AIRMAN

PC

SERVICE MANUAL

SCREW COMPRESSOR

PDS185S-6C2

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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.

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1. Specification

1.1 Specifications

Item	unit	PDS185S-6C2	
		Export model	US model
●Weight・Mass			
Overall length	in.(mm)	116.5(2,960)	128.7(3,270)
Overall length (Bonnet only)	in.(mm)	74.6(1,895)	74.6(1,895)
Overall width	in.(mm)	65.0(1,650)	66.9(1,700)
Overall height	in.(mm)	59.4(1,510)	59.8(1,520)
Net dry mass	lb(kg)	1,896(860)	1,896(860)
Operating mass	lb(kg)	2,116(960)	2,116(960)
●Compressor			
Free air delivery	cfm(m^3/min)	185(5.2)	
Working pressure	psi(MPa)[bar]	100(0.69)[6.9]	
Pressure of pressure control valve	psi(MPa)[bar]	58(0.40)[4.0]	
Burst pressure of safety valve	psi(MPa)[bar]	150(1.03)[10.3]	
Ambient conditions: temperature	°F(℃)	5 to 104(-15 to +40)	
Ambient conditions: altitude	yd(m)	less than 1,640(1,500)	
●Engine			
Type		YANMAR 4TNV88-BDHKS	
Rated output (Gross)	hp/min^{-1} (kW/min^{-1})	48.8/3,000(36.4/3,000)	
Rated output (Net)	hp/min^{-1} (kW/min^{-1})	46.8/3,000(34.9/3,000)	
Fuel consumption	g/kW・h	258	
Rated RPM	min^{-1}	3,000	
RPM at unload conditions	min^{-1}	1,300	
Net dry mass	lb(kg)	362(164)	
●Lubricating oils			
Engine oil capacity (H/L level)	gal.(L)	1.95/1.06(7.4/4.0)	
Compressor oil capacity (including receiver tank and oil cooler etc.)	gal.(L)	3.96(15)	
Compressor oil capacity to be filled		Ambient temperature : 5°F to 104°F (-15℃ to +40℃)	
		SHELL : SHELL CORENA OIL RS32 MOBIL : MOBIL RARUS 424 NIPPON OIL CO.: FAIRCOL RA32	HULS : ANDEROL 3032 MOBIL : RARUS SHC 1024 TEXACO: SYN-STAR DE32
Coolant capacity	gal.(L)	1.53(5.8)	
Fuel tank capacity	gal.(L)	23.8(90)	
●Fuel consumption ratio (for reference only)			
At purge operation	gal./Hr(L/Hr)	0.53(2.0)	
At no load	gal./Hr(L/Hr)	0.71(2.7)	
At 50%	gal./Hr(L/Hr)	1.32(5.0)	
At 70%	gal./Hr(L/Hr)	1.66(6.3)	
At full load	gal./Hr(L/Hr)	2.51(9.5)	

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1. Specification

1.2 Set Value

Item	unit	PDS185S-6C2	
		Export model	US model
●Emergency stop devices			
Actuating pressure of discharge air temperature switch	°F(℃)	248(120)	
Actuating temperature of water temperature switch	°F(℃)	230(110)	
Actuating pressure of oil pressure switch	psi(MPa)[bar]	7.3(0.05)[0.5]	
●Warning devices			
Actuating pressure of discharge air temperature switch	°F(℃)	239(115)	
Actuating temperature of water temperature switch	°F(℃)	221(105)	
Battery failure		When not charged	
Actuating pressure of air filter indicator	psi(kPa)[bar]	0.9(6.23)[0.0623]	
●Set value			
Pressure control valve	psi(MPa)[bar]	58(0.40) [4.0]	
Actuating pressure of safety valve	psi(MPa)[bar]	150(1.03)[10.3]	
Unload starting pressure	psi(MPa)[bar]	100(0.69) [6.9]	
Time for starting purge mode operation (At AUTO IDLE operation mode)	sec	10 to112 (Set at 10 sec. ex.works)	
●Engine RPM			
Rated RPM	min^{-1}	3,000	
RPM at unload	min^{-1}	1,300	
●Indications of gauges or instruments during operation			
Discharge pressure gauge (at full load)	psi(MPa)[bar]	58 to 100(0.40 to 0.69)[4.0 to 6.9]	
Discharge pressure gauge (at no load)	psi(MPa)[bar]	104 to 131(0.72 to 0.90)[7.2 to 9.0]	
Discharge pressure gauge (at purge operation)	psi(MPa)[bar]	58 to 73(0.40 to 0.50)[4.0 to 5.0]	

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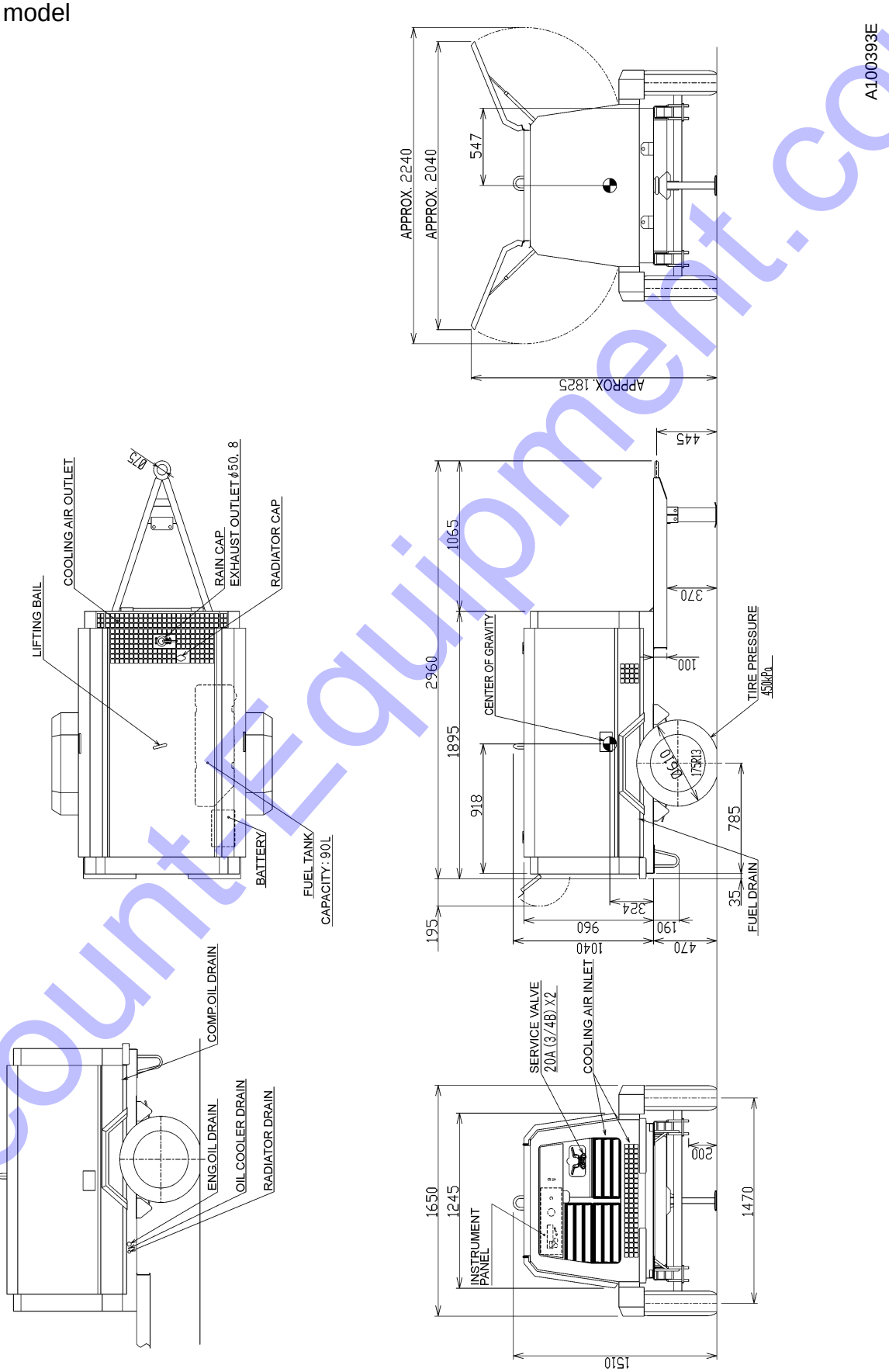
1. Specification

1.3 Outline drawing

(1) Export model

Unit : mm



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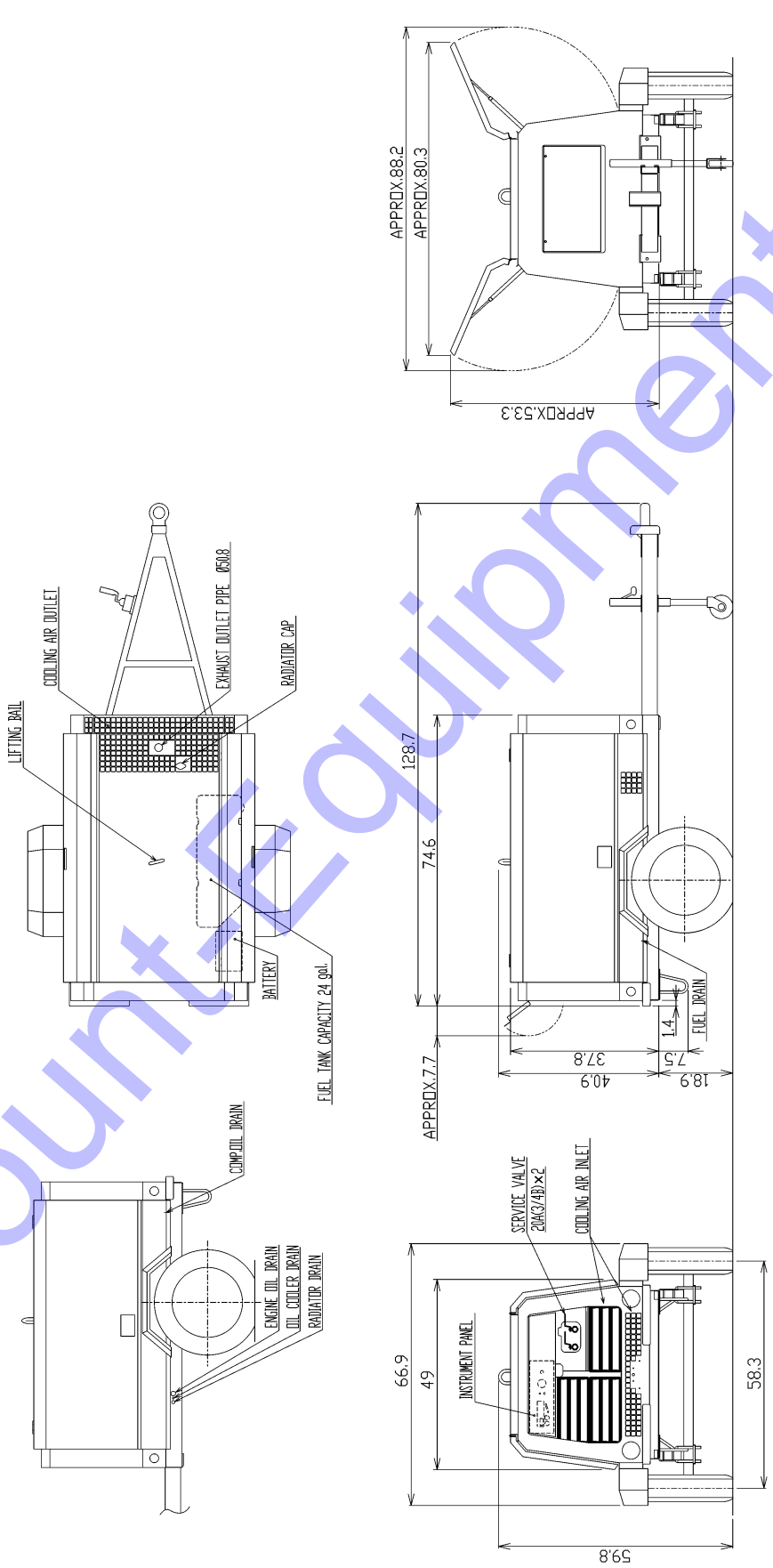
(2) US model

Unit : in.



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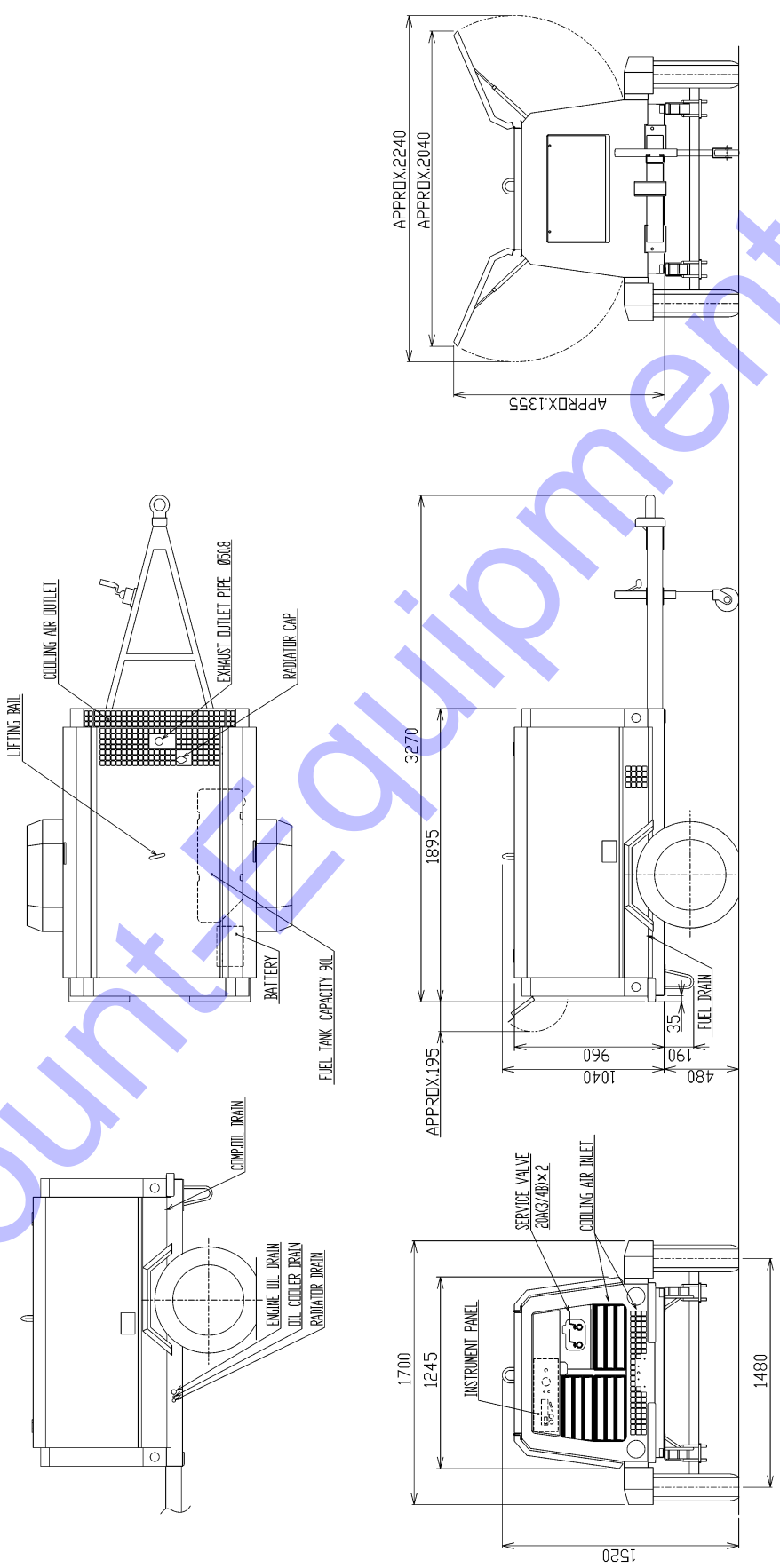
(3) US model

Unit : mm



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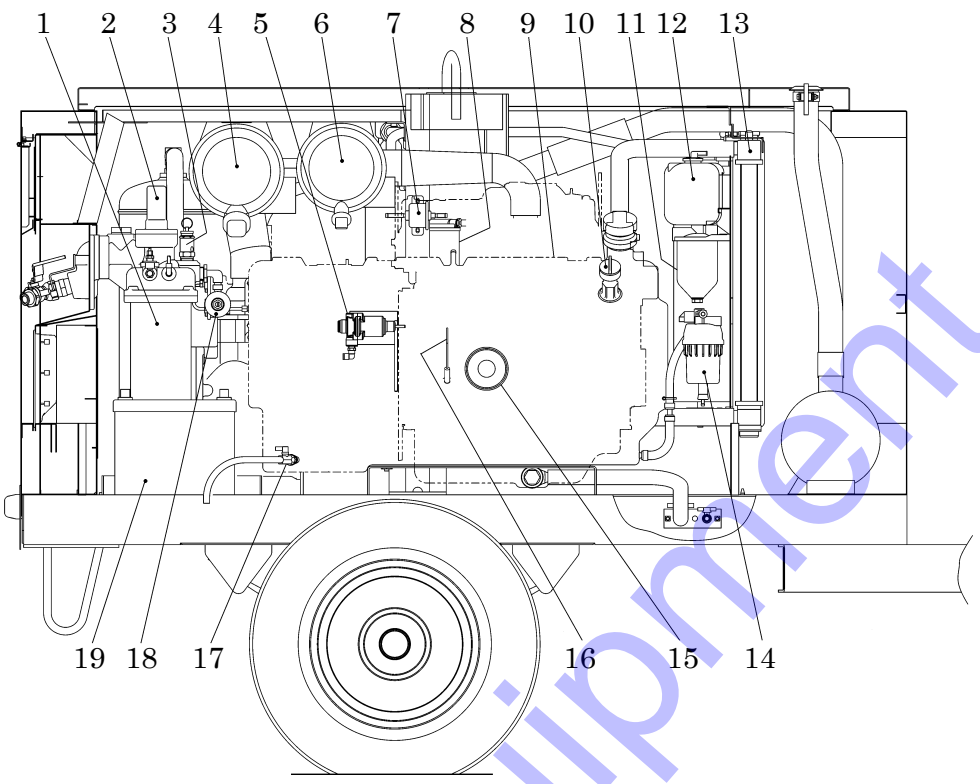
1.4 Internal Components and Part Names



Export model

No.	Description	Function
1	Oil separator	For separating oil mist mixed in compressed air.
2	Pressure control valve	For keeping the receiver tank pressure higher than 58psi (0.4MPa) [4bar] in the tank.
3	Safety valve	For releasing compressed air to the atmosphere when the pressure rises higher than the rated pressure.
4	Air filter (For compressor air-end)	For filtering the dust floating in the intake air.
5	Speed regulator	For regulating engine revolution speed.
6	Air filter (For engine)	For filtering the dust floating in the intake air.
7	Air bleeding electromagnetic pump	For automatically bleeding air from fuel pipes.
8	Fuel filter	For filtering dust and foreign matter mixed or to be mixed in the fuel oil.
9	Fuel tank	For storing diesel fuel oil.
10	Engine oil filler port	For supplying and replenishing engine oil to engine.
11	Fuel pre filter	For filtering dust and foreign matter mixed or to be mixed in the fuel oil.
12	Reserve tank	For checking engine cooling water level and for replenishing cooling water.
13	Radiator	For cooling the coolant for engine because it is water-cooled.
14	Sedimenter	For separating water mixed or to be mixed in the fuel oil.
15	Engine oil filter	For filtering engine oil.
16	Engine oil level gauge	For checking engine oil level.
17	Fuel tank drain valve	For draining condensate accumulated in fuel tank.
18	Pressure regulator	For regulating intake air volume.
19	Battery	For electrically starting engine.

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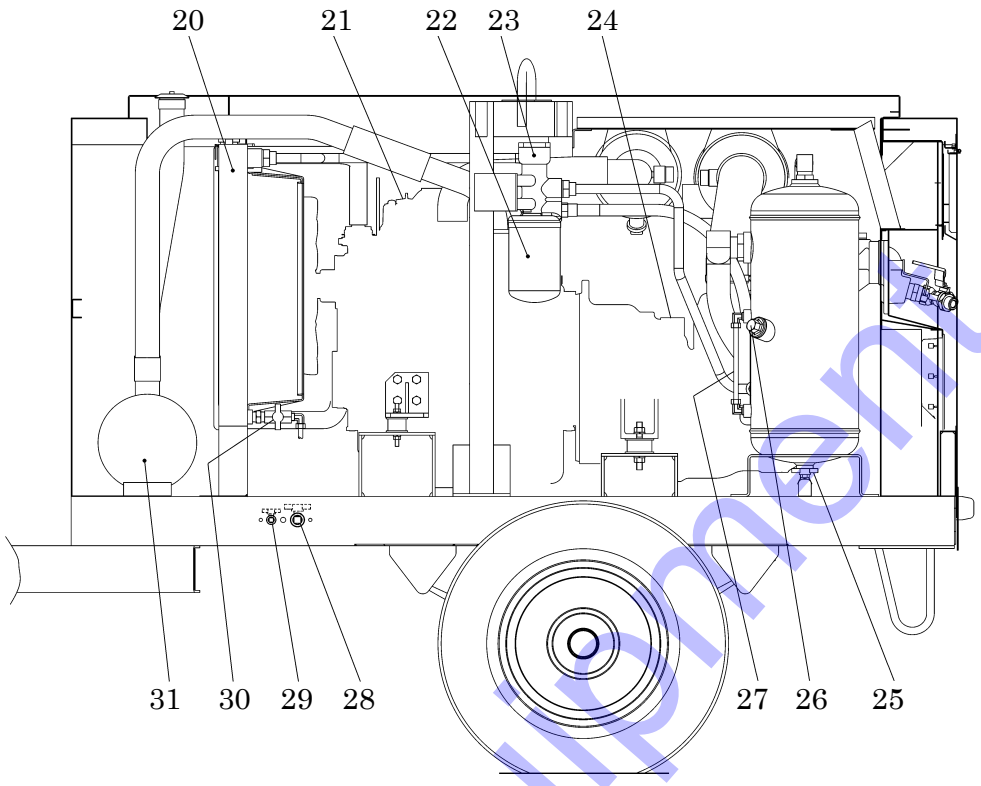
1. Specification



Export model

No.	Description	Function
20	Oil cooler	For cooling compressor oil circulating in the system.
21	Engine	For driving the compressor.
22	Compressor oil filter	For filtering compressor oil circulating in the system.
23	By-pass valve	For keeping compressor oil at proper temperature.
24	Air-end	For compressing intake air.
25	Separator receiver tank drain valve	From this portion where condensate is drained out of separator-receiver tank.
26	Compressor oil filler port	For supplying and replenishing compressor oil.
27	Compressor oil level gauge	Scale for measuring compressor oil level.
28	Engine oil drain valve	For draining engine oil for replacement of it and for maintenance.
29	Coolant drain valve	For draining condensate from engine.
30	Oil cooler drain valve	For draining compressor oil out of oil cooler and oil lines.
31	Exhaust muffler	Equipment which muffles an engine exhaust sound.

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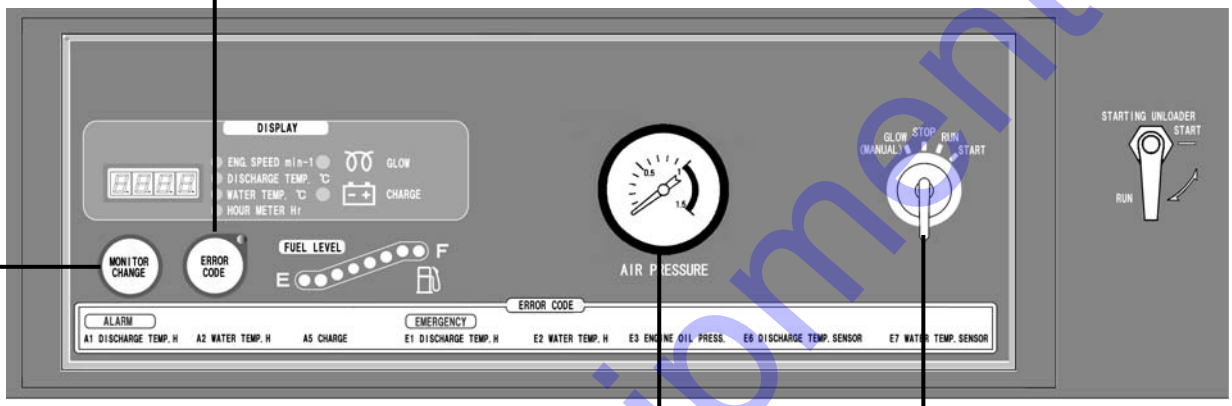
1. Specification

1.5 Instrument panel

(1) Export model

Error code / Reset switch

When this switch is pushed on while lamp is blinking, it shows error code. When starter switch is placed to “STOP”, displayed screen is reset.



A100359E

Discharge air pressure gauge

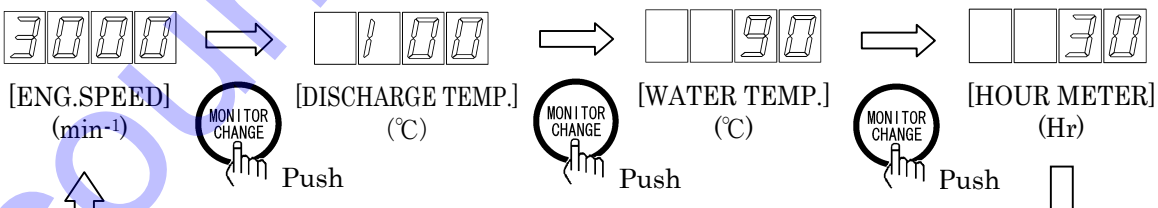
For indication of working pressure

Starter switch

For starting and stopping engine

Digital monitor

When power is supplied, revolution speed (lamp lighting) is indicated.



