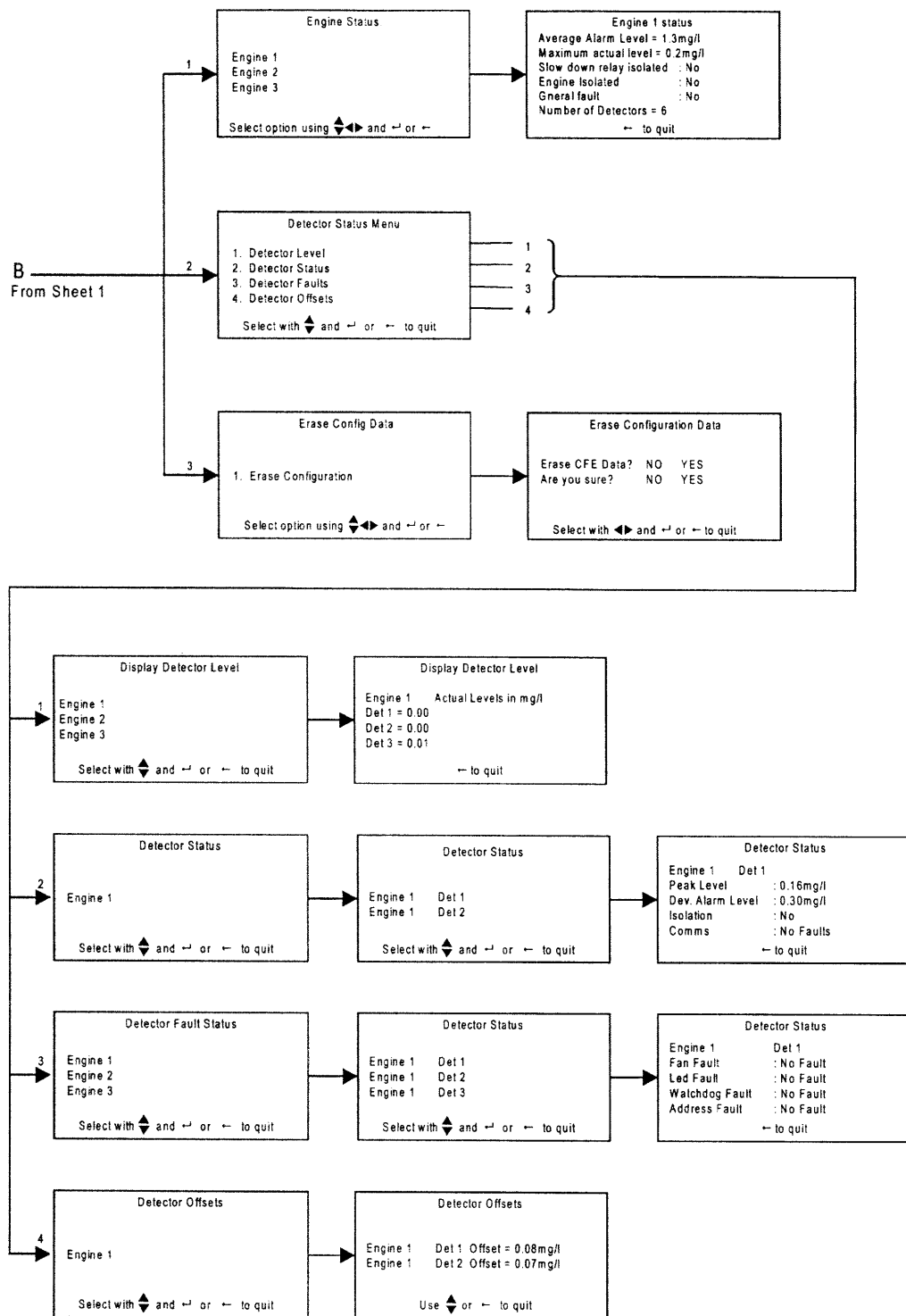


Figure 7: OMD Engineer Menu Schematic
Sheet 3



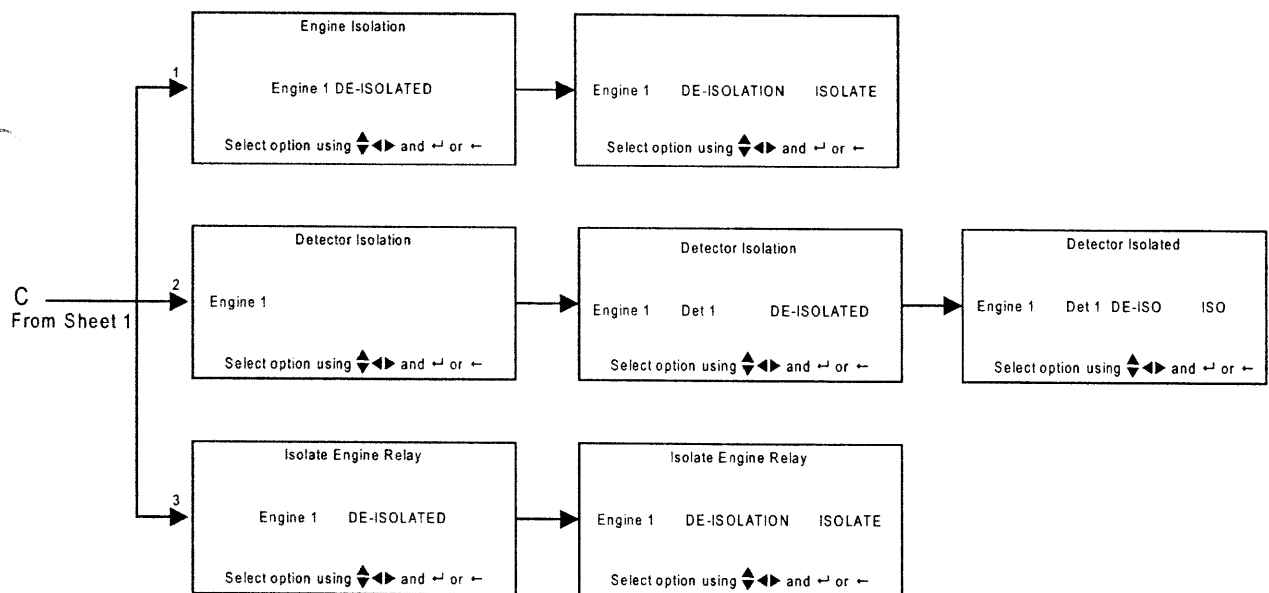


Figure 7: OMD Engineer Menu Schematic
Sheet 4



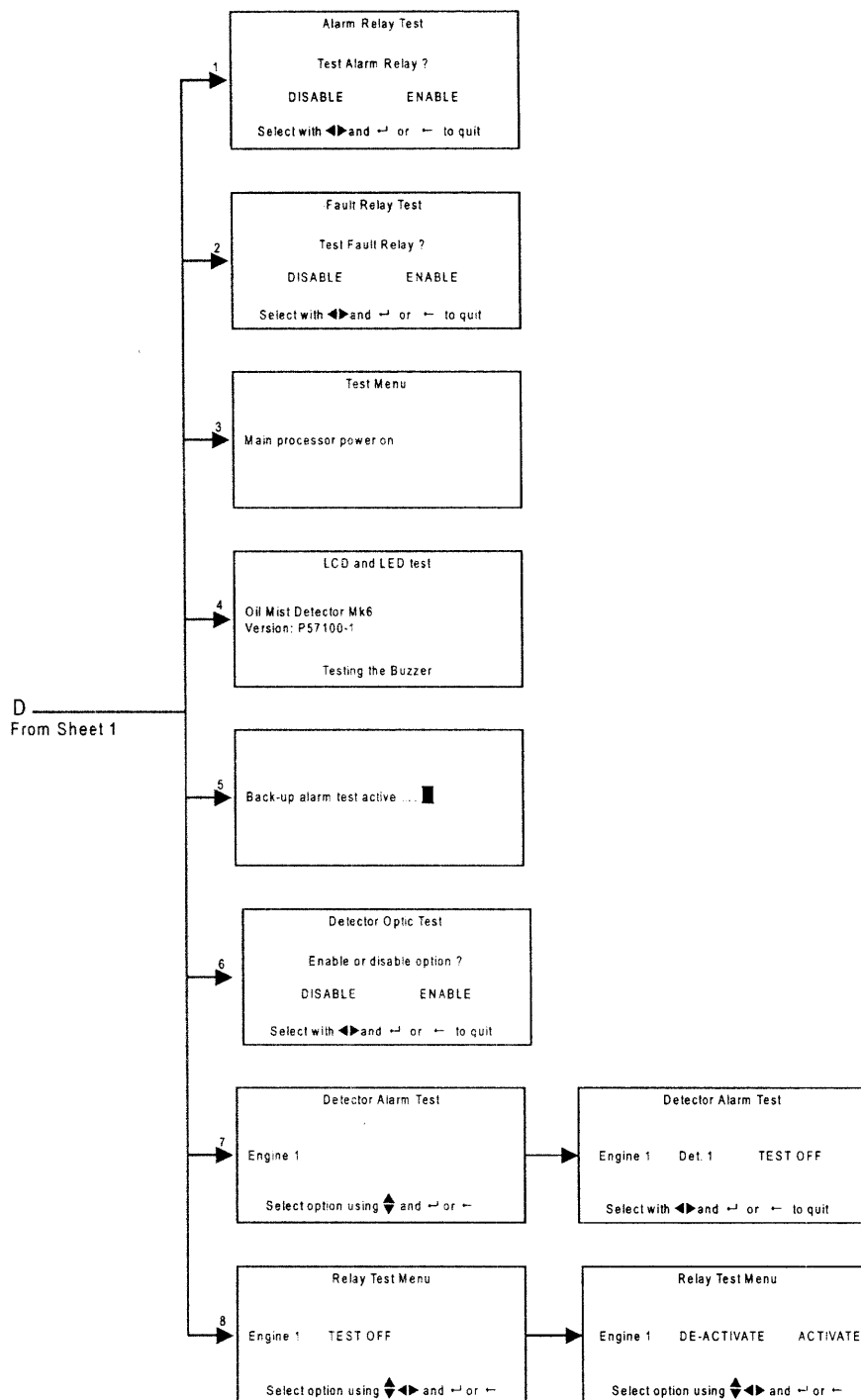


Figure 7: OMD Engineer Menu Schematic
Sheet 5



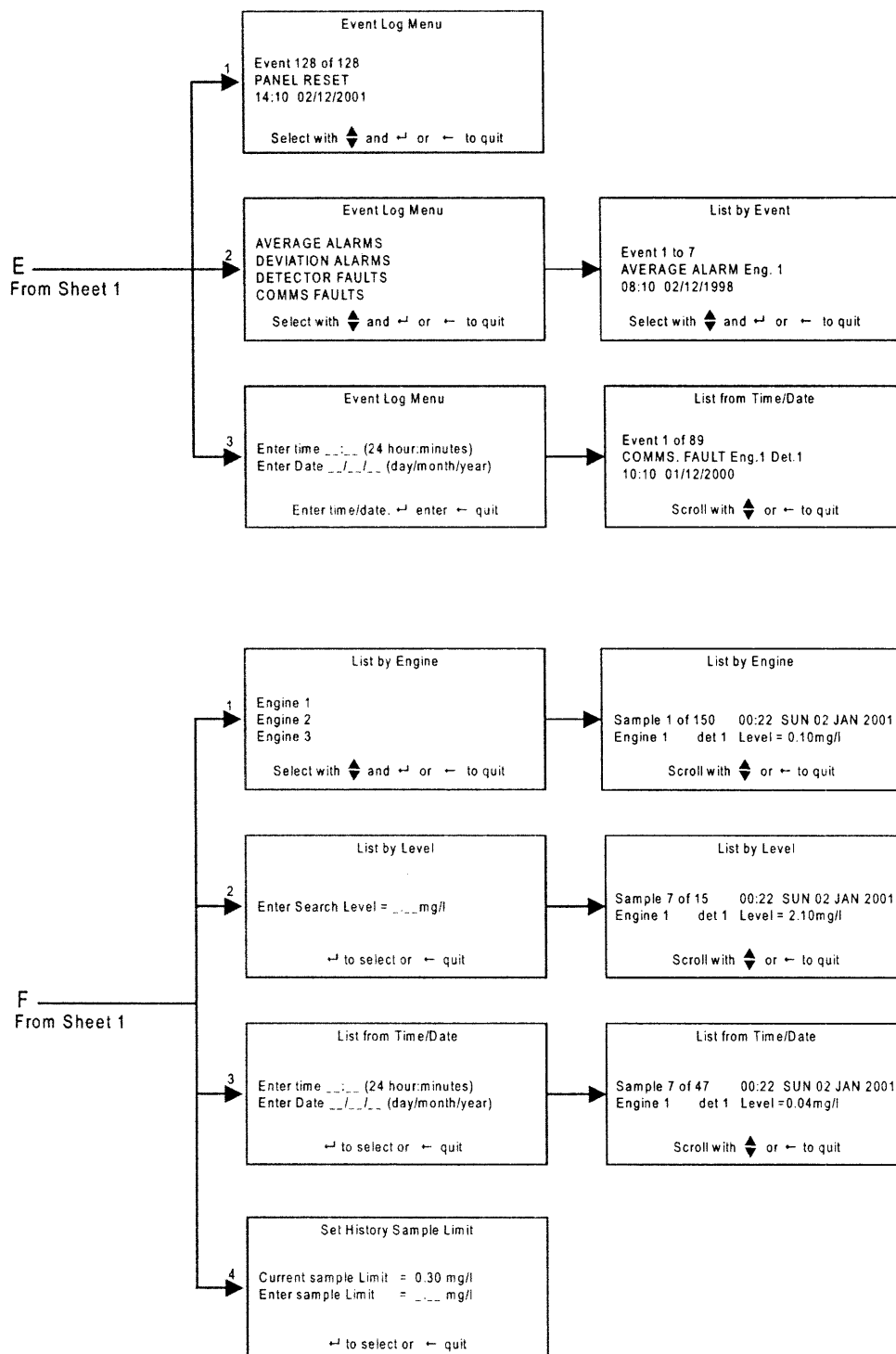


Figure 7: OMD Engineer Menu Schematic
Sheet 6



2.3.1.3 Main Menu - Service

This menu is password protected and access is for authorised service agents of Kidde Fire Protection Ltd only.

2.3.2 Default Settings

Attribute	Default	Comment
Number of engines	1	User selectable - 1 to 8
Number of detectors	6	User selectable - 1 to 64
Detectors per engine	6	User selectable - 1 to 14

2.3.3 Initial Actions and Settings

1. After switch on, the control unit display shows the message **SCANNING FOR DETECTORS**. Followed by a flashing **COMMS FAULT** message.
2. Press **ACCEPT** to silence the audible alarm. The **COMMS FAULT** continues to flash. Select **MAIN MENU** use the cursor to highlight **ENGINEER**. Press **↵**.
3. The display calls for password. Enter the default password **012345** press **↵**. Display shows **MAIN MENU ENGINEER**. Use the cursor to highlight option **1 CONFIGURE SYSTEM**. Press **↵**.

2.3.4 Set Detector Address

Correct operation of the system depends on all detector heads being correctly addressed. This is carried out after installation (refer to Figure 8).

1. Remove the temporary adhesive label covering the access port to the address switches.
2. Use an instrument screwdriver to set the switches.
3. The left hand switch sets the TENS, the right hand switch sets the UNITS.
4. Detectors are supplied with the switches set to 00.
5. The detector addresses must be sequential and should run in sequence from engine to engine, ie if the last detector head on the first engine is address 08, then the first detector head on the second engine must be 09.
6. Clean the detector head in the area around the address switches and indicator lights with wet and dry wipes to ensure any oil or grease is removed. Attach the switch window label so that both the switches and the indicator lights are visible.
7. The address should be written on the invalidate guarantee label in the position shown.
8. It is essential that if detector heads are removed for overhaul they are returned to their original position or they are re-addressed.



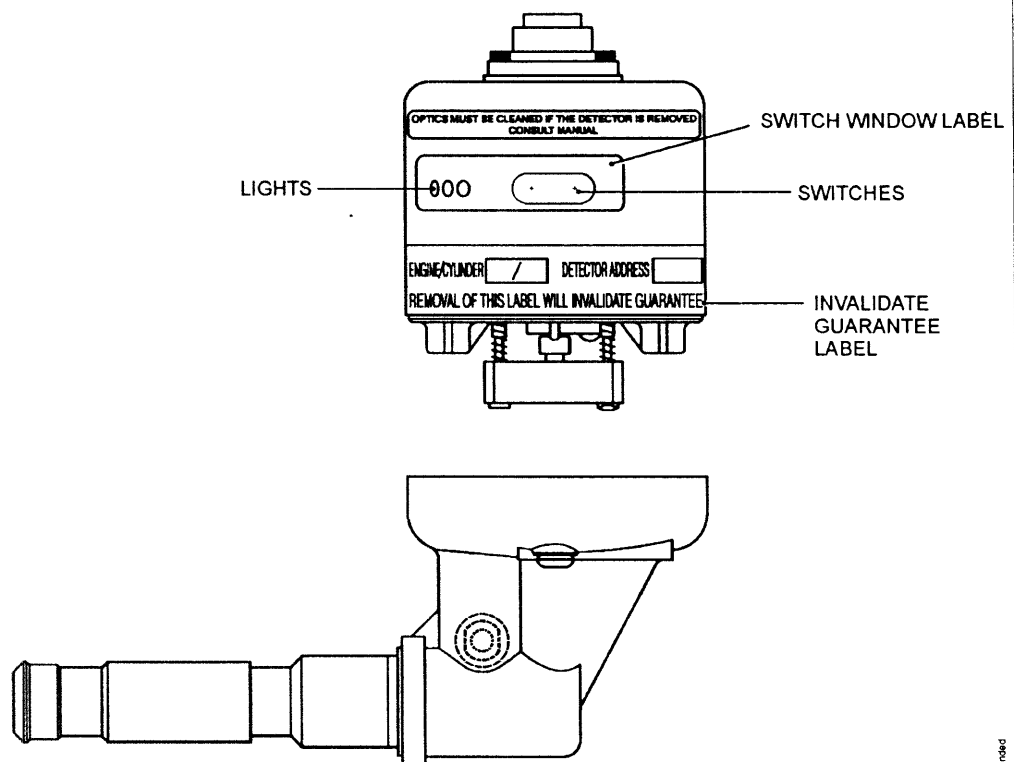


Figure 8: Detector Head E3561-301

2.3.5 Setting Engine Details

1. Select **ENGINEER MAIN MENU**, followed by **CONFIGURATION SYSTEM** and **ENGINE/DETECTOR**.
2. In **ENGINE/DETECTOR CONFIGURATION** enter number of engines. Press $\uparrow$.
3. Select each engine in turn using the $\blacktriangle$ and $\blacktriangledown$ navigation keys.
4. For each engine enter the number of detectors. Press $\uparrow$ after each entry.
5. Press $\leftarrow$ to return to configuration menu.
6. Select engine name. Select engine 1 (2, 3, 4, etc) press $\uparrow$.
7. Enter engine description letter by letter using the $\blacktriangle/\blacktriangledown$ keys to sequence through the alphabet and the $\blacktriangleleft/\blacktriangleright$ keys to move to the next letter. Press $\uparrow$ to store the name. Press $\leftarrow$ to return to engine description page and select **NEXT ENGINE**.
8. Repeat this section to name all configured engines.



2.3.6 Setting Detector to Zero

Once the system is configured to the engine installation, the detectors must be set to zero. As the detectors are electro-optical devices it is normal for each of them to exhibit a small zero shift when first switched on. This is referred to in the configuration menu as **CLEAN AIR OFFSET**.

Note: The detectors must be set to zero prior to engine start.

To zero the detectors proceed as follows:

1. Select **ENGINEER MAIN MENU** and call up **CONFIGURATION**.
2. Select **DETECTOR OFFSETS. CLEAN AIR OFFSET-ZERO DETECTORS** is displayed. Press $\leftarrow$.
3. **DETECTOR OFFSET MENU** is displayed.
4. Type in engine number and detector number, press $\leftarrow$.
5. Repeat this for each detector on each engine.
6. All detectors will now be set to zero.

2.3.7 Setting Alarm Levels

The system is supplied with default alarm settings for both average and deviation. These are based on past experience and allow the system to operate initially and gather data from the engines being monitored. To enable the alarm settings to be matched to the individual engines, the actual oil mist density readings should be taken from each engine after it has been operating at full load for at least two hours.

Average

1. Enter **MAIN MENU** and select **ENGINEER/SYSTEM STATUS**. At **SYSTEM STATUS** select **ENGINE 1 (2, 3, 4, etc)**. **SYSTEM STATUS ENGINE 1 (2, 3, 4, etc)** shows.
2. Read maximum actual average value (retain this value for deviation alarm setting).
3. Reset average alarm level to a maximum of twice the max actual average, as follows:
Return to **CONFIGURATION MENU**, select **3, ALARM LEVELS**, Select **SET AVERAGE ALARM**, Select engine number, press $\leftarrow$. Enter new alarm level, as calculated from above.
4. Repeat steps (1) to (3) for all engines.

Deviation

Have the max actual average for each engine to hand as used in resetting the average alarm (from step (2) in 2.3.7 above).

1. Enter **MAIN MENU** and select **ENGINEER MAIN MENU**. Enter password, Press $\leftarrow$.
2. Select **SYSTEM STATUS** followed by **DETECTOR**, Select **DETECTOR STATUS**, Select engine 1 then select detector 1 (2, 3, 4, etc.) in turn and note the peak level on each detector.
3. Select the highest value, subtract the max actual average for engine 1. Log the result.
4. Repeat for each engine by using $\leftarrow$ key to return to **DETECTOR STATUS** menu.
5. To set the deviation alarm level for engine 1 take the value obtained above for engine 1 and set the deviation alarm for each detector on this engine to twice this value, or a minimum of 0.05mg/l, whichever is the larger; as follows:



6. Use ← key to return to **CONFIGURATION MENU**. Select **ALARM LEVELS**.
7. Select **DEVIATION ALARM**. Select engine 1, enter set new deviation alarm level for each detector for engine 1.
8. Repeat steps (5) to (7) for each engine.

2.3.8 System Access Password

Access to the system is at three levels:

User
Engineer
Service

The User access level allows for READ only. No adjustments are possible but all data and settings can be read.

The Engineer access level is password protected and allows the system to be configured and read. It also allows the alarm settings to be adjusted. The system is supplied with a default password, but it can be altered to suit individual operators. The default password will always remain active for emergency.

To change the password proceed as follows:

1. Press **MAIN MENU** and then select **ENGINEER**. Enter default password, select **1**, **CONFIGURE SYSTEM**.
2. In configuration menu select **5**, **SET PASSWORD**.
3. In set **PASSWORD MENU**, select **SET ENGINEER PASSWORD**.
4. Enter new password, (min 2 digits, max 6 digits) press ↵, enter new password again to confirm and press ↵.

The new password is now active.

The Service access level is also password protected and access is for authorised service agents of Kidde Fire Protection Ltd only.

2.4 SYSTEM OPERATION

Warning: In the event of an alarm, do not interrogate the detector while the alarm condition is still present.

2.4.1 Action on Alarm

On receipt of either a Deviation or Average alarm the engine should, unless connected to a shut-down relay, be stopped if safe to do so and allowed to cool down so that the background oil mist levels reduce. Investigations can then be carried out to find the cause of the alarm and rectify. Once the fault in the engine has been rectified the OMD system can be re-set and the display returns to the normal mode.

When a system fault alarm is received, the information on the display should be noted and then the appropriate fault finding procedure in Chapter 4 of the manual should be consulted to enable the fault to be rectified.

Note: When the engine is started from cold in Arctic conditions, a water mist can be produced that could give a false alarm.



2.4.1.1 Alarm, Fault and Warning Messages LCD

Alarm and fault messages have an associated priority. These are detailed below:

Message	Priority
Alarm	Highest
Comms. fault	2nd highest
Sensor fault	3rd highest
System fault	4th highest

All events are stored in the alarm/fault queue in order of occurrence. The user can scroll through the queue by use of the arrow keys.

Once an event is active the event is displayed on the LCD in the appropriate format. To clear the display press the **ACCEPT** key. Once the **ACCEPT** key is pressed, the display shows the **ENGINE AVERAGES** display.

When an alarm condition exists, the following warning message is displayed regardless of other information on the display (ie alarm events have the highest priority): **DEVIATION ALARM**.

2.4.2 Status Data

2.4.2.1 Engine

This menu will show the average alarm level as set in the engineer configuration menu, the maximum average level that has been reached, if the engine slow down relays and engine are isolated, if the engine system has any general faults and finally the number of detectors configured for this engine.

2.4.2.2 Detector

Detector Status - This gives the following information for each detector, maximum oil mist density, set deviation alarm level, whether the detector is isolated, if the detector has a comms. fault and also the light average.

2.4.3 Checking and Resetting Alarm levels

It may become necessary over a period of time that due, to changes in the engine's characteristics, the alarm levels need to be adjusted. If this becomes apparent, refer to para 2.3.7: Setting Alarm Levels, to enable adjustments to be made.

2.4.4 Detector Offset

Because of the optical design of the detectors it may be required to remove detector readings whilst measuring no oil mist. To carry out this operation, refer to para 2.3.6: Setting Detector to Zero.

2.4.5 Isolation

Engine Isolation

To isolate all of the detectors on one particular engine, access the **MAIN MENU** and select **ENGINEER**. Enter either the default password or own unique password if this option has been used.

1. When in the engineer menu, press key number 3 to highlight **ISOLATE** and then press the ↵ key.



2. Once in the isolate menu, select **1 ENGINE**, press the ↵ key and the display will show the number of engines configured with the word **DE-ISOLATED** beside each one.
3. Using the ▲ and ▼ keys, highlight the engine required and press the ↵ key.
4. The display will show the engine selected with the words **DE-ISOLATION - ISOLATE** beside it.
5. Press the ► key to highlight **ISOLATE** and press the ↵ key.
6. The display reverts to showing the number of engines configured, but the selected engine will have the word **ISOLATED** flashing beside it instead of **DE-ISOLATED**.
7. The three lights marked **ISOLATE**, **DETECTOR ISOLATE** and **ENGINE ISOLATE** all come on.

To de-isolate, repeat the above until you reach the display that shows **DE-ISOLATION - ISOLATE** (step (4)) beside the selected engine and as **DE-ISOLATED** is highlighted press the ↵ key and the detectors on the engine return to normal operation.

To return to the normal menu press the ← key once and then the **MAIN DISPLAY** key.

Detector Isolation

To isolate a detector, access the engineer menu and then the isolate menu as above.

1. When in the isolate menu press the ▼ key and press the ↵ key.
2. The display will show the number of engines configured.
3. Using the ▲ and ▼ keys highlight the engine on which the detector is to be isolated and press the ↵ key.
4. The display changes to show the number of detectors configured on the selected engine with the word **DE-ISOLATED** beside each detector.
5. Using the ▲ and ▼ keys highlight the detector to be isolated and press the ↵ key.
6. The words beside the detector selected will change to **DE-ISO ISO**.
7. By using the ► key, highlight **ISO** and press the ↵ key.
8. The display returns to show all detectors with the word **ISOLATED** flashing by the selected detector. All other detectors still have the word **DE-ISOLATED** beside them.
9. The **ISOLATE** and **DETECTOR ISOLATE** lights will come on.
10. To de-isolate the detector ensure this detector is highlighted and press the ↵ key to return to the display showing **DE-ISO ISO** and, as **DE-ISO** is highlighted, press the ↵ key again and the screen returns to showing all detectors de-isolated and the lights will go off.
11. To return to the normal screen press the ← key once and press the **MAIN DISPLAY** key.

Slow Down Relay Isolation

To isolate a slow down relay, access the engineer menu and the isolate menu as above.

1. In the isolate menu select **3 RELAY** and press the ↵ key.
2. The display shows the number of engines configured with the word **DE-ISOLATED** beside each one.
3. Highlight the engine of which the relay is to be isolated by use of the ▲ and ▼ keys and press the ↵ key.



4. The display shows **DE-ISOLATION ISOLATE** beside the engine selected.
5. Press the ► key to highlight **ISOLATE**.
6. Press the ↵ key and the display will show **ENGINE 1 (2 - 8)** with the word **ISOLATED** flashing beside it.
7. The **SHUTDOWN ISOLATE** light and the **ENGINE ISOLATE** lights come on.
8. To return the relay to normal operation, press the ↵ key whilst the display is showing the engine number and the word **ISOLATED** is flashing.
9. The display shows **ENGINE 1 (2 - 8) DE-ISOLATION ISOLATE**. Press ↵. The display shows **ENGINE 1 (2 - 8) DE-ISOLATED** and the two lights will go out.
10. Press the **MAIN DISPLAY** key to return to the **NORMAL** display.

2.5 SYSTEM TEST

Press the **TEST** key pad on the control unit. The **TEST MENU** appears, with this menu selected eight more menu options appear on screen as follows: (the eighth option is only available through the engineer menu.)

- | | | |
|----|----------------|---|
| 1. | Alarm Relay | Checks the correct operation of the main alarm relay. |
| 2. | Fault Relay | Checks the correct operation of the fault relay. |
| 3. | System Test | Checks the correct operation of the system software. |
| 4. | LED/LCD Test | Checks all of the lights and all segments of the LCD on the control unit and also the internal sounder. |
| 5. | Back-up Alarm | Checks the Back-up alarm connection from each detector by switching the internal sounder on & off once for each detector. |
| 6. | Optics | Checks the output from the detector light array to ensure it is within limits. |
| 7. | Detector Alarm | Simulates a deviation alarm without operating the slowdown relay. |

Warning:WARNING;Carrying out this test with the engine operating will cause the engine shut/slow down system to operate if fitted.

- | | | |
|----|----------------|--|
| 8. | Slowdown Relay | Checks the correct operation of the slowdown relay. (Only available in password protected screen). |
|----|----------------|--|

2.5.1 No. 1 - Alarm Relay

1. Press the **TEST** key pad on the control unit. The **TEST MENU** is displayed, defaulting to No.1 **ALARM RELAY**.
2. Press ↵ key.
3. Display changes to:

ALARM RELAY TEST
TEST ALARM RELAY
DISABLE ENABLE

Note: **DISABLE** will be highlighted.

4. Press ► key to highlight **ENABLE**.
5. Press ↵ key and observe:
 - a. The display returns to the test menu.



- b. The **TEST** light on the control unit comes on.
- c. The main alarm relay operates. This is confirmed by any audible and visual alarms operating that are connected to this relay.

To cancel the alarm:

1. Ensure **ALARM RELAY** in the test menu is highlighted.
2. Press ↵ key.
3. Display changes to that shown in para 2.5.1 step (3) above with **DISABLE** highlighted.
4. Press ↵ key again and the alarm will reset and the display will return to the test menu.
5. When testing of the main alarm is complete either; Press the **MAIN DISPLAY** key on the control unit to return to the normal display, or select another test option.

2.5.2 No. 2 Fault Relay

1. Press the **TEST** key pad on the control unit. The **TEST MENU** is displayed, defaulting to No.1 **ALARM RELAY**.
2. Press key pad No. 2 or the ▼ key to highlight No. 2 **FAULT RELAY**.
3. Press the ↵ key.
4. The display changes to:

FAULT RELAY TEST
TEST FAULT RELAY ?
DISABLE ENABLE

Note: **DISABLE** will be highlighted.

5. Press the ► key to highlight **ENABLE**.
6. Press ↵ and observe:
 - a. The display returns to the Test Menu.
 - b. The **TEST** light on the control unit comes on.
 - c. Fault relay changes state. This is confirmed by any audible and visual alarms operating that are connected to this relay.
 - d. To cancel the alarm repeat para 2.5.2 steps 2 & 3 above and then press the ↵ key again.
 - e. When testing of the fault relay is complete, either; Press the **MAIN DISPLAY** key to return to the normal display or select another test option.

2.5.3 No. 3 System Test

1. Press the **TEST** key pad on the control unit. The **TEST MENU** is displayed, defaulting to No.1 **ALARM RELAY**.
2. Press key pad No. 3 or the ▼ key twice to highlight No. 3 **SYSTEM TEST**.
3. Press ↵ and observe:
4. The words **MAIN PROCESSOR POWER ON** appear for 2-3 seconds and then the display returns to the test menu.
5. This test is now complete. The operator can now either: Press the **MAIN DISPLAY** key to return to the normal display or select another test option.



2.5.4 No. 4 LED/LCD Test

1. Press the **TEST** key pad on the control unit. The **TEST MENU** is displayed, defaulting to No.1 **ALARM RELAY**.
2. Press key pad No. 4 or the ▼ key 3 times to highlight No 4 **LED/LCD TEST**.
3. Press ↵ and observe:
 - a. All of the lights on the control unit come on.
 - b. Horizontal bars scroll down the display.
 - c. The following appears on the display after the bars scroll down

LCD AND LED TEST
OIL MIST DETECTOR MK6
VERSION: P57100-10*

(*Will depend on the software version fitted)

- d. The internal sounder operates for approximately 5 seconds.
 - e. All lights except for the green **POWER ON** light go out.
 - f. The display returns to the test menu.
4. This test is now complete. The operator can now either: Press the **MAIN DISPLAY** key to return to the normal display, or select another test option.

2.5.5 No. 5 Backup Alarm

1. Press the **TEST** key pad on the control unit. The **TEST MENU** is displayed, defaulting to No.1 **ALARM RELAY**.
2. Press key pad No. 5 or the ▼ key four times to highlight No. 5 **BACK-UP ALARM**.
3. Press ↵ and check that the internal sounder operates the same number of times as there are detectors fitted to the system and the display shows **BACK-UP ALARM ACTIVE**.

Note: If the system has 6 detectors fitted then the internal sounder operates 6 times.

4. When the test is complete the display will return to the test menu.
5. This test is now complete. The operator can now either: Press the **MAIN DISPLAY** key and return to the normal display or select another test option.

2.5.6 No. 6 Optics

1. Press the **TEST** key pad on the control unit. The **TEST MENU** is displayed, defaulting to No.1 **ALARM RELAY**.
2. Press key pad No. 6 or the ▼ key five times to highlight No. 6 **OPTICS**.
3. Press ↵ and the display changes to:

DETECTOR OPTICS TEST
ENABLE OR DISABLE ?
DISABLE ENABLE

4. Press the ► key to highlight **ENABLE**.
5. Press ↵ and observe:
 - a. The words **OPTIC TEST ENABLED** appear on the display underneath what is shown in step (3) above.



- b. The internal sounder operates once to indicate that the test is complete and the display reverts back to the test menu.
6. This test is now complete. The operator can now either: Press the **MAIN DISPLAY** key and return to the normal display or select another test option.

2.5.7 No. 7 Detector Alarm

1. Press the **TEST** key pad on the control unit. The **TEST MENU** is displayed, defaulting to No.1 **ALARM RELAY**.
2. Press key pad No. 7 or the ▼ key 6 times to highlight No. 7 **DETECTOR ALARM**.
3. Press ↵ and the display changes to:

DETECTOR ALARM TEST

ENGINE 1

ENGINE 2

Note: The number of engines shown is dependant on how many are configured up to a maximum of 8. However, **ENGINE 1** is highlighted as the default setting.

4. Press ↵ again and the display changes to:

DETECTOR ALARM TEST

ENGINE 1	DET. 1	TEST OFF
ENGINE 1	DET. 2	TEST OFF

Note: The number of detectors shown will depend on how many are configured up to a maximum of 14 per engine. However, **ENGINE 1 DET. 1** is highlighted as the default setting.

5. Press ↵ again and check the following:
 - a. The internal sounder comes on immediately.
6. The display briefly shows the number of engines configured as in step (3) above.
7. The red **ALARM** and yellow **TEST** lights come on as does the **ENGINE ALARM** and **FAULT** lights. Both the red lights are flashing. The main alarm relay goes into an alarm condition.
8. The display shows:

DEVIATION ALARM

ENGINE NO	DET
TIME	DATE

9. Press the **ACCEPT** keypad and observe:
 - a. The display changes to the toggling graphics mode.
 - b. The red **ALARM** lights both change to a steady state.
 - c. The main alarm relay resets.
11. Press the **RESET** key and check:
12. The display returns to normal.
13. All lights except the **POWER ON** go out.

Repeat the complete test for each detector that is to be tested. Select the detector to be tested by use of the ▲, ▼, ◀ and ▶ keypads.



2.5.8 No. 8 Slowdown Relay

Warning: Carrying out this test while the engine is running **WILL** cause it to stop or slow down.

1. Press the Main Menu key on the control unit and select **ENGINEER** by using the ▼ down key or the number 2 key.
2. Press the ↵ enter key and enter the password when prompted, when entered press the ↵ enter key again.
3. The display will show 7 menu headings defaulted to No. 1 Configure System. Press the No.4 key or the ▼ down key 3 times to highlight No.4 **TEST**.
4. Press the ↵ enter key and 8 test menus will show on the display defaulted to No.1 Alarm Relay. Press the No.8 key or the ▼ down key 7 times to highlight **SLOWDOWN RELAY**.
5. Press the ↵ enter key and the display shows the following defaulting to Engine 1 which will be highlighted:

RELAY TEST MENU

ENGINE 1 TEST OFF

Note: The number of engines shown is dependant on how many are configured up to a maximum of 8. However, **ENGINE 1** is highlighted as the default setting.

6. Press the ↵ enter key and the display shows the following, **DE-ACTIVATE** will be highlighted:

RELAY TEST MENU

ENGINE 1 DE-ACTIVATE ACTIVATE

7. Press the ► right key to highlight Activate and the press ↵ enter key, the display will show the following with the words **TEST ON** flashing.

RELAY TEST MENU

ENGINE 1 TEST ON

The slow down relay changes state and all alarms connected to the relay operate, also the test light on the control unit comes on.

8. To cancel the alarm press the ↵ enter key and the display will be as step (6) above with **DE-ACTIVATE** highlighted.
9. Press the ↵ enter key again and the display will be as step (5) above and the test light on the control unit will go out.
10. Press the ← quit key to return to the test menus or the Main Display and **RESET** to return to the normal display.

2.6 DATA [EVENT AND HISTORY] LOGS

The Event and History logs are to enable the user to interrogate past events and can be accessed via the user menu separately.

1. To access the event log press the **MAIN MENU** and when the choice of access levels appears on the screen, **USER** will be highlighted. Press the ↵ key and press 3 **EVENT LOG** and press the ↵ key. The display will show the last event that has occurred. With ▲ and ▼, scroll through the complete event log until the required entry is found.



To speed up the search for the required event it is also possible to do so by event type eg. deviation alarm or, if the approximate date of the event is known, a search from time and date is also available in the Event log sub-menu.

2. To return to the normal display press **←** key once and then the **MAIN DISPLAY** key.
3. To access the History log press the **MAIN MENU** key as above and select **USER**. When accessed press 4 **HISTORY LOG** and press **↵** key.

The display shows the last entry and date of occurrence.

4. Use the **▲** and **▼** keys to scroll through the list to find the entry required or search by a specified mg/l level or by date.
5. To return to the normal display press the **←** key once and then the **MAIN DISPLAY** key.



CHAPTER 3

MAINTENANCE

3.1 ROUTINE MAINTENANCE

Warning: Do not work on the system unless the power is switched off or isolated.



ATTENTION
OBSERVE PRECAUTIONS
FOR HANDLING
ELECTROSTATIC
SENSITIVE
DEVICES

Caution: Ensure that anti - static handling procedures are observed where appropriate.

The following checks are recommended to be carried out every 6 months, with the system switched off. The checks should be carried out by competent personnel with suitable skill levels.

3.1.1 Control Unit

1. Ensure that all glands are tight to prevent ingress of oil and moisture.
2. Check the sealing strip between the door and box is not damaged preventing a seal being made.

3.1.2 Junction Box

1. Ensure that all glands are tight to prevent ingress of oil and moisture.
2. Ensure that the lid fixing screws are tight, to prevent ingress of oil and water.

3.1.3 Cables

1. Ensure all connections in both the control unit and junction box(es) are tight.
2. Check all cables. Replace any that are found to be damaged.

3.1.4 Detectors

1. Ensure that the detector base is screwed tight into the crankcase.
2. Remove the cable connector from the detector and check for damage.

3.1.5 System Lifed Parts

The following parts from the system have a limited operational life and should be changed at the earliest opportunity when the life span has passed or the system will not be able to function correctly.

1. Battery on the Main Processor Board - Operational Life = 5 years
See para 3.6.2 on how to replace the Main Processor Board (at the moment, the only way to replace the battery is by replacement of the Main Processor Board).
2. LCD - Operational Life = 5 years
See para 3.8 on how to replace this item.
3. Fan inside the detector - Operational Life = 1.5 years
See para 3.4 on how to replace this item.



3.2 DETECTOR HEAD REPLACEMENT

Warning: Do not remove the detector base from the crankcase whilst the engine is in operation. This operation should be carried out while the engine is stopped to avoid the possibility of hot oil coming out of the base fixing hole.

Note: If an in-service detector head is removed for any reason, the detector optics must be cleaned before reassembling and replacing it.

Note: Care must be taken when removing a detector whilst the engine is running as it is possible a quantity of oil could pass through the base bowl.

3.2.1 To replace the detector:

1. Switch off the system (if safe to do so) or isolate the detector.
2. Remove the cable connector fitted to the top of the detector.
3. Using a 4mm Allen key, loosen the two fixing screws in the assembly base.
4. Lift out the detector head and note its address.
5. Set the address on the new detector head in accordance with para 2.3.4 except that the selected address must be the same as that of the detector head that has been removed.
6. Fit the detector head onto its base and tighten up the fixing screws. Affix the new label.
7. Re-fit the cable to the detector head.
8. If the system was switched off, switch back on and allow the system to initialise.
9. If isolated, then de-isolate, return to main display by pressing the **MAIN DISPLAY** keypad and press **RESET**. Allow the system to initialise.

3.3 DETECTOR HEAD REFURBISHMENT

After 5 years of service, the detector head must be returned to an approved agent for a complete overhaul including changing all seals.

3.4 FAN REPLACEMENT

Note: Care must be taken when removing a detector whilst the engine is running as it is possible a quantity of oil could pass through the base bowl.

3.4.1 To replace the fan:

1. Switch off the system (if safe to do so), or isolate the associated detector.
2. Remove the cable connector from the top of the detector.
3. Using a 4mm Allen key, loosen the detector fixing screws on the base.
4. Remove the detector from its base and turn it upside down to reveal the fan.
5. Remove the fixing screw holding the fan socket to the mounting plate.
6. Using a pulling tool (Part Number D9131-002) (available with service kit Part No.D9221-027, refer to Appendix B), remove the collet holding the fan onto its mounting legs.
7. Lift the fan off of its mounting legs, ensuring the springs under the fan are not lost.

Caution: Ensure a fan of the same make as that removed is fitted. If not, then a fan failure fault will occur. The correct fan can be selected by matching the detector serial number suffix (M or P) to the fan type. I.E. Papst or Micronel. See spare parts list.



8. Discard the failed fan and fit a replacement fan in reverse order of disassembly.

3.5 CABLE REPLACEMENT

If changing a detector cable, isolating that detector will be sufficient.

3.5.1 Detector Cable

1. Isolate the detector with the damaged cable.
2. Remove the cable connector on top of the detector.
3. Remove the lid from the junction box and identify the cable to be removed.
4. Disconnect the wires in the junction box, undo the cable gland and pull the cable out of the junction box. Discard the damaged cable.
5. Push the new cable through the cable gland, ensuring the gland seal and lock nut have first been put onto the cable. Strip back the outer covering of the cable as required. Make-off ends ready to connect to the terminals in the junction box.
6. Connect the wires to the terminals and make-off the screen in the gland and then tighten to ensure a good seal.
7. Connect the cable connector to the detector.
8. When satisfied that all connections are satisfactory, re-fit the junction box lid.
9. De-isolate the detector, return to the main display and press the **RESET** switch and allow the system to initialise.

Note: If the cable being replaced is the last in any zone, then the Pink and Brown wires must be left longer to reach the end of line terminals.

3.5.2 Junction Box Power Supply Cable Replacement

1. Switch off the system.
2. Open the door of the control unit and disconnect the damaged power supply cable. Undo the cable gland and remove the cable from the control unit.
3. Remove the lid from the relevant junction box and disconnect the wires and screen from the terminals inside. Undo the cable gland and remove the cable from the junction box.
4. Starting at the junction box, using the correct specification cable, pass it through the gland into the box. Make-off ends and connect the 2 cores and screen as indicated on the label in the junction box lid.
5. At the control unit, pass the cable through the gland and make-off the wire cable ends. Connect the two wires as indicated by the label inside of the box. Make-off the screen inside of the gland and then tighten the gland nut to ensure the gland is sealed.
6. When satisfied that all connections are correct, close and lock the door of the control unit and replace the lid of the junction box.
7. Switch the system on and allow to initialise.

