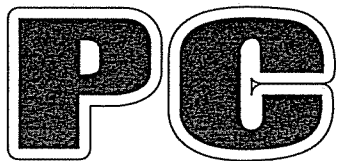


**AIRMAN**



**SERVICE MANUAL**

**SCREW COMPRESSOR**

**PDS185S-6C2**

# 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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| <p>Copies of this service manual are intended to be distributed to limited numbers of our customers. The unauthorized reproduction or distribution of this service manual is prohibited.</p> |
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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 <sup>3</sup> /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(°C)  | 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 <sup>-1</sup><br>(kW/min <sup>-1</sup> ) | 48.8/3,000(36.4/3,000)   |  |
| Rated output (Net)  | hp/min <sup>-1</sup><br>(kW/min <sup>-1</sup> ) | 46.8/3,000(34.9/3,000)   |  |
| Fuel consumption  | g/kW・h  | 258  |  |
| Rated RPM   | min <sup>-1</sup>                               | 3,000  |  |
| RPM at unload conditions  | min <sup>-1</sup>                               | 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<br>(including receiver tank and oil cooler<br>etc.) | gal.(L)   | 3.96(15)   |  |
| Compressor oil capacity to be filled  |   | Ambient temperature: 5°F to 104°F (-15°C to +40°C)                                       |  |
|   |   | SHELL : SHELL CORENA OIL RS32<br>MOBIL : MOBIL RARUS 424<br>NIPPON OIL CO.: FAIRCOL RA32 | HULS : ANDEROL 3032<br>MOBIL : RARUS SHC 1024<br>TEXACO: SYN-STAR DE32 |
| Coolant capacity  | gal.(L)   | 1.53(5.8)  |  |
| Fuel tank capacity  | gal.(L)   | 23.8(90)   |  |
| ●Fuel consumption ratio<br>(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)  |  |

# 1. Specification

## 1.2 Set Value

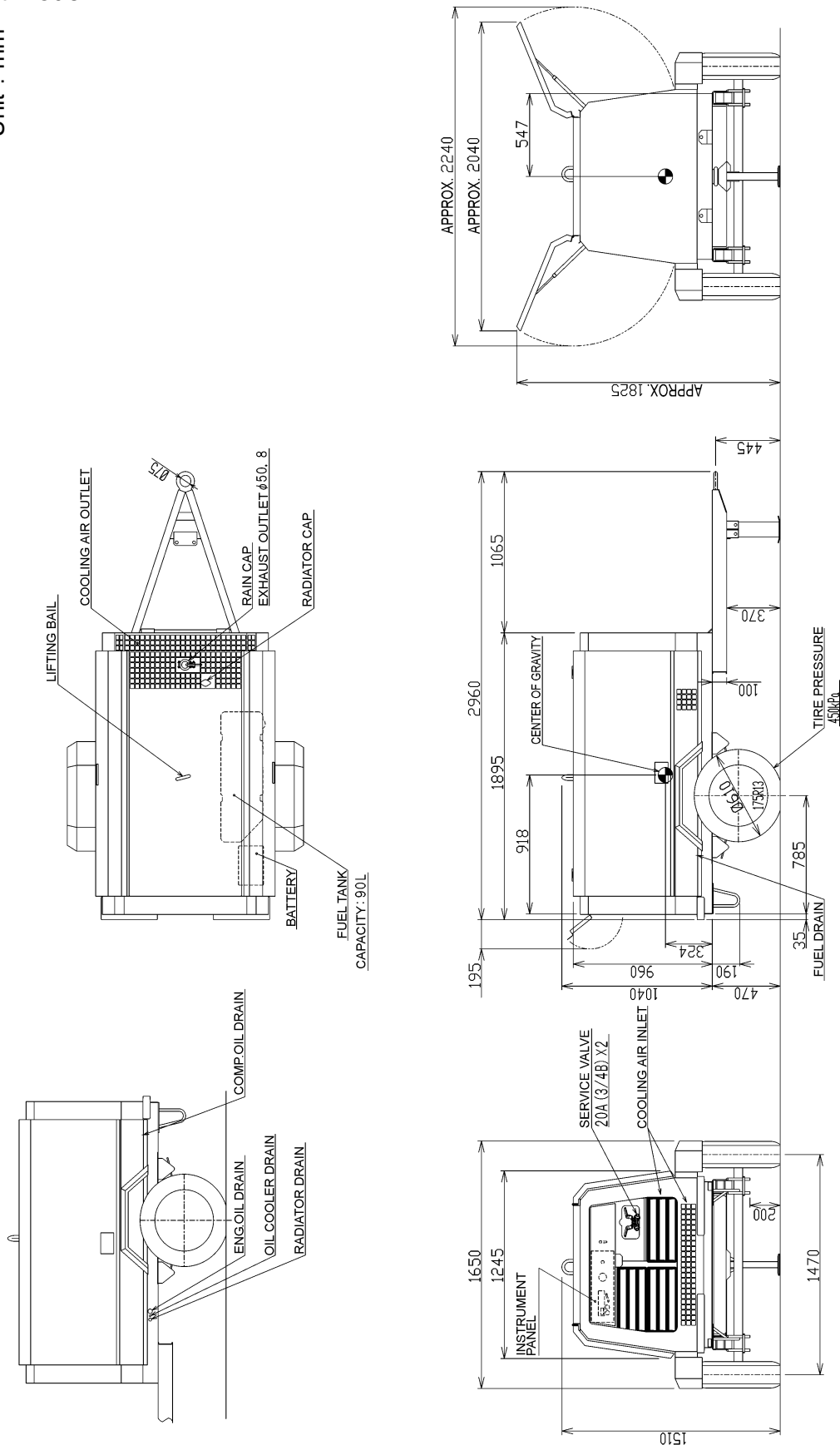
| Item   | unit              | PDS185S-6C2                           |          |
|--|-------------------|---------------------------------------|----------|
|  |                   | Export model                          | US model |
| ●Emergency stop devices  |                   |                                       |          |
| Actuating pressure of discharge air temperature switch               | °F(°C)            | 248(120)                              |          |
| Actuating temperature of water temperature switch                    | °F(°C)            | 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(°C)            | 239(115)                              |          |
| Actuating temperature of water temperature switch                    | °F(°C)            | 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<br>(Set at 10 sec. ex.works) |          |
| ●Engine RPM  |                   |                                       |          |
| Rated RPM  | min <sup>-1</sup> | 3,000                                 |          |
| RPM at unload  | min <sup>-1</sup> | 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]    |          |

# 1. Specification

## 1.3 Outline drawing

### (1) Export model

Unit : mm

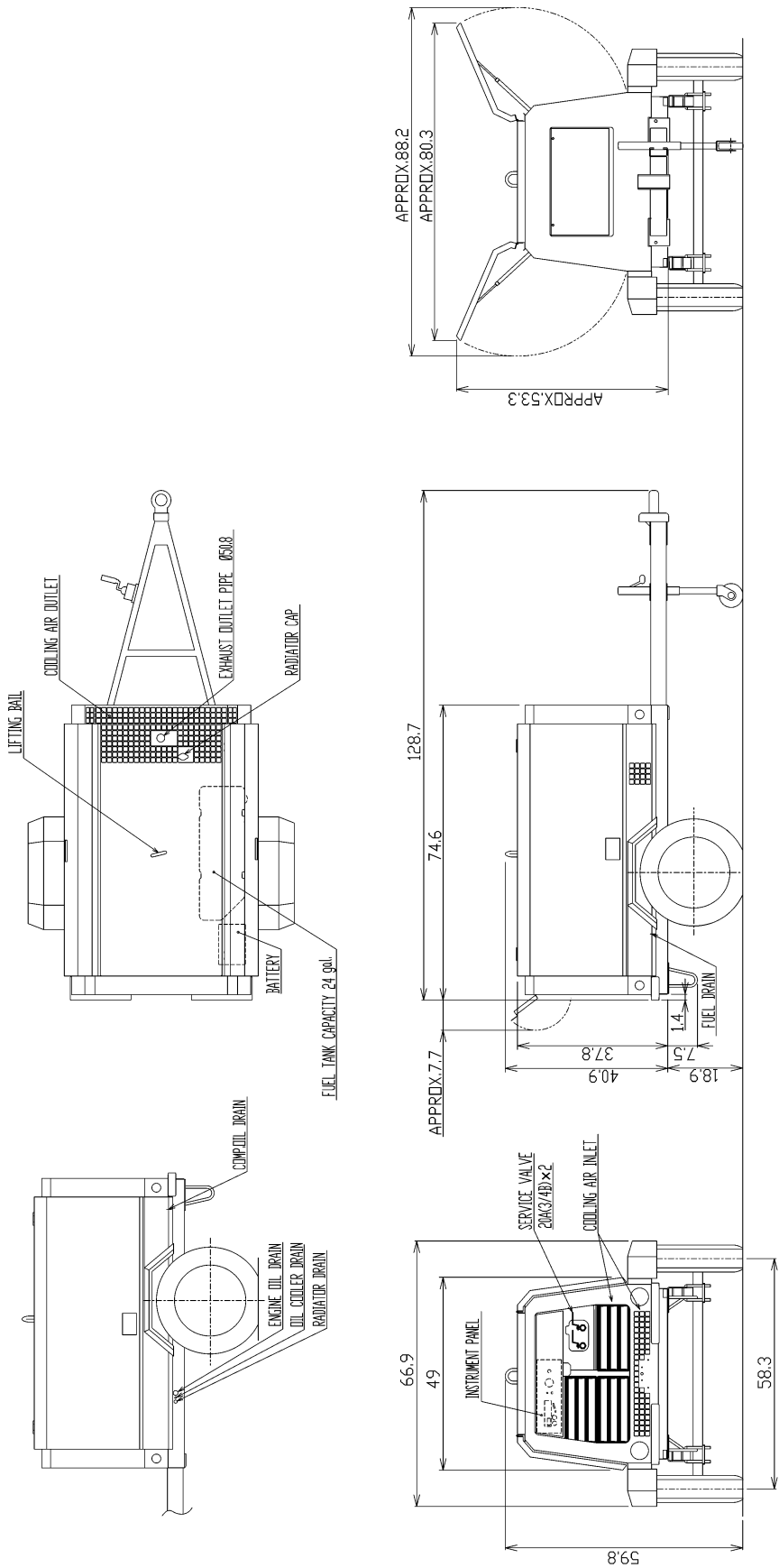


A100393E

# 1. Specification

(2) US model

Unit : in.