Whenever indication selector switch is pushed every time, indication screen is changed by turns as shown above.

※In case that discharge air temperature is below 20℃, “－－－L” is indicated on screen.

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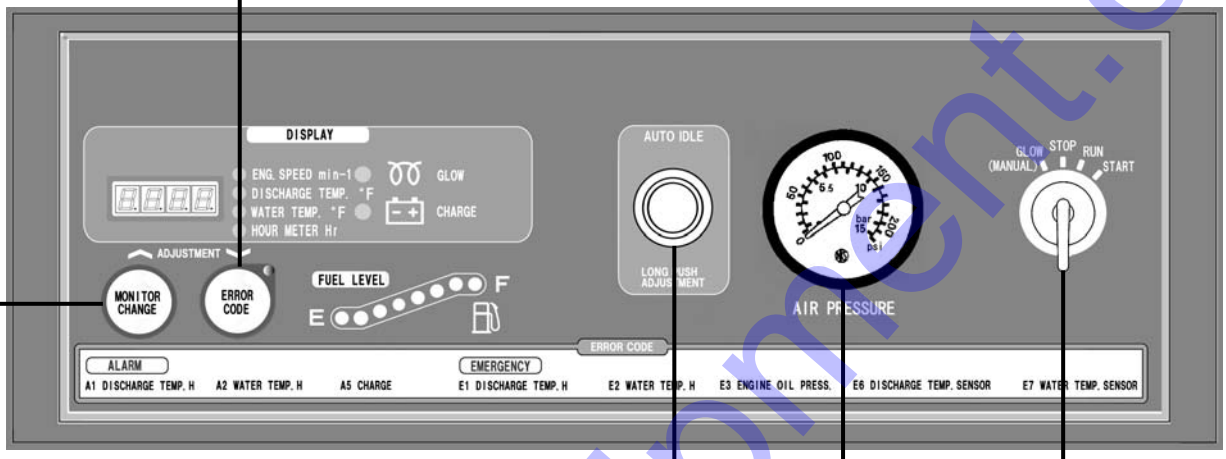
(2) US model

Error code / Reset switch

When this switch is pushed on while lamp is blinking, it shows error code. When starter switch is placed to “STOP”, displayed screen is reset.



A100444MMD

Auto idle switch (with indicator lamp)

This switch is used when fuel consumption is minimized at no load operation.

Discharge air pressure gauge

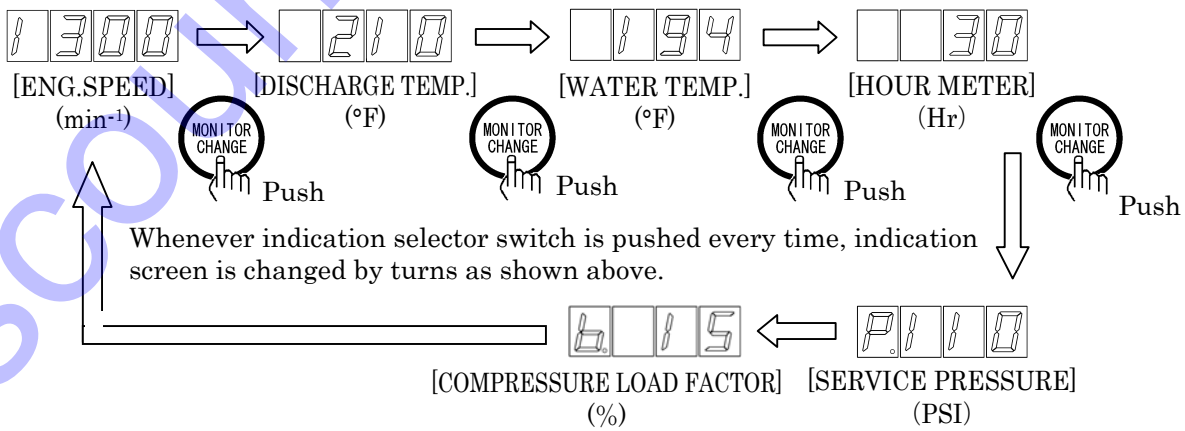
For indication of working pressure

Starter switch

For starting and stopping engine

Digital monitor

When power is supplied, revolution speed (lamp lighting) is indicated.



- In case that discharge air temperature is below 68°F, “———L” is indicated on screen.
- In case the compressor load factor is more than 50%, “b———” is indicated on screen.
- The indication of service pressure / the compressor load factor is displayed only at the time of purge driving.

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1.5.1 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.	——	
CHARGE	Lamp goes on when alternator is not charging.	Check wiring. Check alternator.	

[Warning display] This displays such trouble of less importance when it occurs during operation, but the unit continues operating.
When any abnormality happens, a trouble code lamp flickers. In this time when trouble code switch is pressed, a failure code will be displayed.

Item	Failure code	Contents	Measures
DISCHARGE TEMP. H	A1	Lamp flickers when the air temperature at the outlet of the air-end reaches 239°F (115℃).	See "Troubleshooting"
WATER TEMP. H	A2	Lamp flickers when coolant temperature reaches 221°F (105℃).	
CHARGE	A5	Belt loosened and/or cut Faulty generation of alternator	

[Emergency display] When any trouble takes place during operation, this displays and it stops as an emergency stop.
When any abnormality happens, a trouble code lamp flickers. In this time when trouble code switch is pressed, a failure code will be displayed.

Item	Failure code	Contents	Measures
DISCHARGE TEMP. H	E1	Lamp displays when the air temperature at the outlet of the air-end reaches 248°F (120℃).	See "Troubleshooting"
WATER TEMP. H	E2	Lamp displays when coolant temperature reaches 230°F (110℃).	
ENG. OIL PRESS.	E3	Lamp goes on when engine oil pressure drops. The function pressure is below 7.3psi(0.05MPa)[0.5bar].	
DISCHARGE TEMP.SENSOR	E6	It is displayed when air temperature sensor at the outlet port of compressor air end is disconnected.	
WATER TEMP.SENSOR	E7	It is displayed when engine coolant temperature sensor is disconnected.	

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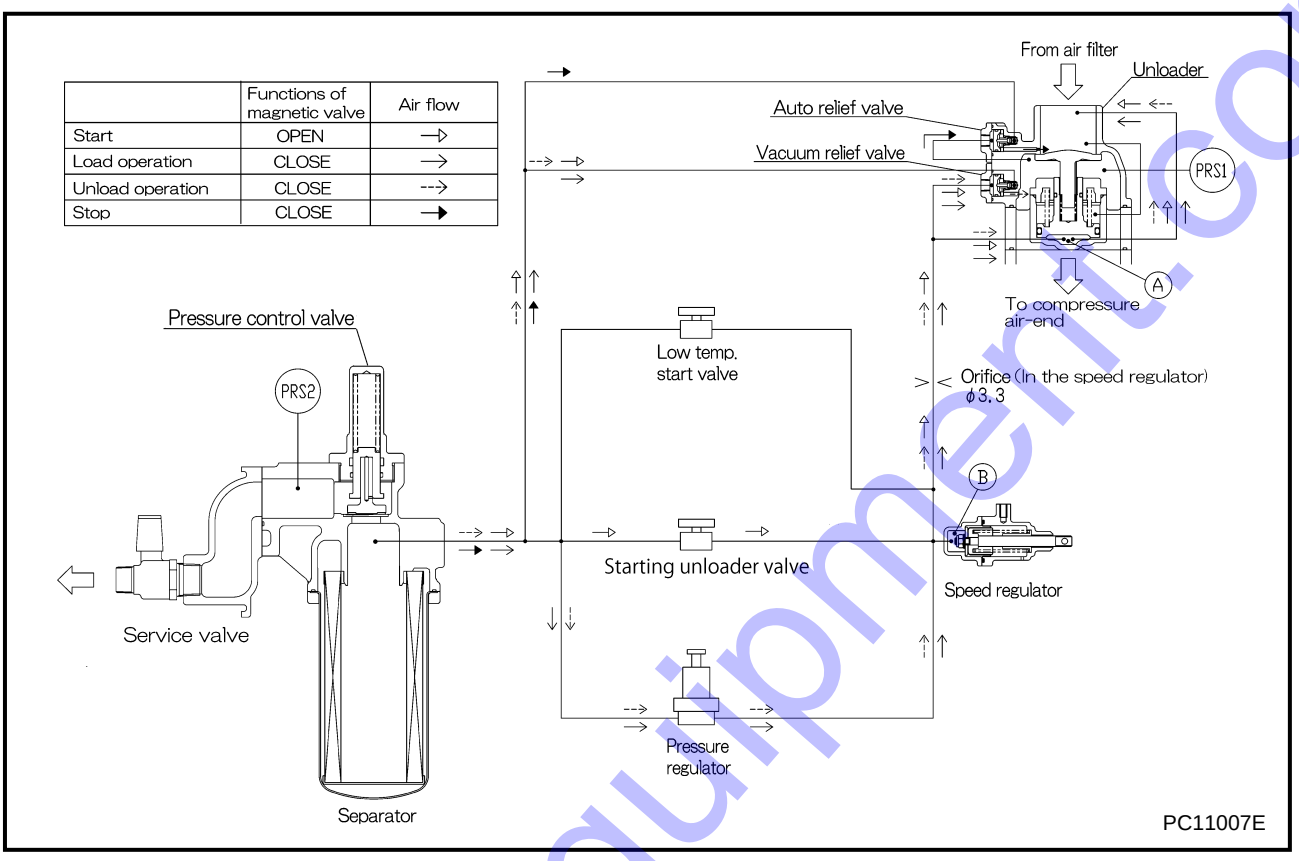
1.6 Capacity Control Device

(1) Export model



Step	Response
Start	When starting operation, starting unloader valve opens. And compressed air is sent to unloader chamber Ⓐ and speed regulator chamber Ⓑ. Thus pressure in chamber Ⓐ and Ⓑ rises smoothly and closes unloader valve completely at low pressure. And at the same time, engine speed drops by function of speed regulator. Consequently, load at start-up will be saved.
Load operation	Air volume sent to unloader chamber Ⓐ and speed regulator chamber Ⓑ increases and decrease according to increase and decrease of delivery air pressure. Thus according as unloader valve position and engine speed change, free air delivery is sleeplessly and automatically regulated from 0 to 100%.
Suction port closing unload operation	When air consumption decreases and compressed air in separator receiver tank exceeds rated pressure, it closes unloader valve by function of pressure regulator and speed regulator and reduces engine speed down to unloaded speed. Further, when interior of compressor air-end becomes extremely high vacuum during unloaded operation, it causes vacuum noise. In order to prevent vacuum noise which occurs in compressor air-end, it detects secondary pressure in pressure regulator to open vacuum relief valve, thus preventing interior of air-end from becoming high vacuum.
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.

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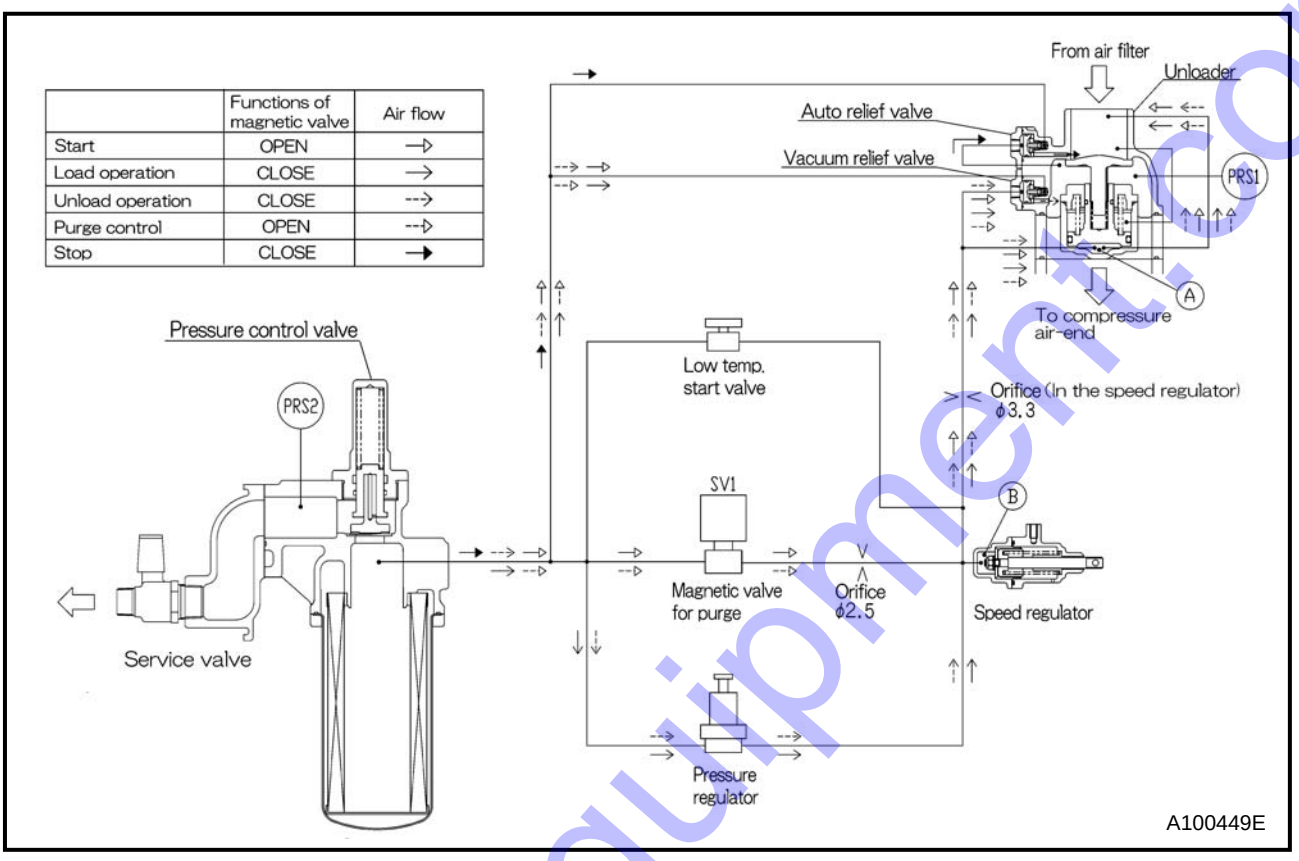
(2) US model

	Functions of magnetic valve	Air flow
Start	OPEN	⇨
Load operation	CLOSE	→
Unload operation	CLOSE	⇢
Purge control	OPEN	⇢
Stop	CLOSE	➔



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1. Specification

Step	Response
Start	When starting operation, solenoid valve (SV1) opens. And compressed air is sent to unloader chamber Ⓐ and speed regulator chamber Ⓑ. Accordingly, the pressure in the chamber Ⓐ and Ⓑ rises soon to fully close unloader valve at low pressure. And then engine speed drops with the function of speed regulator and it starts automatically starting unloader operation. Thus it can reduce the load at start-up.
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%.
Suction port closing unload operation	When air consumption decreases and compressed air in separator receiver tank exceeds rated pressure, it closes unloader valve by function of pressure regulator and speed regulator and reduces engine speed down to unloaded speed. Further, when interior of compressor air-end becomes extremely high vacuum during unloaded operation, it causes vacuum noise. In order to prevent vacuum noise which occurs in compressor air-end, it detects secondary pressure in pressure regulator to open vacuum relief valve, thus preventing interior of air-end from becoming high vacuum.
Purge control At unload operation	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 an intake negative pressure sensor (PRS1), solenoid valve (SV1) opens 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, services pressure sensor (PRS2) detects it and it disengages the purge control (solenoid valve 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.

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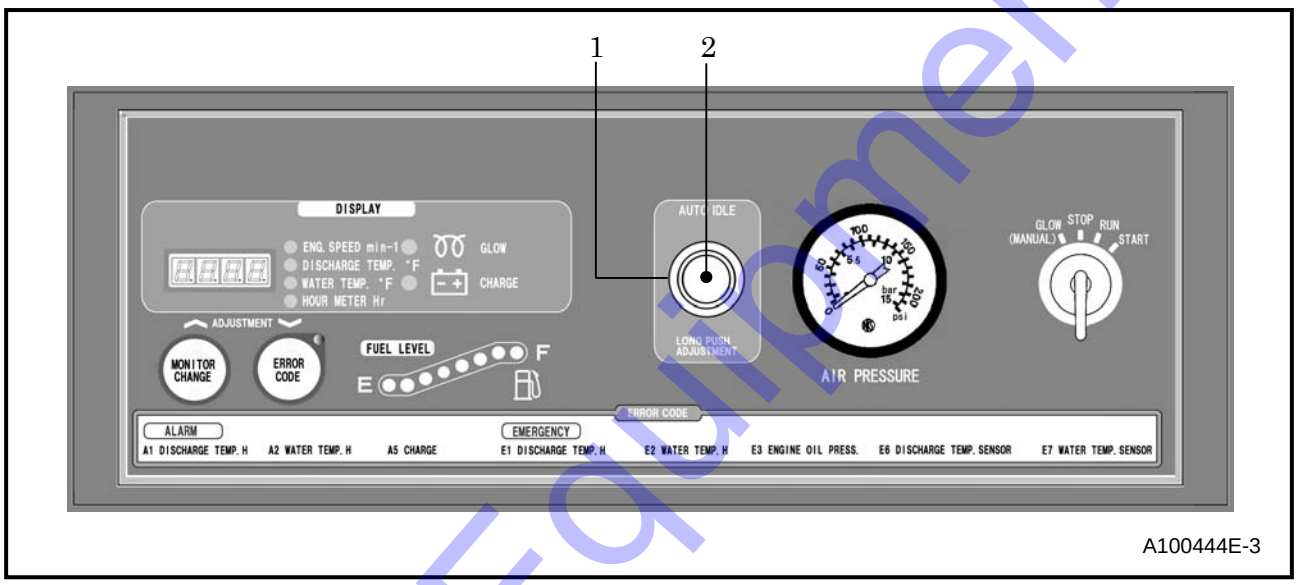
1.6.1 AUTO IDLE control (Purge control)

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 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" goes out to disengage this purge control.



A100444E-3

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.	Lamp flickers at short intervals.
② When this condition continues for a certain time, the solenoid valve 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.	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 operation gets "OFF" and it is transferred to normal operation. In this stage, the lamp "AUTO IDLE" goes on.	Lamp goes on.

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

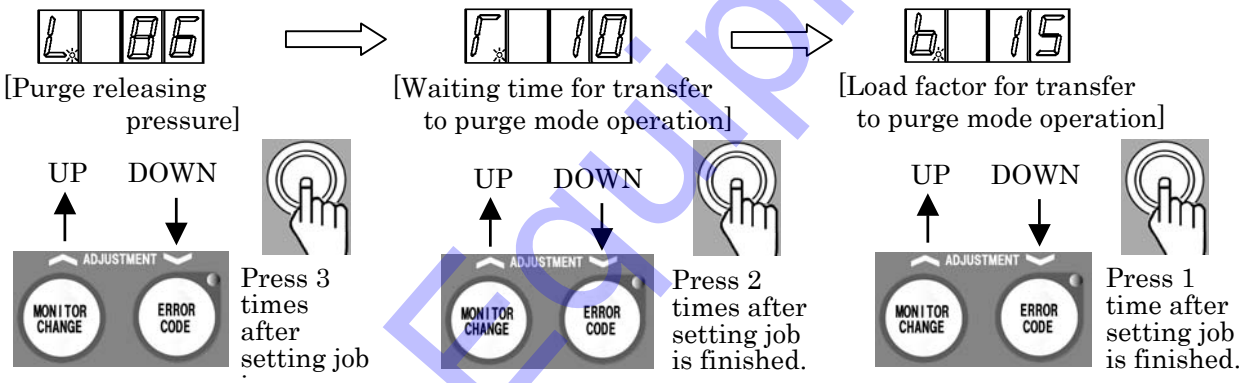
● How to change set value of auto idle pressure/ timer is shown below.

No.	Item	Indication	Unit	Primary set value	Range of set values
1	Purge releasing pressure	L	PSI	86	70 to 100
			kPa	60	50 to 70
2	Waiting time for transfer to purge mode operation	T	sec	10	5 to 60
3	Load factor for transfer to purge mode operation	b	%	15	5 to 30

<Procedures of adjustment>

When auto-idle switch is pressed longer (than 5 second), first L.(Purge releasing pressure) is displayed.

Each time auto-idle switch is pressed, each indication will be selected. Then each time it is pressed one time, T.(Waiting time for transfer to purge mode operation) is switched to b.(Load factor for transfer to purge mode operation),according to the set orders.



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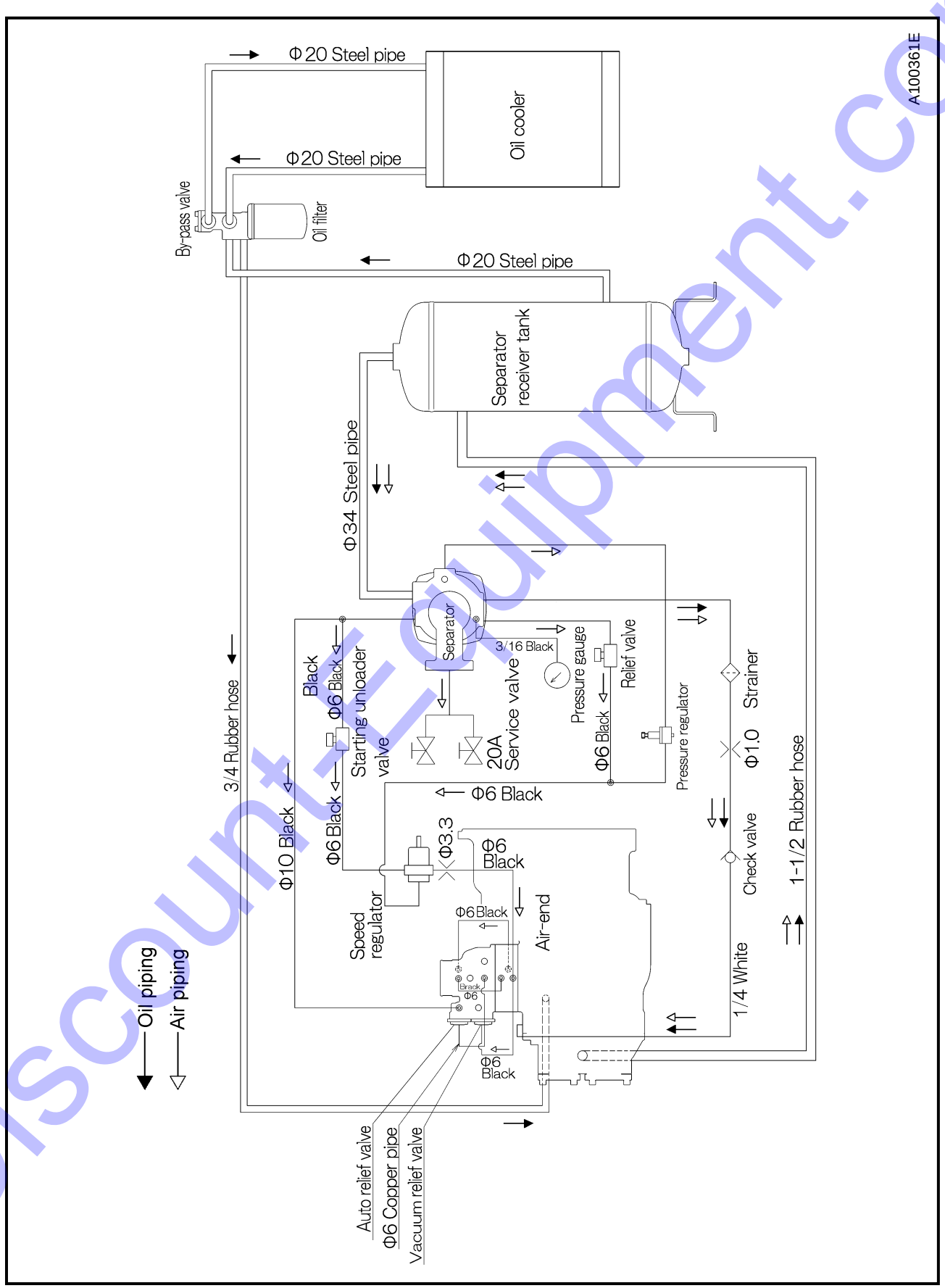
1.7 Piping Diagram