3.5.3 Communications Cable Replacement

1. Switch off the system.
2. Open the door of the control unit and identify the connections of the damaged cable and disconnect from the relative terminals. Undo the cable gland and remove the cable from the control unit.
3. Remove the lid from the relevant junction box and disconnect the wires from the terminals. Undo the gland nut and pull the cable out.



4. Push the correct specification cable through the gland of the junction box. Make-off the ends of the wires and connect to the relevant terminals. Tighten the gland nut.
5. Push the other end of the cable through the cable gland of the control unit. Make-off the ends and connect to the relevant terminals ensuring that the same wire colours have been used for the Comms positive, negative and also for the alarm back up. Make-off the screens inside of the gland and then tighten the gland nut.
6. When satisfied that all connections are satisfactory, close and lock the control unit door and replace the junction box lid.
7. Switch on the system and allow to initialise.

3.6 CONTROL UNIT PCBs

3.6.1 Interface PCB Replacement - Part No. 44782-K085 (refer to Figure 9)

1. Switch off the system and replace the PCB as follows:
2. Remove and identify all external wiring.
3. Remove connectors PLG1 and PLG2 - noting the orientation.
4. Remove 8 off retaining screws and remove the board.
5. Fit the replacement board in place with the 8 off screws.
6. Re-fit connectors PLG1, PLG2 and all external wiring.
7. Switch the system back on and allow to initialise.

3.6.2 Main Control Processor PCB - Part No. 44782-K071-02 (refer to Figure 10)

1. Switch off the system and replace the Main PCB as follows:
2. Remove all connectors, PLG1, PLG2, PLG4, PLG5, PLG8, PLG 9 and PLG10 noting the orientation.
3. Remove 6 off fixing screws and 2 off M4 nuts. Remove the PCB.
4. Fit the replacement PCB with the 6 off screws and 2 off M4 nuts, re-fit all connectors.
5. Switch on system and allow to initialise.

3.6.3 8 Engine Status Display PCB Replacement - Part No. 44782-K098 (refer to Figure 11)

1. Switch off the system and remove the 8 Engine Status Display PCB as follows:
2. Remove the two connectors located on the top left hand side of the board, noting the orientation.
3. Remove 6 off fixing screws and remove the PCB.
4. Fit the new PCB with the 6 off screws and replace the two connectors.
5. Switch the system on and allow to initialise.

3.6.4 Status Display PCB - Part No. 44782-K102-01 (refer to Figure 12)

1. Switch off the system and remove the Status Display PCB as follows:
2. Remove the Main Control Processor PCB. (Refer to para 3.6.2)
3. Remove the connectors from the Status Display PCB, noting the orientation.
4. Remove the 4 off fixing screws and remove the PCB.
5. Fit the replacement PCB with the 4 off screws and re-fit the connectors.
6. Re-fit the Main control processor PCB.



7. Switch on the system and allow to initialise.

3.6.5 Junction Box PCB Replacement - Part No. 44782-K117 (refer to Figure 13)

1. Switch off the system and remove the Junction Box PCB as follows:
2. Remove the lid from the junction box.
3. Disconnect the detector, power supply and comms cables.
4. Remove the 4 off screws securing the board in the box and remove the board, noting the position of detector 1.
5. Fit the new board ensuring that detector 1 is in the same position on the new board as the removed board and secure with the 4 off screws.
6. Reconnect the detector, power supply and comms cables and replace the lid.
7. Switch the system on and allow to initialise.

3.7 REPLACEMENT OF 8 ENGINE STATUS DISPLAY MEMBRANE

3.7.1 Replace the 8 Engine Status Display Membrane as follows:

1. Remove the 8 Engine Status Display PCB as above. (Refer to para 3.6.3)
2. Remove the seven M4 nuts and washers holding the membrane to the door unit.
3. Remove the membrane.
4. Fit the replacement 8 Engine Status Display membrane in reverse order of disassembly.

3.8 REPLACEMENT OF LCD DISPLAY

3.8.1 Replace the LCD Display as follows:

1. Remove the Main Control Processor PCB as in para 3.6.2.
2. Undo the 4 off M3 screws in the LCD cover.
3. Gently lift up the cover and unplug the LCD connection cable and feed through the slot in the end of the cover.
4. Undo and remove the 2 off studs on the left of the display and loosen the 2 off studs on the right of the display and then slide the LCD assembly out.
5. Refit in the reverse order of disassembly. Ensure the white wires from the LCD display that connect into PLG2 are located correctly in the top of the cover. Ensure the wires are not trapped when the cover is replaced.

3.9 REPLACEMENT OF LCD DISPLAY MEMBRANE

3.9.1 Replace the LCD Display Membrane as follows:

1. Remove the LCD Display as above (Refer to para 3.8)
2. Remove the membrane.
3. Refit the replacement LCD Display membrane in the reverse order of disassembly.

3.10 DECOMMISSIONING

All the components of the MK 6 OMD system may be disposed of as normal waste. i.e. using normal rubbish disposal methods in accordance with current and local environmental regulations.



Figure 9: Interface PCB



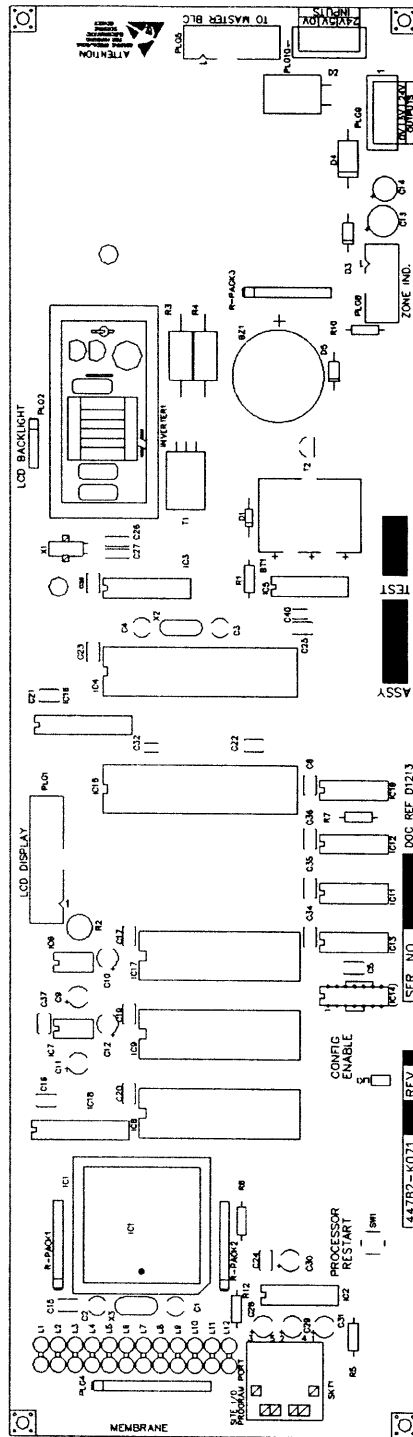


Figure 10: Main Control Processor PCB



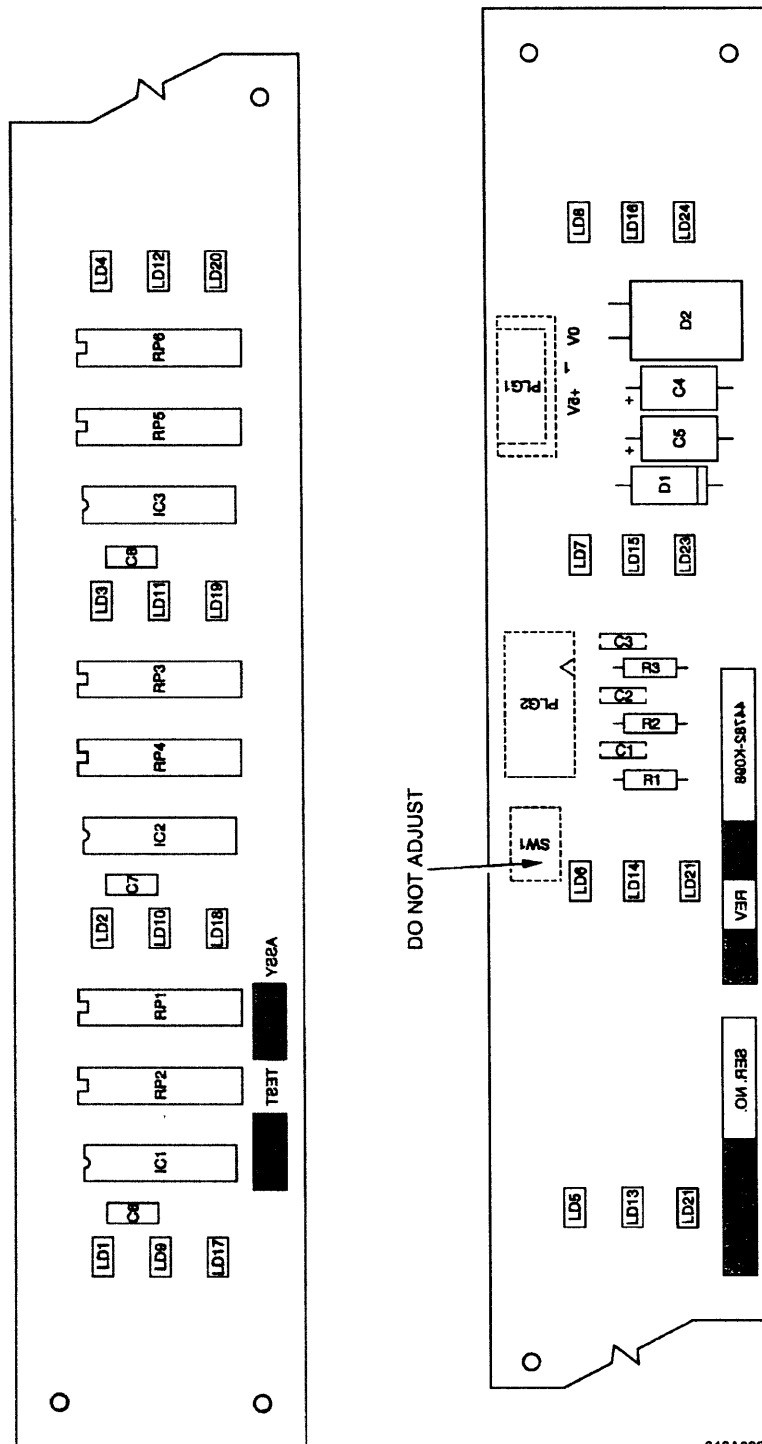
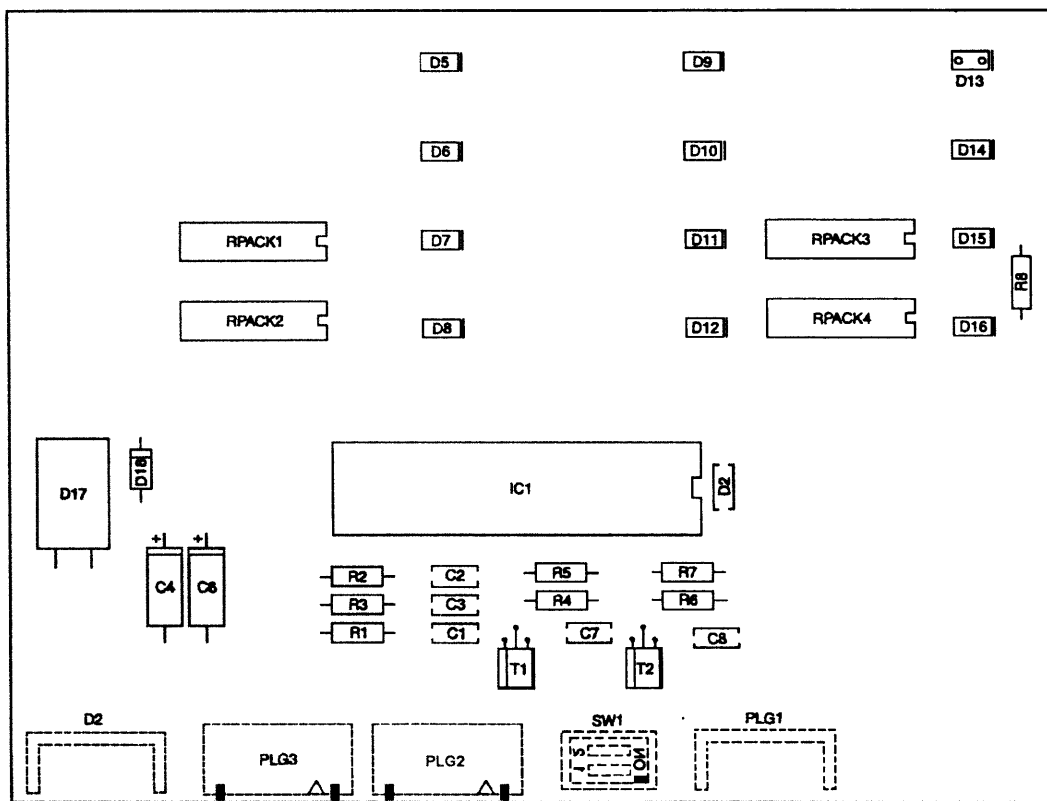


Figure 11: 8 Engine Status Display PCB

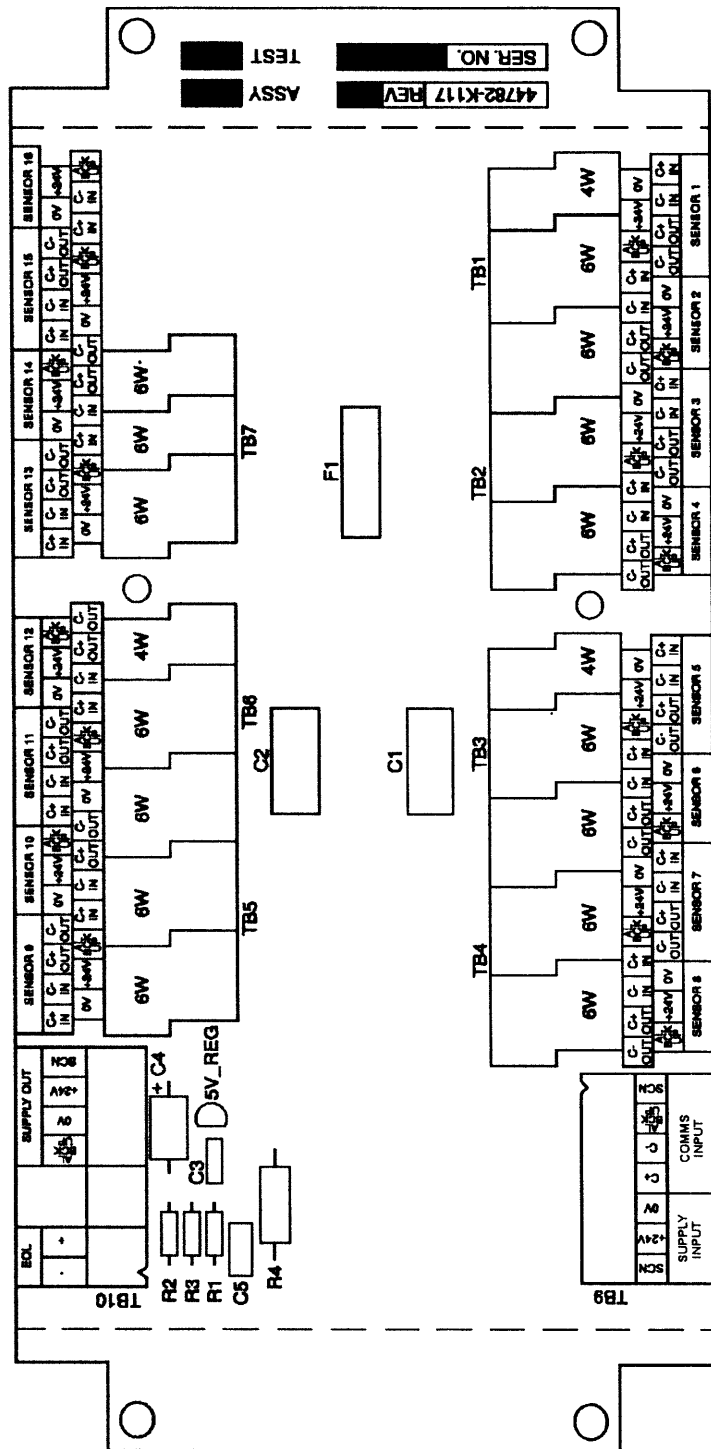




646A006

Figure 12: Status Display PCB





648A011

Figure 13: Junction Box PCB



CHAPTER 4

FAULT FINDING

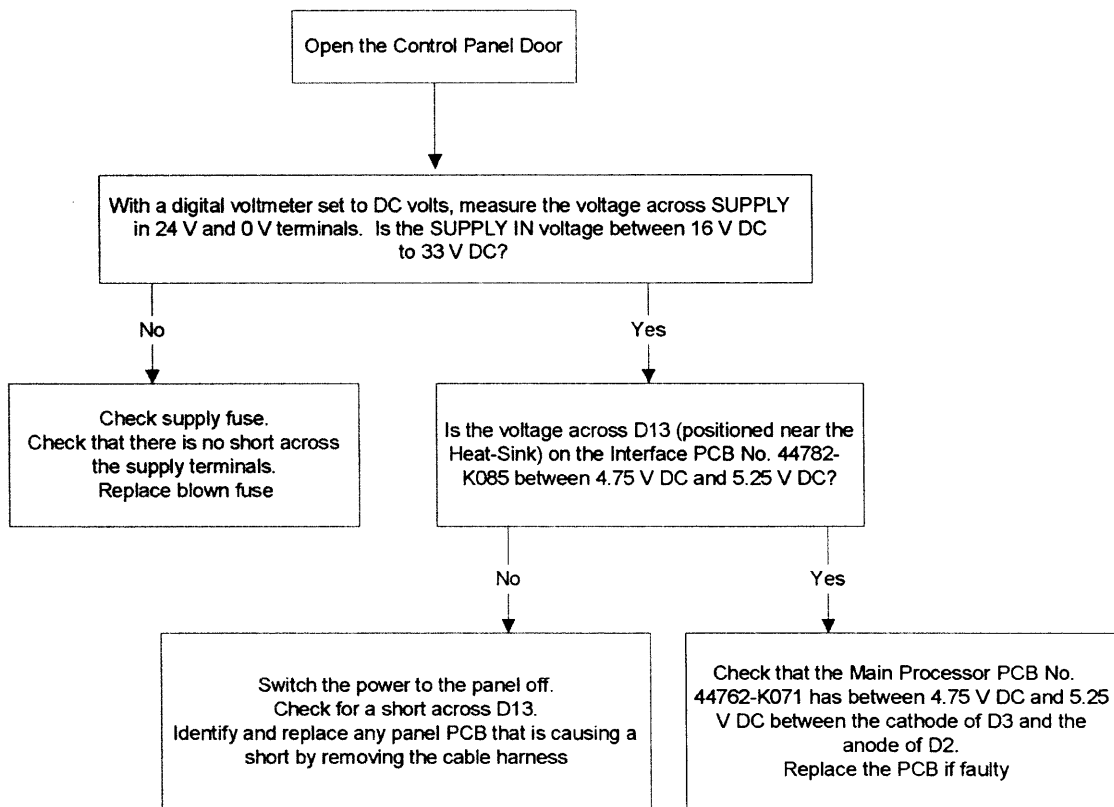
4.1 GENERAL

The table below lists a series of failure modes and the likely faults that would be indicated should that failure mode appear. Also listed are Actions, numbered 1 to 7, which should be followed if the associated fault appears. On the following pages, Actions 1 to 7 are shown as flow charts which will assist with fault finding on the Mk.6 OMD system.

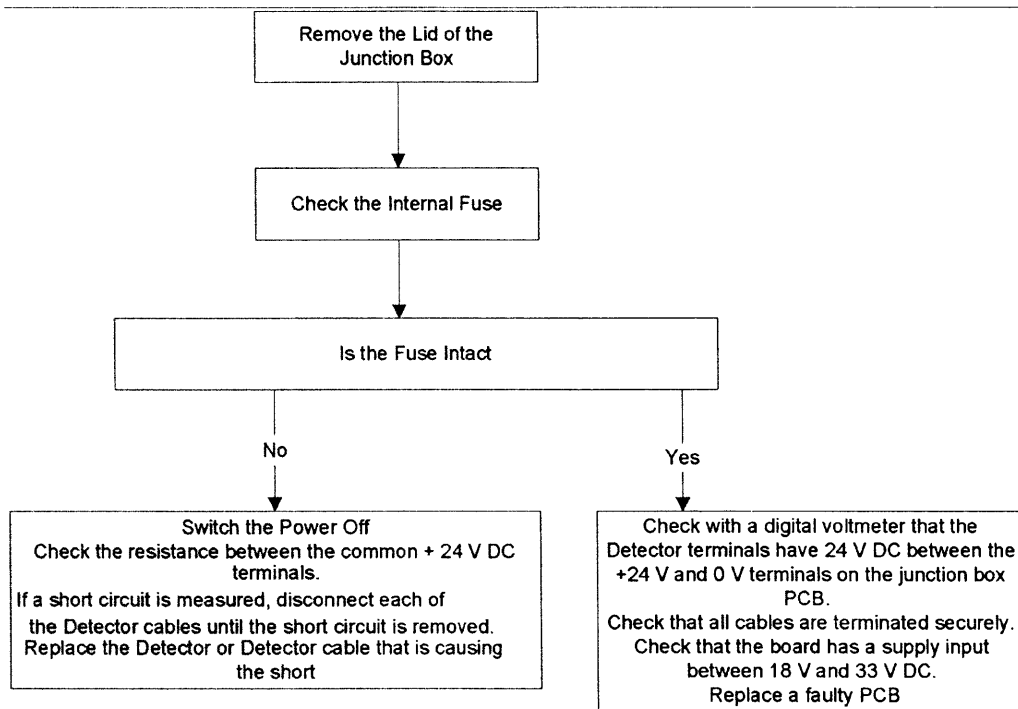
Failure Mode	Fault	Action
Control Unit power indicator is off and the display is blank	Supply Failure.	1
The Detector Power On (Green) indicator(s) are OFF on one engine	Junction Box fuse. Faulty Detector.	2
The display shows COMMS FAULT e.g. Engine 1 det 3	Incorrect Detector address setting. Missing Detector Supply. Faulty Detector.	3
The display shows FAN FAULT e.g. Engine 2 det 3	Fan Failure.	4
The display shows LED Fault Engine 3 Det 1	Detector circular oil mist cavity needs to be cleaned. Failed LED.	5
The display shows Detector Fault e.g. Engine 4 det 2	Blocked Detector aperture. Damaged Detector light-guide. Faulty Detector	6
False Deviation Alarm	Incorrect deviation alarm setting	7



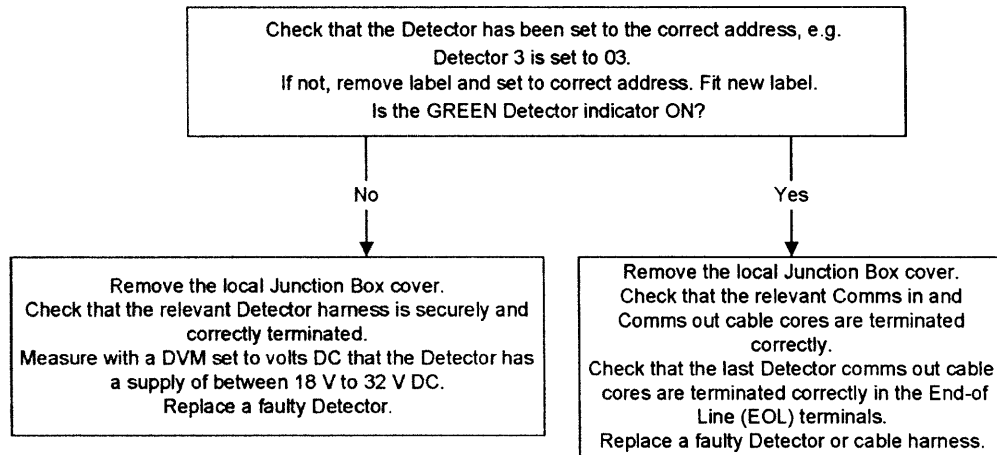
ACTION 1



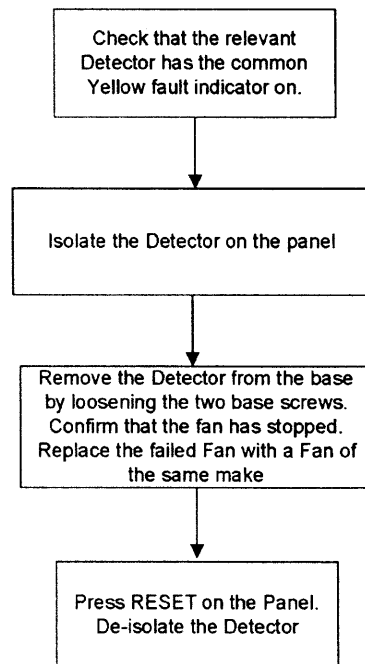
ACTION 2



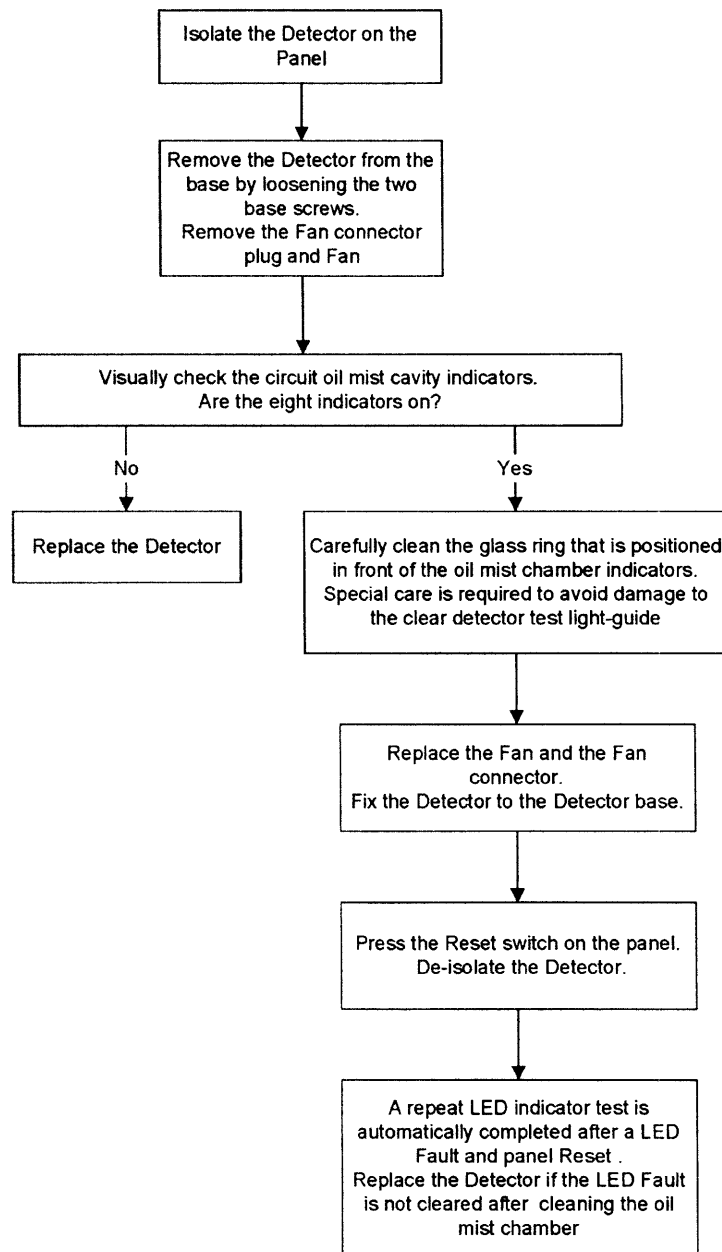
ACTION 3



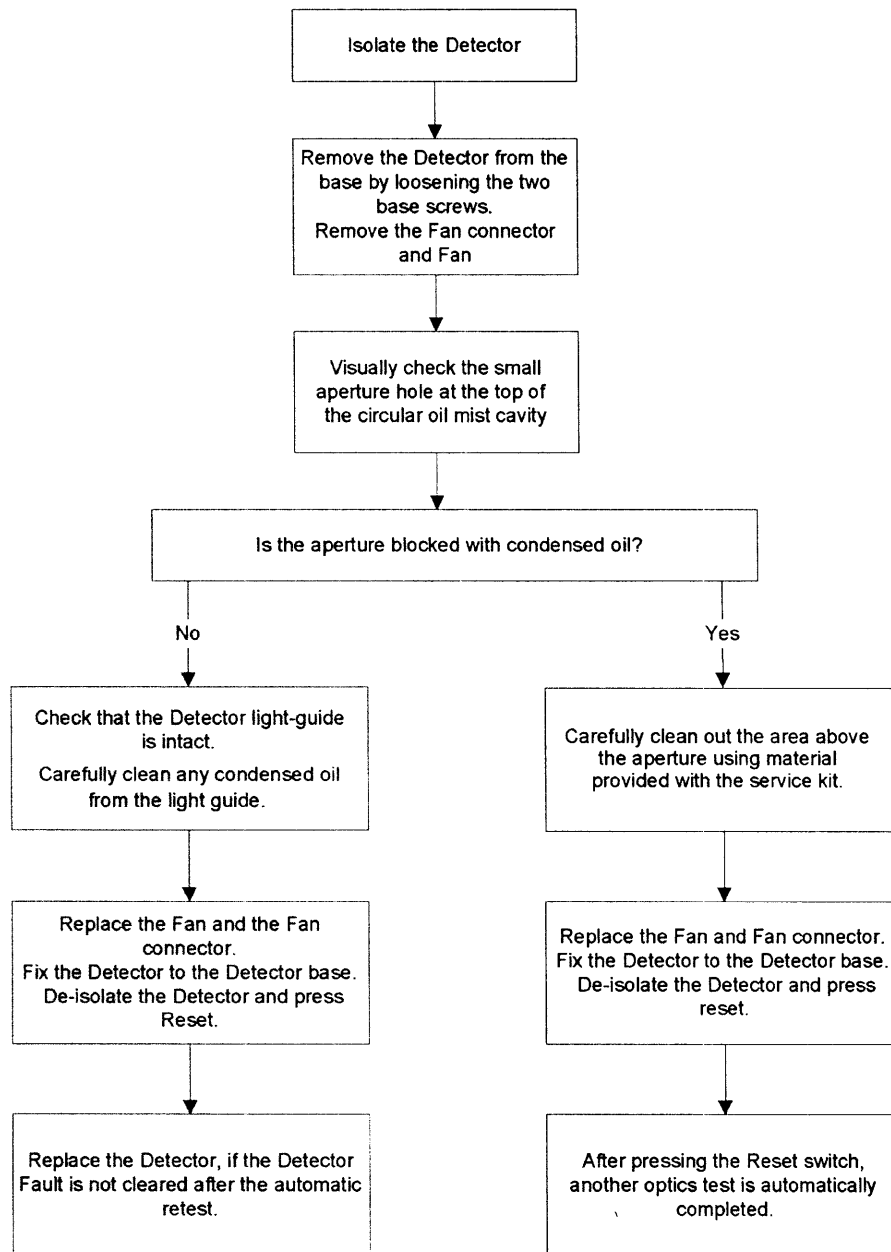
ACTION 4



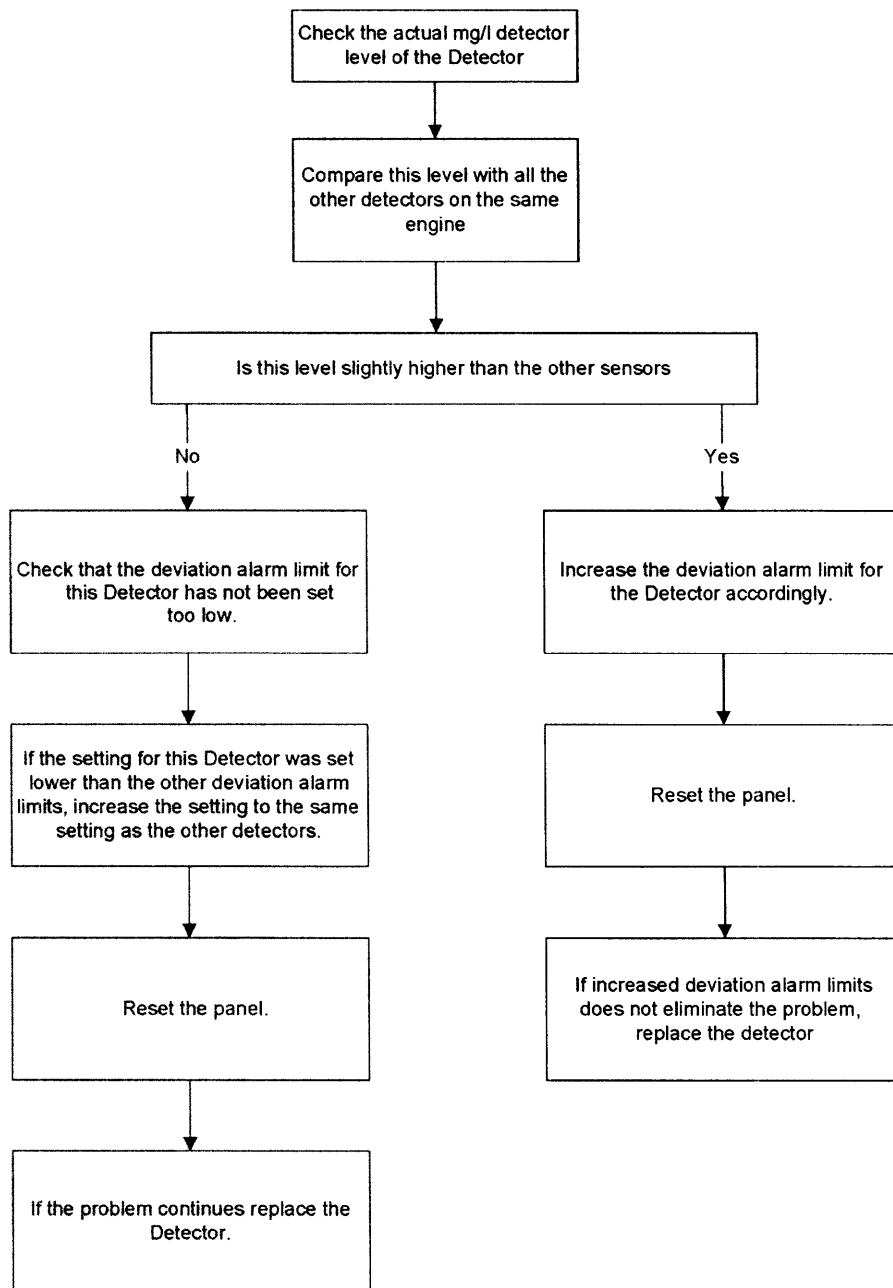
ACTION 5



ACTION 6



ACTION 7



CHAPTER 5

DATA

5.1 LEADING PARTICULARS

Table 1 Control Unit

Enclosure Rating	IP32	
Scanning Time	1.2 seconds for 64 detectors	
Max No. of detectors	64	
Max No. of engines monitored	8	
Power Supply	24 V DC (+30% -25%)	
Protection	Self Re-settable fuse inside panel	
Insulation	Flash tested to 2000 V for 1 minute	
Power Consumption	5.2 W	
Temp Rating	0 - 55 °C	
Dimensions		
Bulkhead Mounted	Height	250 mm (270 mm mounting centres)
	Width	500 mm (445 mm mounting centres)
	Depth	121 mm
Panel Mounted	Height	303 mm
	Width	553 mm
	Depth	121 mm
	Weight	7 kg
System Outputs:	Volt-free change over contacts rated at 30v 1amp DC	
Main Alarm	1 set	
Fault Alarm	1 set	
Engine Slow Down	8 sets, 1 set per engine	



Table 2 Detector

Mounting	3/4 inch BSP	
Enclosure Rating	IP65	
Address Switch	2 x 10 position (0 to 99)	
Indicators	Green	Detector On
	Red	Alarm
	Amber	Detector Fault
Electronic Replaceable Micro-Fan		
Power Consumption	25W	
Temperature Rating	0 - 70 °C	
Dimensions	Height	175 mm
	Width	90 mm
	Length	205 mm
	Weight	0.6 kg

Table 3 Junction Box

Enclosure Rating	IP65	
Max detector inputs	14	
Fuse Rating	4.5 A	
Power Consumption	Zero	
Temperature Rating	0 - 70 °C	
Dimensions	Height	160 mm (110 mm mounting centres)
	Width	260 mm (240 mm mounting centres)
	Depth	95 mm
	Weight	2.3 kg



CHAPTER 6

SPARE PARTS

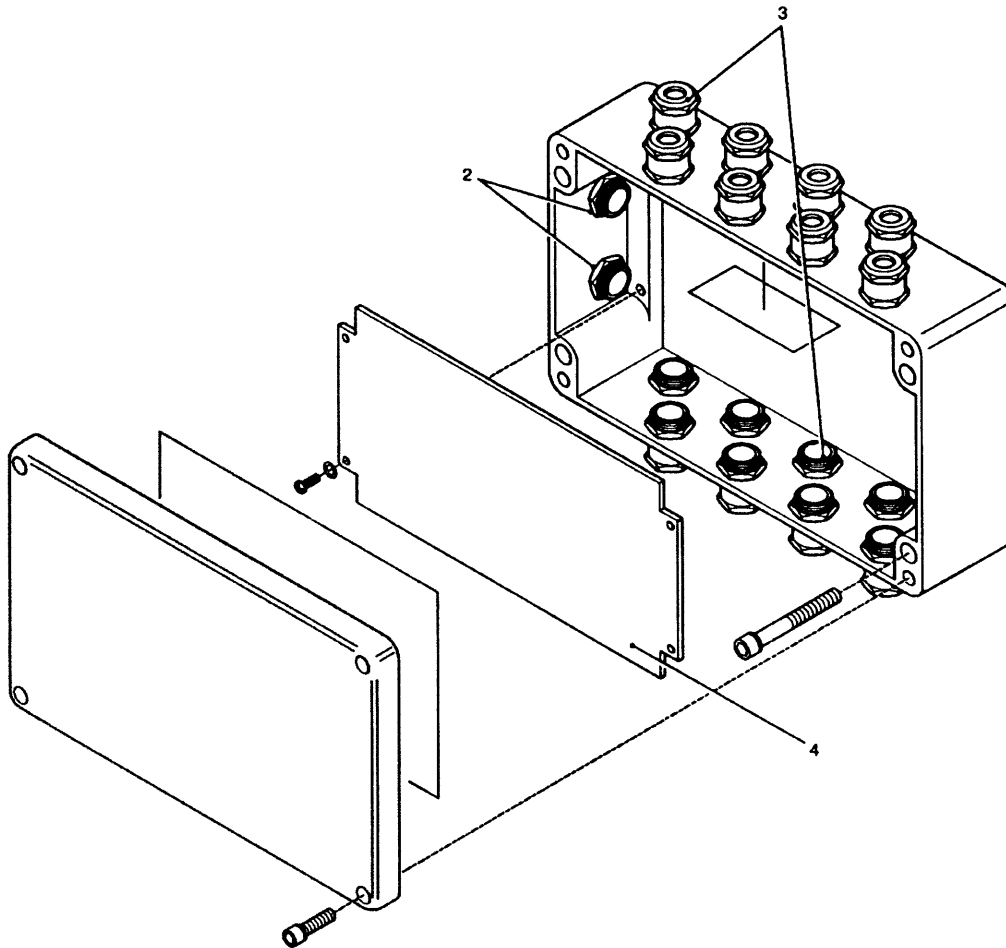


Figure 14: Junction Box

Item	Description	Part No.
	JUNCTION BOX	D4720-001/01-14
2	Nylon Gland	B5151-013
3	Metal Gland	B5151-002
4	Printed Circuit Board	44782-K117



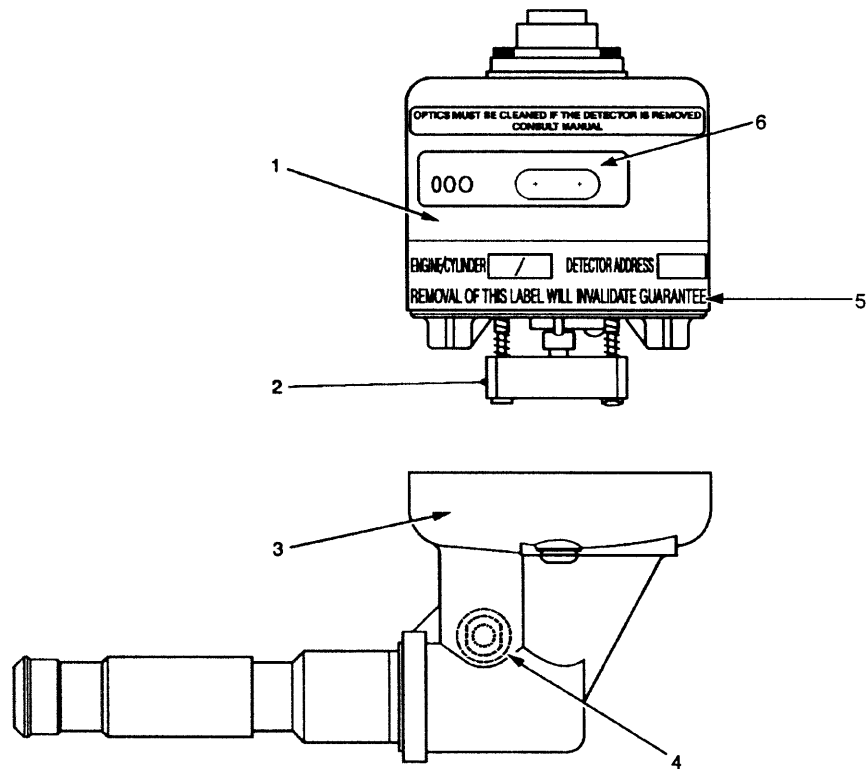
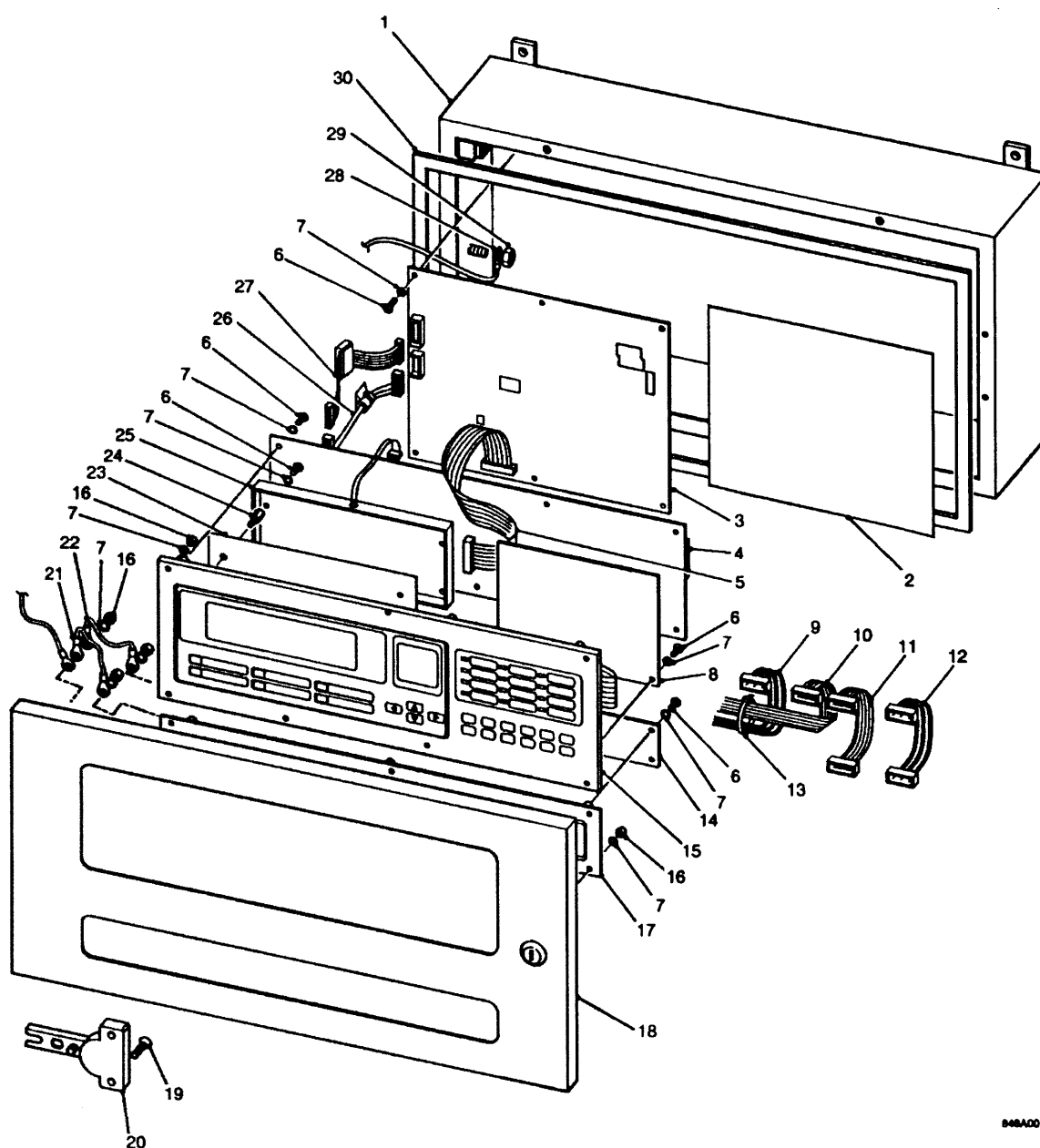


Figure 15: Detector Head E3561-301

Item	Description	Part No.
1	Detector Head Assembly	D5622-001
2	Fan Assembly (Papst or Micronel)	D5622-005/02
3	Base Unit Sub-Assembly	D5622-101
4	Connector Push In	B5465-307
5	Label Invalidate Guarantee	C9175-803
6	Label Switch Window	C9189-801





848A001

Figure 16: Mark 6 Oil Mist Detector Control Unit

Item	Description	Part No.	Qty
1	Box	35333-K053	1
2	Label, Ext. Connections	36215-K147	1
3	PCB, OMD6 Interface	44782-K085	1

Item	Description	Part No.	Qty
4	PCB, Main Control Processor	44782-K071-02	1
5	Harness, MCP-LCD Display	43682-K033	1
6	Screw, M4 x 6	21883-D012	22
7	Washer	21177-164	36
8	PCB	44782-K102-01	1
9	Harness, MCP-Status Display PSU	43682-K067	1
10	Harness, MCP-Status Display	43682-K066	1
11	Harness, MCP-Status	43682-K030	1
12	Harness, MCP-Status PSU	43682-K036	1
13	Tie Wrap	22310-D001	2
14	PCB, 8 Engine Display	44782-K098	1
15	Membrane	39155-K040	1
16	Nut, M4	21883-005	14
17	Membrane	39155-K039	1
18	Door	35300-K056	1
19	Screw, M3.5 x 10	21833-D011	4
20	Hinge	27650-D009	2
21	Earth Cable	43682-K050	1
22	Earth Cable	43682-K050	1
23	LCD Display	43782-K035	1
24	Spacer	23700-K017	4
25	LCD Cover	15100-K091	1
26	Harness, PCB-MBLC PSU	43682-K037	1
27	Harness, PCB-MBLC	43682-K032	1
28	Earth Cable	43682-K015	1
29	Nut, M6	21883-D014	1
30	Seal	13455-D033	1.5m



The following is a list of replaceable parts for the Mk 6 OMD System:

Description	Part No.	Quantity
CONTROL UNIT PCBs		
Interface Board	44782-K085	1 per Control Unit
8 Engine Staus Display Board	44782-K098	1 per Control Unit
Main Processor Board	44782-K071-02	1 per Control Unit
Status Display Board	44782-K102-01	1 per Control Unit
Control Unit LCD Display	43782-K035	1 per Control Unit
Status Display Membrane	39155-K039	1 per Control Unit
Function Key Membrane	39155-K040	1 per Control Unit
CABLES		
Straight Connector	43682-K108-00-08 inc.	1 per Detector
90 deg. Connector	43682-K109-00-08 inc	1 per Detector
Detector Complete	E3561-301	Up to 64
Detector Head	D5622-011	Up to 64
FAN		
Papst type 405FS	D5622-005	1 per Detector
Micronel type F41LP-005KK-9	D5622-005-02	1 per Detector
KITS		
Spares Kit (Straight)	D9221-024	Optional
Spares Kit (90 deg)	D9221-025	Optional
Commissioning Kit	D9221-026	Optional
Service Kit	D9221-027	Optional
JUNCTION BOX		
Printed Circuit Board	44782-K117	1 per Box
Gland (Metal)	B5151-002	Up to 14 per Box
Fuse, 4 Amp, 20 mm Slow Blow	27411-K001	1 per Box
Gland (Nylon)	B5151-013	2 per Box





Kidde Fire Protection Limited

Belvue Road, Northolt, Middlesex, UB5 5QW

Tel: +44 (0) 20 8839 0700 Fax: +44 (0) 20 8845 4304

www.kfp.co.uk

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August 2001





CLIENT : DAEWOO shipbuilding & marine eng. Co.,Ltd.
HULL NO. : 5258
ENGINE TYPE : HSD-MAN B&W 5S70MC

Subject:

Starter for Aux.blower & Turning gear motor

Note :

5					
4					
3					
2					
1	COMMENTS REFLECT	2003.04.10	J.W. Lee		
0	FIRST ISSUED	2002.11.21	2/24/04		
REV.	DESCRIPTION	DATED	Prepared	Reviewed	Approved
DESIGN TEAM 2			Documentation No.		
Tel. +82 55 260 6406 Fax. +82 55 260 6640			EA02-1258		
HSD ENGINE Co., Ltd.					