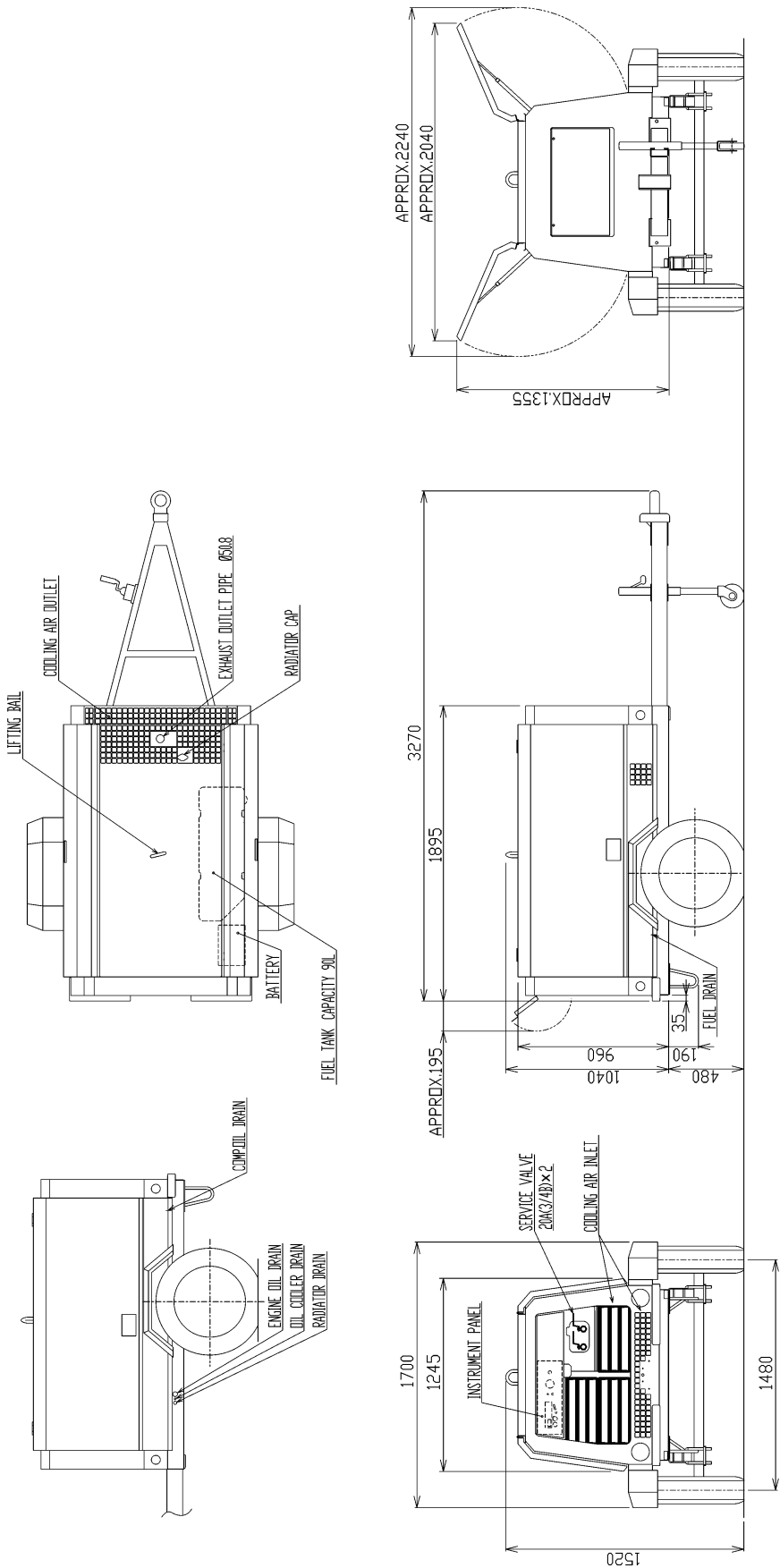


A100469

# 1. Specification

(3) US model

Unit : mm

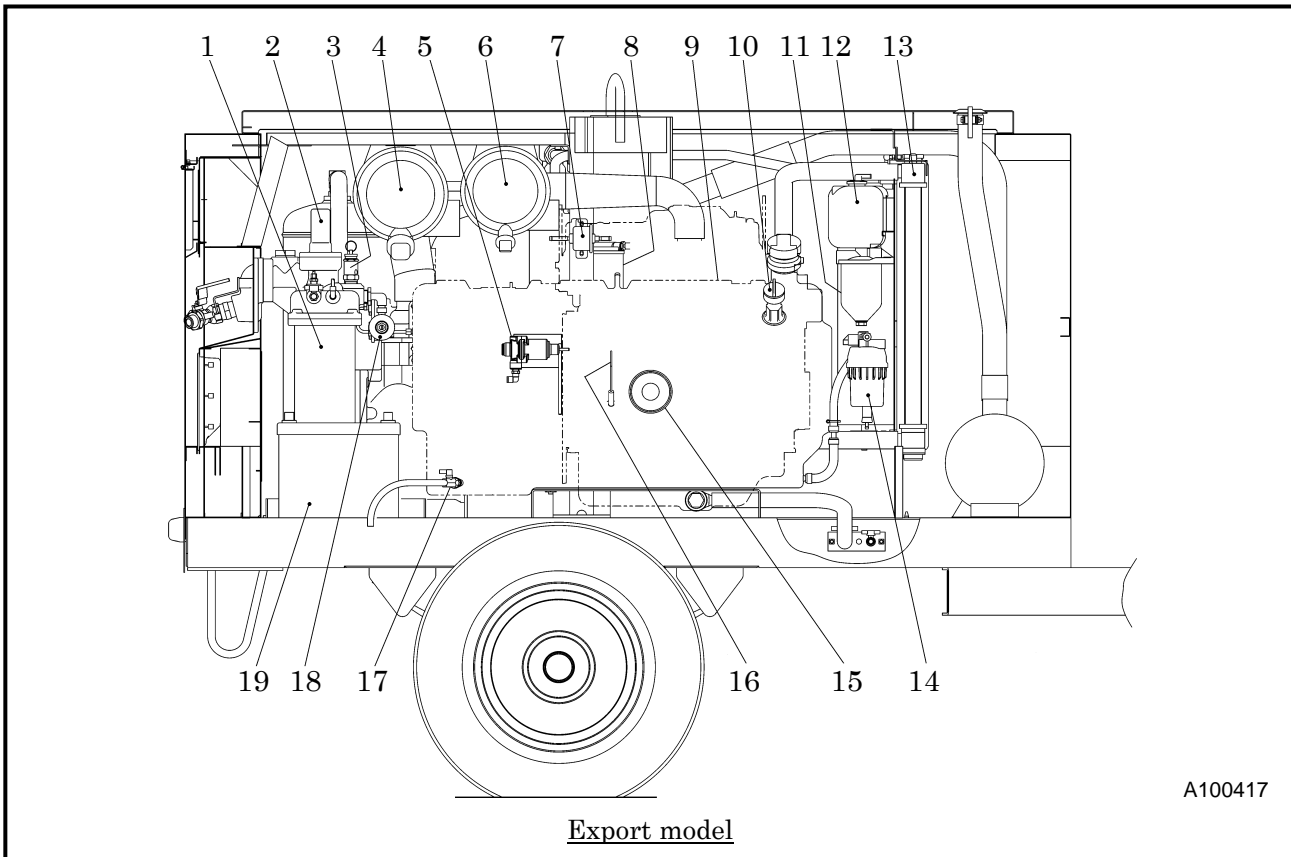


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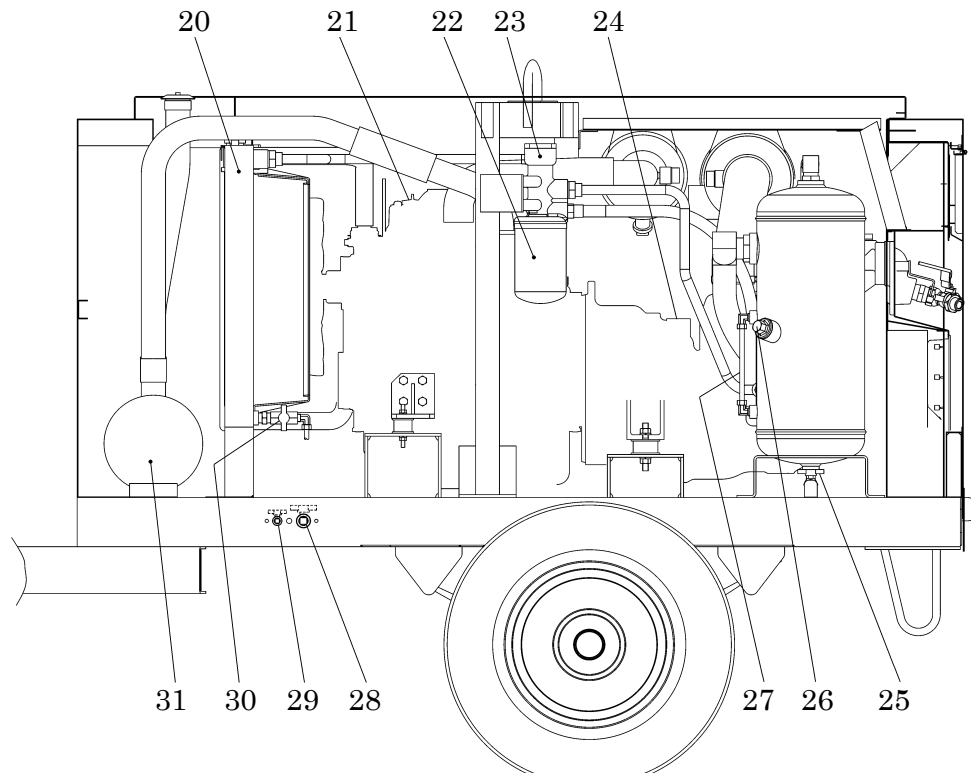
# 1. Specification

## 1.4 Internal Components and Part Names



| 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<br>(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<br>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.  |

# 1. Specification



A100418

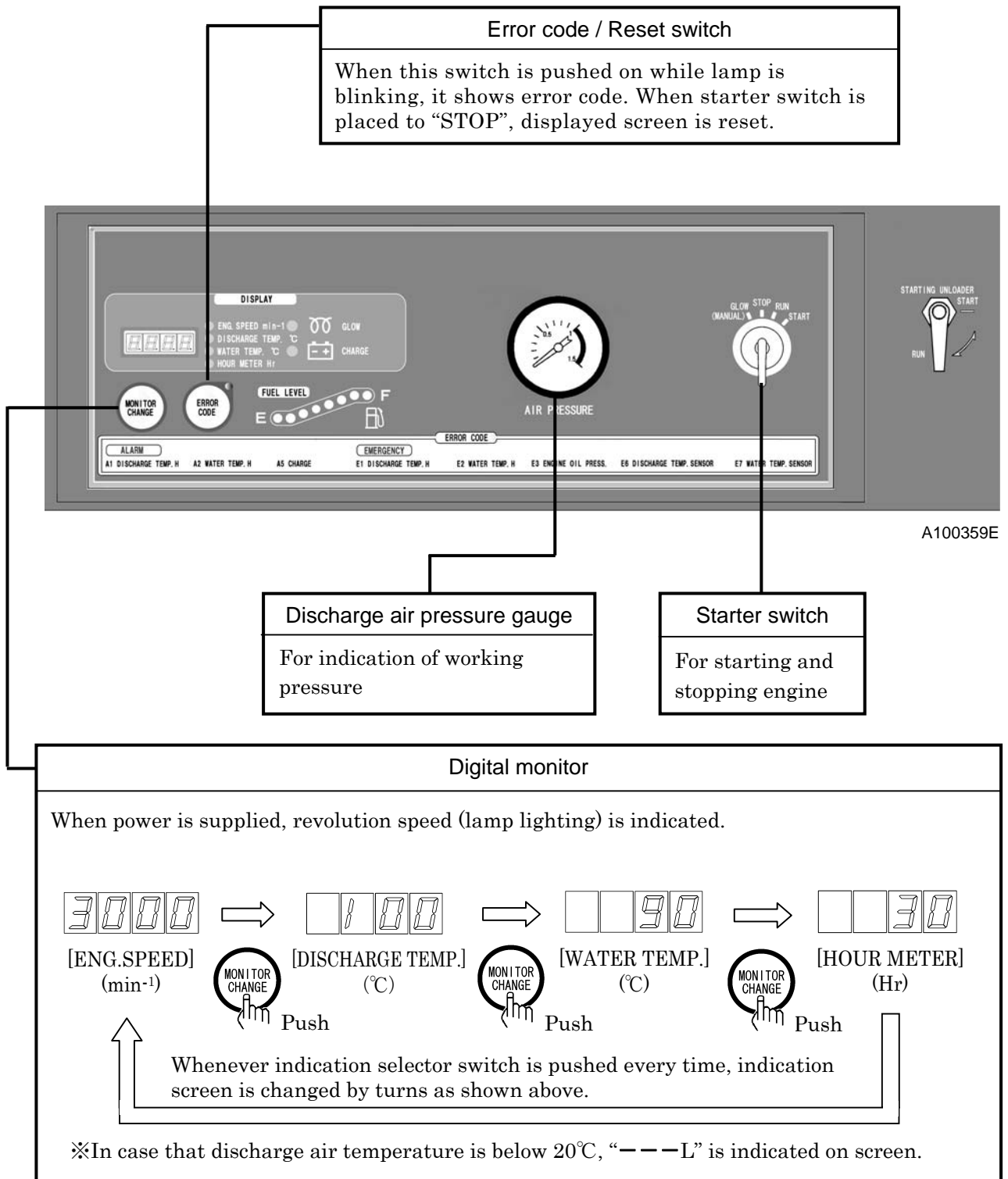
Export model

| 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.                              |