(1) Export model



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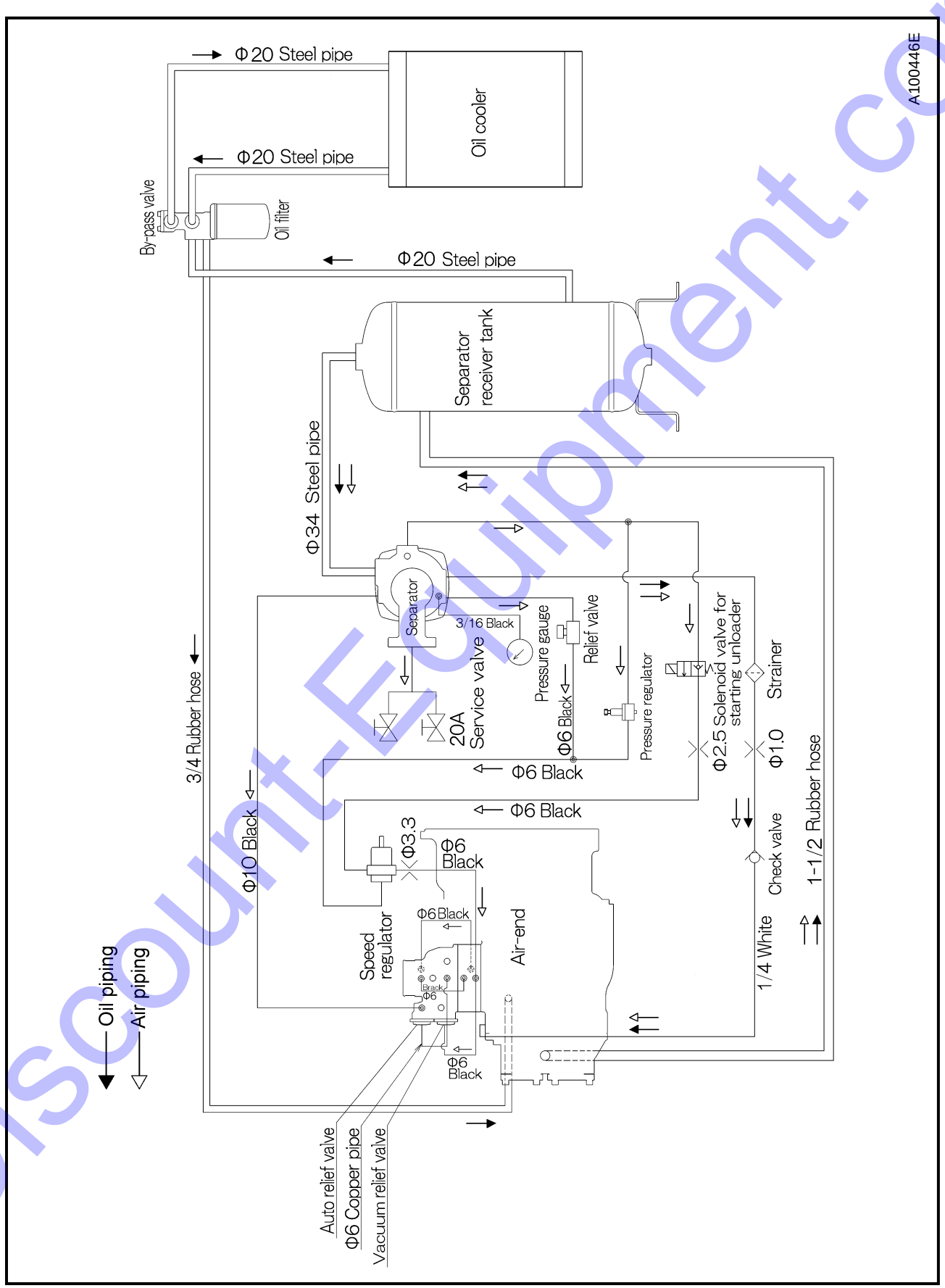
(2) US model



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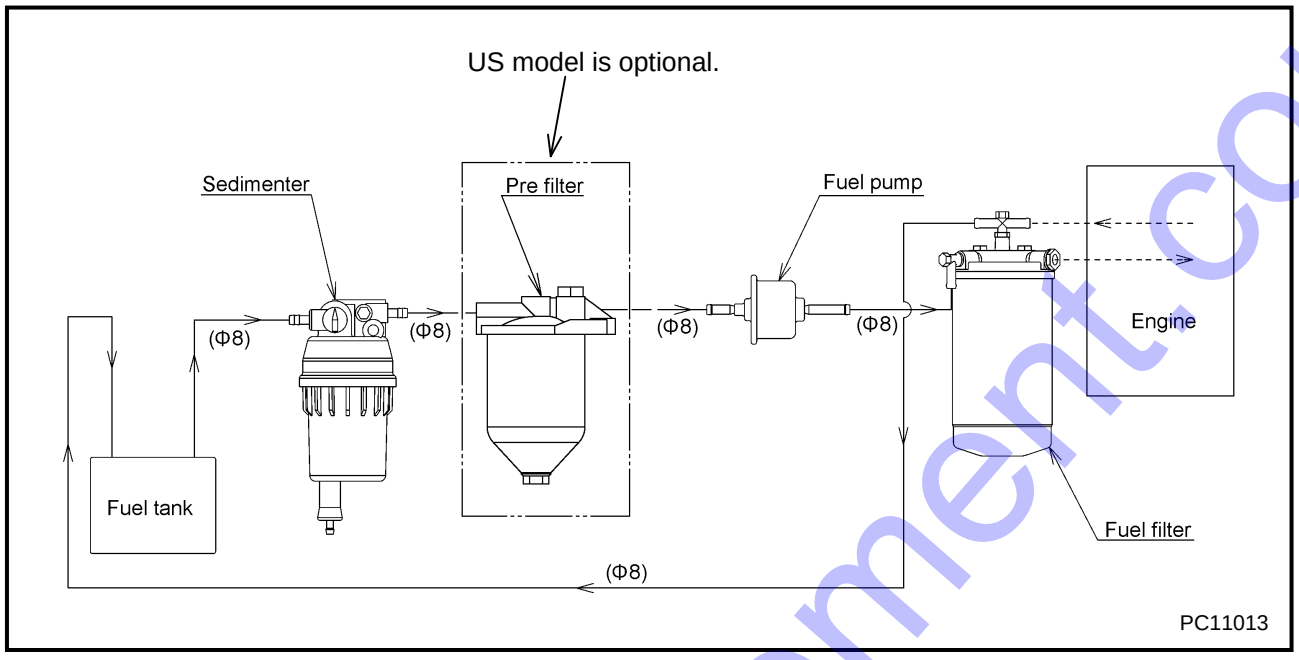
1.8 Fuel piping



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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.

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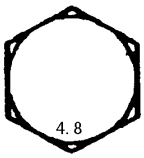
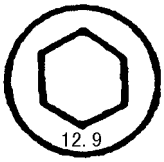
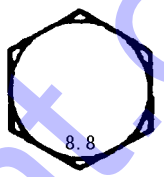
2. Maintenance

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 in. (mm)	Low or Middle carbon steel bolt (SS400B etc...)		High tensile strength bolt (SCM435 etc...)		
	4.6～6.8（4T～6T）		8.8～12.9（7T～12T）		
	 Hexagon bolts		 Socket bolts  Hexagon bolts		
	Hexagon bolts Width of across flat in. (mm)	Tightening torque lbf・in.(N・m) [kgf・cm]	Socket bolts Width of across flat in.(mm)	Hexagon bolts Width of across flat in.(mm)	Tightening torque lbf・in.(N・m) [kgf・cm]
0.24 (6)	0.39(10)	44.2(5)[51]	0.20 (5)	0.39(10)	88.5(10)[100]
0.31 (8)	0.51(13)	106.2(12)[124]	0.24 (6)	0.51(13)	221.2(25)[245]
0.39(10)	0.67(17)	221.2(25)[245]	0.31 (8)	0.67(17)	433.6(49)[485]
0.47(12)	0.75(19)	380.5(43)[425]	0.39(10)	0.75(19)	752.2(85)[845]
0.55(14)	0.87(22)	601.8(68)[675]	0.47(12)	0.87(22)	1,194.7(135)[1,350]
0.63(16)	0.94(24)	938.1(106)[1,055]	0.55(14)	0.94(24)	1,858.4(210)[2,100]
0.71(18)	1.06(27)	1,283.2(145)[1,450]	0.55(14)	1.06(27)	2,566.4(290)[2,900]
0.79(20)	1.18(30)	1,814.2(205)[2,050]	0.67(17)	1.18(30)	3,628.3(410)[4,100]
0.87(22)	1.26(32)	2,477.9(280)[2,800]	0.67(17)	1.26(32)	4,955.8(560)[5,600]
0.94(24)	1.42(36)	3,053.1(345)[3,450]	0.75(19)	1.42(36)	6,283.2(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.

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

	Application parts & portions	Strength classification		Tightening torque lbf・in.(N・m)[kgf・cm]										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	44.2 (5) [51]	106.2 (12) [124]	–	380.5 (43) [425]	–	–	–	–	–	–	for prevention of deformation of outer ring
		12.9	–	4.8	44.2 (5) [51]	106.2 (12) [124]	–	380.5 (43) [425]	–	–	–	–	–	–	for prevention of deformation of outer ring
②	・Plate holding pinion gear	12.9	–	10.9	–	292.0 (33) [325]	566.4 (64) [640]	–	–	–	–	–	–	–	for prevention from loosening
	・Others	12.9	–	8.8	88.5 (10) [100]	221.2 (25) [245]	433.6 (49) [485]	752.2 (85) [845]	1194.7 (135) [1350]	1858.4 (210) [2100]	–	–	–	–	
2	Mounting														
③	・Mounting bracket	4.8	–	4.8	–	106.2 (12) [124]	221.2 (25) [245]	380.5 (43) [425]	601.8 (68) [675]	929.2 (105) [1050]	1327.4 (150) [1500]	1858.4 (210) [2100]	–	–	with spring washer
④	・Vibration isolator ass'y	–	4.8	4.8	–	106.2 (12) [124]	221.2 (25) [245]	380.5 (43) [425]	601.8 (68) [675]	929.2 (105) [1050]	1327.4 (150) [1500]	1858.4 (210) [2100]	–	–	with spring washer and thick washer
3	Coupling portion between comp. air end and engine														
⑤	・Housing	4.8	–	4.8	–	106.2 (12) [124]	221.2 (25) [245]	380.5 (43) [425]	601.8 (68) [675]	929.2 (105) [1050]	1327.4 (150) [1500]	1858.4 (210) [2100]	–	–	with spring washer
⑥	・Coupling (for installing flywheel)	10.9/12.9	–	8.8	–	221.2 (25) [245]	433.6 (49) [485]	752.2 (85) [845]	1194.7 (135) [1350]	1858.4 (210) [2100]	2477.9 (280) [2800]	3628.3 (410) [4100]	–	–	with spring washer
⑦	・Coupling (for installing driving shaft)	12.9	–	8.8	–	221.2 (25) [245]	433.6 (49) [485]	752.2 (85) [845]	1194.7 (135) [1350]	1858.4 (210) [2100]	2477.9 (280) [2800]	3628.3 (410) [4100]	–	–	with lock washer
⑧	・Coupling (for installing gear of resin)	10.9	–	8.8	–	221.2 (25) [245]	433.6 (49) [485]	752.2 (85) [845]	1194.7 (135) [1350]	1858.4 (210) [2100]	2477.9 (280) [2800]	3628.3 (410) [4100]	–	–	with spring washer and thick washer
4	Lifting portion														
⑨	・Lifting bail (less than M20)	10.9	4.8	6.8	–	159.3 (18) [183]	327.4 (37) [365]	601.8 (68) [675]	929.2 (105) [1050]	1327.4 (150) [1500]	1858.4 (210) [2100]	–	–	–	with spring washer
	・Lifting bail (more than M20)	10.9	4.8	4.8	–	–	–	–	–	–	–	1858.4 (210) [2100]	2477.9 (280) [2800]	3053.1 (345) [3450]	with spring washer
5	Pressure vessel and pipes														
⑩	・Separator cover	10.9	–	8.8	–	221.2 (25) [245]	433.6 (49) [485]	752.2 (85) [845]	1194.7 (135) [1350]	1858.4 (210) [2100]	2477.9 (280) [2800]	3628.3 (410) [4100]	4955.8 (560) [5600]	6283.2 (710) [7100]	with spring washer
⑪	・Press.cont.body	10.9	–	8.8	–	221.2 (25) [245]	433.6 (49) [485]	752.2 (85) [845]	1194.7 (135) [1350]	1858.4 (210) [2100]	2477.9 (280) [2800]	3628.3 (410) [4100]	4955.8 (560) [5600]	6283.2 (710) [7100]	with spring washer ※2
⑫	・Press.cont.cover	10.9	–	4.8	–	106.2 (12) [124]	221.2 (25) [245]	380.5 (43) [425]	601.8 (68) [675]	929.2 (105) [1050]	1327.4 (150) [1500]	1858.4 (210) [2100]	2477.9 (280) [2800]	3053.1 (345) [3450]	with spring washer
⑬	・Flange for pipe* First priority	4.8	4.8	4.8	–	106.2 (12) [124]	221.2 (25) [245]	380.5 (43) [425]	601.8 (68) [675]	929.2 (105) [1050]	1327.4 (150) [1500]	1858.4 (210) [2100]	2477.9 (280) [2800]	3053.1 (345) [3450]	with spring washer
⑬	・Flange for pipe (less than M20) Second priority	10.9	8.8 ※3	8.8	–	221.2 (25) [245]	433.6 (49) [485]	752.2 (85) [845]	1194.7 (135) [1350]	1858.4 (210) [2100]	2566.4 (290) [2900]	–	–	–	with spring washer
⑬	・Flange for pipe (more than M20) ※1 Second priority	10.9	4.8	4.8	–	–	–	–	–	–	–	1858.4 (210) [2100]	2477.9 (280) [2800]	3053.1 (345) [3450]	with spring washer
6	Undercarriage														
⑭	・Spring bracket	10.9	4.8	6.8	–	159.3 (18) [183]	327.4 (37) [365]	601.8 (68) [675]	929.2 (105) [1050]	1327.4 (150) [1500]	1858.4 (210) [2100]	2699.1 (305) [3050]	3628.3 (410) [4100]	4690.3 (530) [5300]	with spring washer
⑮	・U-bolt	10.9	4.8	6.8	–	159.3 (18) [183]	327.4 (37) [365]	601.8 (68) [675]	929.2 (105) [1050]	1327.4 (150) [1500]	1858.4 (210) [2100]	2699.1 (305) [3050]	3628.3 (410) [4100]	4690.3 (530) [5300]	
⑯	・Hub,wheel	10.9	8.8	10.9	–	–	433.6 (49) [485]	1194.7 (135) [1350]	1327.4 (150) [1500]	2477.9 (280) [2800]	–	–	–	–	
⑰	・Draw bar	10.9	4.8	6.8	–	159.3 (18) [183]	327.4 (37) [365]	601.8 (68) [675]	929.2 (105) [1050]	1327.4 (150) [1500]	1858.4 (210) [2100]	2699.1 (305) [3050]	3628.3 (410) [4100]	4690.3 (530) [5300]	with spring washer
⑱	・Brake	10.9	4.8	6.8	–	159.3 (18) [183]	327.4 (37) [365]	601.8 (68) [675]	929.2 (105) [1050]	1327.4 (150) [1500]	1858.4 (210) [2100]	2699.1 (305) [3050]	3628.3 (410) [4100]	4690.3 (530) [5300]	with spring washer
⑲	・Stand for storing drawbar	10.9	4.8	4.8	–	106.2 (12) [124]	221.2 (25) [245]	380.5 (43) [425]	601.8 (68) [675]	929.2 (105) [1050]	1327.4 (150) [1500]	1858.4 (210) [2100]	2477.9 (280) [2800]	3053.1 (345) [3450]	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).

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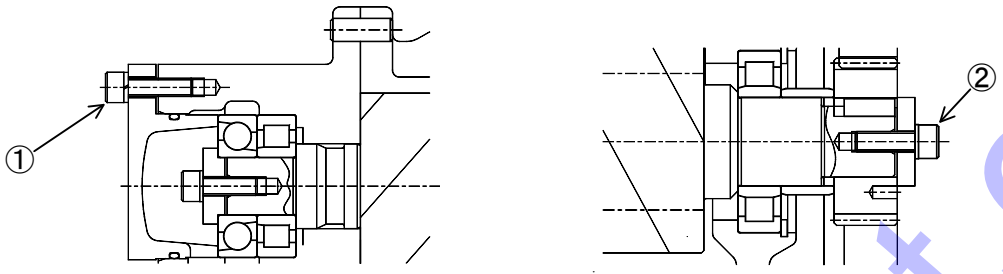
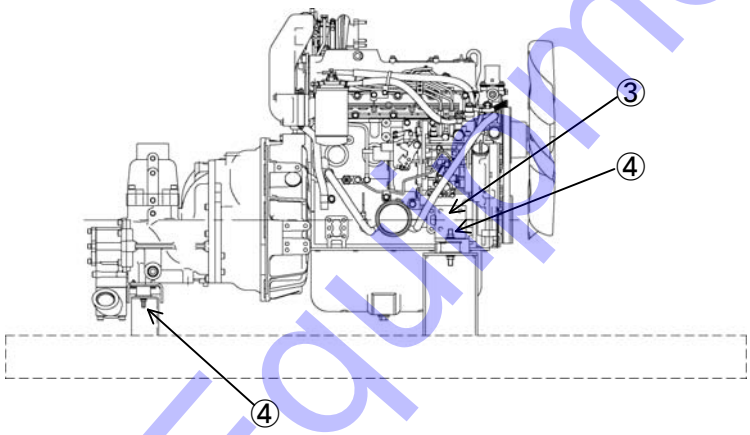
2. Maintenance

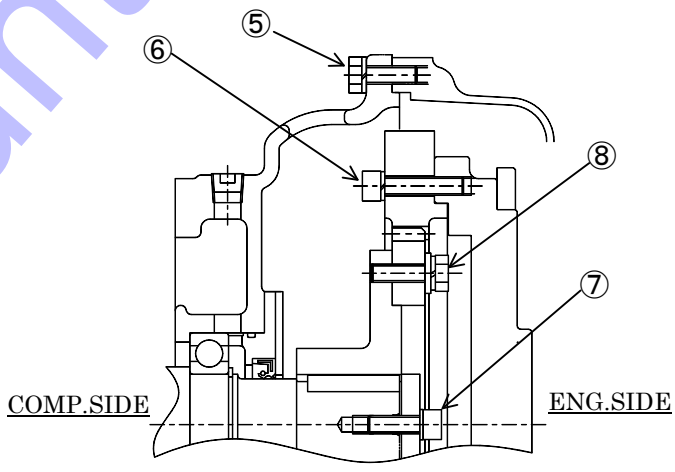
1 Air end



2 Mounting



3 Coupling portion between comp. air end and engine



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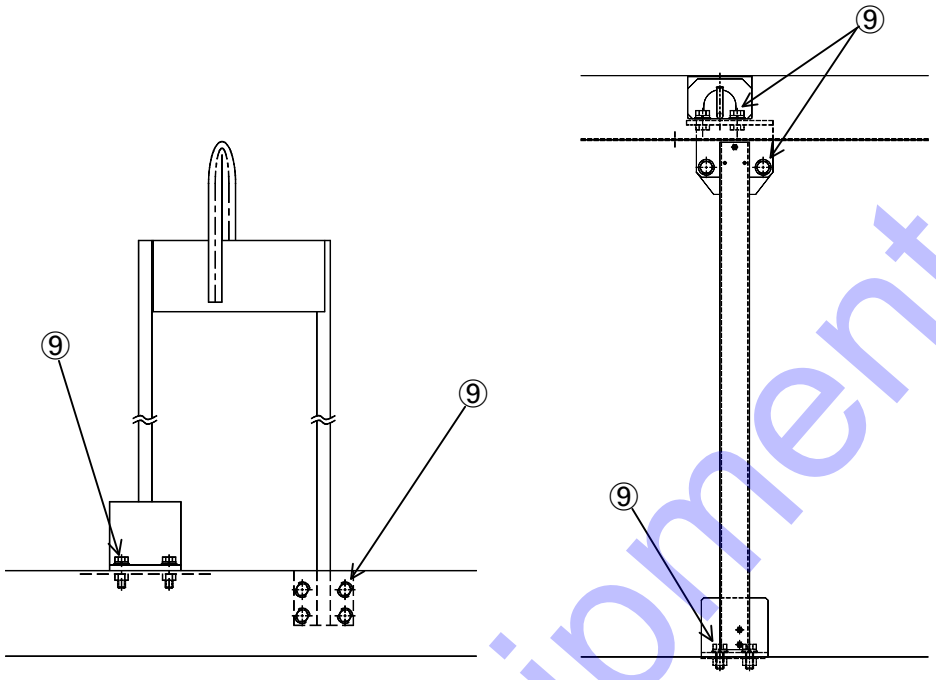
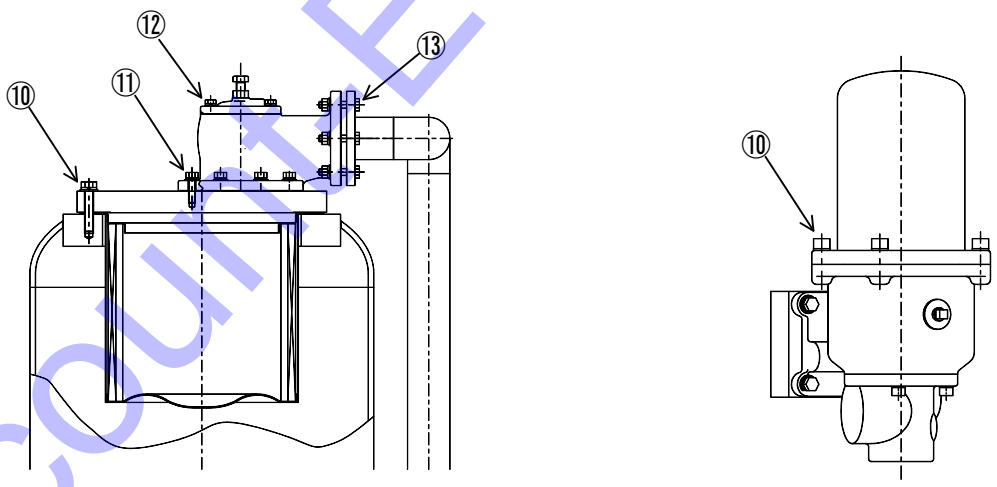
4 Lifting portion



5 Pressure vessel and pipes



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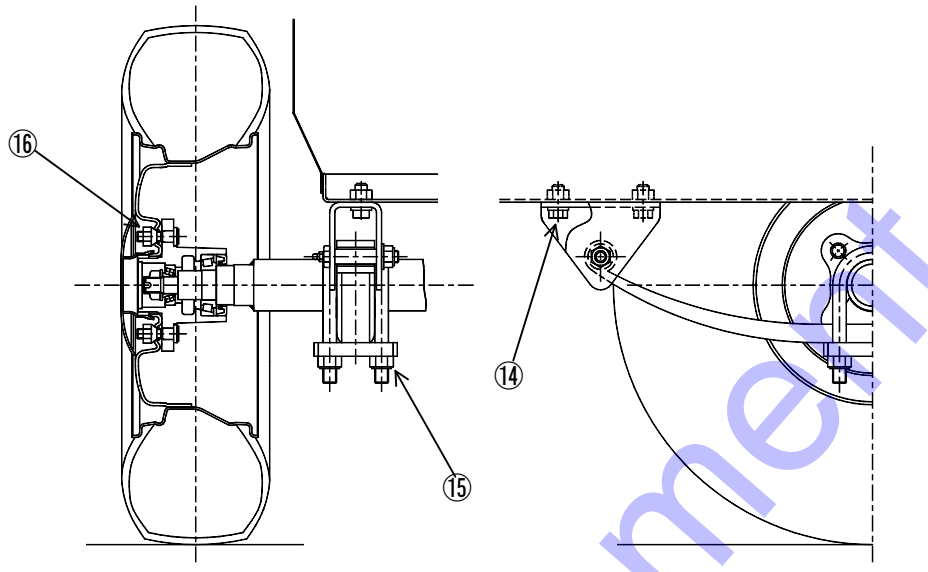
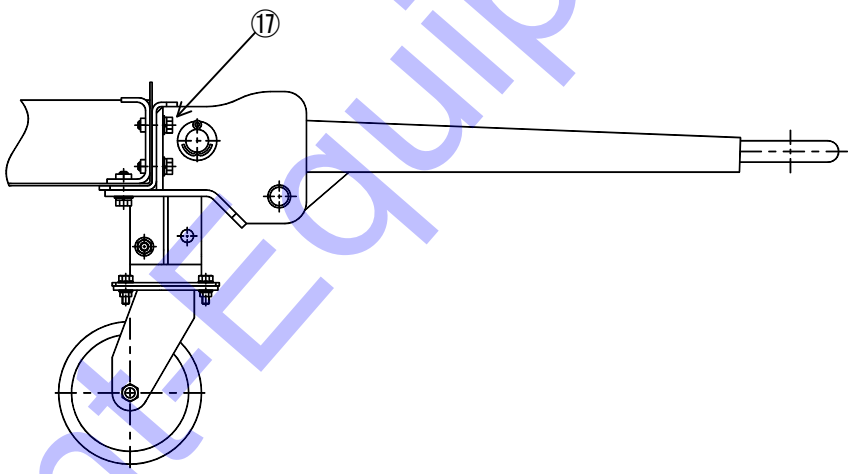
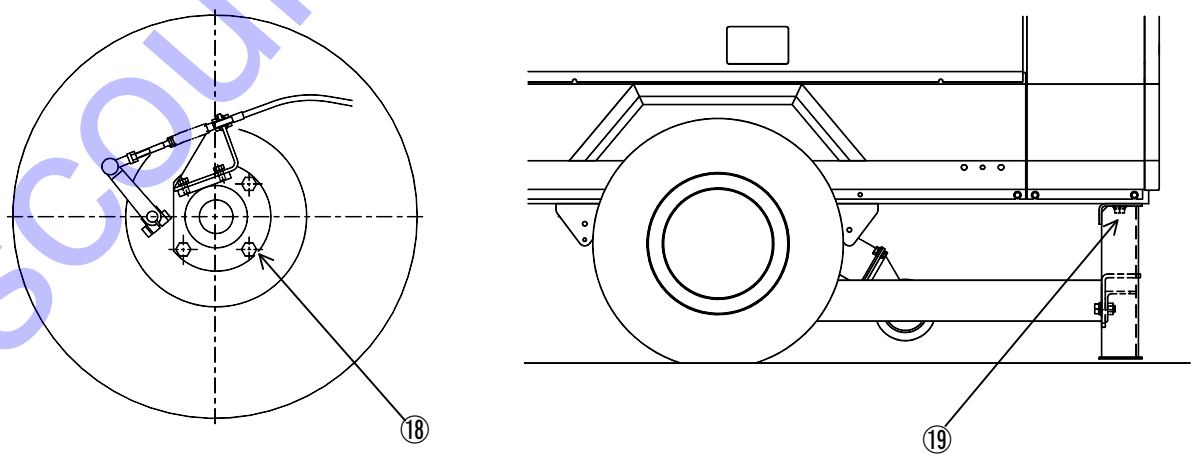
6 Undercarriage







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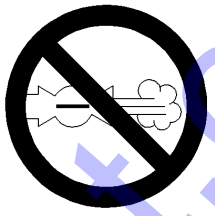
2.3 How to adjust regulator and how to replace diaphragm

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.