HSD ENGINE Co.Ltd.



1 2 3 4 5

A A

D R A W I N G
F O R
W O R K I N G

B B

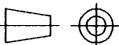
MESSRS : HSD ENGINE CO.,LTD
SHIP or PJT NO. : UNIQUE 5258 △1
SHIP OWNER : _____
SPECIFICATION : 440V 3P 60HZ 63KW / 5.5KW △1
ENGINE MODEL : 5S70MC
PAINT COLOR : 7.5 BG 7/2

C C

D D

E E

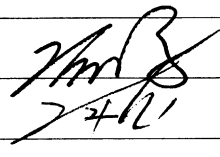
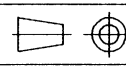
F F

			APD	J.H. KIM	SHEET NO. 01
1	2003.03.27	FOR WORKING	CHK	H.S. HAN	SCALE N / S
0	2002.11.19	FOR APPROVAL	DWN	Y.K. KIM	
REV	DATE	DESCRIPTION	TITLE ; 5258 STARTER FOR AUX.BLOWER & TURNING GEAR MOTOR		
 SinSueng Electric Co., Ltd. TEL : +82-55-231-6707~8, FAX : -6709					

DRAWING NO. ; 13-000406,13-000416 (SSE000854,SSE000855)



OWNER	UNIQUE		S-NO.	H-5258	
MESSRS	HSD ENGINE CO., LTD.		CLASS	DNV	
POWER SOURCE	AC 440 V 3 ϕ 60HZ		AMBITENT TEMP	40 45 (50) °C	
CONTROL SOURCE	AC 220 V 1 ϕ 60HZ / AC 24V				
DC SOURCE	DC V				
PANEL TYPE	WALL MOUNTING				
PAINT COLOR	OUT SIDE	MUNSELL NO. : 7.5BG 7/2		IN SIDE	DITTO
LETTER OF NAME PLATE	ENGLISH	MATERIAL OF NAME PLATE		PHENOLIC	
DRAWING & DOCUMENT	ENGLISH	EARTHING (Tr)		WITH	
SIGNAL LAMP	E-12 (24V 1W)	FUSE		SB-C1	
OVERLOAD PROTECTOR	THERMAL TYPE, THREE PHASE WITH AMBIENT TEMPERATURE COMPENSATION (INTERNAL RESETTING SYSTEM)				
MOLDED CASE CIRCUIT BREAKER					
	ST (INDEPENDENT)	FIXED TYPE			
COLOR OF VINYL CAP	POWER CIRCUIT R,U,X ---- RED P(+) : RED S,V,Y ---- WHITE N(-) : BLUE T,W,Z ---- BLUE		CONTROL CIRCUIT : NUMBERING EARTH : GREEN/YELLOW		
INTERNAL WIRING	MAIN CIRCUIT : 660V SCP CONT CIRCUIT (1.25mm) : 660V SYP or SCP				
CABLE LEAD-IN	LOWER POSITION : CABLE COAMING				
AUX. BLOWER CAPACITY	MOTOR CAPACITY		MOTOR CURRENT		NONE HEATER CAPACITY
	63 KW $\triangle 1$		98 A $\triangle 1$		-
TURNING GEAR CAPACITY	MOTOR CAPACITY		MOTOR CURRENT		NONE HEATER CAPACITY
	5.5 KW		11.2 A $\triangle 1$		-
DRAWING COPIES	APPROVAL DWG 3 COPIES		WORKING DWG COPIES		COMPLETION DWG COPIES

			APD		SHEET NO. 02
1	2003.03.27	FOR WORKING	CHK		SCALE N / S
0	2002.11.19	FOR APPROVAL	DWN		Y. K. KIM
REV	DATE	DESCRIPTION			
 SinSueng Electric Co., Ltd. TEL : +82-55-231-6707~8, FAX : -6709			TITLE ; 5258 <u>GENERAL SPECIFICATION</u>		

DRAWING NO. ; 13-000406(SSE000854)



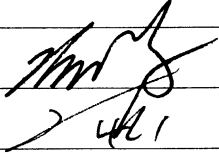
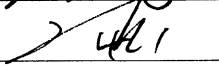
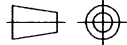
BASIC SYMBOLS		SWITCH GEAR ACCESSORIES	
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	ONE CONDUCTOR OR A GROUP OF SEVERAL CONDUCTORS		DISCONNECTION SWITCH OR MOULDED CASE CIRCUIT BREAKER
	TWO CONDUCTORS (MULTILINE REPRESENTATION)		MOULDED CASE CIRCUIT BREAKER (WITH SHUNT TRIP COIL)
	TWO CONDUCTORS (SINGLE-LINE REPRESENTATION)		UNDER VOLTAGE TRIPPING COIL OF CIRCUIT BREAKER
	n CONDUCTORS (SINGLE-LINE REPRESENTATION)		SWITCH (GENERAL) SINGLE THROW
	CROSSING WITHOUT ELECTRICAL CONNECTION		SWITCH (GENERAL) DOUBLE THROW
	JUNCTION OF CONDUCTORS	TERMINALS	
	TERMINAL CONNECTION OF CONDUCTORS		
	JOINT TERMINALS		
	RESISTANCE OR RESISTOR		TERMINAL MAKE CABLE NO. CABLE SIZE
	INDUCTANCE OR INDUCTOR		EQUIPMENT OF OUTSIDE
	WINDING		EQUIPMENT OF OTHER UNIT
	CAPACITANCE. CAPACITOR	POWER & RELAY CONTACT	
	RELAY COLL. GENERAL SYMBOL		
	HULL CONNECTION (EARTH)		
	MECHANICAL COUPLING GENERAL SYMBOL		CONTACT (GENERAL) OF MANUAL CONTACT
	SWITCH. GENERAL SYMBOL		MANUALLY OPERATED AUTO RESET CONTACT
	THREE POLE SWITCH SINGLE REPRESENTATION		MANUALLY OPERATED AUTO CONTACT (WITH LOCKING DEVICE)
	CIRCUIT BREAKER		MECHANICAL CONTACT
	CHANGE OVER CONTACT BREAK BEFORE MAKE		HAND-RESET CONTACT
	MAKE BEFORE BREAK CONTACT (OVER LOAD CONTACT)		RELAY CONTACTOR OR AUX. SWITCH CONTACTOR
	CONTACTOR NORMALLY OPEN (MAIN)		CONTACTOR WITH TIME LIMIT OPERATION (ON DELAY TYPE)
	CONTACTOR NORMALLY CLOSE (MAIN)		CONTACTOR WITH TIME LIMIT OPERATION (OFF DELAY TYPE)
	MAKE CONTACTOR (a CONTACTOR) GENERAL SYMBOL		LATCHING RELAY CONTACT
	MAKE CONTACTOR (b CONTACTOR) GENERAL SYMBOL		GANG SWITCH MANUALLY OPERATED RESIDUAL CONTACT
	RESISTOR WITH MOVING CONTACTOR GENERAL SYMBOL		C CONTACTOR
	FUSE		CONTROL SWITCH OR CONTROLLER CONTACT
	GENERATOR		
	MOTOR		
	SINGLE-PHASE TRANSFORMER WITH SEPARATOR WINDINGS		
	AUTO-TRANSFORMER THREE PHASE		
	SEMICONDUCTOR DIODE OR RECTIFIER GENERAL SYMBOL		
	VOLTMETER		
	AMMETER		
	CURRENT TRANSFORMER		
	PILOT LAMP (FOR ELECTRIC SOURCE ON)		
	INDICATING LAMP (FOR MOTOR RUNNING)		
	STAND-BY INDICATING LAMP		

			APD		SHEET NO. 03
0	2002.03.27	FOR WORKING	CHK		SCALE N / S
0	2002.11.19	FOR APPROVAL	DWN	Y. K. KIM	
REV	DATE	DESCRIPTION	TITLE ; 5258		
SinSueng Electric Co., Ltd. TEL : +82-55-231-6707~8, FAX : -6709			SYMBOL LIST		



NO	DESCRIPTION
2	TIME DELAY STARTING OR CLOSING RELAY
2T	TIMING RELAY (GENERAL)
2TX	CONTROL RELAY FOR TIMING RELAY
3	CONTROL SWITCH
3C	START PUSH BUTTON
3CL	START PUSH BUTTON FOR LOW SPEED
3CH	START PUSH BUTTON FOR HIGH SPEED
3CF	START PUSH BUTTON FOR FORWARD
3CR	START PUSH BUTTON FOR REVERSE
3-0	STOP PUBH BUTTON
3CX	CONTROL RELAY FOR START
3-0X	CONTROL RELAY FOR STOP
4	MAIN CONTROL CIRCUIT RELAY
4X,Y	CONTROL RELAY
4HX,LX	CONTROL RELAY
4C	KEEP RELAY (CLOSE COIL)
4T	KEEP RELAY (TRIP COIL)
5	STOPPING SWITCH OR RELAY
5E	EMERGENCY STOP SWITCH
6	STARTING CONTACTOR OR RELAY
	MAGNETIC CONTACTOR FOR STAR-DELTA START OR COMPEN START
8	CONTROL SOURCE SWITCH
10	SEQUENCE SWITCH
10T	TIMING RELAY FOR SEQUENTIAL START
11	TEST SWITCH OR RELAY
19 19T	STARTING TO RUNNING TRANSITION RELAY STARTING TO RUNNING TRANSITION TIMER FOR STAR-DELTA & COMPEN START
20	VALVE (ELECTROMAGNETIC VALVE)
23	THERMOSTAT
23Q	THERMOSTAT FOR OIL
23W	THERMOSTAT FOR WATER
23X	CONTROL RELAY FOR THERMOSTAT
27	UNDER VOLTAGE RELAY
27X	VOLTAGE RELAY
28	ALARM DEVICE
28B	CONTROL RELAY FOR BELL
28S	CONTROL RELAY FOR SIREN
28X	CONTROL RELAY FOR ALARM
28Z	CONTROL RELAY FOR BUZZER
30	CONDITION OR FAULT INDICATOR
30X,Y	CONTROL RELAY FOR TROUBLE
30Z	INDICATOR

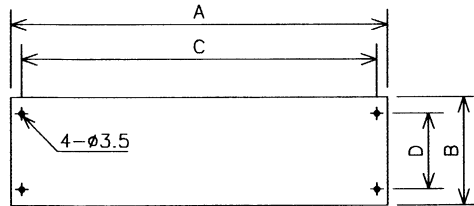
NO	DESCRIPTION
33	POSITION SWITCH OR DETECTOR
33Q	FLOAT SWITCH FOR OIL
33W	FLOAT SWITCH FOR WATER
33X,Y	AUX. RELAY FOR FLOAT SWITCH
33T	TIMING RELAY FOR FLOAT SWITCH
33IL	DOOR INTERLOCK SWITCH FOR DRAW OUT START UNIT
43	CHANGE OVER SWITCH CONTACTOR OR RELAY FOR CONTROL CIRCUIT
43	CHANGE OVER SWITCH (GENERAL)
43A	MANUAL-AUTO CHANGE OVER SWITCH
43R	LOCAL-REMOTE CHANGE OVER SWITCH
43RX	CONTROL RELAY FOR REMOTE SIDE OPERATION
48	OVERDUE DETECT RELAY
48T	OVERDUE DETECT (COMPEN START FAIL) TIMER
49	TEMPERATURE RELAY FOR ROTARY MACHINE
51	OVER CURRENT RELAY
51X	AUX. RELAY
52	CIRCUIT BREAKER
63	PRESSURE SWITCH
63A	PRESSURE SWITCH FOR AIR
63Q	PRESSURE SWITCH FOR OIL
63W	PRESSURE SWITCH FOR WATER
63X	AUX. RELAY FOR PRESSURE SWITCH
63C	KEEP RELAY FORPRESSURE SWITCH (CLOSE COIL)
63T	KEEP RELAY FORPRESSURE SWITCH (TRIP COIL)
66	FLASHER RELAY
66F	FLICKER RELAY
72	D.C CIRCUIT BREAKER OR MAGNETIC CON'
83	AUTOMATIC SELECTIVE CONTROL OR TRANSFER RELAY
83X,Y	AUX. RELAY
88	MAGNETIC CONTACTOR OR SWITCH FOR GENERAL MACHINE
88	MAIN CONTACTOR
88-1	MAIN CONTACTOR FOR COMPEN START OR STAR-DELTA
88-2	MAIN CONTACTOR FOR COMPEN START OR STAR-DELTA
89	DISCONNECTING SWITCH

APD		SHEET NO. 04
CHK		SCALE N / S
DWN	Y. K. KIM	
 SinSueng Electric Co., Ltd. TEL : +82-55-231-6707~8, FAX : -6709		TITLE ; 5258 CONTROL DEVICE NUMBERS

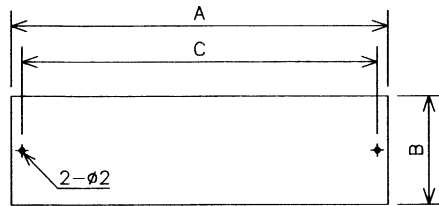


A

SIZE



B



C

TYPE	A	B	C	D	T
0	200	30	190	—	2T
1	63	16	53	—	2T
2	52	18	45	—	2T
3	50	10	43	—	2T
4	80	30	70	—	2T

D

MATERIAL : PHENOLIC

GROUND : WHITE

LETTER : BLACK

LETTERS EXAMPLE

CIR NO :

CABLE SIZE :

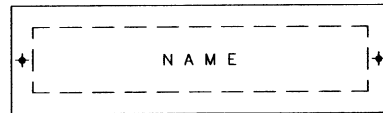
RATING :

FRAME :

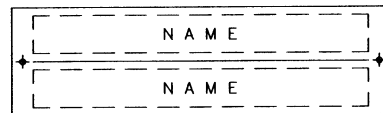
E

MODEL

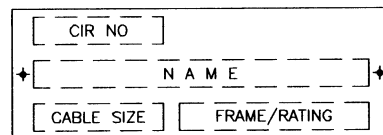
TYPE : AH



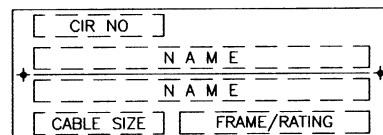
TYPE : B



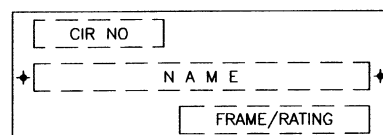
TYPE : C



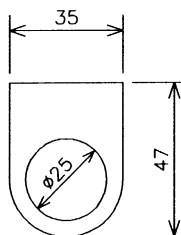
TYPE : D



TYPE : E



TYPE : CL



MATERIAL : PHENOLIC

LETTER : BLACK

GROUND : WHITE

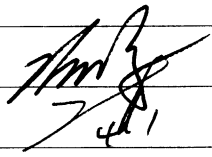
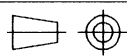
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			APD		SHEET NO. 05
0	2003.03.27	FOR WORKING	CHK		SCALE N / S
0	2002.11.19	FOR APPROVAL	DWN	Y. K. KIM	
REV	DATE	DESCRIPTION	TITLE : 5258		
SinSueng Electric Co., Ltd. TEL : +82-55-231-6707~8, FAX : -6709			NAME PLATE MODEL		



1	2	3	4	5	
NO	SYMBOL	N A M E	TYPE	Q'TY	R E M A R K
0	NP1	NO.1 AUX. BLOWER STARTER	OAH	1	PHENOLIC
0	NP2	NO.2 AUX. BLOWER STARTER	OAH	1	PHENOLIC
1	WL-1 WL-2	SOURCE	CL	2	PHENOLIC 25ø
2	GL-1 GL-2	RUNNING	CL	2	PHENOLIC 25ø
3	3C-1 3C-2	START	CL	2	PHENOLIC 25ø
4	3-01 3-02	STOP	CL	2	PHENOLIC 25ø
5	RL-1 RL-2	OVER LOAD	CL	2	PHENOLIC 25ø
6	43R-1 43R-2	LOCAL - REMOTE	CL	2	PHENOLIC 25ø

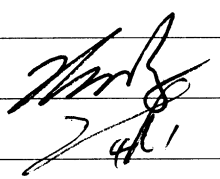
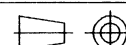
NO	SYMBOL	N A M E	TYPE	Q'TY	R E M A R K
0	NP1	TURNING GEAR STARTER	AH0	1	PHENOLIC
0	NP2	RECEPTACLE BOX	AH2	1	SUS
0	NP3	TURNING GEAR	AH3	1	PHENOLIC
0		<u>CAUTION</u> DO NOT START THE MOTOR OVER THAN 5 TIMES/MIN CONTINUOUSLY	AH4	1	PHENOLIC : 2t GROUND : WHITE LETTER : RED
1	WL	SOURCE	CL	1	PHENOLIC 25ø
2	GLF	FORWARD	CL	1	PHENOLIC 25ø
3	GLR	REVERSE	CL	1	PHENOLIC 25ø
4	RL	OVER LOAD	CL	1	PHENOLIC 25ø
5	3-0	STOP	CL	1	PHENOLIC 25ø
6	43	LOCAL - REMOTE	CL	1	PHENOLIC 25ø

			APD		SHEET NO. 06
1	2003.03.27	FOR WORKING	CHK		SCALE N / S
0	2002.11.19	FOR APPROVAL	DWN		
REV	DATE	DESCRIPTION			
 SinSueng Electric Co., Ltd. TEL : +82-55-231-6707~8, FAX : -6709			TITLE ; 5258 NAME PLATE LIST		

DRAWING NO. ; 13-000406(SSE000854)

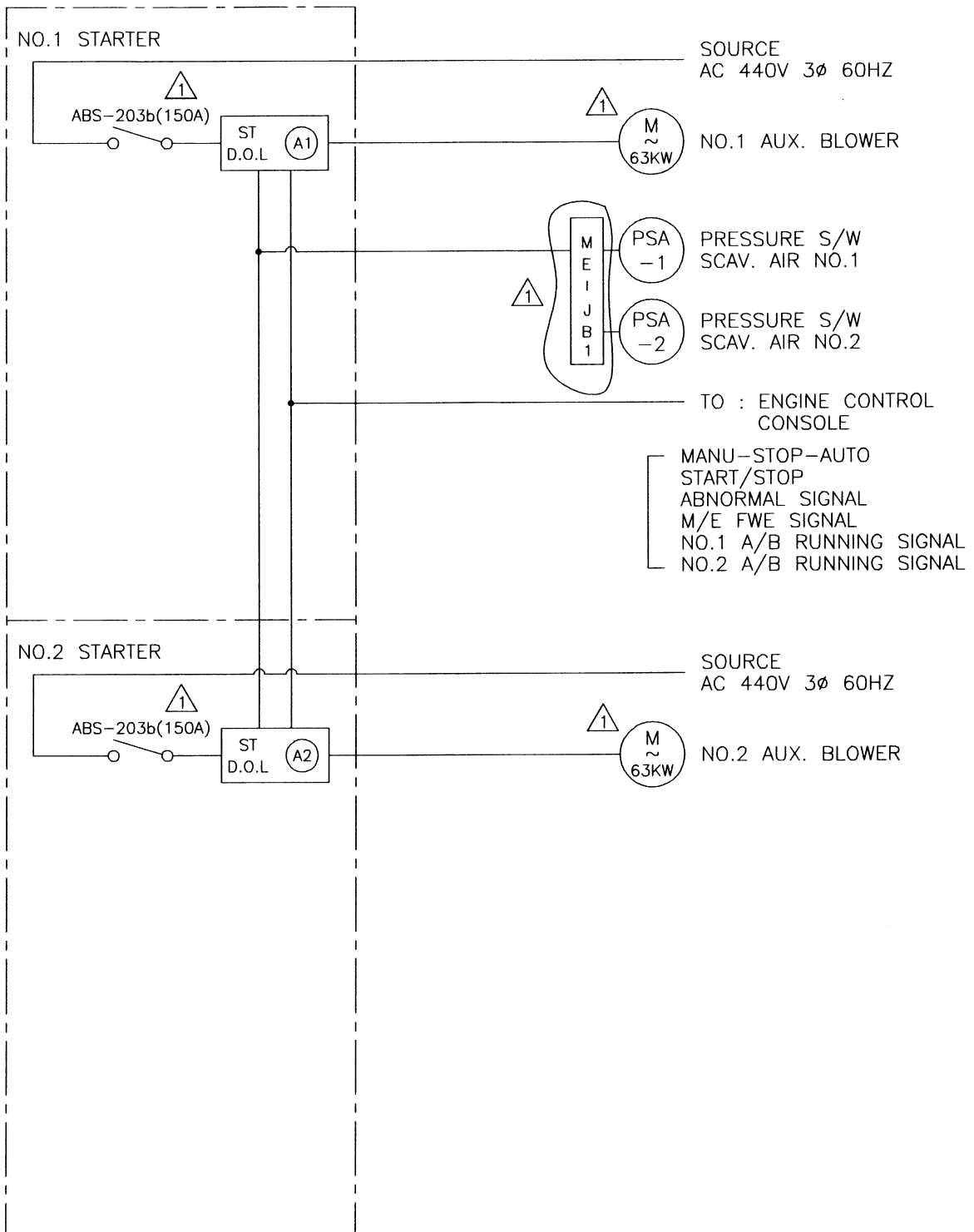


	1	2	3	4	5			
	NO	SYMBOL	N A M E	TYPE	SPECIFICATION	REMARK	Q'TY	MAKER
A	1	89-1 89-2	M.C.C.B	ABS-203b	AC440V 3P	150A	2	L . G
	2	88-1 88-2	MAGNETIC CONTACTOR	GMC-150	AC220V 60HZ		2	L . G
	3	51-1 51-2	OVER CURRENT RELAY	EOCR-SS-05	AC220V 60HZ		2	SAMHWA
	4	4X-1,2 5X-1,2	CONTROL RELAY	SZR-MY4N	AC220V 60HZ	WITH SOCKET	4	L . G
	5	51X-1,2 63X-1,2	CONTROL RELAY	SZR-MY4N	AC220V 60HZ	WITH SOCKET	4	L . G
	6	88X-1,2	CONTROL RELAY	SZR-MY4N	AC220V 60HZ	WITH SOCKET	2	L . G
B	7	S1 S2	CONTROL RELAY	SZR-MY4N	AC220V 60HZ	WITH SOCKET	2	L . G
	8	63T-1 63T-2	TIMER	H3BA	AC220V 60HZ	WITH SOCKET	2	OMRON
	9	48T-1,2 10T-1,2	TIMER	KTM-3M	AC220V 60HZ	WITH SOCKET	4	KOINO
	10	10T-3,4	TIMER	KTM-3M	AC220V 60HZ	WITH SOCKET	2	KOINO
	11	CT1 CT2	CURRENT TRANSFORMER	J-25	150/5A		2	KWANG SUNG
C	12	A1 A2	AC AMMETER	SC-A2	0~150A	OVER SCALE 300%	2	KYONG BO
	13	RHM1 RHM2	RUNNING HOUR METER	TH2356	9999.9H	AC220V	2	MATSUSHITA
	14	TR1-1 TR2-1	TRANSFORMER		440/220V,24V	500VA	2	SINSUENG
	15	1F1,1F2 2F1,2F2	FUSE	SB-C1	10A		4	SAMBOO
	16	1F3 2F3	FUSE	SB-C1	5A		2	SAMBOO
	17	1F4 2F4	FUSE	SB-C1	3A		2	SAMBOO
D	18	WL-1 WL-2	PILOT LAMP	YSPL2-024W	24V, 25ø E-12(24V1W)	WHITE	2	YONG SUNG
	19	GL-1 GL-2	PILOT LAMP	YSPL2-024G	24V, 25ø E-12(24V1W)	GREEN	2	YONG SUNG
	20	RL-1 RL-2	PILOT LAMP	YSPL2-024R	24V, 25ø E-12(24V1W)	RED	2	YONG SUNG
	21	3C1 3C2	PUSH BUTTON	YSP12-11G	AC250V, 25ø	GREEN	2	YONG SUNG
	22	3-01 3-02	PUSH BUTTON	YSP12-11R	AC250V, 25ø	RED	2	YONG SUNG
E	23	43R-1 43R-2	SELECTOR S/W	YSR2-22LB	AC250V, 25ø	BLACK	2	YONG SUNG

			APD		SHEET NO. 07
1	2003.03.28	FOR WORKING	CHK		SCALE N / S
0	2002.11.19	FOR APPROVAL	DWN		Y. K. KIM
REV	DATE	DESCRIPTION			
 SinSueng Electric Co., Ltd.			TITLE ; 5258		
TEL : +82-55-231-6707~8, FAX : -6709			MATERIAL LIST		

DRAWING NO. ; 13-000406(SSE000854)

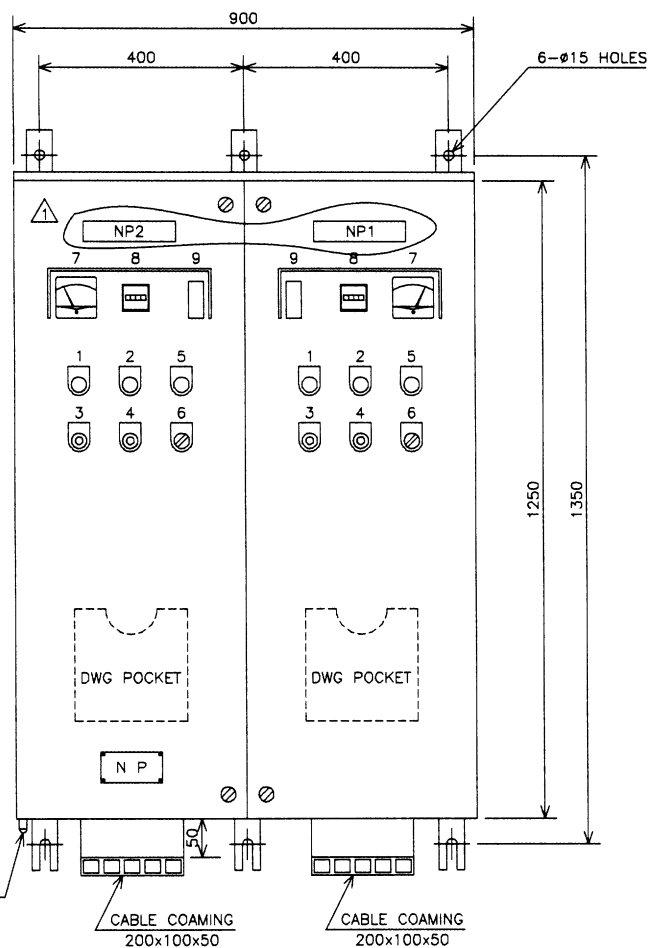




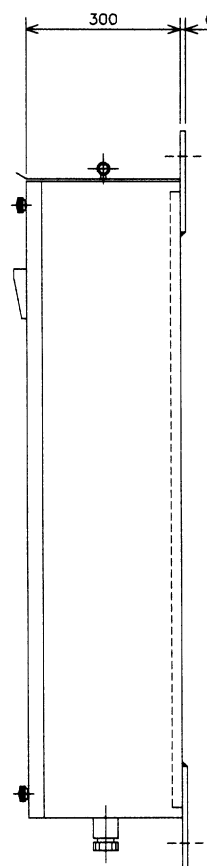
			APD		SHEET NO. 08
1	2003.03.27	FOR WORKING	CHK		SCALE N / S
0	2002.11.19	FOR APPROVAL	DWN	Y. K. KIM	
REV	DATE	DESCRIPTION	TITLE ; 5258		
SinSueng Electric Co., Ltd. TEL : +82-55-231-6707~8, FAX : -6709			WIRING DIAGRAM		

DRAWING NO. ; 13-000406(SSE000854)





FRONT VIEW



SIDE VIEW

NOTE

- ENCLOSURE TYPE : IP23
- STEEL PLATE : 2.3t
- PAINTING COLOR : MUNSELL NO. 7.5BG 7/2
- IN DOOR : CIRCUIT DIAGRAM VINYL COTTING
- WEIGHT : ABOUT 180 kg

9	M.C.C.B	ABS-203b	2	ABS-203b, 150A
8	RUNNING HOUR METER	TH2356	2	9999.9H
7	AMMETER	KA-80	2	0~150A
6	LOCAL - REMOTE	25ø	2	SEL S/W (BLACK)
5	OVER LOAD	25ø	2	PILOT LAMP (RED)
4	STOP	25ø	2	PUSH BUTTON (RED)
3	START	25ø	2	PUSH BUTTON (GREEN)
2	RUNNING	25ø	2	PILOT LAMP (GREEN)
1	SOURCE	25ø	2	PILOT LAMP (WHITE)
NP2	NO.2 AUX. BLOWER STARTER	PHENOLIC	1	NAME PLATE
NP1	NO.1 AUX. BLOWER STARTER	PHENOLIC	1	NAME PLATE
NO	N A M E	M A T E R I A L	Q'TY	R E M A R K

1	2003.03.27	FOR WORKING
0	2002.11.19	FOR APPROVAL
REV	DATE	DESCRIPTION



SinSueng Electric Co., Ltd.

TEL : +82-55-231-6707~8, FAX : -6709

TITLE ; 5258

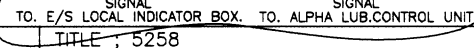
AUX. BLOWER STARTER
OUTLINE DWG

APD		SHEET NO. 09
CHK		SCALE N / S
DWN	Y. K. KIM	

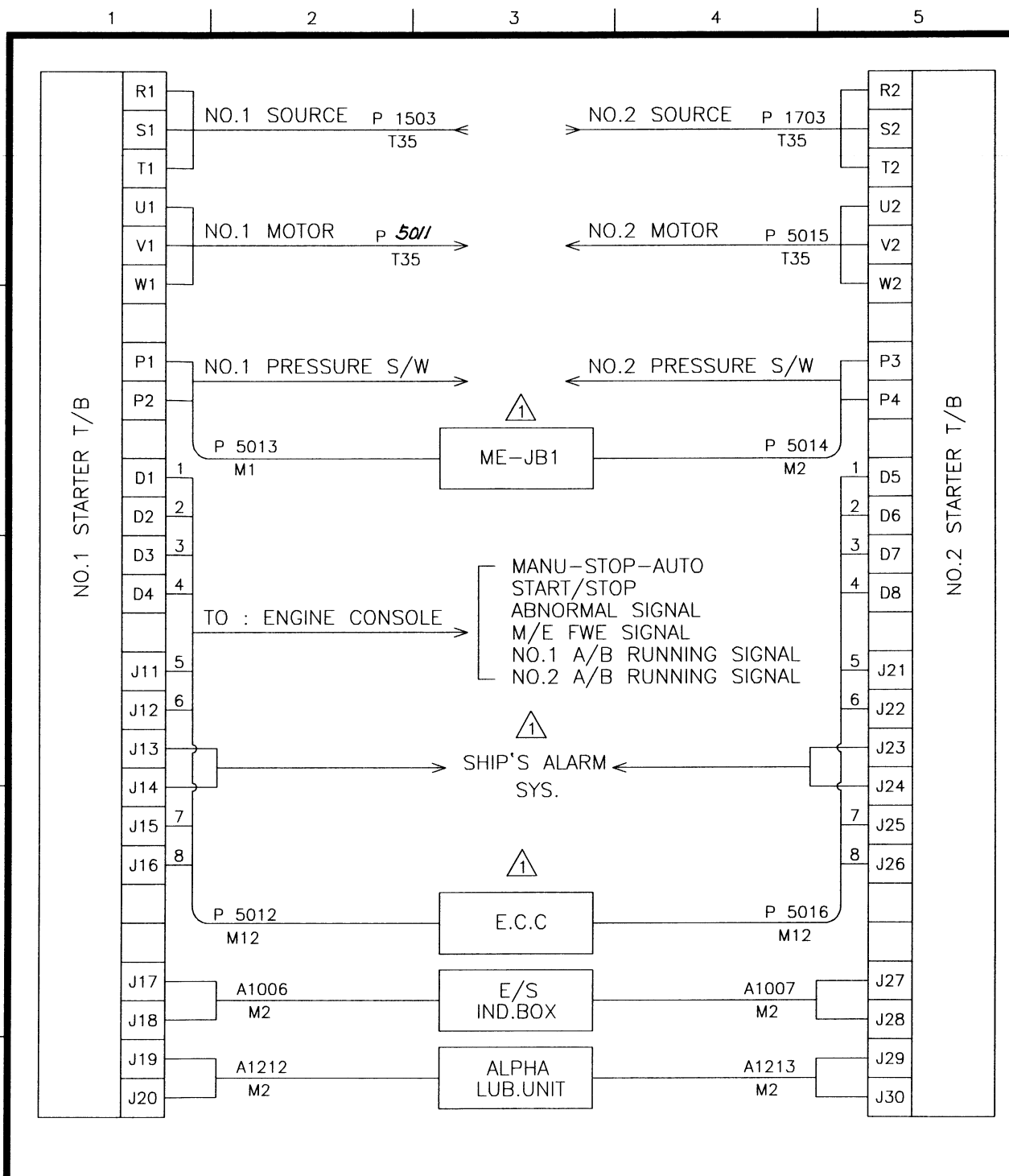




APD		SHEET NO. 10
CHK		SCALE N / S
DWN		Y. K. KIM



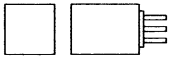
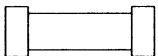
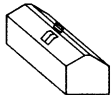
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CHK	<i>[Signature]</i>	SCALE N / S
DWN	Y. K. KIM	 

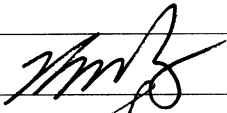
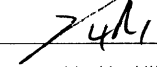
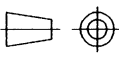


			APD		SHEET NO. 12
1	2003.03.27	FOR WORKING	CHK		SCALE N / S
0	2002.11.19	FOR APPROVAL	DWN	Y. K. KIM	
REV	DATE	DESCRIPTION	TITLE ; 5258		
SinSueng Electric Co., Ltd. TEL : +82-55-231-6707~8, FAX : -6709			TERMINAL ARRANGEMENT		

DRAWING NO. ; 13-000406(SSE000854)



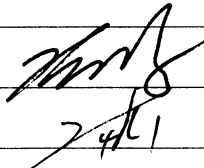
NO	NAME	SKETCH	TYPE	QUANTITY		REMARKS
				WORKING	SPARE	
1	MAGNETIC SWITCH		GMC-150 AC220V, 60HZ	2	1	
2	EOCR 		EOCR-SS-05	2	1	
3	CONTROL RELAY		SZR-MY4N AC220V, 60HZ	10	1	
4	TIME RELAY		KTM-3M AC220V, 60HZ	6	1	
5	FUSE		SB-C1, 10A	4	4	
			SB-C1, 5A	2	2	
			SB-C1, 3A	2	2	
6	GLOVE FOR SIGNAL LAMP		GLOVE , 25ø	2	1	WHITE
			GLOVE , 25ø	2	1	GREEN
			GLOVE , 25ø	2	1	RED
7	BULB FOR SIGNAL LAMP		E-12 (24V 1W)	6	6	
8	SPARE BOX		NP=SPARE BOX		1	

			APD		SHEET NO. 13
1	2003.03.27	FOR WORKING	CHK		SCALE N / S
0	2002.11.19	FOR APPROVAL	DWN	Y. K. KIM	
REV	DATE	DESCRIPTION	TITLE ; 5258 AUX.BLOWER STARTER SPARE PART LIST		
 SinSueng Electric Co., Ltd. TEL : +82-55-231-6707~8, FAX : -6709					

DRAWING NO. ; 13-000406(SSE000854)



	1	2	3	4	5	
	NO	SYMBOL	N A M E	TYPE	SPECIFICATION	REMARK
	1	89	M.C.C.B	ABS-33b	AC220V 3P	30A
A	2	88F,88R	MAGNETIC CONTACTOR	GMC-32	AC220V 60HZ	
	3	51 $\triangle$ 1	OVER CURRENT RELAY	EOCR-SS-30		(3.0~30)A
	4	75X	MAGNETIC CONTACTOR	GMC-22	AC220V 60HZ	
	5	51X 88FX,88RX	CONTROL RELAY	SZR-MY4-N1	AC220V 60HZ	WITH SOCKET
	6	CT	CURRENT TRANSFORMER	J-25	30/5A	
	7	A $\triangle$ 1	AC AMMETER	SC-A2	0~30A	OVER SCALE 300%
B	8	TR1	TRANSFORMER		440/220V,24V	150VA
	9	TR2	TRANSFORMER		440/80,90,100V	200VA
	10	F1,F2	FUSE	SB-C1	10A	
	11	F3,F5,F6	FUSE	SB-C1	5A	
	12	F4	FUSE	SB-C1	3A	
	13	WL	PILOT LAMP	YSPL2	24V, 25 ϕ E-12(24V,1W)	WHITE
C	14	RL	PILOT LAMP	YSPL2	24V, 25 ϕ E-12(24V,1W)	RED
	15	GLF,GLR 3-CF,3-CR	P/B WITH LAMP	YSPBL2	24V, 25 ϕ E-12(24V,1W)	GREEN
	16	3-0	PUSH BUTTON	YSP12	AC250V, 25 ϕ	RED
	17	43	SELECTOR S/W	YSR2-2	AC250V, 25 ϕ	BLACK
	18	REC	RECTIFIER	KBPC 3510	1000V 35A	
	19	SR	SURGE ABSORB	TNR23G 471K		
D	20	GLF	PUSH BUTTON	YSP12	AC250V, 25 ϕ	GREEN
	21	GLR	PUSH BUTTON	YSP12	AC250V, 25 ϕ	GREEN
	22	3-0	PUSH BUTTON	YSSEP-323	AC250V, 25 ϕ	RED

			APD	 Y. K. KIM	SHEET NO. 14
1	2003.03.27	FOR WORKING	CHK		SCALE N / S
0	2002.11.19	FOR APPROVAL	DWN		 
REV	DATE	DESCRIPTION			
 SinSueng Electric Co., Ltd. TEL : +82-55-231-6707~8, FAX : -6709			TITLE ; 5258 MATERIAL LIST		

DRAWING NO. ; 13-000416(SSE000855)



	A	B	C	D	E	F
1	—	—	—	—	—	—

-
- 530
- 350
- 4-Ø15 HOLES
- N P 1
- 7
- 1 2 3
- 8
- 4 5 6
- CABLE REEL
- 830
- 880
- 930
- DWG POCKET
- N P
- EARTH BOLT M8
- CABLE GLAND : 20c:3, 15c:1

Diagram illustrating the control system for the T/G, showing the RPB (Remote Power Button) and J/B (Junction Box) components connected by a cable.

The RPB (Remote Power Button) is shown on the left, featuring a control panel with three buttons: EM'CY STOP (LOCK TYPE), FORWARD, and REVERSE. The J/B (Junction Box) is shown on the right, labeled N P 2. The cable connecting them is labeled CABLE 1.25SQ, VCT. The cable gland on the J/B is labeled CABLE GLAND 20g. The cable is labeled 10 and 11.