# 1. Specification

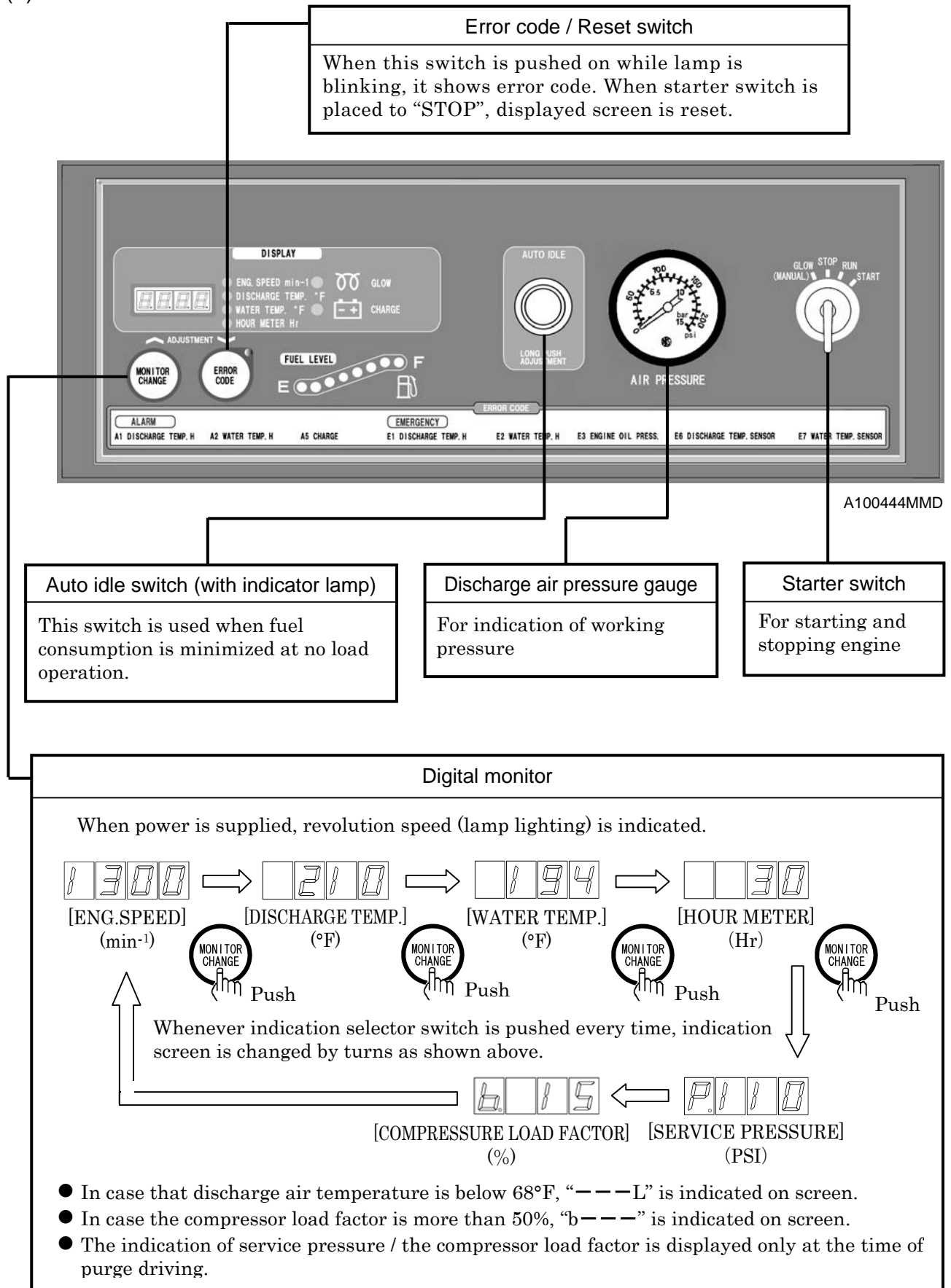
## 1.5 Instrument panel

### (1) Export model



# 1. Specification



## (2) US model



# 1. Specification

## 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.<br>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°C). | See “Troubleshooting” |
| WATER TEMP. H     | A2           | Lamp flickers when coolant temperature reaches 221°F (105°C).                              |                       |
| CHARGE            | A5           | Belt loosened and/or cut<br>Faulty generation of alternator                                |                       |

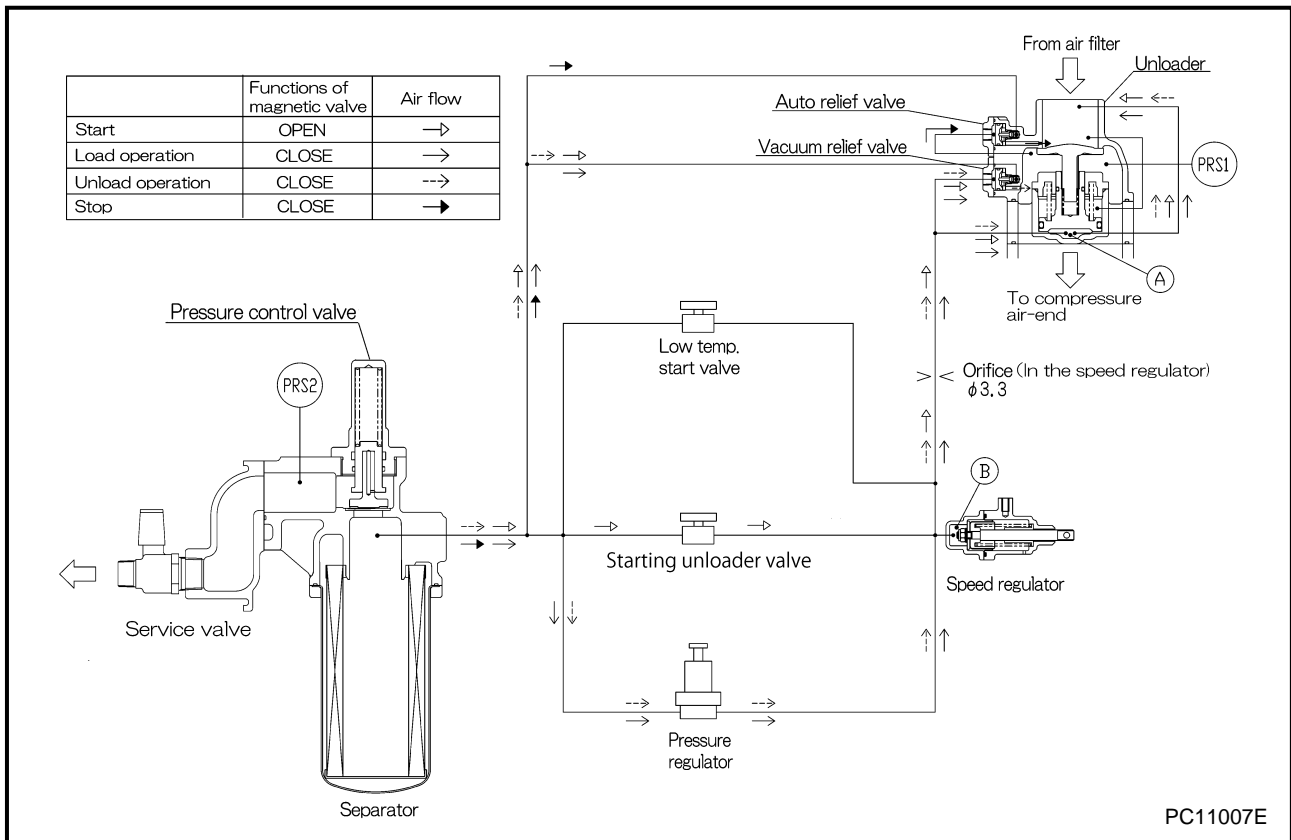
**[Emergency display]** When any trouble takes place during operation, this displays and it stops as an emergency stop.  
When any abnormality happens, a trouble code lamp flickers. In this time when trouble code switch is pressed, a failure code will be displayed.

| 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°C).            | See “Troubleshooting” |
| WATER TEMP. H         | E2           | Lamp displays when coolant temperature reaches 230°F (110°C).   |                       |
| 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.                               |                       |

# 1. Specification

## 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 (A) and speed regulator chamber (B). Thus pressure in chamber (A) and (B) 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 (A) and speed regulator chamber (B) 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.   |

(2) US model

# 1. Specification

| Step                                     | Response  |
|--|---|
| Start                                    | When starting operation, solenoid valve (SV1) opens. And compressed air is sent to unloader chamber (A) and speed regulator chamber (B). Accordingly, the pressure in the chamber (A) and (B) 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 (A) and (B) 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<br>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<br>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.   |



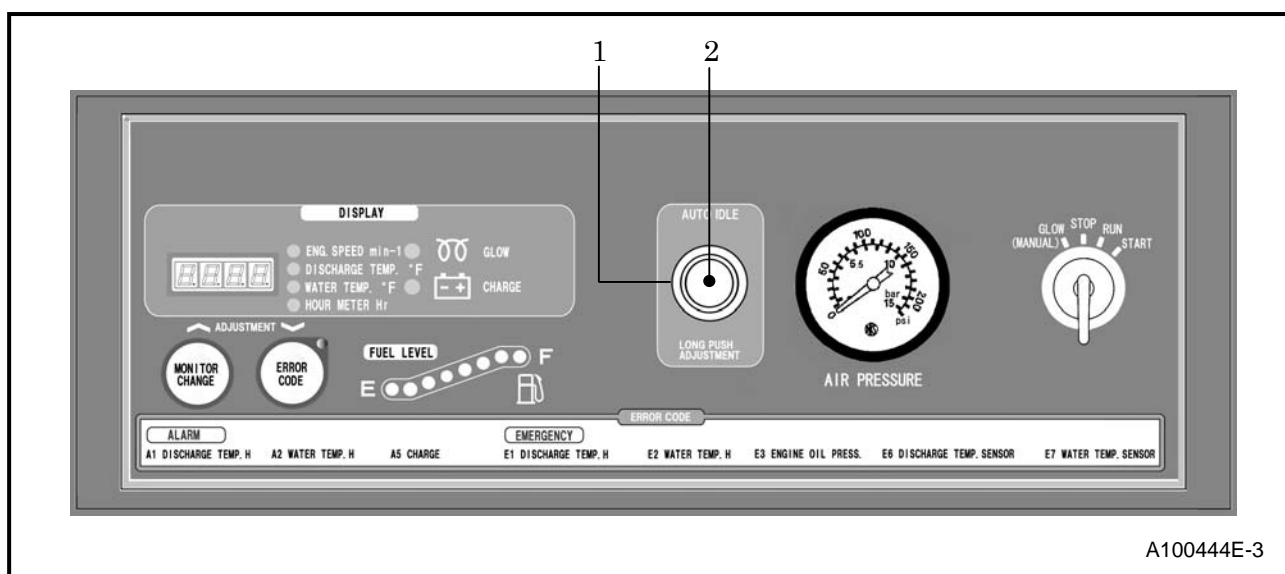
# 1. Specification

## 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.






### 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.                      |

# 1. Specification

## 1.6.2 Setting of “AUTO IDLE” control (purge control) pressure/timer

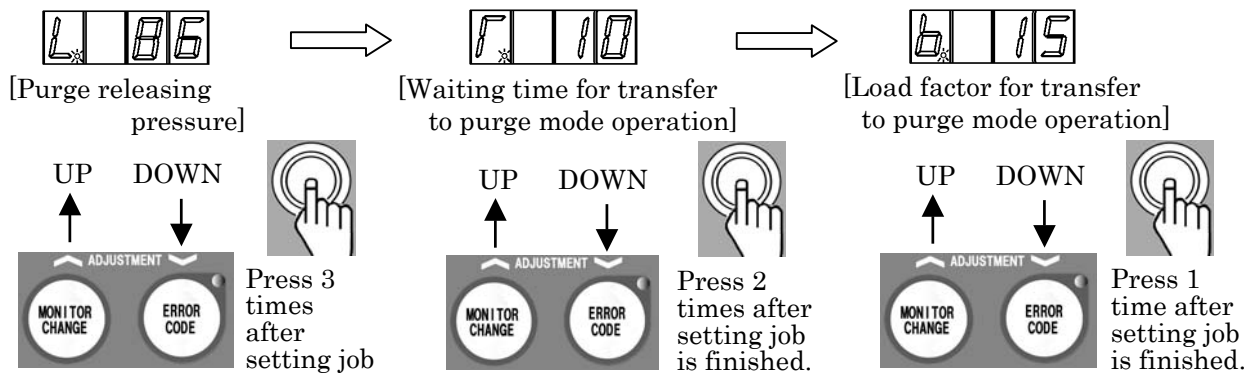
- How to change set value of auto idle pressure/ timer is shown below.