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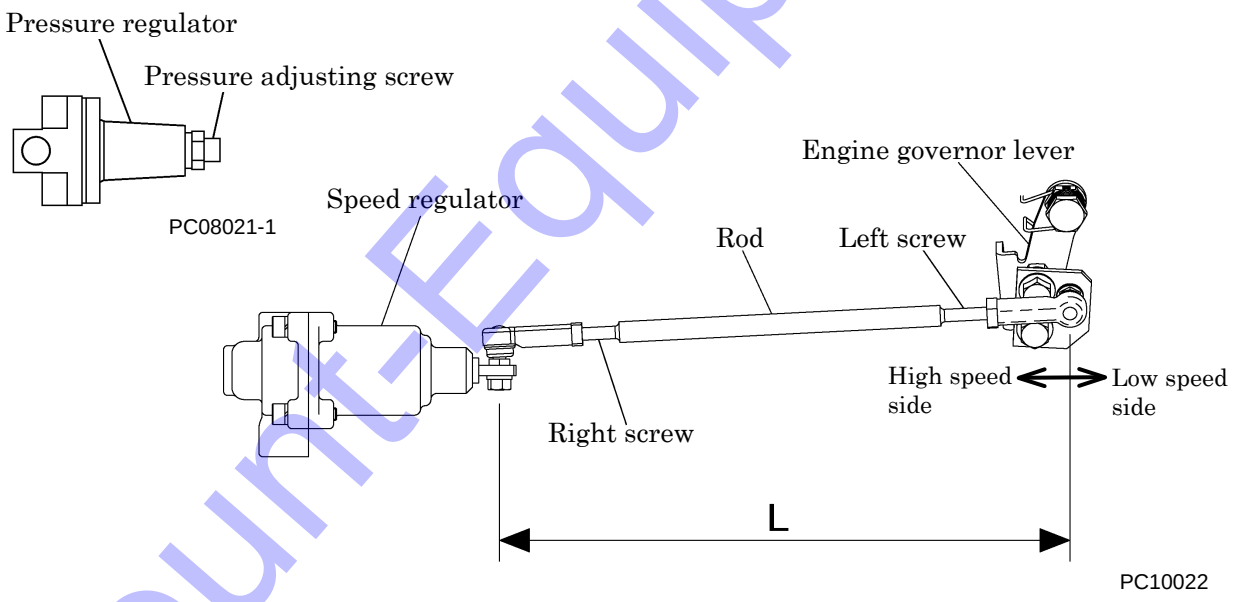
- The speed regulator is already adjusted prior to delivery ex.works. Never change the setting of the regulator by turning bolt and rod recklessly.
- If it is necessary to re-adjust the speed regulator due to overhauling or any trouble, adjust it in accordance with the following procedures.

<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 100psi(0.69MPa)[6.9bar] 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.)

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2.3.2 Change diaphragm

Speed regulator (Bellophragm type)

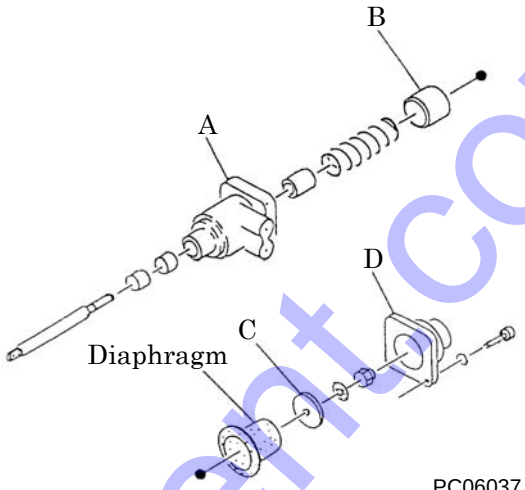
<Procedure>

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.



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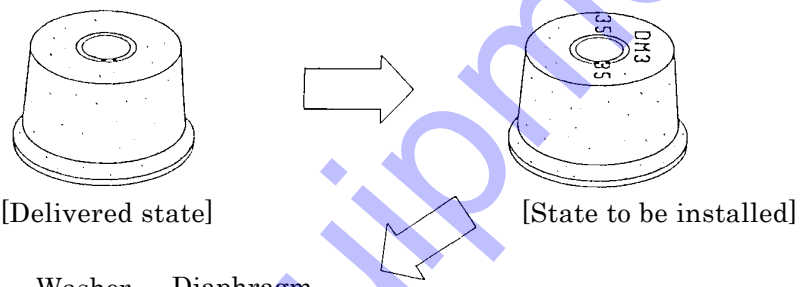

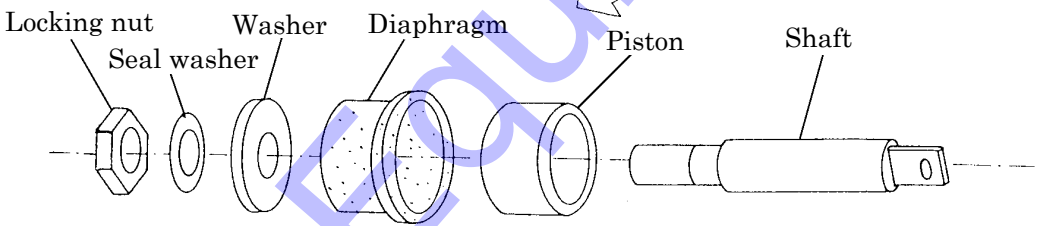

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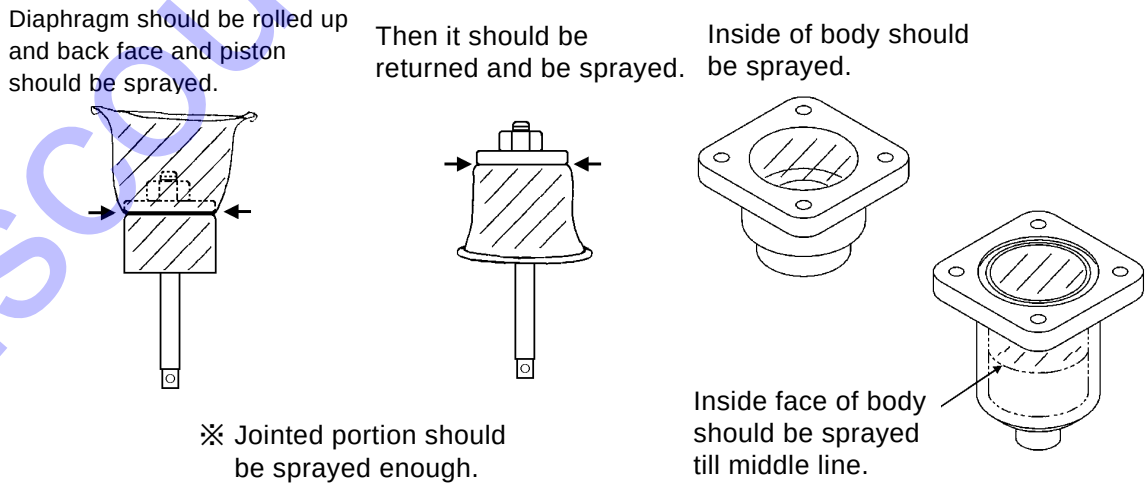
⑤ Internal face of body and cap and also both internal face and external face of diaphragm should be coated with molybdenum sulfide spray.
How to spray molybdenum sulfide paste : The areas in oblique line should be sprayed with this paste.



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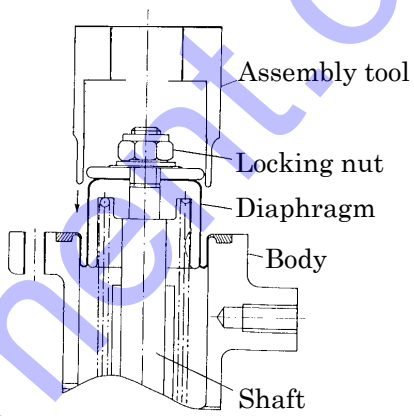
⑥Install diaphragm to shaft and piston and fasten it with a locking nut.
Tightening torque : 70.8bf･in.(8N･m)[80kgf･cm]

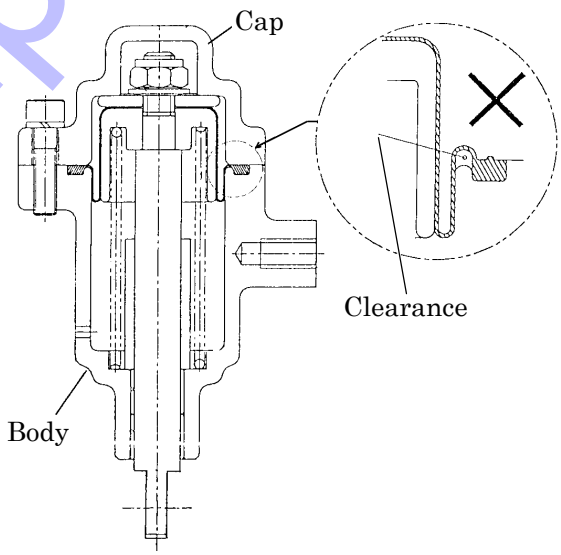
Important : Be careful not to tighten the locking nut excessively. Excessive tightening can cause washer to turn together and twisting diaphragm. The diaphragm will be damaged in shorter period.

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.

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)

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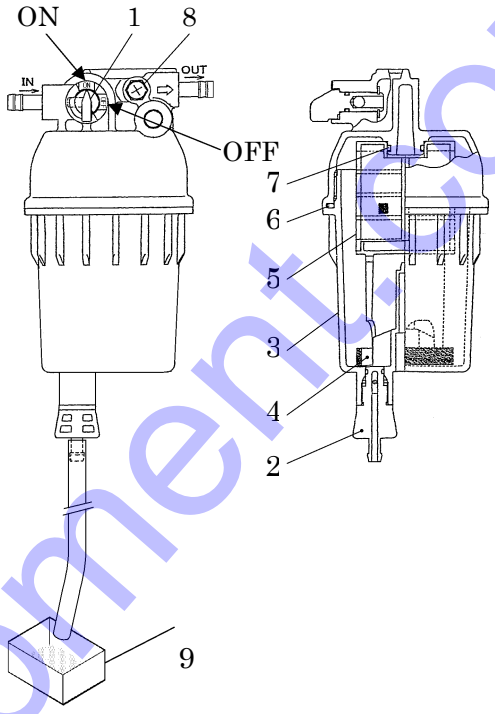
2.4 Clean of element in sedimenter

<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" to the left and remove it.
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.



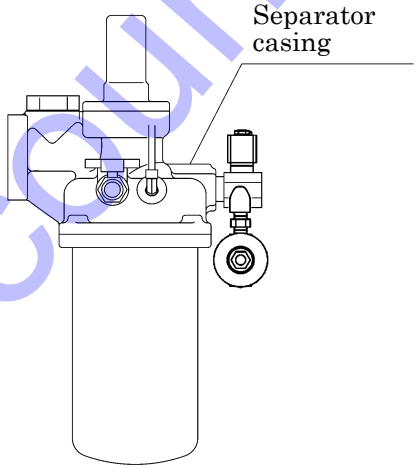
A100117

2.5 Change Oil Separator

IMPORTANT

- When changing the oil separator, both cover and element must be replaced with new ones.

- 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 with a new one.



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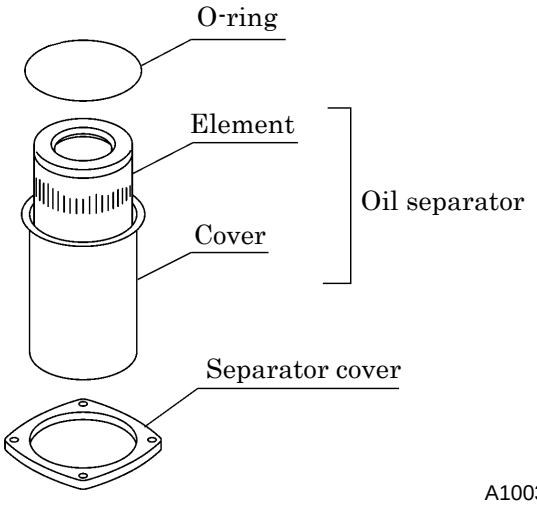

A100371

[Tightening torque of separator cover bolt]
: 0.31 in. (8 mm)
: 433.6lbf·in.(49N·m)[485kgf·cm]

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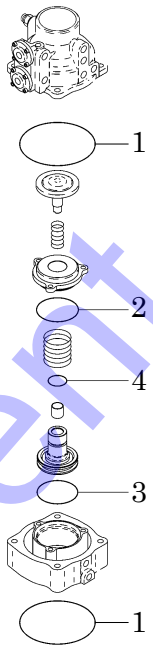
2.6 Change O-Ring of Unloader

<Caution during O-ring replacement>
Supply grease to O-ring "1" · "2" · "3" · "4" after replacement.

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.



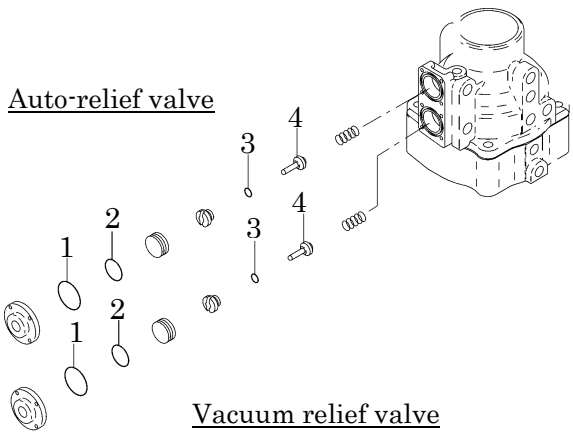
A070337

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. Grease of poor quality will deteriorate the material.

- 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.



A070339

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2.8 Performance check of Pressure control valve

IMPORTANT

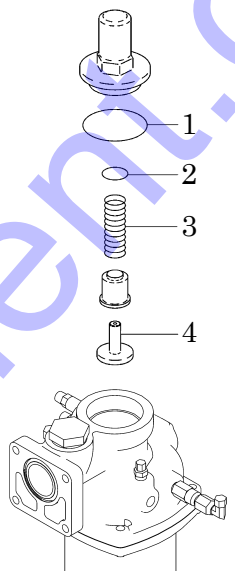
- When reassembling, apply sufficient grease to O-ring Slot/O-ring and sliding surface.
  Use CALTEX MULTIFAK EP1 grease or equivalent. Grease of poor quality will deteriorate the material.

<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 49 to 68psi(0.34 to 0.47MPa)[3.4 to 4.7bar].

② When the pressure is lower than 49psi(0.34MPa)[3.4bar], replace spring "3" 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.



A100372-1

2.9 Check Pressure control valve O-Ring and Piston

- After disassembling and cleaning pressure control valve, check O ring "1"・"2" and piston "4". 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.

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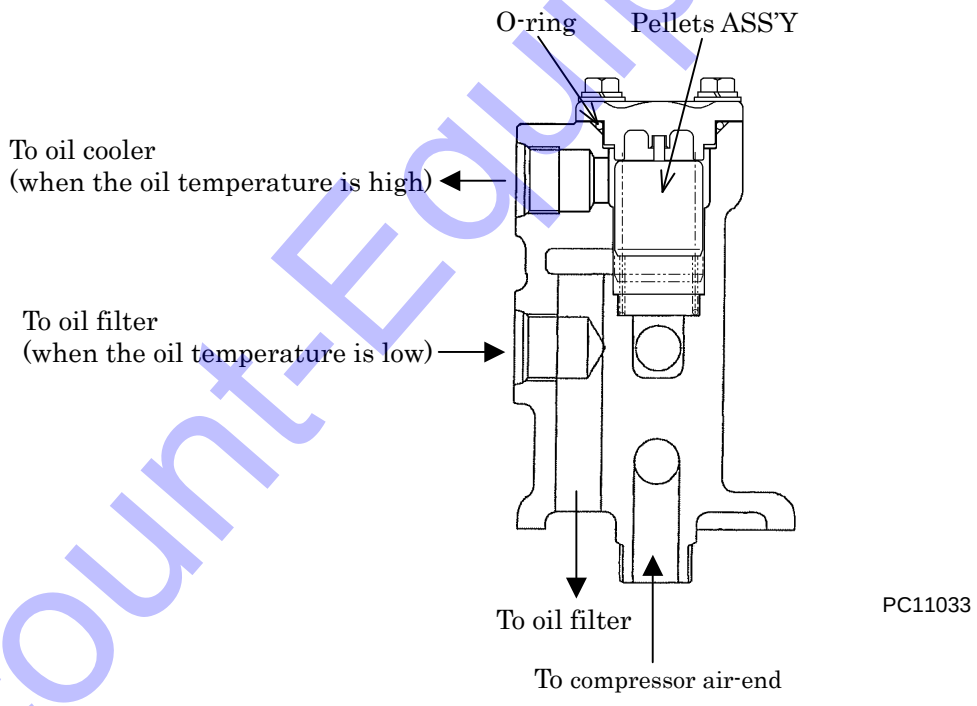
2.10 Change of pellet assembly of by-pass valve

●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.)



Actuating temperature	By-pass valve fully closing temperature
180±37°F (82±3℃)	192±36°F (89±2℃)

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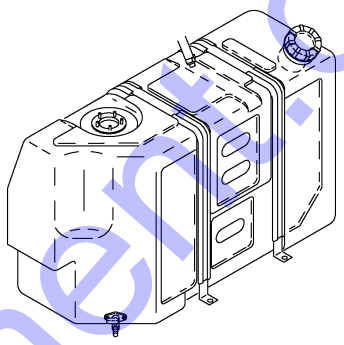
2.11 Clean inside of Fuel Tank

- 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.



PC11008

2.12 Values of Various Adjustments of Engine

Item		Unit	PDS185S-6C2	
Engine model			YANMAR 4TNV88-BDHKS	
Tightening torque of head bolts		lbf･in. (N･m) [kgf･cm]	First time	364.6 to 416.6(41.2 to 47.1)[420 to 480]
			Second time	755.2 to 807.2(85.3 to 91.2)[870 to 930]
Valve clearance	Air intake	in.(mm)	0.0079±0.020 (0.20±0.5) (when engine is cold)	
	Discharge	in.(mm)	0.0079±0.020 (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 14.5 [at lift 0.098in. (2.5mm)]	
Nozzle injection pressure		psi(MPa)[bar]	3,133±72.5(21.6±0.5)[216±5]	
Compression	Standard	psi(MPa)[bar]	470±14.5(3.24±0.1)[32.4±1]	
	Working limit	psi(MPa)[bar]	Limited value	370±14.5(2.55±0.1)[25.5±1]
			Each cylinder limit value	29 to 43.5(0.2 to 0.3)[2 to 3]
Thermostat	Temperature for start of release	°F(℃)	160±34.7 (71±1.5)	
	Full open temperature	°F(℃)	185 (85)	
	Valve lift	in.(mm)	More than 0.31 (8.0)	

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

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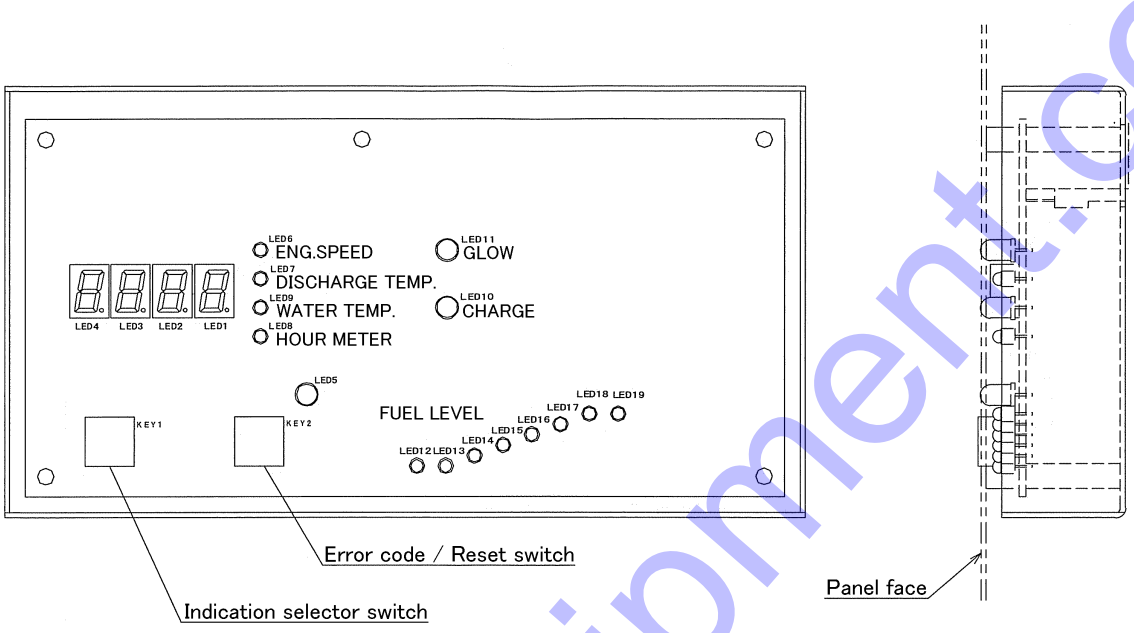
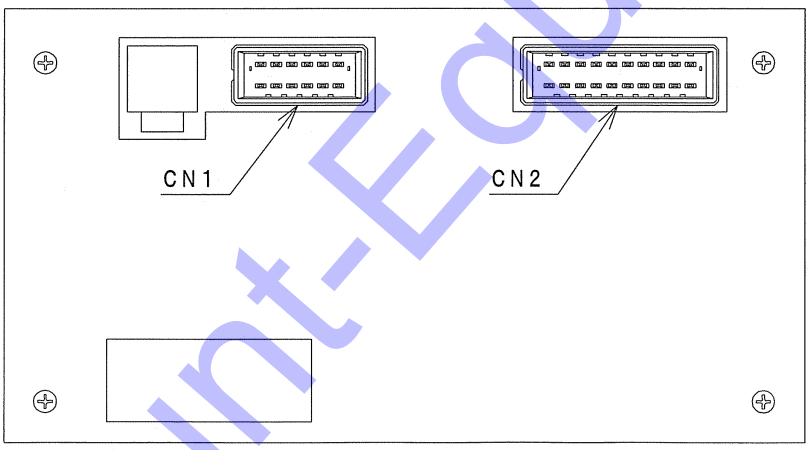
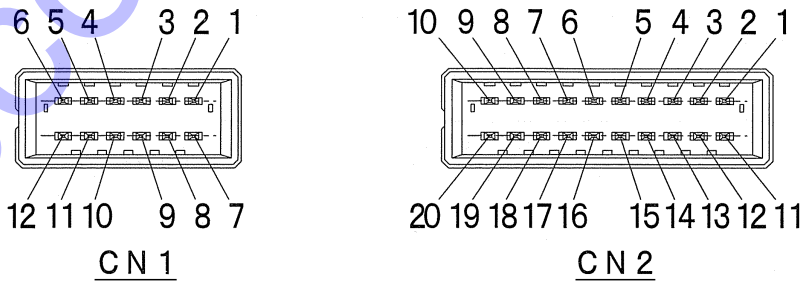
3. Electric System

3.1 Control

Part number: 46870 51901 (Export model)
Part number: 46870 54000 (US model)







PC10024E

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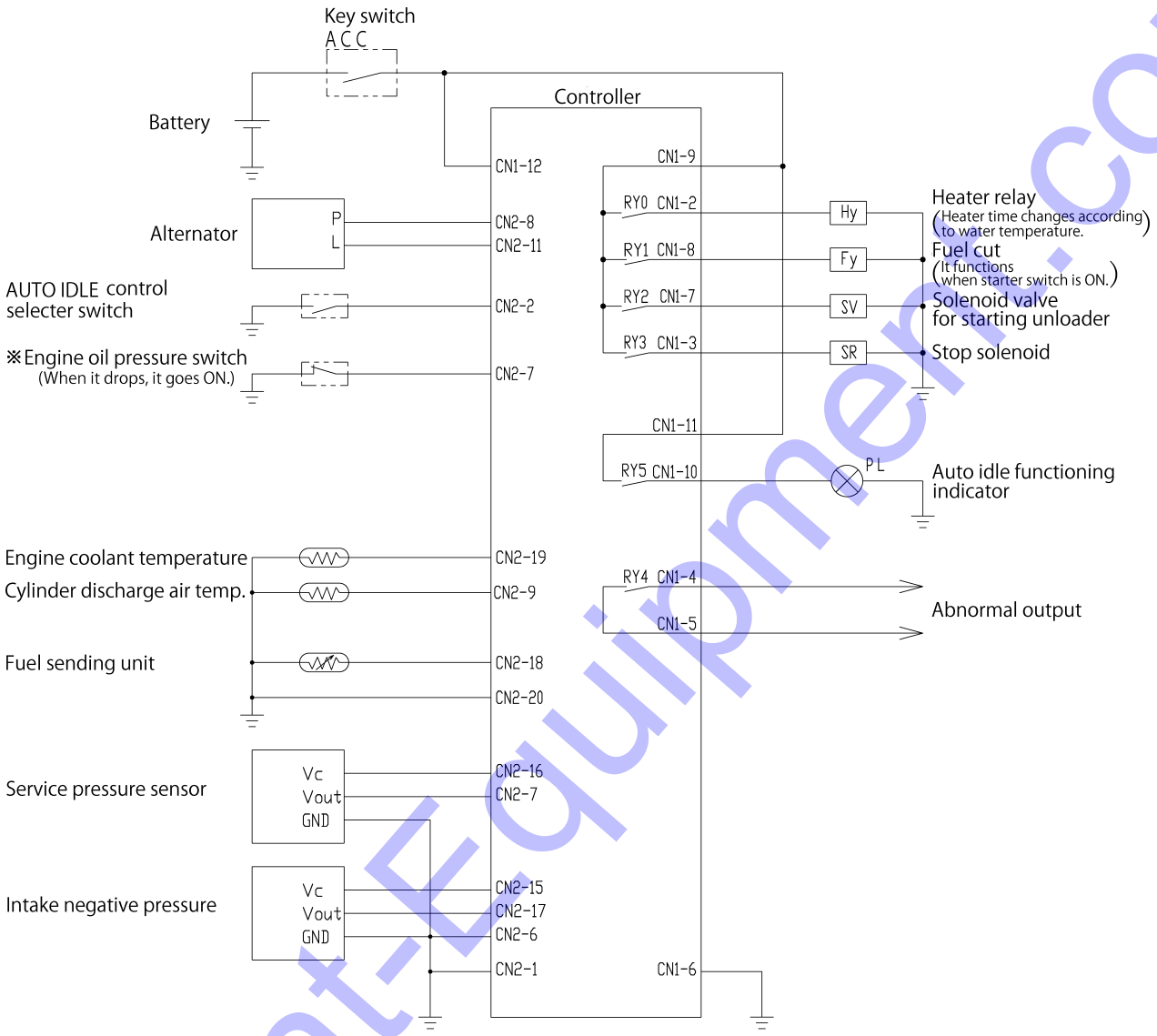
3. Electric System

1.Exterior connection drawing



PC11009E-1

※ : As engine oil pressure switch contact is B, the contact is ON when engine shuts down. After engine starts, the contact becomes OFF due to rise of engine oil pressure. Oil pressure detecting circuit of controller functions at circuit of contact A. After engine oil pressure switch is kept ON for 2 seconds, engine is brought to emergency stop. (Engine oil pressure abnormality detecting circuit functions 10 seconds after it detects alternator generation signal.)