RPB AND J/B FOR T/G

1	2003.03.27	FOR WORKING
0	2002.11.19	FOR APPROVAL
REV	DATE	DESCRIPTION

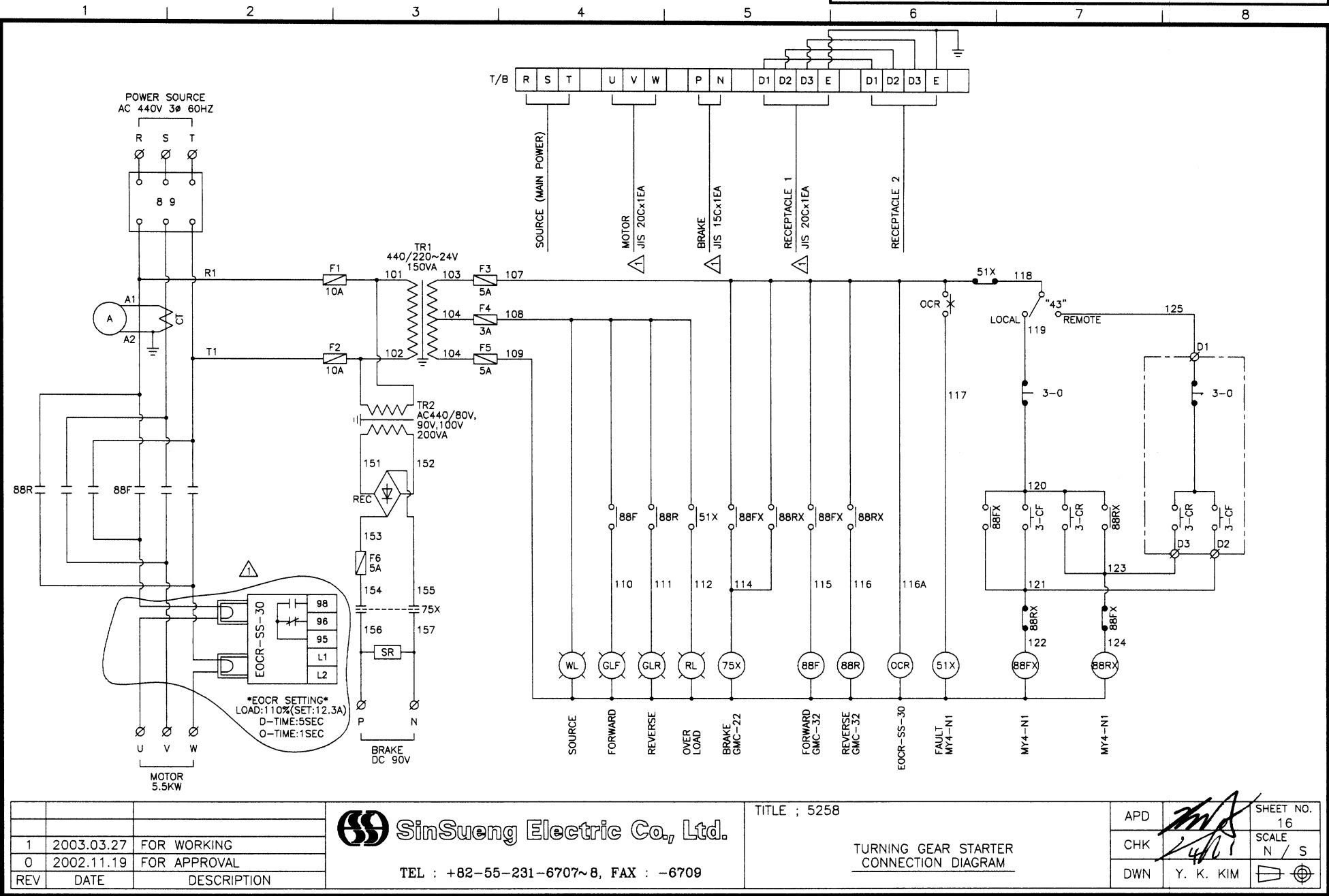


TITLE ; 5258

TURNING GEAR STARTER
OUTLINE DWG

SHEET NO.	15
SCALE	N / S
	





1	2003.03.27	FOR WORKING
0	2002.11.19	FOR APPROVAL
REV	DATE	DESCRIPTION



SinSueng Electric Co., Ltd.

TEL : +82-55-231-6707~8, FAX : -6709

TITLE ; 5258

TURNING GEAR STARTER CONNECTION DIAGRAM

APD

CHK

DWN

SHEET NO.

16

SCALE	
-------	--

	N	/	S
	7		8



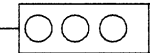
STARTER FOR TURNING GEAR

MARKED PARTS ARE
SUPPLIED BY STARTER MAKERPOWER SUPPLY
AC 440V 3Ø 60HZMOTOR
5.5KW

BRAKE

1 RECEP
PLUG

#2 RECEP

1.25SQ VCT
LENGTH:15M

REMOTE PUSH BUTTON S/W BOX

REV	DATE	DESCRIPTION
1	2003.03.27	FOR WORKING
0	2002.11.19	FOR APPROVAL



SinSueng Electric Co., Ltd.

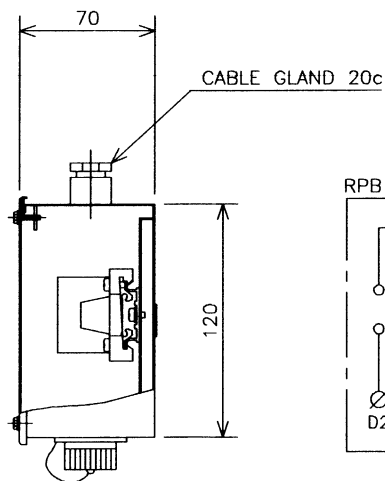
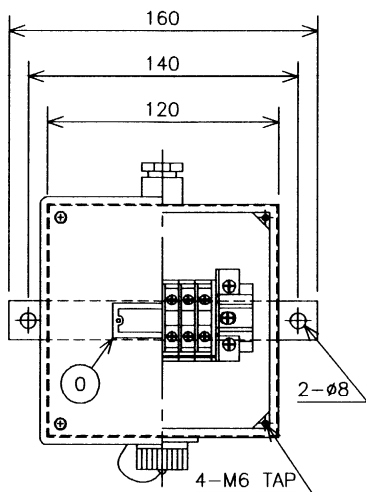
TEL : +82-55-231-6707~8, FAX : -6709

TITLE ; 5258

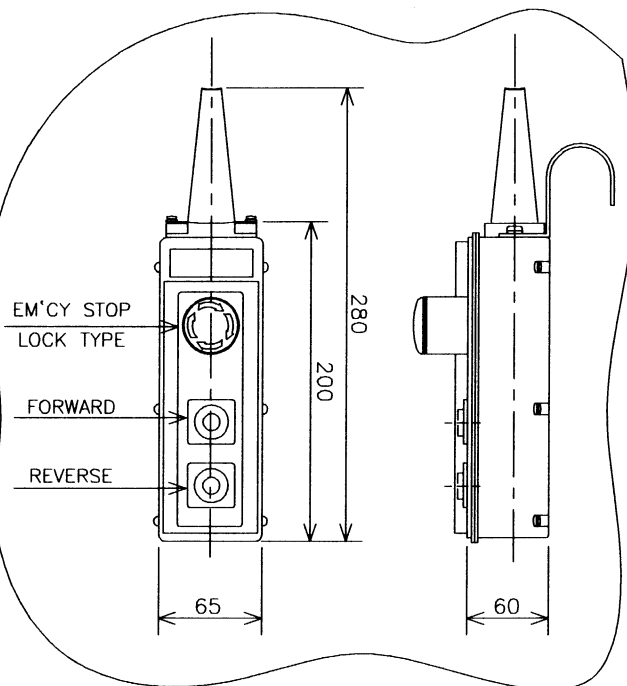
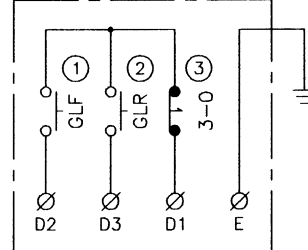
WIRING DIAGRAM
TURNING GEAR STARTER

APD		SHEET NO. 17
CHK		SCALE N / S
DWN	Y. K. KIM	





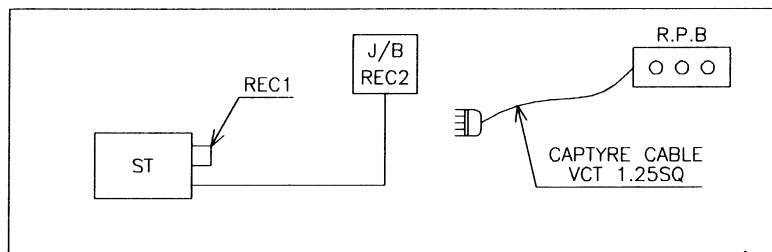
RPB CONNECTION DIAGRAM



NO	NAME	TYPE
0	RECEPTACLE BOX	AH2
1	FORWARD	CL
2	REVERSE	CL
3	EM'CY STOP	CL
4	TURNING GEAR	AH3

NOTE

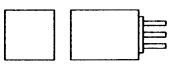
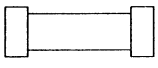
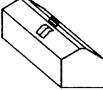
1. STEEL PLATE : 1.6t
2. PAINT COLOR : M-NO. 7.5BG 7/2
3. RECEPTACLE WITH J/B : 1EA
(TYPE : MS CONNECTOR 3102)
4. PLUG : 1EA
(TYPE : MS CONNECTOR 3106)
5. CAPTYRE CABLE : 1.25SQ VCT, (15 m)
6. RPB BOX : 1EA
■ ENCLOSURE PROTECTION : IP23

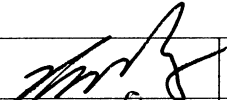
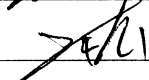
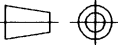


			APD		SHEET NO. 18
1	2003.03.27	FOR WORKING	CHK		SCALE N / S
0	2002.11.19	FOR APPROVAL	DWN	Y. K. KIM	
REV	DATE	DESCRIPTION	TITLE ; 5258		
SinSueng Electric Co., Ltd. TEL : +82-55-231-6707~8, FAX : -6709			RPB AND J/B FOR T/G		

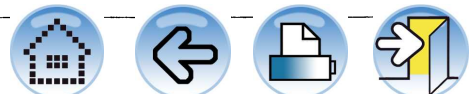
DRAWING NO. ; 13-000416(SSE000855)



NO	NAME	SKETCH	TYPE	QUANTITY		REMARKS
				WORKING	SPARE	
1	MAGNETIC SWITCH		GMC-32 AC220V, 60HZ	2	1	
2	EOCR		EOCR-SS-30	1	1	
3	CONTROL RELAY		SZR-MY4-N1 AC220V, 60HZ	3	1	
4	FUSE		SB-C1, 10A	2	2	
			SB-C1, 5A	3	3	
			SB-C1, 3A	1	1	
5	GLOVE FOR SIGNAL LAMP		GLOVE , 25ø	1	1	WHITE
			GLOVE , 25ø	2	2	GREEN
			GLOVE , 25ø	1	1	RED
6	BULB FOR SIGNAL LAMP		E-12 (24V 1W)	4	4	
7	SPARE BOX		NP=SPARE BOX		1	

			APD		SHEET NO. 19
1	2003.03.27	FOR WORKING	CHK		SCALE N / S
0	2002.11.19	FOR APPROVAL	DWN	Y. K. KIM	
REV	DATE	DESCRIPTION	TITLE ; 5258 TURNING GEAR STARTER SPARE PART LIST		
 SinSueng Electric Co., Ltd. TEL : +82-55-231-6707~8, FAX : -6709					

DRAWING NO. ; 13-000416(SSE000855)





CLIENT : DAEWOO shipbuilding & marine eng. Co.,Ltd.
HULL NO. : 5258
ENGINE TYPE : HSD-MAN B&W 5S70MC

Subject:

Motor for Aux.blower & Turning gear motor

Note :

5					
4					
3					
2					
1	COMMENTS REFLECT	2003.04.10	J.W. Lee		15M
0	FIRST ISSUED	2002.11.21	이재용		이정호
REV.	DESCRIPTION	DATED	Prepared	Reviewed	Approved
DESIGN TEAM 2			Documentation No.		
Tel. +82 55 260 6406 Fax. +82 55 260 6640			EA03-1258		
HSD ENGINE Co., Ltd.					



MESSRS. : HSD ENGINE CO.,LTD.

ARTICLE : AUX. BLOWER WITH MOTOR

SHIP NO. : UNIQUE 5258 CLASS : DNV

ENGINE TYPE : 5S70MC-VI

SHIP OWNER :

PAINT COLOR IN SIDE : MUNSELL NO. N-9.0
OUT SIDE : MUNSELL NO. 7.5BG 7/2

FAN SPEC.				MOTOR SPEC.	
MODEL	HAR-400/115N			FRAME NO.	M2QA 250M2A
DRAWING NO.	H-0207L	R.E.V NO.	1	MAKER	ABB
AIR CAPACITY	2.86 / 5.5	M ³ /SEC	r=1.225 Kg/M ³	OUT PUT & NO. OF POLES	63 Kw 2 POLES
AIR PRESS.	571 / 327	mmAq		VOLTAGE & CYCLES	440 V 60 Hz
AIR DENSITY	1.225 ~ 2.1 Kg/M ³			RAT'G CURRENT	98 A
REVOLUTION	3,552 R P M			REVOLUTION	3,552 R P M
AIR TEMP.	15 °C			AMB. TEMP. & INSULATION PROTECTION GRADE	50 °C, F CLASS, IP55
NO. OF PER SHIP	2 SET/ENGINE				
TOTAL WEIGHT	ab. 1000 Kg/SET				

HISTORY OF DRAWING

1. NOV. 21. 2002 : FOR APPROVAL DWG.
2. MAR. 25. 2003 : FOR WORKING DWG.



HMMCO Hyundai Marine
Machinery Co.,Ltd.

APPROVED

J-H
03. 3. 25
KIM

CHECKED

J.S
03. 3. 25
KIM

DRAWN

J-H
2003. 3. 25
KIM

DATE

2003.03.25

DRAW NO.

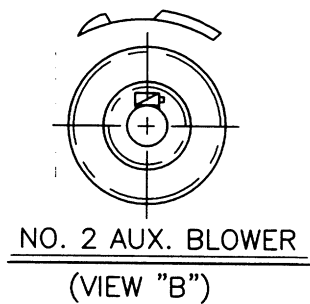
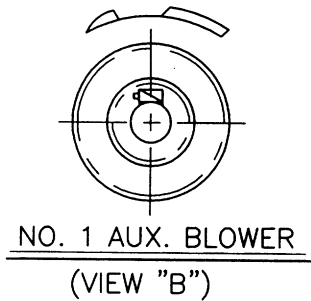
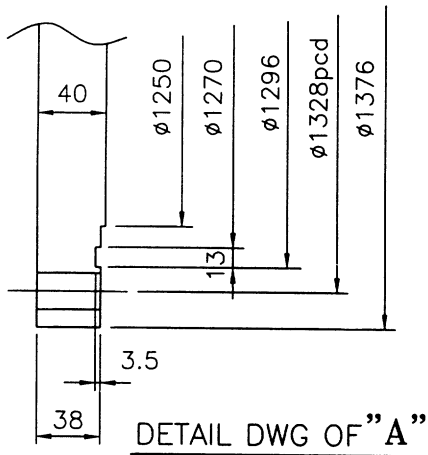
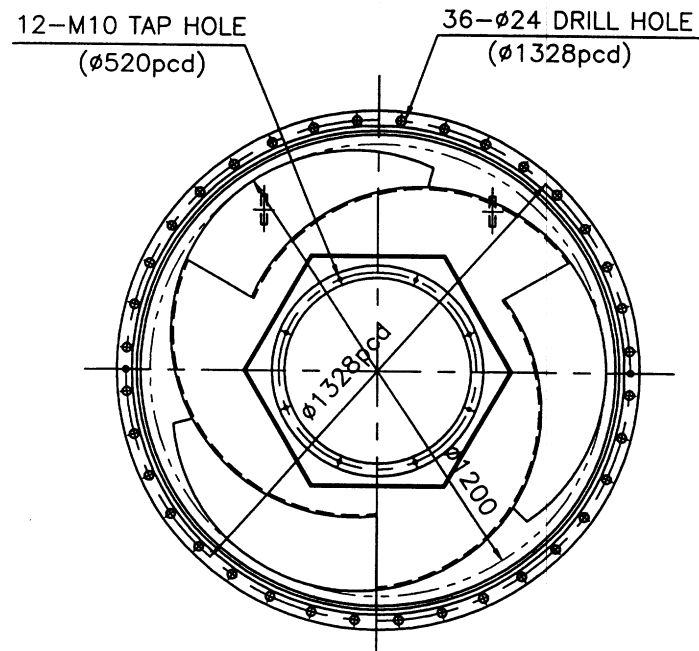
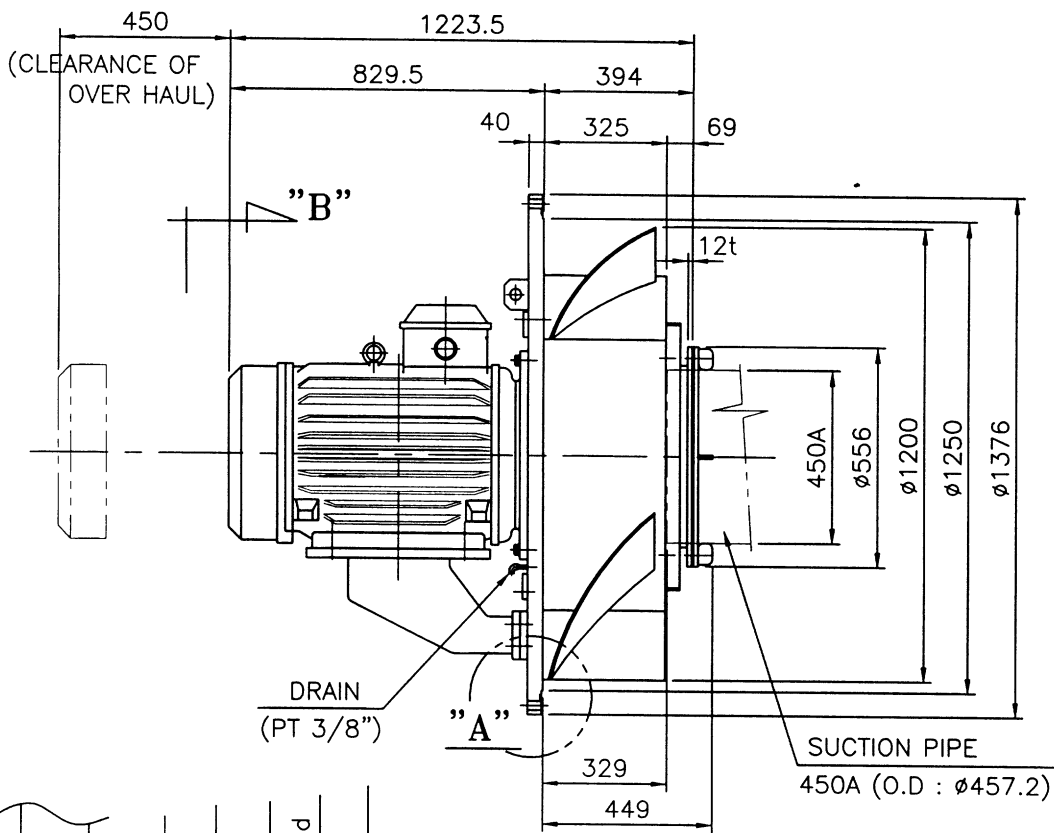
HMR-3125-R1

REAR-07



DRAWING LIST

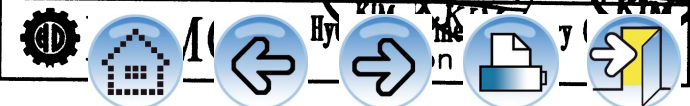
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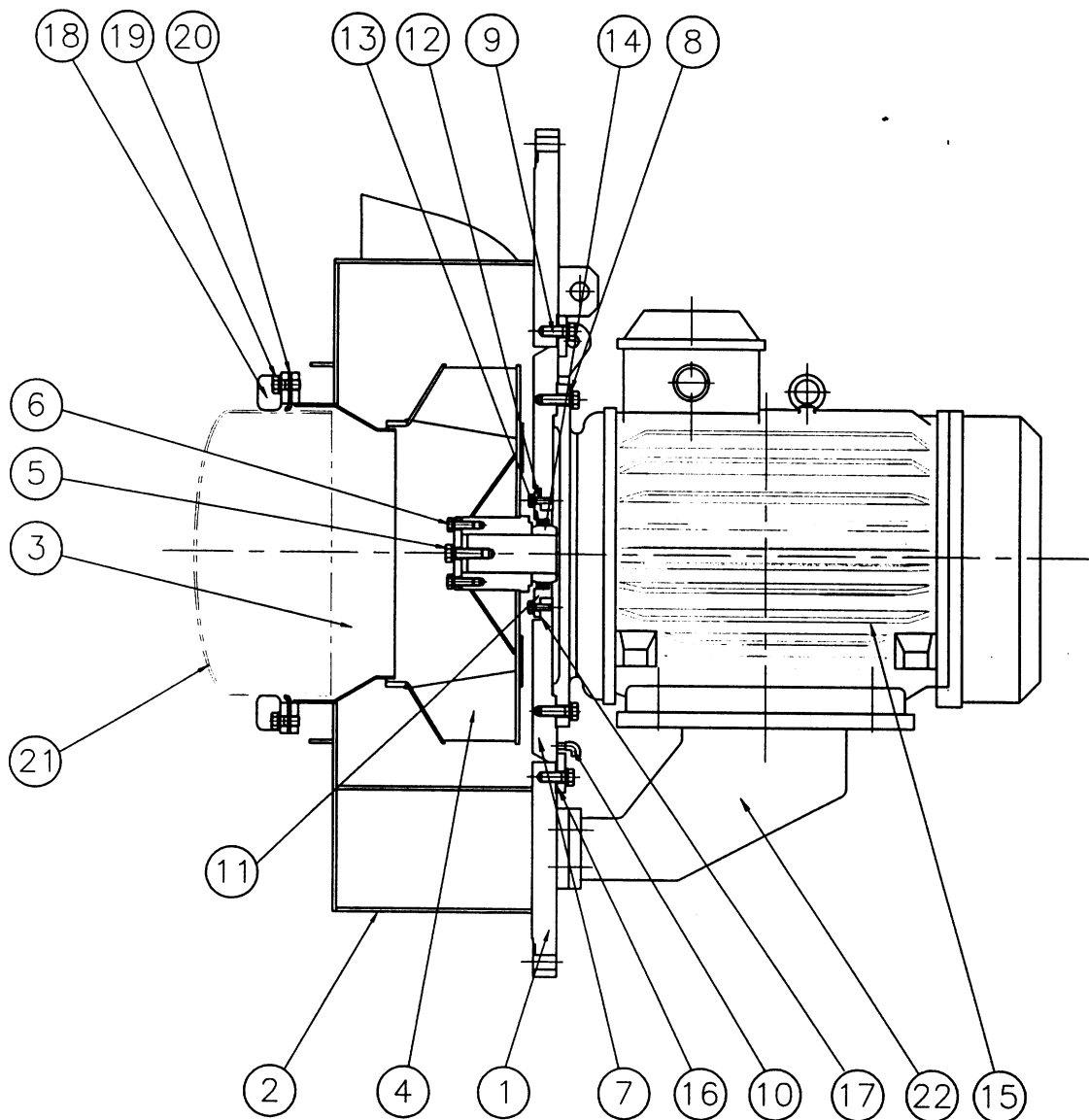


SPECIFICATION						
TYPE		HAR-400/115N		ENGINE TYPE		5S70MC-VI
AIR VOLUME		2.86/5.5	m ³ /sec	TEMPERATURE		15 °C
PRESSURE		571/327	mmAq	AIR GRAVITY		1.225 Kg/m ³
REVOLUTION		3552	RPM	SUCTION AIR DENSITY		1.225~2.1 Kg/m ³
MOTOR		63 KW	2 P	440 V	98 A	3 ø 50°C IP55
MFG. NO.		DATA		CUSTOMER	HSD ENGINE CO.,LTD.	
		03.03.24				
Q'ty		SCALE		TITLE	LAYOUT DWG OF AUX. BLOWER WITH MOTOR	
2 Sets		1=20				
DWG. NO.				3RD ANGLE APPROVE / CHECK		DRAWN J.H
H	-	0	2	0	7	L
						03. 3. 25
						03. 3. 25
						2003. 3. 25

DATE	CODE	MEMO	SIGN
	△		
	△		
	△		

REAR-07





* REMARK *

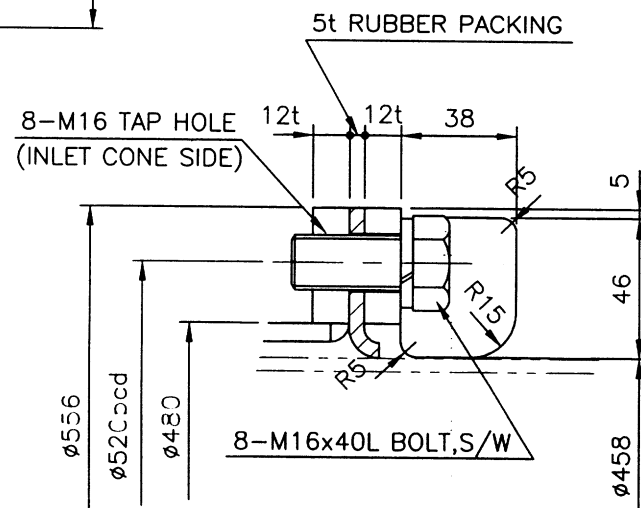
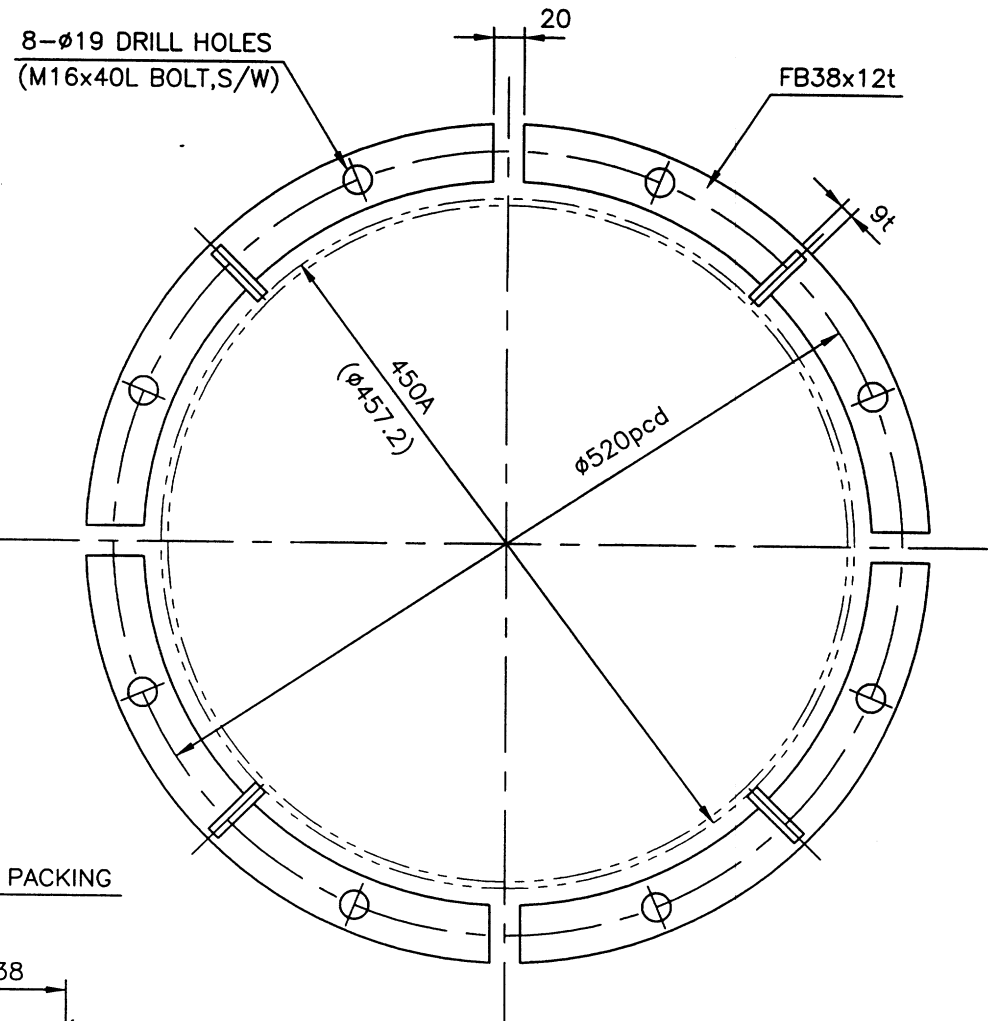
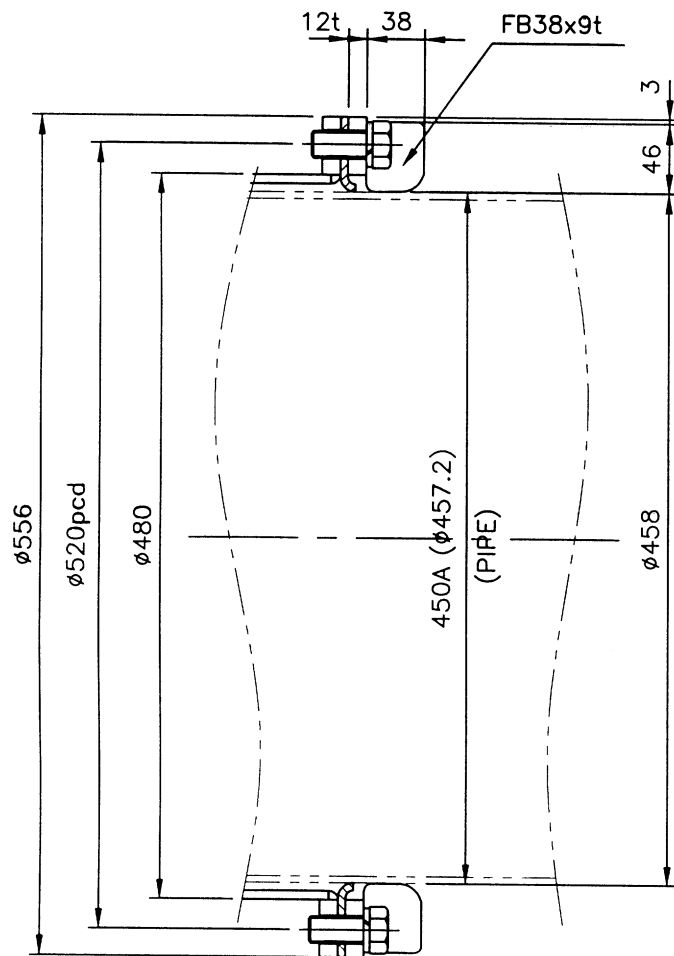
1. SUCTION GASKET : ($\phi 556 \times \phi 447 \times 5t$) - 2ea + 1Spare
2. GASKET : (12Wx5Hx4.1m) - 2ea + 1 Spare
3. BOLT, S/W : (M20x60L) - 36ea x 2Set = 72ea

22	MOTOR BED	SS400	1	FOR 63KW-2P	
21	SUCTION DUCT		1	450A PIPE	HSD
20	GASKET	RUBBER	1	5t	
19	BOLT,NUT,S/W	8.8T	8	M12x35L	
18	GUIDE RING	SS400	1	FOR 450A	
17	GASKET	NON-ASBESTOS	1		
16	GASKET	NON-ASBESTOS	1		
15	MOTOR		1	63KW-2P	
14	SEALING LING	SM45C	1	$\phi 90 \times 40W$	
13	GASLOCK SEAL	SS400	2	$\phi 110 \times \phi 85 \times 10t$	
12	BOLT,S/W	8.8T	6	M10x30L	
11	STUFFING BOX	SS400	1	$\phi 200 \times 29W$	
10	DRAIN	SS400	1	PF 3/8"	
9	BOLT,S/W	8.8T	24	M16x40L	
8	BOLT, S/W	8.8T	8	M16x55L	
7	MOTOR SEAT	SS400	1		
6	BOLT,S/W,D.L/W	8.8T	2	M12x35L	
5	BOLT,S/W,D.L/W	8.8T	1	M16x50L	
4	IMPELLER	A5083P	1		
3	SUCTION CONE	SS400	1	FOR 450A	
2	CASING	SS400	1	5S70MC-VI	
1	CASING SIDE PLATE	SS400	1	$\phi 1378 \times 40t$	
NO.	DESCRIPTION	MAT.L	Q'TY	SPECIFICATION	REMARKS
MFG. NO.	DATA	CUSTOMER			
	02.11.21				
Q'ty	SCALE	TITLE			
2 Sets	1=12	SECTIONAL DWG OF AUX. BLOWER (REAR)			
DWG. NO.	3RD ANGLE	APPROVE	CHECK	DRAWN J.T.T	
H-0207S				02.11.21	202.11.21

DATE	CODE	MEMO	SIGN

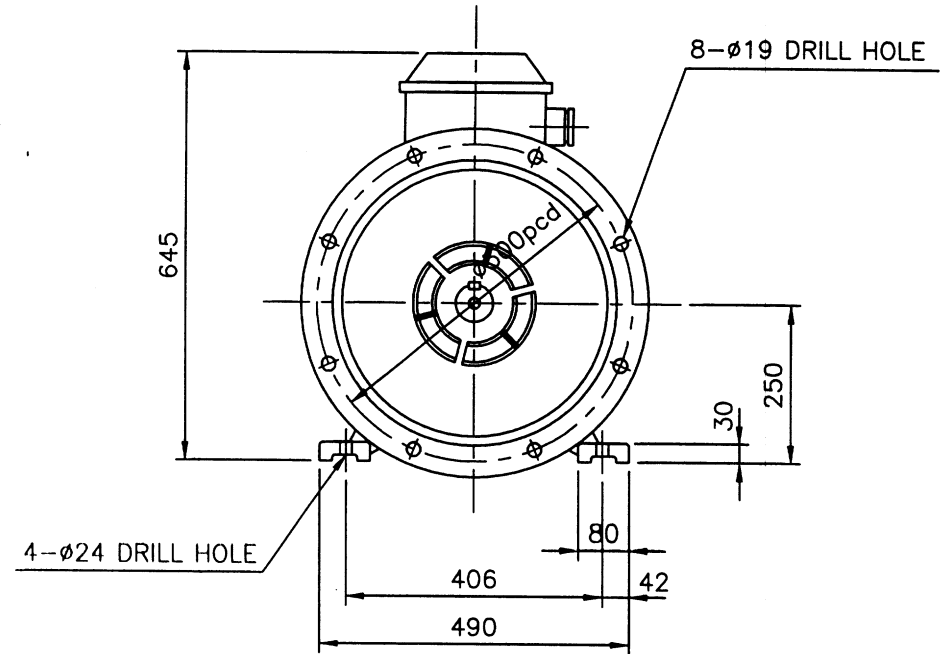
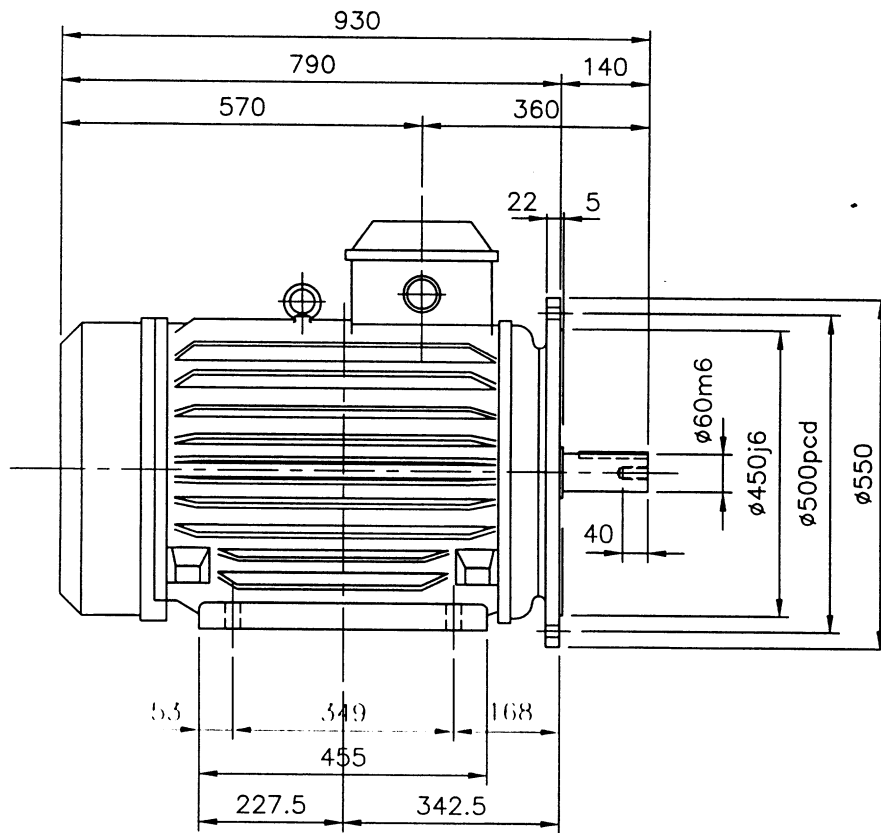
REAR-07





DATE	CODE	MEMO	SIGN
	△		
	△		
	△		

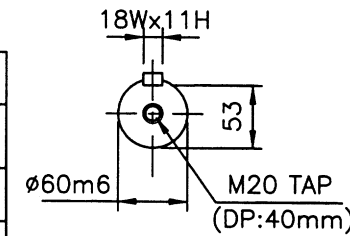
NO.	DESCRIPTION	MAT.L	Q'TY	SPECIFICATION	REMARKS
MFG. NO.	DATA	CUSTOMER	HSD ENGINE CO.,LTD.		
	02.02.01				
Q'ty	SCALE	TITLE	DETAIL DWG OF SUCTION GUIDE RING		
2 Sets	1=5				
DWG. NO.		3RD ANGLE	APPROB	CHECK	DATE
H-0008GR	△	☐	03.3.25	03.3.25	03.3.25



* SPECIFICATION

OUT PUT	POLES	FRAME	VOLTS	CYCLE	RPM	RATING	INSULATION CLASS	PROTEC GRADE	AMBIENT TEMP.
63 KW	2 P	250M2A	440 V	60 Hz	3552	CONT.	F	IP55	50 °C
STATING TIME	RATING CURRENT	STATING CURRENT	POWER FACTOR	EFFICIENCY	STATING TORQUE	BEARING		STATING METHODS	CABLE GLAND
3 SEC	98 A	676.2 A	92 %	92.7 %	24.6 Kg.m	FRONT	REAR	D.O.L	35Ax1EA
						△6314C3	△6314C3		

1. GREASE NIPPLE TO BE JIS B 1575 PT 1/8" BALL TYPE



$$\begin{aligned} \phi 450j6 &= \phi 450 \begin{matrix} 0 \\ -0.020 \end{matrix} \\ \phi 60m6 &= \phi 60 \begin{matrix} +0.030 \\ +0.011 \end{matrix} \end{aligned}$$

WEIGHT : 419Kg

NO.	DESCRIPTION	MAT.L	Q'TY	SPECIFICATION	REMARKS
PJT NO.	DATA	CUSTOMER			
	2003.03.24				
MFG. NO.	SCALE	TITLE			
	1/12	LAYOUT DWG OF ABB MOTOR(M2QA)			
		(63KW-2P Fr.250M2A-B35)			
DWG. NO.	3RD ANGLE APPROVAL CHECKS	DRAWN BY			
H-0633MT	△	KIM			
		2003.3.25			

DATE	CODE	MEMO	SIGN
03.03.24	△	MAKER CHANGED	J.S.KIM
	△		
	△		

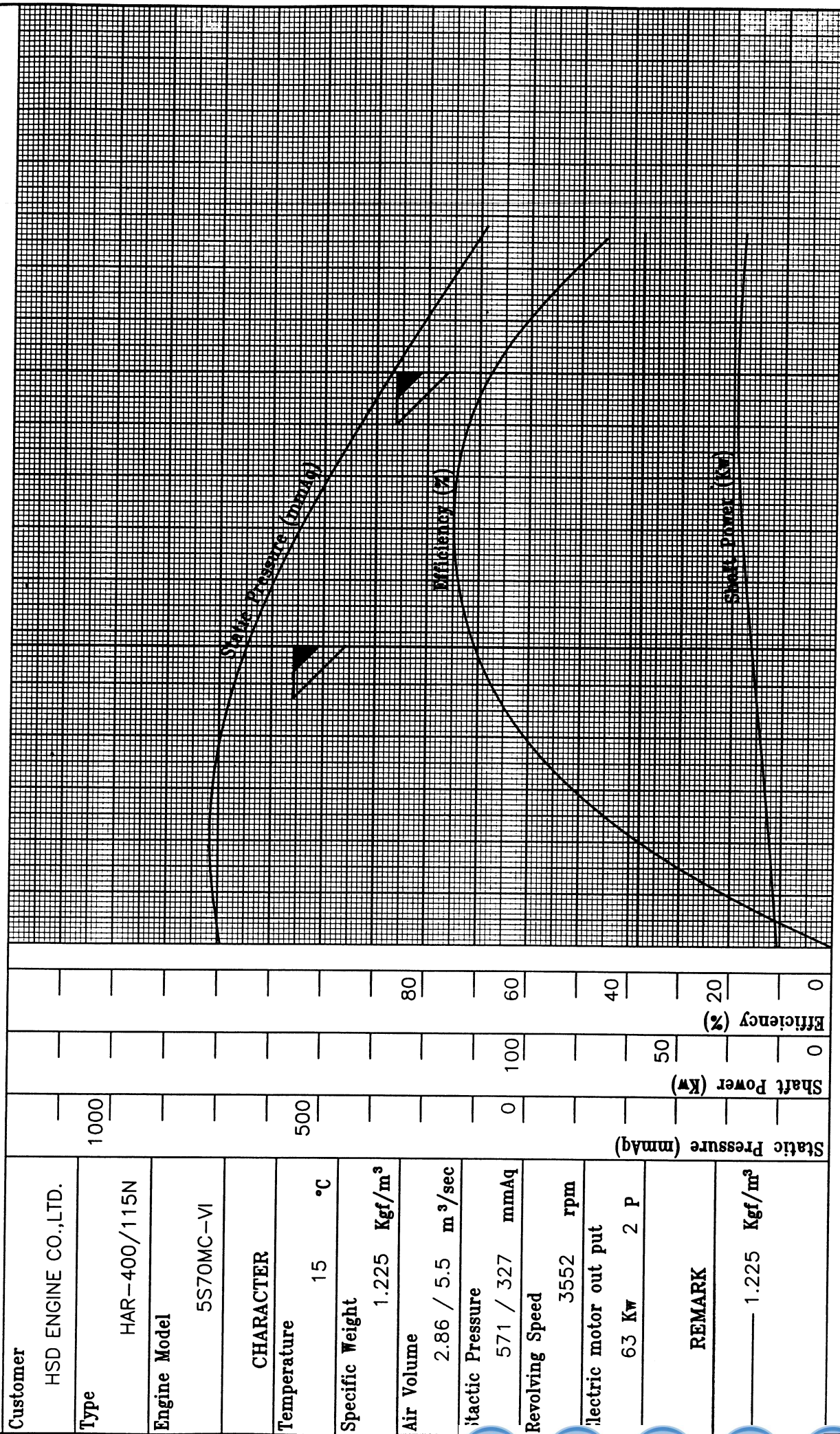
U S E		SPARE PART LIST		A M E N D	REV.	DATE	NOTE
NO.1~2 AUX. BLOWER							
ITEM NO.	NAME OF PARTS	OUT LINE	QUANTITY			REMARK	
			WORKING		SPARE		
			PER BL.SET	PER ENG.			
1	BEARING		2	4	2	$\triangle$ NO. 6314 C3 63Kw x 2P MOTOR	
2	GASLOCK SEAL		2	4	2	THERMOELASTIC SEAL	
3	GASKET		1	2	1	5t NBR	
4	GASKET		1	2	1	5t NBR	
	SPARE PART BOX				1	WITH KEY AND LOCK	
HMMCO Hyundai Marine Machinery Co., Ltd. Inchon Korea			APPROVED	CHECKED	DRAWN		
DRAW NO.	H-0207P	REVISION NO.	1				



U S E		TOOL LIST	A M E N D	REV.	DATE	NOTE
NO.1~2 AUX. BLOWER						
ITEM NO.	NAME OF PARTS	OUT LINE	Q'TY	REMARK		
1	IMPELLER TOOL		1			
2	BEARING TOOL		1	12"		

HMMCO Hyundai Marine Machinery Co., Ltd. Inchon Korea		APPROVE 	CHECK 	DRAWN
DRAW NO.	H-0207T	REVISION NO.	0	

ESTIMATED PERFORMANCE CURVE



Customer	HSD ENGINE CO.,LTD.		
Type	HAR-400/115N		
Engine Model	5S70MC-VI		
CHARACTER			
Temperature	15	°C	
Specific Weight	1.225	Kgf/m³	
Air Volume	2.86 / 5.5	m³/sec	
Static Pressure	571 / 327	mmHg	
Revolving Speed	3552	rpm	
Electric motor out put	63 Kw	2 P	
REMARK			
	1.225	Kgf/m³	

Air Volume (m³/sec)



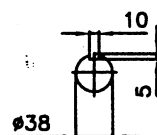
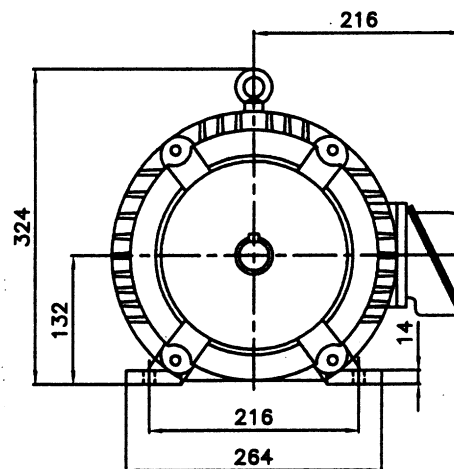
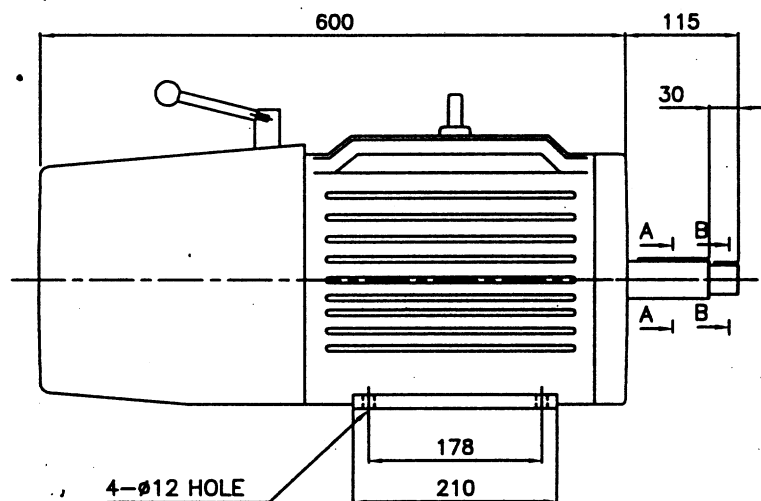
NO	NAME	MAT'L	QTY	REMARK

①

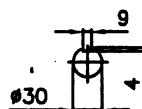
— SPECIFICATION —

MOTOR	
MAKER	HYUNDAI
TYPE	HK-X\$D
POLES	6P
DUTY	1HR
OUTPUT	7.5HP, 5.5KW
WEIGHT	110KG
BEARING	DE 6208ZZ
	ODE 6208ZZ
FREQUENCY	60Hz
ENCLOSURE	IP54
CABLE GLAND	20bX1, 25cX1
TERMINAL BLOCK	20A . 6P
RATED VOLTAGE	440V
INSULATION CLASS	F
COOLING METHOD	IC0141 (FC)
SPEED AT RATED LOAD	1170RPM
RATED LOAD CURRENT	11.2A

MAGNETIC BRAKE	
MAKER	NAM KWANG ELECTRIC CO
TYPE	NKSB-15S
TORQUE	12kg-m
VOLTAGE	DC 90V
AMPS	1.28A
WATTS	115W
WEIGHT	25kg



SECTION A-A



SECTION B-B

REV	DATE	PREPARED BY	REVIEWED BY	APPROVED BY
ITEM NAME		TURNING GEAR WITH MOTOR		
PART NAME		MOTOR OUTLINE		
		S= /		DATE: . . .
DWG.				