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

### <Procedures of adjustment>

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

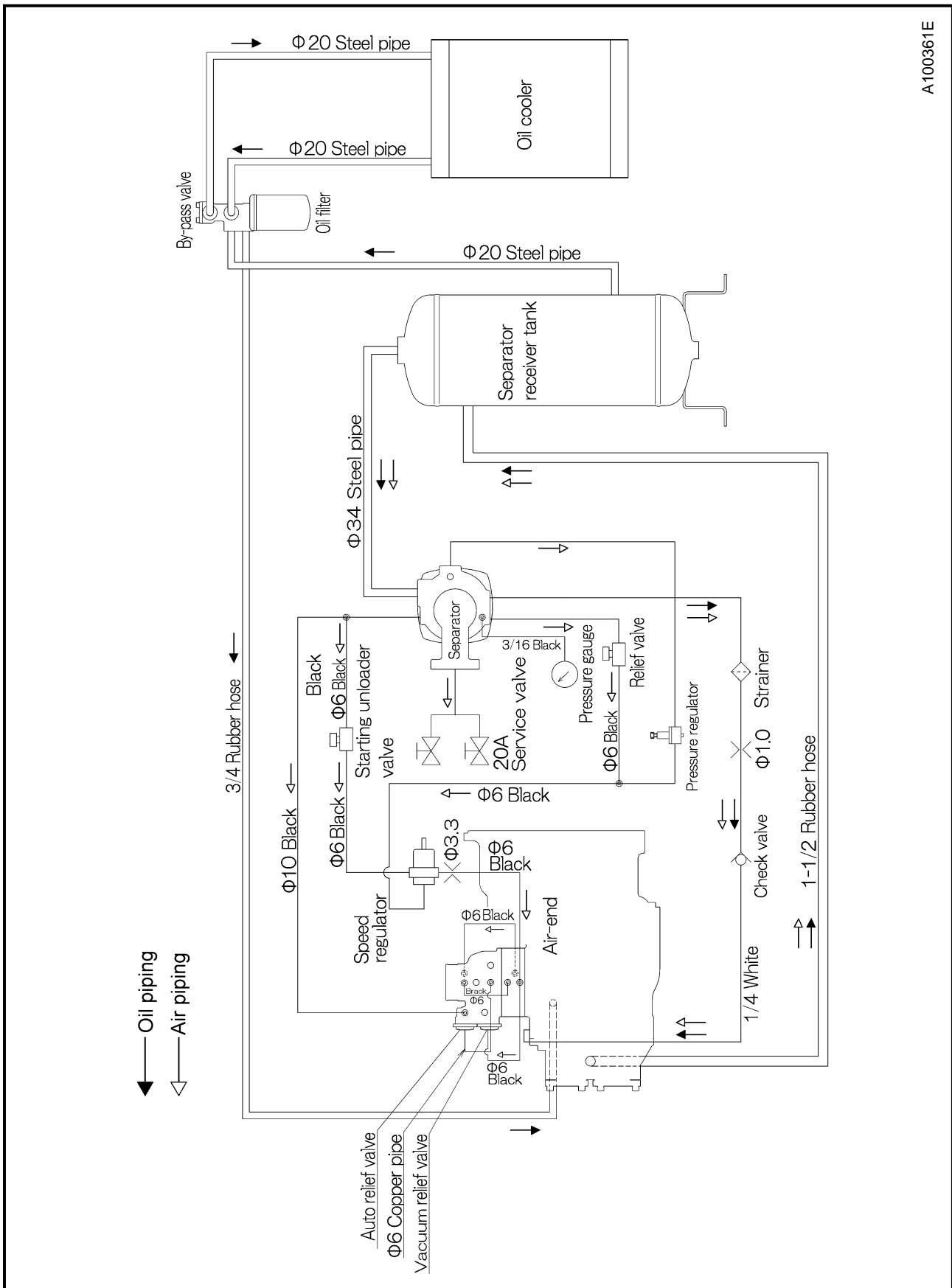
Each time auto-idle switch is pressed, each indication will be selected. Then each time it is pressed one time, T.(Waiting time for transfer to purge mode operation) is switched to b.(Load factor for transfer to purge mode operation),according to the set orders.



## 1. Specification

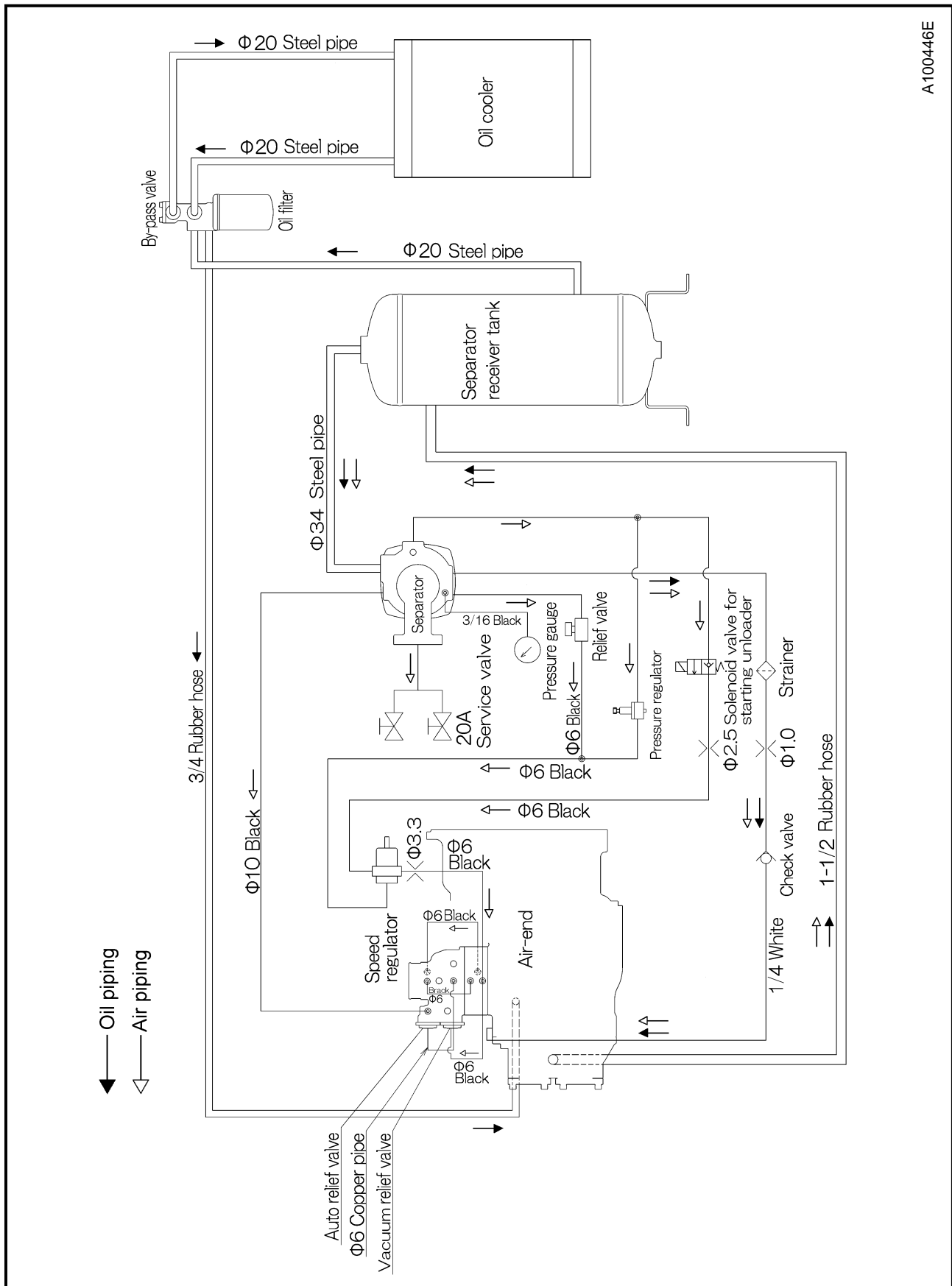
## 1.7 Piping Diagram

### (1) Export model



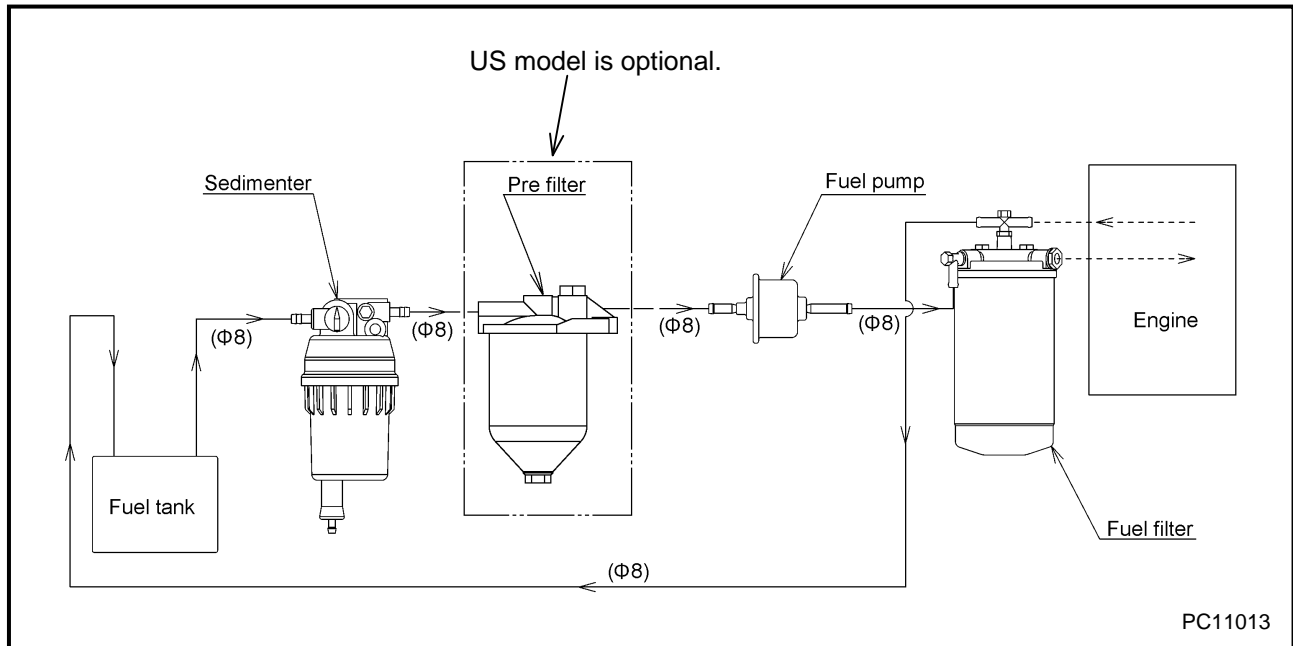
# 1. Specification

## (2) US model



# 1. Specification

## 1.8 Fuel piping



## 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

① Measuring instruments (e. g. tester, insulation resistance gauge etc.)