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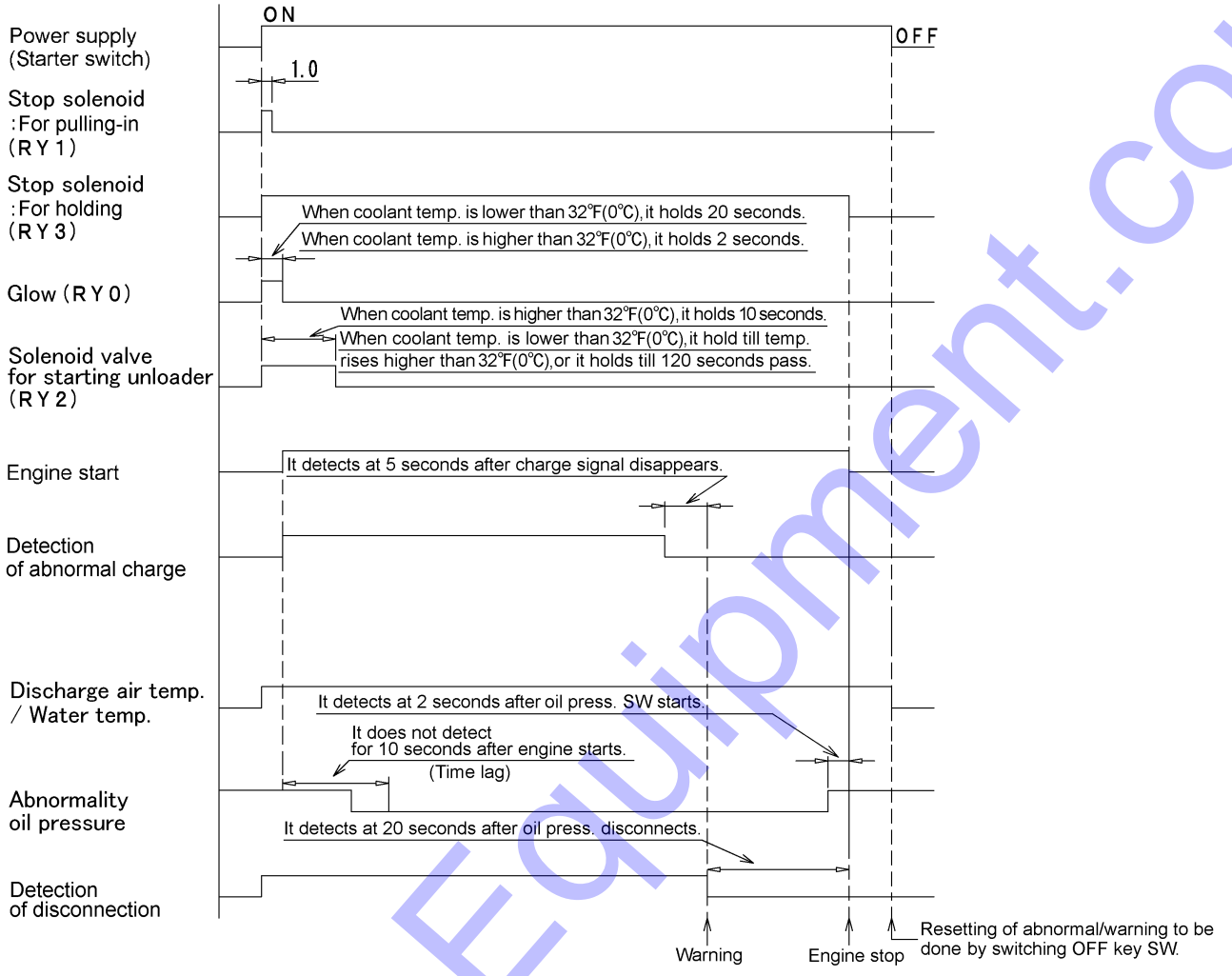
2. Timing of each output relay



PC11010E-1

3. Warning・emergency display and emergency stop functions

	Item	Indicator	Sensor		Actuation	Detecting timing	Time lag
Warning	Discharge temp. H	A-1	Thermister	–	Lamp goes on at 239°F (115℃)	Always	1.0 sec
	Water temp. H	A-2	Thermister	–	Lamp goes on at 221°F (105℃)	Always	1.0 sec
	Charge	A-5	–	–	Charge signal disappears and lamp goes on.	After starting engine	5.0 sec
Emergency	Discharge temp. H	E-1	Thermister	–	Lamp goes on at 248°F (120℃)	Always	1.0 sec
	Water temp. H	E-2	Thermister	–	Lamp goes on at 230°F (110℃)	Always	1.0 sec
	Eng. oil press	E-3	Pressure SW	A contact	Lamp goes on when oil pressure is lower than 7.3psi (0.05MPa) [0.5bar]	10 seconds after engine starts	2.0 sec
	Discharge temp. sensor	E-6	Thermister	–	Disconnected and lamp goes on.	After starting engine	20.0 sec
	Water temp. sensor	E-7	Thermister	–	Disconnected and lamp goes on.	After starting engine	20.0 sec

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

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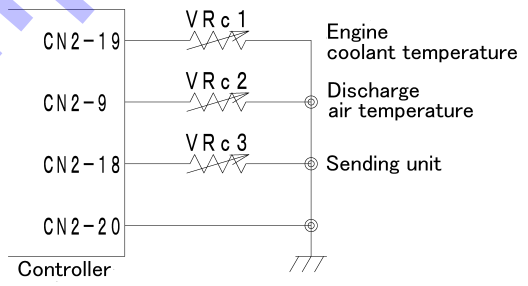
4. Functions of each output relay

Mark	Name	Remark	
RY0	Relay for heater relay	It goes ON when starter SW is ON.	When coolant temp. is lower than 32°F(0℃), it becomes OFF 20 seconds later. When coolant temp. is higher than 32°F(0℃), it becomes OFF 2 seconds later.
RY1	Relay for solenoid relay	It goes ON for 1 second when starter SW is ON.	
RY2	Relay for starting unloader	It goes ON when starter SW is ON.	When coolant temp. is lower than 32°F(0℃), or when 120 seconds pass, it becomes OFF. When coolant temp. is higher than 32°F(0℃), it becomes OFF 10 seconds later.
RY3	Relay for solenoid	It goes ON when starter SW is ON.	
RY4	Abnormality output relay		
RY5	Purge function relay (US model only)	Blinking during purge function	When switching to purge operation ・・・Blinks every 0.5 seconds During purge operation ・・・Blinks every 1 second

5.Adjustment and inspection

Perform the detection and inspection of discharge air temperature, engine coolant temperature, and setting unit by controller in the following steps.

(1) Connect resistance to controller as shown right.
Or use multi-speed variable resistance (resistance value: 1.0kΩ) for VRc1, VRc2 and VRc3.



PC10027E

(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 (℃)	Set temperature (°F)	Resistance (Ω)
Engine coolant VRc1	Warning	105	221	640±15
	Emergency	110	230	560±15
Discharge air temperature VRc2	Warning	115	239	491±15
	Emergency	120	248	432±15

(3) Sending unit

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

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6.List of functions

(1)Connector CN1

Pin No.	Line color	Connection	Remark
1	R/W	CN1-12	Common
2	Y/R	Heater relay [A] terminal	When starter switch is “ON”, and voltage is applied to CN1-12 terminal, interior contact (RYO) is “ON”, and voltage is outputted out of CN1-2 terminal to make a heater relay function. 2 seconds later [when coolant temp. is lower than 32°F (0℃), 20 seconds later] the interior contact (RYO) becomes “OFF” to cut power supply to heater relay and complete engine preheating.
3	W/B	Stop solenoid [R] terminal	**For holding stop solenoid** When starter switch is “ON”, and voltage is applied to CN1-12 terminal, interior contact (RY3) is “ON”, and voltage is outputted from CN1-3 terminal to supply power to R terminal for holding stop solenoid. When starter switch is “OFF” or emergency stop system functions, the interior contact (RY3) becomes “OFF” to cut power supply to the stop solenoid and consequently engine stops.
4	—	NIL	For outputting signal of abnormality
5	—	NIL	For outputting signal of abnormality
6	—	NIL	

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7	Y/G	Purge/starting unloader solenoid valve (US model only)	When starter switch is "ON", and voltage is applied to CN1-12 terminal interior contact (RY2) between CN1-9 and CN1-7 terminal becomes "ON" to supply power to solenoid for purge/starting unloader to open the valve. Thus this unit automatically starts starting unloader operation when it starts up, consequently saving load at start-up. When controller CN2-8 terminal receives input of alternator generation signal after engine starts, controller timer begins to function and 10 seconds later [after whichever shorter time passes between the time till water temperature rises higher than 32°F (0℃) when it is lower than 32°F (0℃) and the time of 120 seconds later] the interior contact (RY2) becomes "OFF" to cut power supply to the purge/starting unloader operation and then switched to normal mode operation from starting unloader mode. ●Functions during AUTO IDLE (purge control) operation When auto idle switch is switched on during operation, auto idle lamp goes on and switched to purge control operation. When this switch is pressed on again, auto idle lamp goes out and this mode is released. When air consumption decreases and pressure regulator begins to function, engine speed drops and at the same time, unloader valve of compressor air-end gradually begins to close and suction load increases. Compressor load factor is shown as monitor indication (See 1.5(2)) based on the suction load which is detected by suction load sensor. When the load factor becomes lower than the specified value [(set value prior to delivery: 15% (See 1.6.2)], auto idle lamp blinks at short intervals. When this situation continues for a certain time (set time prior to delivery: 10 seconds), the interior contact in controller (RY2) becomes "ON" to make solenoid for purge function to start purge. Thus receiver tank pressure drops to save machine power. At this time the auto idle lamp blinks at long intervals. Further, when air consumption increases and the pressure at load becomes lower than the purge releasing pressure (set value prior to delivery: 86psi(0.59MPa)[5.9bar] to cut power supply to the solenoid for purge/starting unloader mode and then switched to normal node operation. Auto idle lamp changes from blinking to lighting.
8	Y/L	Solenoid relay	**For pulling stop solenoid** When starter switch is "ON", and voltage is applied to CN1-12 terminal, interior contact (RY1) is "ON", and voltage is outputted out of CN1-8 terminal to make the solenoid relay function. Thus power is supplied to W terminal of stop solenoid and it pulls interior plunger. 1 second later, the interior contact (RY1) becomes "OFF" to cut power supply to solenoid relay. Then stop solenoid is switched to holding circuit.
9	R/W	CN1-12	Common
10	W/G	Auto idle function indicator (US model only)	No electrical connection found. When auto idle switch is "ON", and power is supplied to CN2-2 terminal, interior contact (RY5) becomes "ON" to make auto idle function indicator go on.
11	R/W	CN1-12 (US model only)	Power supply for auto idle function lamp lighting.
12	R/W	Starter switch [ACC] terminal (Through 5A Fuse)	Power supply

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(2)Connector CN2

Pin No.	Line color	Connection	Remark
1	B	Earth	
2	W	AUTO IDLE switch (US model only)	When auto idle is switched "ON" to be electrically connected, it will be switched to purge control mode.
※ 3	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 (RY3) between CN1-9 and CN1-3 terminal turns "OFF" to cause emergency stop to engine. ●Set pressure of emergency stop oil pressure below 7.3psi(0.05MPa)[0.5bar]
4	—	NIL	
5	—	NIL	
6	B	Earth	
7	G	Service pressure sensor Vout terminal (US model only)	Detection of service pressure.
8	W/R	Alternator P terminal	Input alternator frequency (engine rotating speed signal)
9	G/W	Discharge air temp. sensor	Detection of discharge air temperature. When it is higher than the emergency stop actuating set temperature, interior contact (RY3) between CN1-9 and CN1-3 terminals will be turned "OFF" to make engine emergency stop. ●Warning・Emergency stop set temperature Warning temperature : 239°F(115℃) Emergency stop temperature: 248°F(120℃)
10	—	NIL	
11	W/B	Alternator L terminal	For detecting abnormal charge
12	—	NIL	
13	—	NIL	
14	—	NIL	
15	R	Intake negative pressure sensor Vc terminal (US model only)	Power supply for intake negative pressure sensor
16	R	Service pressure sensor Vc terminal (US model only)	Power supply for service pressure sensor
17	Y	Intake negative pressure sensor Vout terminal (US model only)	Detection of intake negative pressure.
18	G/Y	Sending unit	For detecting residual fuel
19	Y/B	Coolant temp. sensor	Detection of engine coolant temperature. When the set temperature of emergency stop becomes higher, the interior contact (RY3) between CN1-9 and CN1-3 terminals turns "OFF" to cause engine to emergency stop. ●Warning・Emergency stop set temperature Warning temperature : 221°F(105℃) Emergency stop temperature: 230°F(110℃)
20	G/B	Earth	

※ : Abnormal oil pressure detection circuit of controller starts to function in 10 seconds after it detects alternator generating signal with CN2-8 terminal.

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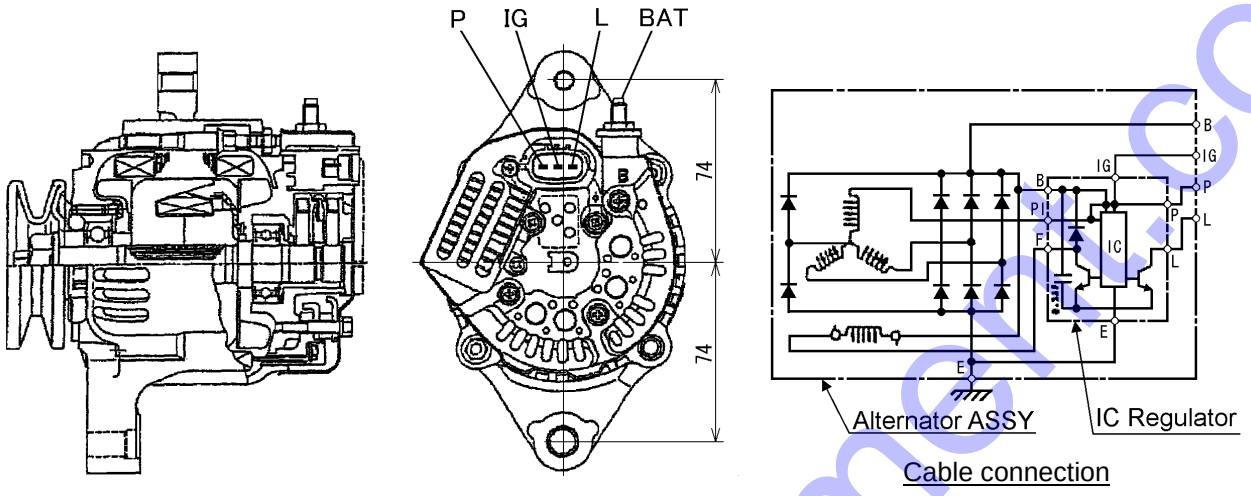
3.2 Alternator [Dynamo regulator (IC type)]

YANMAR part number: 129423-77200



PC10028E-1

(1)List of functions

Pin No.	Line color	Connection	Remark
BAT	R	Starter motor B terminal	Power for charging voltage.
IG	R/B	5A Fuse (Through joint connector)	It detects battery voltage, and it controls rotor coil electromagnetic current.
L	W/B	Controller CN2-11 terminal	It makes warning lamp go on when battery charging function is abnormal.
※ P	W/R	Controller CN2-8 terminal	Output alternator frequency (engine rotating speed signal)
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

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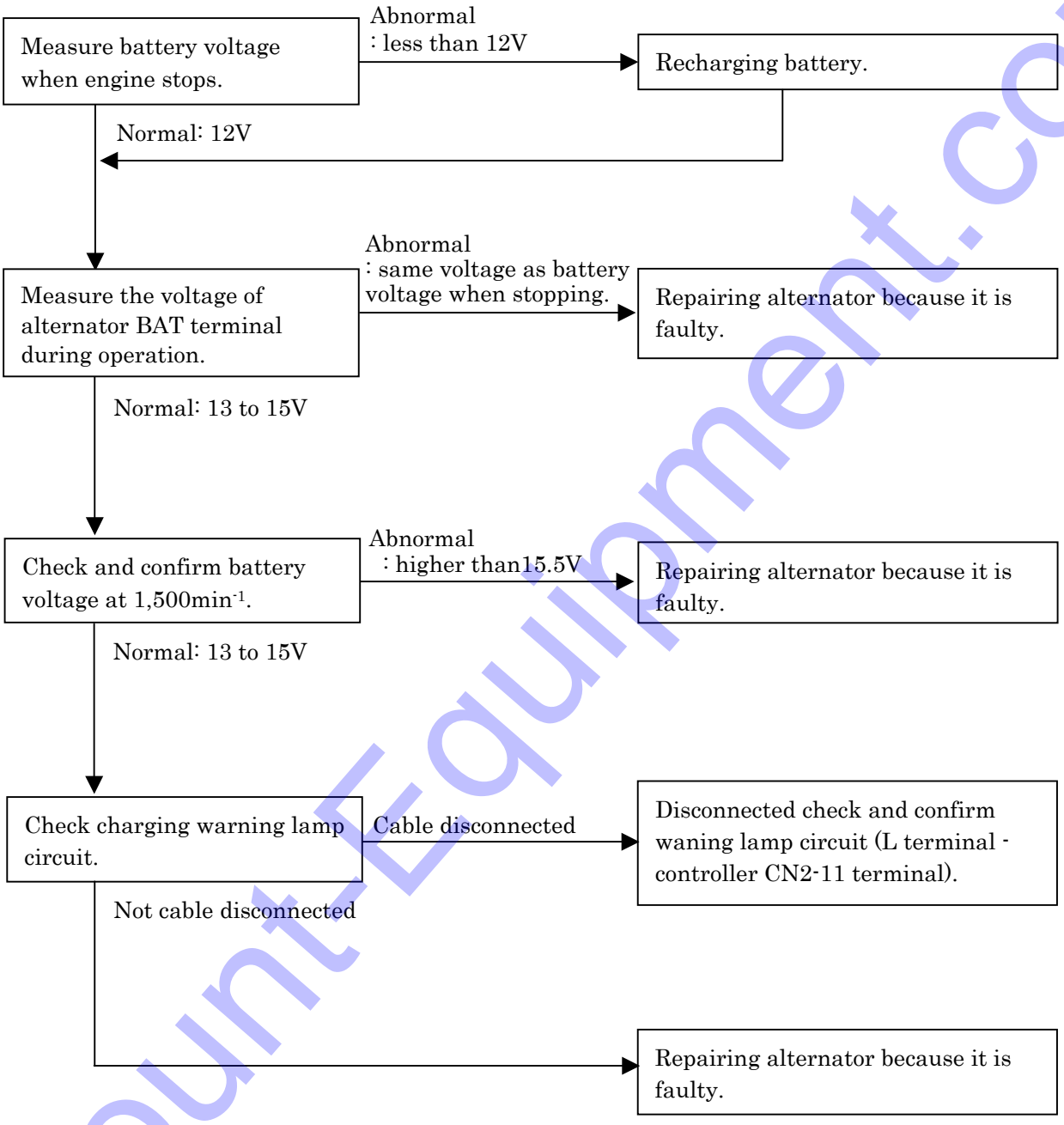
(3) Diagnosing when battery charging warning lamp lights



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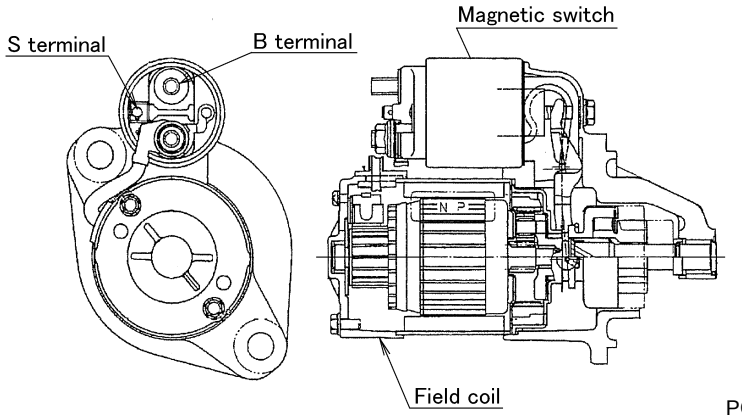
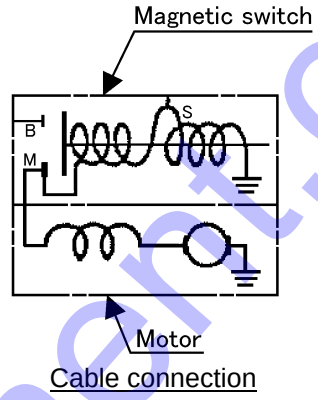
3.3 Starter

YANMAR part number: 129242-77010



PC10036E



PC10030E

(1)List of functions

Pin No.	Line color	Connection	Remark
B	B	Battery + terminal	For supplying power to starter which enables starter pinion to turn.
S	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}.

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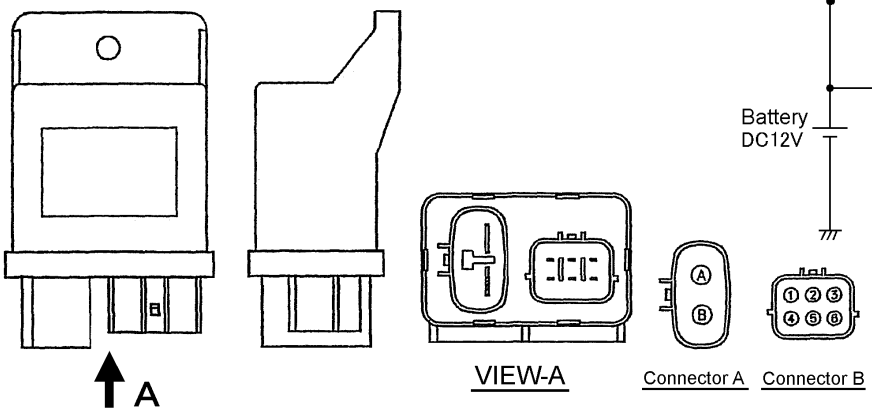
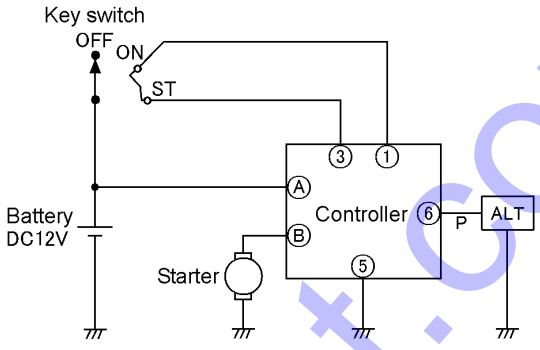
3.4 Safety relay

Part number:44346 16400





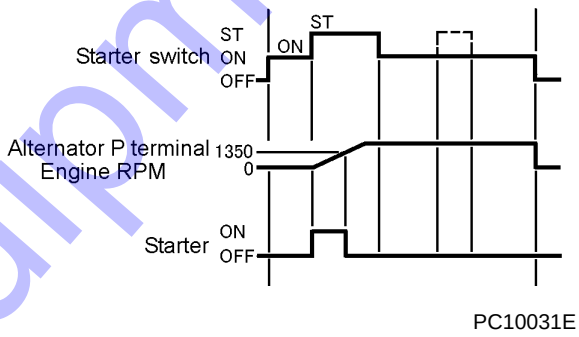
PC10003E

(1) Specification

Rated voltage		DC12V
Range of voltage at which unit is used		DC10 to 15V
Range of temperature at which unit is used		-22～+176°F (-30 to +80℃)
Rated load		MAX 40A
Power input of alternator (P terminal)		※frequency signal
Interior contact between A and B terminal	Engine speed for contact disconnection	1350±210min^{-1}
	Engine speed for recovery	650±150min^{-1}

※ For the details, see engine service manual.