HSD ENGINE

Client : DAEWOO SHIPBUILDING & MARINE ENGINEERING CO.LTD

Hull Number : HN 5258

Engine Type : 5S70MC

Subject :

Pressure Transmitter and Switch

Note :**Attachments :**

5					
4					
3					
2					
1	<i>THE NO. OF SENSOR TO BE ADDED (P. 2, 3)</i>	<i>2008.04.15</i>	<i>이정호</i>	<i>이정호</i>	<i>이정호</i>
0	First issued.	<i>2002.11.15</i>	<i>김정호</i>	<i>이정호</i>	<i>이정호</i>
Rev.	Description	Date	Prepared	Reviewed	Approved
Design Team 2 Tel. +82 55 260 6607 Fax. +82 55 260 6640 HSD ENGINE CO., LTD. PLANT 2			Documentation No. EW 03 - 1258		



PRESSURE SWITCH LIST

UNIQ 5258

UNIT: (kg / cm²)

NO	TAG NO.		DESCRIPTION	Q'TY		TYPE CORD NO.	RANGE (kg / cm ²)	SETTING POINT (kg / cm ²)	TIME DELAY (SEC)	DIFF. PRESS. (kg / cm ²)	FITTING THREAD	REMARKS
	HSD	AMS CH.		W	S							
1	PSAS1/2		AUXILIARY BLOWER CONTROL (START/STOP)	2			0~4	0.5,0.7	-	0.2	PF 3/8"	
2	PSML0	T01.2	MAIN L.O INLET LOW PRESS. (SHUTDOWN)	1				0.9	6~8	0.2	PF 3/8"	
3	PSMLOSP	J01.1	MAIN L.O INLET LOW PRESS. (STAND-BY)	1				-	-	0.2	PF 3/8"	
4	PSCFWSP	N01.1	JACKET C.F.W INLET (STAND-BY)	1				-	-	0.2	PF 3/8"	
5	PSTL0	T01.3	T/C L.O INLET (SHUTDOWN)	1				0.8	6~8	0.2	PF 3/8"	
6	P11		CONTROL AIR INLET FINISHED WITH ENGINE	1				0.5	-	0.2	PF 3/8"	
7	P13		SAFETY AIR INLET FINISHED WITH ENGINE	1				0.5	-	0.2	PF 3/8"	
8	P2		EMERGENCY CONTROL	1			1~10	2.0	-	0.4	PF 3/8"	
9	P3		EMERGENCY CONTROL RESET	1				2.0	-	0.4	PF 3/8"	
10	PSSA		SAFETY AIR INLET	1				5.5	6~8	0.4	PF 3/8"	
11	P16	P03	TACHO FAILURE ALARM CANCEL	1				4.0	-	0.4	PF 3/8"	
12	PSF0P	E01.1	FUEL OIL INLET(STAND-BY)	1					-	0.4	PF 3/8"	



4

PRESSURE TRANSMITTER LIST

UNIQ 5258

UNIT: (kg/cm²)

NO	TAG NO.		DESCRIPTION	Q'TY		KIND OF FLUID	TYPE CORD NO.	RANGE (kg/cm ²)	SETTING POINT		TIME DELAY (SEC)	OUTPUT SIGNAL (mA)	CABLE GLAND	REMARKS
	HSD	AMS CH.		W	S				SLD	AL.				
1	PTML0	J05	MAIN L.O INLET	1		OIL		0~4.0	1.1	1.3	6~8	4~20mA	JIS 15C	
2	PTPC0	J12	PISTON COOLING OIL INLET	1					1.1	1.3	6~8	"	"	
3	PTTL0	J19	T/C L.O INLET	1					-	1.2	6~8	"	"	
4	PTSAP	P04	SCAVENGE AIR IN AIR RECEIVER	1		AIR			-	-	4-	"	"	
5	PTSAG		SCAVENGE AIR IN AIR RECEIVER FOR GOV.	1					-	-	-	"	"	
6	PTCFW	N03	JACKET C.F.W INLET	1		WATER		0~6.0	1.5	2.0	6~8	"	"	
7	PTCW	N06	A/C COOLING WATER INLET	1					-	1.0	6~8	"	"	
8	PTF0	E08	FUEL OIL INLET	1		OIL		0~16.0	-	6.5	6~8	"	"	
9	PTSAA	P01	STARTING AIR INLET	1		AIR		0~40.0	-	15	6~8	"	"	
10	PTSAB		STARTING AIR INLET FOR BMS	1					-	-	Δ -	"	"	
11	PTCA	P02	CONTROL AIR INLET	1		AIR		0~10	-	5.5	6~8	"	"	
12	PTEA	P07	EXHAUST VALVE SPRING AIR	1					-	5.5	6~8	"	"	
											Δ			

a) NOTE : WITH STOPPED COOLING WATER PUMP, THE SET POINT FOR THE SENSOR IS STATIC PRESSURE PLUS THE STATED VALUE



3

F		3		4		
No.	Drawing no.	Description	Q'ty	Material	Weight	Size

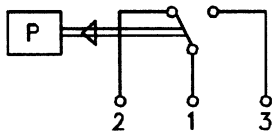
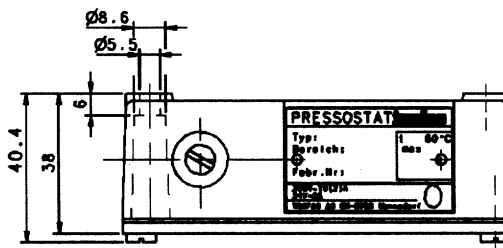
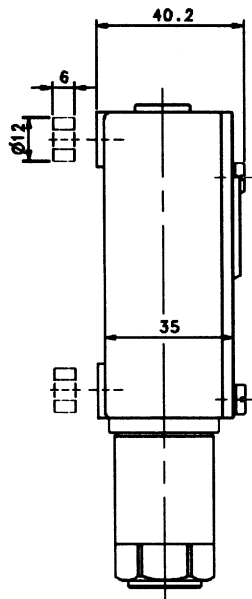
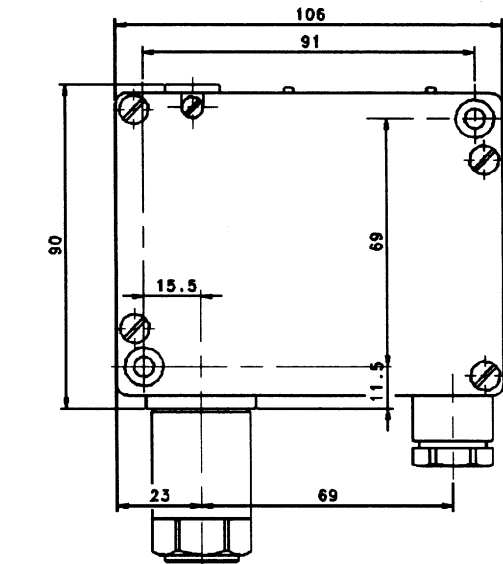
Single stage Controller

- . Robust aluminium die cast housing, epoxy coated
- . Accuracy +2% of full scale
- . Repeatability < +0.5% of full scale
- . Protection IP65
- . Any mounting position possible

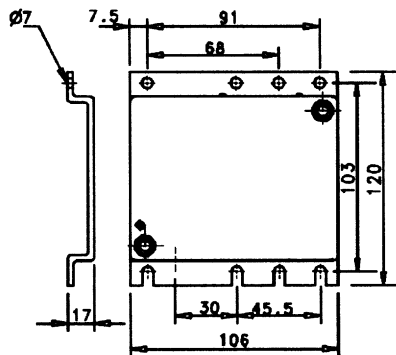
Specifications

Order.no.	Type	Pressure range in bar	max. working Pressure in bar	max. short time over pressure in bar	Ambient temperature	Media temperature
S 1.6	904.2373.901.31.A1	0.2 ... 1.6	10	13	-20 ... +70°C	-40 ... +150°C
S 4.0	904.2376.903.31.A1	0 ... 4	12	26		
S 6.0	904.2377.903.31.A1	0 ... 6				
S 10	904.2378.905.31.A1	1 ... 10	24	36		
S 16	904.2379.905.31.A1	1 ... 16				
S 25	904.2380.905.31.A1	2 ... 25	40	75		
S 40	904.2381.905.31.A1	4 ... 40				

- . Name plate : maker standard
- . Language : English
- . Range(Bar or kg/cm2) is applied according to POR.
- . Calculation cert. & class. cert. to be submitted to HSD QM Team.



Connections



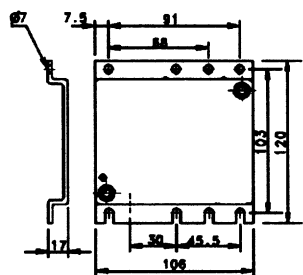
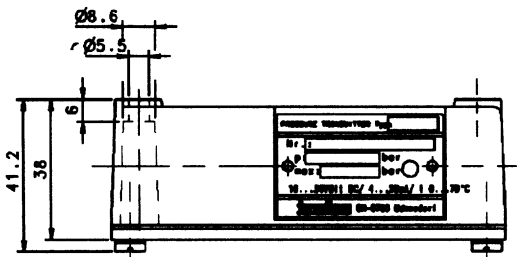
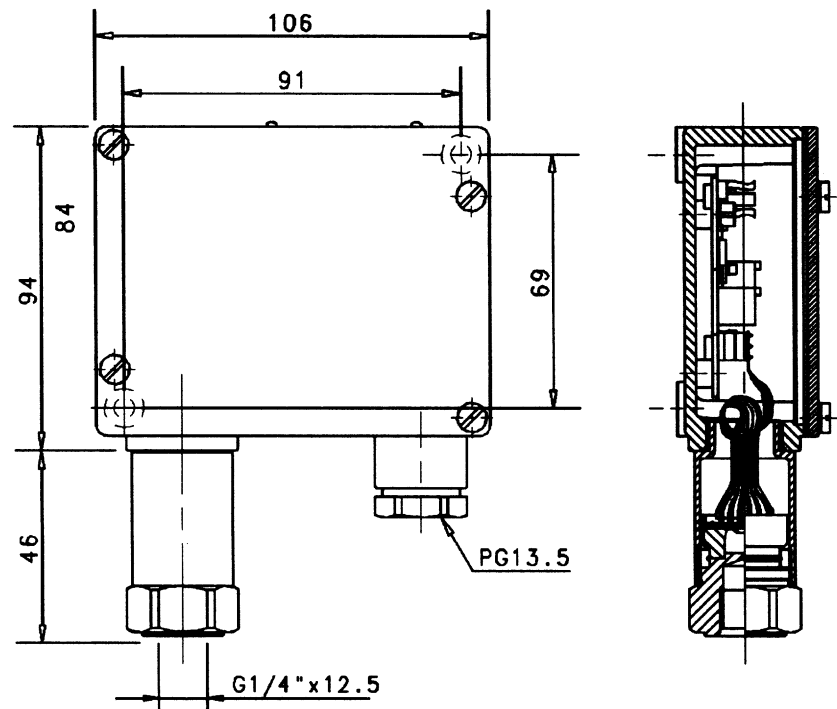
Mounting bracket No.31

This drawing contains confidential information proprietary to HSD must not be re-produced or disclosed to others or used in any other way in whole or part except as authorized in writing by HSD. 이 도면은 HSD의 기밀 정보이며, 무단으로 복제, 배포, 또는 다른 용도로 사용될 경우 법적 책임을 지게 됩니다.						9
						8
						7
						6
						5
						4
						3
						2
						1
						0
					2000.07.12	김신우
					김신우	김신우
					김신우	김신우
					First issued	
					Date	Rev.
					Drawn	
					Chk'd	
					App'd	
					Description of Revision	
					Mass (Kg):	
					Material:	
					Ref. licensor drawing no. :	
					HSD old drawing no. :	
					Projections:	
					Type:	
					Scale:	
					Size:	
					Title:	
					MS/HSD No.:	
					Drawing No.:	
					Ver	
					0035	



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F		3		4		
No.	Drawing no.	Description	Q'ty	Material	Weight	Size



Mounting bracket No.31

Electrical Data

- Supply voltage : 10 ... 34 V DC
nominal 24 V DC
- Output : 4 ... 20mA
- Accuracy : < +0.5 % of full scale p < 16 bar
< +0.3% of full scale p > 16 bar
- Nominal temperature : -25' ... +85'C
- Protection : IP65
- Housing material : AlMg epoxy coated

Specifications

Ordering number	Type	Range(unit)	Output
N 1.0	8202.71.2210.31.A1	0 - 1.0 BAR	4 ... 20mA
N 2.5	8202.75.2210.31.A1	0 - 2.5 BAR	
N 4.0	8202.76.2210.31.A1	0 - 4.0 BAR	
N 6.0	8202.77.2210.31.A1	0 - 6.0 BAR	
N 10.0	8202.78.2210.31.A1	0 - 10.0 BAR	
N 16	8202.79.2210.31.A1	0 - 16.0 BAR	
N 25	8202.80.2210.31.A1	0 - 25.0 BAR	
N 40	8202.81.2210.31.A1	0 - 40 BAR	

- Name plate : maker standard
- Languag : english
- Range(Bar or kg/cm2) is applied according to POR.
- Calculation cert. & class. cert. to be submitted to HSD QM Team.

				9
				8
				7
				6
				5
				4
				3
				2
				1
2000.07.12				0
Date	Drawn	Chk'd	App'd	Rev.
2000.07.12	강신우	강신우	강신우	First issued
Mass (Kg):		Material:		Ref. licensor drawing no. :
				HSD old drawing no. :
Projections:		Type:		
1 각		Trafag 8202		
Scale:	Size:	Title:		
	A3	PRESSURE TRANSMITTER		
HSD/HQ No.:		Drawing No.:		
0035		13-0		

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이 도면에는 기밀 정보가 포함되어 있으며, HSD의 사전 허가 없이 무단으로 복제, 배포, 또는 다른 용도로 사용될 수 없습니다.

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이 도면에는 기밀 정보가 포함되어 있으며, HSD의 사전 허가 없이 무단으로 복제, 배포, 또는 다른 용도로 사용될 수 없습니다.

 HSD ENGINE	Client : DAEWOO SHIPBUILDING & MARINE ENGINEERING CO.LTD Hull Number : HN 5258 Engine Type : 5S70MC				
Subject : Temperature Transmitter and Switch					
Note :					
Attachments :					
5					
4					
3					
2					
1	TAG NO. OF SENSOR TO BE ADDED (P. 2)	2003.04.15	01/26/01	✓	01/26/01
0	First issued.	2002.11.15	31/2/01	✓	01/26/01
Rev.	Description	Date	Prepared	Reviewed	Approved
Design Team 2 Tel. +82 55 260 6607 Fax. +82 55 260 6640 HSD ENGINE CO., LTD. PLANT 2			Documentation No. EW 02 - 1258		



TEMPERATURE SENSOR LIST

UNIQ 5258

NO	TAG NO.		DESCRIPTION	Q'TY		SENSOR ELEMENT TYPE	TEMP. RANGE (℃)	NORMAL RANGE (℃)	SETTING POINT		TIME DELAY (SEC)	PROTECTION TUBE				CABLE GLAND SIZE	REMARKS
	HSD	AMS CH.		W	S				SLD	AL.		Lmm	Do/D,D	S	E		
1	TE01-05	Q01.1~5	CYL. EXHAUST GAS OUTLET	5		PT100Ω	0~600	320~390	450	430	6~8	200	23/20	PF3/4"	25	#16	HIGH
2	TE12	Q02	T/C EXHAUST GAS OUTLET	1		PT100Ω	"	-	-	350	6~8	200	"	"	"	#16	HIGH
3	TE06-10	Q04.1~5	JACKET C.F.W OUTLET	5		PT100Ω	0~200	80~85	95	90	6~8	80	12.7	"	20	#16	HIGH
4	TE19	E09	FUEL OIL INLET	1		PT100Ω	"	-	-	-	6~8	100	"	"	"	15C	HIGH
5	TE13	J18	T/C BRG.L.O OUTLET-NA	1		PT100Ω	"	-	-	95	6~8	120	"	"	"	15C	HIGH
6	TE20-24	J10.1~5	PISTON COOLING OIL OUTLET	5		PT100Ω	"	50~65	75	70	6~8	120	"	"	"	15C	HIGH
7	TE25	J06	MAIN L.O INLET	1		PT100Ω	"	40~45	60	55	6~8	120	"	"	"	15C	HIGH
8	TE11	P05	SCAV.AIR RECEIVER	1		PT100Ω	"	-	-	55	6~8	200	"	"	"	15C	HIGH
9	TE14-18	P06.1~5	CYL.SCAV.AIR FIRE DETECTION	5		PT100Ω	"	-	120	80	6~8	200	13.8	"	"	15C	HIGH
10	TE26	J17	THRUST PAD SEGMENT	1		PT100Ω	0~200	60~70	80	75	6~8	130	10.0	PF1/2"	"	15C	HIGH

NOTE :



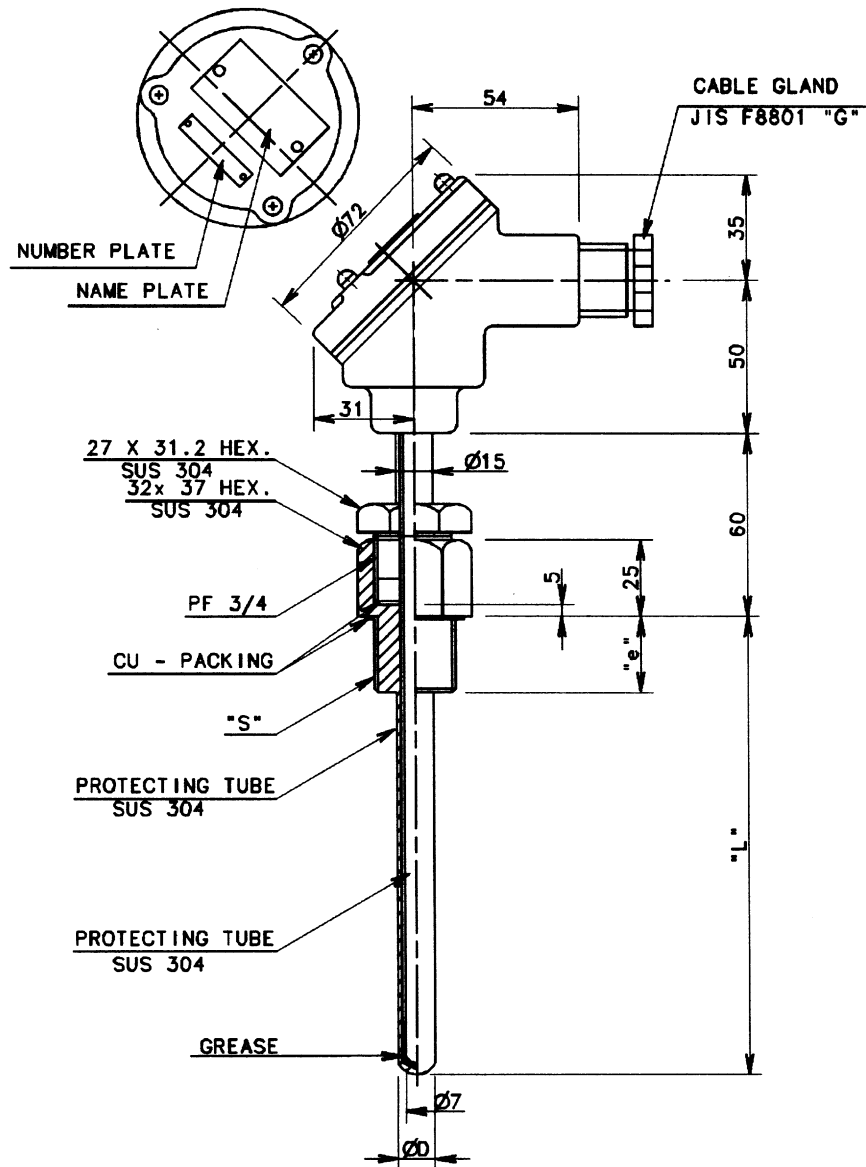
TEMPERATURE SWITCH LIST

UNIQ 5258

[illegible]

NOTE :





No.	Drawing no.	Description	Q'ty	Material	Weight	Size
TERMINAL NAME PLATE						

TABLE FOR APPLICATION CODE

1. STANDARD LENGTH

EXECUT-ION NO.	L	∅D	"e"
L80	80	12.7	20
L100	100		
L120	120		
L150	150		
L180	180	13.8	
L200	200		
L220	220		
L250	250		
L300	300		

2. PITTING THREAD (s)

EXECUT-ION NO.	"s"
01	PF 3/4"
02	PF 1/2"
03	M33 x 2
04	M24 x 2
05	M18 x 1.5

3. ELEMENT TYPE

EXECUT-ION NO.	TYPE
S	SINGLE ELEMENT
D	DOUBLE ELEMENT

EX) L150-01-D ← DOUBLE ELEMENT TYPE
 S=PF 3/4"
 L=150, ∅D=12.7, e=20

9
8
7
6
5
4
3
2
1
0

001024

L.H.KIM

J.I.LEE

K.S.LEE

EXECUTION NO. ADDED.

000705

J.I.LEE

J.I.LEE

K.S.LEE

First issued

Date	Drawn	Chk'd	App'd	Description of Revision	Rev.
Mass (Kg): Material: Ref. licensor drawing no. :					
Projection: Type:					
Scale: Size: Title:					
MS/AS No.: Drawing No.:					

Pt100Ω

TEMPERATURE SENSOR

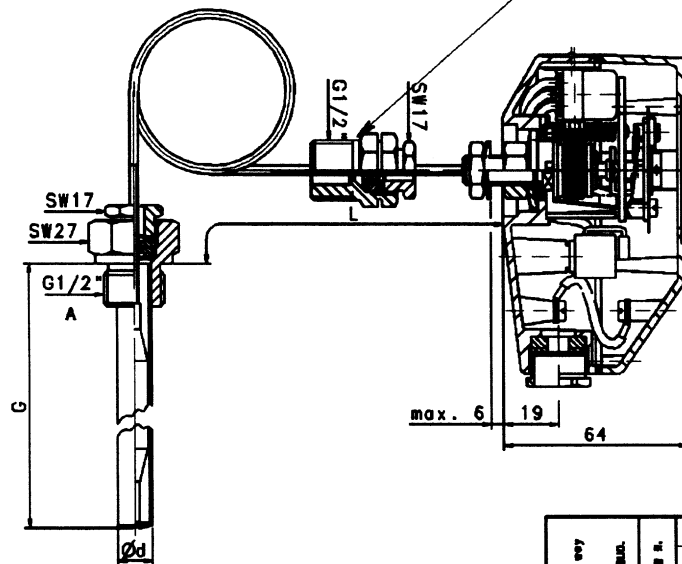
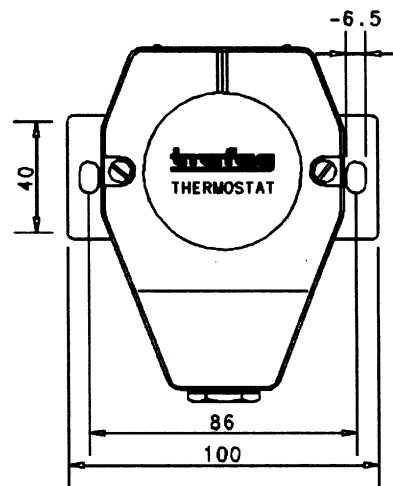
3

7

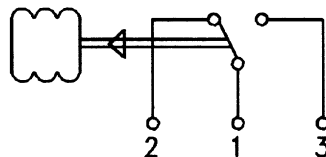
1

This drawing contains confidential information proprietary to MSD and must not be reproduced or disclosed to others or used in any other way without the prior written consent of MSD. In the event of any such use, MSD shall be held harmless.

MSD Drawing - do not correct by hand

A
B
C
D

WHEN A=1,3, DON'T APPLIED CONNECTOR.



Connections

F		3		4		
No.	Drawing no.	Description	Q'ty	Material	Weight	Size

Information

- Salt mist tested
- Oil proof sealings
- Accuracy +2% of full scale
- Vibration resistance to 4g (GL)
- Set point drift due to ambient temperature drift from 20°C to 55°C, smaller than 2.5°C.

Specifications

Range in °C	Sensor max. °C	Switch type No.	Switching diff. K (°C)	Sensor length(G)	Cable length(L)	A
20 ...110	115	23 26	2.0 3.5	G=65 G=110 G=150	L=1000 L=3000 L=5000	1=G3/4" 2=G1/2" 3=M33X2
20 ...150	165	23 26	2.5 5.0			
40 ...300	330	23 26	7.0 7.0			
Max. housing temperature :				-30°... +70°C		
Pressure proofness of protection tube :				max. 25bar		

- Name plate : maker standard
- Language : english
- Calculation cert. & class. cert. to be submitted to HSD QM Team.
- Ordering number : T150-1110-5-2

A(2:2=G1/2")
Cable length(5:L=5000)
Sensor length(110:G=110)
Range(150:20...150)

- This drawing is applied to MAN B&W(For Thrust pad)

This drawing contains confidential information proprietary to HSD and must not be reproduced or disclosed to others or used in any other way in whole or part except as authorized in writing by HSD.
If HSD requires changes to the drawing, the HSD Engineering Department will be notified and the drawing will be revised.
The drawing is the property of HSD and must be returned to HSD upon completion of the project.

2000.07.12	김신우	김신우	김신우	First issued	9
					8
					7
					6
					5
					4
					3
					2
					1
					0
Date Drawn Chk'd App'd Description of Revision					Rev.
Mass (Kg):		Material:		Ref. licensor drawing no. :	
				HSD old drawing no. :	
Projection:		Type:			
Scale:		Size:		Title:	
		A3		Trafag 471.2331	
MS/MD No.:		Drawing No.:		TEMPERATURE SWITCH	
0035					

2D Drawing - do not correct by hand



HSD ENGINE

Client : DAEWOO SHIPBUILDING & MARINE ENGINEERING CO.LTD

Hull Number : HN 5258

Engine Type : 5S70MC

Subject :**P.C.O Non-Flow Switch****Note :**

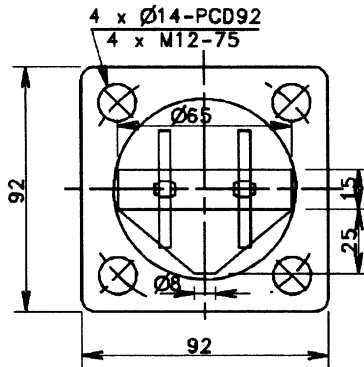
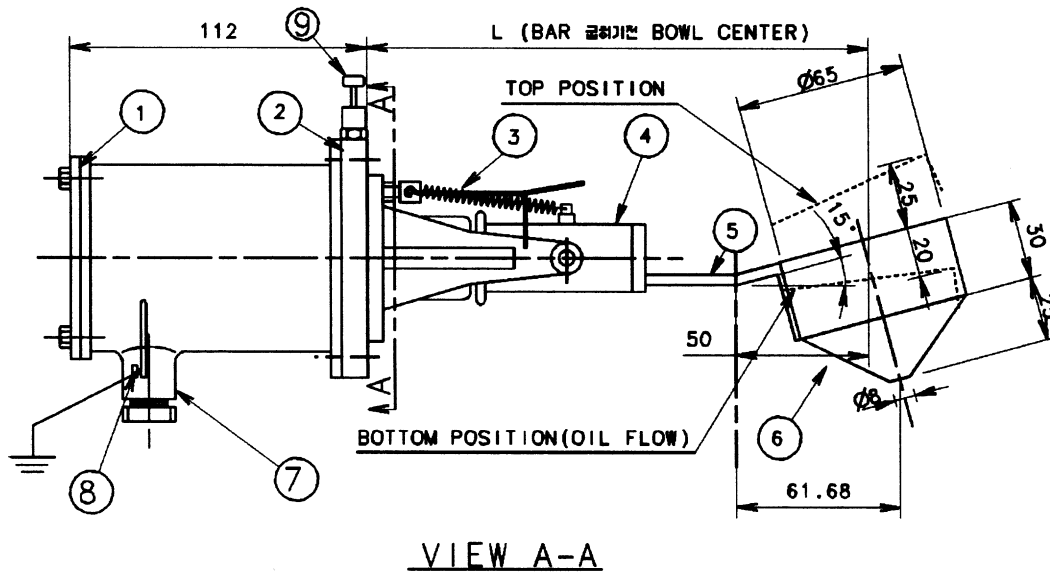
* 1 SET/ EACH CYLINDER

Attachments :

5					
4					
3					
2					
1					
0	First issued.	2012. 11. 15	김정환		01260H
Rev.	Description	Date	Prepared	Reviewed	Approved
Design Team 2 Tel. +82 55 260 6607 Fax. +82 55 260 6640 HSD ENGINE CO., LTD. PLANT 2			Documentation No. EW 05 - 1258		



1. DIMENSIONS



2. SPECIFICATION

1. INSTALLATION : SIDE MOUNTING
2. MAX. TEMPERATURE : 120°C
3. MAX. PRESSURE : 10 BAR
4. CONTACT : 5A, 125V
5. Q'TY :
6. WIRING DIAGRAM

MARK AT NON-FLOW MARK AT NORMAL-FLOW

No.	Drawing no.	Description	Q'ty	Material	Weight	Size
1		COVER	1	ALBC		
2		BODY	1	ALBC		
3		SPRING	1	SUS304		
4		HINGE BODY	1	SUS304		
5		BAR	1	SUS304		
6		BOWL	1	SUS304		
7		CABLE GLAND	1	BC		
8		EARTH BOLT	1	SUS304		
9		TEST LEVER	1	SUS304		
10		GASKET	2	NON-ASBESTOS		

NOTE

1. NECESSARY WEIGHT IT CLOSE CONTACT
B-B IS BOWL VOLUME 80g LUB. OIL
THE SPRING IS TO BE ADJUSTED SO 25g
PLACED IN THE FILLER BOWL JUST KEEPS
IT IS THE BOTTOM POSITION WHEN CONTACT
A-A IS CLOSED

2. "L" LENGTH

-60MC/-70MC/-80MC : 215 mm

-50MC/-90MC : 193 mm

3. 모든 component (body, test lever, gasket, bolt, 볼트와 name plate)를 조립하여 공급할 것.

4. OUTPUT CONTACT : TYPE "S" : SPDT

TYPE "D" : DPDT

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					8
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20020523 M.J.JEON L.H.KIM J.I.LEE First issued					
Date	Drawn	Chk'd	App'd	Description of Revision	Rev.
Mass (Kg):		Material:		Ref. licensor drawing no. :	
				HSD old drawing no. : 123-6000209-2	
Projection:		Type:			
1 2nd					
Scale:	Size:	Title:			
	A3	FLOW SWITCH FOR P.C.O LOW-FLOW			
HSD/HSD No.:		Drawing No.:			
		13-			



HSD ENGINE

Client : DAEWOO SHIPBUILDING & MARINE ENGINEERING CO.LTD

Hull Number : HN 5258

Engine Type : 5S70MC

Subject :

Fuel Oil Leakage Level Switch

Note :

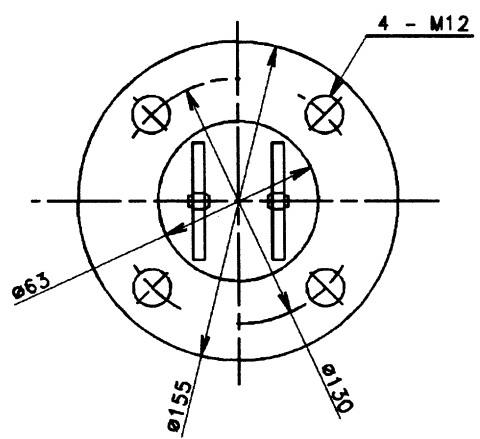
* 1 SET/ ENGINE

Attachments :

5					
4					
3					
2					
1					
0	First issued.	2002.11.15	김기현		07-362
Rev.	Description	Date	Prepared	Reviewed	Approved
Design Team 2 Tel. +82 55 260 6607 Fax. +82 55 260 6640 HSD ENGINE CO., LTD. PLANT 2			Documentation No. EW 06 - 1258		



1



2. SPECIFICATION

1. INSTALLATION : SIDE MOUNTING
2. MAX. TEMPERATURE : 150°C
3. MAX. PRESSURE : 2 BAR
4. CONTACT : 5A, 125V
5. Q'TY :
6. WIRING DIAGRAM

MARK AT LOW LEVEL MARK AT HIGH LEVEL



				9
				8
				7
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				1
				0
000720	이정일	이경선	이경선	First issued
Date	Drawn	Chk'd	App'd	Description of Revision
Mass (Kg):		Material:		Ref. isocomar drawing no. : HSD old drawing no. : 123-6000525-0
Projection:  1 차분		Type:		
Scale:	Size: A3	Title: LEVEL SWITCH FOR F.O LEAKAGE LEVEL		
MS/HSD No.:		Drawing No.:		



Client : DAEWOO SHIPBUILDING & MARINE ENGINEERING CO.LTD
 Hull Number : HN 5258
 Engine Type : 5S70MC

Subject :

Air Cooler Water Level Switch

Note :

* 1 SET/ AIR COOLER

Attachments :

5					
4					
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1					
0	First issued.	2002.11.15	김정호		김정호
Rev.	Description	Date	Prepared	Reviewed	Approved
Design Team 2 Tel. +82 55 260 6607 Fax. +82 55 260 6640 HSD ENGINE CO., LTD. PLANT 2			Documentation No. EW 07 - 1258		

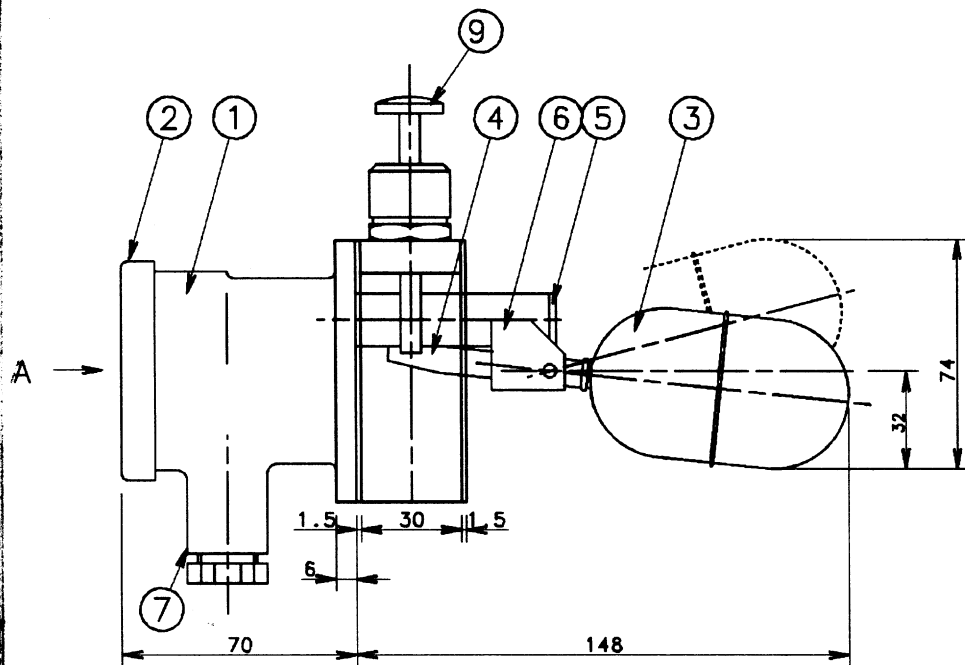


1

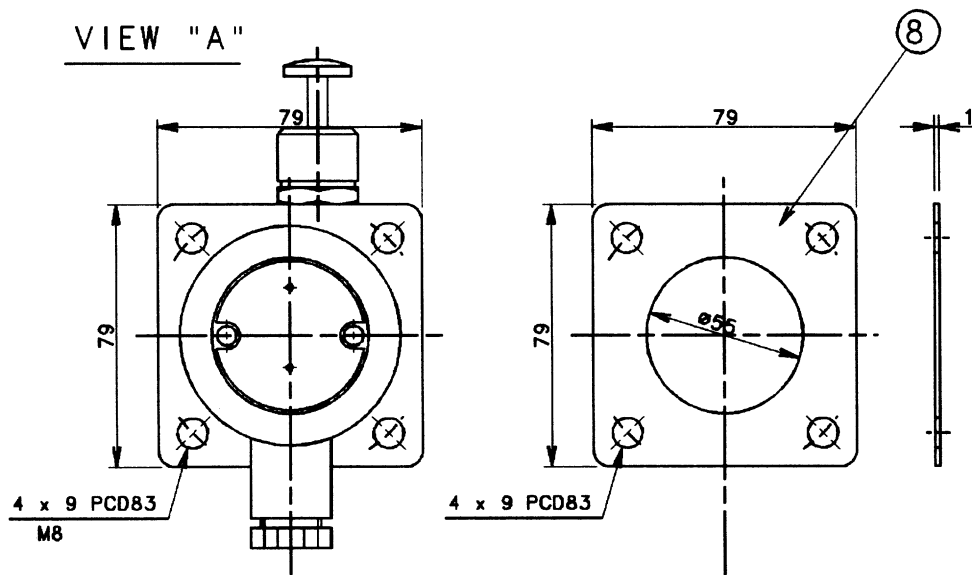
2

3

4



VIEW "A"

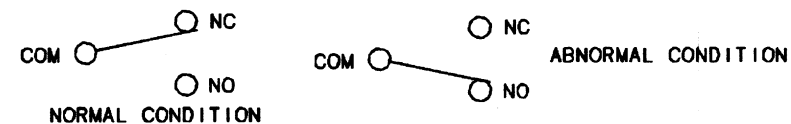


No.	Drawing no.	Description	Q'ty	Material	Weight	Size
1		BODY	1	.C.S		
2		COVER	1	.C.S		
3		FLOAT	1	SUS 304		
4		MAGNET HOLDER	1	SUS 304		
5		REED SWITCH CHAMBER	1	SUS 304		
6		STOPPER	1	SUS 304		
7		CABLE GLAND	1	BS		
8		GASKET	2	NON-ASBESTOS		
9		TEST LEVER	2	BS		

SPECIFICATION

- CONTACT CAPACITY : AC 250V 0.25A, DC 110V 0.25A
- MAX. PRESSURE & MAX. TEMPERATURE : 2.5 BAR AT 135 °C
3.0 BAR AT 100 °C
- COLOR : MUNSELL NO. 7.5 BG 7/2

WIRING DIAGRAM



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					8
					7
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					5
					4
					3
					2
					1
					0
980223	이종일	이종선	이종선	TEST LEVER 추가	1
960502	이종일	이종선	이종선	First issued	0
Date		Drawn	Chk'd	App'd	Description of Revision
Mass (Kg):		Material:		Ref. licensor drawing no. :	
				HSD old drawing no. : 123-6000207-1	
Projection:		Type:			
Scale:		Size:		Title:	
		A3		LEVEL SWITCH FOR A/C WATER DRAIN LEVEL	
MS/HSD No.:		Drawing No.:			
0035		13-		6	



HSD ENGINE

Client : DAEWOO SHIPBUILDING & MARINE ENGINEERING CO.LTD

Hull Number : HN 5258

Engine Type : 5S70MC

Subject :

Turbocharger Tachometer

Note :

* 1 SET/ EACH T/C

Attachments :

5					
4					
3					
2					
1					
0	First issued.	2002.11.15	3/25/02		27369
Rev.	Description	Date	Prepared	Reviewed	Approved
Design Team 2		Documentation No.			
Tel. +82 55 260 6607 Fax. +82 55 260 6640		EW 08 - 1258			
HSD ENGINE CO., LTD. PLANT 2					



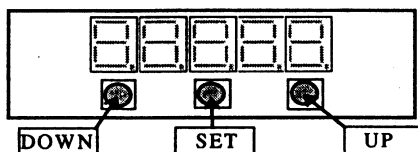
Digital Speed- /Frequency Indicator with one channel MDA 26121015

1. Introduction

The digital panel meter MDA26121015 (1 channel 0...50 kHz) for speed- or frequency measurement is part of a digital panel meter series with direct or programmable indirect process indication. The software allows a menu-guided trouble-free programming and operation. The indicator can be used as speed indicator for the connection of one 3-wire proximity speed probe with PNP or NPN output.

2. Programming of the instrument

Before the instrument can be used it must be programmed acc. to the following instructions (Exception: Instrument has been ordered as pre-programmed version!). The programming is shown in the programme list. You can programme the indicator by means of three push-buttons placed behind the red transparent front panel.



But before you can start with the programming please go on as described.