② Tools

③ Torque wrenches

④ Jigs and specialized tools

⑤ Sealing tape

⑥ Molybdenum sulfide (tube type)

⑦ Lithium extreme pressure type grease

- CALTEX MULTIFAK EP1

- MULTINOC SDX

⑧ Diesel oil

⑨ Compressor oil

⑩ Cleaning cloths

⑪ Literatures (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.

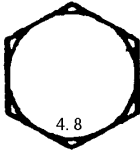
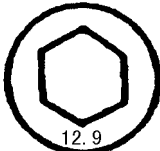

(13) Before starting the machine after disassembly, run it at low idle to check for unusual noises, etc. to prevent engine or generator damage.

## 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<br><br>Strength and<br>sorting<br><br>Width of<br>across flat<br>Tightening<br>torque<br><br>Bolt diameter<br>in. (mm) | Low or Middle carbon steel bolt<br>(SS400B etc...)   |  | High tensile strength bolt<br>(SCM435 etc...)  |  |  |
|---|--|--|--|--|--|
|   | 4.6~6.8 (4T~6T)  |  | 8.8~12.9 (7T~12T)  |  |  |
|   | <br>Hexagon bolts |  | <br>Socket bolts | <br>Hexagon bolts |  |
|   | Hexagon bolts<br>Width of across<br>flat in. (mm)  | Tightening<br>torque<br>lbf·in.(N·m)<br>[kgf·cm] | Socket bolts<br>Width of across<br>flat in.(mm)  | Hexagon bolts<br>Width of across<br>flat in.(mm)   | Tightening<br>torque<br>lbf·in.(N·m)<br>[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<br>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. Maintenance

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

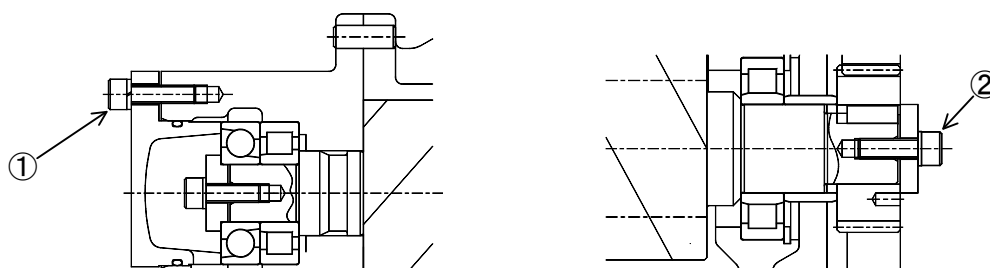
※3 Nut shall be of S45C ( equivalent to 8.8 of strength classification ).



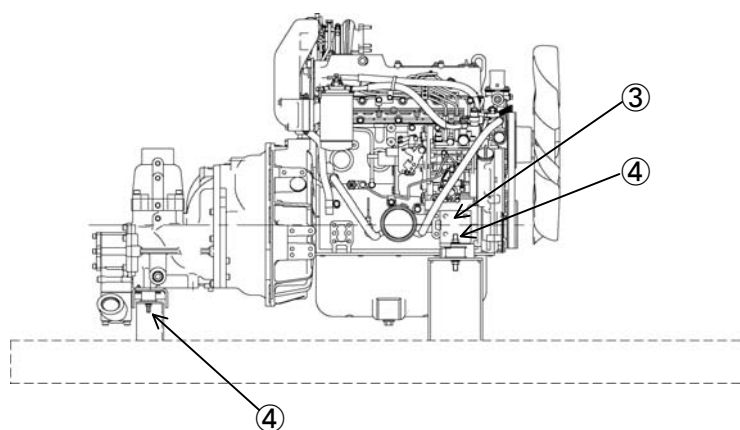
## 2. Maintenance

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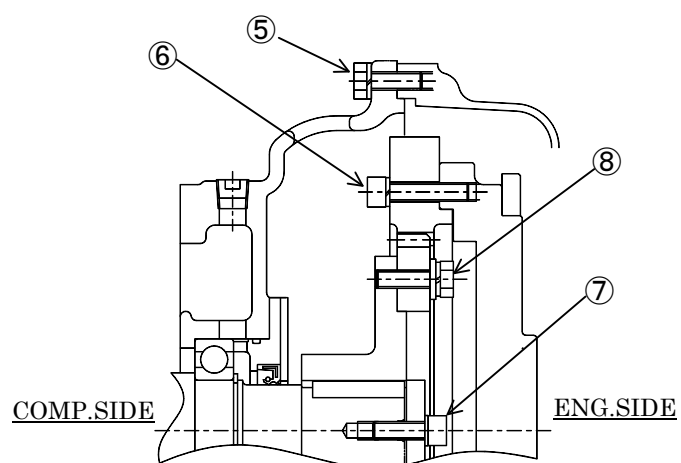
### 1 Air end



### 2 Mounting



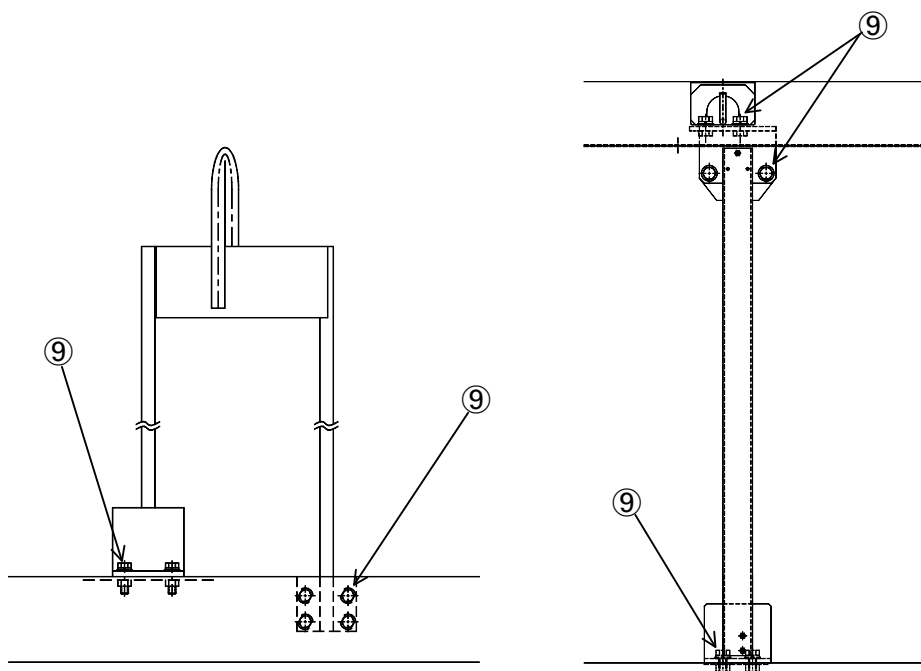
### 3 Coupling portion between comp. air end and engine



