FSCURTIS®

PC

SERVICE MANUAL

SCREW COMPRESSOR

PDS265S-4B2/5B2	→ FAC-75P/75B (YANMAR)
PDS265SC-4B2/5B2	→ FAC-75PC/75BC (YANMAR)
PDS265SD-4B2/5B2	

HOKUETSU INDUSTRIES CO., LTD.

Preface

This service manual explains about the cautions for maintenance jobs and is to serve a guide for the electric system, and troubleshooting for service personnel.

In this book the fundamental matters and other things already mentioned in the “Instruction Manual” and the “Parts Catalog” are omitted to avoid duplication.
Therefore, for the operation and handling of this unit, we request you to refer to the instruction manual and caution plates, and further for the structure and components of the unit, please refer to the “Parts Catalog” separately to be supplied with the unit.
If you should find any description which does not coincide with the instruction manual and parts catalog, we request you to make sure to start the job after clarifying it.

Service personnel is required to safely take quick and proper countermeasures as well as to use correct technology of maintenance in case of field services and periodical maintenance. It is important that service personnel should have proper and sufficient knowledge about the structure and function of the unit and should be well familiar with such technique mentioned in them.

Regarding the part numbers mentioned in this manual, we request you to refer to the Parts catalog separately supplied together with the unit, because the parts numbers in this manual are sometimes changed.

Table of Contents

1. Specification

1.1 Specifications

Item	unit	PDS265S<SC>[SD]-4B2	PDS265S<SC>[SD]-5B2
●Weight・Mass			
Overall length (with drawbar laid down)	mm	2,980	—
Overall length (Bonnet only)	mm	2,050	
Overall width	mm	1,630	1,200
Overall height	mm	1,715	1,250
Tire		6.5-14 8PR	—
Net dry mass	kg	1,320<1,340>	1,150<1,180>
Operating mass	kg	1,460<1,480>	1,290<1,320>
●Compressor			
Free air delivery	m^3/min	7.5	
Working pressure	MPa	0.69	
Pressure of pressure control valve	MPa	0.4	
Burst pressure of safety valve	MPa	1.0	
Ambient conditions: temperature	℃	−15 to +40	
Ambient conditions: altitude	m	less than 1,500	
●Engine			
Type		YANMAR 4TNV98T-NHK	
Rated output	kW/min^{-1}	61.2/2,500	
Fuel consumption	g/kW・h	250	
Rated RPM	min^{-1}	2,500	
RPM at unload conditions (max./min.)	min^{-1}	2,700/1,400	
Net dry mass	kg	245	
●Lubricating oils			
Engine oil capacity (H/L level)	L	10.5/6.0	
Compressor oil capacity (including receiver tank and oil cooler etc.)	L	30.0	
Compressor oil capacity to be filled		Ambient temperature -15℃～40℃ : MOBIL: RARUS 424 SHELL: CORENA OIL RS32 CALTEX: COMPRESSOR OIL RA32	
Coolant capacity	L	10.0	
Fuel tank capacity	L	115	
●Emergency stop devices			
Actuating pressure of oil pressure switch	MPa	0.05	
Actuating temperature of water temperature switch	℃	110	
Actuating pressure of discharge air temperature switch	℃	120	
●Warning devices			
Actuating pressure of discharge air temperature switch	℃	115	
Actuating temperature of water temperature switch	℃	107	
Battery failure		When not charged	
Actuating pressure of air filter indicator	kPa	6.2	
Fuel residual level gauge	L	less than about 9.0	
●Fuel consumption ratio (for reference only)			
At full load	L/Hr	15.0	
At 70% load / At 50% load	L/Hr	10.0/9.0	
At no load/ At purge operation	L/Hr	5.4/3.8	

1. Specification

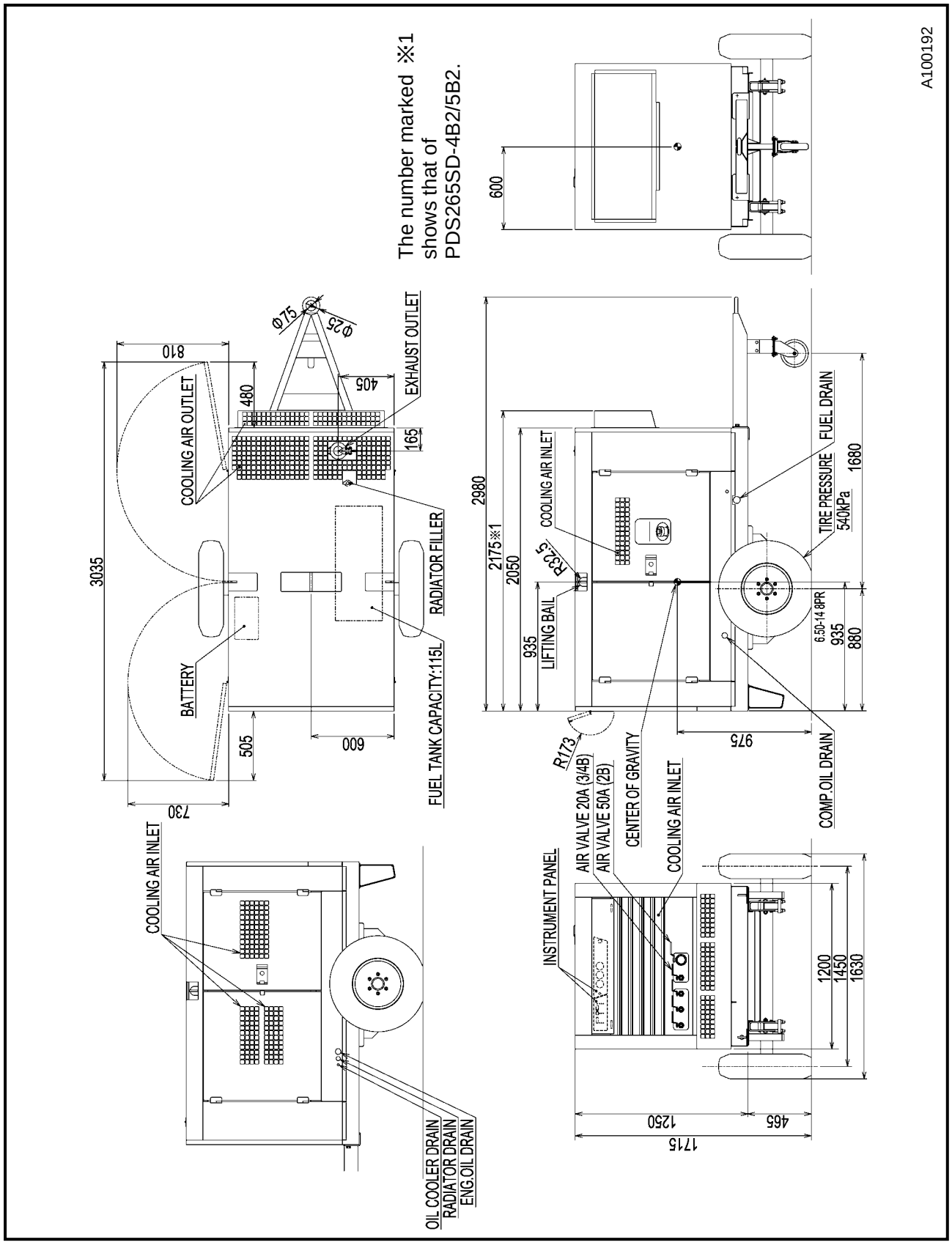
1.2 Set Value

Item	unit	PDS265S<SC>-4B2	PDS265S<SC>-5B2
●Safety devices			
Discharge air temperature	℃	120	
Engine oil pressure	MPa	0.05	
Engine coolant temperature	℃	110	
Fuel residual level	L	less than about 9.0	
●Set value			
Air filter differential pressure	kPa	6.2	
Pressure control valve	MPa	0.4	
Actuating pressure of safety valve	MPa	1.0	
Unload starting pressure	MPa	0.69	
Time for starting purge mode operation (On AUTO IDLE type operation)	sec	10 to112 (Set at 10 sec. ex.works)	
●Engine RPM			
Rated RPM	min^{-1}	2,500	
RPM at unload	min^{-1}	1,400	
●Indications of gauges or instruments during operation			
Discharge pressure gauge (at full load)	MPa (kgf/cm^2)	0.4 to 0.69 (4.1 to 7.0)	
Discharge pressure gauge (at no load)	MPa (kgf/cm^2)	0.8 to 0.9 (8.1 to 9.2)	
Discharge pressure gauge (at purge operation)	MPa (kgf/cm^2)	0.4 to 0.5 (4.1 to 5.1)	

1. Specification

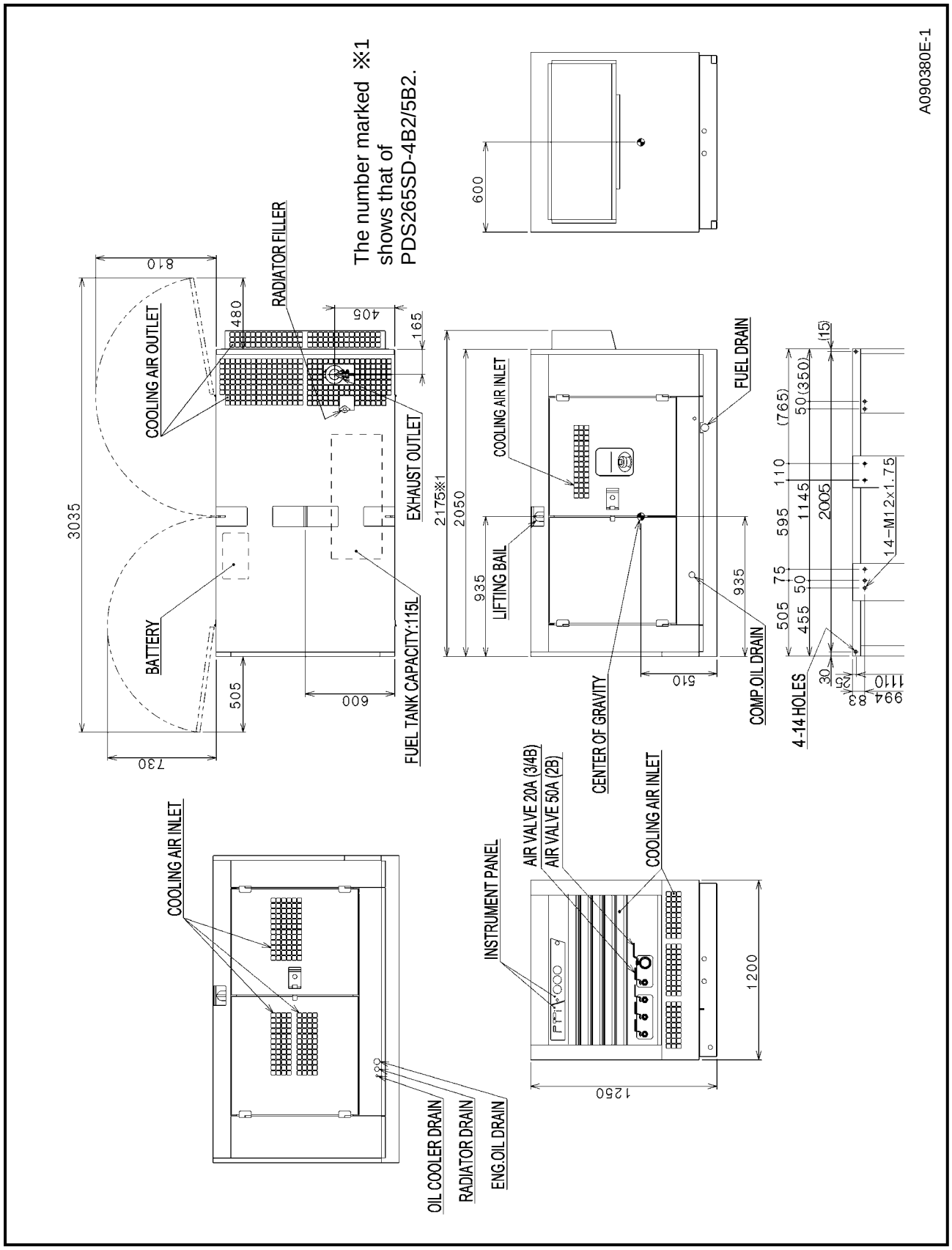
1.3 Outline drawing

PDS265S-4B2
PDS265SC-4B2
PDS265SD-4B2

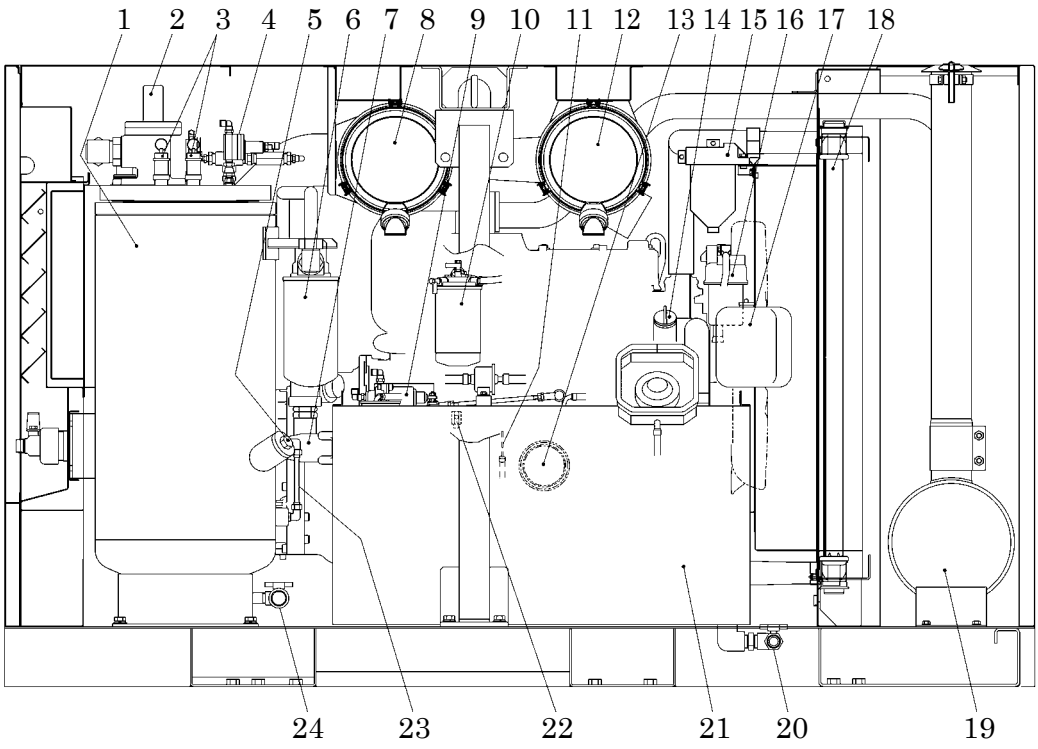


1. Specification

PDS265S-5B2
PDS265SC-5B2
PDS265SD-5B2

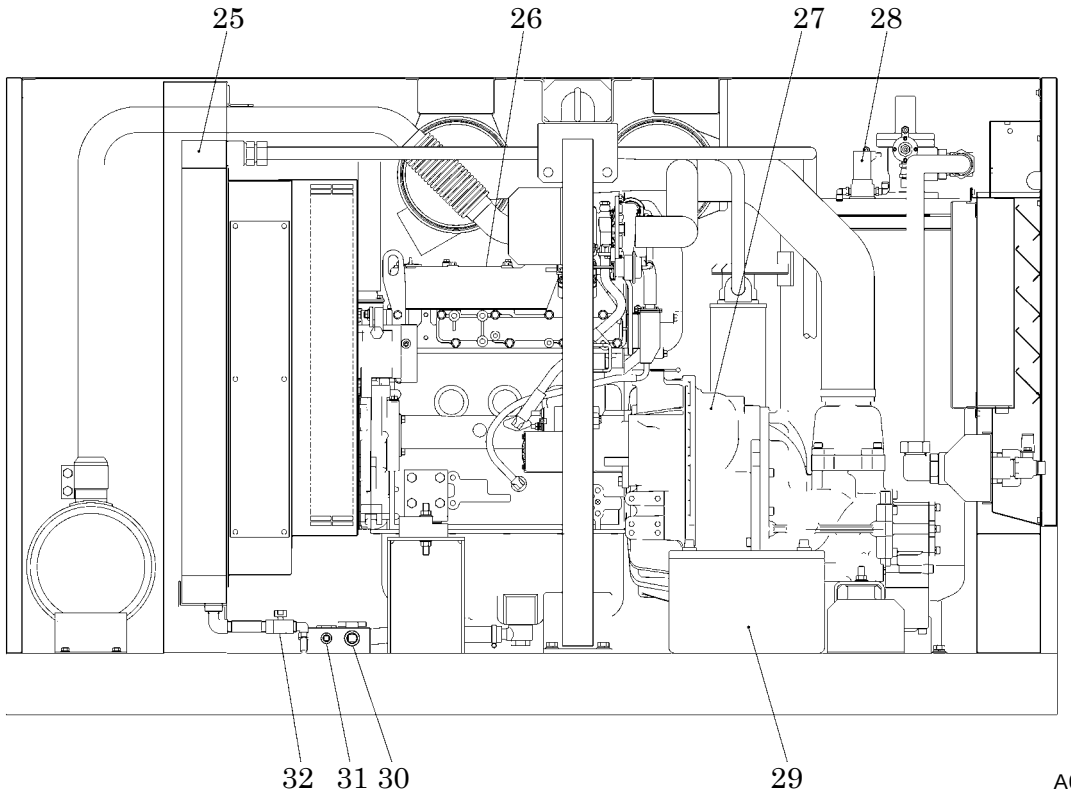


1.4 Internal Components and Part Names



PDS265S-5B2

No.	Description	Function
1	Separator receiver tank	For separating compressor oil from compressed air sent into the tank.
2	Pressure control valve	For keeping the receiver tank pressure higher than 0.4MPa in the tank.
3	Safety valve	For releasing compressed air to the atmosphere when the pressure rises higher than the rated pressure.
4	Pressure regulator	For adjusting intake air volume (into compressor air-end)
5	Compressor oil filler port	For supplying and replenishing compressor oil.
6	Compressor oil filter	For filtering compressor oil circulating in the system.
7	By-pass valve	For keeping compressor oil at optimum temperature.
8	Air filter (For compressor)	For filtering the dust floating in the intake air.
9	Speed regulator	For regulating revolution speed of compressor air-end.
10	Fuel filter	For filtering dust and foreign matter mixed or to be mixed in the fuel oil.
11	Engine oil level gauge	For checking engine oil level.
12	Air filter (For engine)	For filtering the dust floating in the intake air.
13	Engine oil filter	For filtering engine oil.
14	Engine oil filler port	For supplying and replenishing engine oil to engine.
15	Fuel pre filter	For filtering dust and foreign things mixed in fuel oil and also for separating water.
16	Sedimenter	For separating water mixed or to-be miixed in the fuel oil.
17	Reserve tank	For checking engine cooling water level and for replenishing cooling water.
18	Radiator	For cooling the coolant for engine because it is water-cooled.
19	Exhaust muffler	Equipment which muffles an engine exhaust sound.

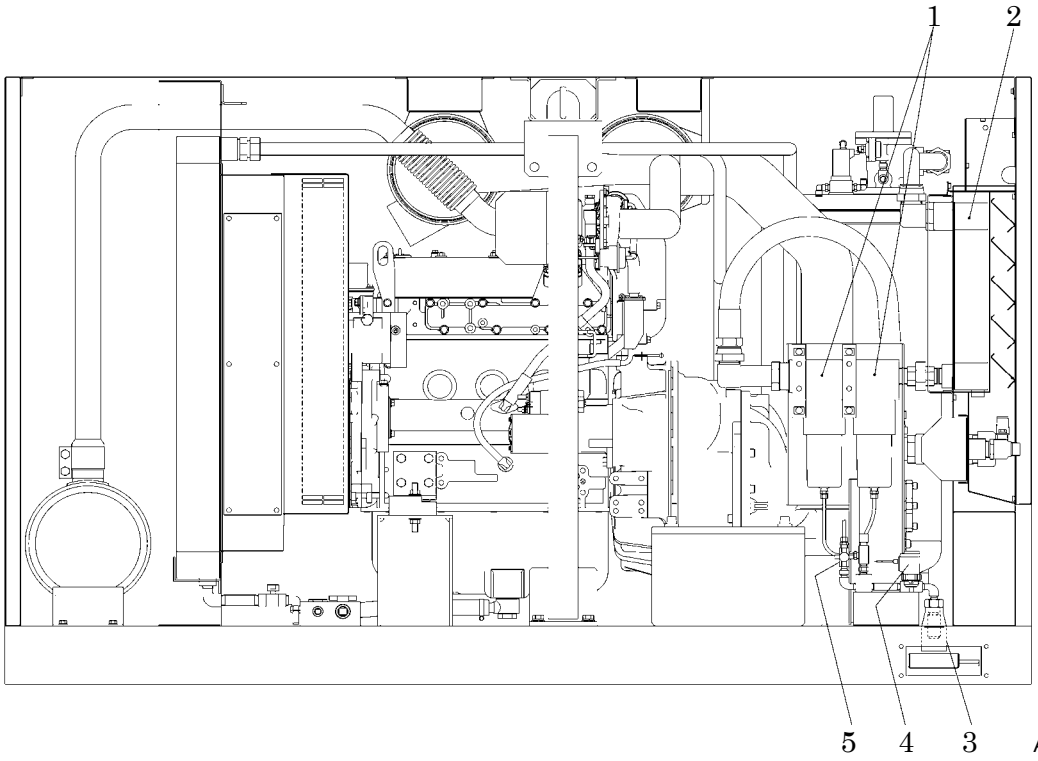


PDS265S-5B2

No.	Description	Function
20	Fuel tank drain valve	For draining condensate and water accumulated at the bottom of the fuel tank.
21	Fuel tank	For storing diesel fuel oil.
22	Coolant drain valve	For draining condensate from engine.
23	Compressor oil level gauge	For checking compressor oil level.
24	Compressor oil drain valve	For draining compressor oil from separator receiver tank.
25	Oil cooler	For cooling compressor oil circulating in the system.
26	Engine	For driving the compressor.
27	Air-end	For compressing intake air.
28	Solenoid valve (SV1)	For controlling starting unloader operation and purge operation.
29	Battery	For electrically starting engine.
30	Engine oil drain valve	For draining engine oil for replacement of it and for maintenance
31	Radiator drain valve	For draining condensate accumulated at the bottom of radiator.
32	Oil cooler drain valve	For draining condensate accumulated at the bottom of oil cooler.

[After cooler type]

Only the special devise additionally or optionally attached to the standard unit are shown in the following figure. For the details of the other standard devices, refer to page 2-1,2-2.



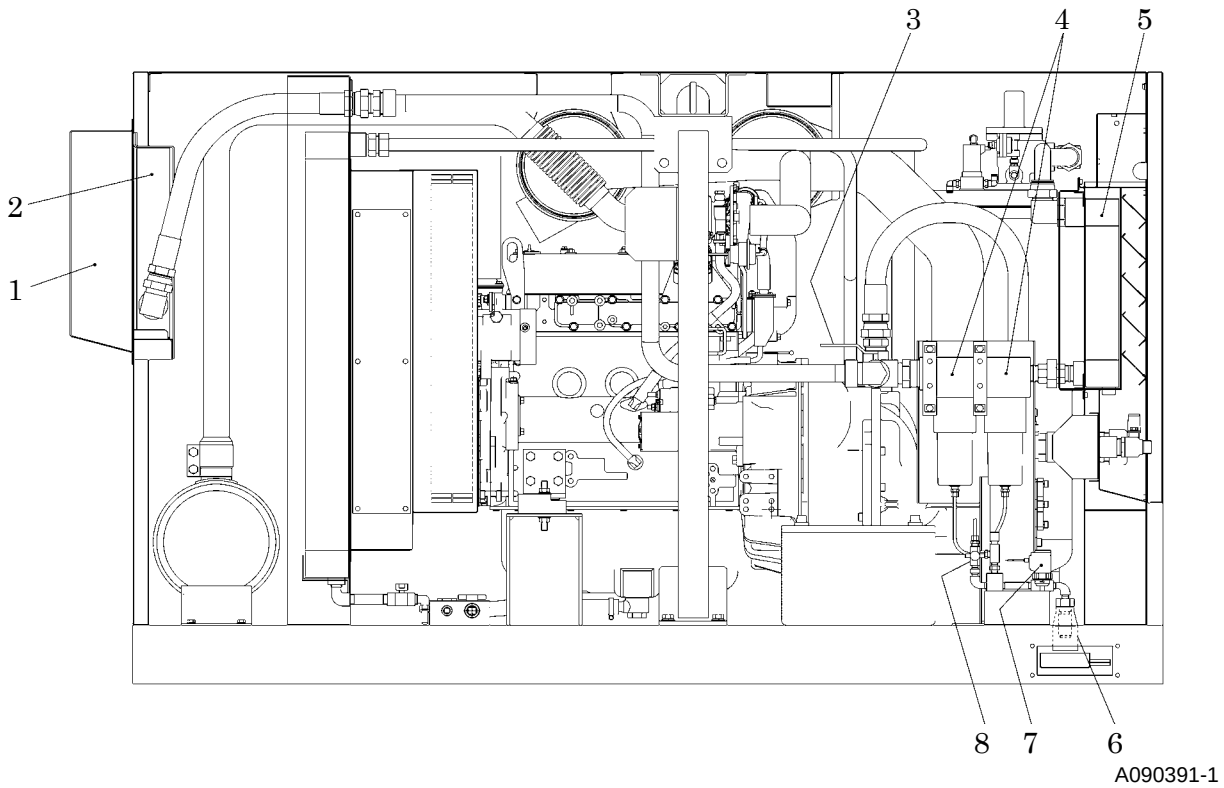
PDS265SC-5B2

No.	Description	Function
1	Drain separator	For separating water from compressed air cooled through oil cooler.
2	After cooler	For cooling compressed air.
3	Drain port of air pipe	For collecting condensate and draining it.
4	Solenoid valve (SV2) AUTO IDLE type only	For draining condensate from drain separator.
5	Drain warming valve	For preventing freezing of water separated through drain separator when exhausting it.

1. Specification

[Dry air type]

Only the special devise additionally or optionally attached to the standard unit are shown in the following figure. For the details of the other standard devices, refer to page 2-1,2-2.



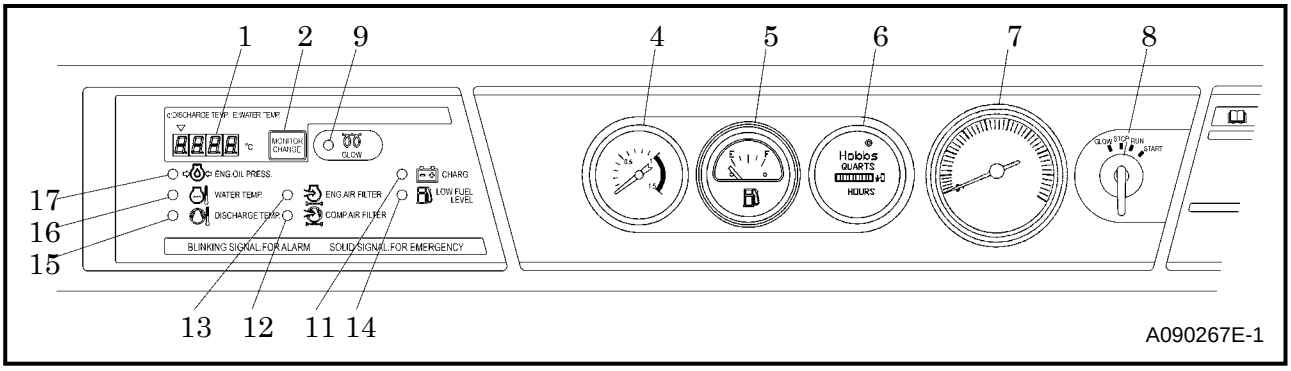
PDS265SD-5B2

No.	Description	Function
1	Duct of cooling air outlet	For discharging cooling air from machine unit
2	After warmer	For raising compressed air temperature
3	Temperature selection valve	For selection between low temperature and high temperature
4	Drain separator	For separating water from compressed air cooled through oil cooler.
5	After cooler	For cooling compressed air.
6	Drain port of air pipe	For collecting condensate and draining it.
7	Solenoid valve (SV2) AUTO IDLE type only	For draining condensate from drain separator.
8	Drain warming valve	For preventing freezing of water separated through drain separator when exhausting it.