- Connect the supply voltage acc. to the connection diagram placed on the instrument housing. If the instrument is switched on, after a short start-up routine (lamp and programme test) the normal mode is reached and the actual measured value is displayed.
- By simultaneously pressing of *DOWN* and *UP* button you change from the normal display mode to the programme mode. At first the input of a password for P00 is required.
- The last blinking figure of the P00 indicates that an input is required now. Press *SET* until the display changes from P00 to 00000
- **REMARK:** Please note that you can always reach the value level from PXX-level by pressing *SET* (long press). After setting a value for PXX, you reach the next PXX by pressing *SET* again.
- Input of values can be set at the blinking figure only by pressing the *DOWN* or *UP* button. If the blinking figure has been changed to your needs you can reach the next figure by shortly pressing *SET*. Now the next figure is blinking and can also be changed as described before.
- If for P00 the right password 09876 has been inserted and *SET* is pressed (long) the display changes to the beginning of programme list e.g. P01.
- Now all programme steps can be checked and changed if necessary. The available programme steps are listed in the enclosed programme list.
- It is also possible to choose directly a programme step by inserting the needed PXX number (but only after passing through the password routine successfully). It's also not necessary to set all PXX-values if the default values already suits to you.
- If programming is finished you can leave the program steps by pressing *DOWN* and *UP* simultaneously. Now you are back again in the normal measuring mode.
- If all connections are made ACC. to the connection diagram, the unit is ready for operation.

ATTENTION: Please pay attention to the rules for a correct installation as follows.



3. Instrument mounting and installation requirements

The instrument is assigned to a fixed mounting in a proper panel cut-out. Please follow the enclosed points 1. ... 5. to ensure a good and trouble-free operation.

WARNING: Instrument must be mounted installed and connected by skilled and qualified electricians only.

DANGER: If you don't follow the enclosed instructions carefully
you risk an electric shock which can be dangerous to life !



1. Use for the measuring signal input(s) shielded cables only and connect the shield at the connection point for shields at the instrument only.
2. Connect the instrument with a $\varnothing 2.5 \text{ mm}^2$ earth line as short as possible (preferably max. 20 cm) to a central earth point.
3. **ATTENTION:** Connect or disconnect the terminals (pluggable connector) at the backside of the instrument, only if power supply voltage is off!
4. The pluggable connector allows an easy installation or exchange of the instrument if necessary (but take care of 3.)
5. Please make sure that the power supply voltage which shall be used, corresponds with the voltage marked on the instruments connection diagram.



4. Programme list

Pxx-Nr.	Basic values Ex factory	Selection	Designation/Information	Your values or settings:
P00	09876	09876	Password	
Adjustment of the input signal(s) to the required display information				
P03	00060	= 255	Pulses per revolution (for example number of teeth of the pulse wheel)	
P16	01000	=99999	Upper switch point relay	
P17	00900	=99999	Lower switch point relay	
P24	00000	00000	Relay acts as N.O.	
		00001	Relay acts as N.C.	
Limits for display indication and analogous output (Output : Option)				
P32	00000	=99999	Indication or process value at input frequency = 0Hz	
			Corresponds also to the value for 0V, 0mA or 4mA acc. to settings	
P33	05000	=99999	Indication or process value at max. input frequency see P34	
			Corresponds also to the value for 10V or 20mA acc. to settings	
P34	05000	=99999	Max. Speed or frequency for the indication in the display	
P38	00000	00000	Selection of current output 4...20mA	
		00001	Selection of current output 0...20mA	
P51	00500	0100 - 09999	Display refreshment in ms	

5. Failure Indications

If during normal operation the info E05 is displayed, the speed sensor delivers no pulses any longer. Please check and correct the speed probe.

6. Technical data

Standard data:

Power supply: 24VDC +30%/-25%
 Power consumption: max. 5 W
 Over current protection: to be made by external fuse 1A delayed action
 Operating temperature: 0°C ... 60°C
 Storage temperature: -10°C ... +80°C
 Relative humidity: < 90% , non condensing
 Protection acc. To DIN 40050: IP64 Front cover against housing
 IP00 Housing and Connections
 Connection: pluggable screw connection row with 15 poles
 Cross section for connection wires: 0,2-2,5mm² (IEC 947-7-1)
 Housing dimensions: 96 x 48 mm, L= 127mm, acc. DIN 43700
 Weight: ca. 400g
 EMC Requirements: EN 50 081-1, EN 50 082-2 and NSR EN 60010

Display:

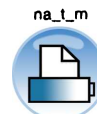
Indicators: 7-segment, LED
 Segment height: 14,2mm
 Colour: red
 Number of digits: 5

Speed probe input:

Quantity: 1
 Input frequency range: 0 ... 50kHz, lowest measurable frequency: 1Hz
 Connectable probes: - 3-wire speed probe (NPN/PNP)
 Available aux. voltage: +15VDC, max.30mA / 8V (R=1k)
 Measuring principle: Periodic time measurement above some periods based on the actual input frequency
 Failure: < ± 0,05% of measured value ±1 digit

Relay output:

Relay type: N.O. or N.C. function free programmable
 Max. switch load: 60W, 125VA
 Max. switch voltage: 220VDC, 250VAC
 Max. switch current: 2A DC/AC
 Max. operating current: 3A DC/AC
 Min. switch cycles: 10⁶
 Contact material: Gold plated silver contacts
 Switching indication: Through red 3mm LED



Analogue output

Current output:

Range:

0 ... 20mA (adjustable) or

4 ... 20mA (adjustable)

Max. burden:

500Ω

Resolution:

10 Bit D/A transformation

Linearity failure:

< ±20μA (at constant environmental conditions)

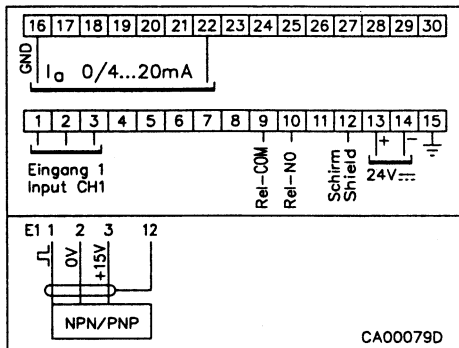
Max. Reaction time *:

300ms

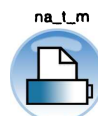
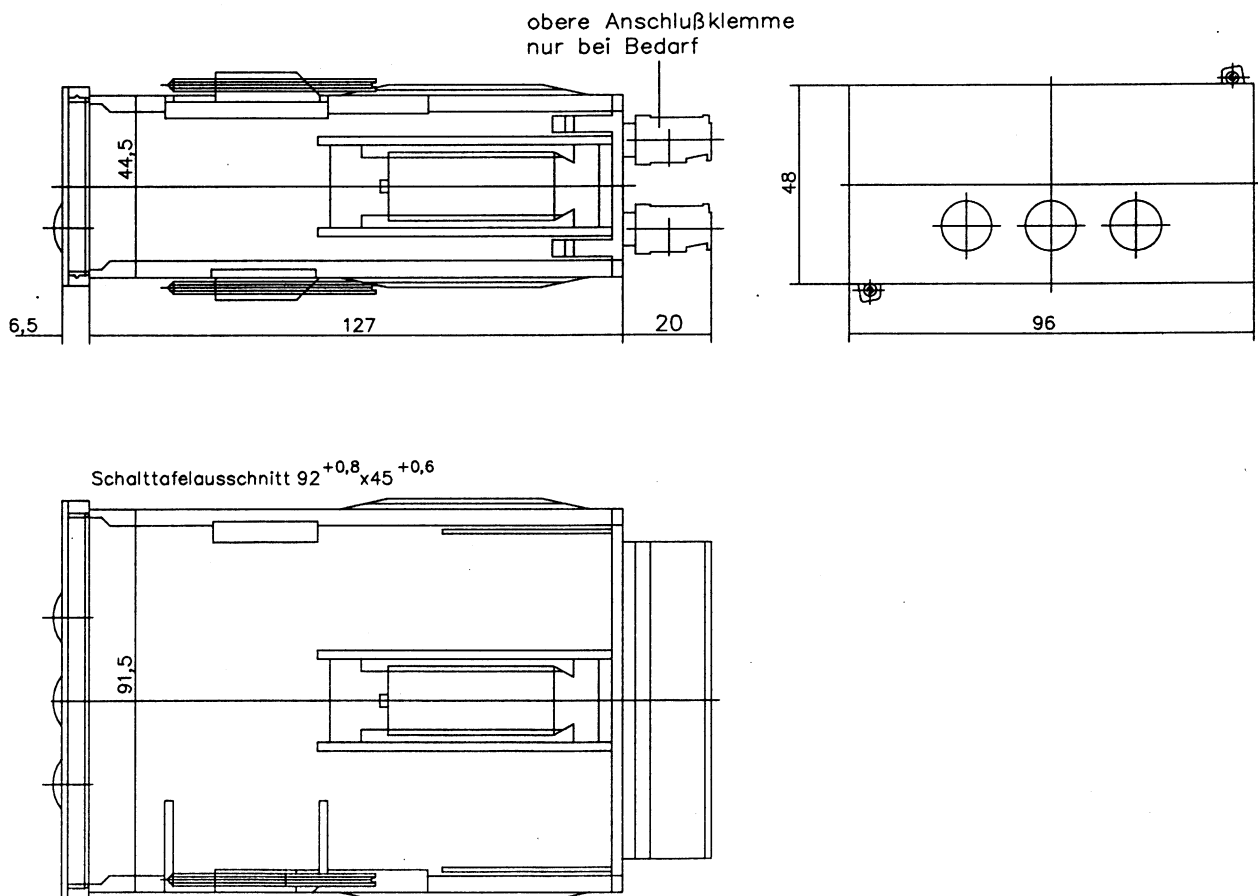
Type Approval

GL and ABS

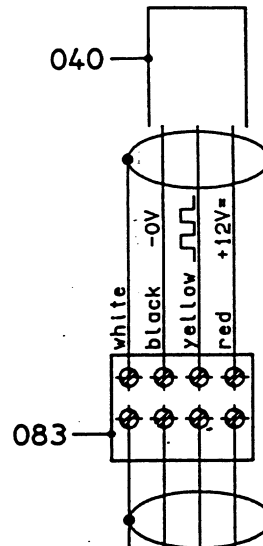
Connection diagram:



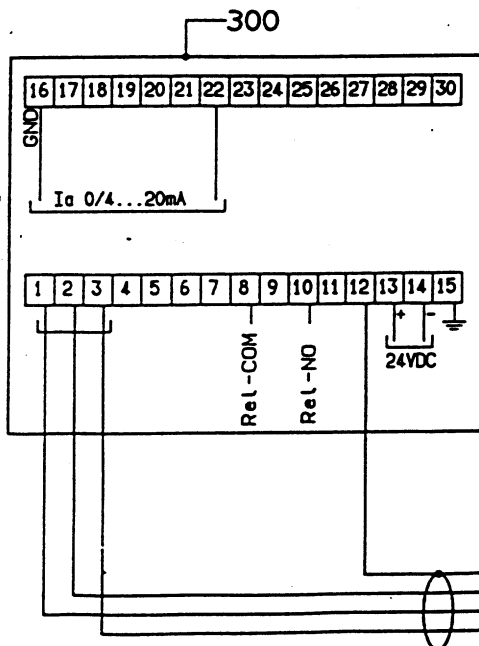
Housing dimensions:



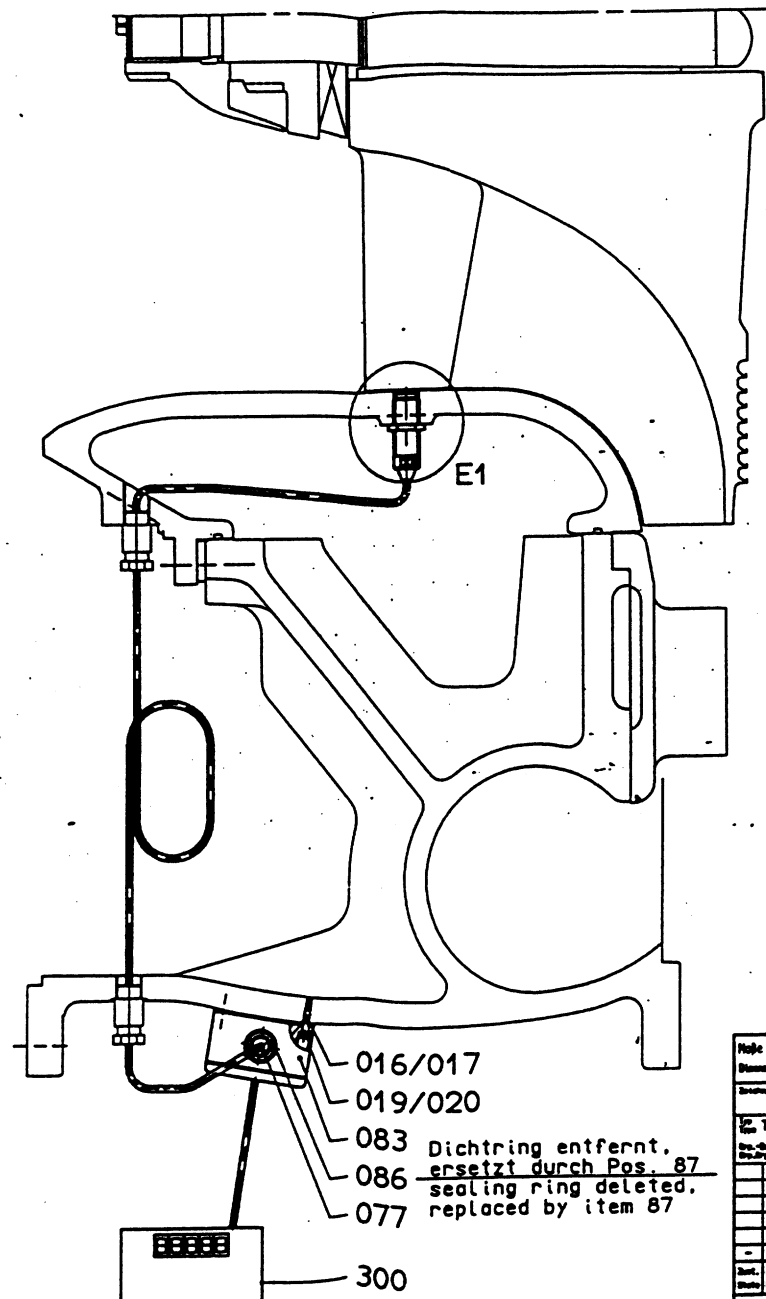
040



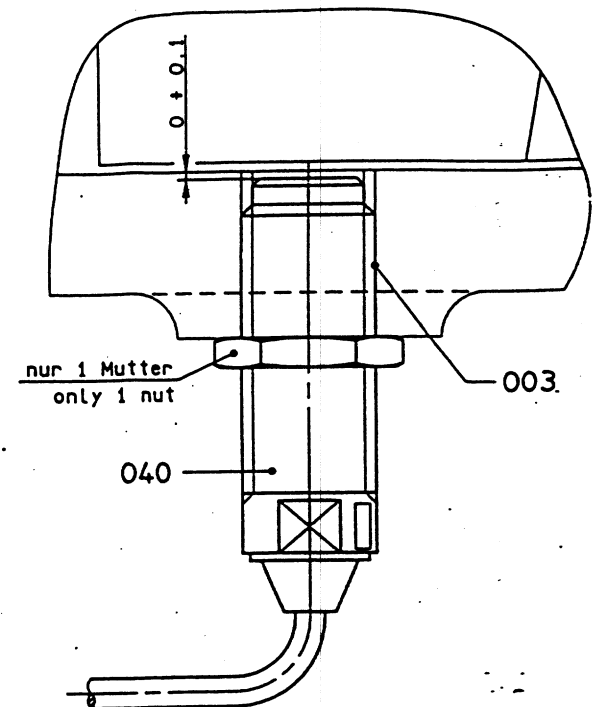
~~Abgeschirmte Leitung 3x0,75mm²
keine MAN B&W Diesel AG Lieferung
screened cable 3x0,75mm²
no MAN B&W Diesel supply~~

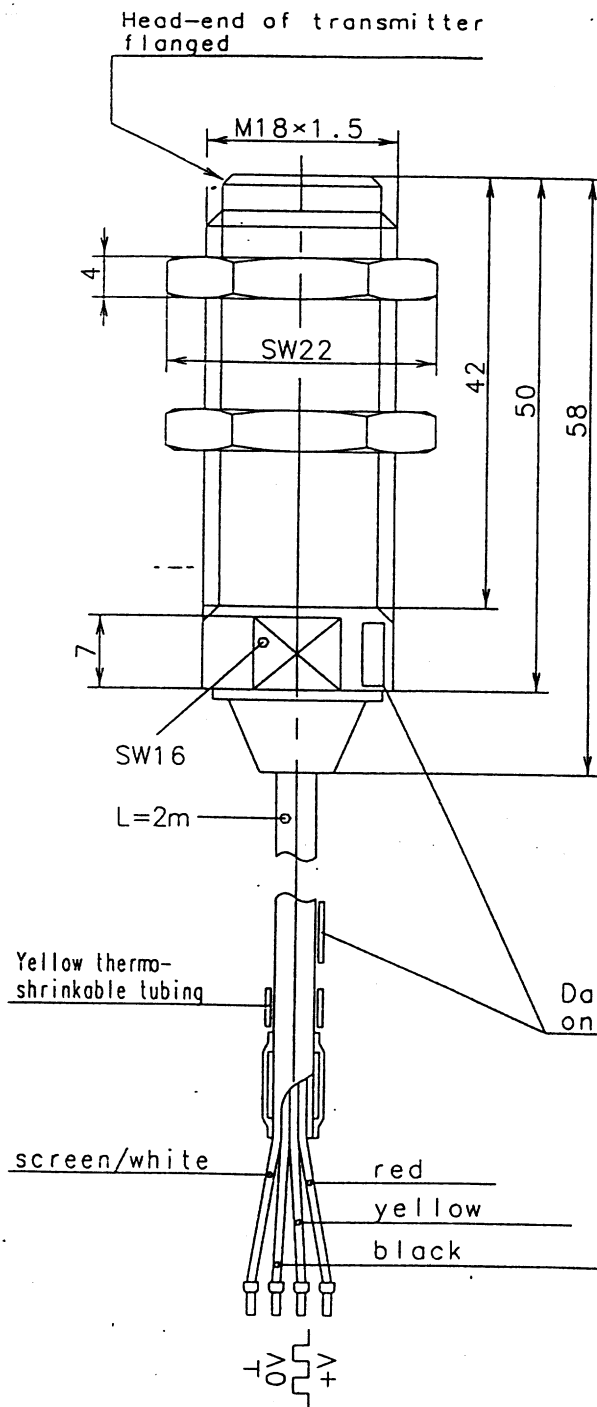


installation of speed transmitter 1:2.5



nur 1 Mutter
only 1 nut

[illegible]



Technical data:

Power supply
Current consumption
Signal output

Frequency range
Insulation
Protection type
Pole wheel-transmitter-
distance
Working temperature
Housing

Connection cable

HF-transmitter with amplifier DSH1840.01SHV

10...30V DC
max. 8mA bei 12V

rectangular voltage from push-pull switch step
short-circuit-proof and protected against confusing the poles

0.1Hz...20kHz

Cable screening galvanic insulated from housing and electronic
Head and cable side IP67

0.2...2.0mm (Aluminium-pole wheel)
-30...+125°C

Aluminium-alloy, black anodised, sensitive to percussion,
resistant to chemicals and aging

Teflon cable 3×0.24mm² screened, length 2m, cable jacket white

ZONE	LTR	DESCRIPTION		DRAWN	M.Q.E	APPRO
REVISIONS						
SIGNATURES		MO-DA-YR		 SAMSUNG Aerospace Industries, Ltd. NA-GENERAL IMPULSE TRANSMITTER DSH1840.01SHV		
DRAWN 이성민		05-31-99				
M.Q.E						
APPRO. 이성민		5/31/99				
MATERIAL						
Dimensions without tolerance indication: B, medium acc. DIN 7168 Edges acc. DIN 6784 Surface acc. DIN ISO 1302		REF DWG NO. 11.56252-0082		DWG NO. TC562-ALL-S02		REV.
		SCALE 2 / 1		   		



HSD ENGINE

Client : DAEWOO SHIPBUILDING & MARINE ENGINEERING CO.LTD

Hull Number : HN 5258

Engine Type : 5S70MC

Subject :**Bearing Temperatrue Sensor****Note :****Attachments :**

5					
4					
3					
2					
1	THIS NO. OF SENSOR TO BE ADDED (P.2)	2003.04.15	5/362	5/362	5/362
0	First issued.	2002.11.15	5/362	5/362	5/362
Rev.	Description	Date	Prepared	Reviewed	Approved
Design Team 2		Documentation No.			
Tel. +82 55 260 6607 Fax. +82 55 260 6640		EW 09 - 1258			
HSD ENGINE CO., LTD. PLANT 2					



M/E BEARING TEMPERATURE SENSOR LIST

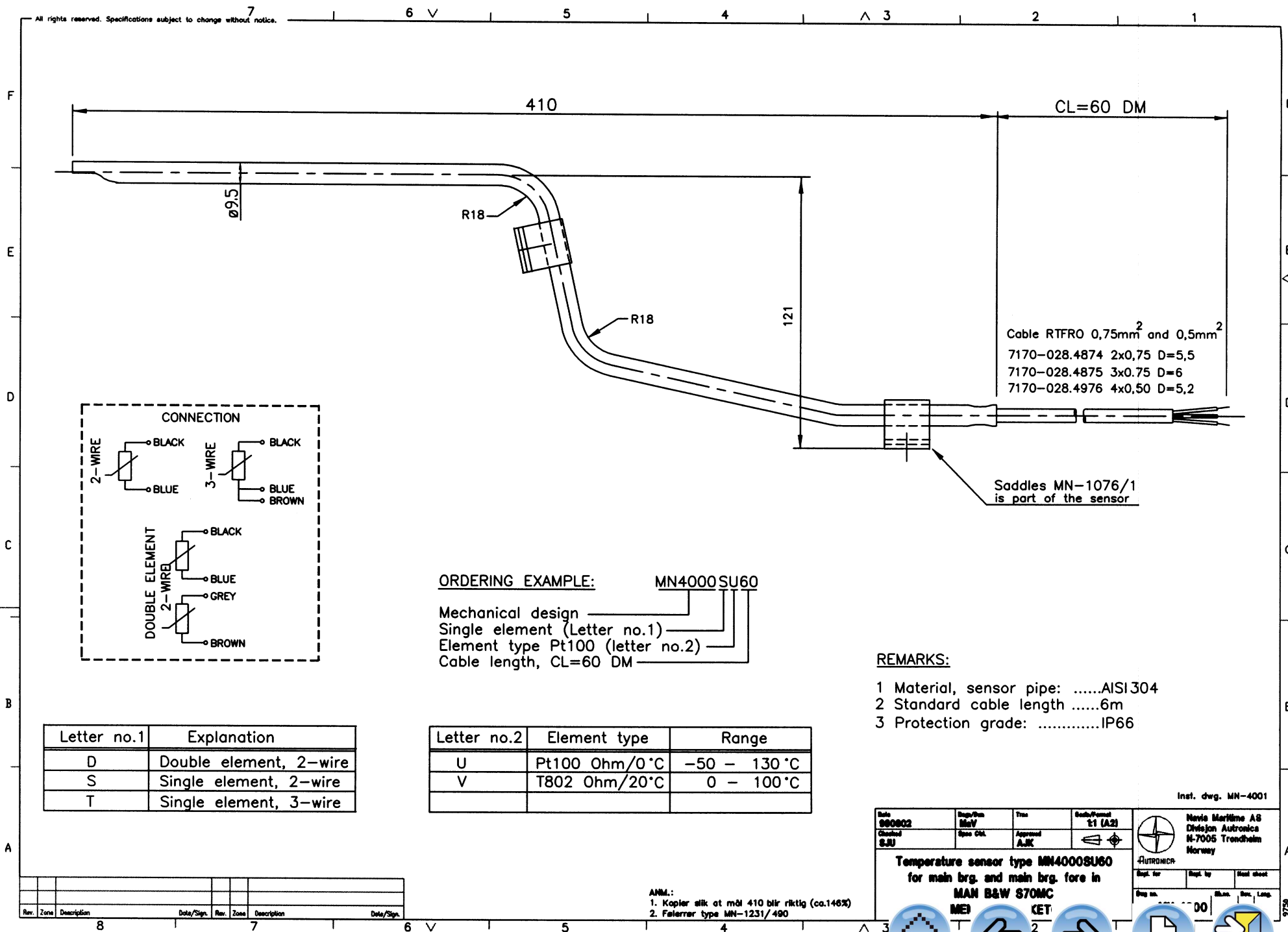
UNIQ 5258

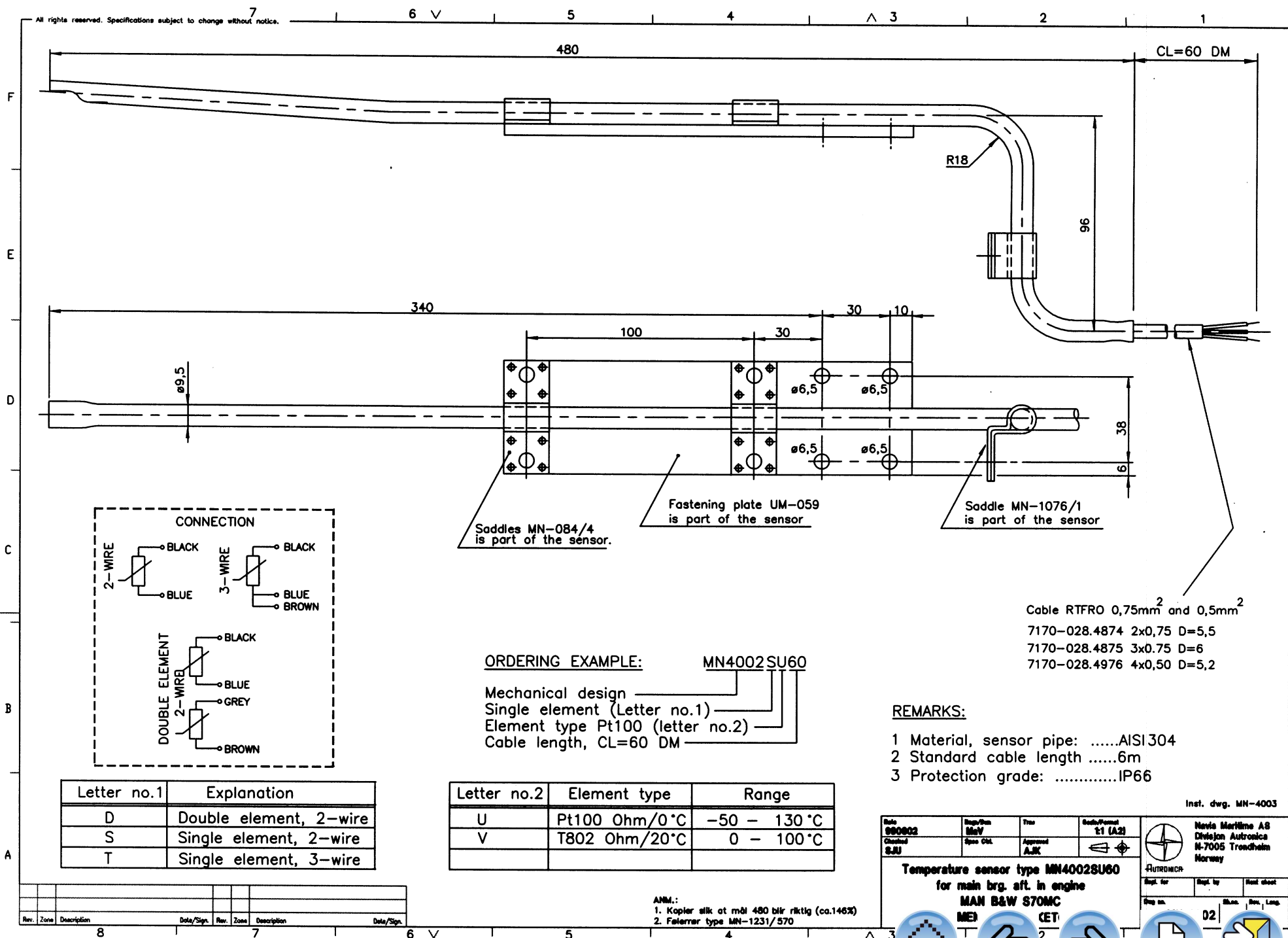
[illegible]

NOTE :

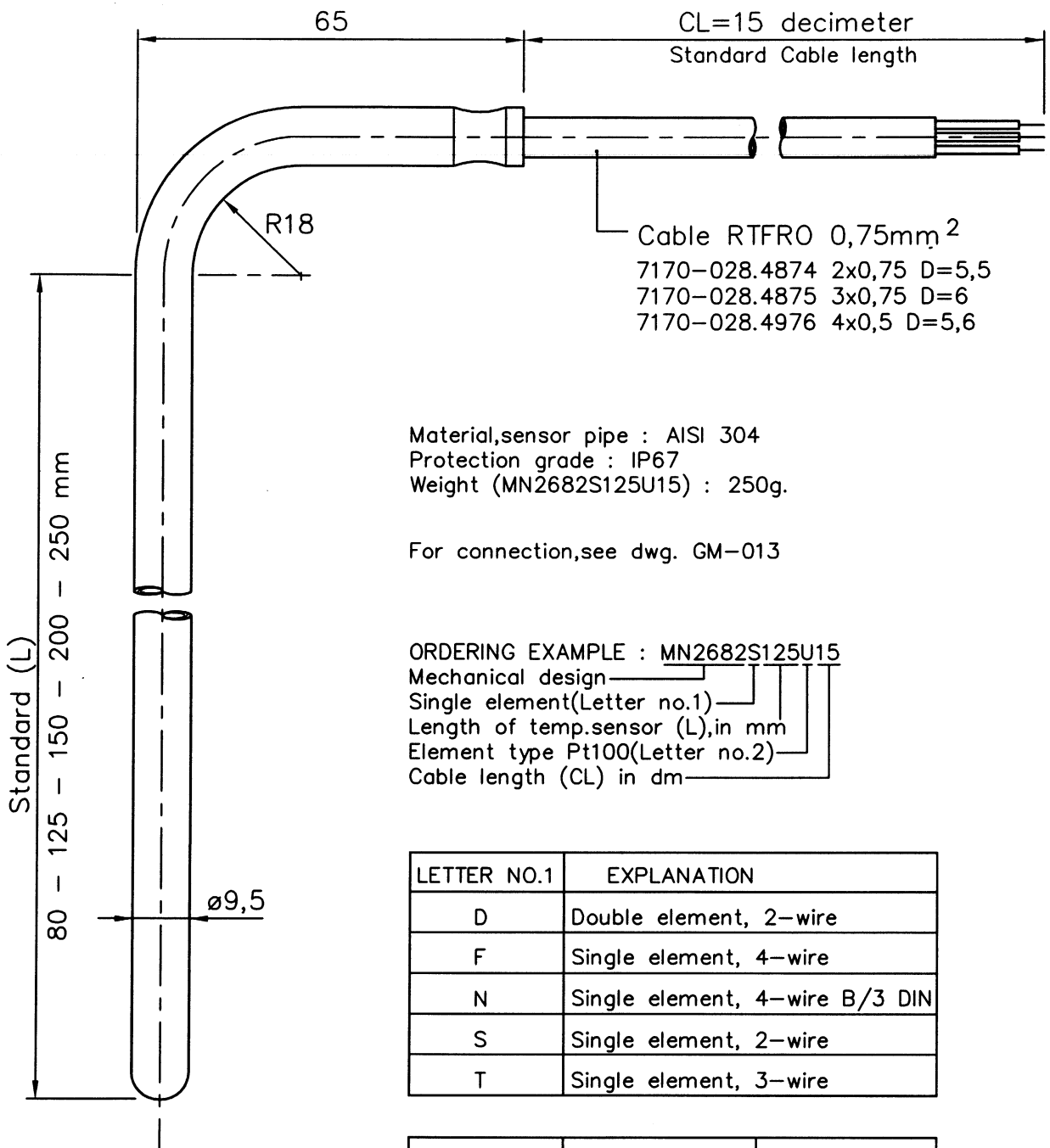


4





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LETTER NO.1	EXPLANATION
D	Double element, 2-wire
F	Single element, 4-wire
N	Single element, 4-wire B/3 DIN
S	Single element, 2-wire
T	Single element, 3-wire

LETTER NO.2	ELEMENT TYPE	RANGE
C	Ni100	-50-130 °C
M	Pt100ohm/0 °C	-50-130 °C
U	Pt100 ohm/0 °C	-50-130 °C
V	T802 ohm/20 °C	0-100 °C

B	Ny kabel 170192 A.K.	D	Kabel ø5,2 -> 5,6, 97-06-27, ELS/BSw
A	Omtegn.letter inn, 14.03.89, A.K./O.L.	C	7170-028.4976 in 970408AJK/ELS
Rev.	Zone	Rev.	Zone
	Description		Description
	FLUTRONIC		
	Date/Sign.		Date/Sign.

Date 13.01.89	Dsgn/Dwn AJK/OL	Trac	Scale/Format 1:1
Checked J.S.	Spec Ctrl.	Approved AJK	

Temperature sensor type MN2682--

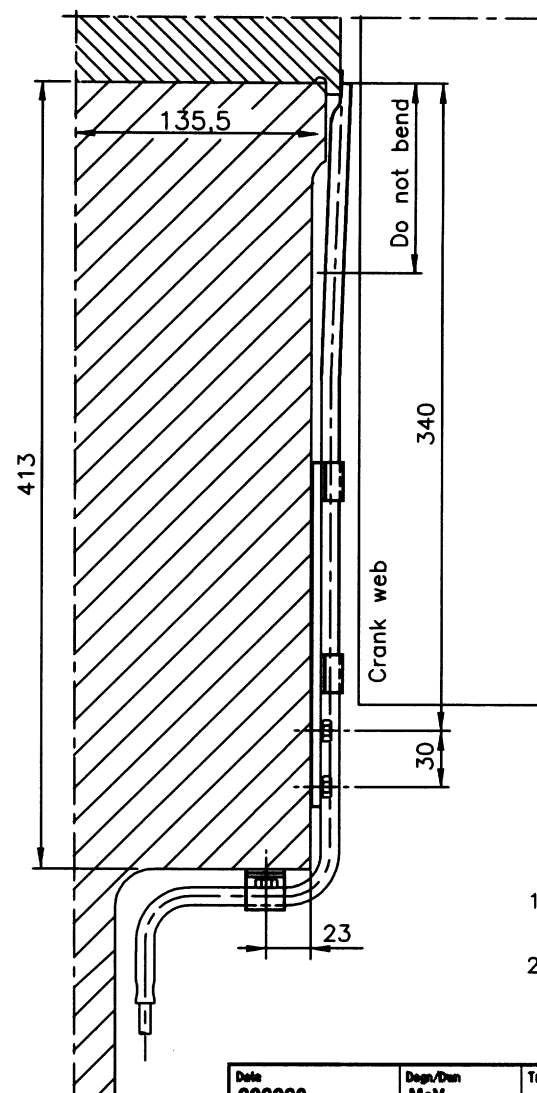
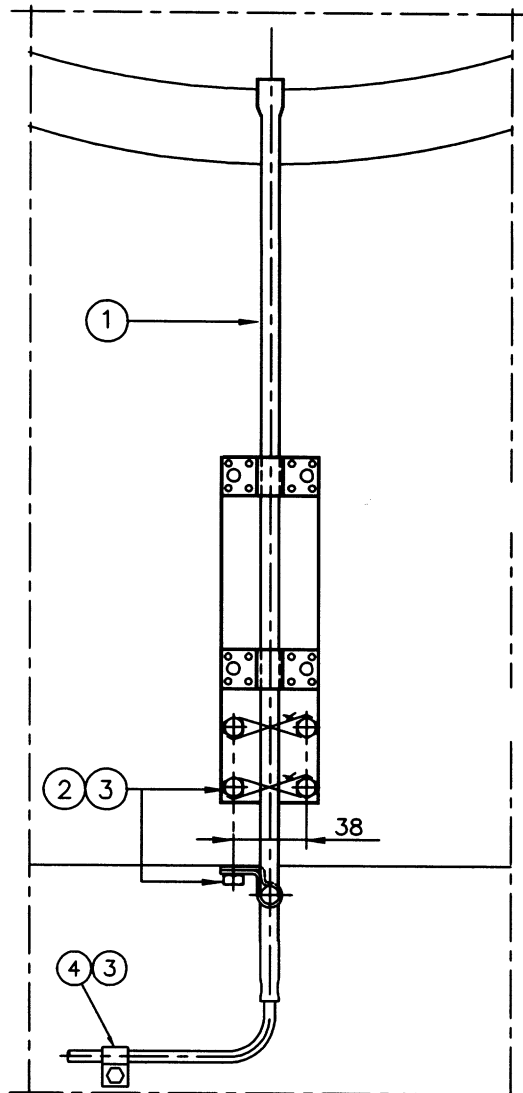
DIMENSIONAL SKETCH



KMSS AS
Ship Control
N-7005 Trondheim
Norway

Repl. for	Repl. by	Next sheet
Dwg no. MN-2682	Sh.no.	Rev. Lang. D





REMARKS

1. The oil stream from the bearing must flow on the sensor tip.
2. Check that there is clearance between the crank and the sensor.

20	4	Fastening equipment	UT-283
2,2m	3	Lock wire $\phi 1$	6261-001.0100
5	2	Screws M6x12	UTN016/6H
1	1	Temperature sensor	MN4002SU60
Qty.	Pos.	Name, type, dim	Article no. ,spec.

Date 990902	Desn/Dwn MaV	Trac	Scale/Format
Checked SJU	Spec Ctl	Approved AJK	
Installation of temperature sensor type MN4002SU60 in main brg. aft. in engine MAN B&W S70MC SYSTEM LAY-OUT			



Navia Maritime AS
Divisjon Autronica
N-7005 Trondheim
Norway

AUTRONICA

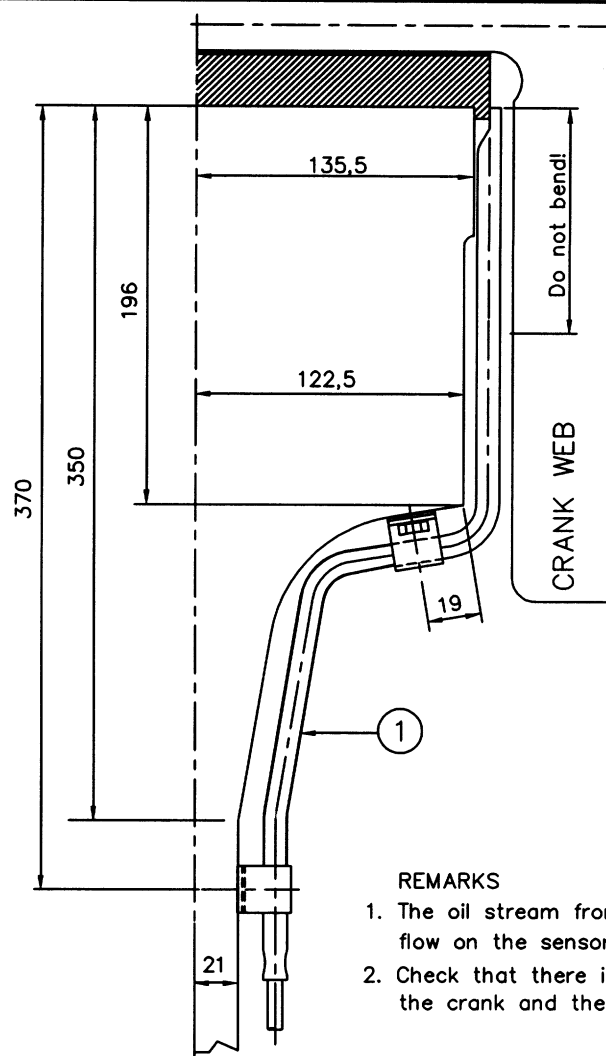
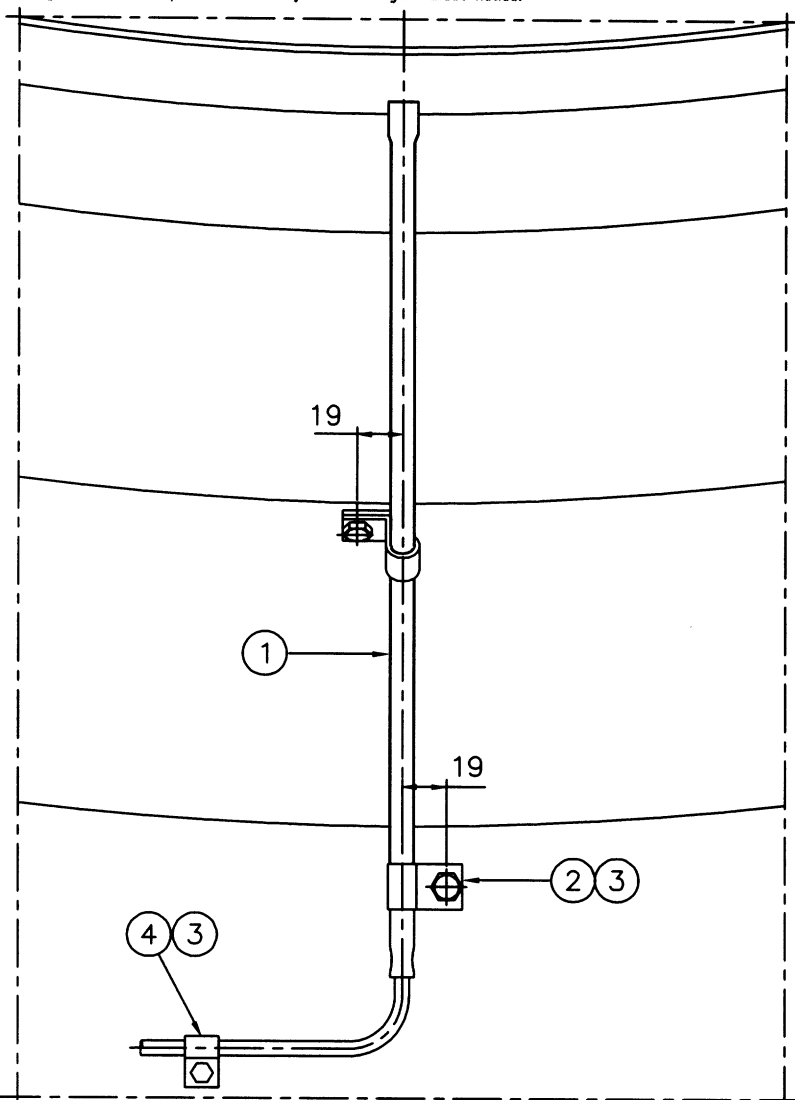
Repl. for Repl. by Next sheet

Dwg no. Sh.no. Rev. Lng.

MN-4003

9750

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REMARKS

1. The oil stream from the bearing must flow on the sensor tip.
2. Check that there is clearance between the crank and the sensor.

20	4	Fastening equipment	UT-283	
2m	3	Lock wire $\phi 1$	6261-001.0100	
2	2	Screws M6x12	UTN016/6H	
1	1	Temperature sensor	MN4000SU60	
Qty.	Pos.	Name, type, dim	Article no. ,spec.	Remarks

Date
990902

Checked
SJU

Design
MaV

Spec Ctl

Trace

Approved
AJK

Scale/Format



Navia Maritime AS
Divisjon Autronica
N-7005 Trondheim
Norway

Installation of temperature sensor type
MN4000SU60 in main brg. and main brg. fore
in engine MAN B&W S70MC
SYSTEM LAY-OUT

Repl. for

Repl. by

Next sheet

Dwg no.