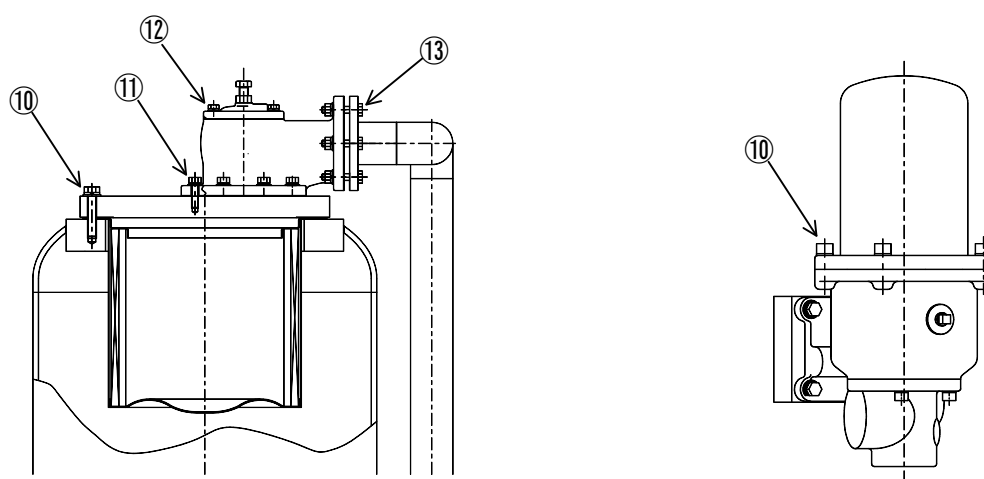
## 2. Maintenance

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### 4 Lifting portion

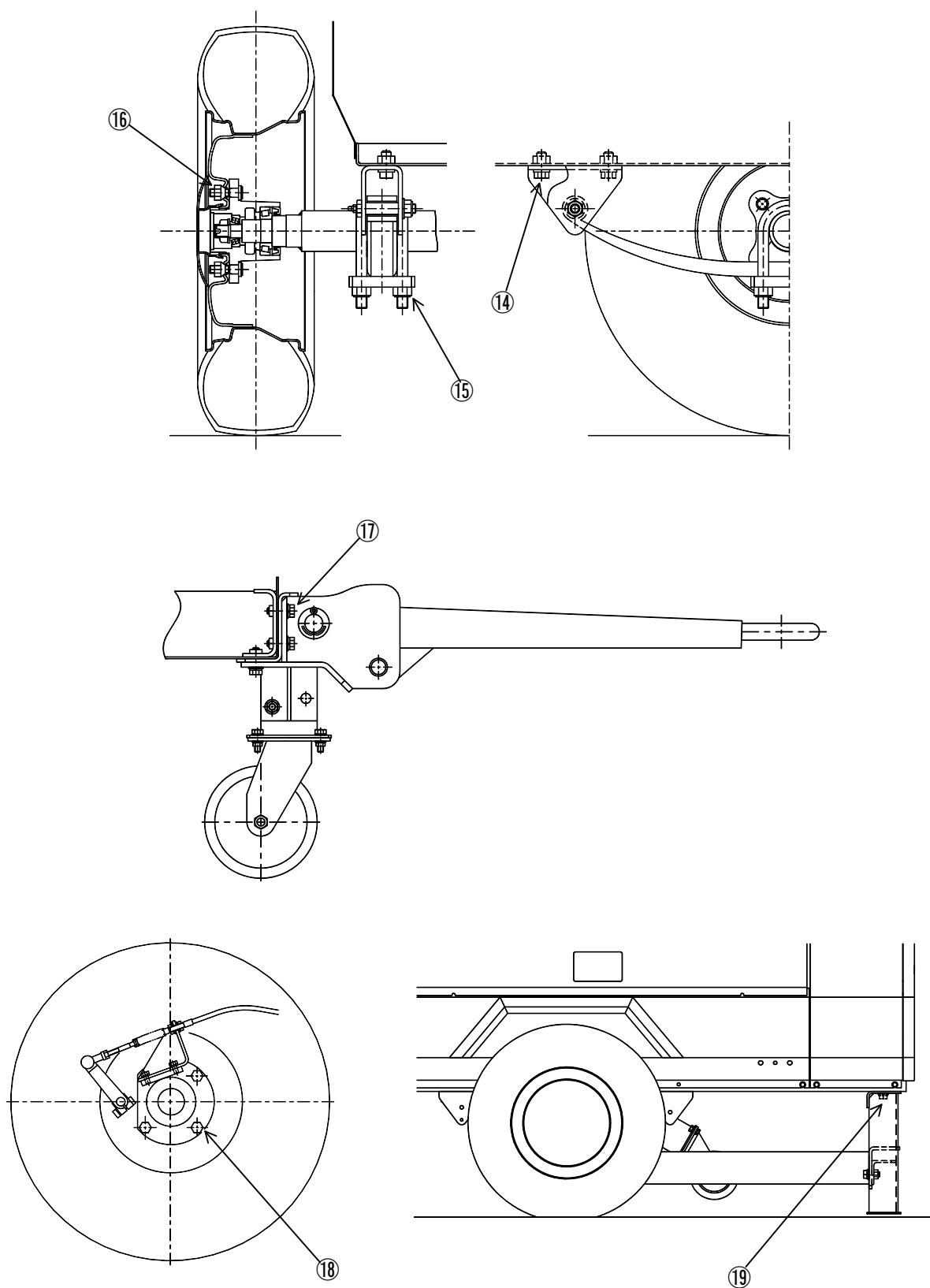


### 5 Pressure vessel and pipes



## 2. Maintenance

### 6 Undercarriage



## 2. Maintenance

### 2.3 How to adjust regulator and how to replace diaphragm

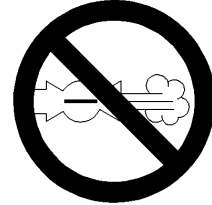
#### 2.3.1 Method of adjustment



**CAUTION**

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

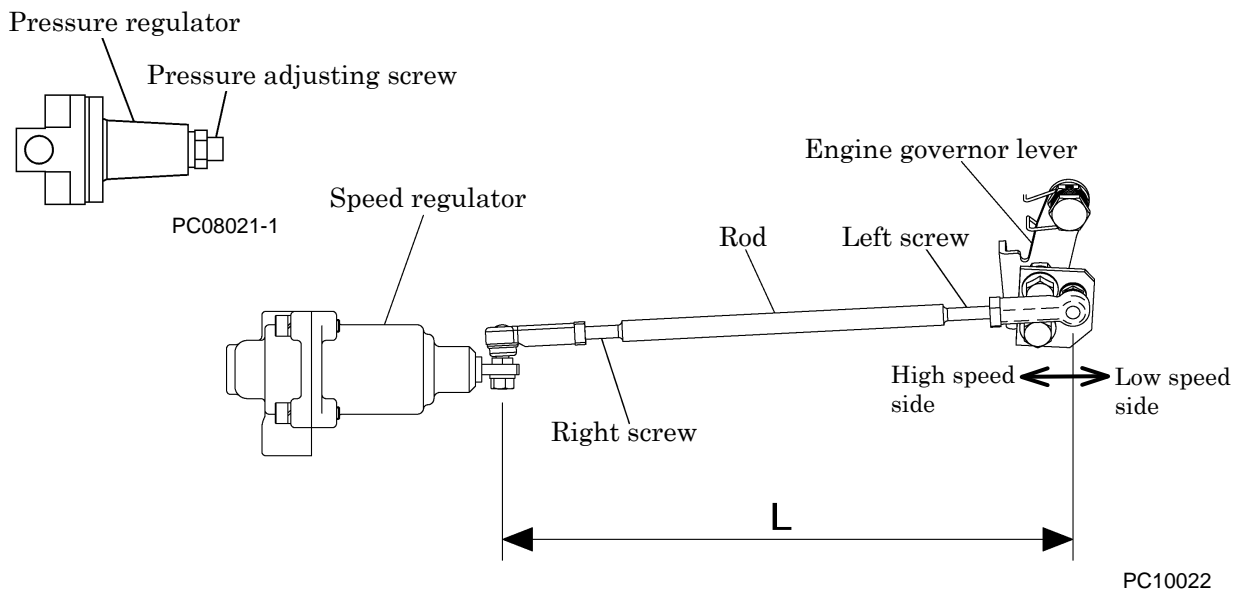
- When adjusting regulator system, install a silencer to the air delivery port and wear earplugs for protection of hearing damage.



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 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.)

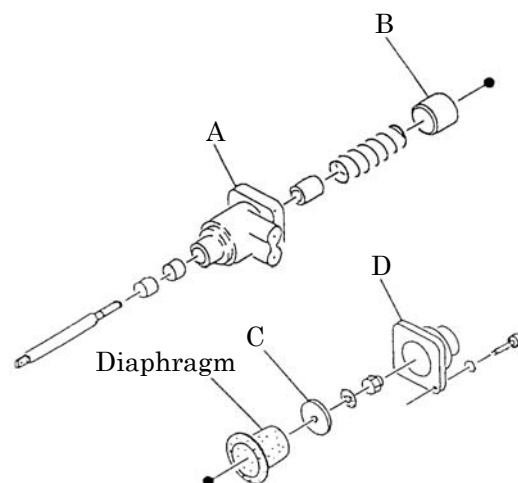
## 2. Maintenance

### 2.3.2 Change diaphragm

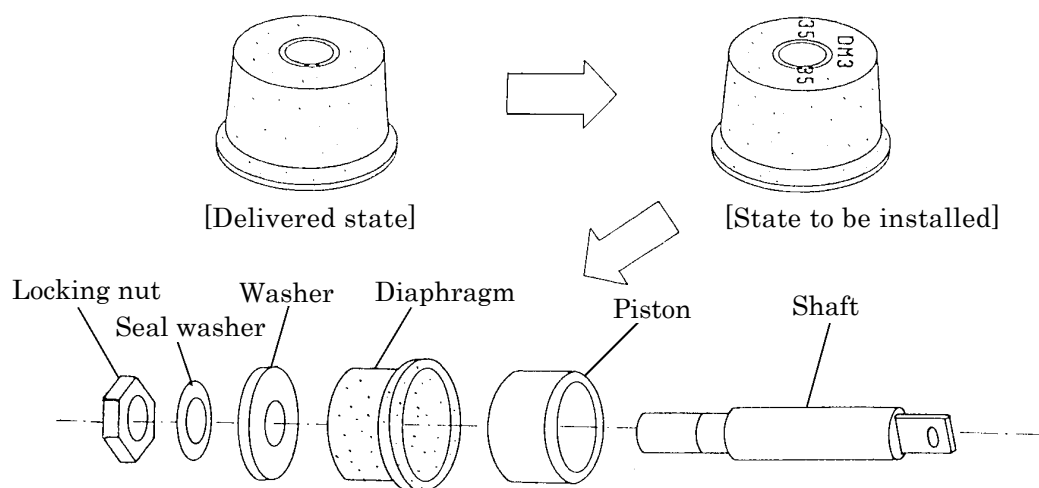
#### Speed regulator (Bellophragm type)

##### <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.



PC06037

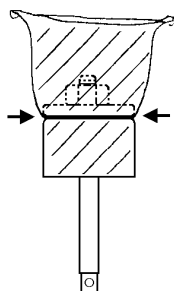


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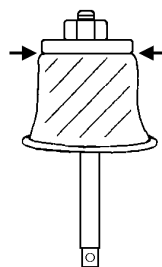
- ⑤ Internal face of body and cap and also both internal face and external face of diaphragm should be coated with molybdenum sulfide spray.

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

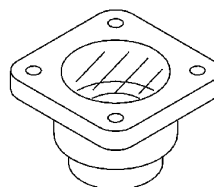
Diaphragm should be rolled up and back face and piston should be sprayed.



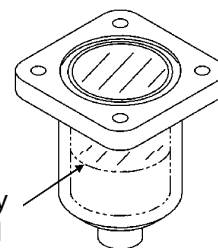
Then it should be returned and be sprayed.



Inside of body should be sprayed.



Inside face of body should be sprayed till middle line.



※ Jointed portion should be sprayed enough.

PC11037-1

## 2. Maintenance

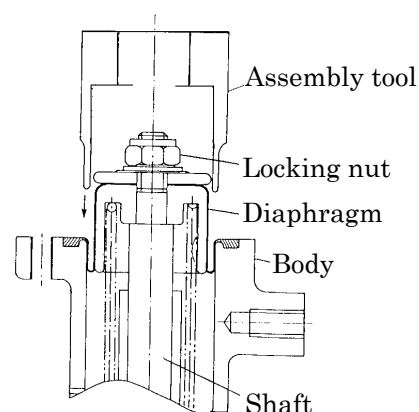
- ⑥ Install diaphragm to shaft and piston and fasten it with a locking nut.

Tightening torque :  $70.8 \text{bf} \cdot \text{in.} (8 \text{N} \cdot \text{m}) [80 \text{kgf} \cdot \text{cm}]$

**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.

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

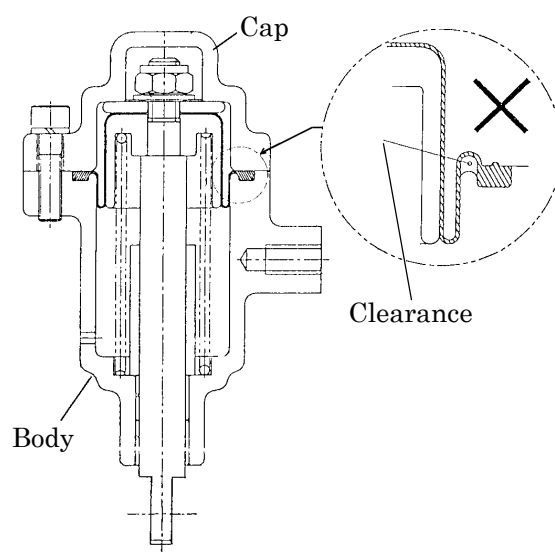
**Important** : Once diaphragm is settled in, turn slowly the tool for secure installation. When turning the tool, hold the diaphragm not to be afloat.



- ⑧ After 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.



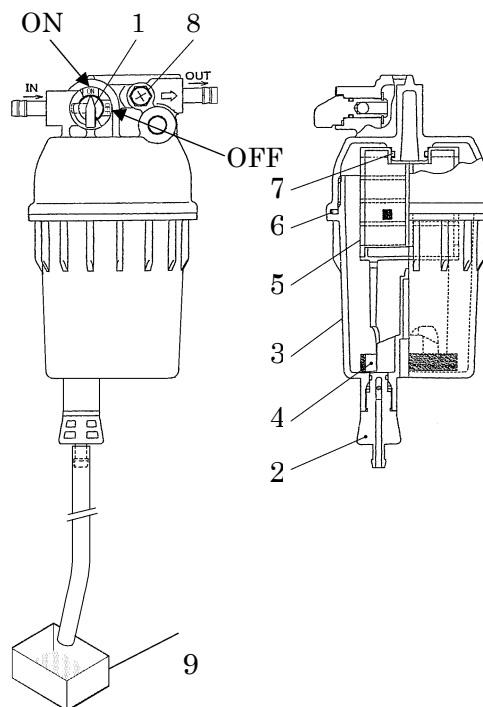
- ⑨ After re-assembling the speed regulator, adjust it according to the adjustment method of speed regulator (See 2.3.1)

## 2. Maintenance

### 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.

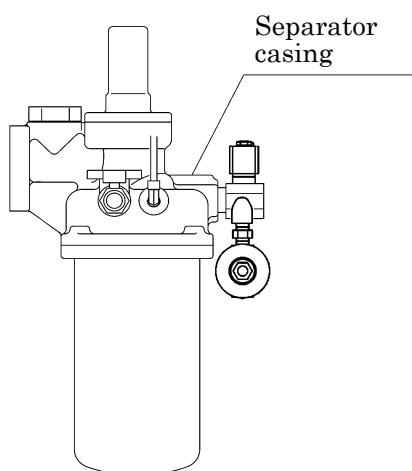


A100117

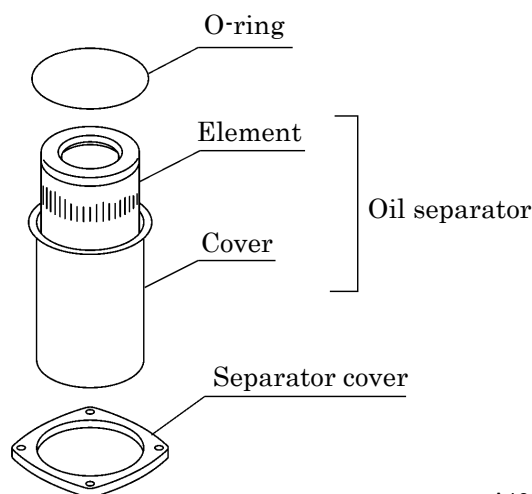
### 2.5 Change Oil Separator

#### 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.



A100463-1



A100371

[Tightening torque of separator cover bolt]

: 0.31 in. (8 mm)

: 433.6lbf·in.(49N·m)[485kgf·cm]

## 2. Maintenance

## 2.6 Change O-Ring of Unloader

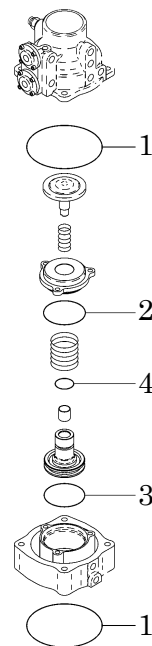
### <Caution during O-ring replacement>

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.