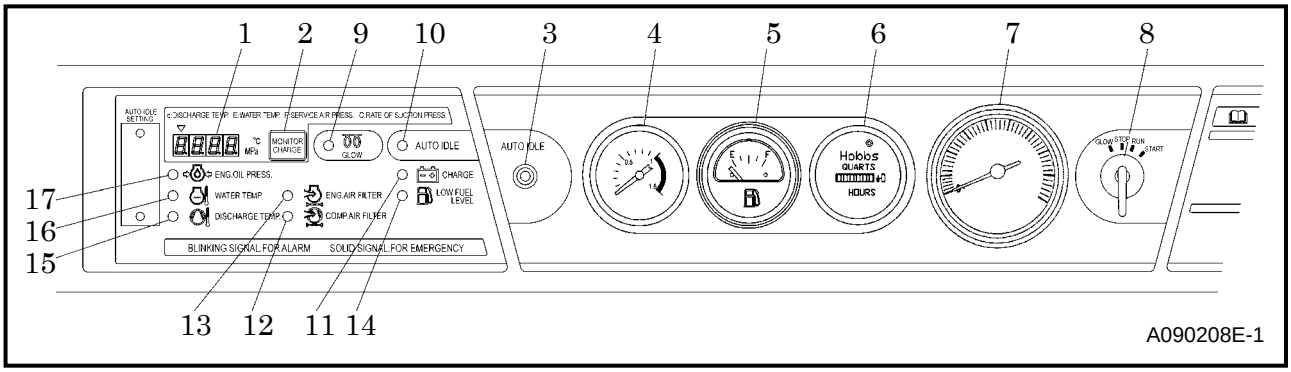
1. Specification

1.5 Instrument panel

[Standard type]



[AUTO IDLE type (option to be arranged at factory)]



1. Digital monitor indicator
   (temp. /pressure/ rate of suction press.)
2. Selector switch for digital monitor indication
3. Auto idle switch (purge control)
   [Option to be arranged at factory]
4. Discharge air pressure
   (for pressure in separator receiver tank)
5. Fuel level gauge
6. Hour meter
7. Tachometer (option to be arranged at factory)
8. Starter switch

＜Indicator lamp＞

9. Glow
10. Auto idle (purge control)
    [Option to be arranged at factory]

＜Warning lamp＞

11. Charge
12. Compressor air filter clogging
13. Engine air filter clogging
14. Low fuel level

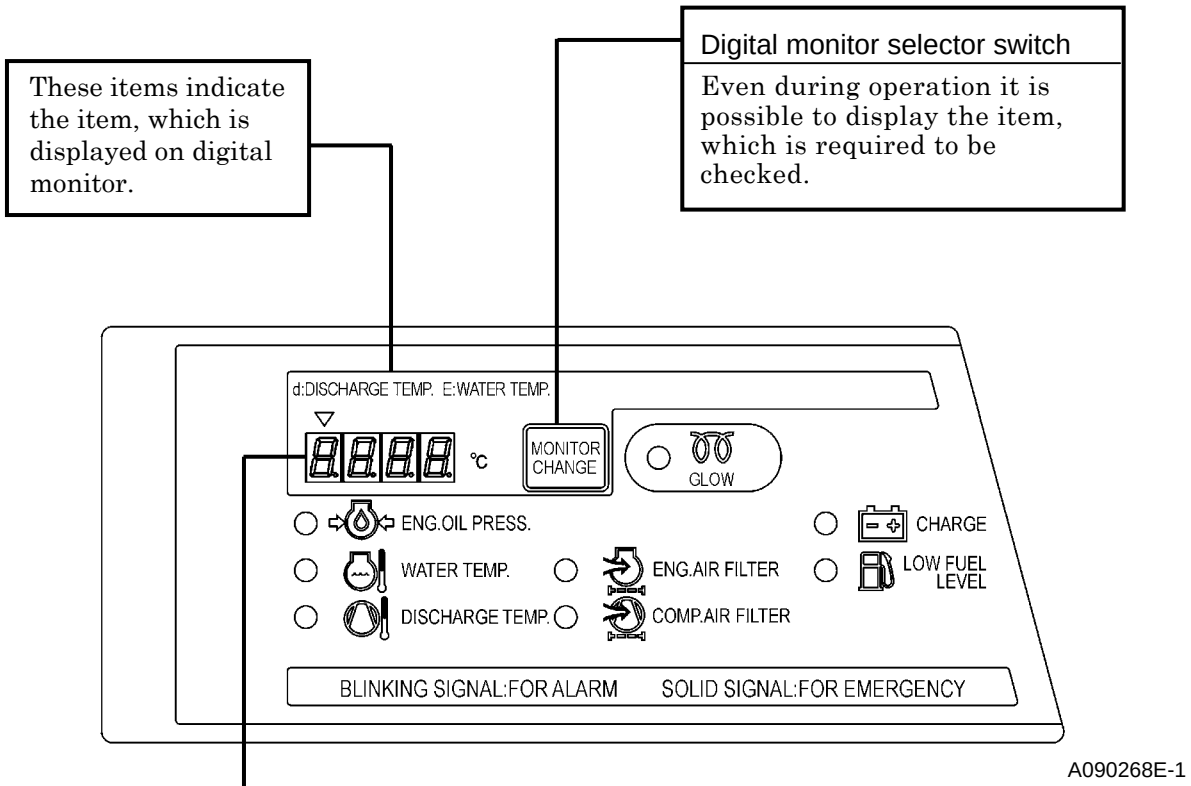
＜Emergency stop lamp＞

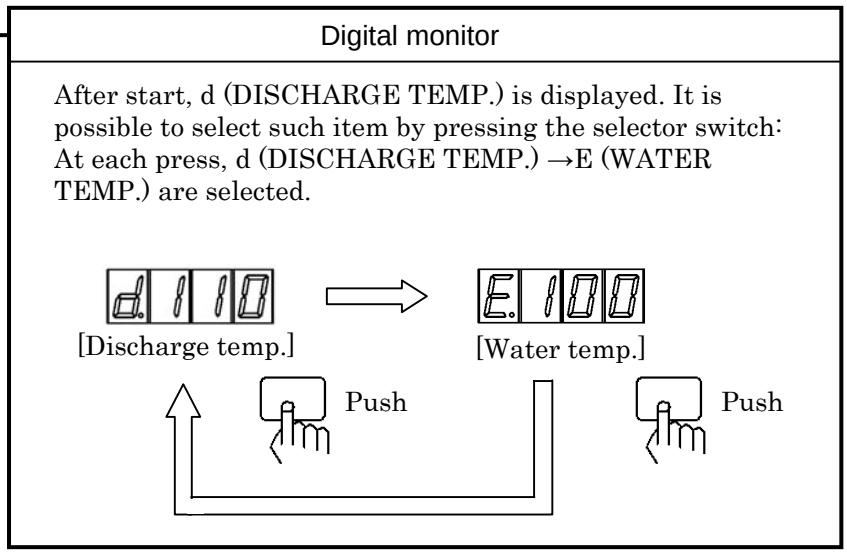
15. Discharge air temperature
16. Water temperature
17. Engine oil pressure

1.5.1 Digital monitor indicator

- Place starter switch “RUN” and then digital monitor indicator goes on.
- Press monitor selector switch for selection of digital monitor display.

[Standard type]



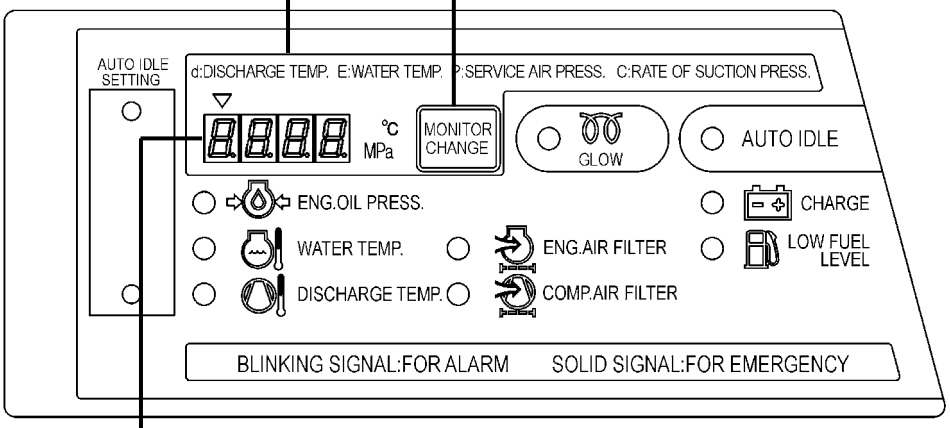


[AUTO IDLE type (option to be arranged at factory)]

These items indicate the item, which is displayed on digital monitor.

Digital monitor selector switch

Even during operation it is possible to display the item, which is required to be checked.



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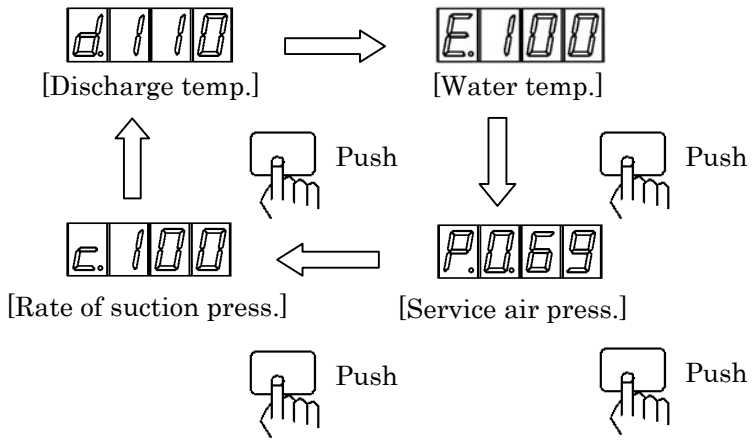
Digital monitor

After start, d (DISCHARGE TEMP.) is displayed. It is possible to select such item by pressing the selector switch: At each press, d (DISCHARGE TEMP.) →E (WATER TEMP.) →P (SERVICE AIR PRESS.) →C (RATE OF SUCTION PRESS.) are selected.



1.5.2 Indicator lamp

Indicator lamp

Turn the starter switch to “RUN” position. Then the lamp goes on.

Item	Contents	Measures	Monitor
GLOW	Press starter switch “GLOW” and the lamp goes on and after preheating is finished, the lamp will be off.	——	
AUTO IDLE (Option to be arranged at factory)	AUTO IDLE switch (purge control) “ON” and then lamp goes on.	——	——

Warning lamp

When some little trouble occurs during operation, the lamps will flickers.
When the warning lamp flickers, take appropriate measures to recover the situation swiftly.

Item	Contents	Measures	Monitor
DISCHARGE TEMP.	Lamp flickers when the air temperature at the outlet of the air-end reaches the set temperature of 115℃.	See “Troubleshooting”	
WATER TEMP.	Lamp flickers when coolant temperature reaches 107℃.		
CHARGE	Lamp flickers when alternator is not charging.	Check wiring. Check alternator.	
COMP. AIR FILTER	Lamp flickers when air filter gets clogged and suction resistance increases. [Actuating resistance is more than 6.2kPa.]	Clean Replace	
ENG. AIR FILTER			
LOW FUEL LEVEL	Lamp flickers when fuel level in fuel tank becomes lower and it drops less than about 9L.	See “Troubleshooting”	

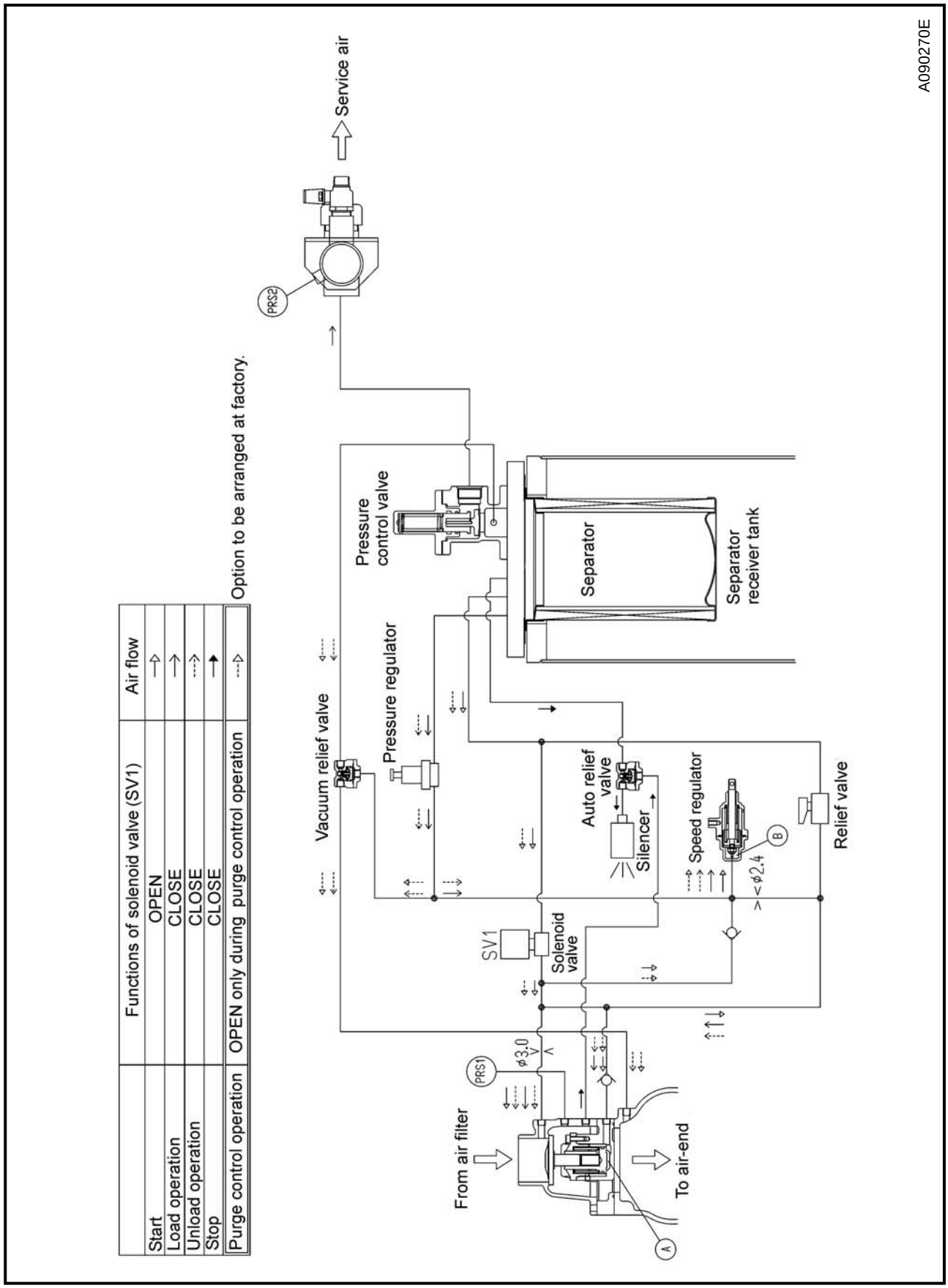
Emergency stop lamp

The compressor stops when the emergency stop lamp goes on.
Be sure to follow the measures shown below before starting the unit again.

Item	Contents	Measures	Monitor
DISCHARGE TEMP.	Lamp goes on when the air temperature at the outlet of the air-end reaches the set temperature of 120℃.	See “Troubleshooting”	
WATER TEMP.	Lamp goes on when coolant temperature reaches 110℃.		
ENG. OIL PRESS.	Lamp goes on when engine oil pressure drops. [The function pressure is below 0.05MPa.]		

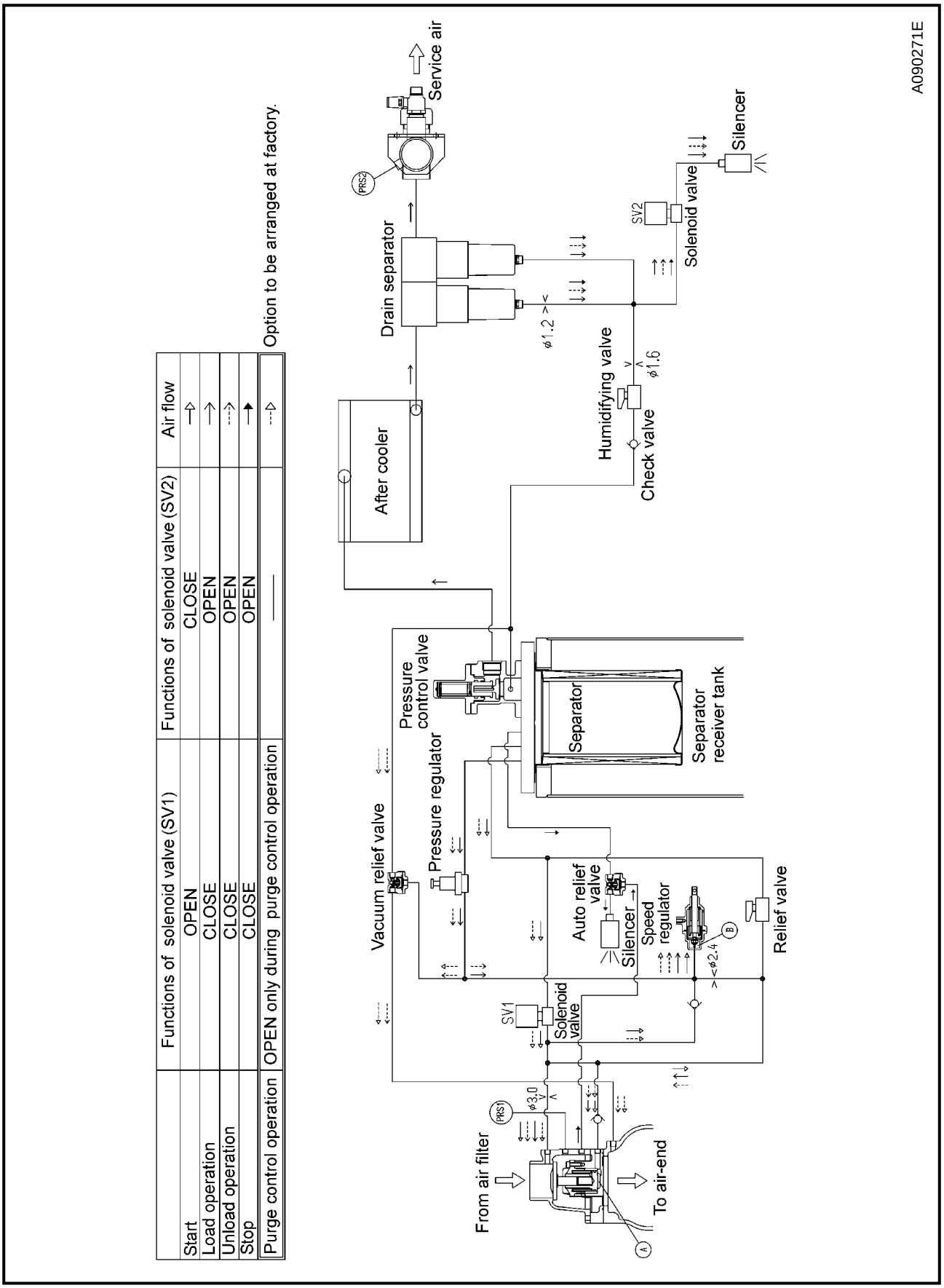
1.6 Capacity Control Device

[Standard type]



	Functions of solenoid valve (SV1)	Air flow
Start	OPEN	→
Load operation	CLOSE	→
Unload operation	CLOSE	⇢
Stop	CLOSE	←
Purge control operation	OPEN only during purge control operation	⇢

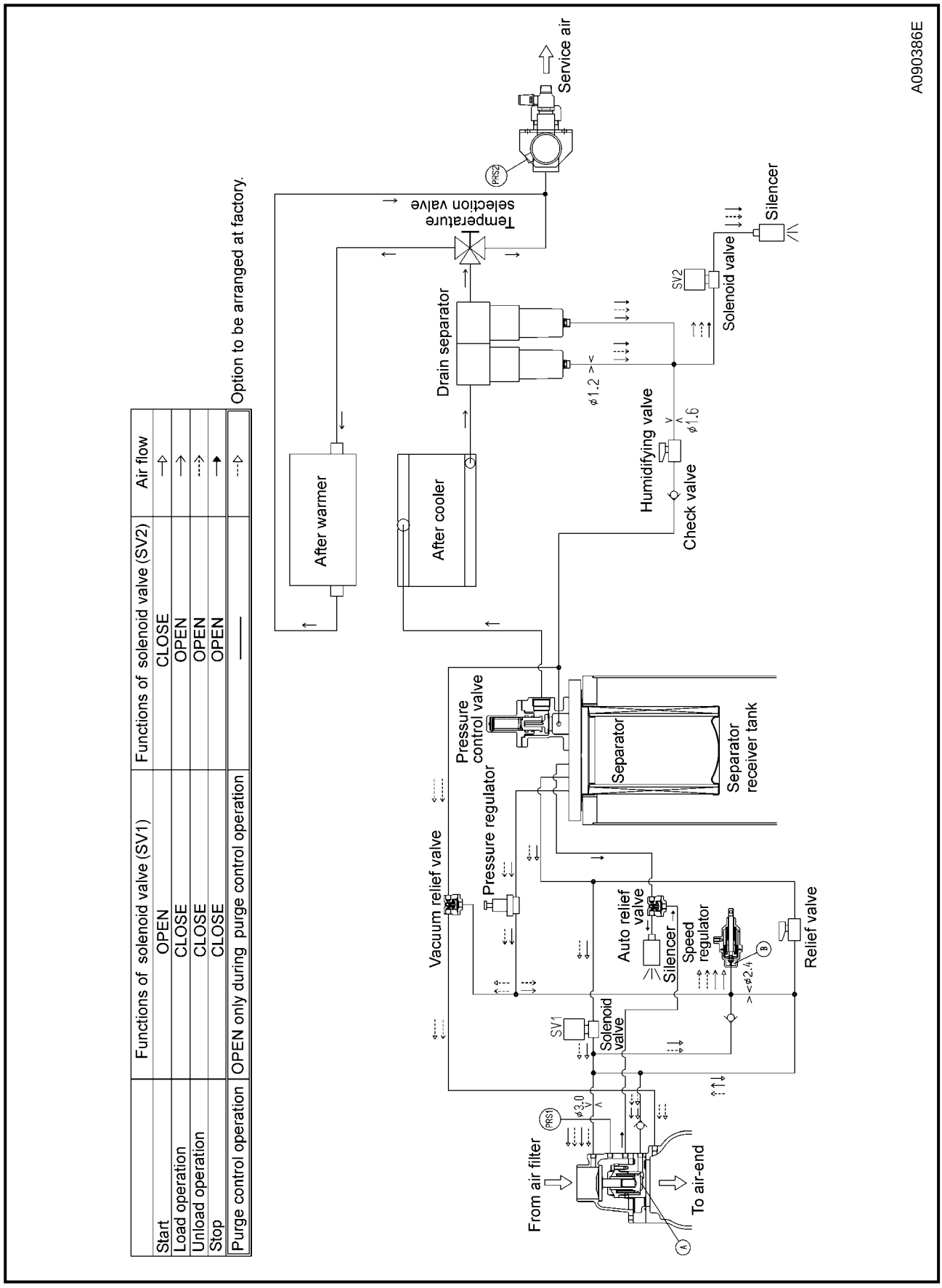
[After cooler type]



	Functions of solenoid valve (SV1)	Functions of solenoid valve (SV2)	Air flow
Start	OPEN	CLOSE	—▷
Load operation	CLOSE	OPEN	—▷
Unload operation	CLOSE	OPEN	---▷
Stop	CLOSE	OPEN	---▲
Purge control operation	OPEN only during purge control operation	——	---▷

Option to be arranged at factory.

[Dry air type]



	Functions of solenoid valve (SV1)	Functions of solenoid valve (SV2)	Air flow
Start	OPEN	CLOSE	—▷
Load operation	CLOSE	OPEN	—▷
Unload operation	CLOSE	OPEN	---▷
Stop	CLOSE	OPEN	▶
Purge control operation	OPEN only during purge control operation	——	---▷

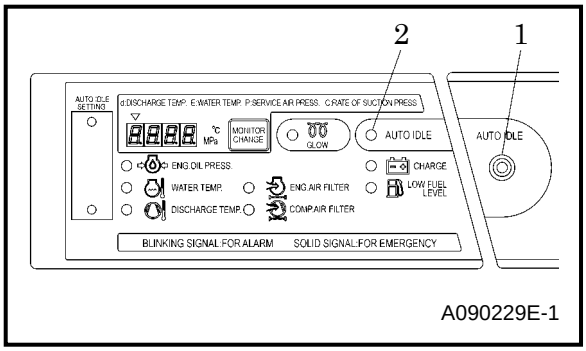
Step	Response
Start	When starting operation, solenoid valve (SV1) opens. [Solenoid valve (SV2) closes.] And compressed air is sent to unloader chamber Ⓐ and speed regulator chamber Ⓑ. The pressure in chamber Ⓐ rises soon, and unloader valve fully closes due to low pressure. Thus the load required for starting is reduced.
Load operation	After starting operation, SV1 valve closes after 10 seconds have passed. The air volume sent to the chambers Ⓐ and Ⓑ from pressure regulator increases or decreases according to the rise and drop of discharge air pressure. Thus according as unloader valve position and engine speed change, free air delivery is steplessly and automatically regulated from 0 to 100%. [Solenoid valve (SV2) opens and it drains condensate water.]
Suction port closing unload operation	When air consumption is reduced, and the pressure exceeds the rated one, speed regulator functions to lower the engine speed in proportion to the pressure rise and, at the same time, to close unloader valve. Under unloaded operation, the interior of compressor air-end becomes vacuum and vacuum noise is caused. In order to prevent occurrence of vacuum noise, it functions to open the vacuum relief valve, detecting the secondary pressure of pressure regulator and thus it prevents high vacuum state inside the compressor air end from being caused.
Purge control unload operation (Option to be arranged at factory)	When the certain set time (it can be changed.) has passed at lower pressure than the set negative pressure, detecting the negative pressure inside the compressor air end with a pressure sensor PRS1, solenoid valve (SV1) opens [solenoid valve (SV2) closes.] and it closes unloader valve. At the same time, it functions to relieve the compressed air from separator receiver tank to the atmosphere and thus it lowers the pressure. Thus the compressor power is saved. When air consumption increases, and the pressure used for load drops below the set pressure, pressure sensor PRS2 detects it and it disengages the purge control (SV1 closes) to start full load operation.
Stop	When stopping operation, it opens Auto relief valve to relieve the compressed air in separator receiver tank to atmosphere, detecting the pressure inside compressor air-end.

1.6.1 AUTO IDLE control (Purge control)

This model is equipped with auto idle control operation mode. This operation mode is recommendable for such use: not so much air consumption is required and it is used continuously and also power consumption under unloaded operation is required to be saved. Use this mode, depending upon the need and demand. For the selection of this mode, switch on "AUTO IDLE" on the operation panel.

Select this operation mode freely, according to required air consumption.

<Procedure>
① During operation, push on the auto idle switch"1".
② Then the indicator lamp auto idle "2" goes on.
③ In order to stop this operation mode, push again auto idle switch"1" and then the lamp"2" goes out to disengage this purge control.



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[Function of auto idle control (Purge control)]

Function	Conditions of auto idle lamp
① First engine speed drops to the minimum speed by pressure regulator, owing to reduction of air consumption. Later the air consumption is reduced further, the unloader valve gradually closes and intake negative pressure increases. In this stage, the pressure sensor detects the intake negative pressure. Then when the intake negative pressure becomes higher than the set pressure, the "AUTO IDLE" lamp flickers at short intervals.	Pappa Lamp flickers at short intervals.
② When this condition continues for a certain time, the solenoid valve (SV1) functions to start purge mode operation. Consequently, the pressure inside separator receiver tank drops and reduces the power of compressor air end. In this stage, the lamp "AUTO IDLE" flickers at longer intervals.	Paka Paka Lamp flickers at longer intervals.
③ Next, when the pressure for load down to the purge releasing pressure owing to the increase of air consumption, the solenoid valve (SV1) operation gets "OFF" and it is transferred to normal operation. In this stage, the lamp "AUTO IDLE" goes on.	Lamp goes on.

1.6.2 Setting of "AUTO IDLE" control (purge control) pressure/timer

[Standard set values prior to delivery ex-works]

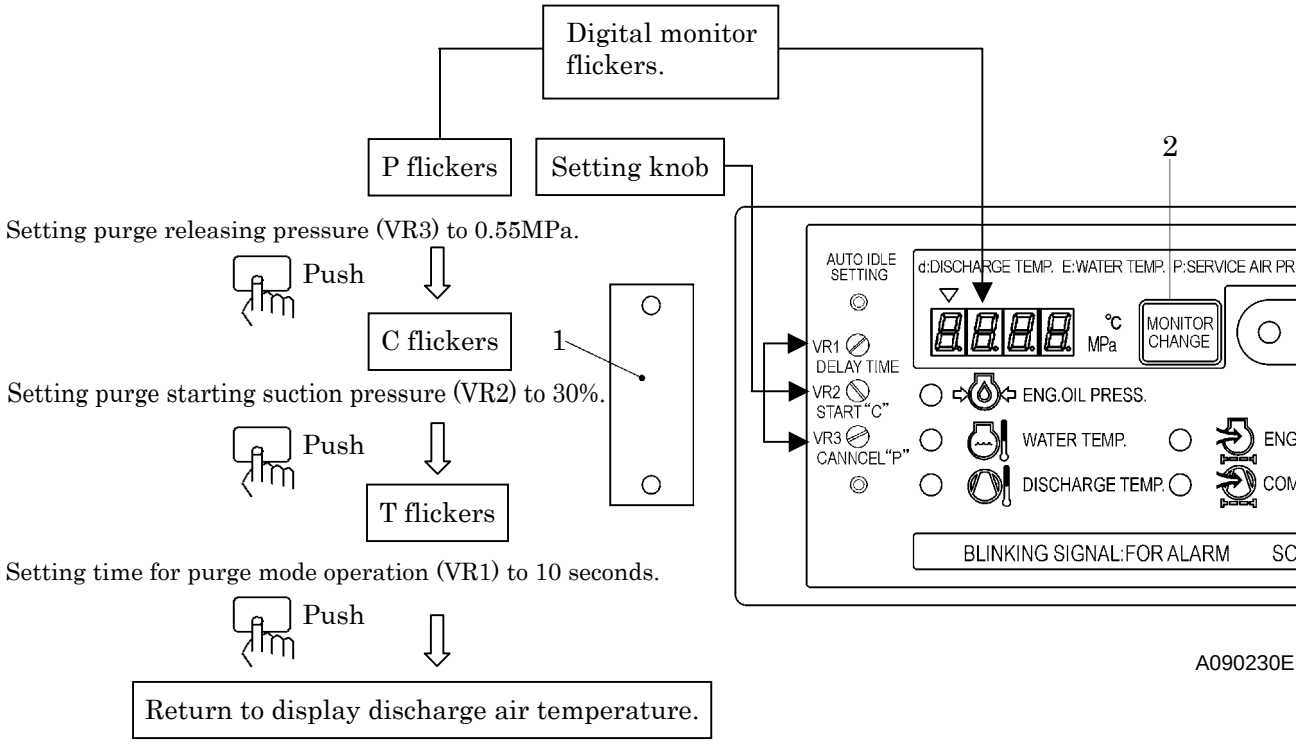
Item	Set prior to delivery ex-works	Setting range
Purge releasing pressure VR3	0.55MPa	0.35-0.66MPa
Purge starting intake negative pressure VR2	30%	0 to 80%
Timer set to be expected for purge modeVR1	10 seconds	10 to 112 seconds

⚠ CAUTION

- Purging mode operation is already arranged prior to delivery from factory. Therefore, it is not necessary to perform any adjustment in usual case.
- For adjustment of VR1, VR2 and VR3, follow the under-mentioned procedures.
- For adjusting set value with knob, turning the knob to left lowers the set value, while turning the knob to right raises the value.