(2) Chart of function



PC10031E

(3) List of functions

Pin No.	Line color	Connection	Remark
1(C)	R/B	Starter switch ACC terminal	Power supply
2	—	NIL	
3(E)	B/W	Starter switch C terminal	Signal of start is inputted When starter switch is turned to “START” and voltage is applied to E terminal the contact between terminal A and B is switched to “ON” to supply power to starter motor S terminal to turn starter motor. When alternator P terminal frequency inputted to terminal H exceeds 250 Hz (at engine speed of 1350min^{-1}), the contact between terminal A and B is switched to “OFF” and power supply to starter motor is cut to stop engine. And after starting is secured, the contact between terminal A and B is kept “OFF” to prevent overrun and plunging of pinion gear.
4	—	NIL	
5(G)	B	Earth	
6(H)	W/R	Alternator P terminal	Input alternator frequency (engine rotating speed signal)
A	R	Starter motor B terminal	For excitation terminal of starter motor magnet switch excitation coil.
B	W	Starter motor S terminal	

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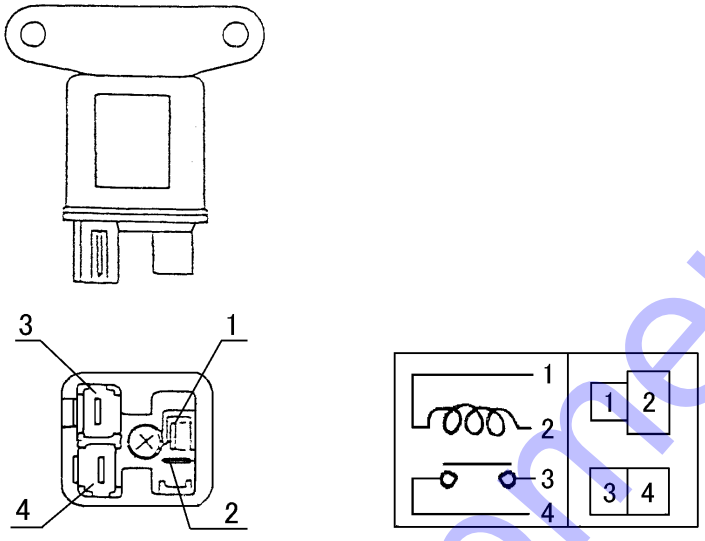
3.5 Solenoid relay·Heater relay

Part number:44327 05000

YANMAR part number:119650-77910



Cable connection

PC10005

(1) Specification

Rated voltage	DC12V
Continuous rating	1min
Coil resistance (between No.1 and No.2 terminal)	13Ω

(2-1) Solenoid relay functions list

Pin No.	Line color	Connection	Remark
1	Y/L	Controller CN1-8 terminal	See“CN1-8 terminal of NO.6 List of function of No.3.1 Controller”.
2	B	Earth	
3	G	30A Fuse	
4	Y	Stop solenoid W terminal	

(2-2) Heater relay functions list

Pin No.	Line color	Connection	Remark
1	Y/R	Starter switch R2 terminal	When starter switch is turned to “GLOW” or “START”, power is supplied to switch the contact between No.3 and No.4 terminal to “ON”.
2	B	Earth	
3	R	50A Fuse (Through alternator BAT terminal)	When the contact between No.3 and No.4 terminal is “ON”, preheating begins.
4	L	Glow plug	

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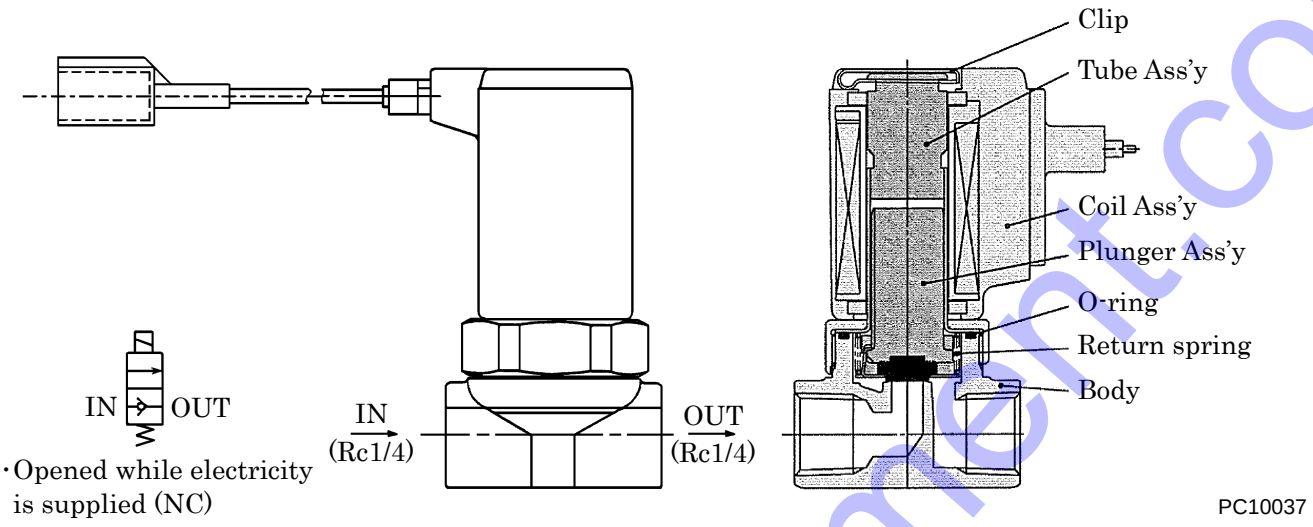
3.6 Purge/starting unloader solenoid valve

Part number:46811 24100



(1) Specification

Rated voltage	DC12V
Function	Power is supplied. It is ON (NC)

(2) List of functions

For details of functions, see "NO.6 List of function (CN1-7 terminal) of No.3.1 Controller".

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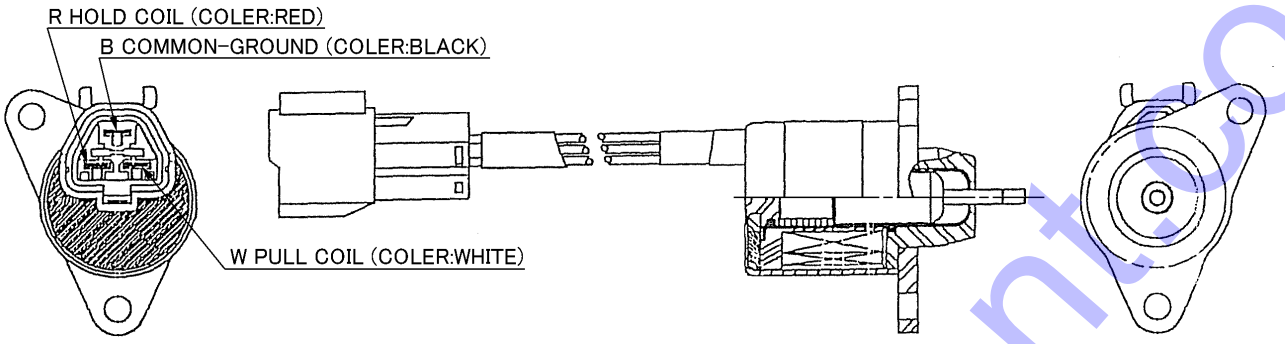
3.7 Stop solenoid

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	Y	30A Fuse (Power supply) [Suction power supply]
R	W/B	Controller CN1-3 [Holding power supply]
B	B	Earth

※For details of functions, see “No.6 List of function (CN1-7 and CN1-8 terminal) of No.3.1 Controller”.

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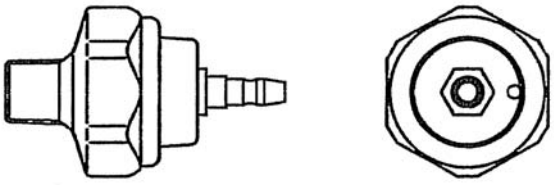
3.8 Engine oil pressure switch (For emergency stops)

Part number:44328 21800



PC10013

Specification

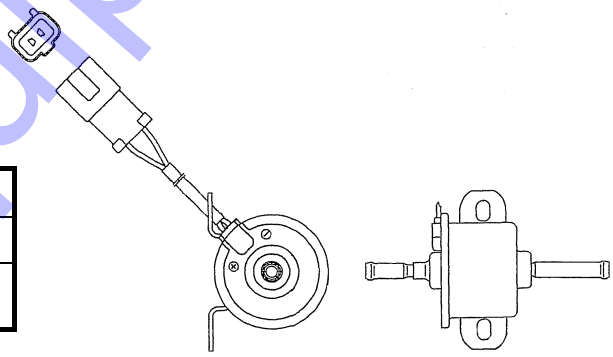
Setting pressure	7.3psi(0.05MPa)[0.5bar]
Contact type	B contact switch (Contact "OFF" in excess of set pressure)
Time lag	・10 seconds after engine starts. ・2 seconds during operation ※

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

3.9 Fuel air-bleeding electromagnetic pump

Part number:43650 02700

YANMAR part number:129612-52100



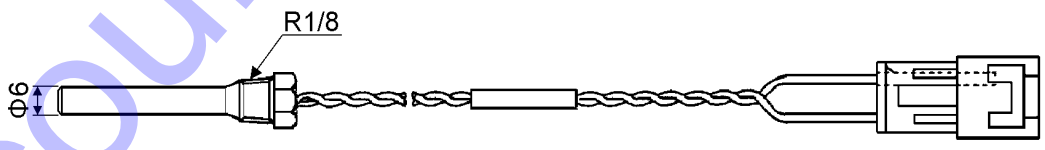
PC10014

Specification

Rated voltage	12V
Operating current	1.5A (MAX)
Delivery capacity	More than 0.11 to 0.29gal/min (0.4 to 1.1 L/min)

3.10 Discharge air temperature sensor・Coolant temperature sensor

Part number:44364 06500



PC08033

《Note》 Take care not to tighten excessively. Less than 17.7lbf・in.(2N・m)[20kgf・cm]

※For temperature characteristic of resistance, see "No.5.Adjustment and inspection of No.3.1 Controller".

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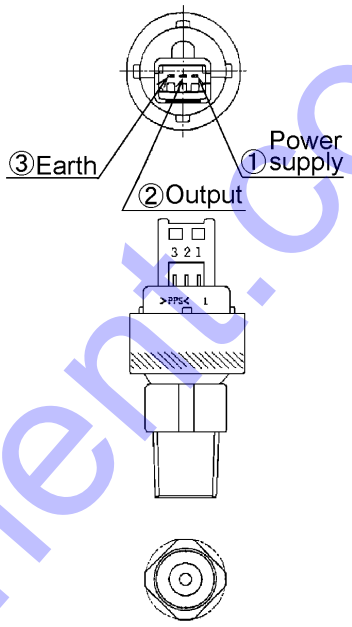
3.11 Pressure sensor (for Intake negative pressure and for service pressure)

Part number:44328 20600



PC08035

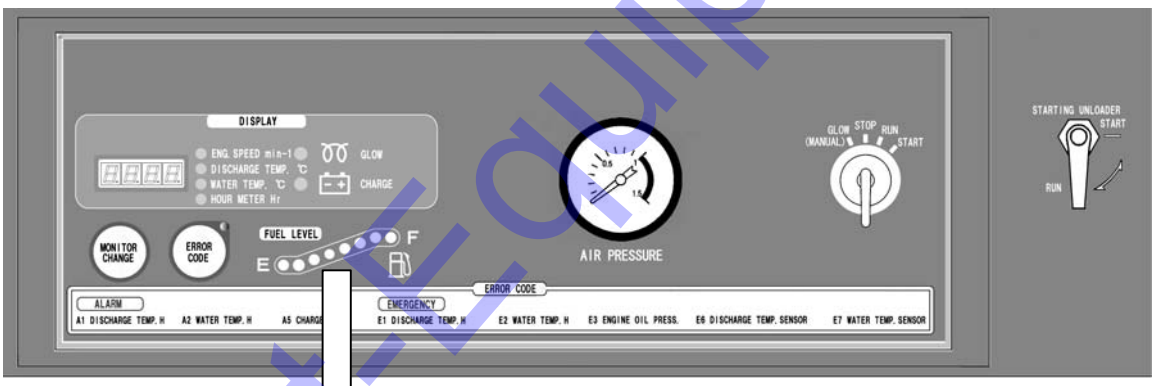
Trouble diagnosis of pressure sensor itself

Check and confirm that output voltage between ②-③ is DC0.5± 0.1V when 5V is applied between ①-③ terminals at an atmospheric pressure.

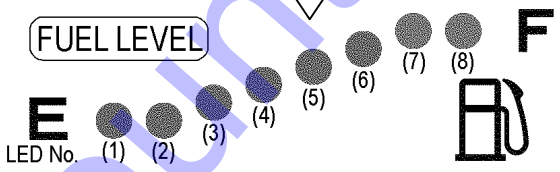
Pressure and output voltage(for reference only)

Electric wire	Signal
①VCC	Power supply (5V)
②VOUT	Output Pressure 0psi (0MPa) [0bar] DC0.5V Pressure 14psi (0.1MPa) [1bar] DC0.9V Pressure 85psi (0.6MPa) [6bar] DC2.9V Pressure 100psi (0.69MPa) [6.9bar] DC3.3V Pressure 142psi (0.98MPa) [9.8bar] DC4.5V
③GND	Earth

3.12 Fuel meter (Display)



A100359E



PC10033E

Relation between indicator lamp (LED) and residual fuel level

Indicator lamp		Remaining fuel gal. (L)	Remark
LED No.1	OFF (Red)	4.2(16)	E
LED No.2	ON (Red)	6.1(23)	
LED No.3	ON (Green)	7.9(30)	
LED No.4	ON (Green)	10.6(40)	1/2
LED No.5	ON (Green)	13.2(50)	
LED No.6	ON (Green)	15.1(57)	
LED No.7	ON (Green)	17.7(67)	
LED No.8	ON (Green)	19.8(75)	
Full		23.8(90)	F

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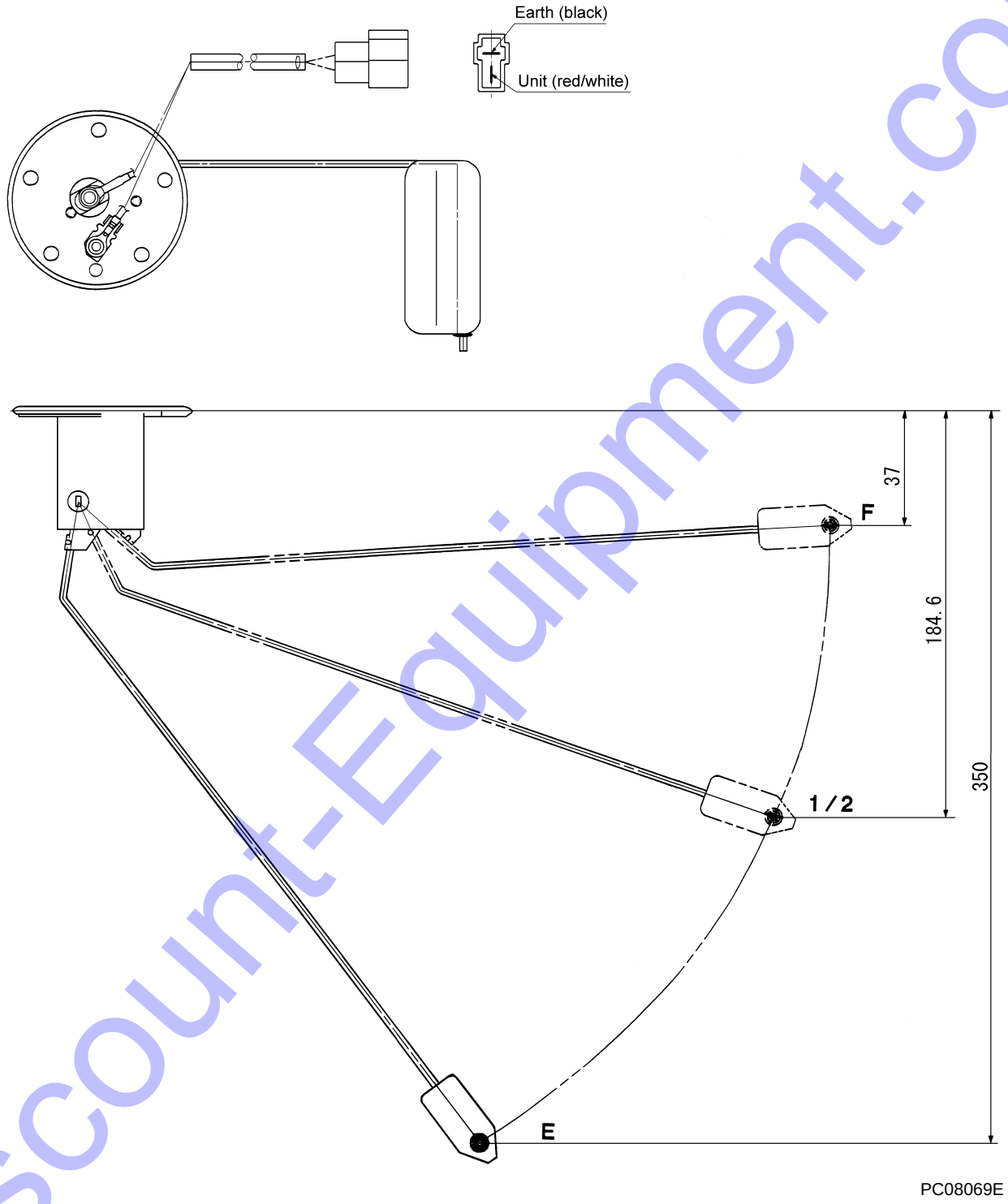
3.13 Sending unit

Part number:36159 02202



PC08069E

※For resistance at float position, see “No.5.Adjustment and inspection of No.3.1 Controller”.

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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.

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(5) Procedures of diagnosis

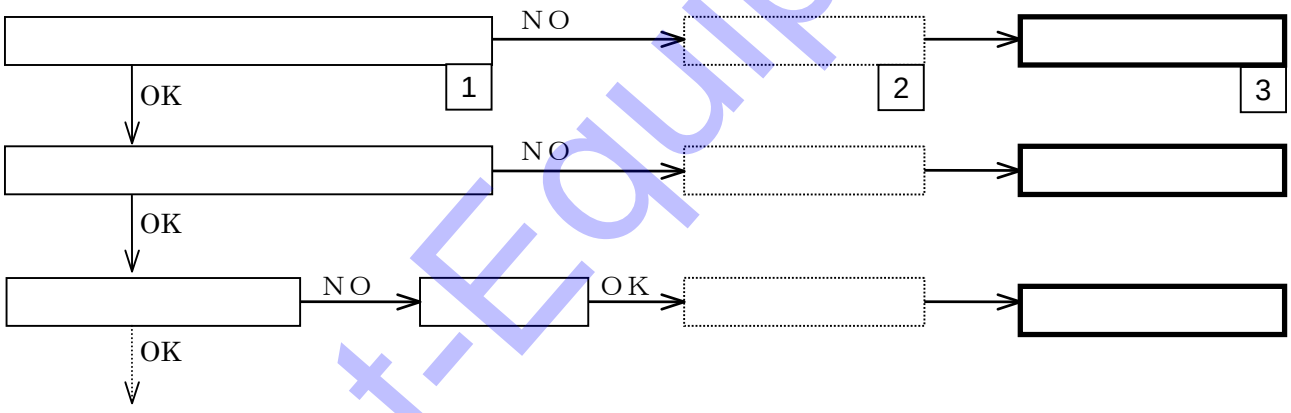
When you become well experienced, you can find out the cause easily during the process of confirmation (4). But easy understanding could cause unexpected failure. So check and judge it according to the following procedures.

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.

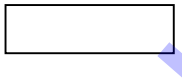
(6) Prevention of repeated occurrence of similar trouble

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”

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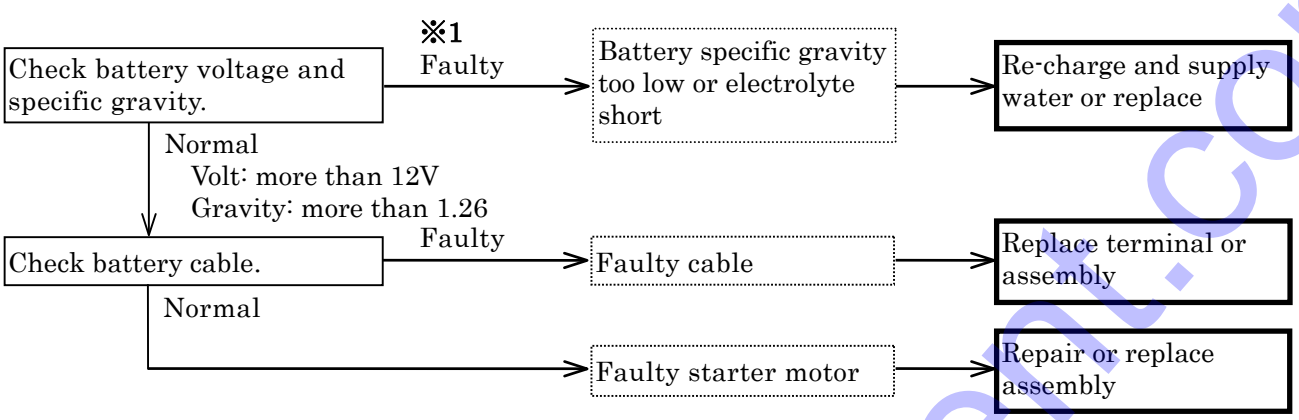
4. Troubleshooting

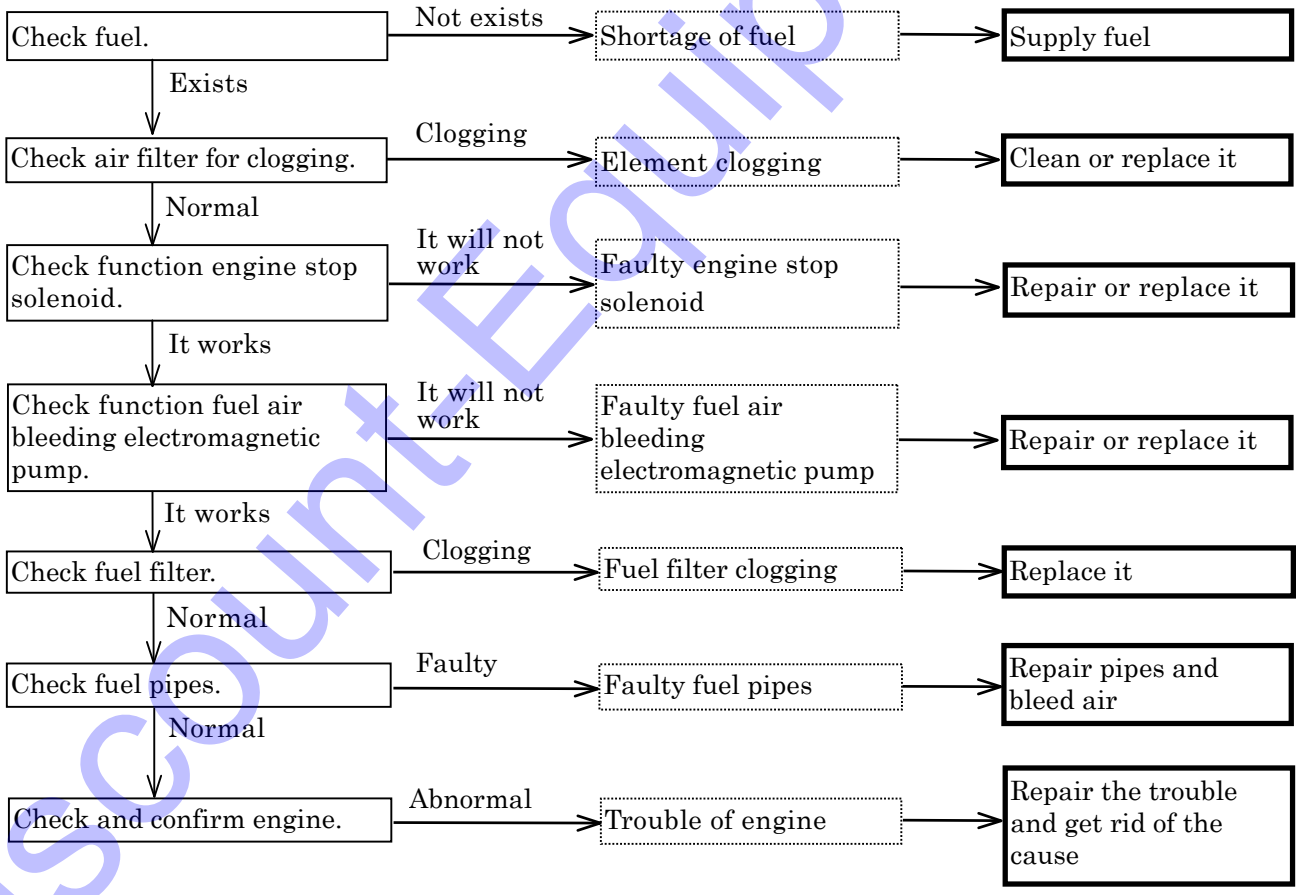
4.2 Failures of compressor and engine

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 Starter turns, but engine will not start



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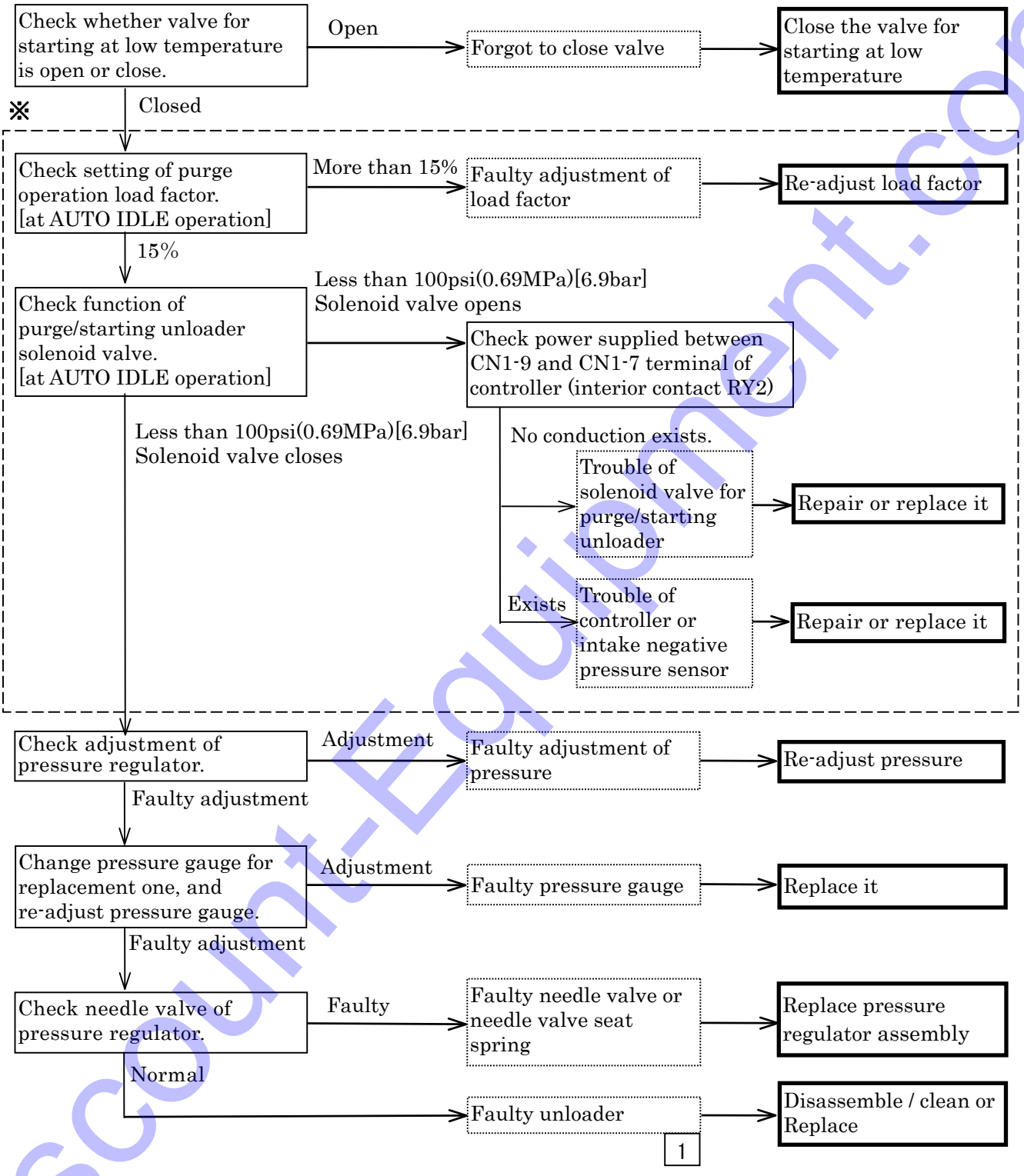
4.2.3 Engine revolutions will drop before pressure rises up to rated one



※ Items in dotted square show failure diagnosis items for US model auto idle operation mode.