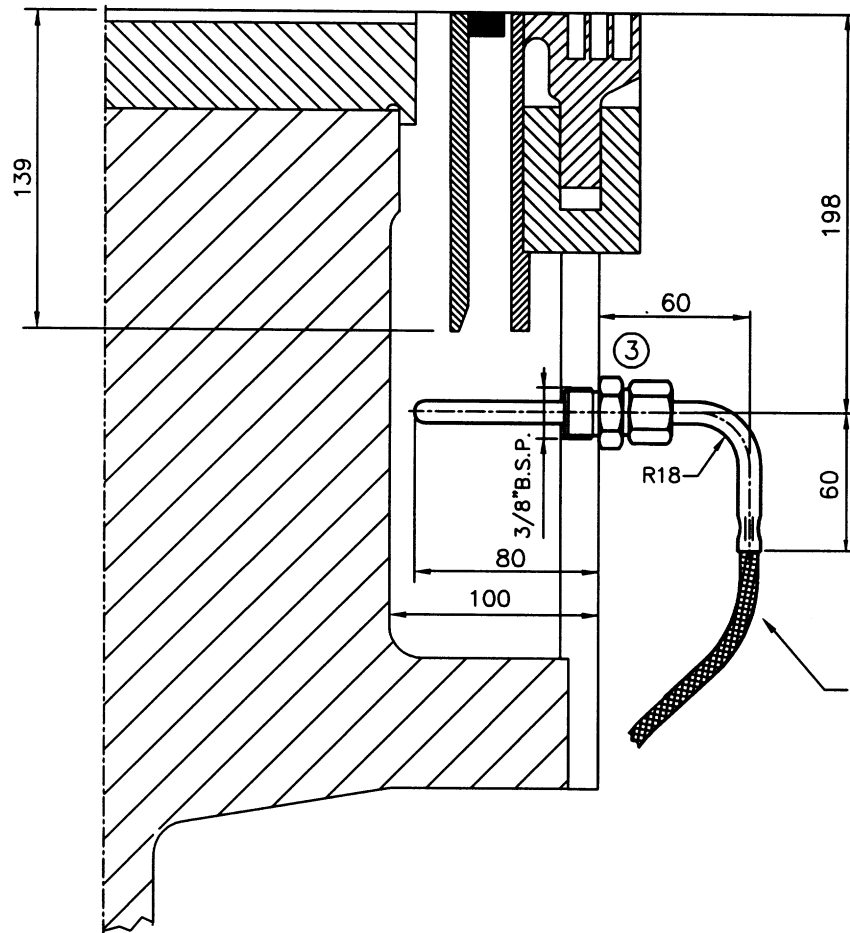
Sh.no.

Rev. Long.

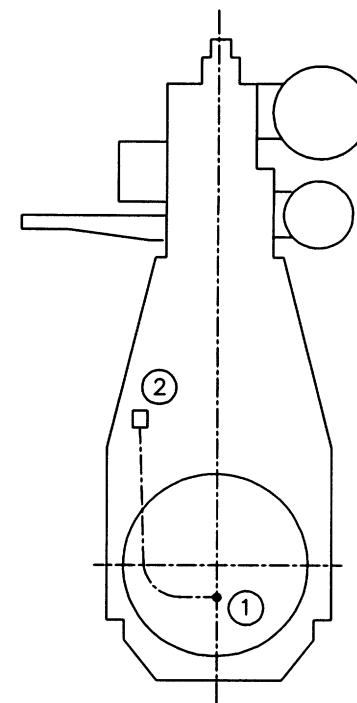
MN-4001

9750

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Cable RTFRO 0,75 mm²
 7170-028.4874 2x0,75 D=5,5
 7170-028.4875 3x0,75 D=6



Remark:1: The oil stream from the bearing must flow on the sensor tip.

1	3	Coupling	FM9,5-B38	
1	2	Connection box	UG-396	
1	1	Temperature sensor	MN2682S115U30	
Qty	Pos	Name, type, dim.	Article no., spec.	Remarks
Date	110293	Desgn/Dwn AK	Trac	Scale
Checked	J.Sk.	Spec Ctrl.	Approved SJU	
Installation of temperature sensor type MN2682S115U30 for thrust radial brg. MAN B&W S70MC SYSTEM LAY-OUT				Autronica AS P.O.Box 3010, N-7002 Trondheim Norway Autronica
Ref.		Next sheet		
Dwg no.		Shno, Rev.		
MN-3484		A		

Rev.	Zone	Date/Sign.	Rev.	Zone	Description	Date/Sign.
A		6581->FM9,5-B38 970912 AJK/				





Client : DAEWOO SHIPBUILDING & MARINE ENGINEERING CO.LTD
Hull Number : HN 5258
Engine Type : 5S70MC

Subject :

Axial Vibration Monitoring

Note :

Attachments :

5					
4					
3					
2					
1	<i>MANUAL TO BE ADDED</i>	2003.4.15	2/28/2	2/28/2	2/28/2
0	First issued.	2002.11.15	3/2/2	3/2/2	3/2/2
Rev.	Description	Date	Prepared	Reviewed	Approved
Design Team 2 Tel. +82 55 260 6607 Fax. +82 55 260 6640 HSD ENGINE CO., LTD. PLANT 2			Documentation No. EW 10 - 1258		

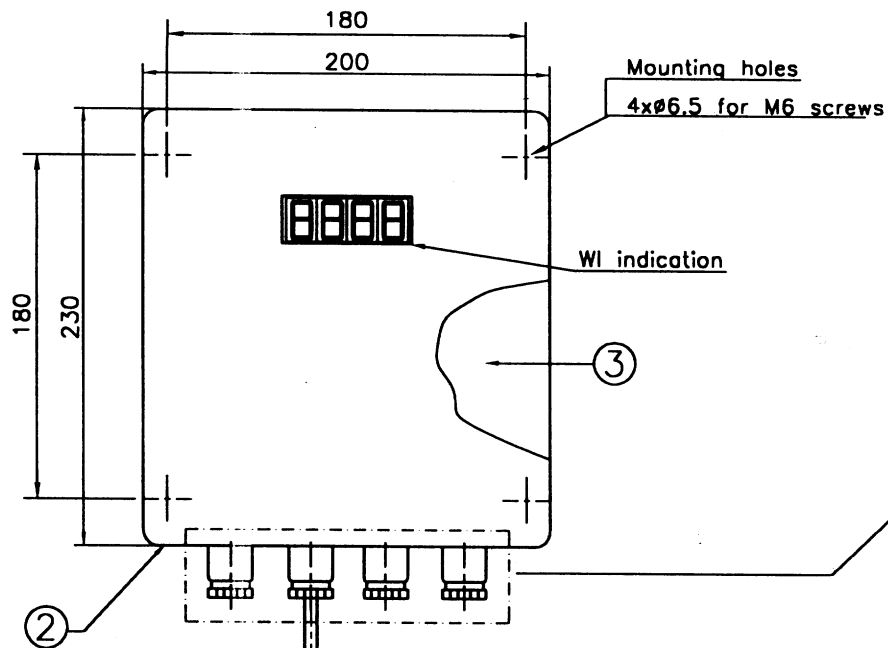


AXIAL VIBRATION MONITOR

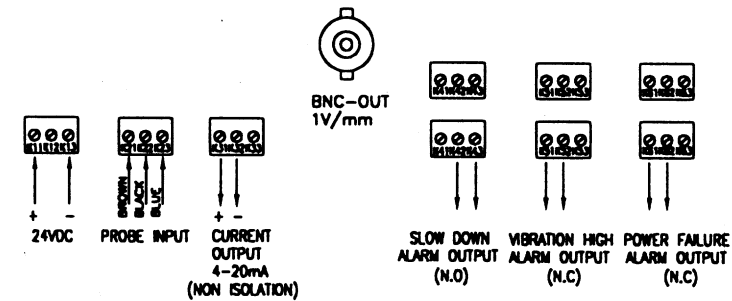
UNIQ 5258

UNIT: mm

[illegible]



WARNING : BNC shield is connected to ground of power supply.(24V DC)
Connect only floating measuring equipment



No.	Description	Material	Q'ty	Remarks
1	SENSOR ASS'Y		1	SHT. NO.06
2	CASE	AL.	1	
3	PRINT CIRCUIT BOARD	EPOXY	1	

Cable length
MAX. 10M
(CABLE OVERALL DIA : Ø5)

APP.	D. K. LEE	△	TITLE	AX.VIBR.MONITOR OUTLINE	KOMEKO KUM OH MACH.& ELEC.CO.,LTD.
CHK.		△			
CHK.		△			
DWG.	S.J.JEON	△	UNIT:	mm	NG.
DATE	08.OCT.01	△	SCALE:	N/	

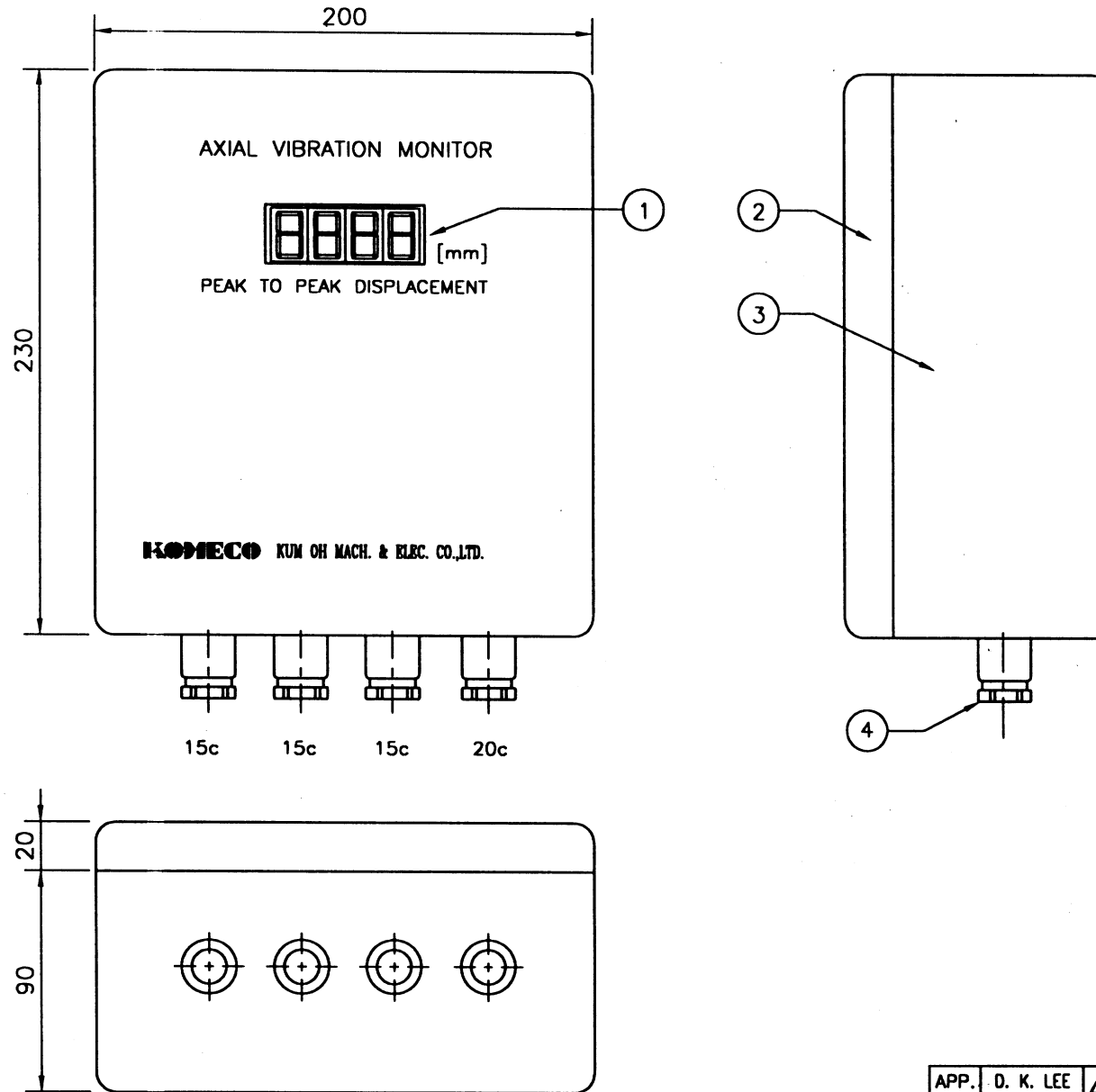
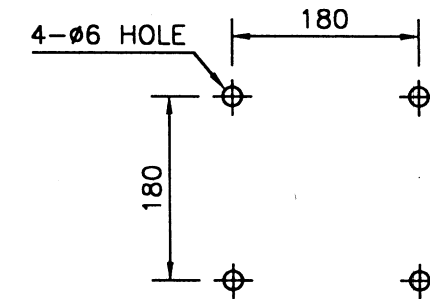


ITEM	DESCRIPTION	MATERIAL	Q'TY	REMARKS
1	WINDOW	ACRYL	1	
2	COVER	AL-SI12	1	
3	BODY	AL-SI12	1	
4	CABLE GLAND	BRASS	3	JIS15cX3
			1	JIS20cX1

NOTE

1. MAKER : KOMEKO
2. TYPE : AVM-KM30-01
3. PROTECTION : IP65
4. PAINT COLOR : GREY

MOUNTING DIMENSION



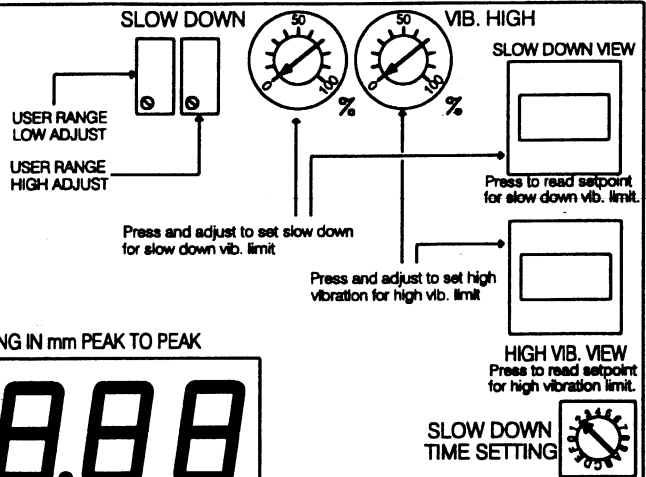
APP.	D. K. LEE	△	TITLE	AX.VIBR.MONITOR CONTROL BOX	KOMEKO KUM OH MACH.& ELEC.CO.,LTD.
CHK.		△			
CHK.		△			
DWG.	S.J.JEON	△	UNIT: mm	REV NO	DWG. NO
DATE	08.OCT.01	△	SCALE: N/		



CONNECTION AND ADJUSTMENT

AVM-KM30

Ver 2.01. 2000/9/29. KOMEKO.
All rights reserved.



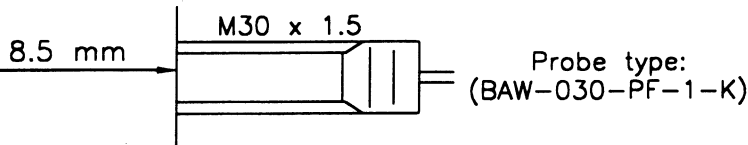
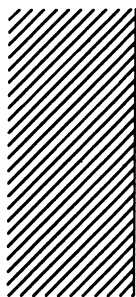
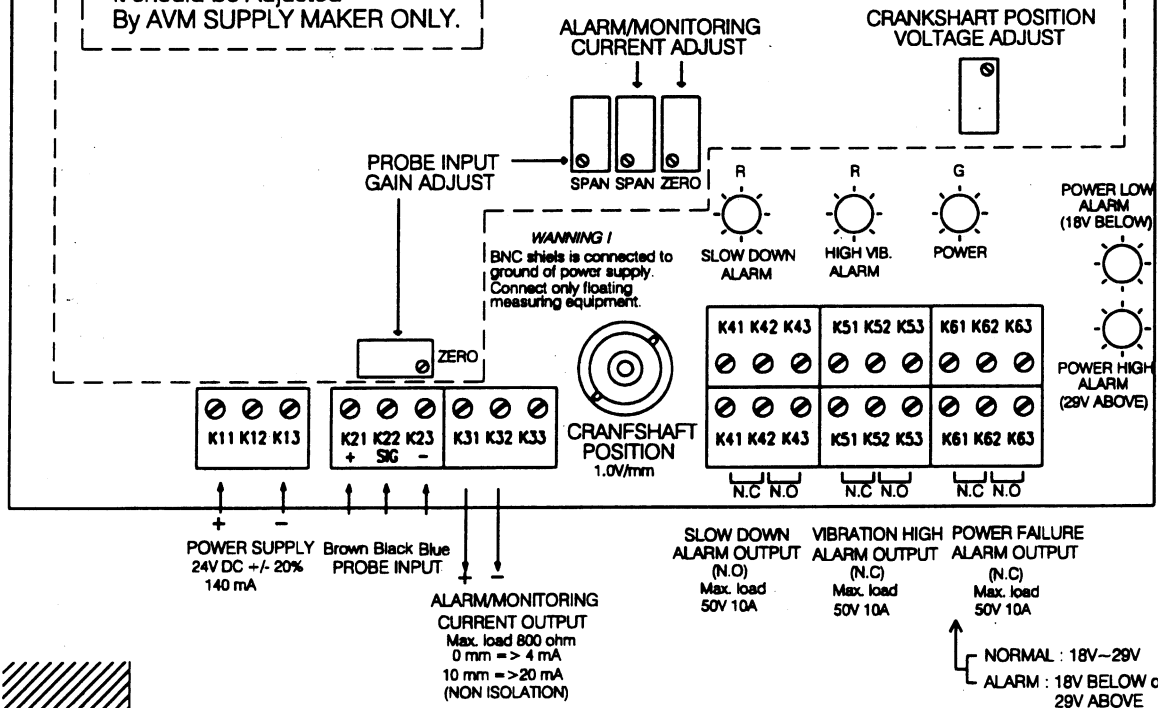
READING IN mm PEAK TO PEAK



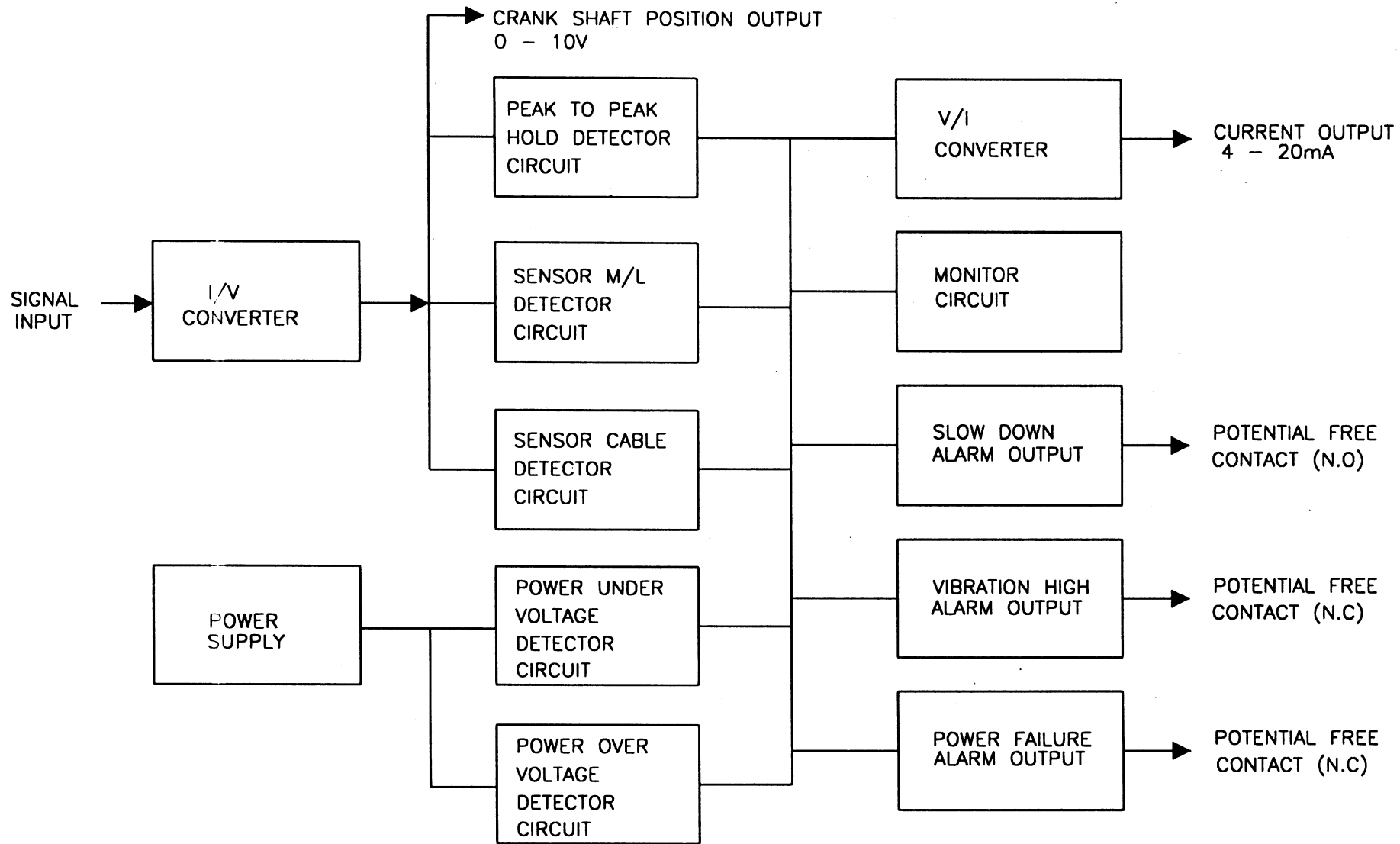
Satisfactory function before engine start : 0.00 - 0.05
Power on -> 88.88
Scan slow down vibration setting value -> 100
Scan high vibration alarm setting value -> 200
Scan user range low setting value -> 300
Scan user range high setting value -> 400
Scan slow down time setting value -> 500
Power failure -> 99.11
Sensor failure -> 99.22
User range low -> 99.33
User range high -> 99.44

Setting of slow down delay time :
(Recommended initial setting : 120 sec.)
0 = 0 sec. 5 = 100 sec. A = 200 sec.
1 = 20 sec. 6 = 120 sec. B = 220 sec.
2 = 40 sec. 7 = 140 sec. C = 240 sec.
3 = 60 sec. 8 = 160 sec. D = 260 sec.
4 = 80 sec. 9 = 180 sec. E = 280 sec.
F = 300 sec.

- CAUTION -
It should be Adjusted
By AVM SUPPLY MAKER ONLY.

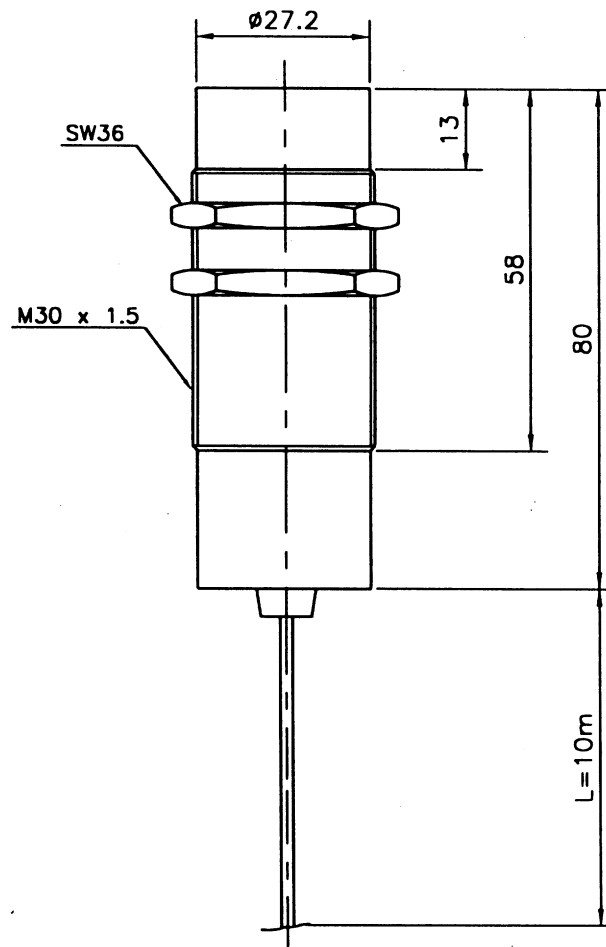


APP.	D.K.LEE	△	TITLE CONNECTION AND ADJUSTMENT		KOMEKO KUM OH MACH.& ELEC.CO.,LTD.	
CHK.		△				
CHK.		△				
DWG.	S.J.JEON	△	UNIT: mm	REF. NO.	DWG. NO.	SHT. NO.
DATE	08.OCT.01	△	SCALE: N/S		/AT	

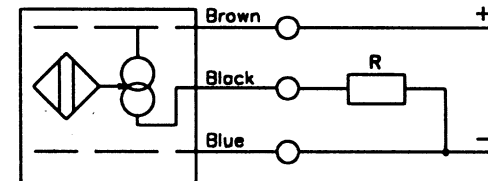


APP.	D.K.LEE	△	TITLE BLOCK DIAGRAM		KOMEKO KUM OH MACH.& ELEC.CO.,LTD.	
CHK.		△				
CHK.		△				
DWG.	S.J.JEON	△	UNIT:	REF. NO.	DWG. NO.	SHEET NO.
DATE	08.OCT.01	△	SCALE:			





OUTPUT CIRCUIT

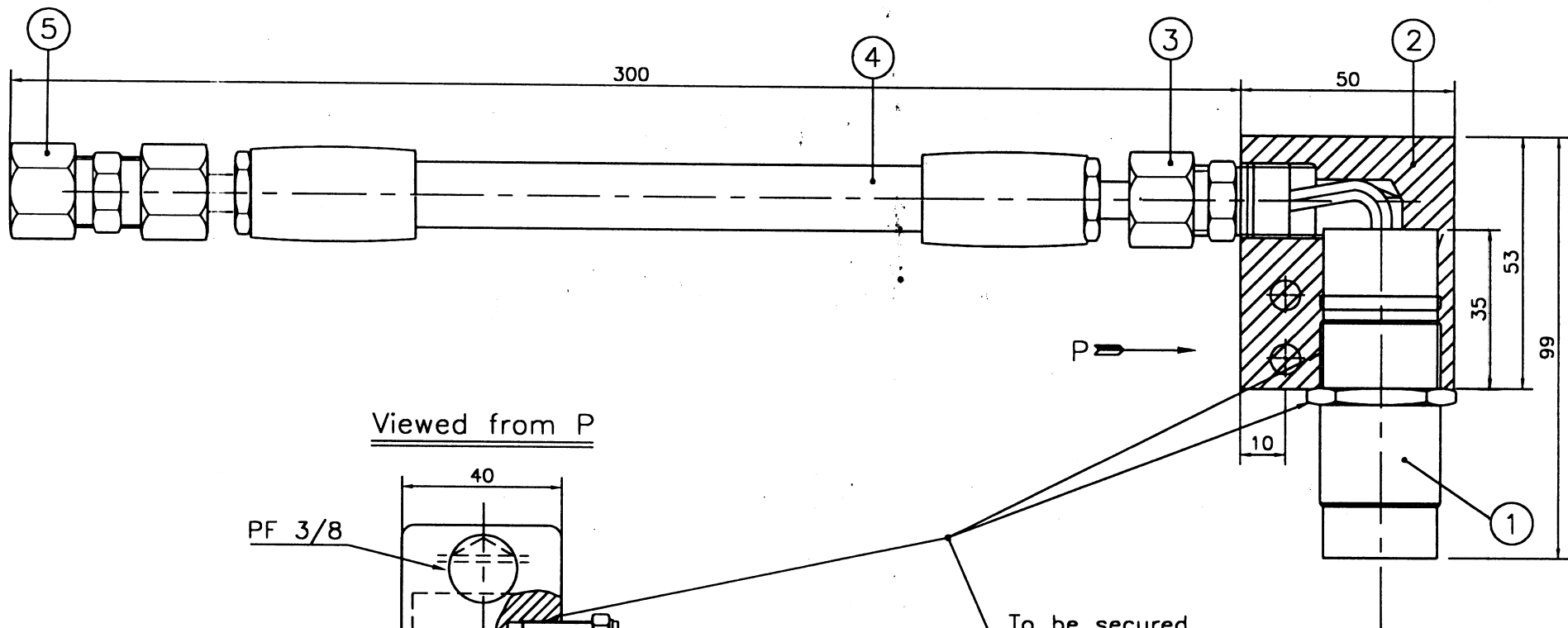


SPECIFICATION

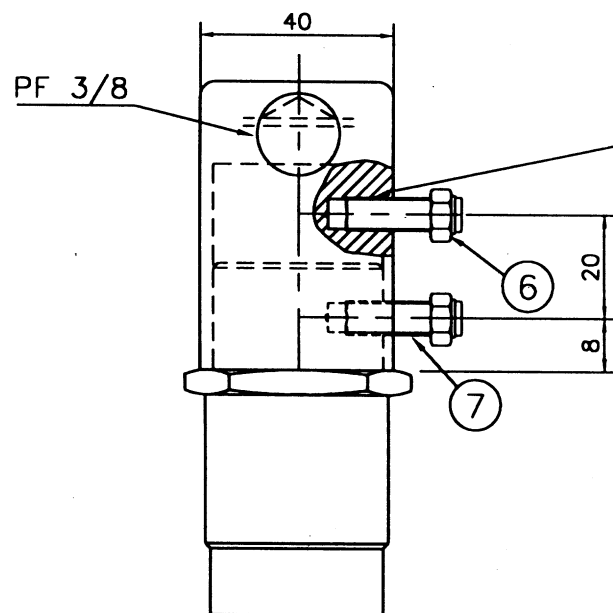
1. MAKER : BALLUFF
2. TYPE : BAW 030-PF-1-K
3. MAX.SENSING DISTANCE : 3~15mm
4. LINEARITY : from 4.5~12mm
5. AMBIENT TEMPERATURE: -10°C to $+60^{\circ}\text{C}$
6. OUTPUT SIGNAL : PNP, analog
7. REPEAT ACCURACY : $\leq 0.02\text{mm}$
8. SUPPLY VOLTAGE : 10~30VDC
9. RIPPLE : $\leq 10\%$ Peak to Peak
10. HOUSING MATERIAL : Nickel Plated Brass
11. PROTECTION : IP67
12. CABLE : 3 X 0.34mm^2 ($\phi 5$), POLY-URETHANE FLEX. CABLE

APP.	D.K.LEE		TITLE ANALOG SENSOR (PROBE) (BAW030-PF-1-K)	KOMEKO KUM OH MACH.& ELEC.CO.,LTD.	
CHK.					
CHK.					
DWG.	S.J.JEON		UNIT: mm	REF. NO.	DWG. NO.
DATE	08.OCT.01		SCALE: N/		SHT. NO.





Viewed from P



To be secured
by Locktite.

NO.	PART NAME	MATERIAL	DIMENSION	Q'TY	REMARK
1	SENSOR	NICKEL PLATED BRASS	M30x1.5	1	BAW030 -PF-1-K
2	HOUSING	SS40 (Ni-Cr)	50x53x40	1	
3	CONNECTOR	SS41 (Ni-Cr)	PF 3/8	1	
4	HOSE	SYNTHETIC RUBBER	Ø15	0.2m	
5	CONNECTOR	SS41 (Ni-Cr)	PF 3/8	1	
6	HEXAGON NUT	8	M8	2	
7	STUD SCREW	8.8	M8	2	

APP.	D.K.LEE	△	TITLE SENSOR ASS'Y OF AX.VIBR.MONITOR		KOMEKO KUM OH MACH.& ELEC.CO.,LTD.	
CHK.		△				
CHK.		△				
DWG.	S.J.JEON	△	UNIT: mm	REF. NO.	DWG. NO.	CUT. NO.
DATE	08.OCT.01	△	SCALE: N/S		AV	



AXIAL VIBRATION MONITOR

(MODEL : AVM-KM30-01)

USER MANUAL (Ver 2.02)

Printed in 2002. 01. 25

#155-1, HOEDONG-DONG, KUMJUNG-KU,
PUSAN, KOREA
TEL : 082-051-528-1967 ~ 9
FAX : 082-051-525-9835
E-MAIL : komeco@chollian.net

KOMECCO



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SYSTEM DESCRIPTION

The AVM-KM30-01 (Axial Vibration Monitor with 30mm probe) is a control and monitoring system capable of measuring axial crankshaft vibrations on diesel engines. The system is designed to be mounted directly onto the main engine. The system consists of a control unit based on analog/digital technology and an inductive analog proximity sensor (probe).

The AVM-KM30-01 is capable of measuring 0.00 - 10.00 mm peak-to-peak displacement. The probe supplied by KOMECO delivers a current signal directly proportional to the between the probe and the crankshaft, to the control unit.

시스템 개요

AVM-KM30-01 (30mm 프로브로 축진동 감시장치)은 제어와 감시 시스템이 디젤 엔진의 크랭크샤프트 축진동을 측정하는 기능을 제공한다. 이 시스템은 메인 엔진에 바로 장착할 수 있다. 이 시스템은 아날로그/디지털 기술과 인덕티브 아날로그 근접 센서를 기본으로 구성되었다.

AVM-KM30-01은 0.00에서 10.00mm까지 피크-대-피크 진동을 측정할 수 있다.

KOMECO에서 제공되는 프로브는 크랭크샤프트와 프로브 사이의 거리에 직접적으로 비례하는 전류 신호를 출력하여 AVM-KM30-01 제어 유닛으로 제공된다.

FUNCTIONAL DESCRIPTION

The control unit converts the current signal from the probe to a value of 1 Volt per mm displacement of the crankshaft. This signal is sent to the "Crankshaft Position Output" primary used for test.

The converted signal is processed in a 500 μ s. So, this converted signal is real value to raw signal.

The peak-to-peak value of the displacement is displayed on an internal four-digit display with a resolution of 0.01mm and sent through a voltage-to-current converter, to the "Alarm/Monitoring Current Output", as a 4-20mA current signal.

When the peak-to-peak displacement signal from the probe decreases, the value of the display and the "Alarm/Monitoring Current Output" will not follow immediately, but fall slowly to the actual peak-to-peak displacement. The converted signal is processed in an analytical method. This output signal is not real value to raw signal, because it is not processed on real time base.

기능 설명

Control Unit(AVM-KM30-01)은 크랭크샤프트의 변위(즉 위치의 변동)를 mm당 1V값으로 probe로부터 현재 신호로 변환해준다.

이 신호는 시운전용으로 사용되는 "Crankshaft Position Output"로 보낸다.

이 변환된 신호는 500 μ s로 처리된다. 그러므로 이 변환신호는 원래 신호의 실제 값이다.

변위(진동)의 Peak-to-Peak 값은 4자리로 표시되며, 해상도는 0.01mm이고 "Alarm/Monitoring Current Output" 단자로 4-20mA 전류 신호로 출력된다.

만약 Probe로부터 Peak-to-Peak 변위(진동)가 감소할 경우에 "Alarm/Monitoring Current Output"은 즉시 떨어지지 않으며 점차적으로 실제 Peak-to-Peak 변위(진동)값으로 떨어진다.

이 변환신호는 분석적인 방법으로 처리된다.

이 출력신호는 원래 신호의 실제 값이 아니다. 왜냐하면 real time base로 처리되지 않기 때문이다.

The "Power Fail Output", an on/off signal with a potential-free contact(NO) or normal -close contact(NC), is set if the power source is lower than 18V or higher than 29V. In an occasion, "99.11" is displayed on an internal four-digit display.

The "Vibration High Alarm Output", an on/off signal with a potential-free contact(NO) or normal-close contact(NC), is set if the peak-to-peak signal exceeds a setpoint of the high vibration for more than the "Slow Down Delay Time". The reset of the "VIB. HIGH" output occurs as soon as the peak-to-peak signal has dropped below the setpoint. The setpoint for "Vibration High Alarm Output" is shown on the display by pressing the "HIGH VIB. VIEW" button. Setting of the setpoint for "High Vibration Output" is done by pressing the "HIGH VIB. VIEW" and adjusting the "VIB. HIGH" potentiometer.

The "Slow Down Output", an on/off signal with a potential-free contact(NO) or normal-close contact(NC), is set if the peak-to-peak signal exceeds a setpoint for more than the "Slow Down Delay Time". The setpoint and the "Slow Down Delay Time" are internal adjustable. The reset of the "Slow Down Output" and the "Slow Down Delay Time" occurs as soon as the peak-to-peak signal has dropped below the setpoint.

The setpoint for "Slow Down Output" is shown on the display by pressing the "SLOW DOWN VIEW" button. Setting of the setpoint for "Slow Down Output" is done by pressing the "SLOW DOWN VIEW" button and adjusting the "SLOW DOWN" potentiometer.

Setting of the slow down delay time is done by setting the "SLOW DOWN TIME SETTING" switch to one of the following positions.

0 = 0 sec. 6 = 120 sec. C = 240 sec.
 1 = 20 sec. 7 = 140 sec. D = 260 sec.
 2 = 40 sec. 8 = 160 sec. E = 280 sec.
 3 = 60 sec. 9 = 180 sec. F = 300 sec.
 4 = 80 sec. A = 200 sec.
 5 = 100 sec. B = 220 sec.

initial setting : 100 sec.

제어 유닛은 전원이 불안정(18V 이하, 29V이상) 할 경우 노말오픈(NO) 혹은 노말클로즈(NC)로 신호를 출력해주고 내부 디스플레이 모듈에 "99.11"이 디스플레이 된다.

만약 사용자가 셋팅한 진동 값 이상의 피크-대-피크가 셋팅된 슬로우다운 시간 이상 동안 센서로부터 검출되면 노말오픈(NO) 혹은 노말클로즈(NC)로 신호를 출력해준다. 이 신호의 리셋은 피크-대-피크의 신호가 셋팅한 값 이하로 떨어지자마자 즉시 이루어진다. 셋팅 값을 확인 하려면 "HIGH VIB. VIEW" 버튼을 누른다. 이에 필요한 값 셋팅은 "HIGH VIB. VIEW"를 누른 상태에서 "VIB. HIGH"의 포텐셔미터를 돌려서 조정한다.

슬로우다운 출력 신호는 사용자가 셋팅한 값 이상으로 피크-대-피크가 검출되면 슬로우다운 시간이 지난후에 노말오픈(NO) 혹은 노말클로즈(NC)로 신호를 출력해준다. 셋팅 값을 확인 하려면 "SLOW DOWN VIEW" 버튼을 누른다. 이에 필요한 값 셋팅은 "SLOW DOWN VIEW"를 누른 상태에서 "SLOW DOWN"의 포텐셔미터를 돌려서 조정한다.

슬로우다운 딜레이 시간 셋팅은 "SLOW DOWN TIME SETTING" 스위치를 아래의 값에 준하도록 맞춰서 조정한다.

0 = 0 sec. 6 = 120 sec. C = 240 sec.
 1 = 20 sec. 7 = 140 sec. D = 260 sec.
 2 = 40 sec. 8 = 160 sec. E = 280 sec.
 3 = 60 sec. 9 = 180 sec. F = 300 sec.
 4 = 80 sec. A = 200 sec.
 5 = 100 sec. B = 220 sec.

초기 셋팅 시간 : 100 sec.



User range setting provide advantage that end user can easily mount a probe(sensor) onto engine. If an end user mounts a probe (sensor) closer from the crankshaft than low set value, 99.33 is displayed on an internal four-digit display. And if an end user mounts a probe(sensor) far away from crankshaft than high set value, 99.44 is displayed on an internal four-digit display. User range low setting is done by shorting jumper 1, jumper 2 and jumper 3, and adjusting the "USER RANGE LOW ADJUST" potentiometer. User range high setting is done by shorting jumper 1, jumper 4 and jumper 5, and adjusting the "USER RANGE HIGH ADJUST" potentiometer. The short-circuit/disruption of the probe cable will be indicated on the display by 99.22.

유저 레인지 셋팅은 사용자가 프로브(센서)를 엔진에 장착할 때 편의성을 제공한다. 만약 사용자가 프로브를 장착할 때 로우 셋팅 값보다 더 가까이 프로브를 장착할 경우에는 99.33을 디스플레이하여 취부의 부적합을 알린다. 그리고 하이 셋팅 값보다 더 멀리 프로브를 장착할 경우에도 99.44를 디스플레이하여 부적합을 알려준다. 로우 유저 레인지 셋팅은 점퍼1, 점퍼2, 점퍼3를 쇼트 시킨후에 "유저 레인지 로우 셋팅"을 돌려서 한다. 그리고 하이 유저 레인지 셋팅은 점퍼1, 점퍼4, 점퍼5를 쇼트 시킨후 "유저 레인지 하이 셋팅"을 돌려서 한다. 만약 프로브 선이 단락되거나 단선될 경우 디스플레이상에 99.22가 나타날 것이다.

TROUBLE SHOOTING

I. Standard procedures

In case of suspected malfunction, a structured system test should be carried out. By following the below steps, a complete system test is carried out, and an identification of the problem should be possible.

II. Check of power supply to probe

Connect the power supply to K11(+), K13(-). The display will indicate "88.88". After one second the control unit will scan the value user's of setting.

- 100 : Scanning the set value of slow down vibration
- 200 : Scanning the set value of vibration high alarm
- 300 : Scanning the set value of user range low

고장 점검

I. 절차

만약 정상동작이 되지 않는다고 의심되면 체계적인 테스트가 이루어져야 한다. 제품에 대해서 다음과 같은 단계로 테스트가 이루어진다면 문제점을 확인할 수 있을 것이다.

II. 프로브에 대한 전원 공급 체크

K11(+)와 K13(-)에 전원을 공급한다. 전원을 켜면 처음에 88.88이 디스플레이되고, 약 1초 후에 다음과 같은 값들이 디스플레이된다. 이것은 사용자가 셋팅한 값을 스캔하기 위한 것이다.

- 100 : 슬로우 다운 진동 셋팅 값 스캔
- 200 : 과진동 알람 셋팅 값 스캔
- 300 : 사용자 로우 레인지 셋팅 값 스캔



400 : Scanning the set value of user range high

500 : Scanning the set value of slow down time

Check the voltage on K21(+), K23(-).

For the AVM-KM30-01 the V_p readout should be 14.5~15.5 V.

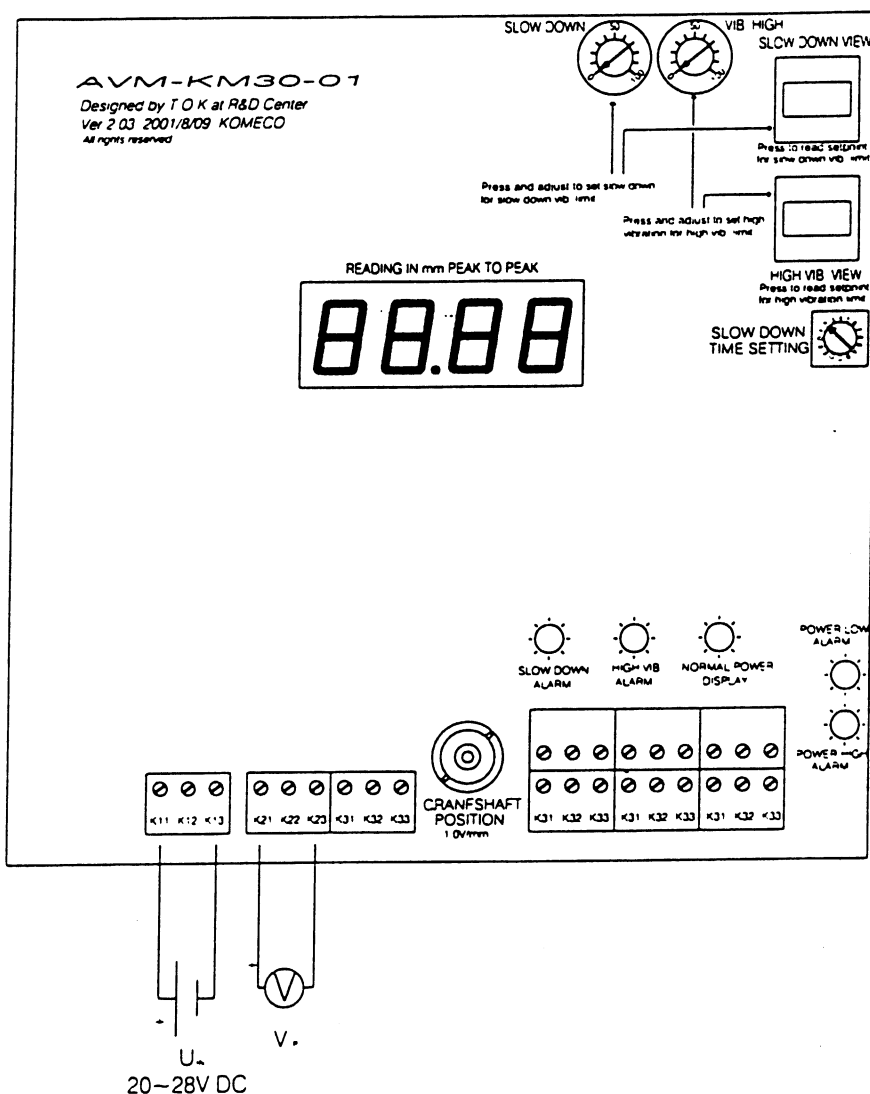
If not, the circuit board may be defective and should be replaced.

400 : 사용자 하이 레인지 셋팅 값 스캔

500 : 슬로우 다운 시간 셋팅 값 스캔

K21(+)와 K23(-)에 전압을 체크한다.