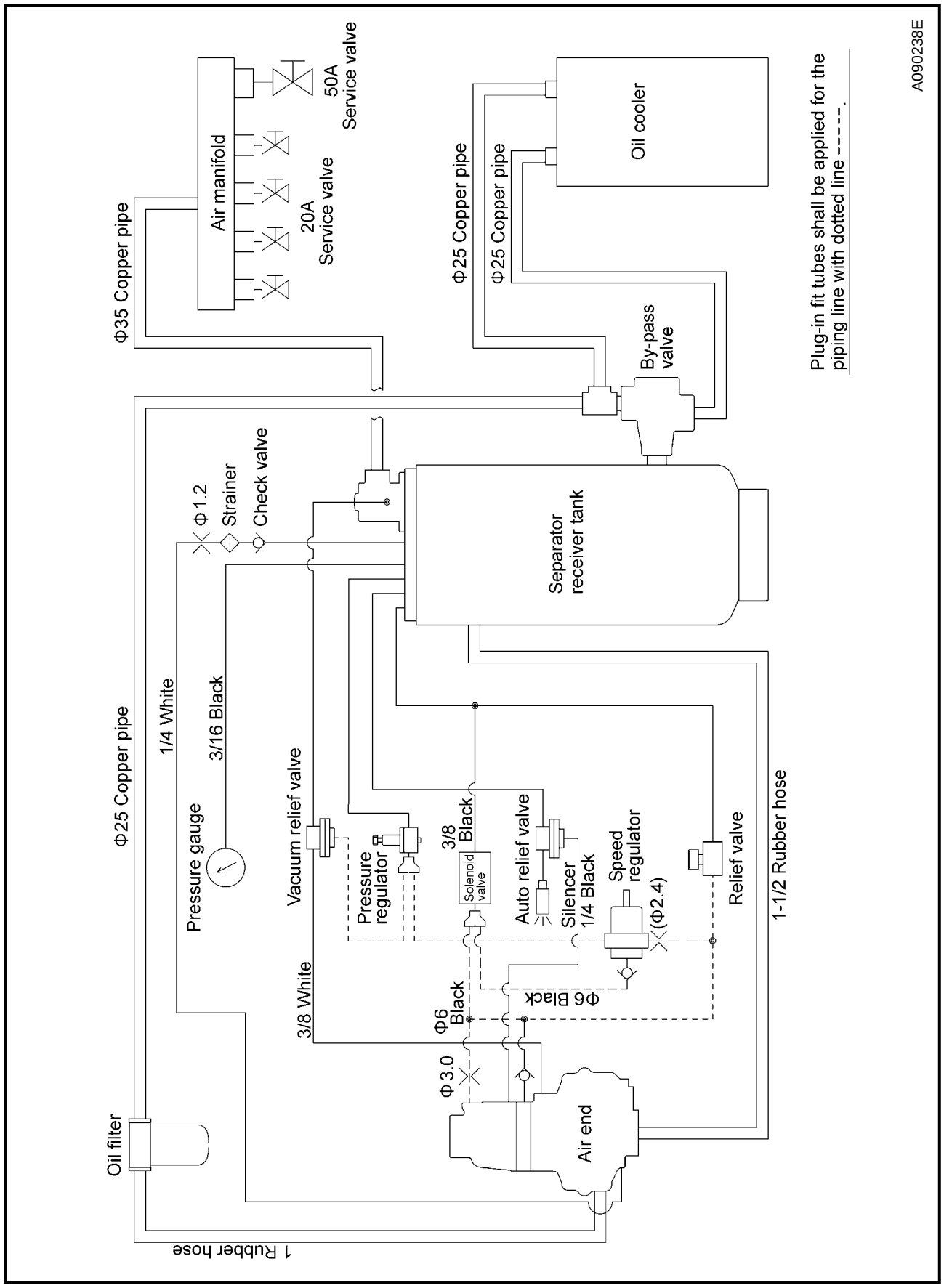
<Procedure>

① Remove the cover"1".
② Place the starter switch "RUN".
③ At first keep pressing digital monitor selector switch"2"for 5 seconds.
④ Then, digital monitor "P" flickers. Adjust the purge release pressure (VR3) to the set pressure value.
⑤ When pushing digital monitor selector switch"2"after having completed setting of VR3, the digital monitor "C" flickers. Then adjust the purge starting suction pressure (VR2) to the set value.
⑥ When pushing digital monitor selector switch"2"after having completed setting of VR2, the digital monitor"1"flickers. Then adjust the time (VR1) for purge mode operation to the set value.
⑦ When pushing the digital monitor selector switch"2"after having completed setting it, the digital monitor returns to display discharge air temperature.
⑧ Install the cover"1"after having completed setting operation mode.

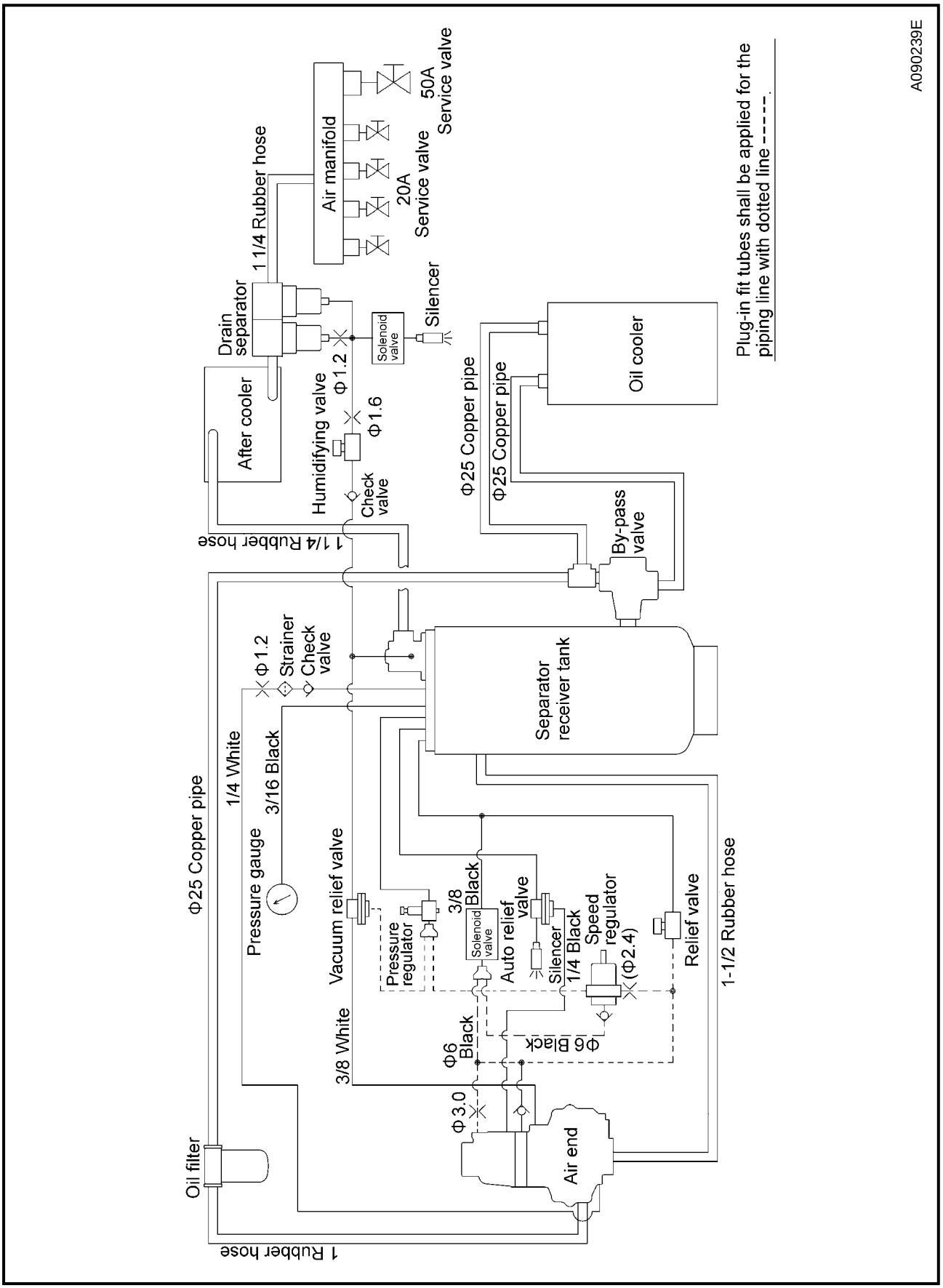


1.7 Piping Diagram

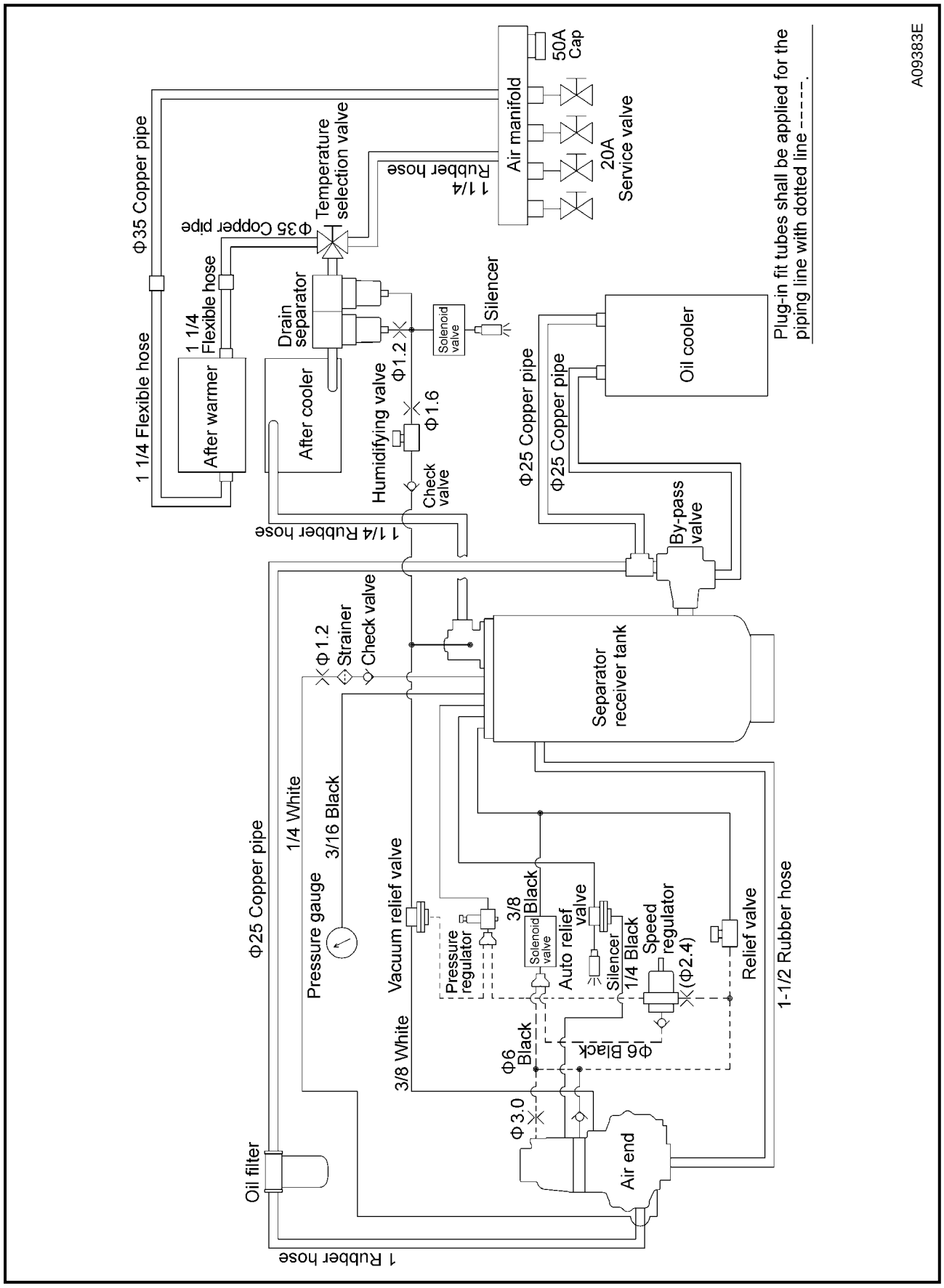
PDS265S-4B2/5B2



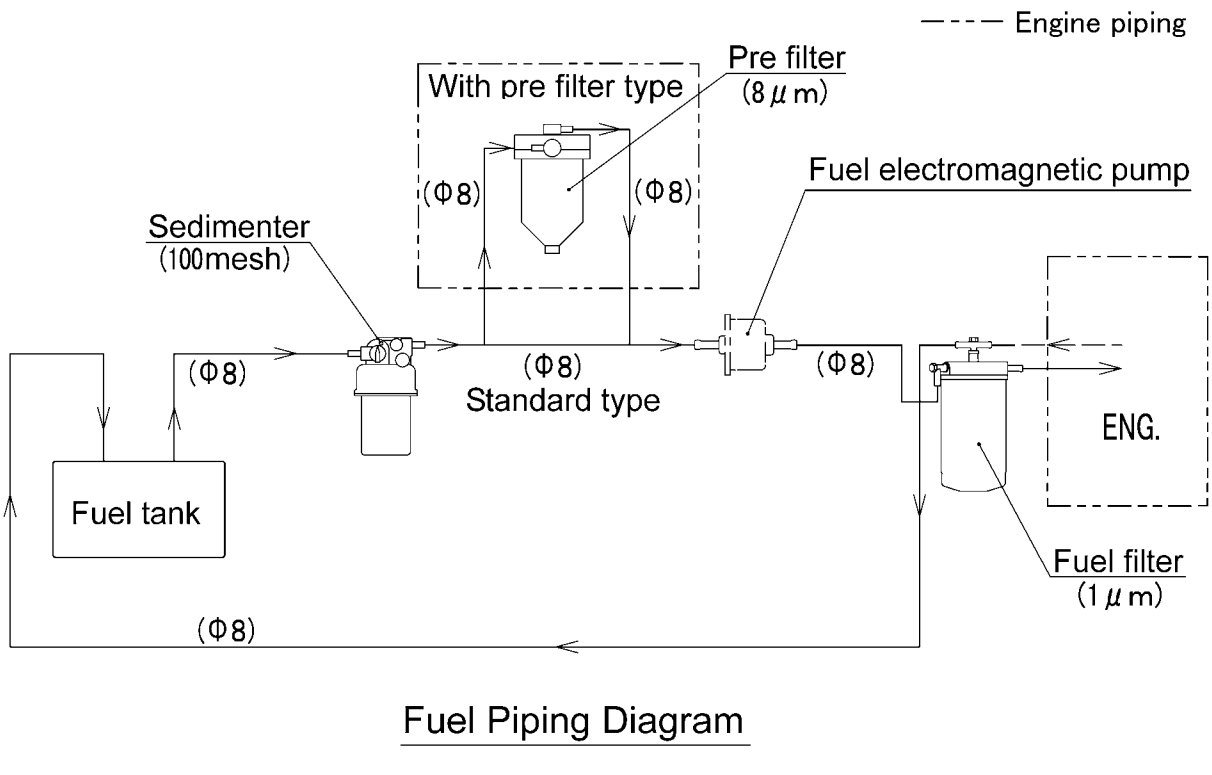
PDS265SC-4B2/5B2 (After cooler type)



PDS265SD-4B2/5B2 (Dry air type)



1.8 Fuel piping



Fuel Piping Diagram

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2. Maintenance

2.1 Cautions for Overhauling

2.1.1 Precautions before starting work

(1) Work to be performed

It is very important to always plan in advance what facilities, tools, instruments, materials, oil, etc. you will need to use; the exact locations and methods of performing inspection, adjustment, or disassembly; and the key points of any repair work to be performed.

(2) Care not to spill oil

Use a pan to collect used compressor oil, engine oil when changing the oil or attaching or detaching an oil line. If a large volume of oil is expected to flow out make, sure to drain any accumulated oil from the reserve tank, engine oil pan in advance.
[Follow the designated regulations to dispose of compressor oil and engine oil.]

(3) Care when detaching parts

When disassembling a complicated part, put a matching mark to indicate the position of detached parts for future reference. Make sure that the negative cable is detached from the battery terminals before starting repair work.

(4) Tools to be prepared

①Measuring instruments (e. g. tester, insulation resistance gauge etc.)
②Tools
③Torque wrenches
④Jigs and specialized tools
⑤Sealing tape
⑥Molybdenum sulfide (tube type)
⑦Lithium extreme pressure type grease
- CALTEX MULTIFAK EP1
- MULTINOC SDX

⑧Diesel oil
⑨Compressor oil
⑩Cleaning cloths
⑪Literatures (such as manuals etc.)

2.1.2 Disassembly and assembly

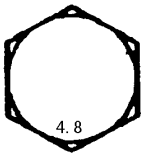
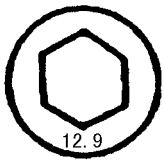
(1) Before removing nylon tubes, hydraulic/fuel hoses, it is necessary to clean the inside of machine to prevent from entrance of dirt and foreign matters.
(2) Perform disassembly work in a dust-free location whenever possible.
(3) When disassembling parts, wash their outer surfaces and place them on a clean sheet of paper or cloth, taking care not to contaminate or damage them.
(4) Wash disassembled parts with diesel oil (cleaning solvent) after checking for contamination or discoloration. However, do not wash rubber parts with diesel oil.
(5) Be careful not to damage disassembled parts, they are precision built.
(6) Replace consumables such as oil seals, O-rings, filters, oil, etc. with new items when reassembling parts.
(7) Apply “CALTEX MULTIFAK EP1” to O-ring surface and “MULTINOC SDX” to sliding portion of oil seal.
(8) When reassembling parts, place each part in the order of assembly and take care that no parts are missing or misassembled.
(9) When reassembling an assembled part (set part), be sure to replace it as an assembly.
(10) Contamination or rusting may occur due to dust or humidity if parts are left in disassembled or partly disassembled condition for a long time. Therefore, be careful to prevent dust or rust from affecting parts if you have to leave the repair incomplete for a long period of time.
(11) Check tightening torque and clearance when assembling parts.
(12) Check the direction of rotation, speed, and oil leakage after assembly.
(13) Before starting the machine after disassembly, run it at low idle to check for unusual noises, etc. to prevent engine or generator damage.

2. Maintenance

2.2 Tightening torque

2.2.1 General bolts and nuts tightening torque

Fasten all the bolts and nuts with the specified tightening torque when assembling.

Kind / Strength and sorting / Width of across flat・Tightening torque / Bolt diameter (mm)	Low or Middle carbon steel bolt (SS400B etc…)		High tensile strength bolt (SCM435 etc…)		
	4.6～6.8（4T～6T）  Hexagon bolts		8.8～12.9（7T～12T）  Socket bolts  Hexagon bolts		
	Hexagon bolts Width of across flat (mm)	Tightening torque N・m (kgf・cm)	Socket bolts Width of across flat (mm)	Hexagon bolts Width of across flat (mm)	Tightening torque N・m (kgf・cm)
6	10	5 (51)	5	10	10 (100)
8	13	12 (124)	6	13	25 (245)
10	17	25 (245)	8	17	49 (485)
12	19	43 (425)	10	19	85 (845)
14	22	68 (675)	12	22	135 (1,350)
16	24	106 (1,055)	14	24	210 (2,100)
18	27	145 (1,450)	14	27	290 (2,900)
20	30	205 (2,050)	17	30	410 (4,100)
22	32	280 (2,800)	17	32	560 (5,600)
24	36	345 (3,450)	19	36	710 (7,100)
Applied sections.	For general sections such as bonnet and frame.		For specified sections.		

IMPORTANT

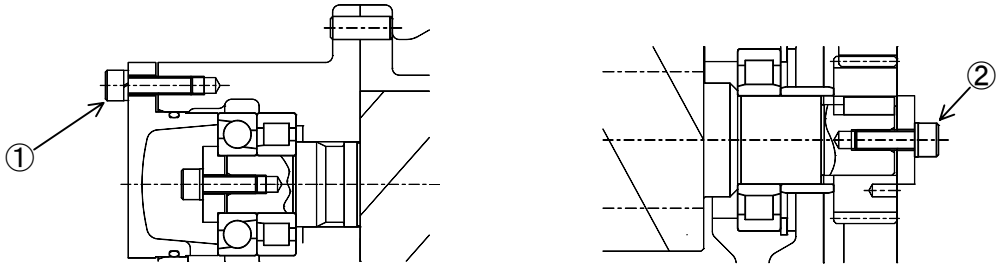
- The above torque values in the table shall be applicable for the bolts and nuts used for machine
- Generally, the abovementioned tightening torques should be followed, but in some points different torque is specified. So use the tightening torque without fail. (See following pages.)
- Make sure to remove rust and dust before tightening.

2.2.2 Tightening torque of such important quality parts as bolts and nuts

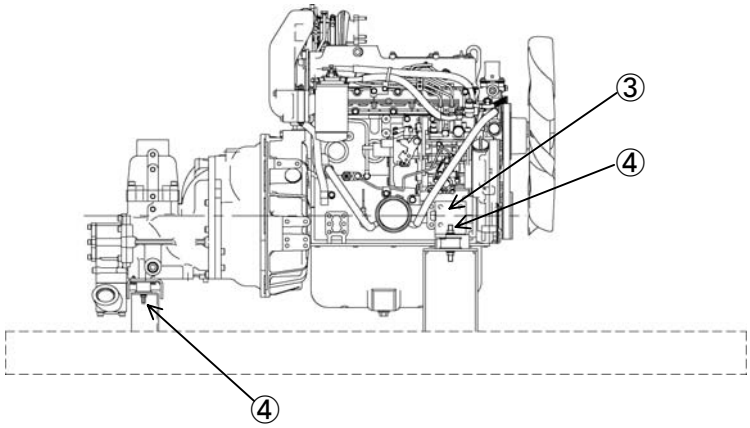
		Application parts & portions		Strength classification		Tightening torque (N·m)										Remarks
				Bolt	Nut	Torque section	Coarse thread / fine thread									
							M6	M8	M10	M12	M14	M16	M18	M20	M22	M24	
1		Air end															
	①	・End cover		10.9	—	4.8	5	12	—	43	—	—	—	—	—	—	for prevention of deformation of outer ring
				12.9	—	4.8	5	12	—	43	—	—	—	—	—	—	for prevention of deformation of outer ring
	②	・Plate holding pinion gear		12.9	—	10.9	—	33	64	—	—	—	—	—	—	—	for prevention from loosening
		・Others		12.9	—	8.8	10	25	49	85	135	210	—	—	—	—	
2		Mounting															
	③	・Mounting bracket		4.8	—	4.8	—	12	25	43	68	105	150	210	—	—	with spring washer
	④	・Vibration isolator ass'y		—	4.8	4.8	—	12	25	43	68	105	150	210	—	—	with spring washer and thick washer
3		Coupling portion between comp. air end and engine															
	⑤	・Housing		4.8	—	4.8	—	12	25	43	68	105	150	210	—	—	with spring washer
	⑥	・Coupling (for installing flywheel)		10.9/12.9	—	8.8	—	25	49	85	135	210	280	410	—	—	with spring washer
	⑦	・Coupling (for installing driving shaft)		12.9	—	8.8	—	25	49	85	135	210	280	410	—	—	with lock washer
	⑧	・Coupling (for installing gear of resin)		10.9	—	8.8	—	25	49	85	135	210	280	410	—	—	with spring washer and thick washer
4		Lifting portion															
	⑨	・Lifting bail (less than M20)		10.9	4.8	6.8	—	18	37	68	105	150	210	—	—	—	with spring washer
		・Lifting bail (more than M20)		10.9	4.8	4.8	—	—	—	—	—	—	—	210	280	345	with spring washer
5		Pressure vessel and pipes															
	⑩	・Separator cover		10.9	—	8.8	—	25	49	85	135	210	280	410	560	710	with spring washer
	⑪	・Press.cont.body		10.9	—	8.8	—	25	49	85	135	210	280	410	560	710	with spring washer
	⑫	・Press.cont.cover		10.9	—	4.8	—	12	25	43	68	105	150	210	280	345	with spring washer ※2
	⑬	・Flange for pipe*	First priority	4.8	4.8	4.8	—	12	25	43	68	105	150	210	280	345	with spring washer
	⑬	・Flange for pipe (less than M20)	Second priority	10.9	8.8 ※3	8.8	—	25	49	85	135	210	290	—	—	—	with spring washer
	⑬	・Flange for pipe (more than M20) ※1	Second priority	10.9	4.8	4.8	—	—	—	—	—	—	—	210	280	345	with spring washer
6		Undercarriage															
	⑭	・Spring bracket		10.9	4.8	6.8	—	18	37	68	105	150	210	305	410	530	with spring washer
	⑮	・U-bolt		10.9	4.8	6.8	—	18	37	68	105	150	210	305	410	530	
	⑯	・Hub,wheel		10.9	8.8	10.9	—	—	49	135	150	280	—	—	—	—	
	⑰	・Draw bar		10.9	4.8	6.8	—	18	37	68	105	150	210	305	410	530	with spring washer
	⑱	・Brake		10.9	4.8	6.8	—	18	37	68	105	150	210	305	410	530	with spring washer
	⑲	・Stand for storing drawbar		10.9	4.8	4.8	—	12	25	43	68	105	150	210	280	345	with spring washer

※1 For larger than M20, tightening torque becomes so big, and so 4.8 or equivalent shall be used.
※2 When fixing parts of aluminum are used, lockwasher shall be used for avoiding damage.
※3 Nut shall be of S45C (equivalent to 8.8 of strength classification).

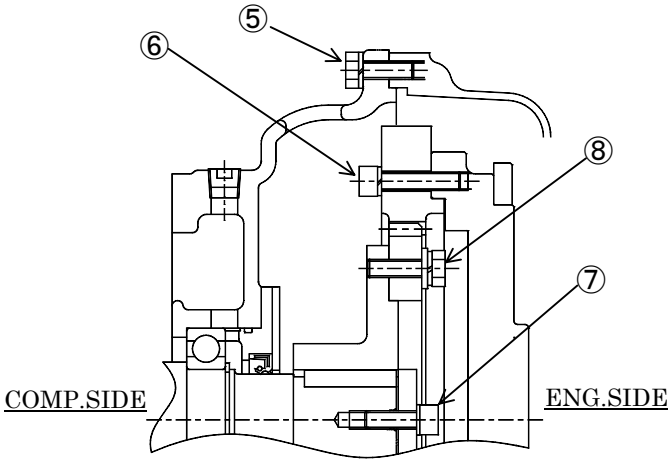
1 Air end



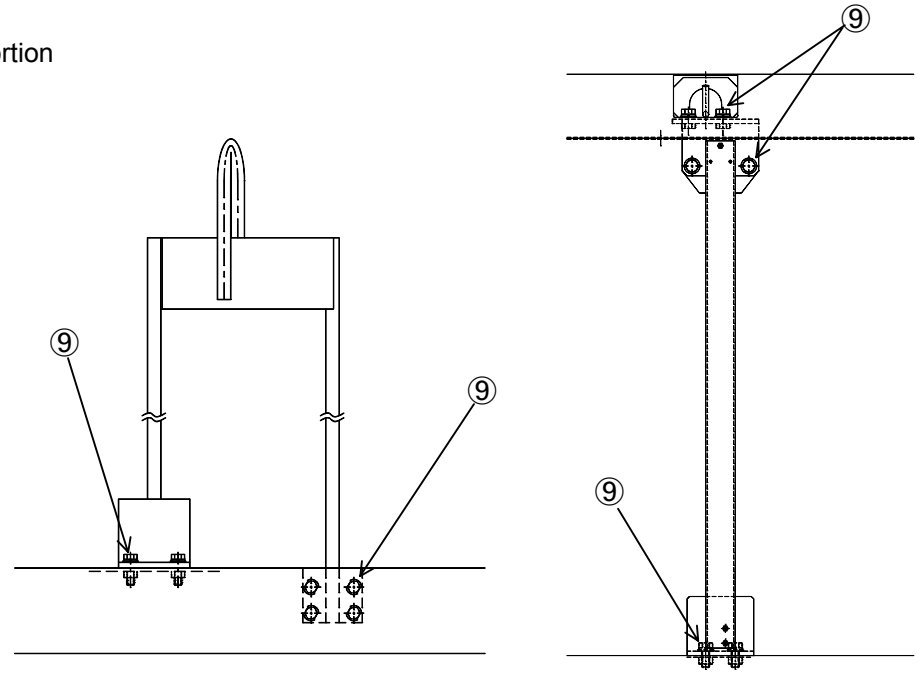
2 Mounting



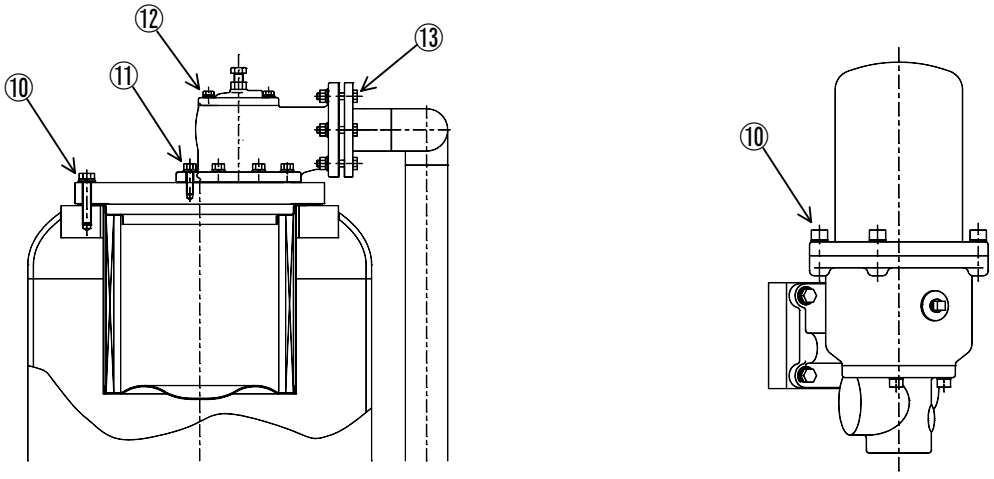
3 Coupling portion between comp. air end and engine