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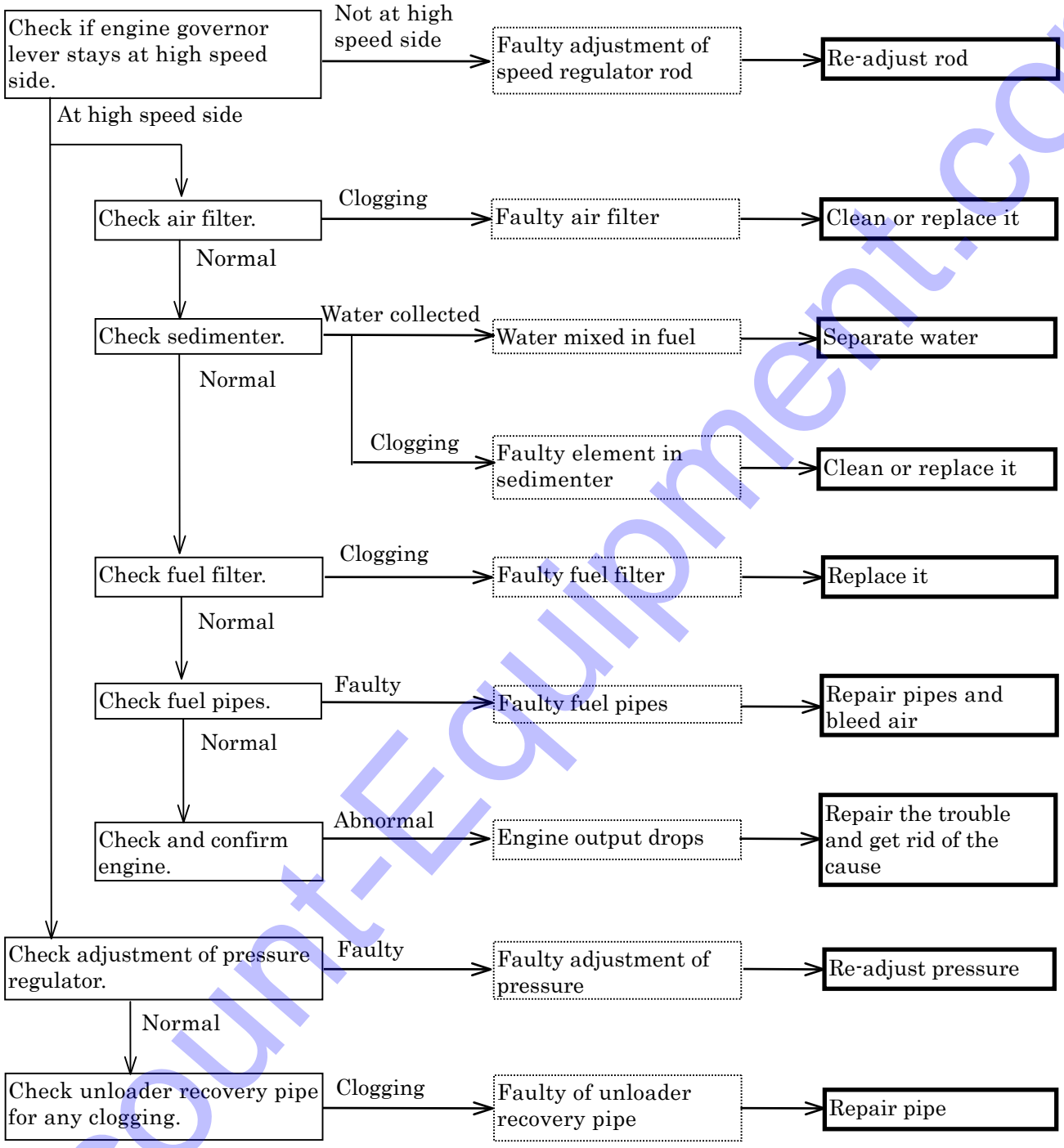
4.2.4 Engine will not turn to meet rated revolutions



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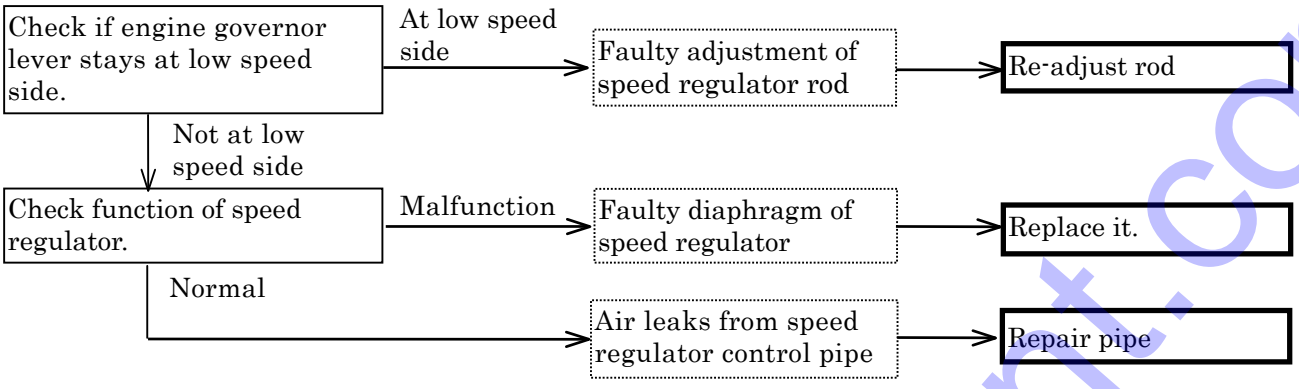
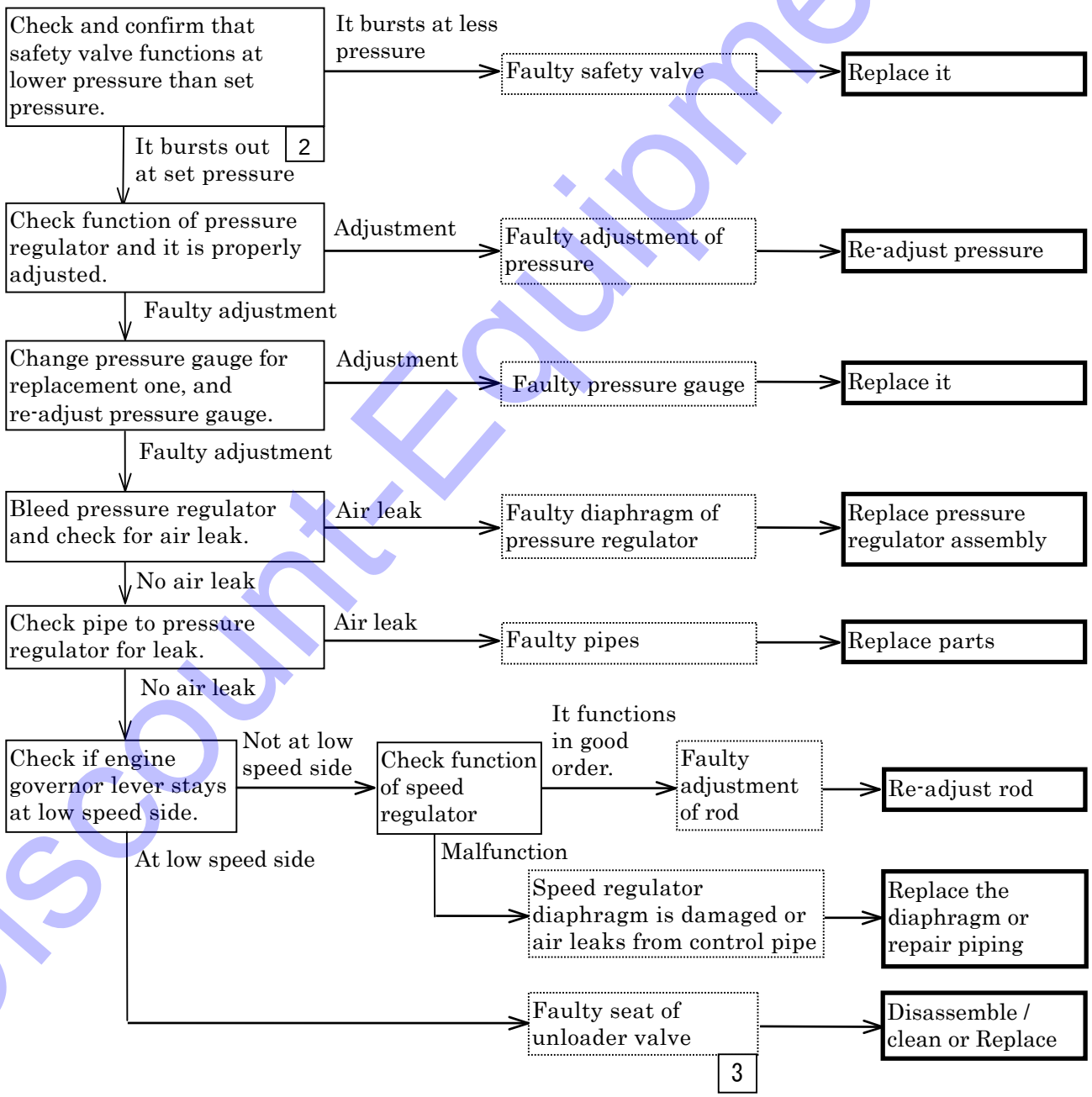
4.2.5 Minimum speed not available even upon no-load operation



4.2.6 Safety valve bursts out during unloaded operation



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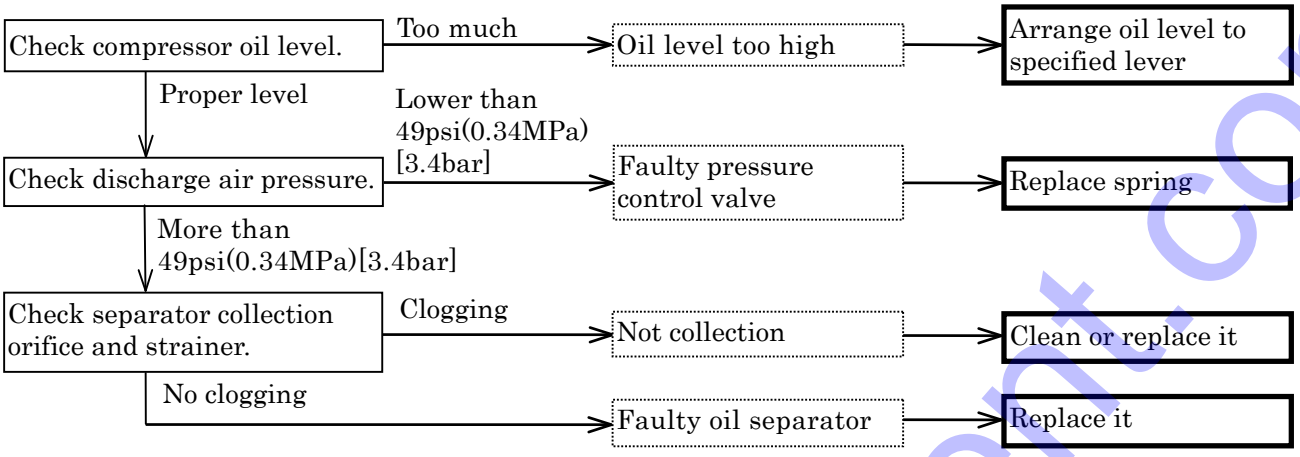
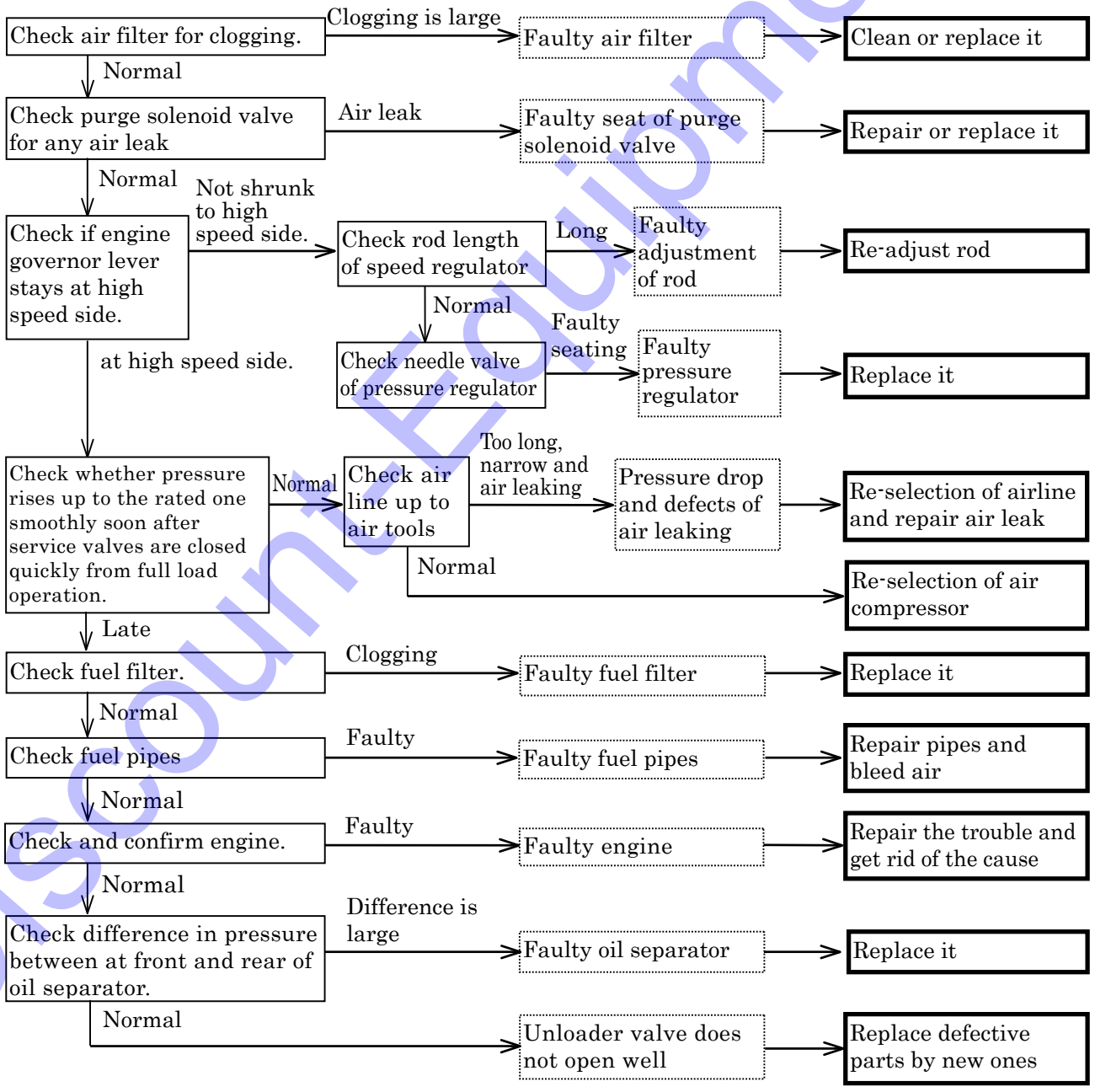
4.2.7 Oil mixed found in delivery air



4.2.8 Discharge air is insufficient



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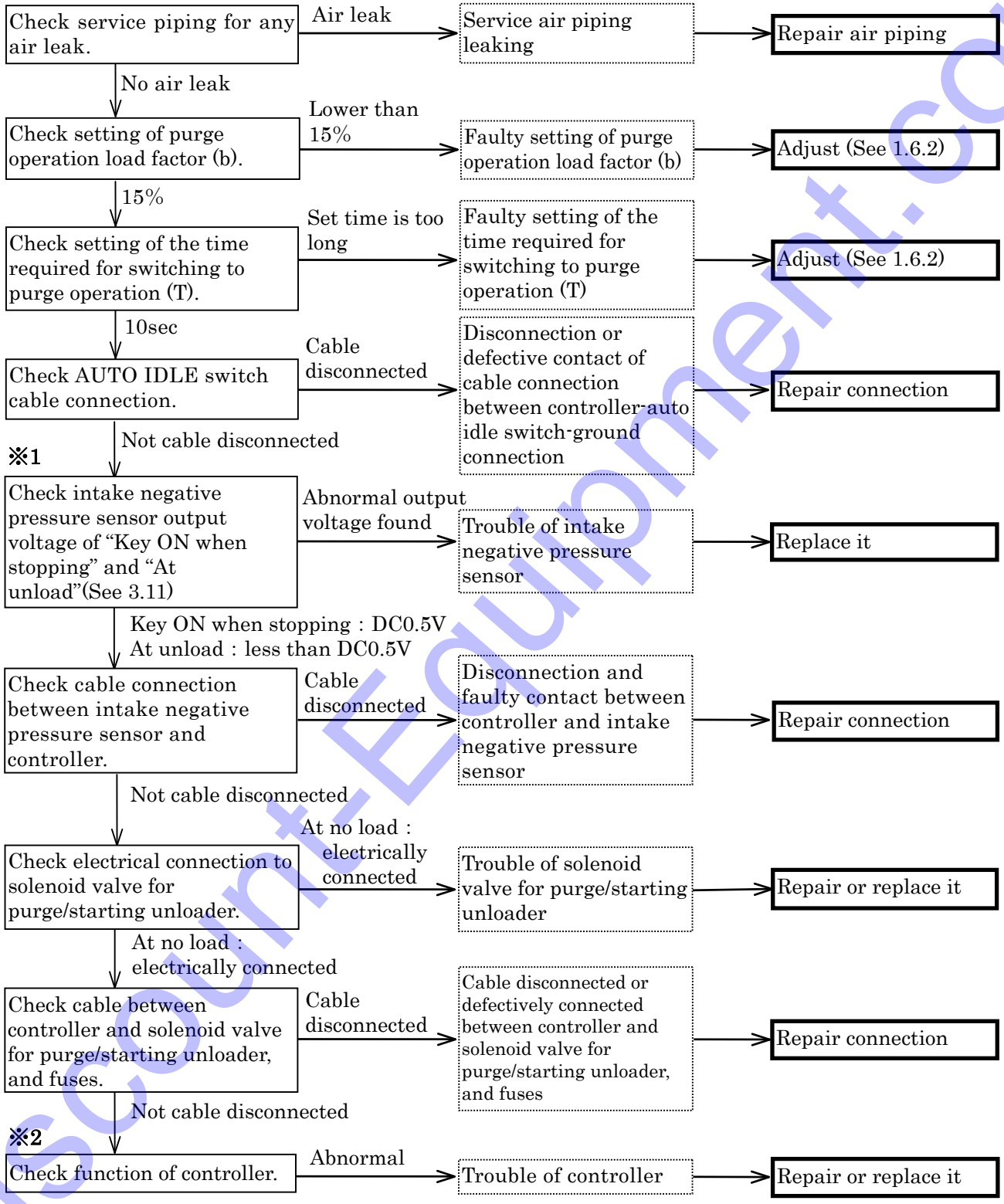
4.2.9 Purge control operation will not start even if AUTO IDLE (purge control) switch is pressed. (US model only)



※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" .

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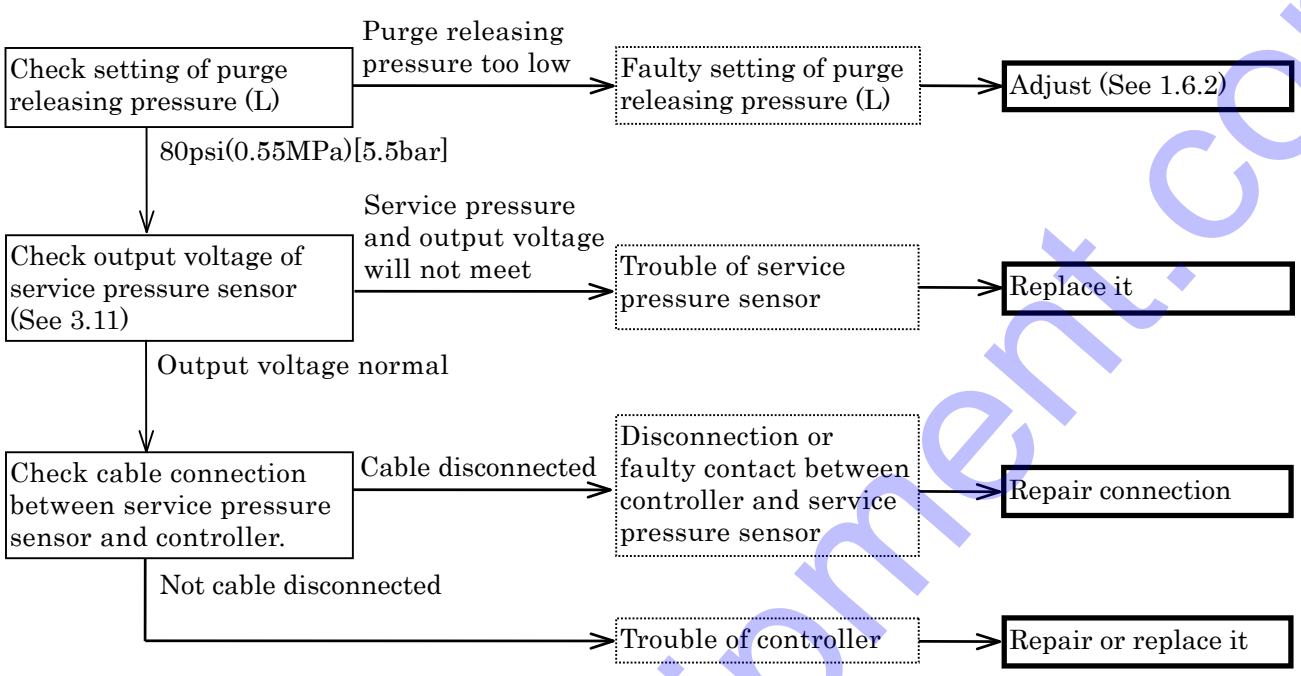
4.2.10 Even when the pressure at consumer's side drops, it will not recover from purge control operation. (US model only)