V_p 의 값이 14.5~15.5V이면 정상이며, 그렇지 않으면 결함이 있으므로 제어 유닛을 교환해야 한다.



III. Check of the electronic cabinet during power on

Connect resistor Res1 to K21 and K22(Res1 = $2k5 = 2.5k\Omega$, not part of KOMECO A/S scope of supply)

When the power is turned on the display will indicate 88.88. After one second the control will scan the value user's of setting.

After the scanning is terminated the display will return to normal condition and indicate 0.00-0.05mm.

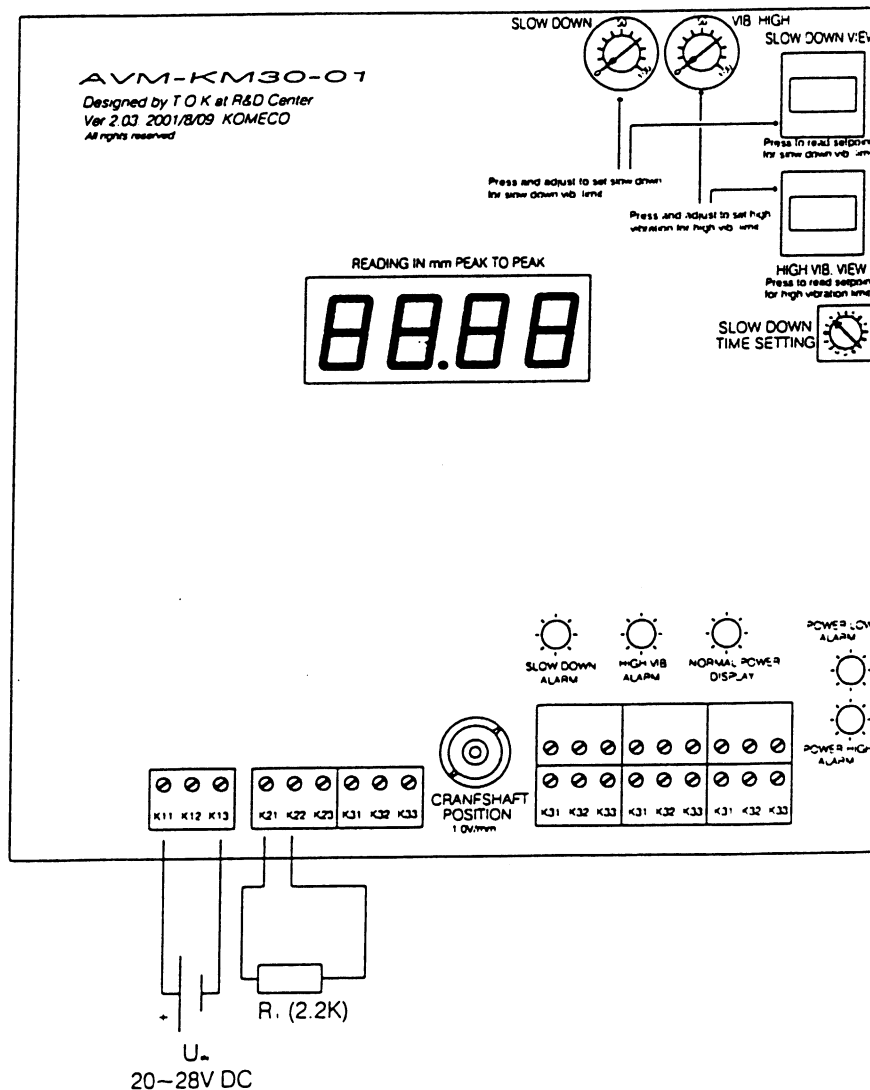
If not, the circuit board may be defective and should be replaced.

III. 전원을 공급했을 동안 electronic cabinet의 체크.

K21과 K22에 저항 Res1을 연결하라(Res1 = $2k5 = 2.5k\Omega$, 이것은 당사 A/S 영역이 아니다). 전원이 공급되면 디스플레이 상에 88.88이 디스플레이된 후 셋팅 값을 스캔한다.

스캔하는데는 약 20초 정도 소요된다. 그 후 정상적인 동작이 이루어지면 디스플레이는 0.00-0.05mm가 될 것이다.

만약 그렇지 않다면 circuit board가 결함이 있으므로 교환해야 한다.



IV. Check of the electronic cabinet for probe input & display

Connect Res1 and Res2 in parallel to K21 and K22.

By continuously connecting and disconnecting Res2 the display will change indication.

For the AVM-KM30-01 the readout will be 3.00-4.00mm.

By permanently disconnecting or connecting Res2 the display will return slowly to indicating 0.00-0.05mm.

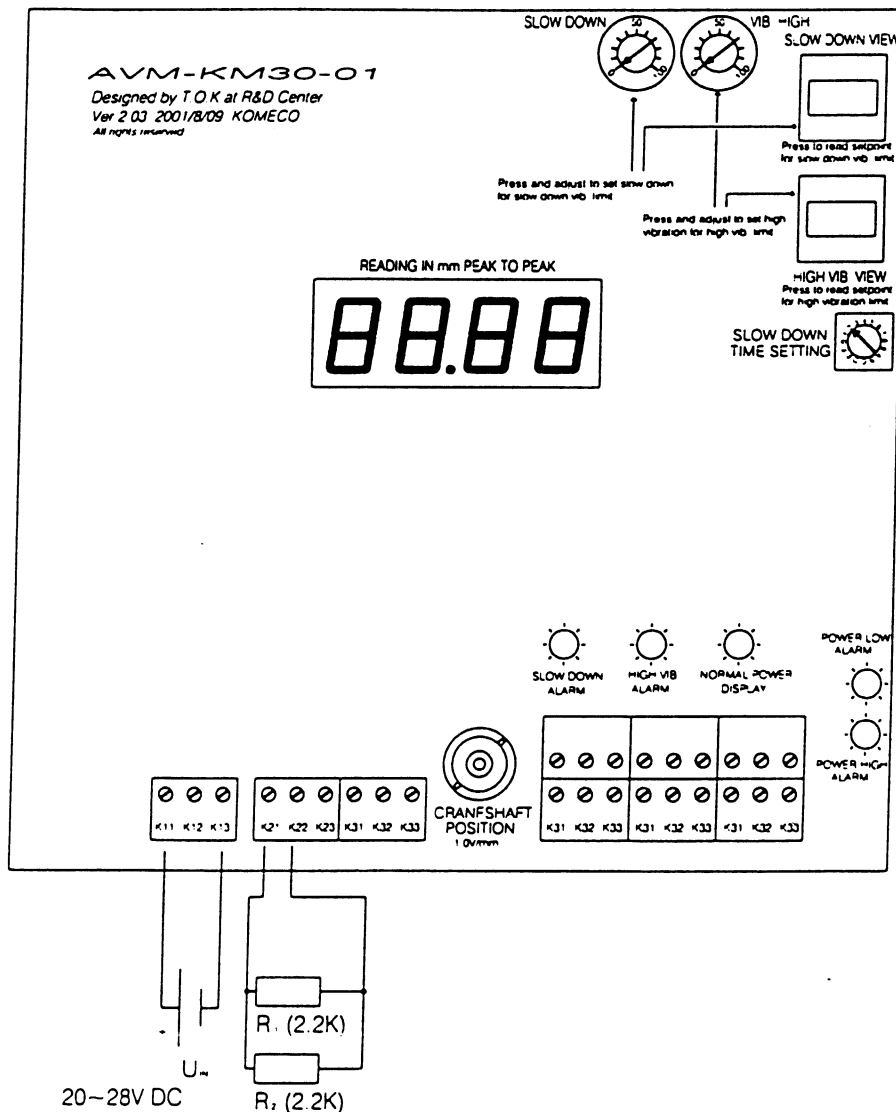
If not, the circuit board may be defective and should be replaced.

IV. 프로브 입력과 디스플레이 증상 체크

Res1과 Res2를 K21, K22에 병렬로 연결한다.

Res2를 계속적으로 접속과 분리를 반복하면 디스플레이가 변하고 그 값은 3.00-4.00mm 사이의 값이 된다.

계속적으로 접속시켜 놓던가 분리시켜 놓으면 디스플레이 값은 점차적으로 0.00-0.05mm로 된다. 만약 그렇지 않다면 circuit board가 결함이 있으므로 교환해야 한다.



V. Check of the electronic cabinet for current output

Connect an amp-meter to K31 and K32.

By continuously disconnecting and connecting Res2 the display will change indication.

I_{out} will follow the value in the display according to the following formulae:

$$I_{out}[mA] = 1.6 \times (\text{display indication}[mm]) + 4$$

If I_{out} differs significantly from the above formulae, the circuit board may be defective and should be replaced.

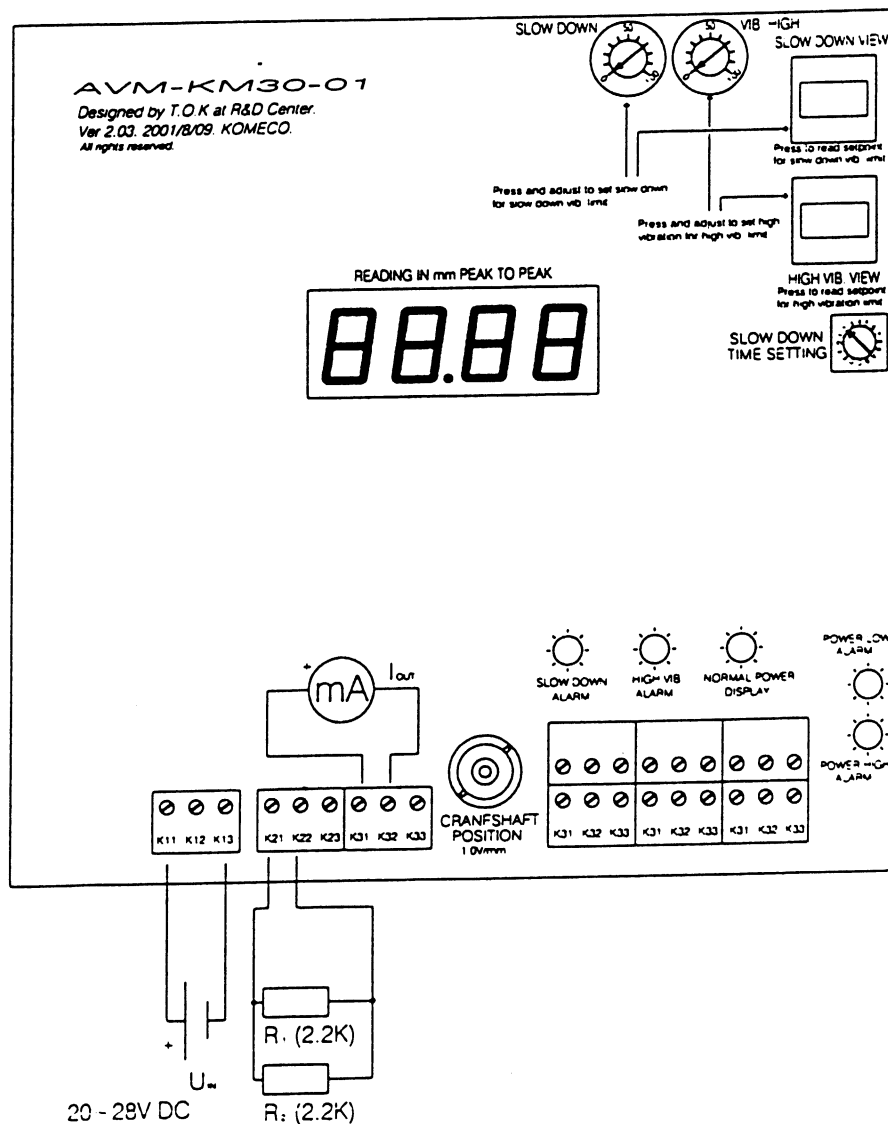
V. 전류 출력 증상 체크

전류(전류계) 메타를 K31과 K32에 연결한다.

Res2를 계속적으로 접속과 분리를 반복하면 디스플레이가 변한다. I_{out} 은 아래의 공식에 의해 디스플레이된 값에 따라서 변한다.

$$I_{out}[mA] = 1.6 \times (\text{디스플레이 값}[mm]) + 4$$

만약 I_{out} 의 출력이 공식에 따라서 변하지 않으면 circuit board가 결함이 있을 수 있으므로 제어 유닛을 교환해야 한다.



VI. Check of the electronic cabinet for Slow Down Output

Connect an ohm-meter to K42 and K43 for Normal-Open(NO), to K41 and K42 for Normal-Close(NC).

Adjust the SLOW DOWN TIME SETTING to position "0".

Connect the power source to K11(+) and K13(-).

Adjust the SLOW DOWN to approximately 2.0mm.

By continuously disconnecting and connecting Res2 the display will change indication.

By permanently disconnecting or connecting Res2 the display will return slowly to an indication of 0.00-0.05mm.

VI. 슬로우 다운 출력 증상 체크

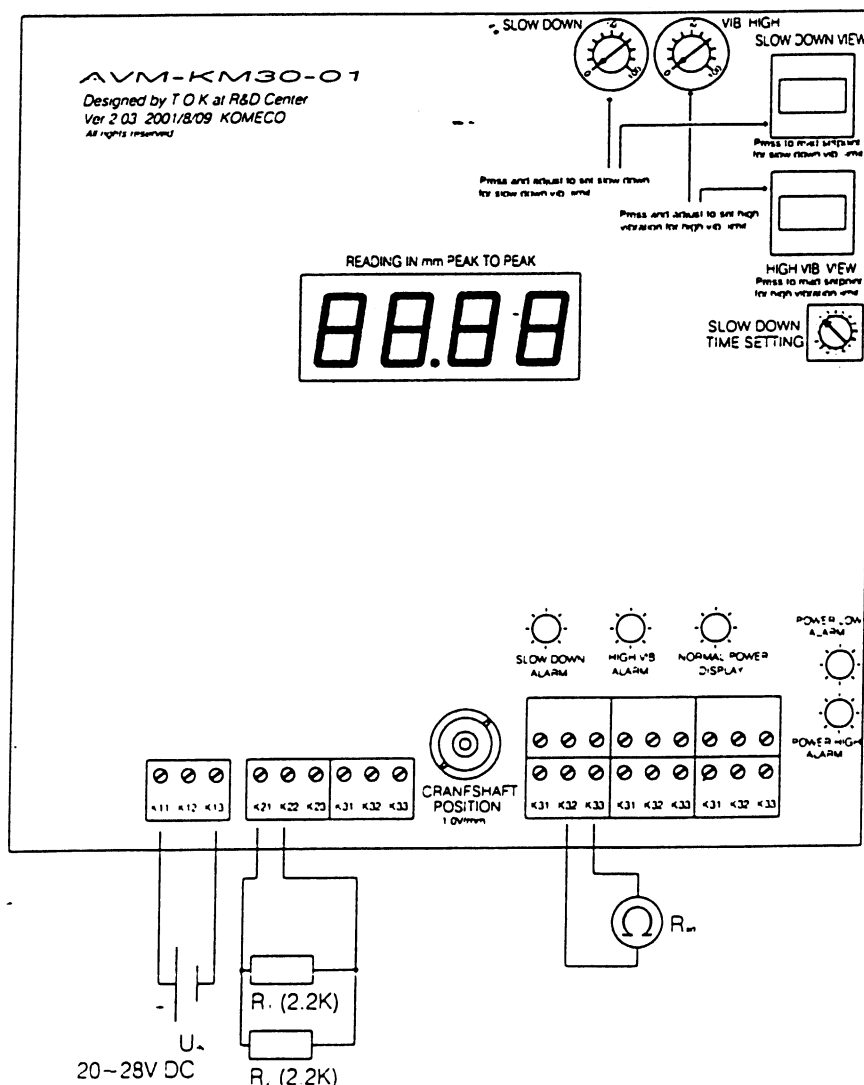
저항 측정기를 K42와 K43(노말 오픈, NO), K41과 K43(노말 클로즈, NC)에 연결한다.

SLOW DOWN TIME SETTING을 "0"으로 맞춘다.
전원을 공급한다.

SLOW DOWN을 약 2.00mm에 맞춘다.

Res2를 계속적으로 접속과 분리하면 디스플레이가 변한다.

계속적으로 접속시켜 놓던가 분리시켜 놓으면 디스플레이 값은 점차적으로 0.00-0.05mm로 된다.



At display indications higher than the adjusted SLOW DOWN the Slow Down Output relay will be activated:

$$R_{sd} = 0\Omega$$

for Normal-Open(NO),

$$R_{sd} = \infty\Omega$$

for Normal-Close(NC).

At display indications lower than the adjusted SLOW DOWN the Slow Down Output relay will be deactivated :

$$R_{sd} = \infty\Omega$$

for Normal-Open(NO),

$$R_{sd} = 0\Omega$$

for Normal-Close(NC).

If not, the circuit board may be defective and should be replaced.

VII. Check of the electronic cabinet for Vibration High Alarm Output

Connect an ohm-meter to K52 and K53 for Normal-Open(NO), to K51 and K52 for Normal-Close(NC).

Connect the power source to K11(+) and K13(-).

Adjust the HIGH VIB. to approximately 2.00 mm.

By continuously disconnecting and connecting Res2 the display will change indication.

By permanently disconnecting or connecting Res2 the display will return slowly to an indication of 0.00-0.05mm.

At display indications higher than the adjusted HIGH VIB. the Vibration High Alarm Output relay will be activated:

$$R_{sd} = 0\Omega \text{ for Normal-Open(NO),}$$

$$R_{sd} = \infty\Omega \text{ for Normal-Close(NC).}$$

At display indications lower than the adjusted HIGH VIB. the Vibration High Alarm Output relay will be deactivated :

$$R_{sd} = \infty\Omega \text{ for Normal-Open(NO),}$$

$$R_{sd} = 0\Omega \text{ for Normal-Close(NC).}$$

If not, the circuit board may be defective and should be replaced.

만약 표시 값이 SLOW DOWN에서 셋팅한 값보다 높으면 슬로우 다운 출력 릴레이가 동작한다:

$$R_{sd} = 0\Omega$$

노말 오픈(NO)에 대하여,

$$R_{sd} = \infty\Omega$$

노말 클로즈(NC)에 대하여.

만약 표시 값이 SLOW DOWN에서 셋팅한 값보다 낮은 값으로 떨어지면 릴레이는 동작을 멈춘다.

$$R_{sd} = \infty\Omega$$

노말 오픈(NO)에 대하여,

$$R_{sd} = 0\Omega$$

노말 클로즈(NC)에 대하여.

만약 정상적으로 동작하지 않으면 circuit board가 결함이 있을 수 있으므로 교환해야 한다.

VII. 과진동 알람 증상 체크

저항 측정기를 K52와 K53(노말 오픈, NO), K51과 K53(노말 클로즈, NC)에 연결한다.

전원을 공급한다.

HIGH VIB.를 약 2.00mm에 맞춘다.

Res2를 계속적으로 접속과 분리를 반복하면 디스플레이가 변한다.

계속적으로 접속시켜 놓던가 분리시켜 놓으면 디스플레이 값은 점차적으로 0.00-0.05mm로 된다.

만약 표시 값이 HIGH VIB.에서 셋팅한 값보다 높으면 Vibration High Alarm 출력 릴레이가 동작한다:

$$R_{sd} = 0\Omega, \text{ 노말 오픈(NO)에 대하여,}$$

$$R_{sd} = \infty\Omega, \text{ 노말 클로즈(NC)에 대하여.}$$

만약 표시 값이 HIGH VIB.에서 셋팅한 값보다 낮은 값으로 떨어지면 릴레이는 동작을 멈춘다.

$$R_{sd} = \infty\Omega, \text{ 노말 오픈(NO)에 대하여,}$$

$$R_{sd} = 0\Omega, \text{ 노말 클로즈(NC)에 대하여.}$$

만약 정상적으로 동작하지 않으면 circuit board가 결함이 있을 수 있으므로 교환해야 한다.



VIII. Check of the electronic cabinet for Power Fail Output

Connect an ohm-meter to K62 and K63 for Normal-Open(NO), to K61 and K62 for Normal-Close(NC).

Connect the power source to K11(+) and K13(-).

By falling the power source down below 18V or raising it up above 29V the readout will be "99.11" and the Power Failure Alarm Output relay will activated:

$R_{sd} = 0\Omega$ for Normal-Open(NO), $R_{sd} = \infty\Omega$ for Normal-Close(NC).

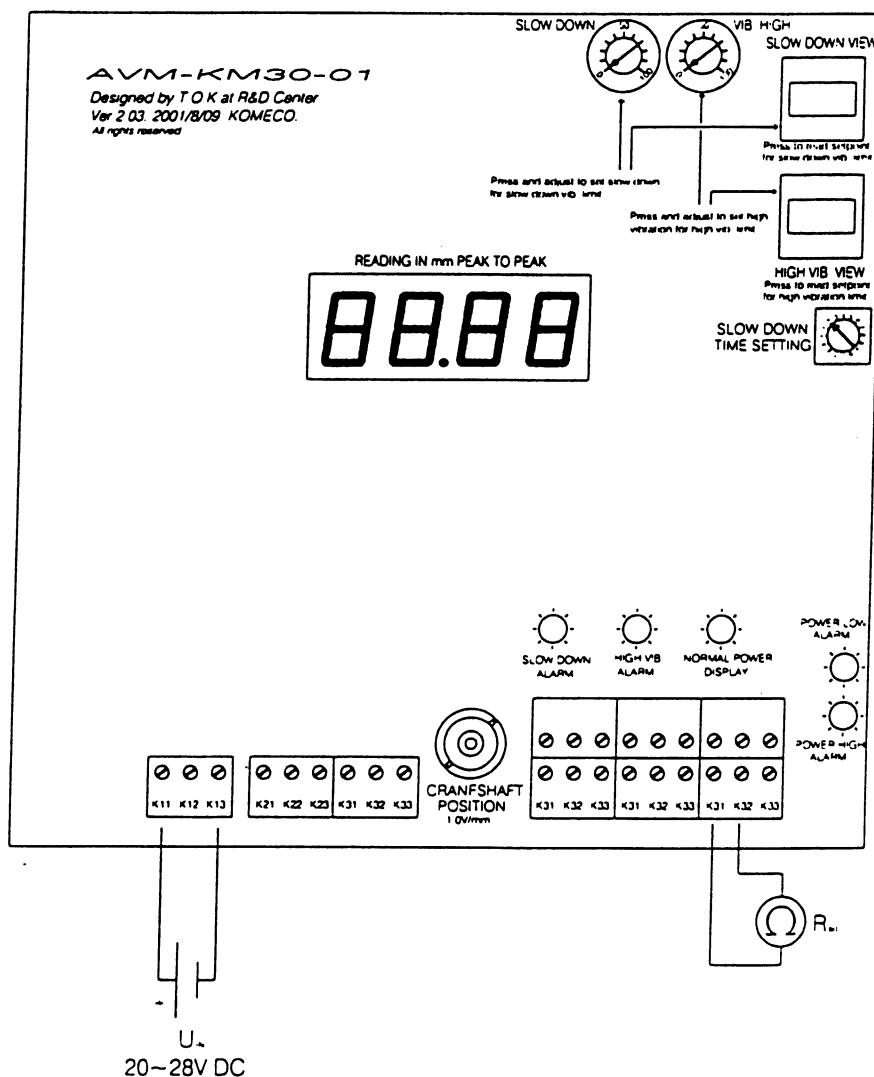
VIII. 전원 불안정 증상 체크

저항 측정기를 K62와 K63(노말 오픈, NO), K61과 K63(노말 클로즈, NC)에 연결한다.

전원을 공급한다.

전원을 18V 이하로 떨어뜨리거나 29V 이상으로 올리면 "99.11"이 디스플레이되고 전원 불안정 알람 출력 릴레이가 동작한다.

$R_{sd} = 0\Omega$, 노말 오픈(NO), $R_{sd} = \infty\Omega$.노말 클로즈(NC).



By setting the power source between 19V and 28V the display will return to an indication of 0.00-0.05mm and the Power Failure Alarm Output relay will be deactivated : $R_{sd} = \infty \Omega$ for Normal-Open(NO), $R_{sd} = 0 \Omega$ for Normal-Close(NC).

If not, the circuit board may be defective and should be replaced.

IX. Check of the Probe

Connect the power supply and an amp-meter to the probe.

First check the connection by moving a piece of metal back and forth in front of the probe. If no variation in I_p is found, the probe or the probe cable may be defective.

If I_p varies, check I_p vs. the distance to the metal. If measurements(mA vs. mm) differ significantly from the calibration data found on the probes calibration sheet, the probe should be replaced.

전원이 18V에서 29V사이로 공급되면 디스플레이 값은 0.00-0.05mm로 되며, 릴레이는 동작을 멈춘다.

$R_{sd} = \infty \Omega$, 노말 오픈(NO), $R_{sd} = 0 \Omega$.노말 클로즈(NC).

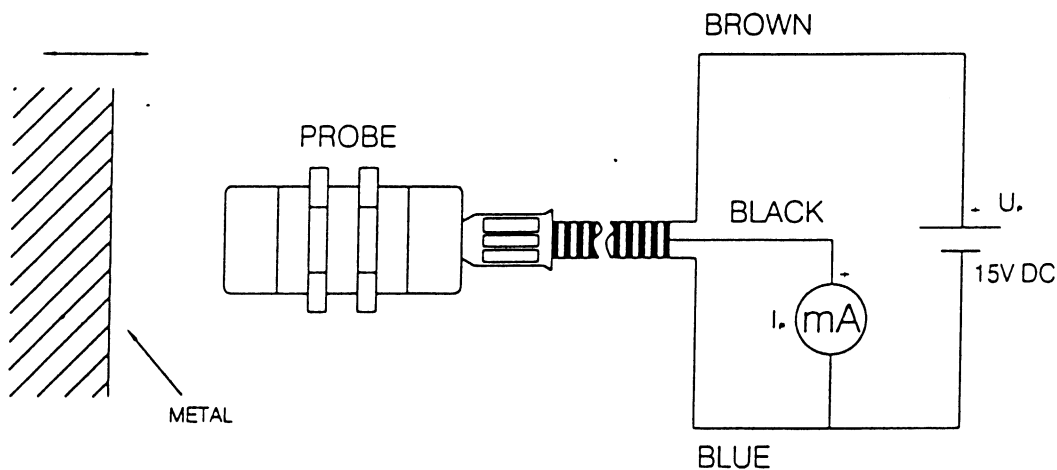
만약 정상적으로 동작하지 않으면 circuit board가 결함이 있을 수 있으므로 교환해야 한다.

XI. 프로브 증상 체크

전원을 공급하고 전류 메타를 프로브에 연결한다.

프로브에 쇠조각을 움직이면서 이동하면 I_p 가 변한다. 만약 I_p 가 변동하지 않으면 프로브나 프로브 선에 이상이 있는 것이다.

만약 I_p 와 쇠조각 선형이 전혀 이루어지지 않고 심하게 흔들리면 프로브를 바꿔야 한다.



X. Check of the electronic cabinet for Voltage Output

Connect the probe cable to K21,22,23.

Connect an voltmeter to the BNC.

By connecting Res1 the voltage output will be 7.40V. By connecting Res1 and Res2 the voltage output will be 10.60V.

By continuously connecting and disconnecting Res2 the voltage output will change from 7.4 to 10.6V.

The measurement range is from 0.00 to 13.00 V and the value is linear on the range from 3.50 to 13.0V. If V_p is not significantly proportional to the distance the circuit board may defective and should be replaced.

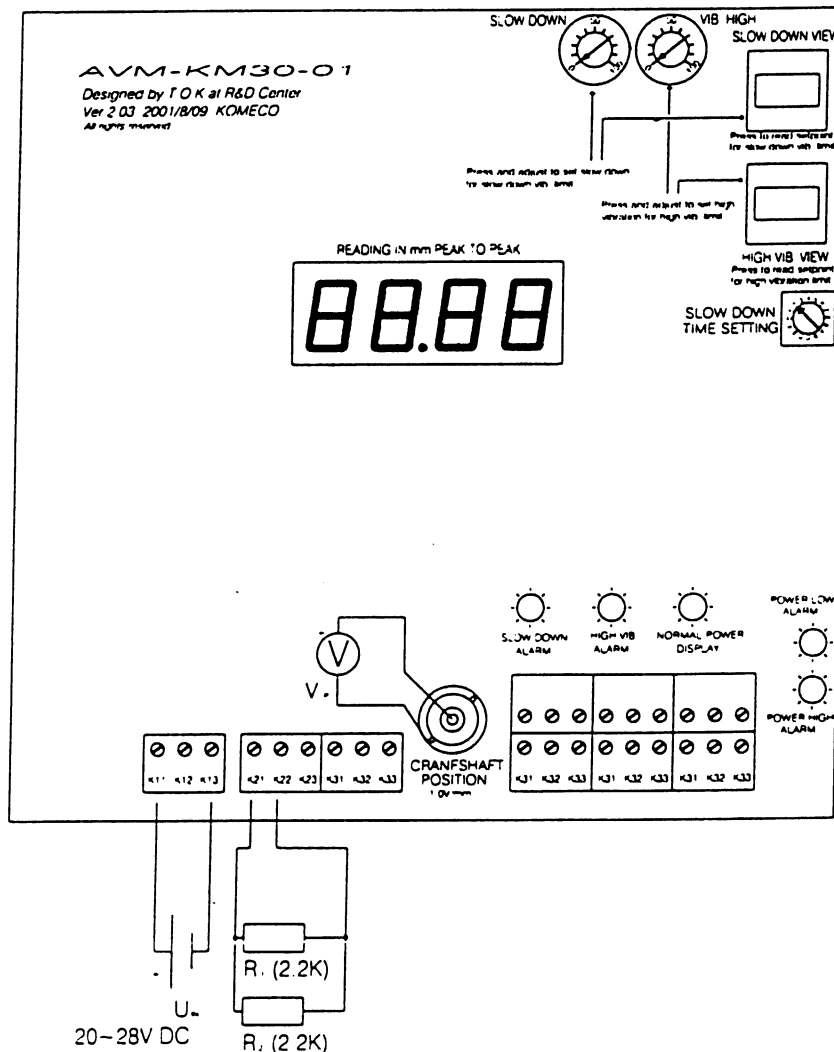
X. 출력 전압 증상 체크

K21, 22, 23에 프로브 선을 연결한다.

전압계를 BNC 단자에 연결한다.

Res1을 계속적으로 접속해 놓으면 출력 전압은 7.40V가 될 것이다. Res1과 Res2를 계속적으로 접속해 놓으면 출력 전압은 10.60V가 될 것이다. 만약 접속과 분리를 계속적으로 반복하면 디스플레이가 변하고 V_{out} 은 7.40에서 10.60V까지 변한다. 0.00에서 13.00V 까지 측정 가능하고 3.50~13.00 범위에서는 선형성이 유지된다.

정상적으로 동작이 되지 않으며 circuit board가 결함이 있을 수 있으므로 교환해야 한다.

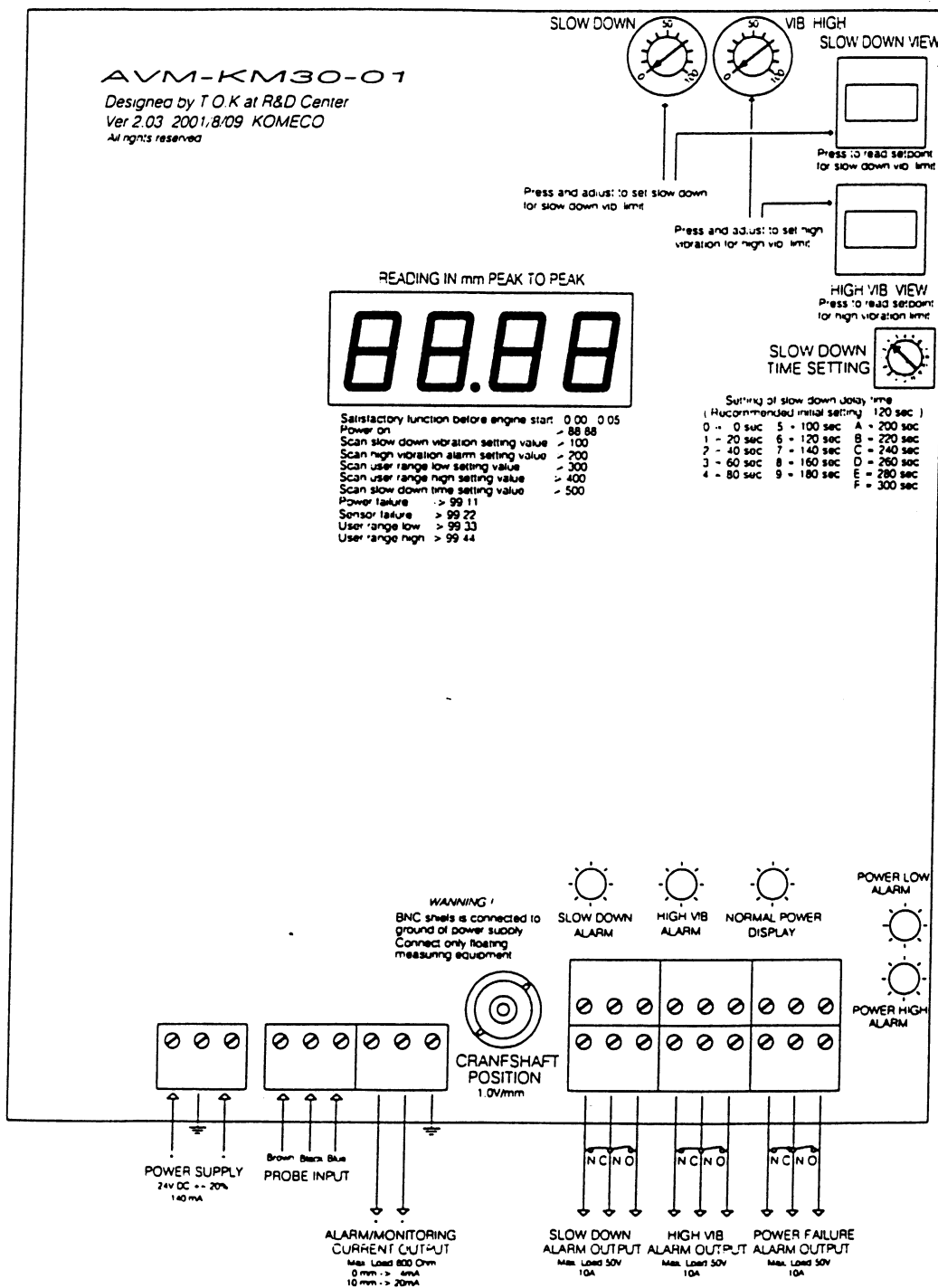


SYSTEM SET-UP

After mounting the probe and connecting the circuit board, the Axial Vibration Monitor is ready for set-up.

시스템 셋업

프robe를 장착한 후에 제어 유닛에 연결하면 시스템 셋업을 위한 준비가 된 것이다.



The set-up procedure has three steps:

First, the set-point for slow down has to be adjusted. Press and hold "SLOW DOWN VIEW". Adjust the set-point by turning the screw on the "SLOW DOWN ADJUST" potentiometer, until the required set-point is shown on the display.

Second, the set-point for high vibration alarm has to be adjusted. Press and hold "HIGH VIB. VIEW". Adjust the set-point by turning the screw on the "VIB. HIGH ADJUST" potentiometer, until the required set-point is shown on the display.

Third, the slow down time setting has to be adjusted. This is done by turning the arrow shaped slot in the slow down potentiometer. The recommended initial setting is 100 seconds("5").

Refer to the "FUNCTIONAL DESCRIPTION" for setting slow down time.

Note: The circuit board has seven additional adjustable potentiometers, marked VR1, VR2, VR3, VR4, VR7, VR9, and VR10. Their functions are as follows:

- VR1 : Scaling of sensor signal to meter
- VR2 : Span of sensor signal to meter
- VR3 : Span of the current output
- VR4 : Zero adjustment of the current output
- VR7 : Adjustment of the low limit of user range
- VR9 : Adjustment of the high limit of user range
- VR10 : Span of the voltage output

셋업 절차는 3단계로 이루어진다:

첫째, 슬로우다운 리미트 값을 조정한다. "슬로우다운 뷰"를 누르면서 "슬로우다운 조정" 포텐셔미터를 드라이버로 돌려 원하는 값으로 맞춘다.

둘째, 과진동 알람 리미트 값을 조정한다. "하이 바이브레이션 뷰"를 누르면서 "하이 바이브레이션 조정" 포텐셔미터를 드라이버로 돌려 원하는 값으로 맞춘다.

셋째, 슬로우다운 시간 값을 조정한다. 화살표 모양을 돌려서 원하는 곳으로 맞춘다. 추천하는 초기 셋팅 값은 100 sec.이다.

그에 대응대는 값은 "기능설명" 편을 참조하라.

주의: 7개의 추가적인 조정 포텐셔미터가 있다.

VR1, VR2, VR3, VR4, VR7, VR9, 그리고 VR10으로 마크되어 있으며 그기능은 아래와 같다:

VR1 : 입력 센서의 스케일링 조정

VR2 : 입력 센서의 스팬 조정

VR3 : 알람/모니터링 전류 출력에 대한 스팬 조정

VR4 : 알람/모니터링 전류 출력에 대한 제로 조정

VR7 : 유저 레인지 리미트 값의 하한 값 조정

VR9 : 유저 레인지 리미트 값의 상한 값 조정

VR10 : 전압 출력에 대한 스팬 조정



SPECIFICATIONS FOR THE AVM-KM30-01

OPERATING	
TEMPERATURE RANGE	: -10 °C to 65 °C
OPERATING	
HUMIDITY	: Less than 90 % RH (Non-Condensing)
PROTECTION	
	: IP54
MEASURING RANGE	
	: Max. : 10.00 mm peak-to-peak(+/- 5.00 mm)
	: Linearity : 10.00 mm peak-to-peak(+/- 5.00 mm)
POWER SUPPLY	
	: Supply voltage : 24 Volt DC +/- 20 %
	: Max current consumption : 140 mA
PROBE	
	: Type : Balluff BAW-030-PF-1-K
	: Cable length : 10 m
	: Mounting distance : 8.5 mm
ALARM/MONITORING	
CURRENT OUTPUT	
	: Output : 4-20 mA
	: Max. load : 800 Ohm
	: 0 mm peak-to-peak -> 4 mA
	: 10 mm peak-to-peak -> 20 mA
	: $I_{out}[mA] = 1.6 \times (\text{displacement in mm peak-to-peak}) + 4$
SLOW DOWN OUTPUT	
	: Potential free contact(NO, NC)
	: Max. load : 50 Volt 10A
VIBRATION HIGH	
ALARM OUTPUT	
	: Potential free contact(NO, NC)
	: Max. load : 50 Volt 10A
POWER SOURCE & SYSTEM	
FAILURE ALARM OUTPUT	
	: Potential free contact(NO, NC)
	: Max. load : 50 Volt 10A
SLOW DOWN	
ADJUSTMENT	
	: 0.00 to 10.00 mm
VIBRATION HIGH	
ADJUSTMENT	
	: 0.00 to 10.00 mm
SLOW DOWN DELAY TIME	
CRANKSHAFT	
POSITION OUTPUT	
	: Output voltage : 0 - 13 Volt
	: Output current max. : 10mA
	: Output : 1.0 Volt change per mm displacement of the crankshaft
ACCURACY	
	: Probe input to Display, Crankshaft position output and Alarm monitoring current output : +/- 5 %



KOMECO	INSPECTION REPORT		REPORT NO.	
			PAGE	1/3
CUSTOMER		ITEM NAME	AXIAL VIBRATION MONITOR	
PROJECT NAME		MODEL	AVM-KM30-01	
ENGINE TYPE		Q'TY		
INSP. LOCATION	KOMECO	SERIAL NO.		
INSP. DATE		DRAWING NO.		

1. EXTERNAL APPEARANCE TESTS

NO.	TEST ITEMS	RESULT
1	Check whether P.C.B. parts and Soldering is good	
2	Check whether P.C.B. is covered with a good silicone compounding	
3	Check whether P.C.B. is stably built inner case	
4	Check whether Screen printing and Painting of case is good	
5	Check whether Cabel grand is suitable to specifications	

2. FUNCTION TESTS

2-1. VIBRATION TEST

NO.	SECTIONS ITEMS	THE VALUE OF STANDARD		THE VALUE OF TEST		
		VIBRATION [mm]	MONITOR DISPLAY[mm]	1	2	RESULT
			FND DISPLAY	FND DISPLAY		
1	TEST POINTS	0.00	0.00			
		1.00	1.00			
		2.00	2.00			
		3.00	3.00			
		4.00	4.00			
		5.00	5.00			
		6.00	6.00			
		7.00	7.00			
		8.00	8.00			
		9.00	9.00			
		10.00	10.00			



KOMECCO		INSPECTION REPORT		REPORT NO.			
				PAGE		2/3	
2-2. ALARM TEST							
NO.	TEST ITEMS	SETTING POINT	OUTPUT CONTACT	RESULT			
				1	2		
1	VIB. HIGH ALARM OUTPUT	SET. POINT : _____	OVER THAN : N.C				
			LOWER THAN : N.O				
2	SLOW DOWN OUTPUT	SET. POINT : _____	OVER THAN : N.C				
			LOWER THAN : N.O				
3	NORMAL POWER DISPLAY	UPPER LIMIT : 29V LOWER LIMIT : 18V	NORMAL : N.C				
			FAILURE : N.O				
2-3 SYSTEM FAILURE TEST							
NO.	TEST ITEMS	FAILURE ITEMS	ERROR MESSAGE	ALARM OUTPUT CONTACT		RESULT	
				NORMAL	WRONG	1	2
1	SYSTEM FAILURE	POWER FAIL(LOW, HIGH)	99.11	N.C	N.O		
		SENSOR FAILURE	99.22	N.C	N.O		
		USER LOW LIMIT	99.33	N.C	N.O		
		USER HIGH LIMIT	99.44	N.C	N.O		
2-4 CURRENT OUTPUT TEST							
NO.	TEST ITEMS	OUTPUT [mA]	RESULT				
			1	2			
1	Check whether the output of current is 4.0mA after JP1 is shorted, then power is on and JP2 is shorted	4.00					
2	Check whether the output of current is 20.0mA after JP1 is shorted, then power is on and JP3 is shorted	20.00					
2-5 VOLTAGE OUTPUT TEST							
NO.	TEST ITEMS	OUTPUT [V]	RESULT				
			1	2			
1	Check whether the output of voltage is 0.00V after JP1 is shorted, then power is on and JP4 is shorted	0					
2	Check whether the output of voltage is 13.00V after JP1 is shorted, then power is on and JP5 is shorted	13.00					



KOMEKO	INSPECTION REPORT				REPORT NO.			
					PAGE		3/3	

2-6. SLOW DOWN DELAY TIME TEST

NO.	TEST ITEMS				RESULT		REMARK
	POSITIONS	DELAY TIME	POSITIONS	DELAY TIME	1	2	
1	1	20 sec.	9	180 sec.			Note 1) Recommended initial setting : 100 sec.
2	3	60 sec.	B	220 sec.			
3	5	100 sec.	D	260 sec.			
4	7	140 sec.	F	300 sec.			

2-7. CURRENT & VOLTAGE OUTPUT ON ABSOLUTE MODE

NO.	TEST POINTS		THE VALUE OF STANDARD			THE VALUE OF TEST						RESULT	
	CRANKSHAFT POSITIONS		FND DISP.	CURRENT	VOLTAGE	FND DISP.	CURRENT		VOLTAGE				
	mm	mA	mm	mA	V	mm	mA		V				
						1	2	1	2	1	2	1	2
1	3.50	1.984	3.50	9.60	3.50								
	4.50	2.549	4.50	11.20	4.50								
	5.50	3.345	5.50	12.80	5.50								
	6.50	4.300	6.50	14.4	6.50								
	7.50	5.370	7.50	16.00	7.50								
	8.50	6.485	8.50	17.60	8.50								
	9.50	7.575	9.50	19.20	9.50								
	10.50	8.590	10.50	-	10.50								
	11.50	9.358	11.50	-	11.50								
	12.50	9.890	12.50	-	12.50								
	13.50	10.340	13.50	-	-								

REMARKS

- ACCURACY : 1. FROM PROBE INPUT TO DISPLAY, CARANKSHAFT POSITION OUTPUT AND ALARM MONITORING CURRENT OUTPUT : $\pm 5 \%$
 2. SLOW DOWN DELAY TIME : $\pm 1 \%$

※ Note 1) Vibration high alarm set time is the half of slow down time.

INSP. DEPT. : INSPECTOR :	INSPECTOR	CHECKED	APPROVED