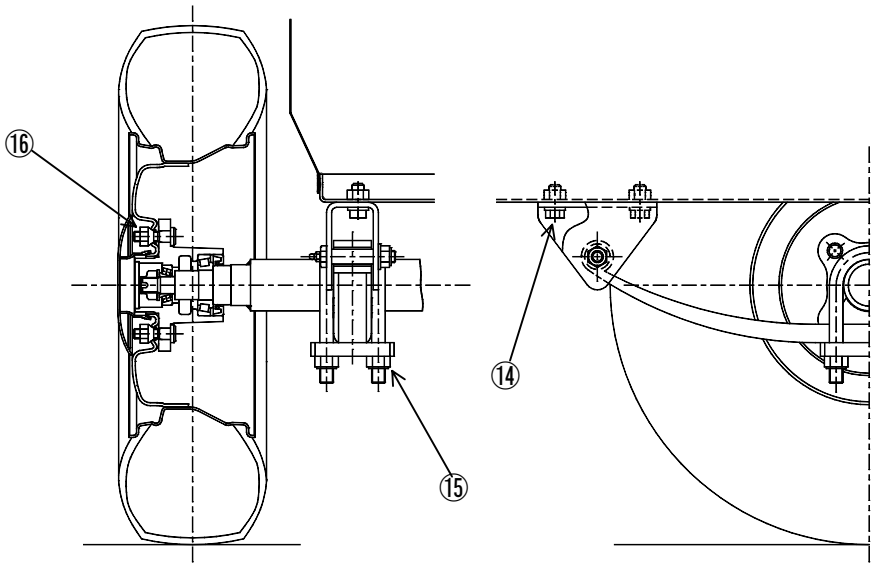
4 Lifting portion

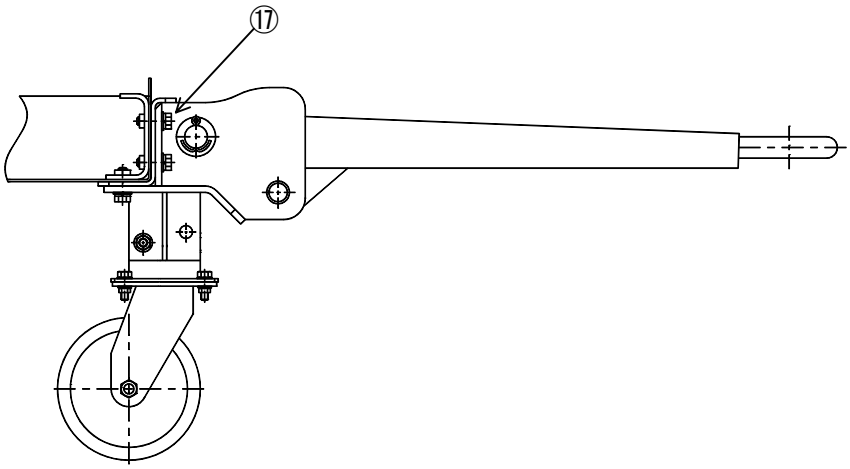


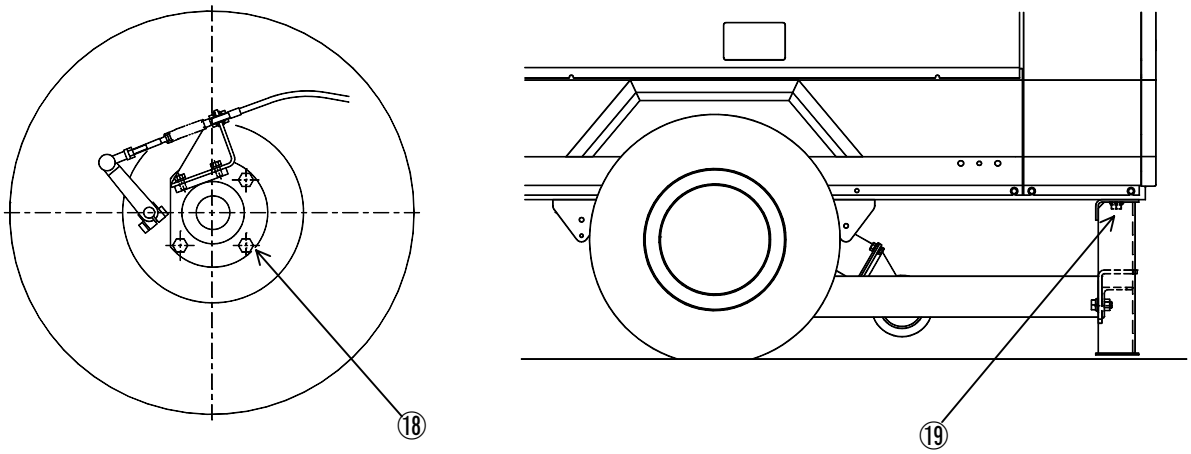
5 Pressure vessel and pipes



6 Undercarriage





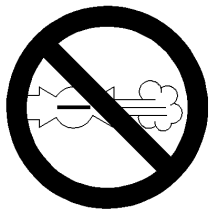


2.3 How to adjust regulator and how to replace diaphragm

2.3.1 Method of adjustment

CAUTION — ***Operation with compressed air supply port opened is prohibited***

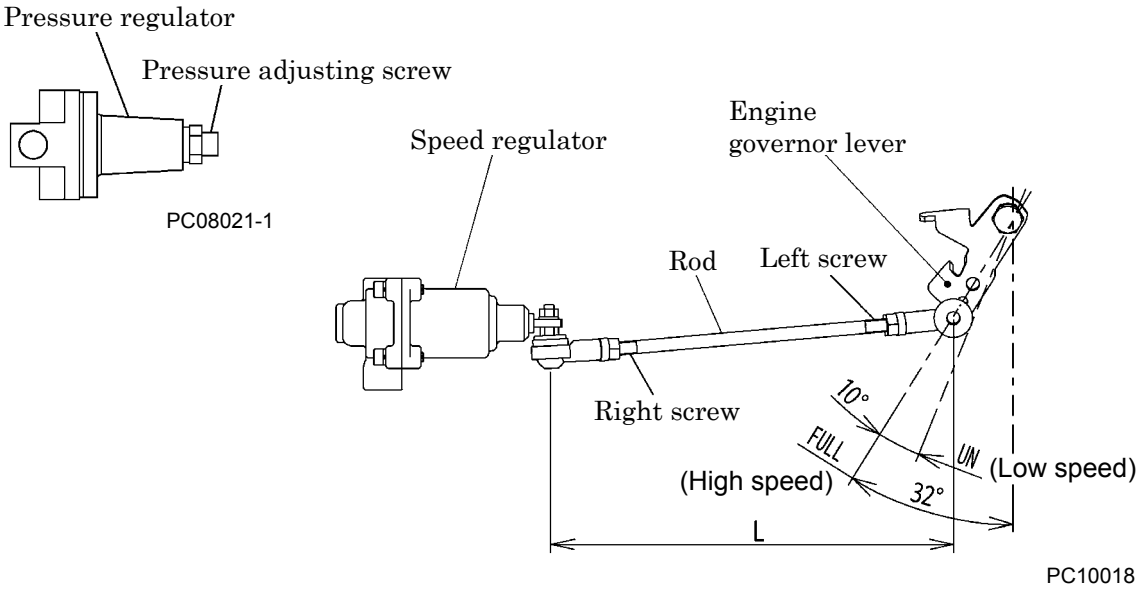
- When adjusting regulator system, install a silencer to the air delivery port and wear earplugs for protection of hearing damage.



D003

- The speed regulator is already adjusted prior to delivery ex.works. Never change the setting of the regulator by turning bolt and rod recklessly.
- If it is necessary to re-adjust the speed regulator due to overhauling or any trouble, adjust it in accordance with the following procedures.

<Adjustment procedure> (For engine speed and pressure, see 1.2)



① Adjust the length of the rod connecting speed regulator so that engine governor lever can be pulled toward high speed side, with compressor kept stopping.
(Making the rod length short, engine speed increases.)

② Adjust this system so that when unload starting pressure exceeds 0.69MPa(7kgf/cm²) by turning pressure adjusting screw, speed regulator can start to function to lower engine RPM.
(Tightening the screw, the pressure rises, and loosening it, the pressure drops.)

2.3.2 Change Diaphragm

Speed Regulator (Bellophragm type)

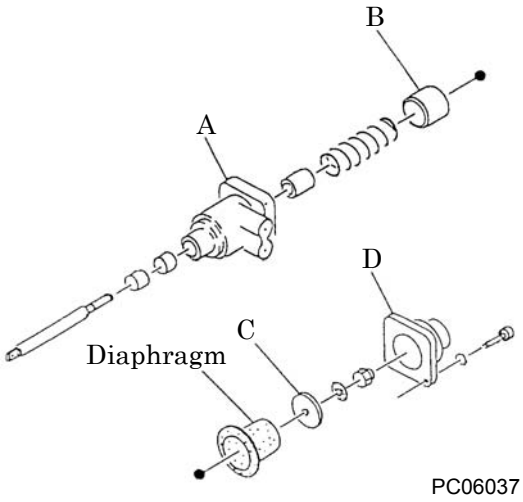
<Procedure>

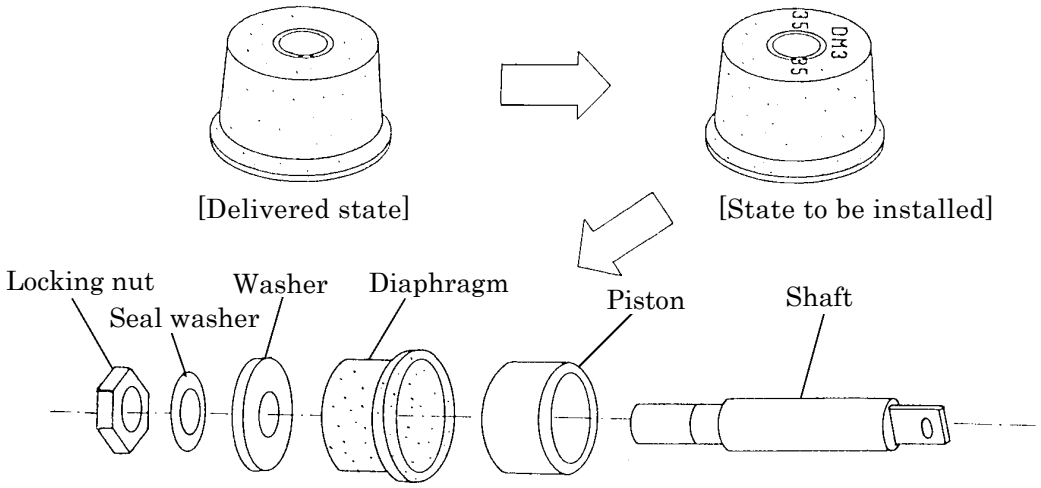
① Remove the speed regulator from the bracket and disassemble it.

② Replace diaphragms with new ones.

③ Check A to D shown in figure for any burrs.

④ Diaphragm is delivered in different state from the state in which it should be installed. So install diaphragm which should be turned inside out, as shown in the following Fig.

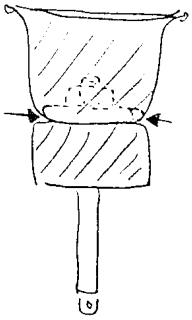




⑤ Internal face of body and cap and also both internal face and external face of diaphragm should be coated with molybdenum oxide spray.

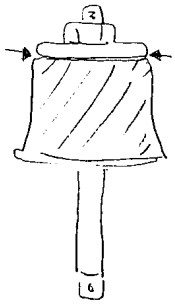
How to spray molybdenum oxide paste : The areas in oblique line should be sprayed with this paste.

Diaphragm should be rolled up and back face and piston should be sprayed.

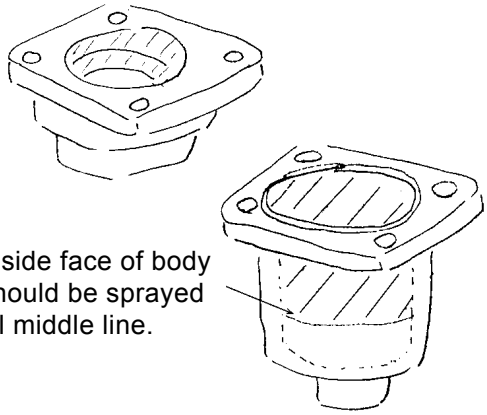


※ Jointed portion should be sprayed enough.

Then it should be returned and be sprayed.



Inside of body should be sprayed.

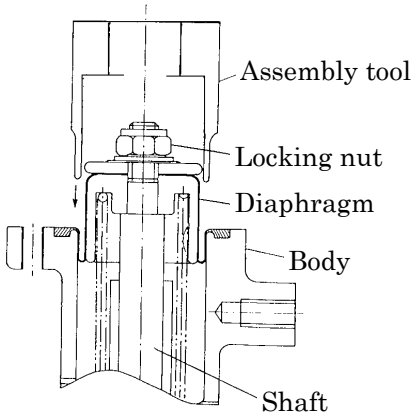


Inside face of body should be sprayed till middle line.

⑥Install diaphragm to shaft and piston and fasten it with a locking nut.
Tightening torque : 8N･m(80kgf･cm)

Important : Be careful not to tighten the locking nut excessively. Excessive tightening can cause washer to turn together and twisting diaphragm. The diaphragm will be damaged in shorter period.

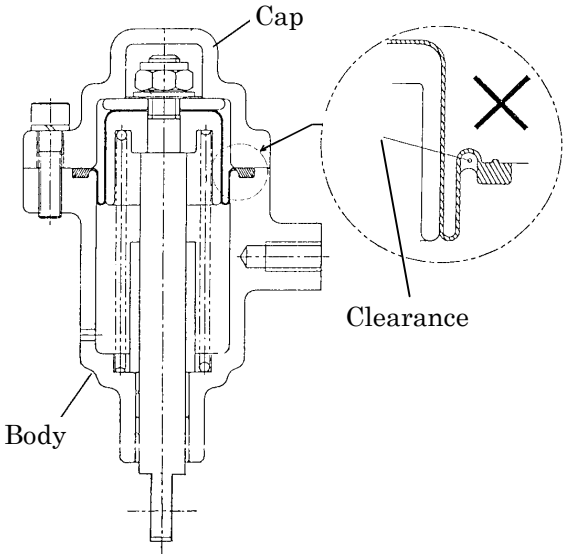
⑦Put in diaphragm to be settled equally in the body using an assembly tool.



Important: Once diaphragm is settled in, turn slowly the tool for secure installation. When turning the tool, hold the diaphragm not to be afloat.

Important: The diaphragm will be damaged easily if the shaft twists when the rod connects under the above condition.

⑧After diaphragm is set in, install the cap and then assemble speed regulator.



Important : Before installing the cap, make sure again that the portion of diaphragm shown in right figure is seated intact. If diaphragm is afloat, it can cause diaphragm to be caught in when installing cap.
If the shaft is turned after installation is finished, it could damage diaphragm. Take care.

⑨After re-assembling the speed regulator, adjust it according to the adjustment method of speed regulator (See 2.3.1).

2.4 Clean of element in sedimenter

<Procedure>

① Turn fuel selector valve "1" to "OFF" position.

② Loosen the drain valve"2"and drain out condensed water inside.

③ Turn the cup "3" counter clockwise to remove the cup "3" .Be careful to remove the cup "3" because it is filled with fuel. Wipe out split fuel completely.

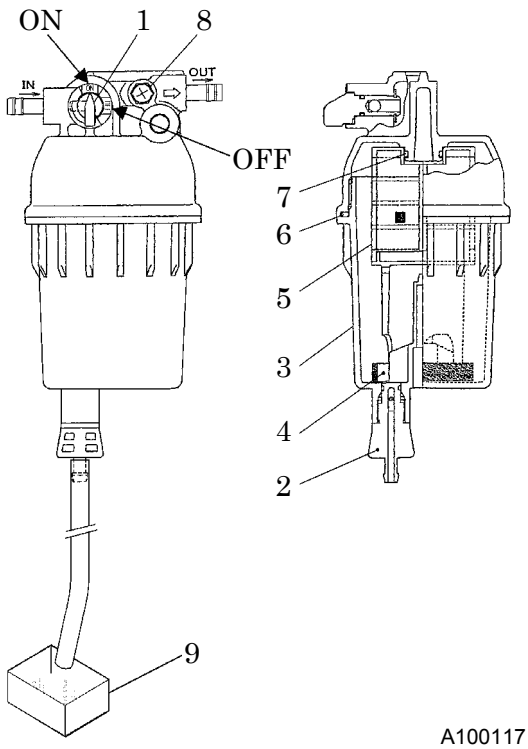
④ Remove float "4" inside cup "3"

⑤ Washing element "5" and the cup inside with new fuel.

⑥ Replace element "5" and O ring "6" , "7" if they are found broken or damaged.

⑦ After finishing clean, assemble it in reverse procedure.

- If air is found still in fuel pipe, place starter switch to "RUN" position and loosen air bleeding bolt "8" to bleed air. After finishing air bleeding, tighten the air bleeding bolt "8" .
- Drain the condensate in container "9" ,and then dispose of condensate according to the designated regulations.



A100117

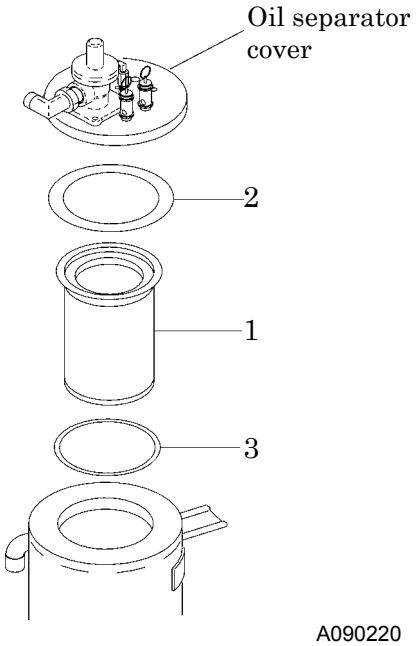
2.5 Change oil separator

- Even before the periodic interval time of replacement, replace the oil separator whenever the oil consumption increases and also oil is found mixed in the discharge air.
- When consumption of the oil is still unusual even after cleaning strainer in the scavenging orifice, change the oil separator "1" and gasket "2" "3" .

[Tightening torque of separator cover bolt]

: 19 mm

: 85 N·m (845 kgf·cm)

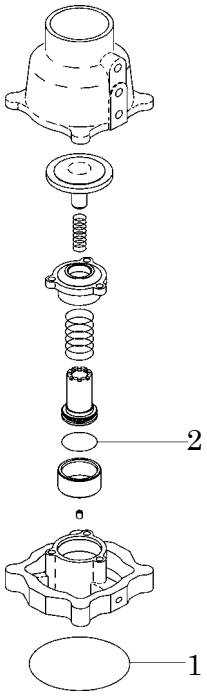


A090220

2.6 Change O-Ring of Unloader

<Caution during O-ring replacement>
Supply grease to O-ring "1", "2" after replacement.

Grease: CALTEX MULTIFAX EP1



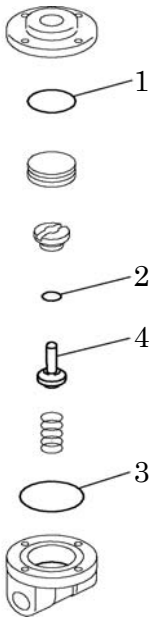
A090219

2.7 Check O-ring and Needle valve of Auto-relief valve and Vacuum relief valve

IMPORTANT

- When reassembling, apply sufficient grease to O-ring Slot/O-ring and sliding surface.
  Use CALTEX MULTIFAK EP1 grease or equivalent.

- Disassemble and clean the component, and check O-ring "1", "2", "3" and needle valve "4". Then, replace O-ring "1", "2", "3" and rubber on the needle valve "4", if hardened.



A050384

2.8 Performance check of Pressure control valve

IMPORTANT

- When reassembling, apply sufficient grease to O-ring Slot/O-ring and sliding surface.
  Use CALTEX MULTIFAK EP1 grease or equivalent. Grease of poor quality will deteriorate the material.

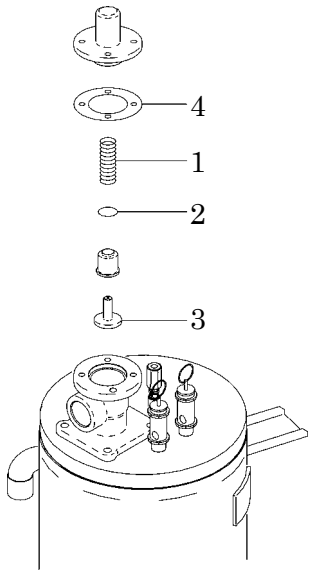
<Procedure>

① When closing stop valve and fully opening service valve while the machine is running, make sure that the discharge pressure gauge shows the figure between 0.35 to 0.50MPa.

② When the pressure is lower than 0.35MPa, replace spring "1" with a new one.

③ When the indicator shows excessively higher pressure, you will find that the piston does not move smoothly due to foreign material and rust stuck inside valve. In such a case, disassemble the component for checking and cleaning.

[Tightening torque of pressure control valve cover bolt]
: 19 mm
: 85 N·m (845 kgf·cm)



A090232

2.9 Check Pressure Control Valve O-Ring and Piston

- After disassembling and cleaning pressure control valve, check gasket "4", O ring "2" and piston "3". When the rubber of these parts is found hardened, or damaged, replace them.
- After replacement, run the machine to check its function, air-leak or any disorder.

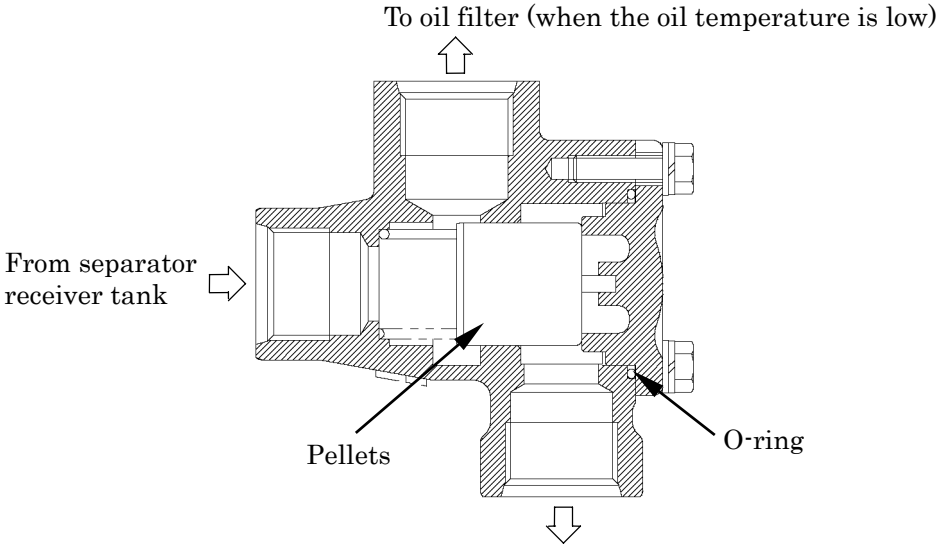
2. Maintenance

2.10 Change of pellet assembly of by-pass valve

●By-pass valve fitted on this unit is of full bore type. While the unit is used for normal operation, it is not to perform periodical replacement of the Inner pellet assembly, but when such trouble as excessive rise of compressor oil temperature, it becomes necessary to replace it, in accordance with the following procedures.

<Procedure>

① First stop the unit and make sure that there is no residual pressure left in the separator receiver tank.
② After checking and confirming that the temperature of compressor oil has become amply low, open drain valves on separator receiver tank and oil cooler to empty compressor oil completely.
③ After having drained oil completely, remove the pellet assembly of by-pass valve and O-ring.
④ Replace the pellet assembly and O-ring by new ones. Install O-ring coated thinly with compressor oil.
⑤ Supply compressor oil through the filler port provided on the receiver tank. (Refer to operation manual.)
⑥ Start operation and check the function of by-pass valve.
(It functions well when delivery air temperature will not rise abnormally.)



S_M106

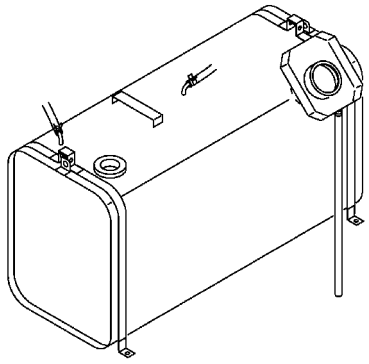
Actuating temperature	By-pass valve fully closing temperature
82±3℃	89±2℃

2.11 Clean inside of Fuel Tank

- Condensate is caused and accumulated at the bottom of fuel tank, owing to churning of dust or dirt mixed when fuel oil is fed and water drop caused while fuel oil tank is used for a long time. When any condensate is found afloat and fuel filter gets clogged too fast, fuel oil tank should be cleaned after condensate is removed from fuel oil tank even before the specified cleaning interval time.

<Procedure>

① Open drain valve to remove fuel oil from fuel tank.
② Remove side cover under door.
③ Remove fuel pipes and wires connected to fuel tank.
④ Remove belt holding fuel tank and remove tank.
⑤ Insert cleansing nozzle through fuel filler port or drain port for cleaning tank.
⑥ After cleaning job is finished, install fuel tank from which water or the like should be completely removed.



PC09015

2.12 Values of Various Adjustments of Engine

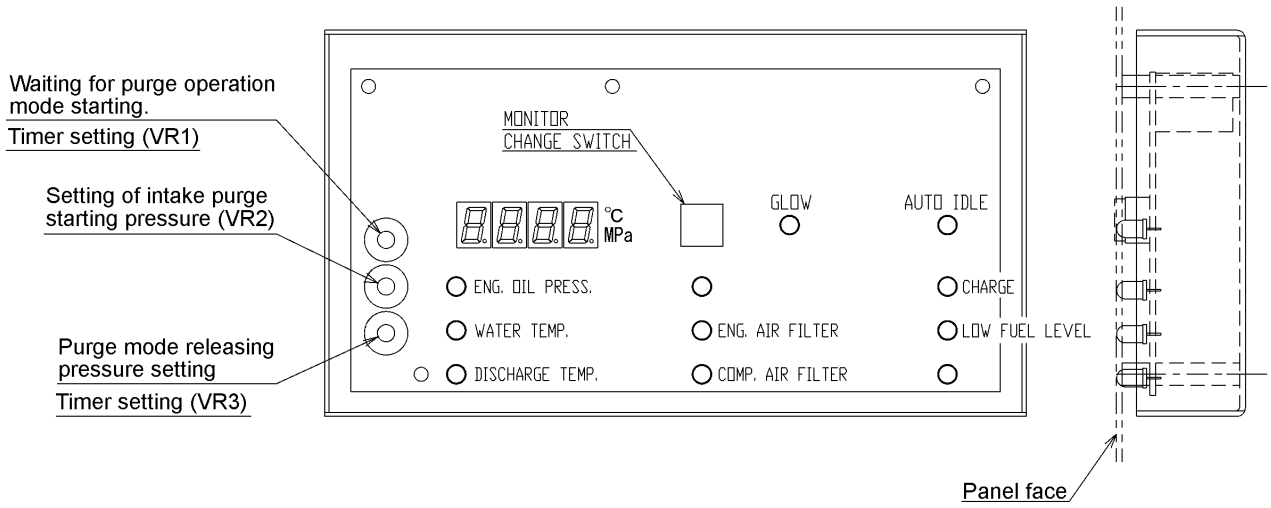
Item		Unit	PDS265S-4B2/5B2	
Engine model			YANMAR 4TNV98T-NHK	
Tightening torque of head bolts		N·m (kgf·cm)	First time (1/2 of tightening torque specified by manufacturer)	49.0 to 58.8 (5.0 to 6.0)
			Second time (Tightening torque specified by manufacturer)	103.1 to 112.9 (10.5 to 11.5)
Valve clearance	Air intake	mm	0.20±0.5 (when engine is cold)	
	Discharge	mm	0.20±0.5 (when engine is cold)	
Firing order			1-3-4-2-1 (No.1 cylinder at flywheel side)	
Injection timing (BTDC)		°	FIT 14.0 (at lift 2.5mm)	
Nozzle injection pressure		MPa (kgf/cm²)	21.6±0.5(220±5)	
Compression	Standard	MPa (kgf/cm²)	≦9.8(≦100)	
	Working limit	MPa (kgf/cm²)	Limited value	9.8(100)
			Each cylinder limit value	Not specified
Thermostat	Temperature for start of release	℃	71±2	
	Full open temperature	℃	85	
	Valve lift	mm	8.0 (+2.0/-0)	

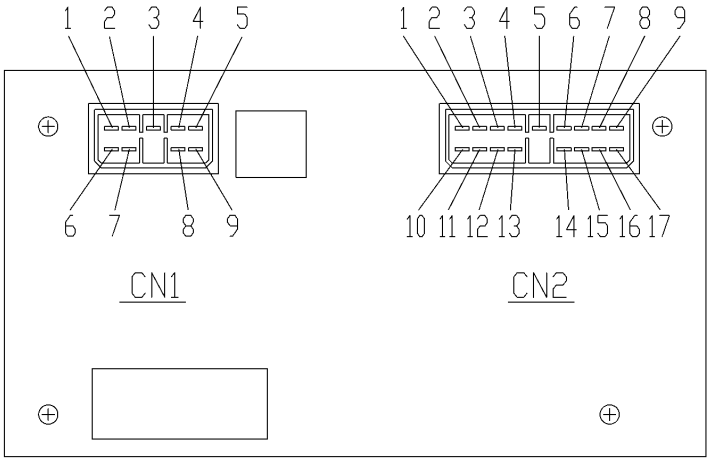
※For the details, see service manual supplied by engine manufacturer.