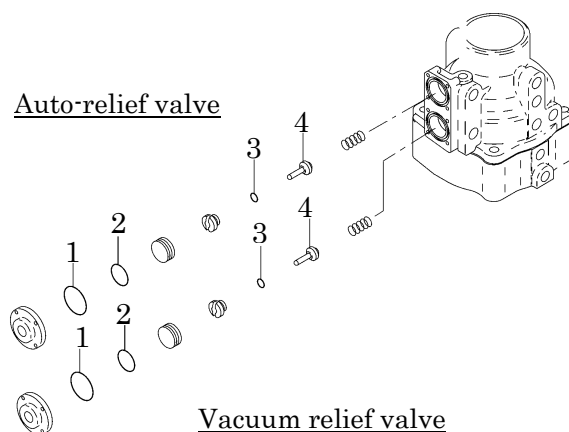
A070337

## 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



## 2. Maintenance

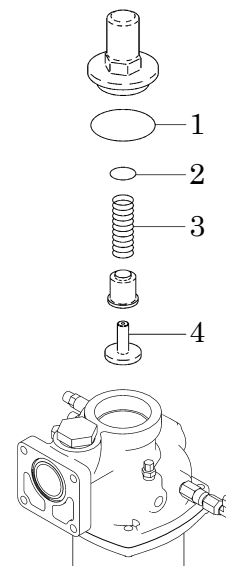
### 2.8 Performance check of Pressure control valve

#### 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.

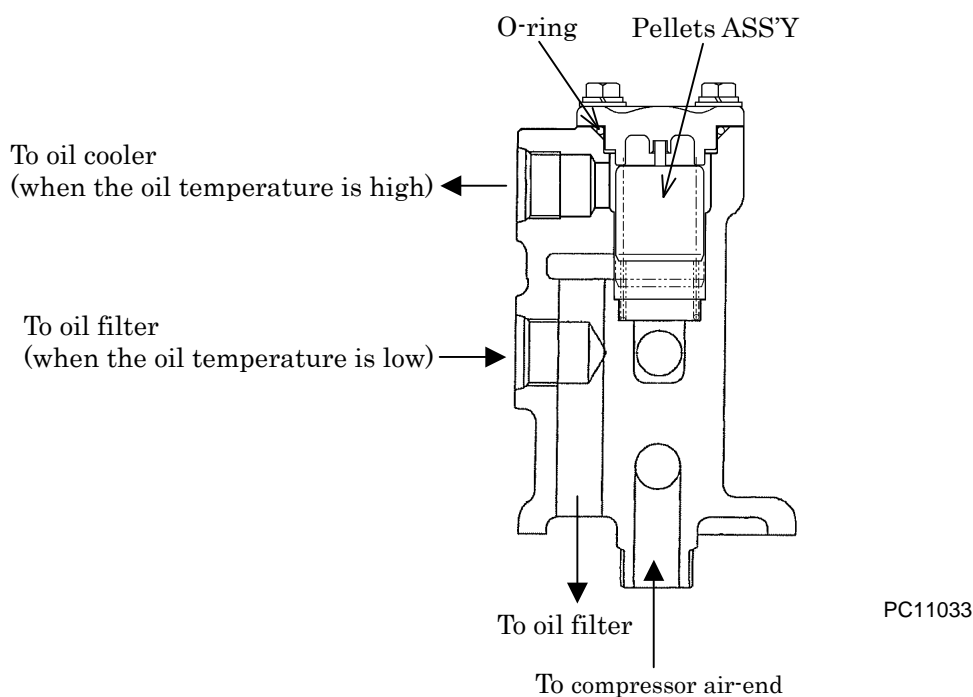
## 2. Maintenance

### 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.)



| Actuating temperature                                       | By-pass valve fully closing temperature                     |
|---|---|
| $180 \pm 37^{\circ}\text{F}$ ( $82 \pm 3^{\circ}\text{C}$ ) | $192 \pm 36^{\circ}\text{F}$ ( $89 \pm 2^{\circ}\text{C}$ ) |

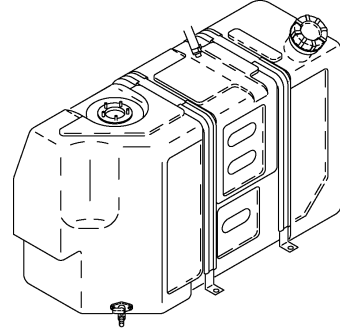
## 2. Maintenance

### 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.<br>(N·m)<br>[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(°C)                       | 160±34.7 (71±1.5)                             |  |
|                                 | Full open temperature            | °F(°C)                       | 185 (85)                                      |  |
|                                 | Valve lift                       | in.(mm)                      | More than 0.31 (8.0)                          |  |

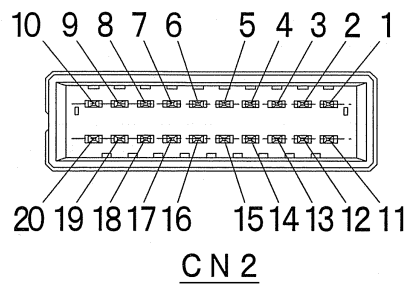
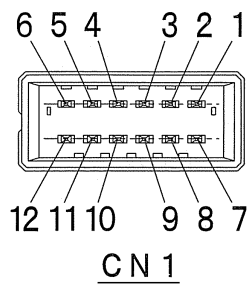
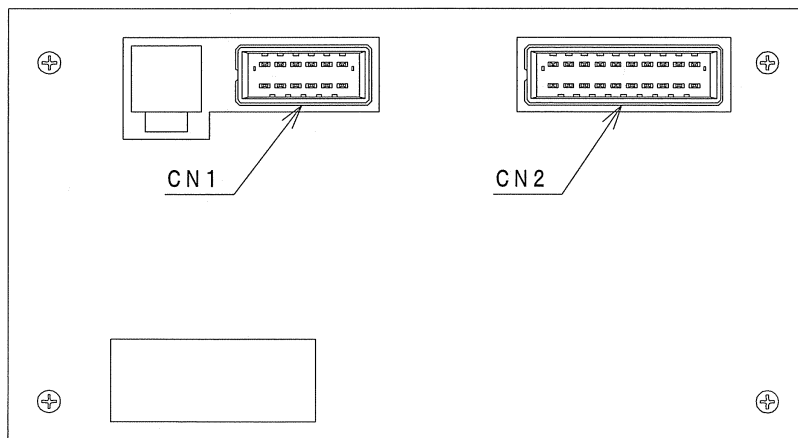
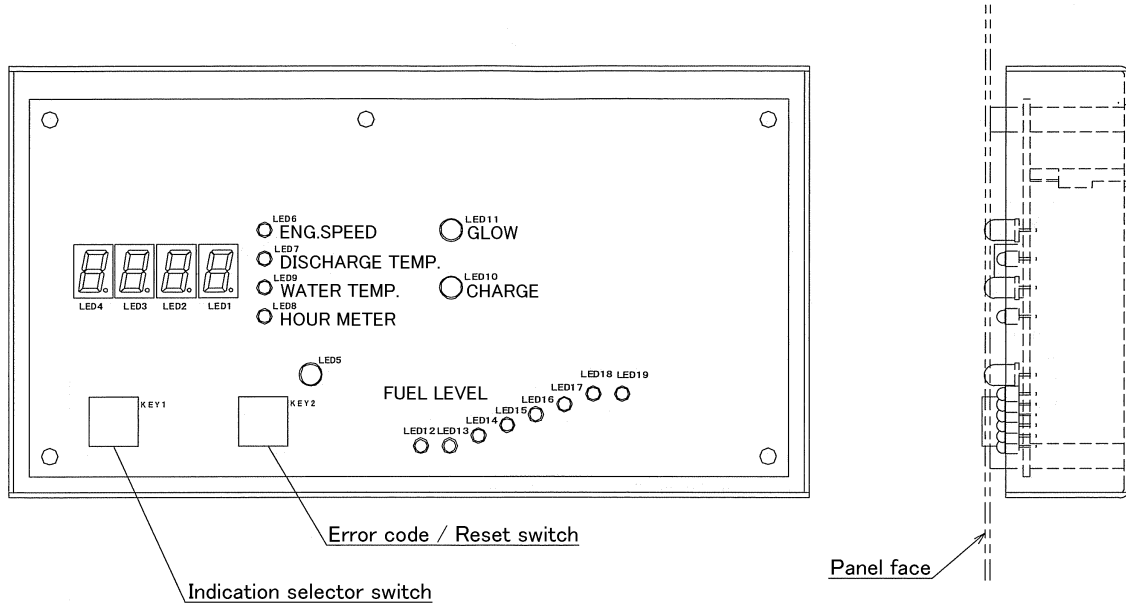
※For the details, see service manual supplied by engine manufacturer.