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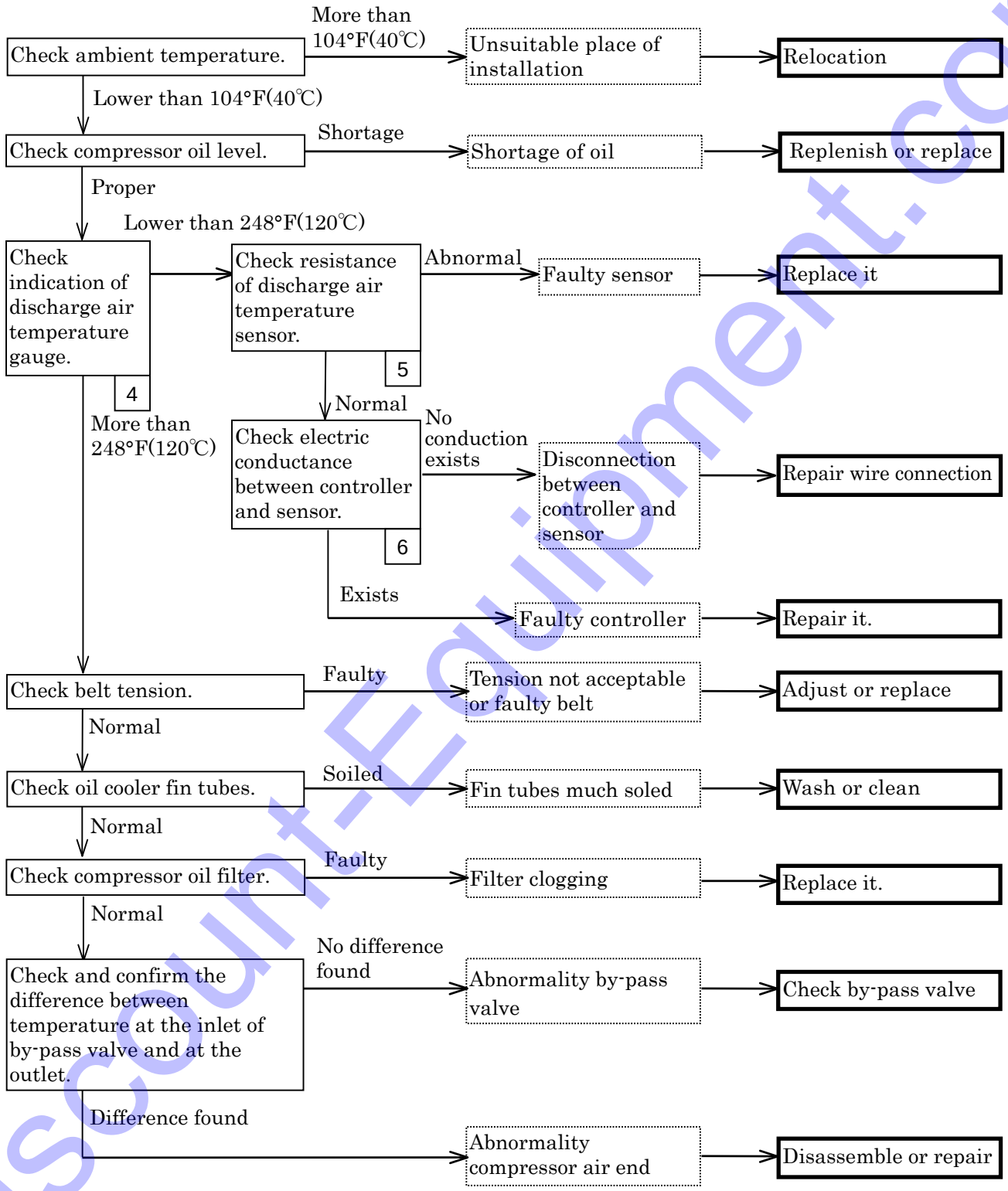
4.3 Operation of emergency switch

4.3.1 Discharge air temperature indication lamp glows and engine stops.



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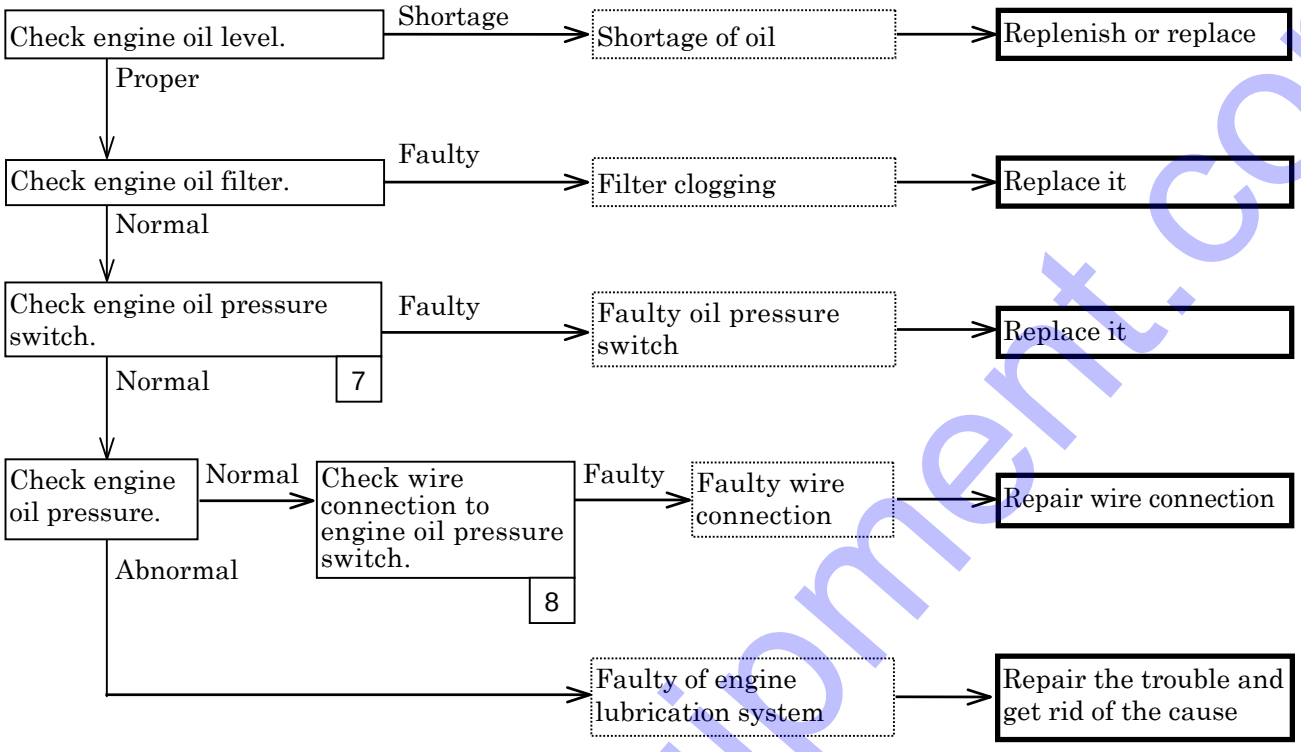
4.3.2 Engine oil pressure emergency indication lamp glows and engine stops



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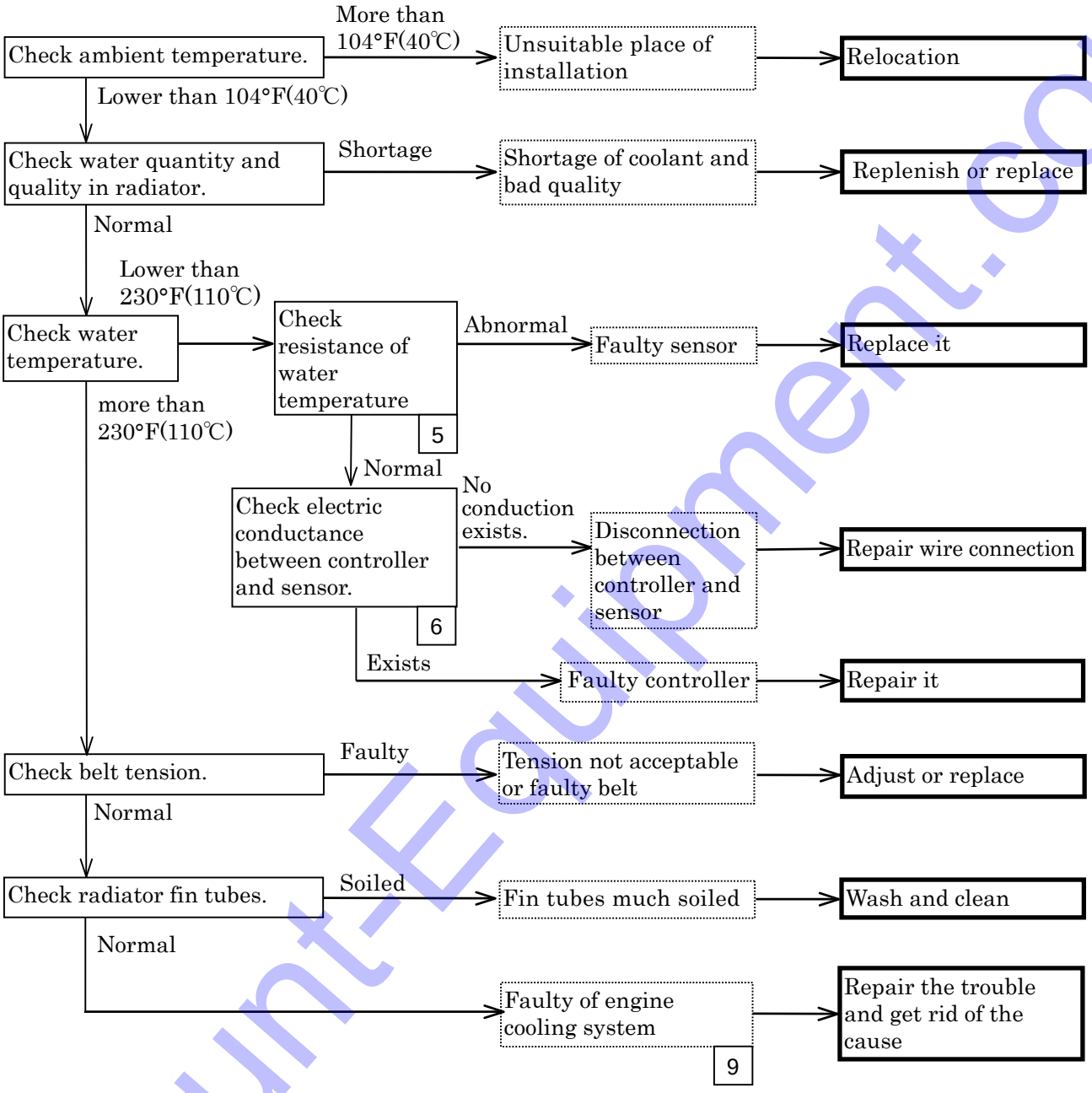
4.3.3 Engine coolant temperature lamp glows and engine stops



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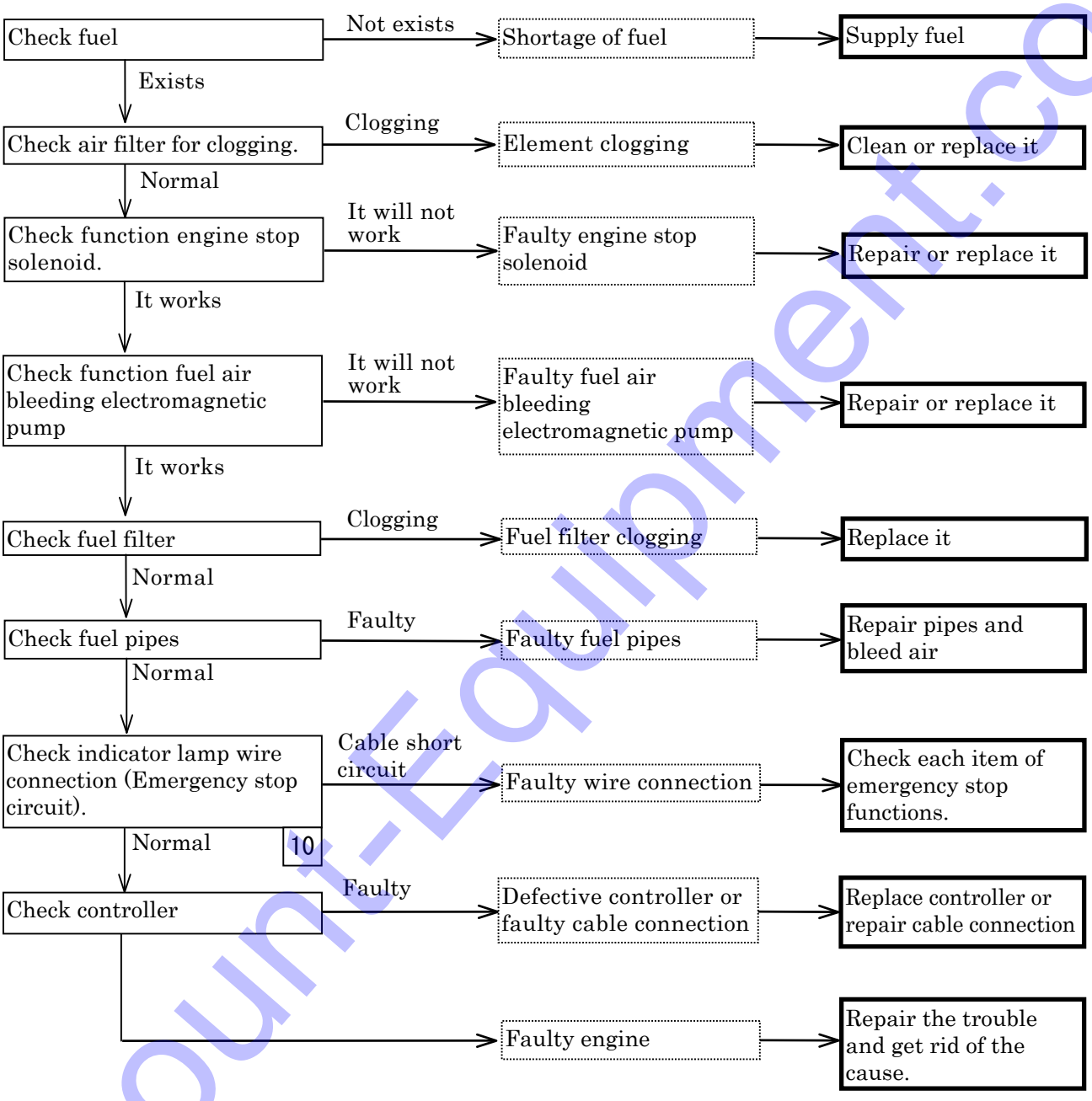
4.4 Others

4.4.1 Indicator lamps will not glow, but engine stops.

(Starter switch is not set in contact, and blown fuse trouble is exempted.)



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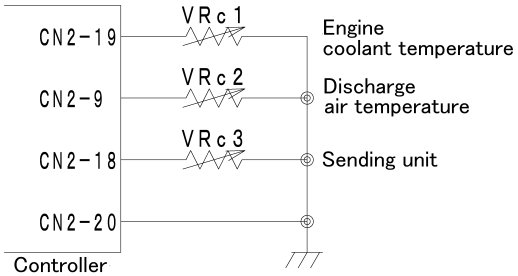
4.5 Explanation of trouble diagnosis

No.	Item	Cause	Remedy
1	Faulty unloader.	Unloader valve cannot be open.	Disassemble unloader valve to check function of valve and piston. Further check recovery pipe for any clogging.
2	Check and confirm that safety valve functions at lower pressure than set pressure for safety valve.	Check and locate pressure maladjustment or defective safety valve.	In case of malfunction of safety valve, safety valve assembly should be replaced.
3	Faulty seat of unloader valve	Faulty seat of unloader valve or faulty sliding function of valve and piston.	Disassemble unloader valve, and clean seat surface and check function of valve and piston.
4	Check discharge air temperature, using digital monitor.	Check whether actual rise of discharge air temperature stops engine or any failure of electrical circuit stops engine.	
5	Check the resistance of discharge air temperature/coolant temperature sensor.	For resistance characteristics of discharge air temperature and coolant temperature sensor, See 3.10.	Even disconnection of thermo sensor or its short-circuit causes engine to stop.
6	Check conductance between controller and discharge air temperature sensor/coolant temperature sensor.	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 [248°F(120℃)/230°F(110℃)] , interior contact (RY3) between controller CN1-9 and CN1-3 terminals turns OFF to cut electrical connection to stop solenoid and making engine stop.	Connect variable resister (1kΩ) as shown in the following figure and gradually lower resistance value of variable resister. And when it displays abnormality, measure the value and check whether it is within the range of resistance of set temperature. (See No.5.Adjustment and inspection of No.3.1) 

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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 2.12.
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.	

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5. References

5.1 Comparison between consumable parts and electrical appliances

Item	Part Number	
	Export model	US model
●Element / Filter		
Air filter ASS'Y (For compressor)	32100 44900	←
Air filter element (outer)	32143 11800	←
Air filter element (inner)	32143 13000	—
Air filter ASS'Y (For engine)	32100 40700	←
Air filter element (outer)	32143 11700	←
Air filter element (inner)	32143 12900	—
Oil separator	34220 16101	←
O-ring for oil separator	03402 15140	←
Compressor oil filter ASS'Y	37400 16100	←
Oil filter cartridge	37438 08900	←
Engine oil filter cartridge	41290 01100 (YANMAR:119005-35151)	←
Fuel filter cartridge	43543 01400 (YANMAR:129907-55801)	←
Fuel pre-filter ASS'Y	43540 08100	—
Element	43541 02400 (YANMAR:41650-550800)	—
O-ring	(YANMAR:123325-36140)	—
O-ring	(YANMAR:24311-000120)	—
Sedimenter ASS'Y	43550 02900 (YANMAR:129242-55700)	←
Element	(YANMAR:129242-55730)	←
O-ring	(YANMAR:24311-000160)	←
O-ring	(YANMAR:24321-000750)	←
●Air control		
Speed regulator	36400 21901	←
Diaphragm	36437 01500	←
Pressure regulator	36400 19000	←
Auto relief valve / Vacuum relief valve	(built-in unloader)	(built-in unloader)
Needle valve	36429 00801	←
O-ring	03402 25008	←
O-ring	03402 25021	←
O-ring	21221 02100	←
Unloader valve	22100 41201	←
O-ring (2 pieces)	03402 10125	←
O-ring	03402 10070	←
O-ring	21441 04800	←
O-ring	21441 04900	←
Pressure control valve	35300 17000	←
O-ring	03402 15075	←
O-ring	03402 25032	←
Spring	22144 07700	←
Piston	35303 03300	←

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5. References

Item	Part Number	
	Export model	US model
●Oil line		
By-pass valve ASS'Y (Built-in compressor oil filter)	—	—
Pellet	37231 02100	←
O-ring	03402 25045	←
●Electrical appliances		
Controller	46870 51901	46870 54000
Safety relay	44346 16400 (YANMAR:119802-77200)	←
Solenoid relay	44327 05000 (YANMAR:119650-77910)	←
Heater relay	44327 05000 (YANMAR:119650-77910)	←
Purge/starting unloader solenoid valve	—	46811 24100
Fuse 30A(FUSE1)	44470 02600	←
Fuse 5A(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	—	46242 21500
Sending unit	36159 02202	←
Fuel air-bleeding electromagnetic pump	43650 02700	←
●Instruments on panel		
Starter switch	44322 07300	←
Pressure gauge	36141 15503	36141 18600

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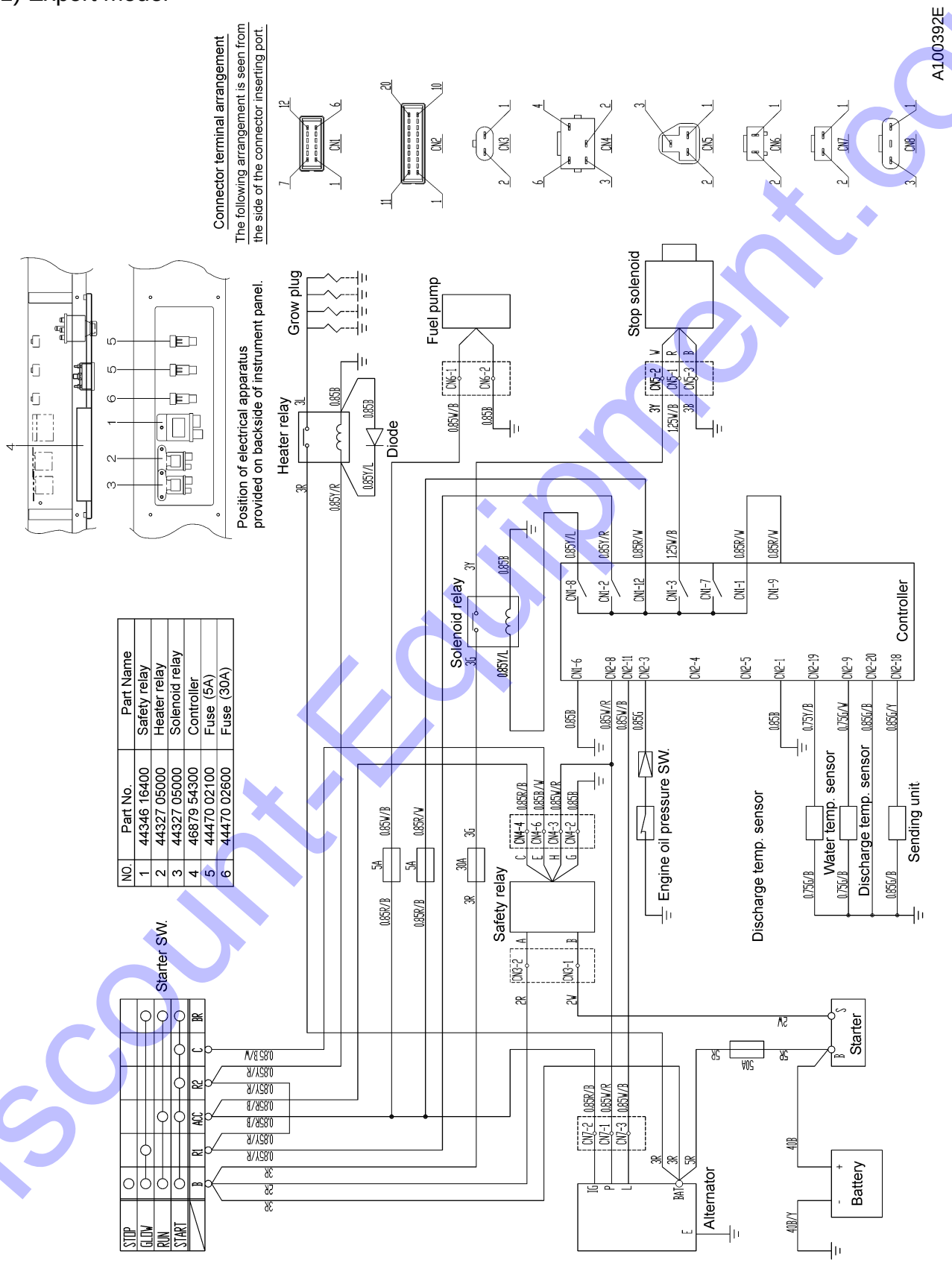
5.2 Engine Wiring Diagram

(1) Export model



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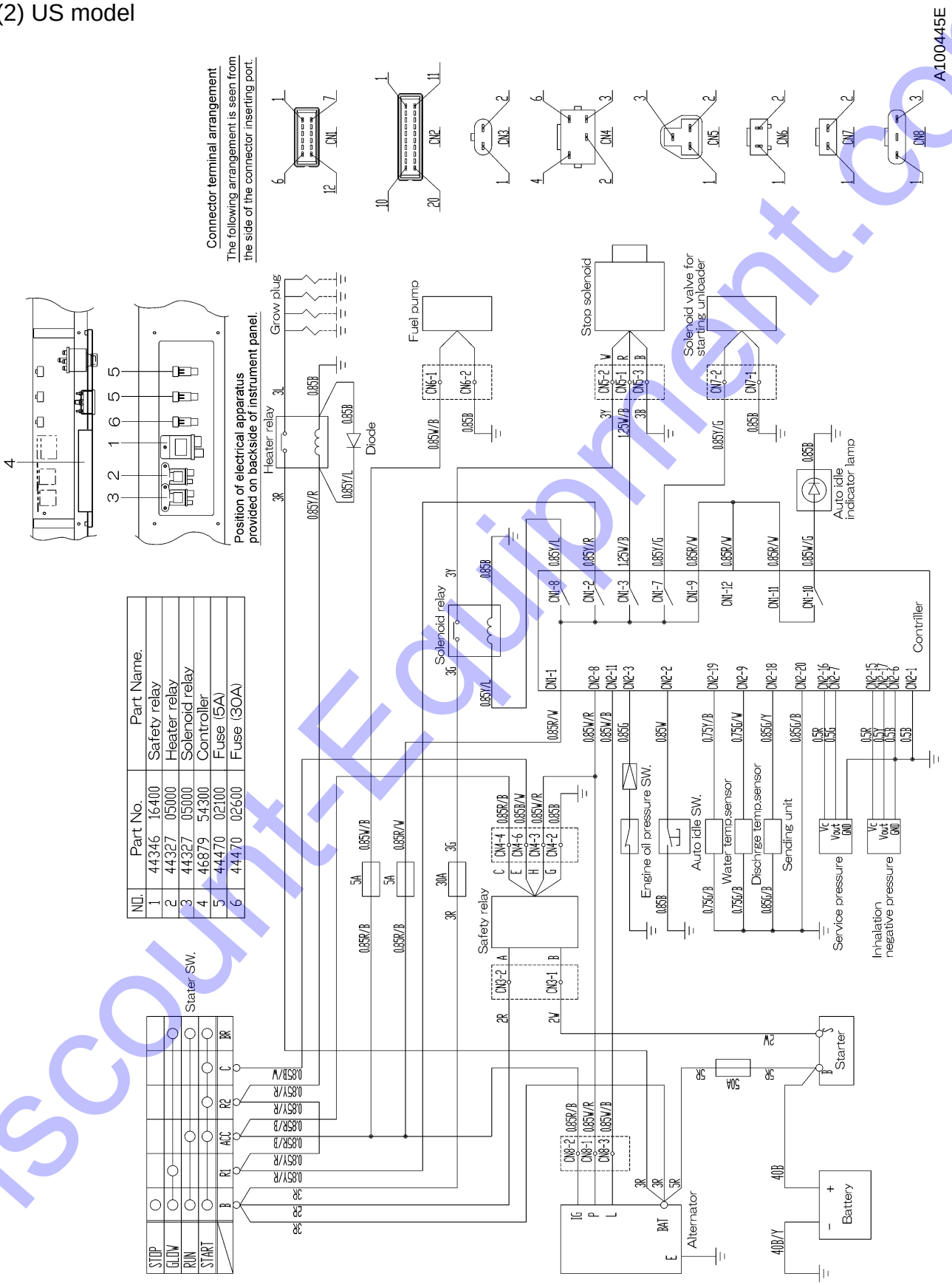
5. References

(2) US model



NO.	Part No.	Part Name.
1	44346 16400	Safety relay
2	44327 05000	Heater relay
3	44327 05000	Solenoid relay
4	46879 54300	Controller
5	44470 02100	Fuse (5A)
6	44470 02600	Fuse (30A)

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