3. Electric System

3.1 Control

Part number: 46879 51800 (Standard Type)
Part number: 46879 50700 (AUTO IDLE Type)

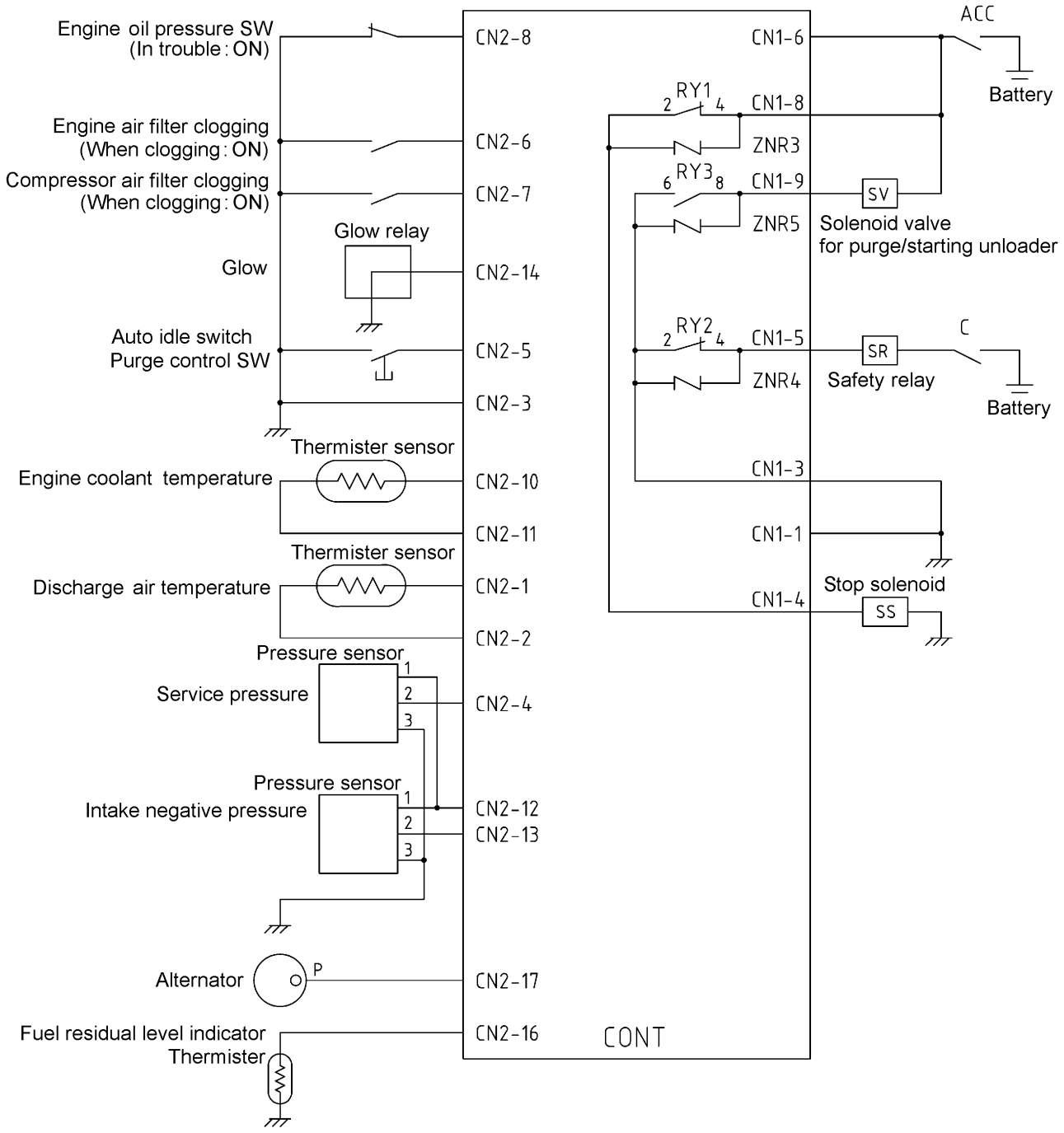




PC10019E

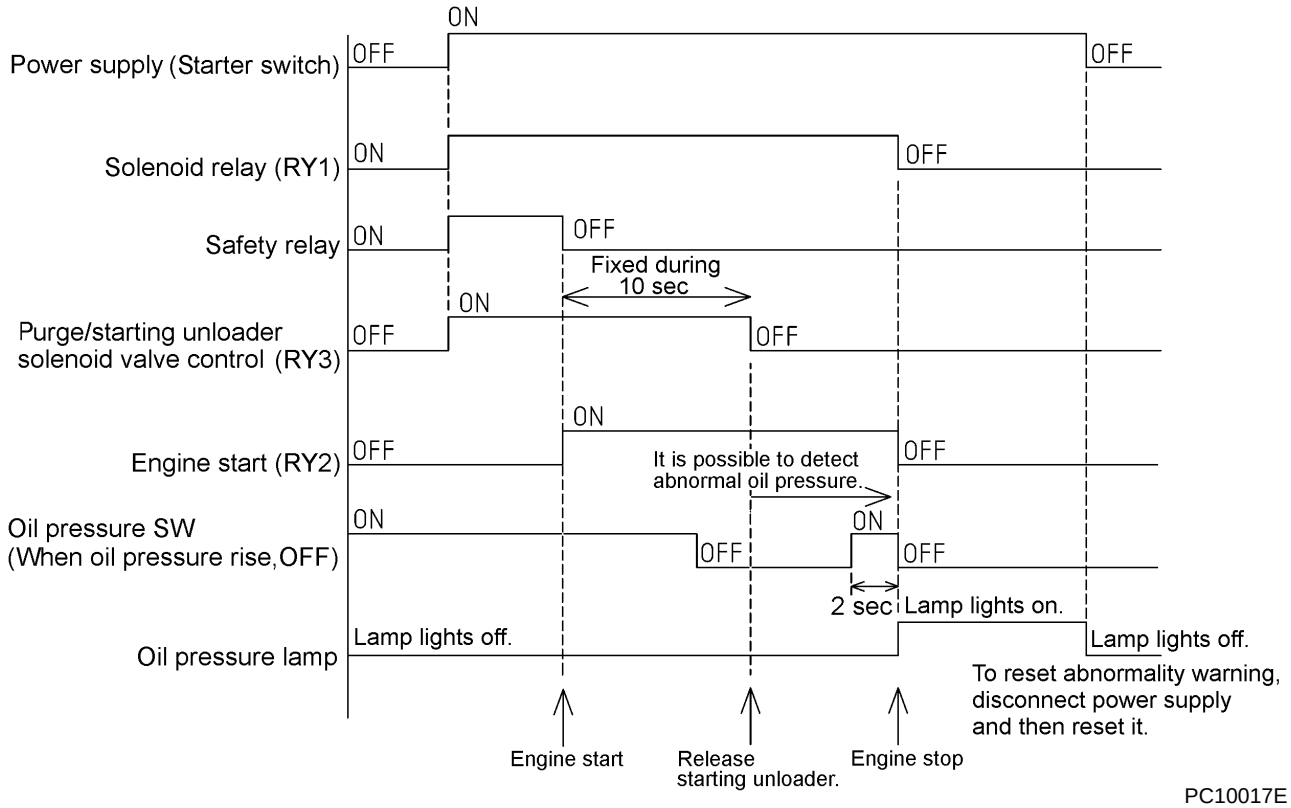
3. Electric System

1.Exterior connection drawing



PC10016E

2. Timing of each output relay



3.Warning and emergency stop device

	Item	Sensor		Actuation	Detecting timing	Time lag
Warning	Discharge air temperature	Thermister	—	Flickering at 115℃	Always	1.0 sec
	Engine water temperature	Thermister	—	Flickering at 107℃	Always	1.0 sec
	Comp. air filter	Negative pressure SW	A contact	Flickering at differential pressure 6.2kPa	After starting engine	10.0 sec
	Eng. air filter	Negative pressure SW	A contact	Flickering at differential pressure 6.2kPa	After starting engine	10.0 sec
Emergency	Discharge air temperature	Thermister	—	Lamp goes on at 120 ℃	Always	1.0 sec
	Engine water temperature	Thermister	—	Lamp goes on at 110℃	Always	1.0 sec
	Fuel residual level	Thermister	—	Lamp goes on when fuel residual level is less than 14.5L	Always	10.0 sec
	Engine oil pressure	Pressure SW	B contact	Lamp goes on when oil pressure is lower than 0.05MPa.	When engine starts	10.0 sec
					During operation	2.0 sec

・Warning : Compressor stops.
・Emergency : Compressor continues to run.

4.Function of control output relay

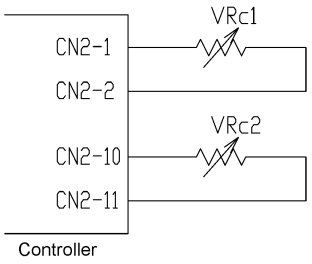
Mark	Name	Remark
RY1	Stop signal relay	It switches “OFF” when emergency stop device functions.
RY2	Operation signal relay	After alternator generating signal is inputted, it switches “OFF”. (It prevents overrun of starter motor and plunging of pinion gear.)
RY3	Purge/starting unloader relay	It switches “ON” when starter switch is ON. 10 seconds after engine starts (inputting alternator generating signal), it switches “OFF”. On purge control unload operation, it switches “ON”.

5.Adjustment and inspection

Confirm detection of rise of discharge air temperature/engine coolant temperature by controller and adjustment of purge control setting knob (VR1-VR3) should be performed in accordance with following procedure.

(1)Check and confirm resistance for detecting rise of discharge air temperature (CN2-2) and of coolant temperature (CN2-11).

1) Connect resistance to controller as shown right.
Or use multi-speed variable resistance (resistance value: 1.0kΩ) for VRc1 and VRc2.



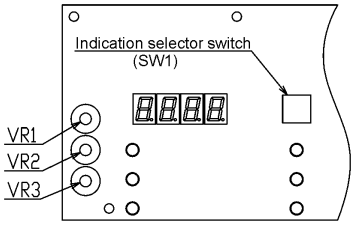
PC08030E

2) Gradually lower resistance values of VRc1 and VRc2 and measure them when they reach abnormal values. Then check and confirm that they are within the following ranges.

Item	Set temperature	Resistance
Discharge air temperature VRc1	115℃	491±15Ω
	120℃	432±15Ω
Engine water temperature VRc2	107℃	608±15Ω
	110℃	560±15Ω

(2)Adjustment of purge control setting knob (VR1-VR3)

1) Keep pushing indication selector switch (SW1) for 5 seconds.
2) Flickering of P. Setting purge releasing pressure (VR3) to 0.55[MPa].
⇩ SW1 ON
3) Flickering of C. Setting purge starting intake negative pressure (VR2) to 30[%].
⇩ SW1 ON
4) Flickering of T. Setting purge timer (VR1) to 10 [sec].
⇩ SW1 ON
Returning to discharge air temperature table.



PC08031E

6.List of functions

(1)Connector CN1

Pin No.	Line color	Connection	Remark
1	B	Earth	
2	—	NIL	Spare earth
3	B	Earth	
4	W/B	Stop solenoid R terminal	When starter switch is “ON”, interior contact (RY1) is “ON”, and then when voltage is applied to CN1-8 terminal, voltage is outputted from CN1-4 terminal to make stop solenoid function. When starter switch is “OFF” or emergency stop device functions, interior contact (RY1) between CN1-8 and CN1-4 terminal gets “OFF” to cut electrical supply and to cause engine stop.
5	B/Y	Safety relay No.5 terminal	Turn starter switch to “START” and then it gets electrically connected. (Starting signal inputted from safety relay No.3 terminal is sent from CN1-3 terminal to ground connector.) After starting engine, and when alternator generating signal is inputted to CN2-17 terminal, interior contact (RY2) between CN1-5 and CN1-3 terminal gets “OFF” to prevent overrun of starter motor and plunging of pinion gear.
6	R/L	Starter switch BR terminal	Power supply
7	—	NIL	Spare earth
8	R/L	Starter switch BR terminal	Power supply for actuation of stop solenoid valve When starter switch turns “ON”, electricity flows between CN1-8 and CN1-4 terminal to actuate stop solenoid valve.

Pin No.	Line color	Connection	Remark
9	L/W	Purge/starting unloader solenoid valve	When starter switch is "ON" and voltage is applied to CN1-6 terminal (power supply) of controller, interior contact between CN1-9 terminal and CN1-3 terminal is "ON". And then power is supplied to solenoid valve for purge/starting unloader to open solenoid valve, and thus compressor starts starting unloader mode operation at the same time when engine starts, and it serves to reduce load caused upon start. After engine starts, controller CN2-17 receives starting signal of alternator electric generation, which makes controller timer function and also makes interior contact (RY3) "OFF". And then power supply for purge/starting unloader is so cut that starting unloader mode operation is switched to normal operation mode. ●Functions during AUTO IDLE (purge control) operation When AUTO IDLE (purge control) switch is pressed on during this mode operation, AUTO IDLE (purge control) lamp goes on and it is switched to purge control mode operation. Further when AUTO IDLE (purge control) switch is pressed again, AUTO IDLE (purge control) lamp is put out and AUTO IDLE (purge control) is released. After air consumption decreases, and first engine speed (RPM) drops down to minimum speed (RPM) by pressure regulator, compressor unloader valve gradually closes to raise suction negative pressure when air consumption decreases further. When pressure sensor detects the raised negative pressure and it is found that it exceeds set value (set value ex.works: 30% setting range: 0-80%), AUTO IDLE (purge control) lamp goes on and off at a brief interval. When this situation continues for a certain time [set time of 10 sec. ex. works (setting range of time: 10 to 112 sec.)], interior contact (RY3) of controller will be "ON" and it makes solenoid valve of purge control function to start purge mode operation. Consequently, the pressure in receiver tank drops and reduces compressor power. At the same time, AUTO IDLE (purge control) lamp is put on and off at a longer interval. When air consumption increases and pressure at consumer side decreases more than purge mode releasing pressure (set pressure ex. works: 550kPa [setting pressure range: 345 to 655kPa]), power supply is so cut to purge/starting unloader solenoid valve that it is switched to normal operation. Consequently, AUTO IDLE (purge control) lamp will not be put on and off, but it is switched ON.

(2)Connector CN2

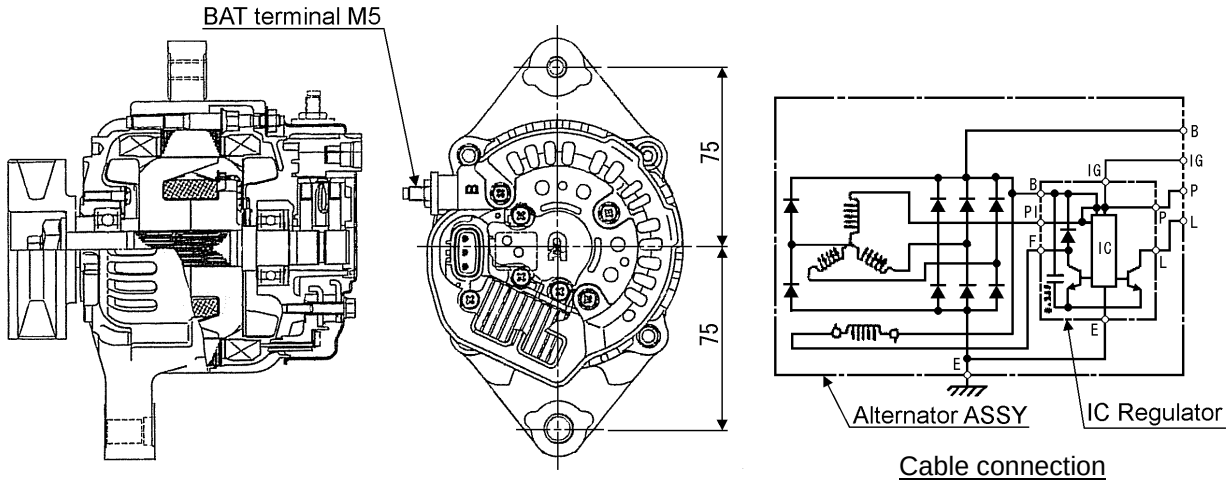
Pin No.	Line color	Connection	Remark
1	G/B	Discharge air temp. sensor	Detection of discharge air temperature. When it is higher than the emergency stop actuating set temperature, interior contact (RY1) between CN1-4 and CN1-8 terminals will be turned "OFF" to make engine emergency stop. ●Warning・Emergency stop set temperature Warning temperature:115℃ Emergency stop temperature:120℃
2	G/W	Discharge air temp. sensor	
3	B	Earth	
4	G	Service pressure sensor No.2 terminal	Detection of service pressure.
5	W	AUTO IDLE (purge control) switch	When auto idle (purge control) is switched "ON" to be electrically connected, it will be switched to purge control mode.
6	G/L	Engine air filter	Detection of engine air filter clogging.
7	G/R	Compressor air filter	Detection of compressor air filter clogging.
※8	G	Engine oil pressure switch	No electrical connection found. When engine oil pressure drops, engine oil pressure switch turns "ON" to electrical connection. When electrical connection, interior contact (RY1) between CN1-4 and CN1-8 terminal turns "OFF" to cause emergency stop to engine. ●Set pressure of emergency stop oil pressure below 0.05MPa
9	—	NIL	Spare earth
10	G/B	Coolant temp. sensor	Detection of engine coolant temperature. When the set temperature of emergency stop becomes higher, the interior contact (RY1) between CN1-4 and CN1-8 terminals turns "OFF" to cause engine to emergency stop. ●Warning・Emergency stop set temperature Warning temperature:107℃ Emergency stop temperature:110℃
11	Y/B	Coolant temp. sensor	
12	R	Service pressure sensor No.1 terminal Intake negative pressure sensor No.1 terminal	Power supply for pressure sensor.
13	Y	Intake negative pressure sensor No.2 terminal	Detection of intake negative pressure.
14	L/W	Heater lamp relay No.3 terminal	Input of pre-heater ignition signal.

Pin No.	Line color	Connection	Remark
15	—	NIL	Spare earth
16	Y/L	Sending unit	No electrical connection found. When fuel residual volume decreases, fuel level switch turns “ON” and gets electrically connected, the contact (RY1) between CN1-4 and CN1-8 terminals turns “OFF to make engine emergency stop. ●Residual fuel volume for emergency stop: less than 3.8gal.(14.5L)
17	Y/G	Alternator P terminal	For detecting RPM of alternator. (used to prevent starter overrunning.)

※ : Abnormal oil pressure detection circuit of controller starts to function in 10 seconds after it detects alternator generating signal with CN2-17 terminal.

3.2 Alternator [Dynamo regulator (IC type)]

YANMAR part number:123951-77200



PC10001E

(1)List of functions

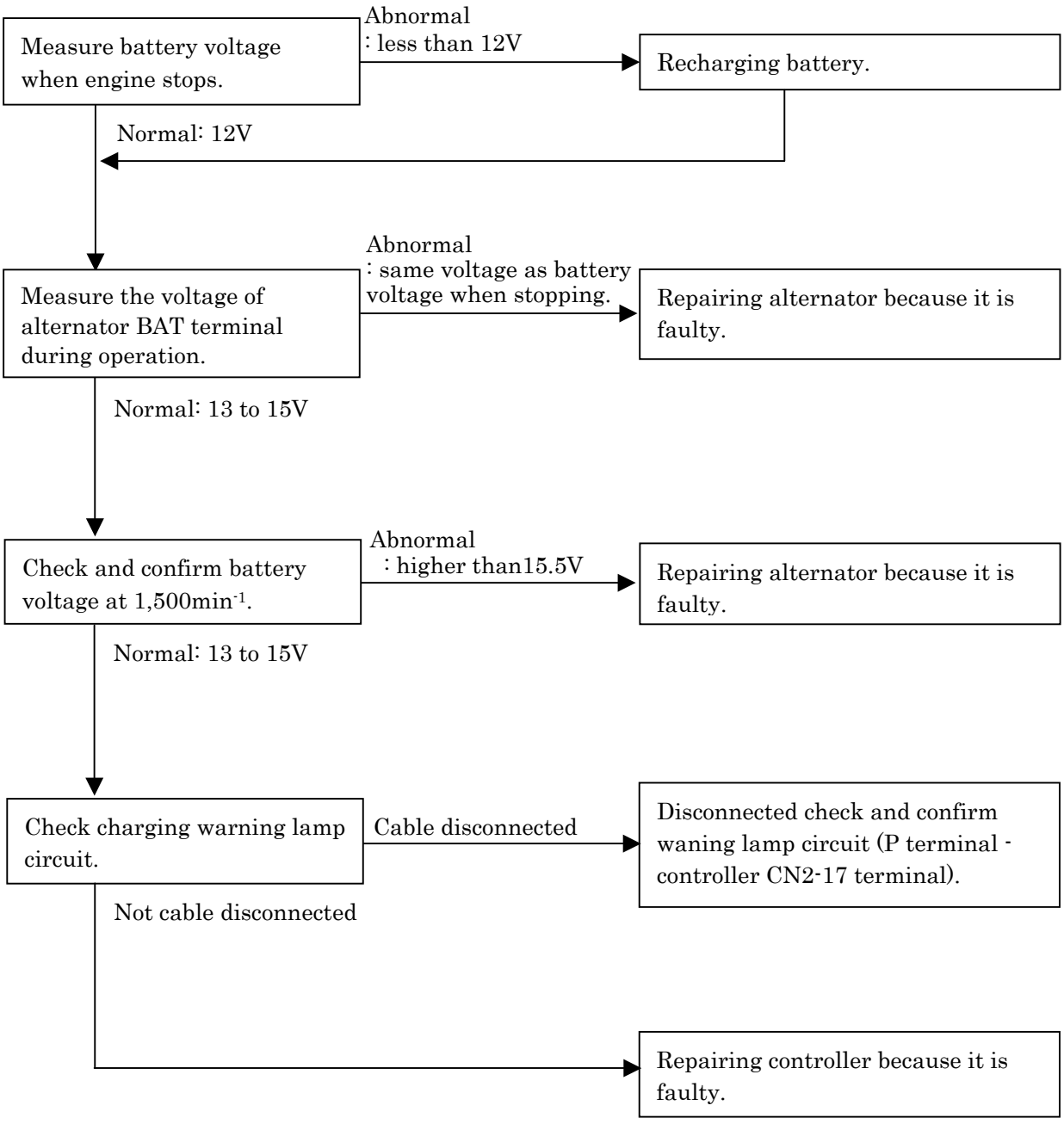
Pin No.	Line color	Connection	Remark
B	R	Starter motor B terminal	Power for charging voltage.
IG	R/W	5A Fuse (Through joint connector)	It detects battery voltage, and it controls rotor coil electromagnetic current.
L	—	NIL	
※ P	Y/G	Controller CN2-17 terminal	For detecting RPM of alternator. (used to prevent starter overrunning.)
E	—	Earth	Earth

※:For diagnosing P terminal, check the generating voltage between P-E terminal and it is normal if the voltage detected is about DC2.2V.

(2) Judgement of alternator functions

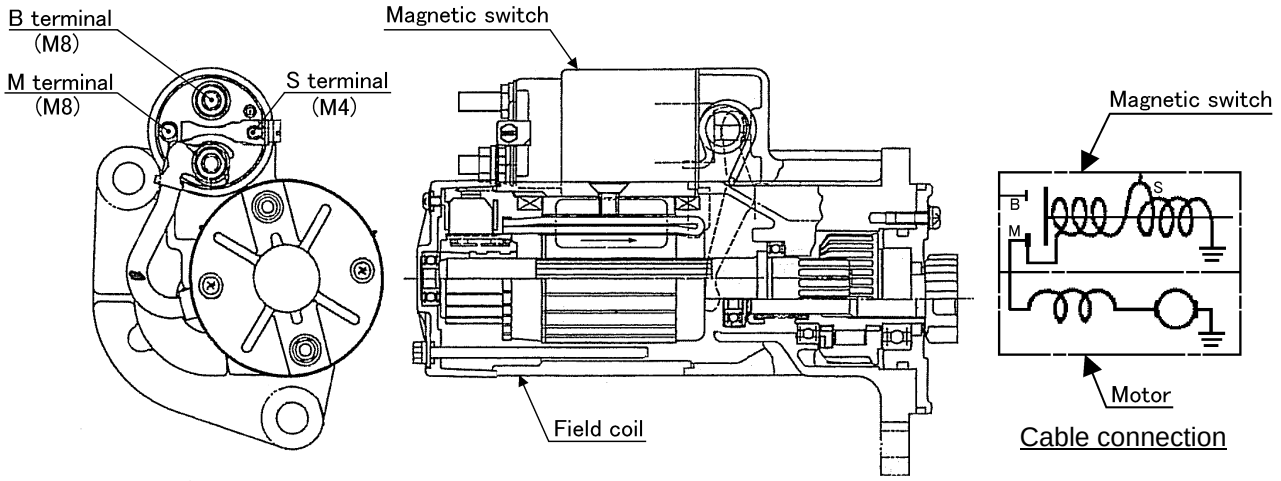
Checking method by measuring battery terminal at full load operation	Normal Value
Measure the battery terminal voltage at 1,500min^{-1}.	13 to 15V

(3) Diagnosing when battery charging warning lamp lights



3.3 Starter

YANMAR part number:129900-77010



PC10002E

(1)List of functions

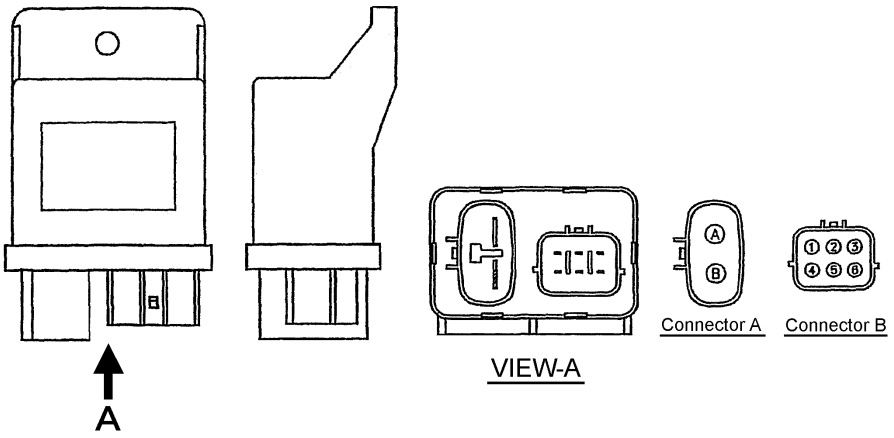
Pin No.	Line color	Connection	Remark
B	R	Battery + terminal	For supplying power to starter which enables starter pinion to turn.
S	B/W	Safety relay B terminal	For supplying power to make starter pinion to spring out and also a little power to make pinion turn for smooth engagement between pinion gear and ring gear when they are in contact.

(2) Judgement of starter functions

Checking method by measuring battery terminal at full load operation	Normal Value
During normal operation at normal temperature	7.7V, 400A and pinion RPM: lower than 1,400min^{-1}.

3.4 Safety relay (SR)

Part number:44346 16400



PC10003E

(1) Specification

Rated voltage	DC12V
Range of voltage at which unit is used	DC10 to 15V
Range of temperature at which unit is used	-30 to +80℃
Rated load	MAX 40A
Power input of alternator (P terminal)	※frequency signal

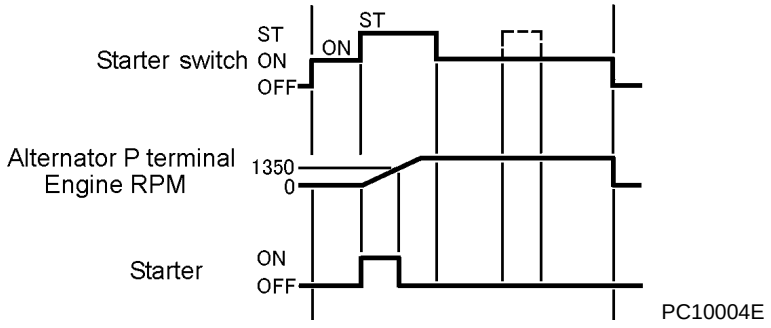
※ For the details, see engine service manual.

<Function>
After starter switch is "ON", namely after it is placed from operation position to start position, it stops starter when engine rpm reaches 1,350rpm. And then it prevents starter from restarting even if it is placed in "START" position.

(2) List of functions

Pin No.	Line color	Connection	Remark
1	R/Y	Starter switch ACC terminal	Power supply
2	—	NIL	
3	B/W	Starter switch C terminal	Detection of start signal.
4	—	NIL	
5	B/Y	Controller CN1-5	Grounding connection of starter relay. Controller (RY2) is controlled by connecting to controller CN1-5.
6	—	NIL	
A	R	Starter motor B terminal	Power supply
B	R/W	Starter motor S terminal	For power supply to electromagnet switch.

(3) Chart of function

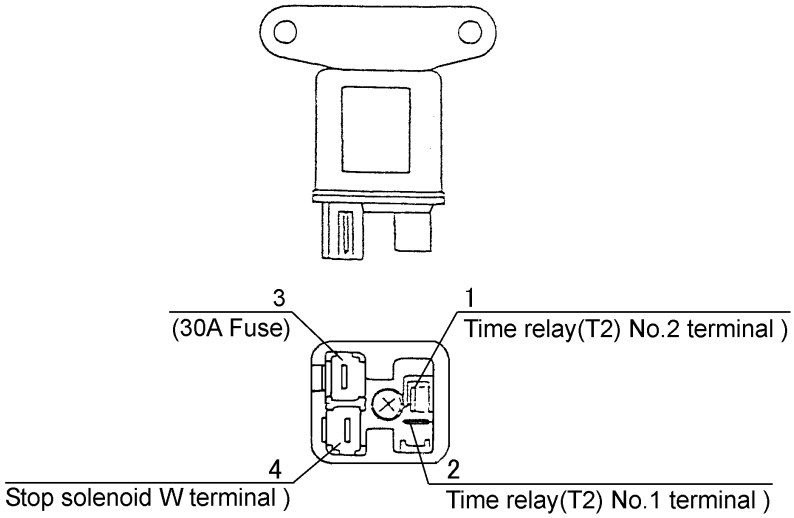


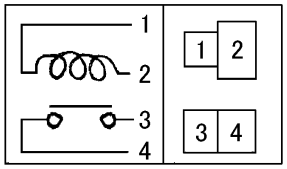
PC10004E

3.5 Solenoid relay (SLR)

Part number:44327 05000

YANMAR part number:119650-77910





Cable connection

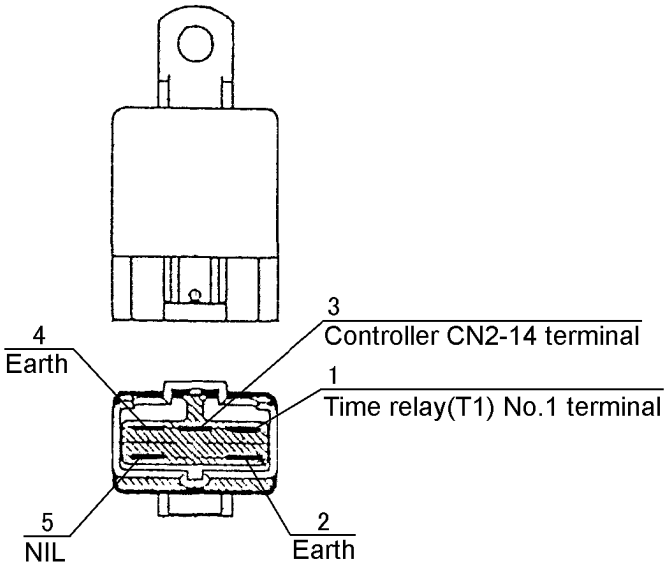
PC10005E

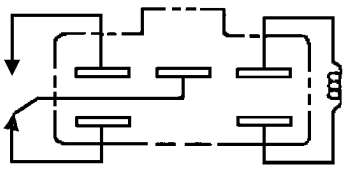
Specification

Rated voltage	DC12V
Continuous rating	1min
Coil resistance (between 1 and 2)	13Ω

3.6 Heater lamp relay (R1)

Part number:44346 08300





Cable connection

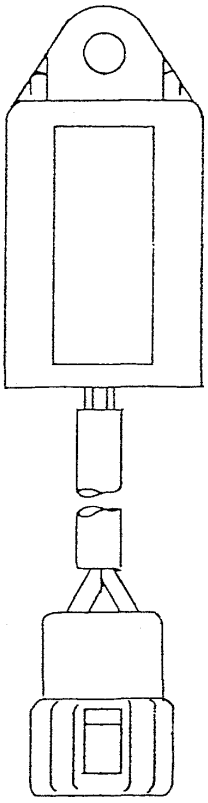
PC10006E

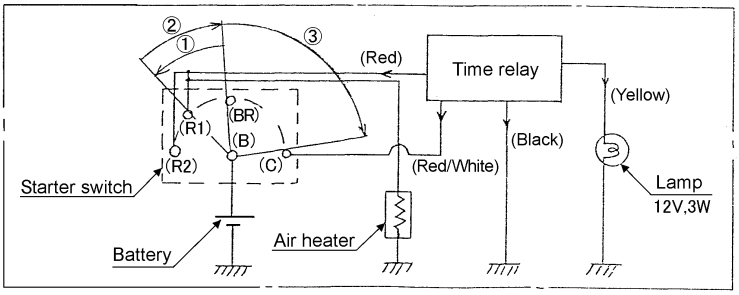
Specification

Rated voltage	12V
Coil resistance	80Ω (±80%)

3.7 Time relay [15sec] (T1)

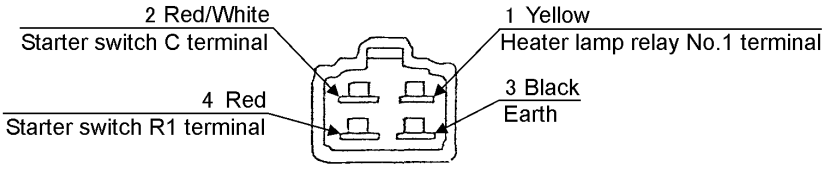
Part number:44327 06100



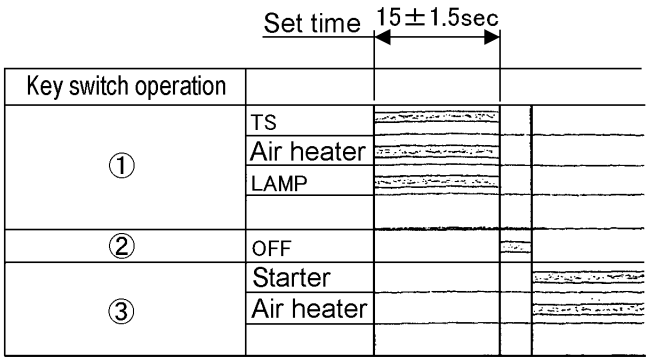


PC10008E

Cable connection



PC10007E

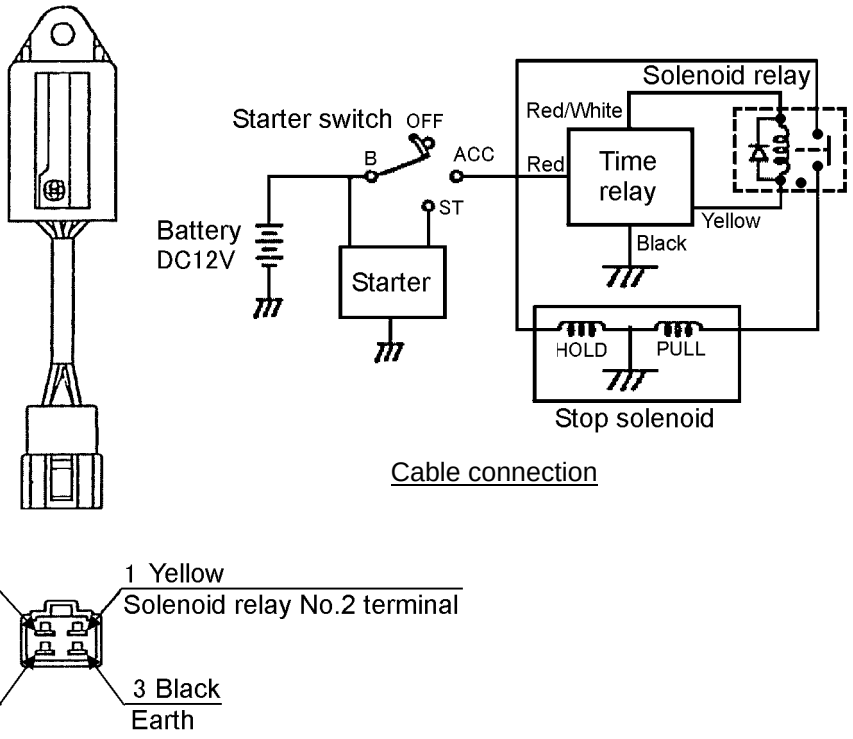


PC10009E

Timing diagram

3.8 Time relay [1sec] (T2)

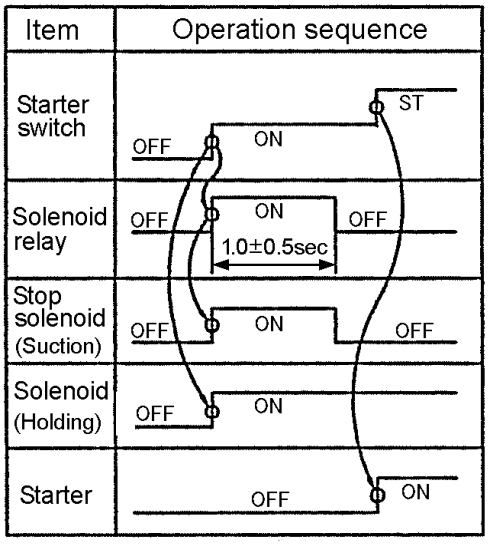
Part number:44327 08700



PC10010E

Specification

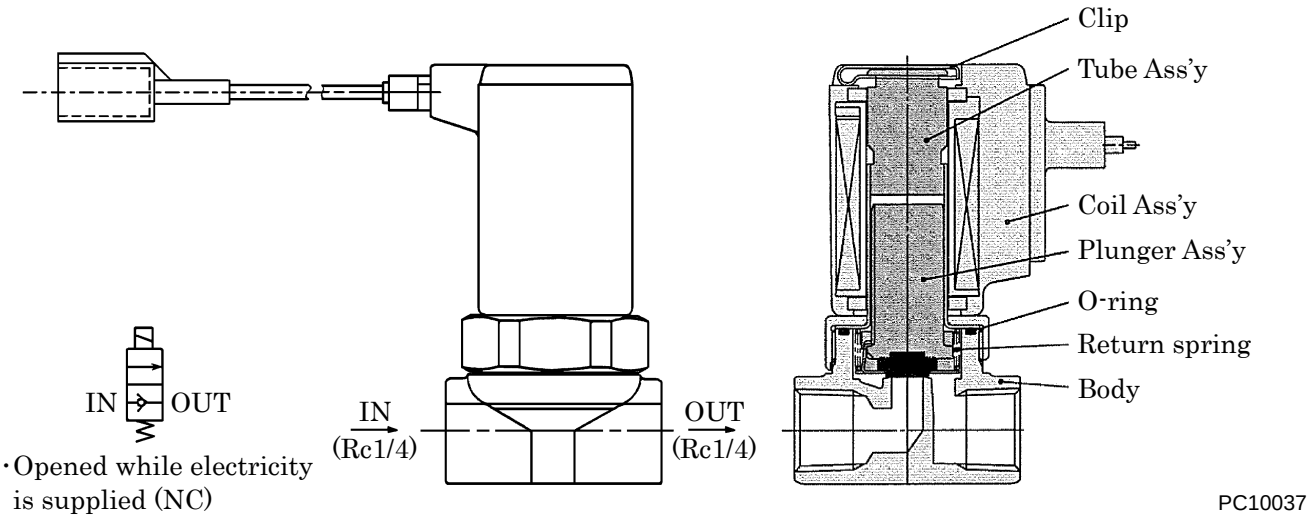
Voltage of power supply	6 to 15V
Time when relay is ON	1±0.5sec



PC10011E

3.9 Purge/starting unloader solenoid valve

Part number:46811 24100



※For details of functions, see "NO.6 List of function of No.3.1 Controller of No.3 Electric System".

●Functions during AUTO IDLE (purge control) operation

When AUTO IDLE (purge control) switch is pressed on during this mode operation, AUTO IDLE (purge control) lamp goes on and it is switched to purge control mode operation. Further when AUTO IDLE (purge control) switch is pressed again, AUTO IDLE (purge control) lamp is put out and AUTO IDLE (purge control) is released.

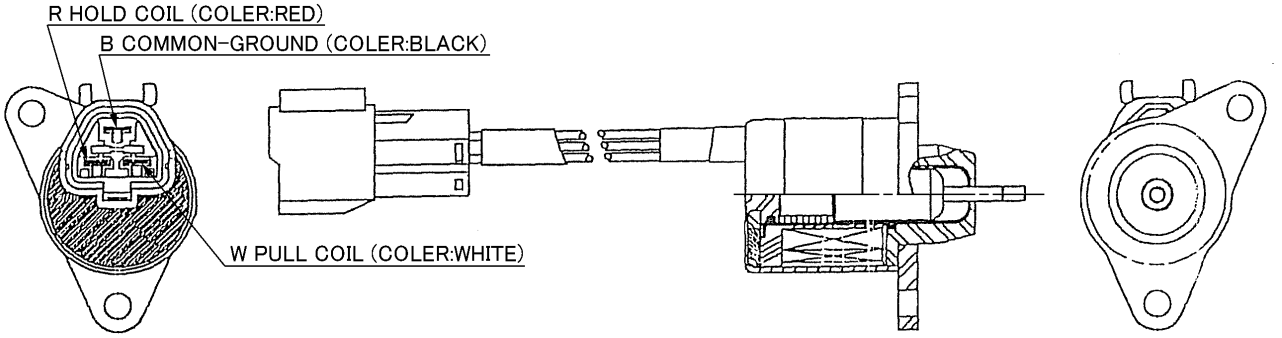
① After air consumption decreases, and first engine speed (RPM) drops down to minimum speed (RPM) by pressure regulator, compressor unloader valve gradually closes to raise suction negative pressure when air consumption decreases further. When pressure sensor detects the raised negative pressure and it is found that it exceeds set value (set value ex.works: 30% setting range: 0-80%), AUTO IDLE (purge control) lamp goes on and off at a brief interval.

② When this situation continues for a certain time [set time of 10 sec. ex. works (setting range of time: 10 to 112 sec.)], interior contact (RY3) of controller will be "ON" and it makes solenoid valve of purge control function to start purge mode operation. Consequently, the pressure in receiver tank drops and reduces compressor power. At the same time, AUTO IDLE (purge control) lamp is put on and off at a longer interval.

③ When air consumption increases and pressure at consumer side decreases more than purge mode releasing pressure (set pressure ex. works: 550kPa [setting pressure range: 345 to 655kPa]), power supply is so cut to purge/starting unloader solenoid valve that it is switched to normal operation. Consequently, AUTO IDLE (purge control) lamp will not be put on and off, but it is switched ON.

3.10 Stop solenoid

YANMAR part number:119233-77932



PC10012E

(1) Specification

Rated voltage		DC12V
Suction coil	Rated current	36.5A
	Resistance	0.33Ω ±10%
Holding coil	Rated current	0.49A
	Resistance	24.5Ω ±10%

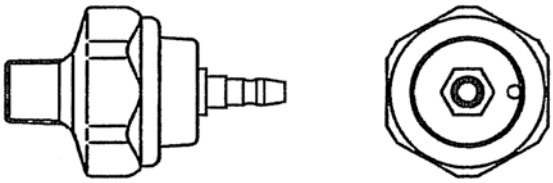
(2) List of functions

Pin No.	Line color	Connection
W	B/W	30A Fuse (Power supply) [Suction power supply]
R	W/B	Controller CN1-4 [Holding power supply]
B	B	Earth

※For details of functions, see “NO.6 List of function of No.3.1 Controller of No.3 Electric System”.

3.11 Engine oil pressure switch (For emergency stops)

Part number:44328 16400



PC10013E

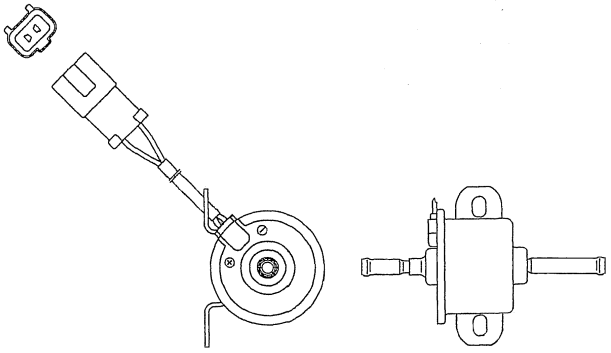
Specification

Operation pressure	0.05MPa (0.5kgf/cm²)
Contact type	B contact switch (Contact "OFF" in excess of operation pressure)
Time lag	・10 seconds after engine starts. ・2 seconds during operation ※

※When such situation under operation pressure continues longer than 2 sec.
It brings engine to emergency stop.

3.12 Fuel air-bleeding electromagnetic pump

Part number:43650 02700
YANMAR part number:129612-52100



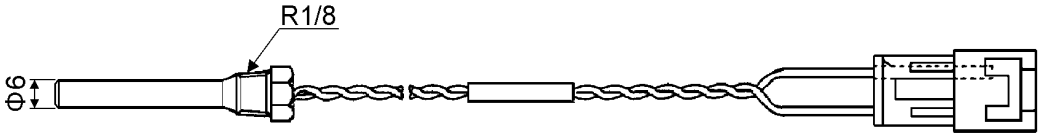
PC10014

Specification

Rated voltage	12V
Operating current	1.5A(MAX)
Delivery capacity	0.4-1.1 L/min

3.13 Discharge air temperature sensor・Coolant temperature sensor

Part number:43650 02700



PC08033

Characteristic of temperature resistance

Water temp. (℃)	Resistance (Ω)	Permissible value (%)
80	1,300	±7
95	840	±6
110	560	±5
115	490	±6

《Note》 Take care not to tighten excessively. Less than 1.96N・m(20kgf・cm)

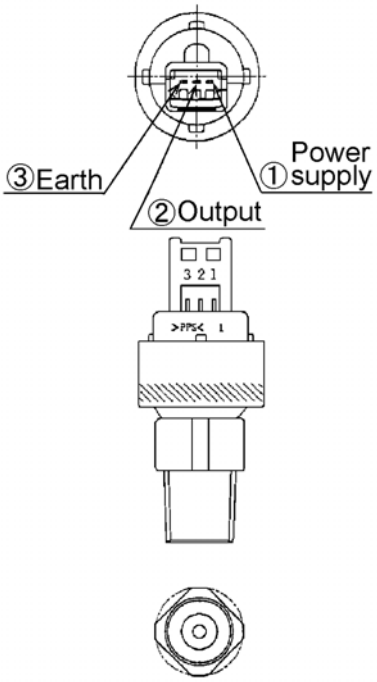
3.14 Intake negative pressure sensor･service pressure sensor

Part number:44328 20600

Pressure and output voltage

Electric wire	Signal
①VCC	Power supply （5V)
②VOUT	Output Pressure 0psi (0MPa) DC0.5V Pressure 14psi (0.1MPa) DC0.9V Pressure 85psi (0.6MPa) DC2.9V Pressure 100psi (0.69MPa) DC3.3V Pressure 142psi (0.98MPa) DC4.5V
③GND	Earth

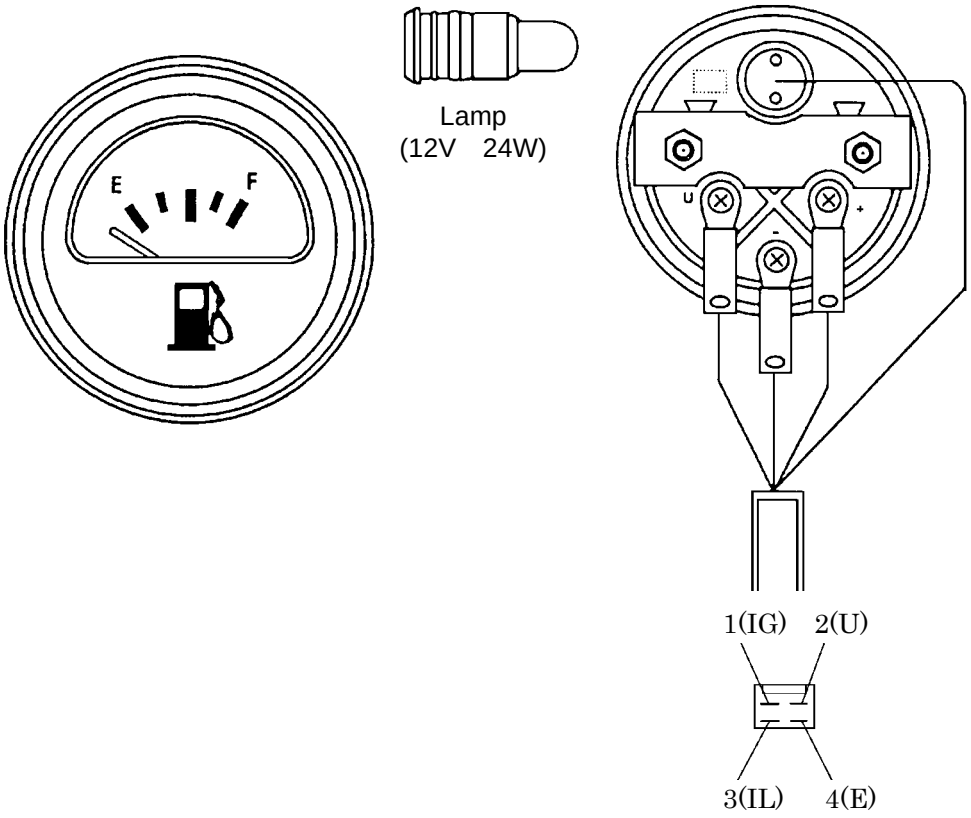
To check output voltage of pressure sensor for diagnosis of trouble, it is necessary to measure the voltage between ②-③terminals.



PC08035

3.15 Fuel meter

Part number:36158 00500



PC08036

(1) Position of meter pointer

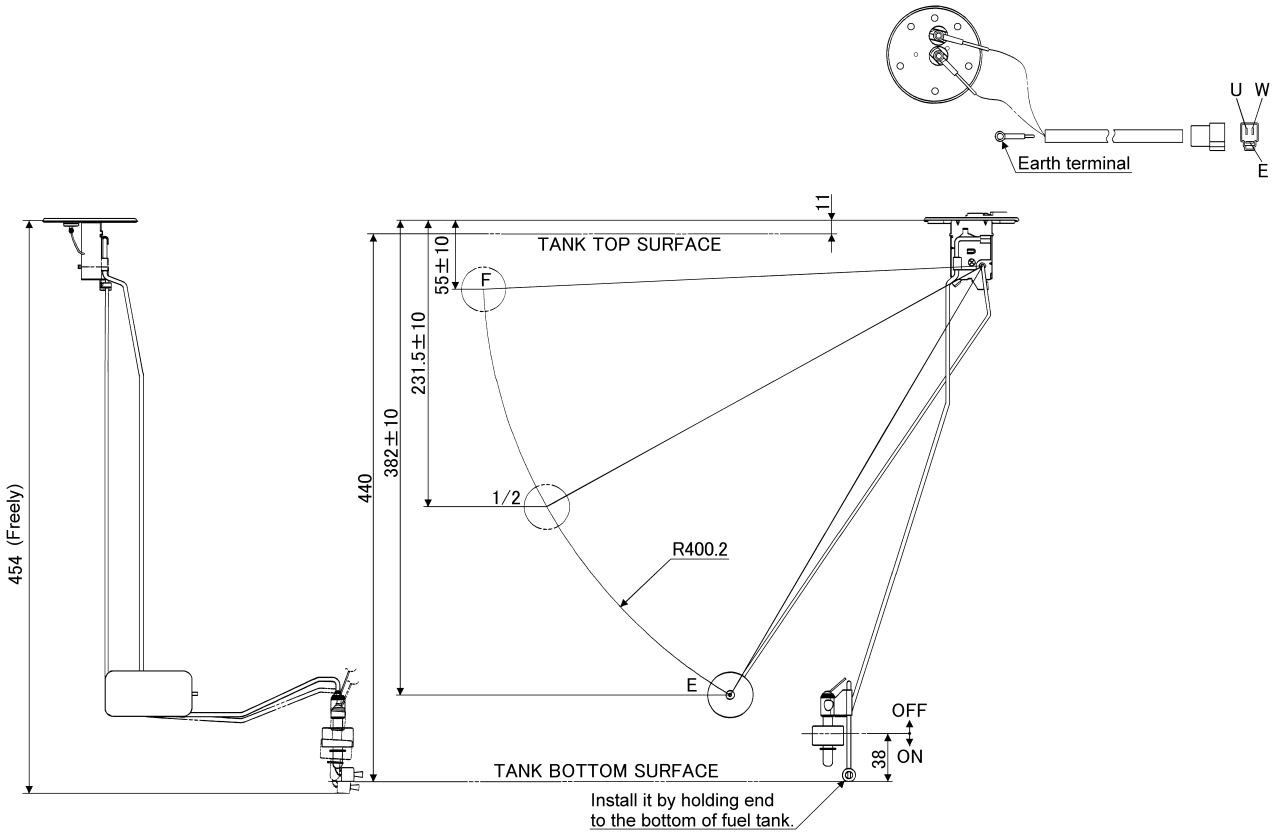
Pointer position	Resistance (Ω)	Remaining fuel (L)
E	95.0 $^{+2.5}_{-5.0}$	23
1/2	32.5 ±0	56
F	7.0 $^{+5.0}_{-2.5}$	115

(2) List of functions

Pin No.	Line color	Connection	Remark
1(IG)	R/Y	10A Fuse	Power source for fuel gauge
2(U)	Y/B	Sending unit	Detector for remaining fuel
3(IL)	R/Y	10A Fuse	Power source for lighting
4(E)	B	Earth	

3.16 Sending unit (With fuel level switch)

Part number:36159 03800



PC08015E

Float position	Resistance (Ω)
E	110.0±7.0
1/2	32.5±5.0
F	3.0±2.0

4. Troubleshooting

4.1 Repairing Procedures

When performing failure diagnosis, pay special attention to the followings, observing general cautions.

4.1.1 Safety caution

(1) Removing such cap and/or plug for receiver tank, fuel tanks and pipes where pressure is loaded, stop the machine and relieve all the interior pressure. Install measuring instruments connected firmly.
(2) When doing the job with co-worker(s) together, make sure to give signal to the other person(s) and do not allow other persons to come near to the job site.
(3) Take care not to touch hot portions and not to be involved in turning portions.

4.1.2 Caution during failure diagnosis

(1) Do not make haste to disassemble the unit
If the unit is disassembled urgently.
①You may disassemble the other portions which are not related with the trouble.
②The cause of trouble may be missing.
The unnecessary reparations require more spare parts and man-hours, and reparation costs will increase more. What is worse, you will lose reliance or trust from clients, operators and users.
Therefore, it is absolutely necessary to investigate the trouble more carefully in advance and to follow the required procedures for failure diagnosis.

(2) Ask the clients about the trouble in details
In order to prevent misunderstanding and incorrect judgment about the trouble, it is necessary to ask users or operators about the following questions.
①Is there any other disorder than the trouble he has informed?
②Anything abnormal occurred before this trouble?
③Did this trouble happen unexpectedly? Or the unit had been operated in bad conditions before?
④When and how did this trouble occur?
⑤Had he repaired the unit before this trouble occurred?
⑥Did he not experience similar trouble before?

(3) Inspection items before starting diagnosis
Sometimes such trouble may be caused owing to routine mishandling of the unit. Before starting failure diagnosis, check the following items.
①The engine runs short of engine oil or its oil is not dirty?
②Check each wire connection for any disconnection.
③Check the other portions for any damage.

(4) Confirmation of trouble
Discuss with user(s) and/or operator(s) sufficiently about the trouble. As a result, judge whether their judgment is based on the numerical comparison or sentimental basis. Make him (them) understand well the reparation or correction you have finished.
Then check and confirm by yourself the cause of the trouble.
Note) Never proceed any investigation or measurement which may cause further greater damage.

(5) Procedures of diagnosis

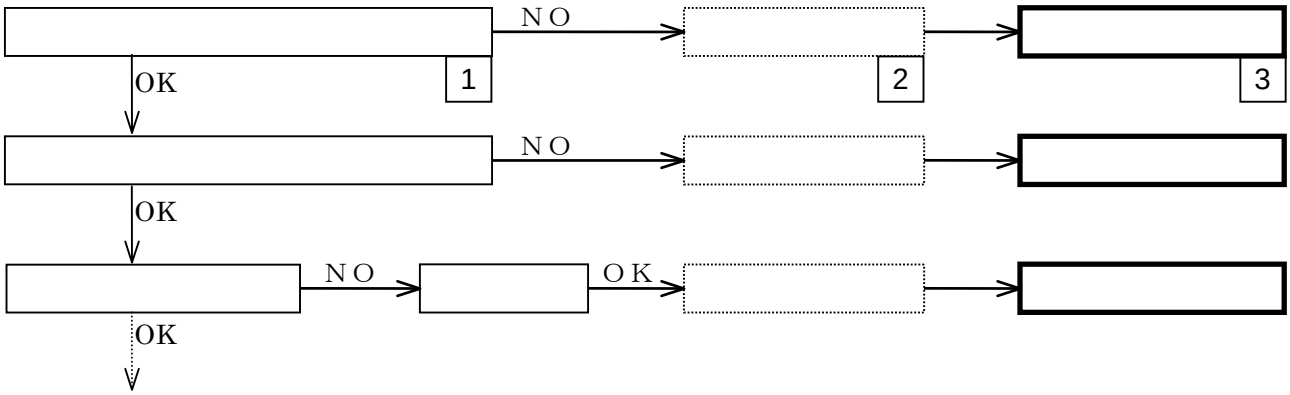
When you become well experienced, you can find out the cause easily during the process of confirmation (4). But easy understanding could cause unexpected failure. So check and judge it according to the following procedures.

①Check the easiest thing or portion first.
②Investigate the most possible cause.
③Check the other things connected to the trouble.
④Check for the possibility of any other troubles.
⑤Start proper and careful investigation on this trouble.

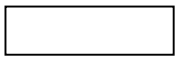
(6) Prevention of repeated occurrence of similar trouble

Even if you have repaired the trouble, unless you get rid of the fundamental cause of the trouble, it will repeatedly occur. Therefore, perform full investigation of the trouble, and it is absolutely necessary to remove the basis of the trouble.

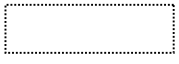
4.1.3 How to use the failure diagnosis



①In the troubleshooting column something abnormal is mentioned in lined parenthesis.



②In the troubleshooting column the cause of the said trouble is mentioned in dotted parenthesis.



③In the troubleshooting column the countermeasures or treatment are mentioned in the double lined parenthesis.

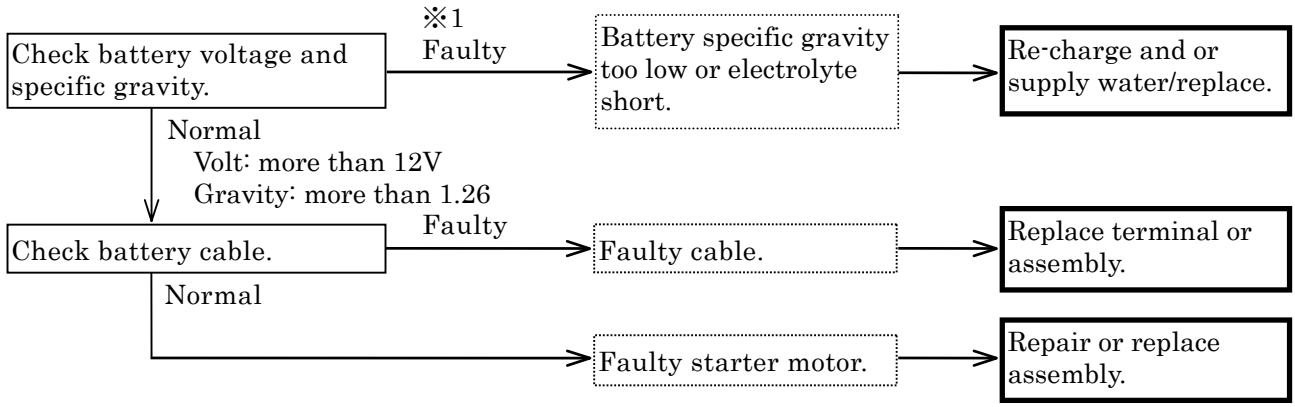
④1 under each column means the index of explanation.

For details, see 4.5 “Explanation of trouble diagnosis”

4. Troubleshooting

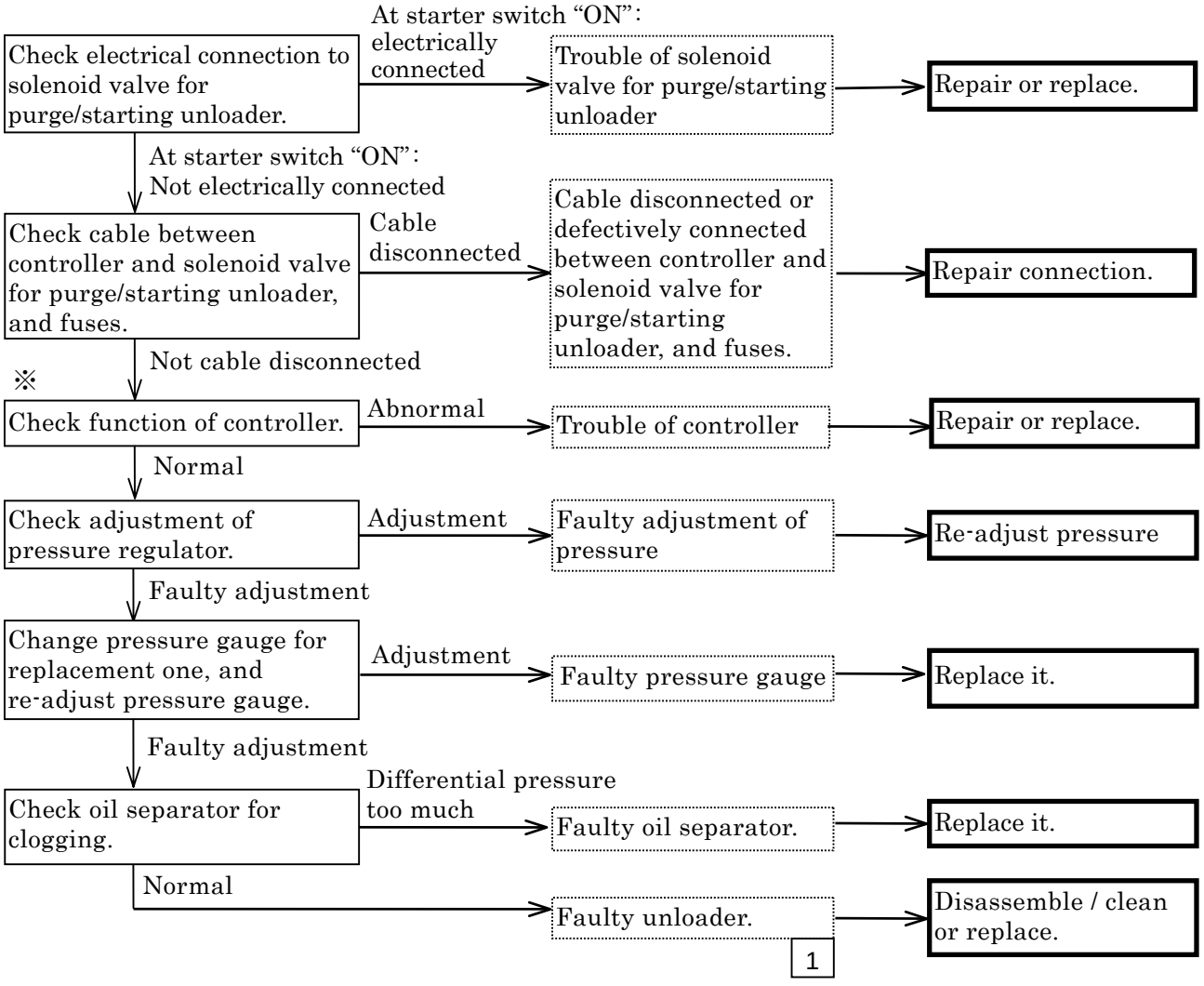
4.2 Failures of compressor and engine

4.2.1 At start-up, starter rotates slowly



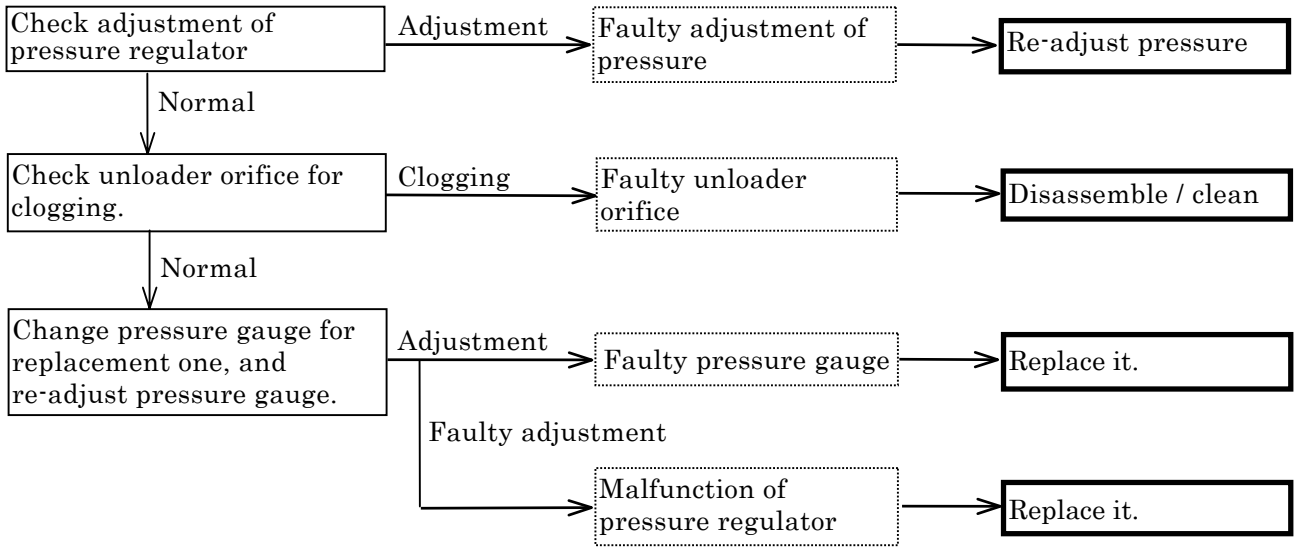
※1 : When starter switch is placed at the "START" position, the battery is not normal if B terminal voltage decreases by 10V.

4.2.2 Receiver tank gauge pressure will not rise up to rated pressure during unloaded operation

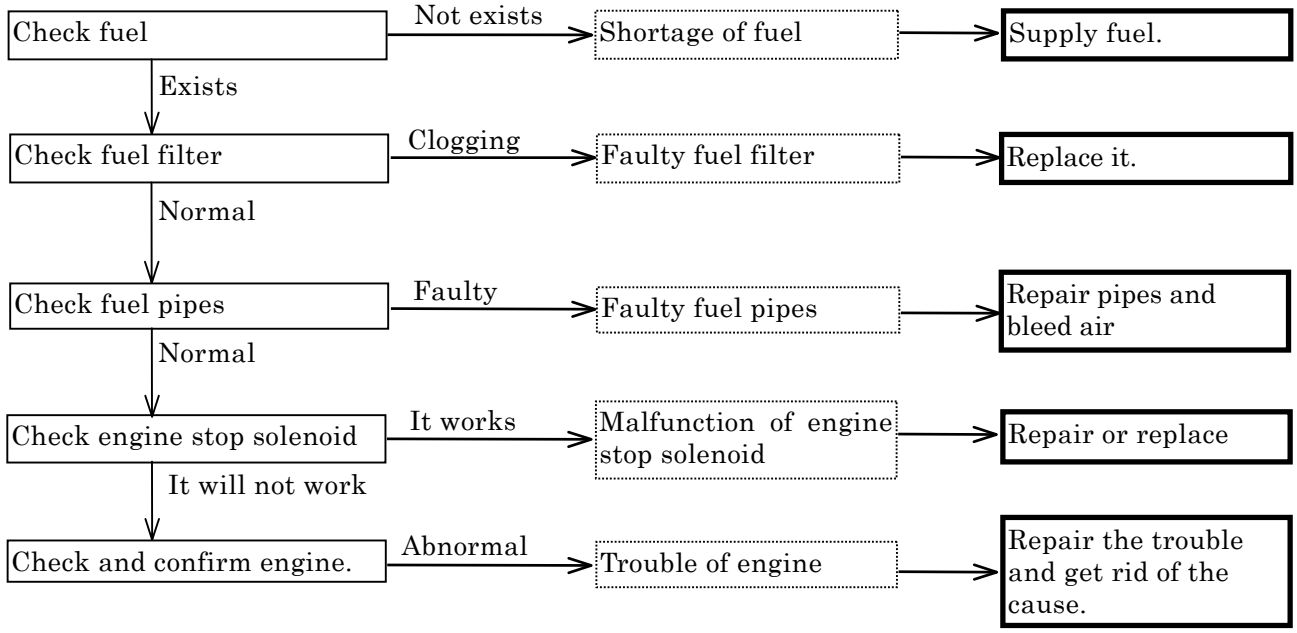


※ : For details of controller functions, see "No.3.1 Controller of No.3 Electric System".

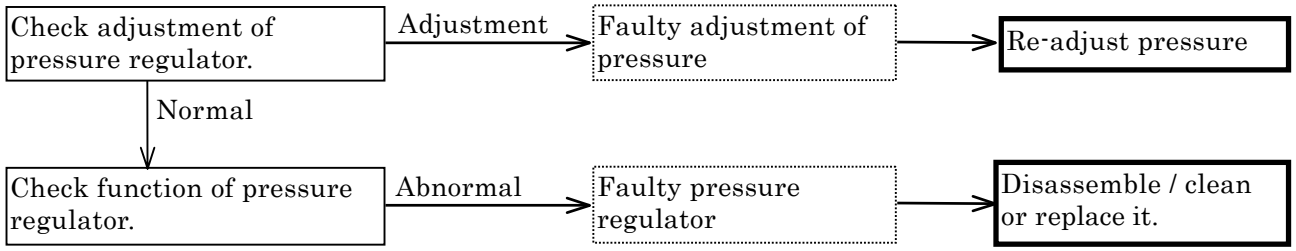
4.2.3 Engine revolutions will drop before pressure rises up to rated one



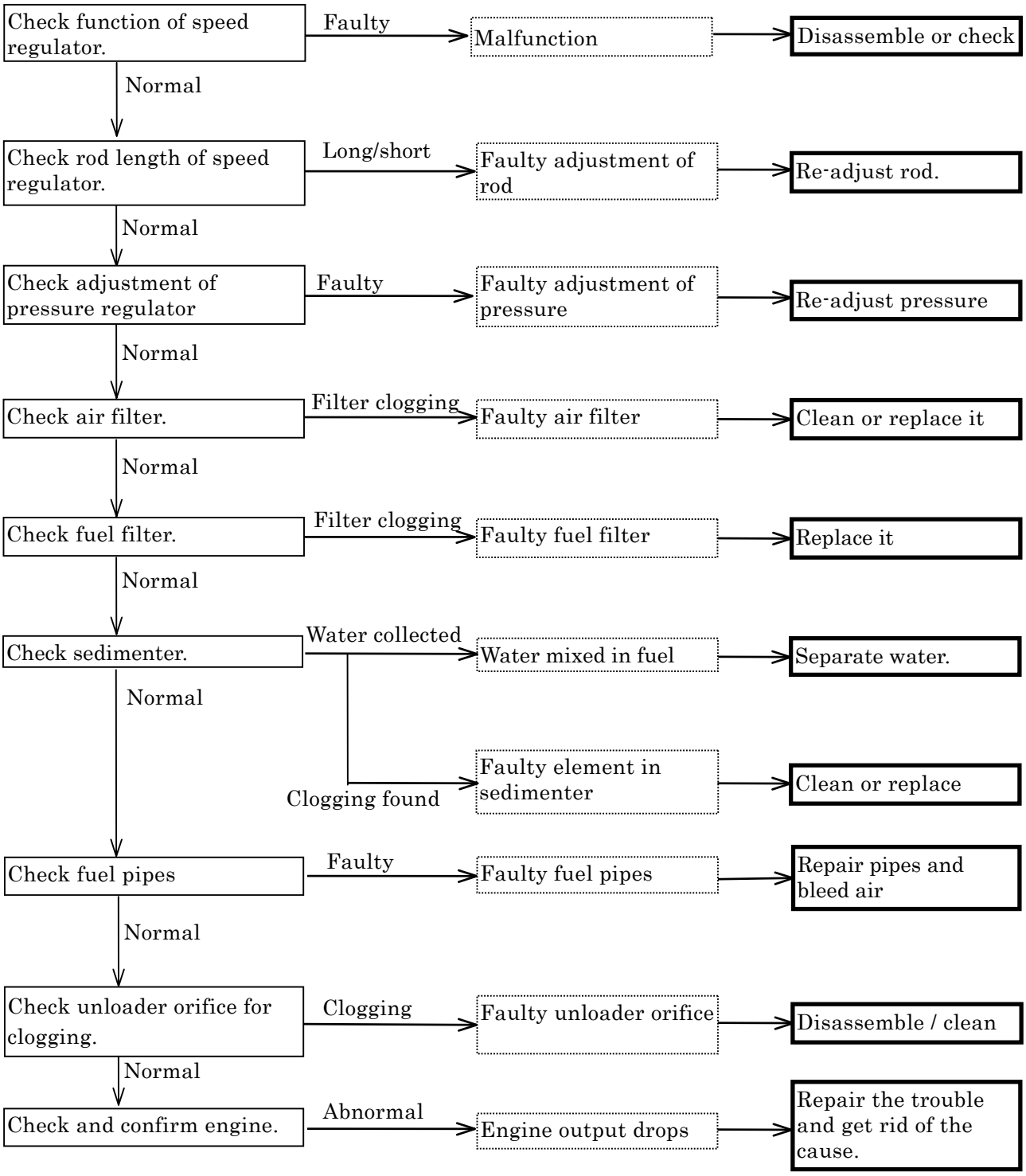
4.2.4 Starter turns, but engine will not start



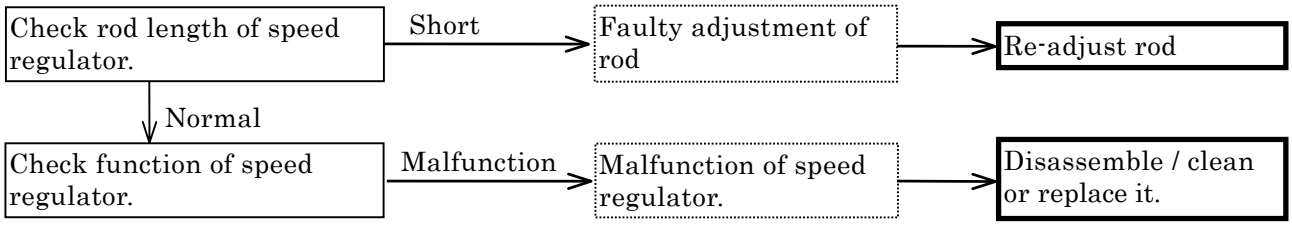
4.2.5 Discharge pressure will not rise up to rated pressure



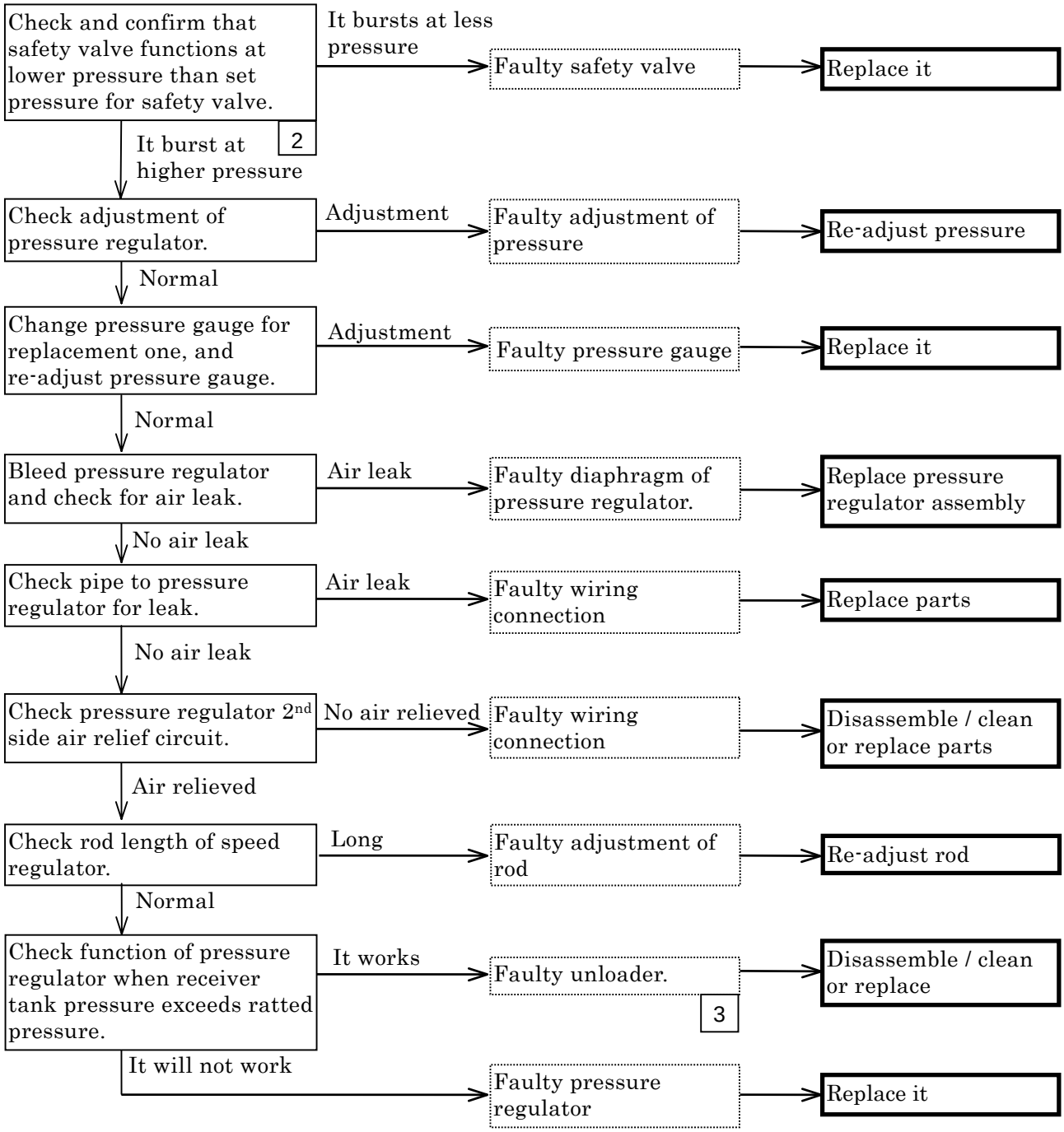
4.2.6 Engine will not turn to meet rated revolutions



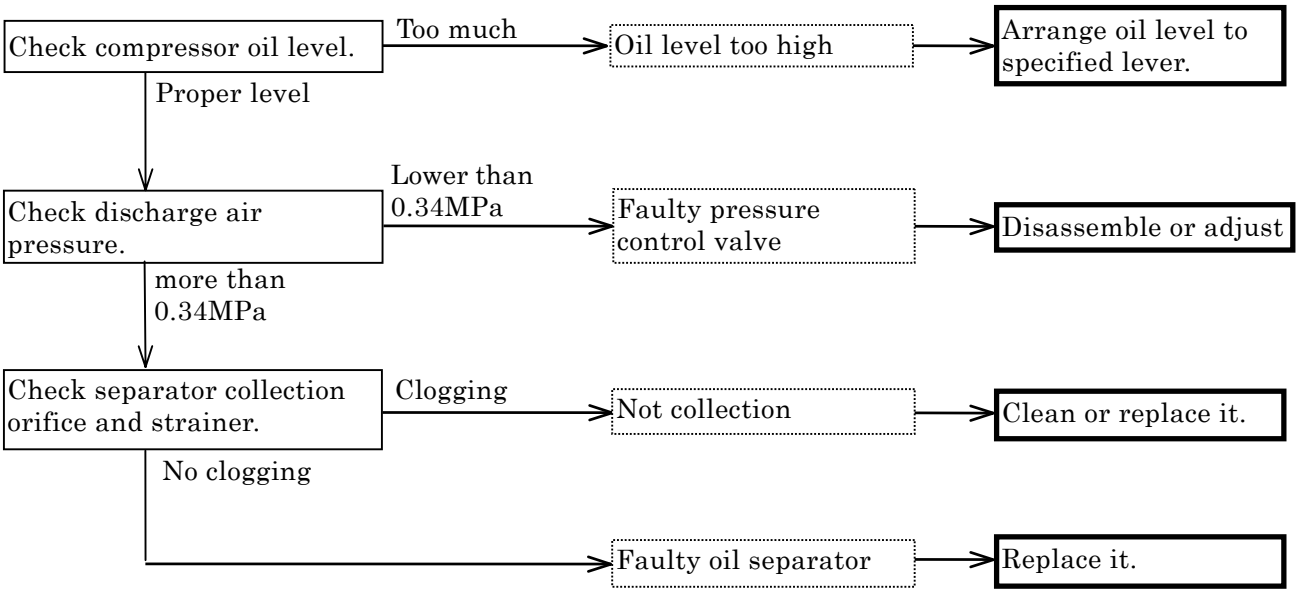
4.2.7 Minimum speed not available even upon no-load operation



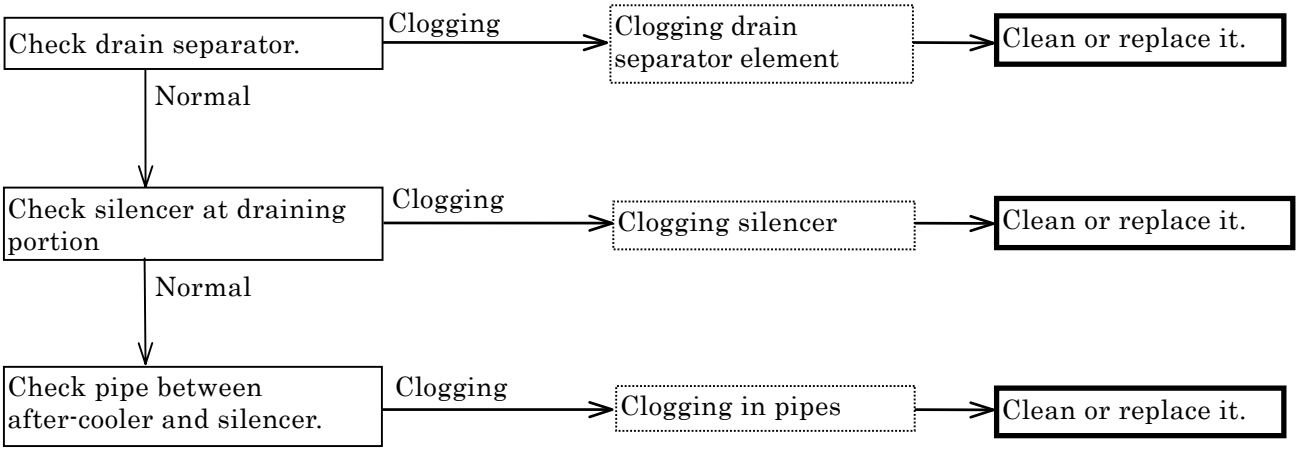
4.2.8 Safety valve bursts out during unloaded operation



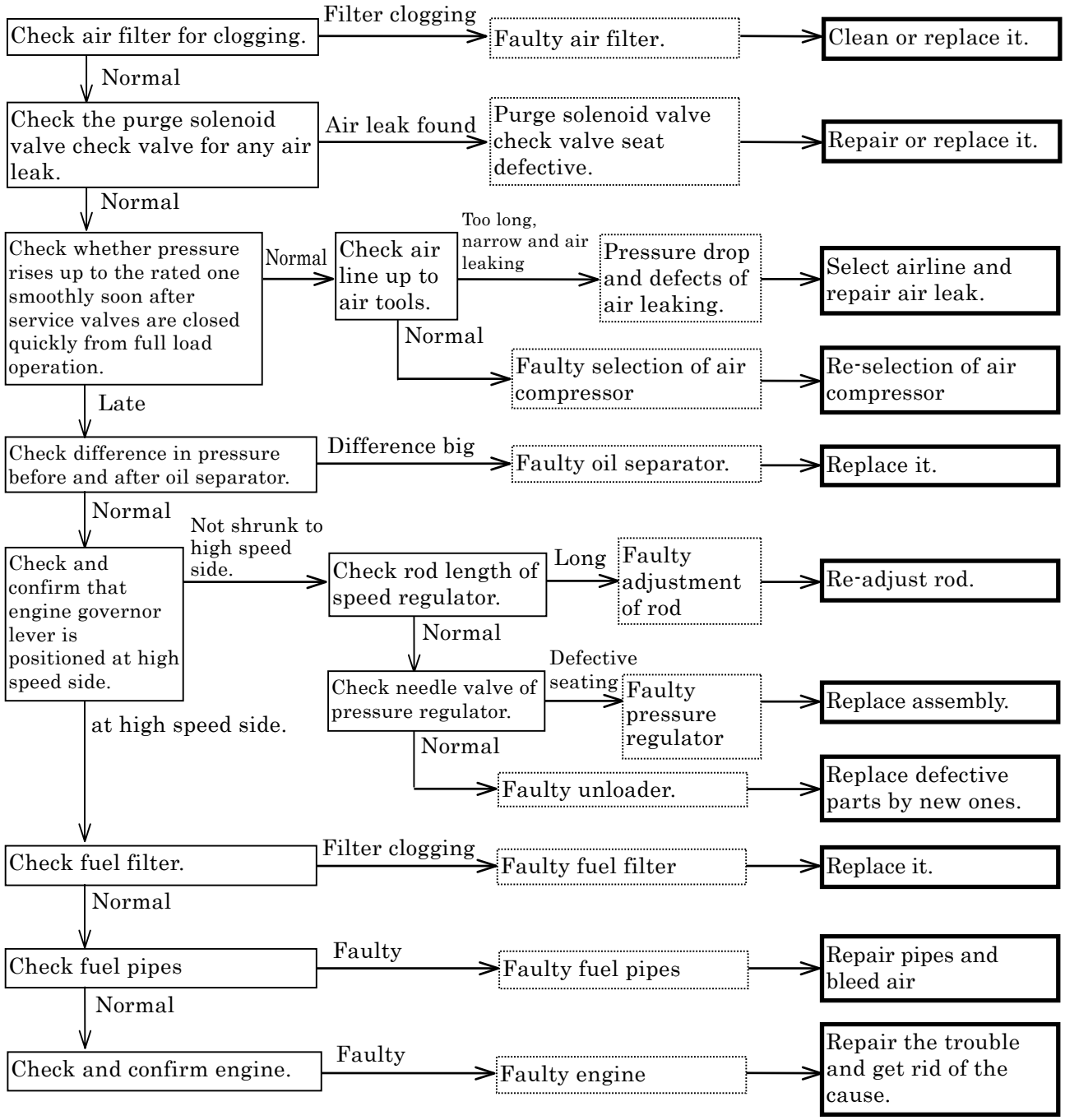
4.2.9 Oil mixed found in delivery air



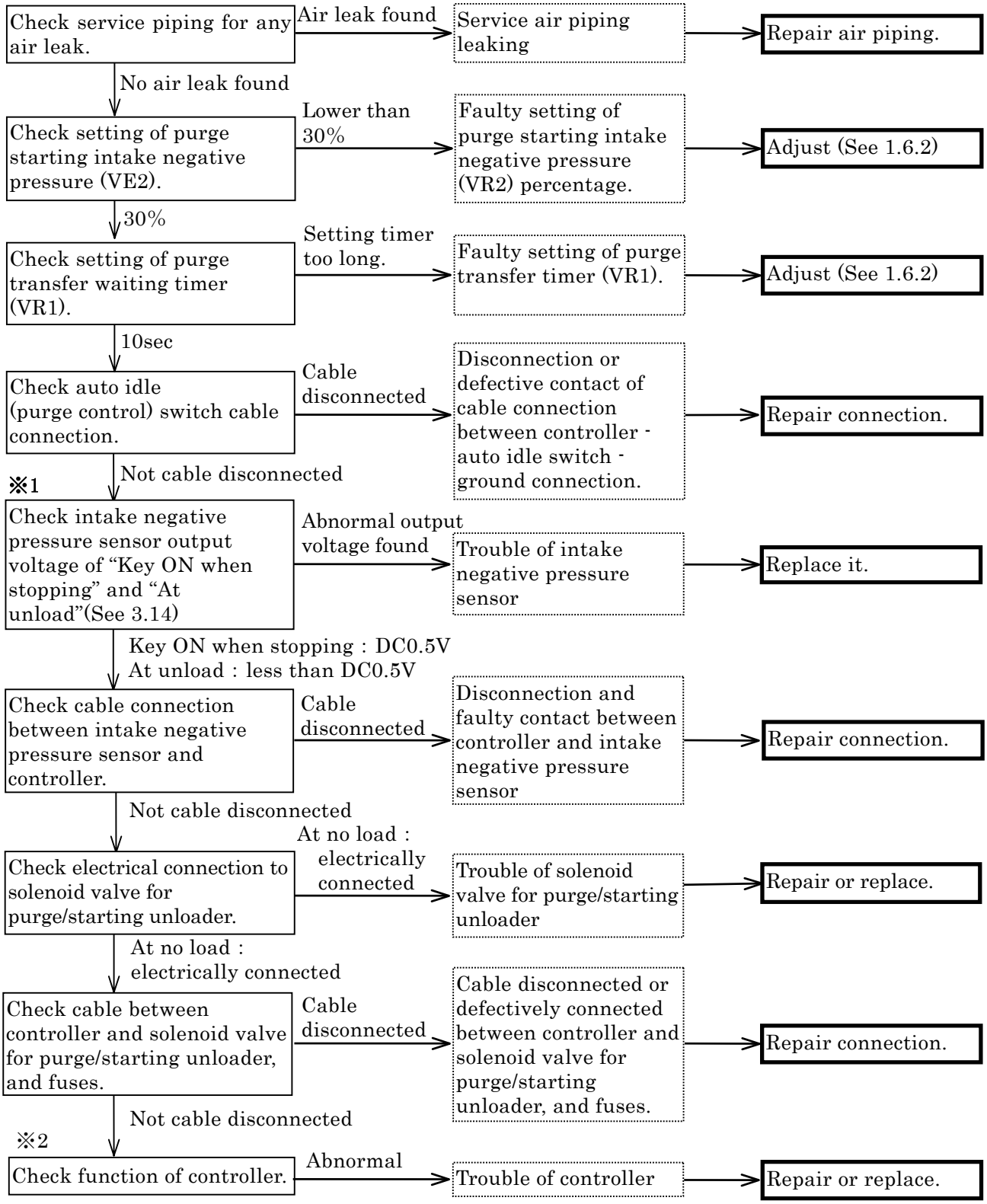
4.2.10 Water found mixed in discharge air (After cooler type)



4.2.11 Discharge air is insufficient



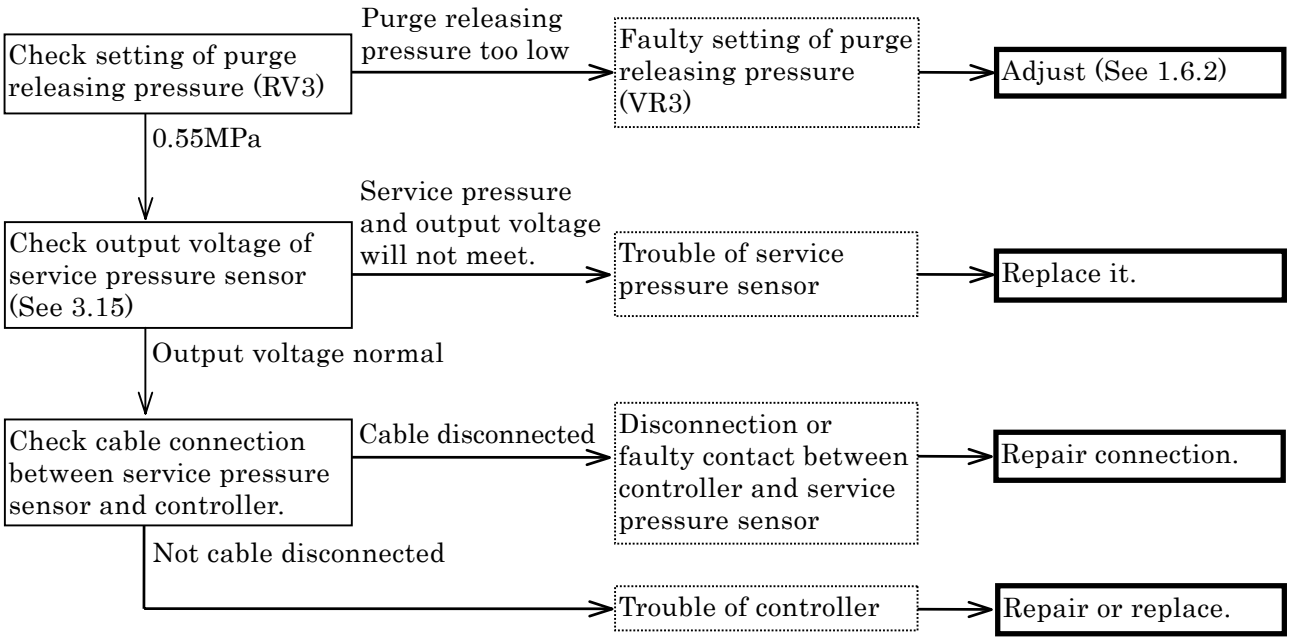
4.2.12 Purge control operation will not start even if auto idle (purge control) switch is pressed (AUTO IDLE type)



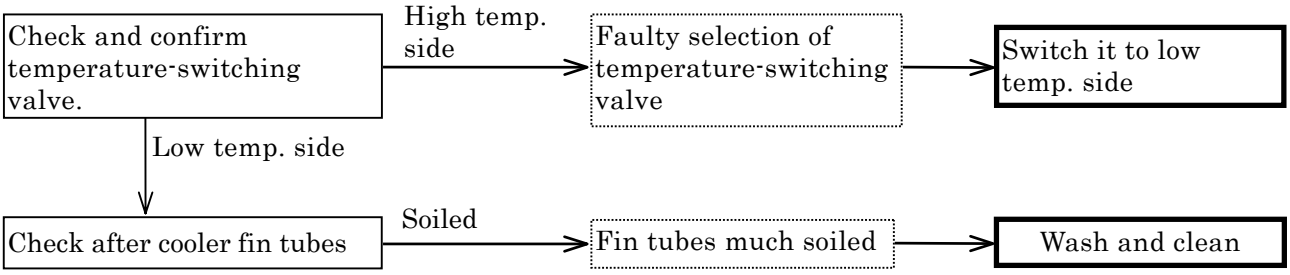
※1 : As the output voltage of intake negative pressure sensor at unload operation is very little, it is better to check the function of purge control operation after replacing the sensor with new one, if it is found difficult to diagnose the trouble.

※2 : For details of controller functions, see "No.3.1 Controller of No.3 Electric System".

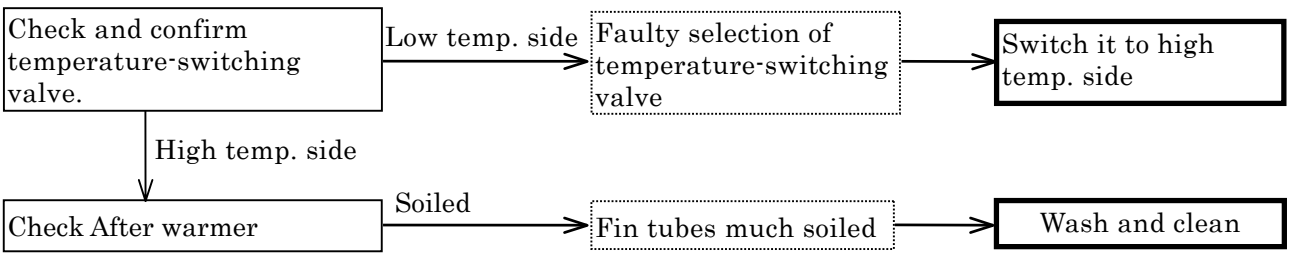
4.2.13 Even when the pressure at consumer's side drops, it will not recover from purge control operation. (AUTO IDLE type)



4.2.14 Discharge air temperature will not drop (Dry air type)

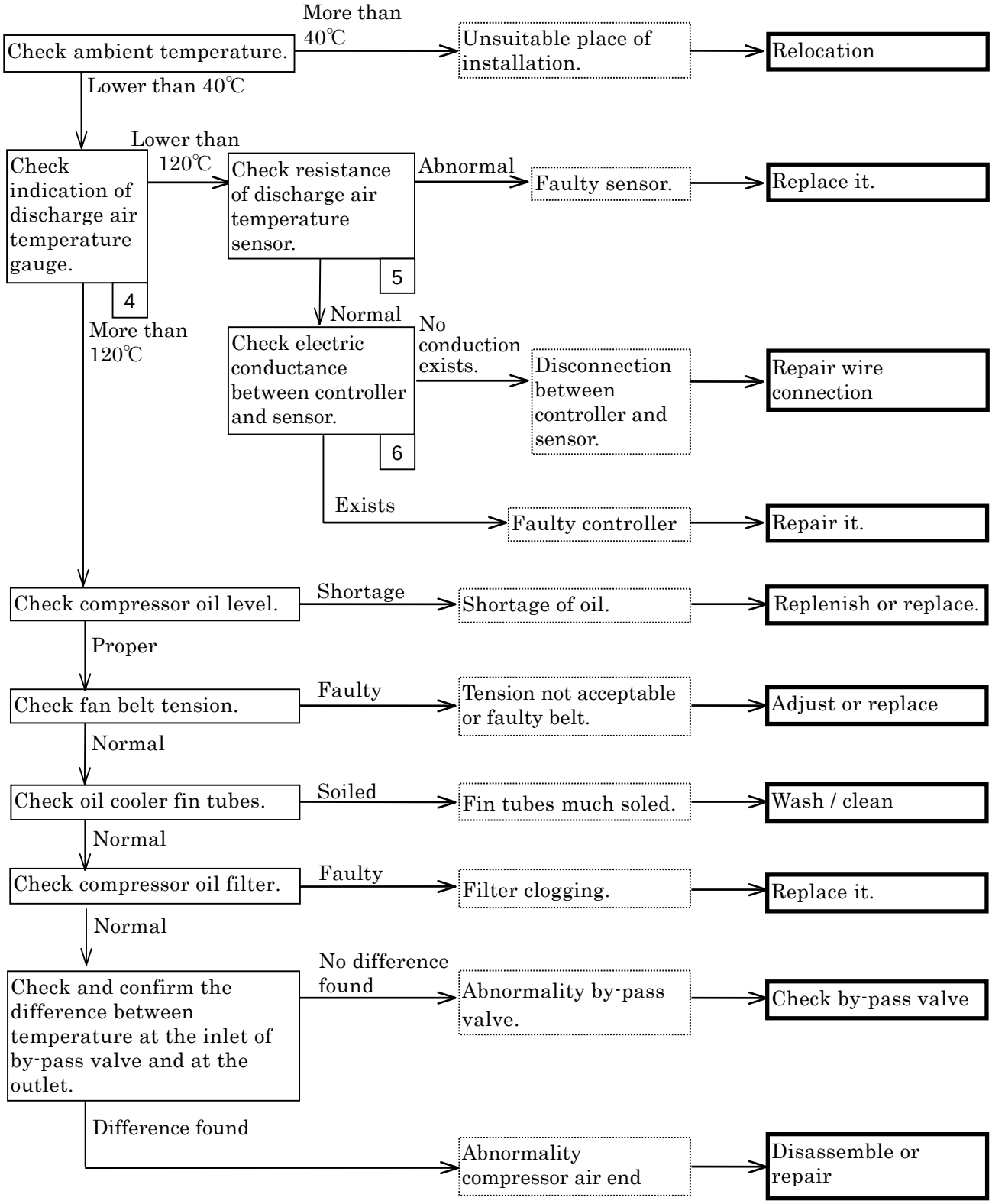


4.2.15 Discharge air temperature will not rise (Dry air type)

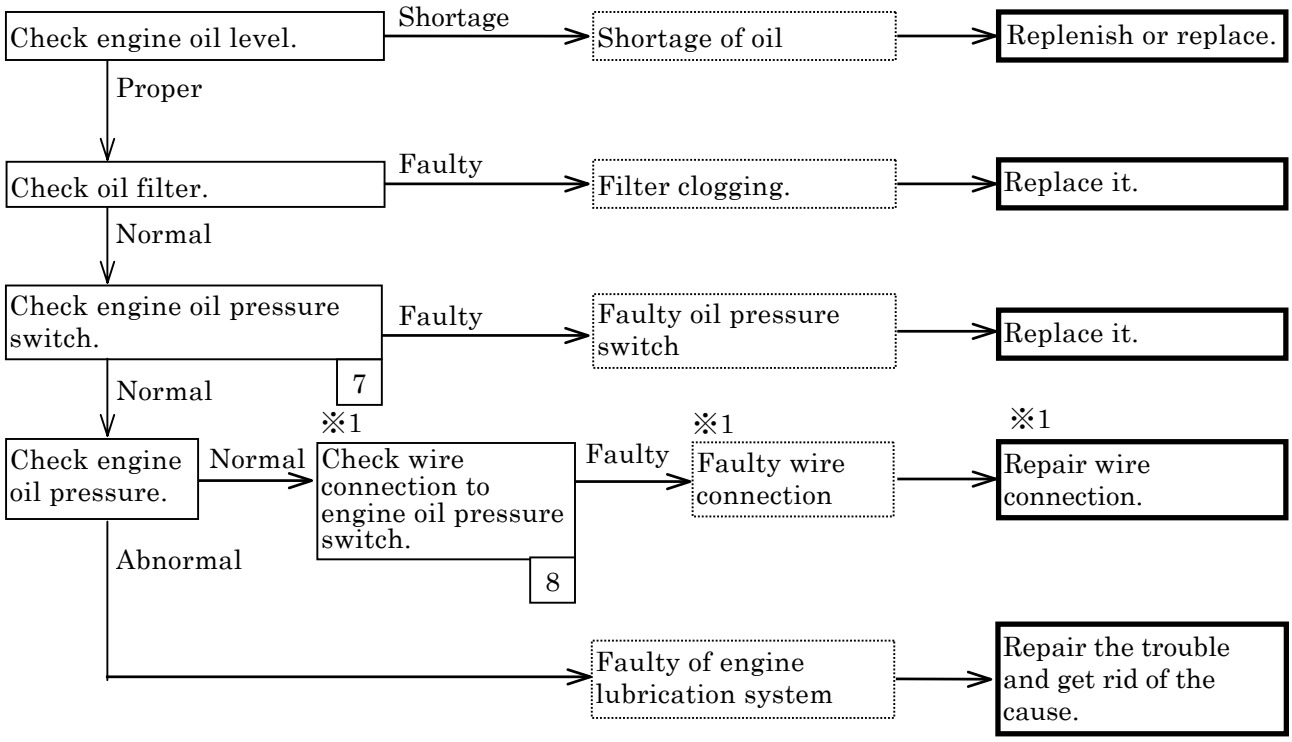


4.3 Operation of emergency switch

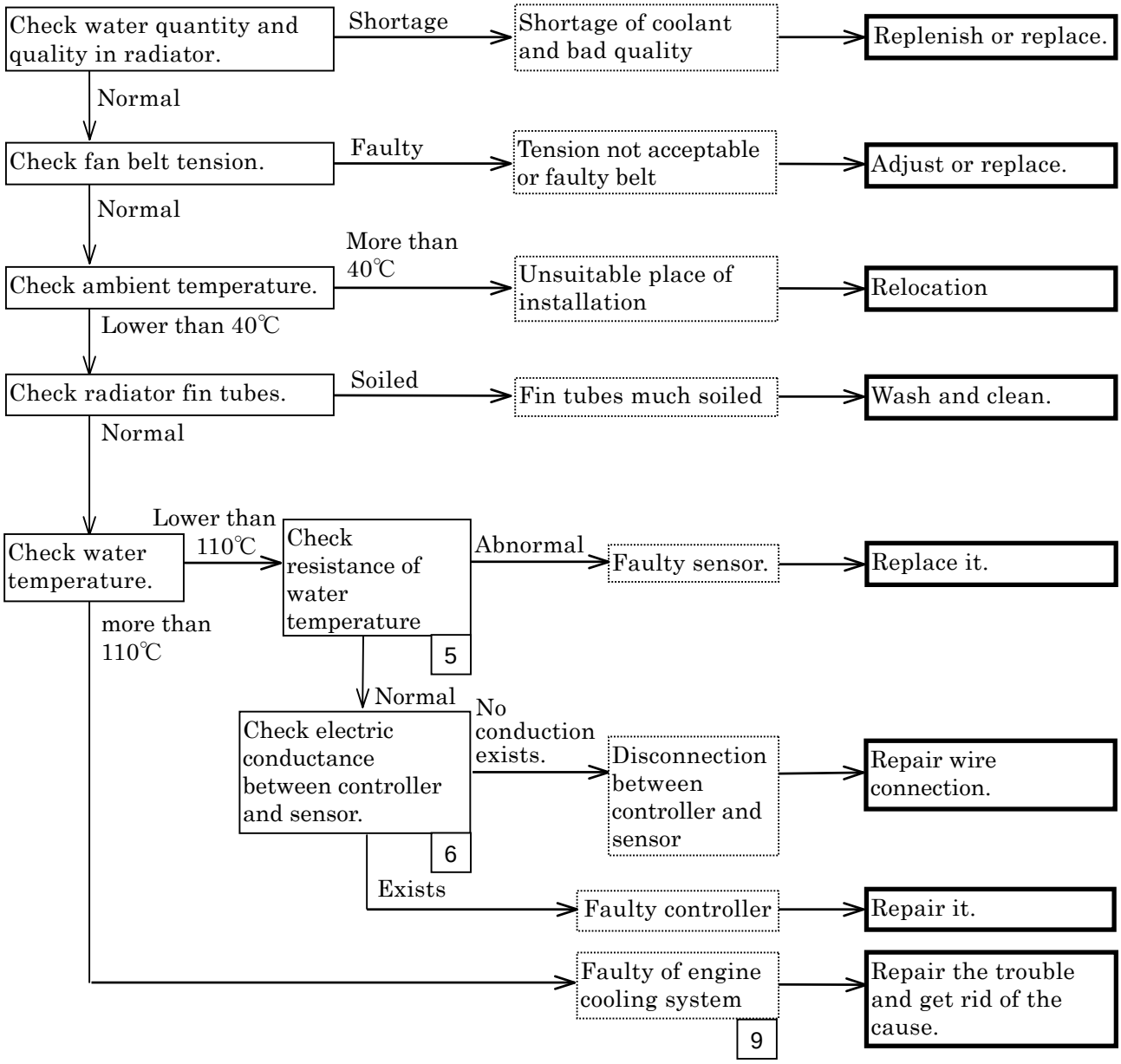
4.3.1 Discharge air temperature lamp glows and engine stops.



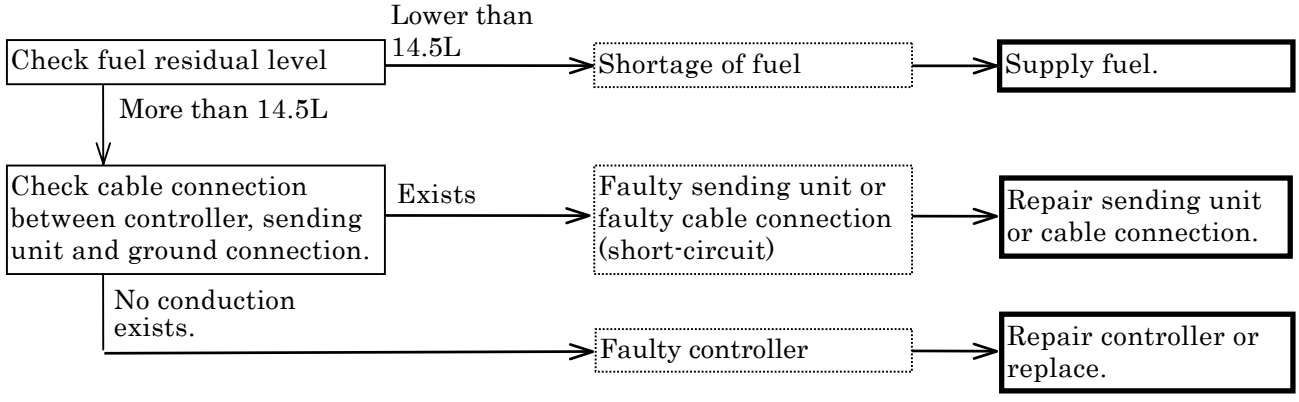
4.3.2 Engine oil pressure lamp glows and engine stops



4.3.3 Engine coolant temperature lamp glows and engine stops



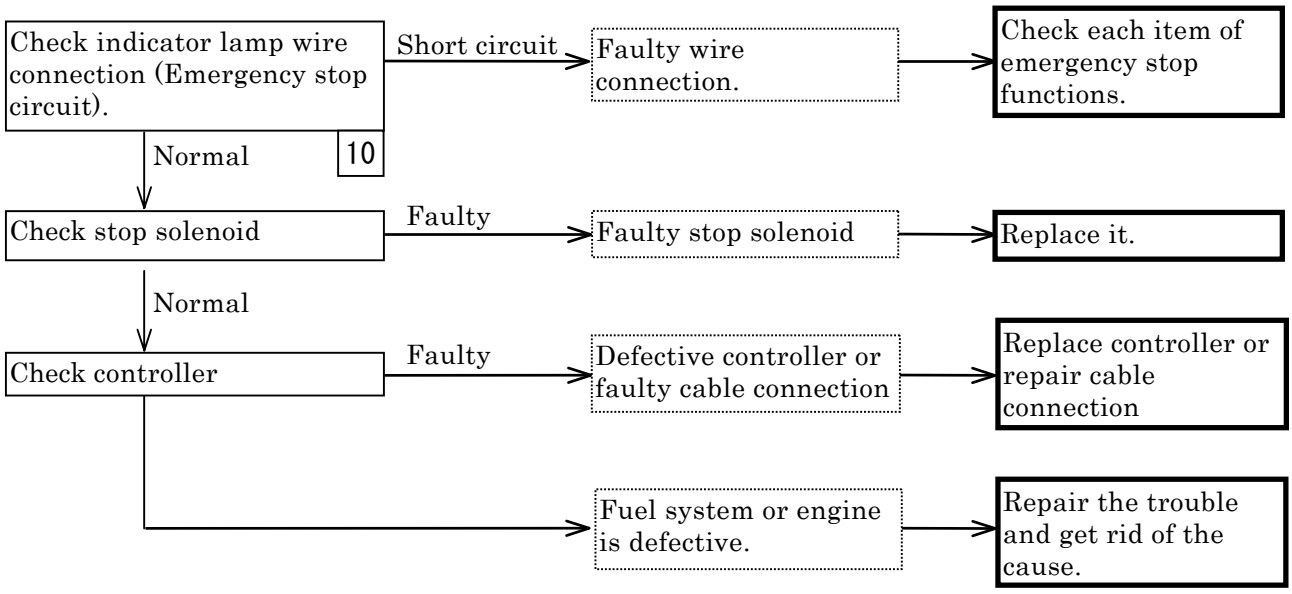
4.3.4 Residual fuel level lamp goes on



4.4 Others

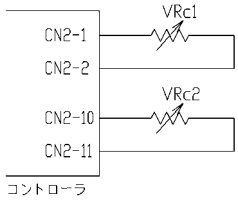
4.4.1 Indicator lamps will not glow, but engine stops.

(Starter switch is not set in contact, and primary circuit of battery relay is not connected properly. Blown fuse trouble is exempted.)



4. Troubleshooting

4.5 Explanation of trouble diagnosis

<table>
<tr><th>No.</th><th>Item</th><th>Cause</th><th>Remedy</th></tr>
<tr><td>1</td><td>Faulty unloader.</td><td>Unloader valve cannot be open.</td><td>Disassemble unloader valve, and check the function of valve and piston. Further check unloader orifice for any clogging.</td></tr>
<tr><td>2</td><td>Check and confirm that safety valve functions at lower pressure than set pressure for safety valve.</td><td>Check and locate pressure maladjustment or defective safety valve.</td><td>In case of malfunction of safety valve, safety valve assembly should be replaced.</td></tr>
<tr><td>3</td><td>Faulty unloader.</td><td>Faulty seat of unloader valve or faulty sliding function of valve and piston.</td><td>Disassemble unloader valve, and clean seat surface and check function of valve and piston.</td></tr>
<tr><td>4</td><td>Check discharge air temperature, using digital monitor.</td><td>Check whether actual rise of discharge air temperature stops engine or any failure of electrical circuit stops engine.</td><td></td></tr>
<tr><td>5</td><td>Check the resistance of discharge air temperature/coolant temperature sensor.</td><td>For resistance characteristics of discharge air temperature and coolant temperature sensor, See 3.13.</td><td>Short- circuiting of thermo sensor will cause engine to stop.</td></tr>
<tr><td>6</td><td>Check conductance between controller and discharge air temperature sensor/coolant temperature sensor.</td><td>Check whether there is any disconnection or short-circuit in cable connection between controller, discharge air temperature sensor and coolant temperature sensor.
Clarify whether the trouble is caused by faulty cable connection or defective controller. When discharge air temperature/coolant temperature exceeds the set temperature (120℃/110℃), interior contact (RY1) between controller CN1-8 and CN1-4 terminals turns OFF to cut electrical connection to stop solenoid and making engine stop.</td><td>How to check controller only is shown as follows: Connect variable resistor (1kΩ) to controller as shown below. Gradually lowering resistance value, measure the value when it begins to show abnormality and check whether it is within the ranges shown below.
 

<table>
<tr><th>Item</th><th>Set temperature</th><th>Resistance</th></tr>
<tr><td rowspan="2">Discharge air temperature (VRc1)</td><td>115℃</td><td>491±15Ω</td></tr>
<tr><td>120℃</td><td>432±15Ω</td></tr>
<tr><td rowspan="2">Engine water temperature (VRc2)</td><td>107℃</td><td>608±15Ω</td></tr>
<tr><td>110℃</td><td>560±15Ω</td></tr>
</table></td></tr>
</table>

No.	Item	Cause	Remedy
7	Check engine oil pressure switch.	For actuation pressure of oil pressure switch, See 1.2 “List of set values”.	
8	Check for any defective connection.	Check and make sure that no disconnection has been found for engine oil pressure switch. (Switching “ON” engine oil pressure switch enables engine emergency stop.)	
9	Faulty of engine cooling system.	When any trouble is not found in thermostat, coolant pump can be in disorder.	For the temperature at which thermostat valve opens, refer to 2.6.
10	Check indicator lamp wire connection.	It sometimes happens that emergency stop circuit is active, but warning lamp will not light on because its circuit is in trouble. Try to locate its cause.	

5. References

5.1 Comparison between consumable parts and electrical appliances

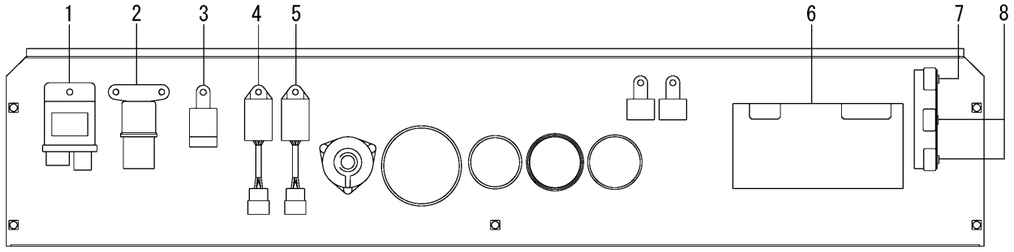
Item	Part Number
●Element / Filter	
Air filter ASS'Y (For compressor)	32100 40301
Air filter element (outer)	32143 12700
Air filter element (inner)	32143 12600
Air filter ASS'Y (For engine)	32100 41001
Air filter element (outer)	32143 12700
Air filter element (inner)	32143 12600
Oil separator	34220 14900
For oil separator gasket (Upper side)	03737 29303
For oil separator gasket (Lower side)	03737 24810
Compressor oil filter ASS'Y	37400 13700
Oil filter cartridge	37438 05601
Engine oil filter	41290 01100 (YANMAR:119005-35160)
Fuel filter	43543 01400 (YANMAR:129907-55801)
●Air control	
Speed regulator	36400 22100
Diaphragm	36437 01500
Pressure regulator	36400 19000
Auto relief valve Vacuum relief valve	36600 03501
Needle valve	36429 00800
O-ring	03402 25008
O-ring	03402 25021
O-ring	21221 02100
Unloader valve	22100 40700
O-ring	03402 10125
O-ring	21441 03700
Pressure control valve	35300 17300
O-ring	03402 25032
Spring	22144 07700
Piston	35303 03300
Installation gasket of pressure control valve	35424 05701
●Instruments on panel	
Starter switch	44322 07300
Pressure gauge	36141 15503
Fuel level gauge	36158 00500
Hour meter	36149 02800
●Oil line	
By-pass valve ASS'Y	37200 11900
Pellet	37231 02100
O-ring	03402 25048

5. References

Item	Part Number
●Electrical appliances	
Controller (Standard type)	46879 51800
Controller (AUTO IDLE type)	46879 50700
Safety relay (SR)	44346 16400 (YANMAR:119802-77200)
Solenoid relay (SLR)	44327 05000 (YANMAR:119650-77910)
Heater lamp relay (R1)	44346 08300 (YANMAR:119247-77100)
Time relay [15sec](T1)	44327 06100 (YANMAR:128300-77920)
Time relay [1sec](T2)	44327 08700 (YANMAR:129211-77920)
Purge/starting unloader solenoid valve (SV1, 2)	46811 24100
Fuse 30A(FUSE1)	44470 02600
Fuse 10A(FUSE2)	44470 02100
Intake negative pressure sensor	44328 20600
Service pressure sensor	44328 20600
Discharge air temp. sensor	44364 06500
Coolant temp. sensor	44364 06500
Engine oil pressure switch	44328 21800 (YANMAR:114250-39450)
Purge Control switch	46167 02900
Sending unit	36159 03800

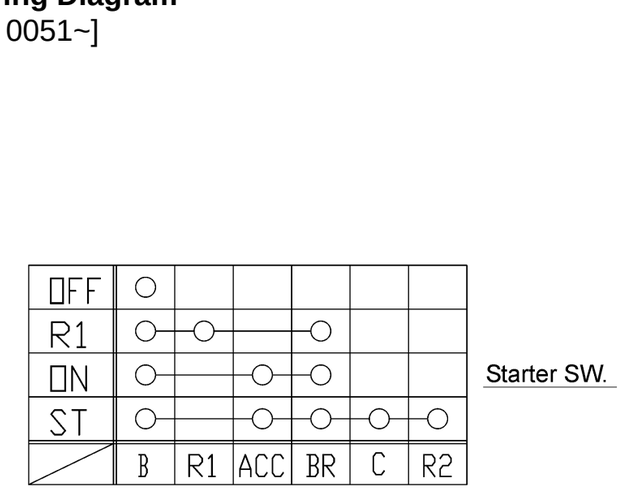
5.2 Engine Wiring Diagram

[SER.NO. : 0051~]

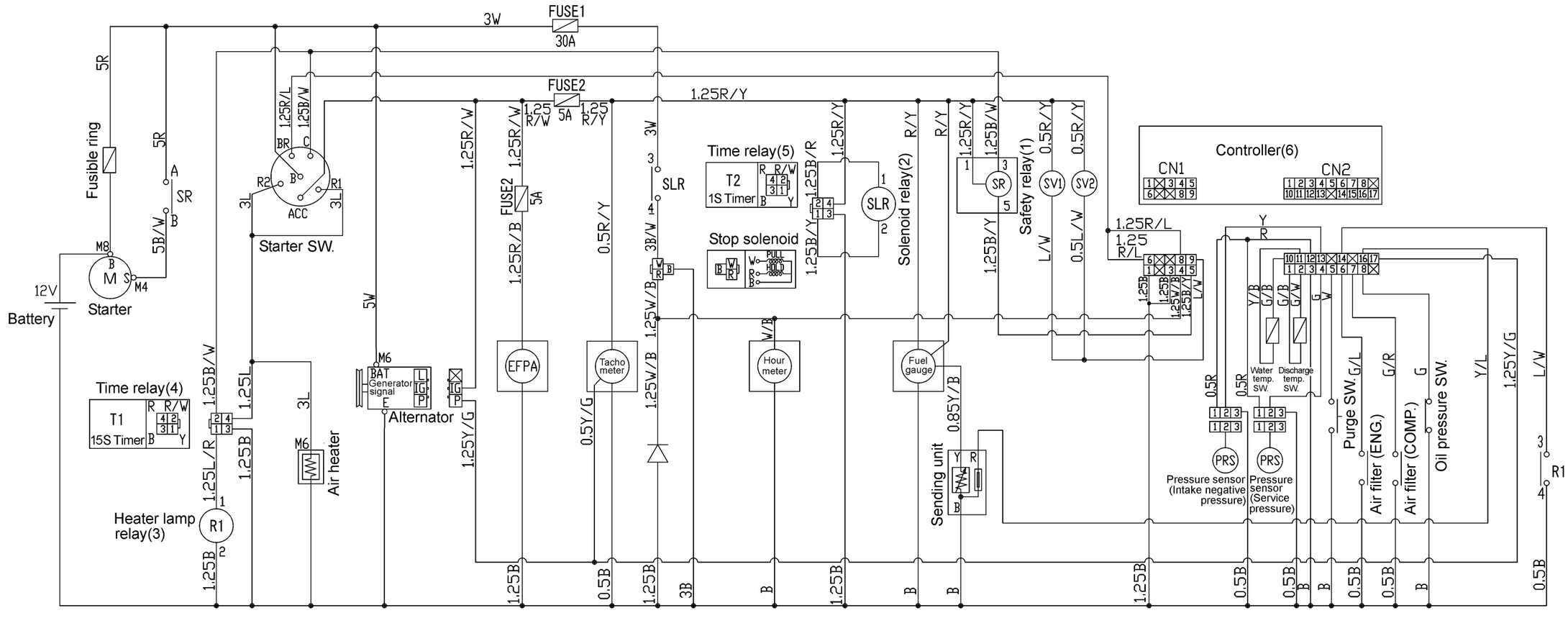


Position of electrical apparatus provided on backside of instrument panel.

NO.	Part No.	Part Name	Mark
1	44346 16400	Safety relay	SR
2	44327 05000	Solenoid relay	SLR
3	44346 08300	Heater lamp relay	R1
4	44327 06100	Time relay (15S)	T1
5	44327 08700	Time relay (1S)	T2
6	46879 51800	Controller (Standard type)	–
	46879 50700	Controller (AUTO IDLE type)	–
7	44470 02600	Fuse folder (30A)	FUSE1
8	44470 02100	Fuse folder (5A)	FUSE2



Starter SW.



Note)The wire size without directions is 0.85mm².

P10015E

This text book contains the most recent information available at the time of printing, and the contents of the list are based on information in effect at that time and are subject to change without notice.

HOKUETSU INDUSTRIES CO., LTD.

8TH FLOOR SHINJUKU SAN-EI BLDG,
22-2 NISHI-SHINJUKU 1-CHOME,SHINJUKU-KU
TOKYO 160-0023 JAPAN
TEL:81-3-3348-7281
FAX:81-3-3348-7289
URL:http//www.airman.co.jp

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