# 3. Electric System

## 3.1 Control

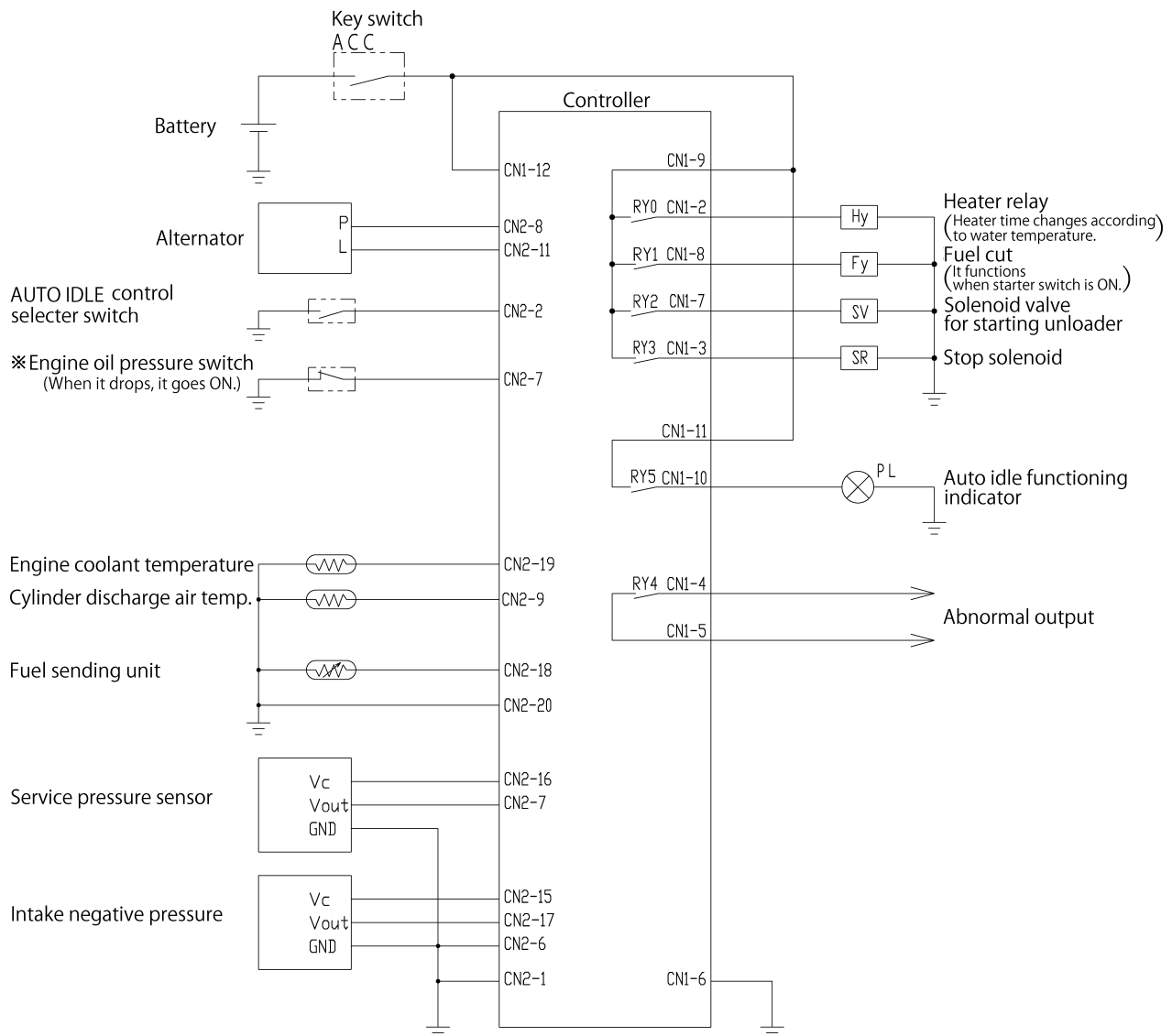
Part number: 46870 51901 (Export model)

Part number: 46870 54000 (US model)



# 3. Electric System

## 1.Exterior connection drawing

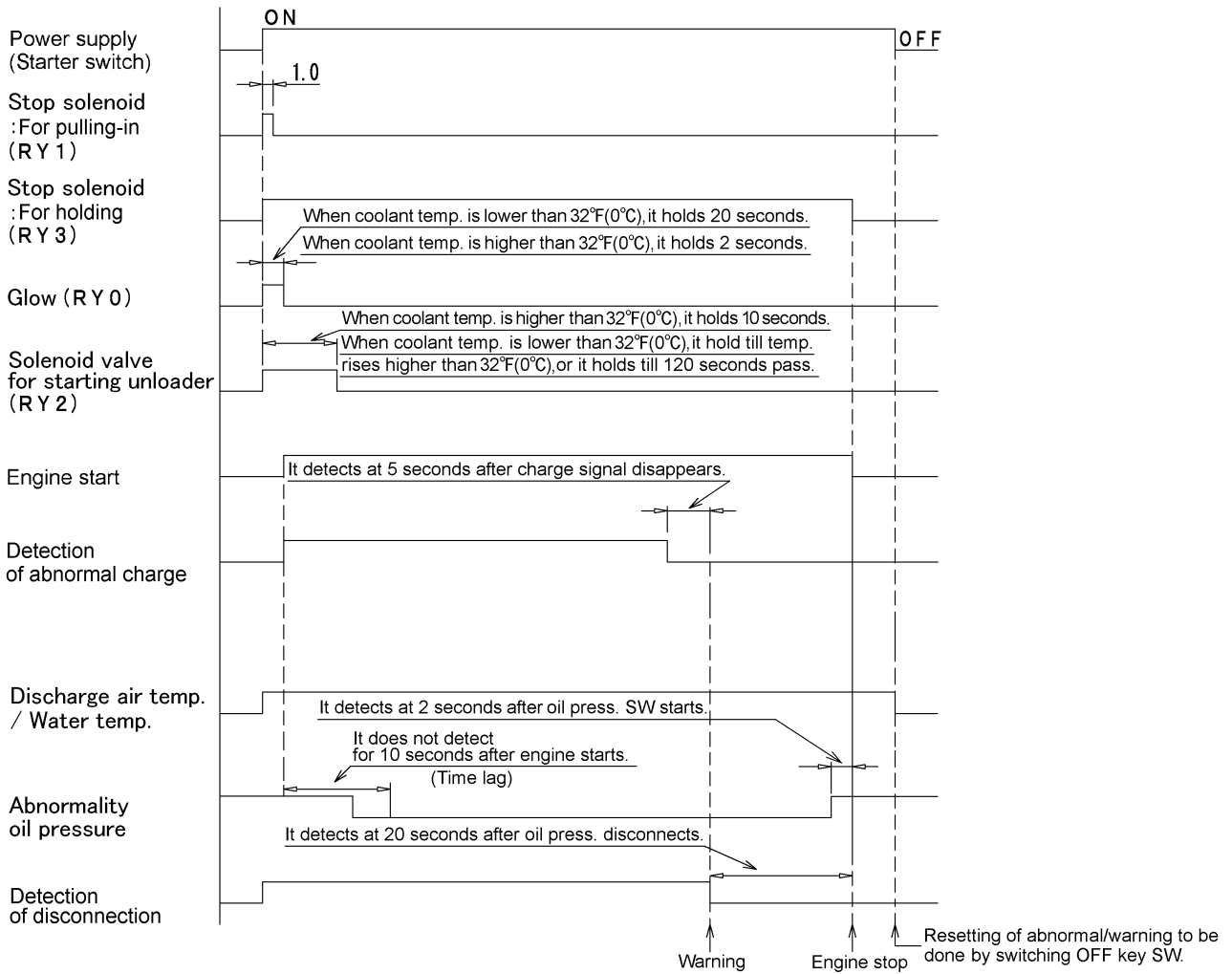


PC11009E-1

※ : 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.)

# 3. Electric System

## 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°C)  | Always                         | 1.0 sec  |
|           | Water temp. H          | A-2       | Thermister  | —         | Lamp goes on at 221°F (105°C)  | 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°C)  | Always                         | 1.0 sec  |
|           | Water temp. H          | E-2       | Thermister  | —         | Lamp goes on at 230°F (110°C)  | 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.

### 3. Electric System

#### 4. Functions of each output relay

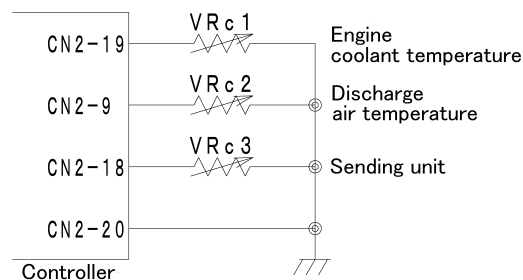
| Mark | Name                                 | Remark   |  |
|------|--------------------------------------|--|--|
| RY0  | Relay for heater relay               | It goes ON when starter SW is ON.              | When coolant temp. is lower than 32°F(0°C), it becomes OFF 20 seconds later.<br>When coolant temp. is higher than 32°F(0°C), 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°C), or when 120 seconds pass, it becomes OFF.<br>When coolant temp. is higher than 32°F(0°C), 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<br>...Blinks every 0.5 seconds<br>During purge operation<br>...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: 1.0k $\Omega$ ) 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 |      | Resistance ( $\Omega$ ) |
|--------------------------------|-----------|-----------------|------|-------------------------|
|                                |           | (°C)            | (°F) |                         |
| Engine coolant VRc1            | Warning   | 105             | 221  | $640 \pm 15$            |
|                                | Emergency | 110             | 230  | $560 \pm 15$            |
| Discharge air temperature VRc2 | Warning   | 115             | 239  | $491 \pm 15$            |
|                                | Emergency | 120             | 248  | $432 \pm 15$            |

- (3) Sending unit

| Float position | Resistance ( $\Omega$ ) |
|----------------|-------------------------|
| F              | $3.0 \pm 2.0$           |
| 1/2            | 32.5                    |
| E              | $110.0 \pm 7.0$         |

### 3. Electric System

#### 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.<br>2 seconds later [when coolant temp. is lower than 32°F (0°C), 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 | <b>For holding stop solenoid</b><br>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.<br>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                        |  |



### 3. Electric System

|    |     |  |   |
|----|-----|--|---|
| 7  | Y/G | Purge/starting unloader solenoid valve (US model only) | <p>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.</p> <p>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°C) when it is lower than 32°F (0°C) 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.</p> <p>●Functions during AUTO IDLE (purge control) operation</p> <p>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.</p> <p>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.</p> |
| 8  | Y/L | Solenoid relay   | <p><b>For pulling stop solenoid</b></p> <p>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.</p>  |
| 9  | R/W | CN1-12   | Common  |
| 10 | W/G | Auto idle function indicator (US model only)           | <p>No electrical connection found.</p> <p>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.</p>   |
| 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  |

### 3. Electric System

#### (2)Connector CN2

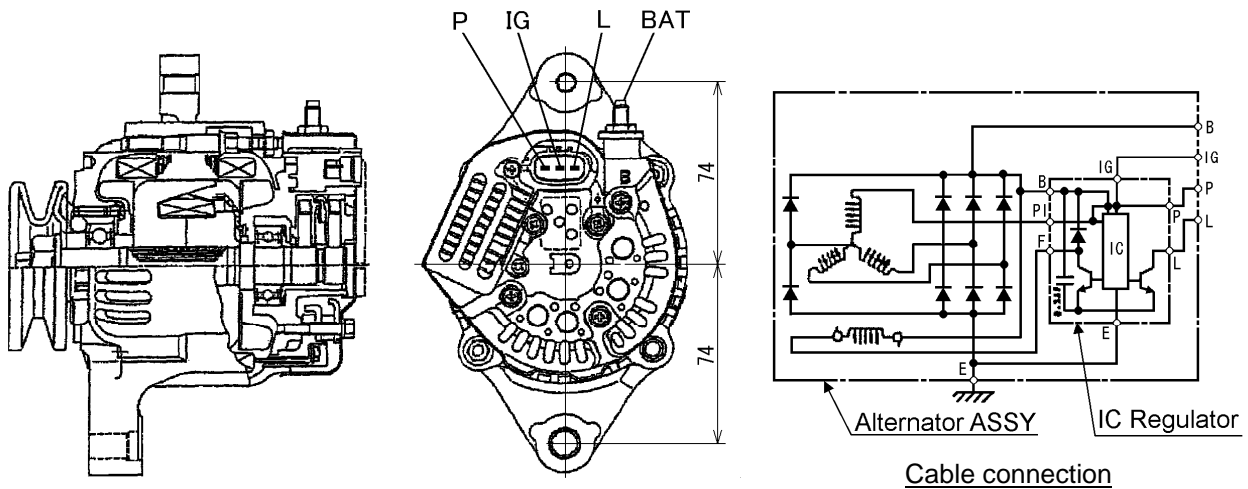
| Pin No. | Line color | Connection  | Remark  |
|---------|------------|---|---|
| 1       | B          | Earth   |   |
| 2       | W          | AUTO IDLE switch (US model only)                              | When auto idle is switched "ON" to be electrically connected, it will be switched to purge control mode.  |
| ※<br>3  | G          | Engine oil pressure switch                                    | No electrical connection found.<br>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.<br>●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.<br>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.<br>●Warning·Emergency stop set temperature<br>Warning temperature : 239°F(115°C)<br>Emergency stop temperature: 248°F(120°C) |
| 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.<br>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.<br>●Warning·Emergency stop set temperature<br>Warning temperature : 221°F(105°C)<br>Emergency stop temperature: 230°F(110°C)           |
| 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.

# 3. Electric System

## 3.2 Alternator

YANMAR part number: 129423-77200



PC10028E-1

### (1)List of functions

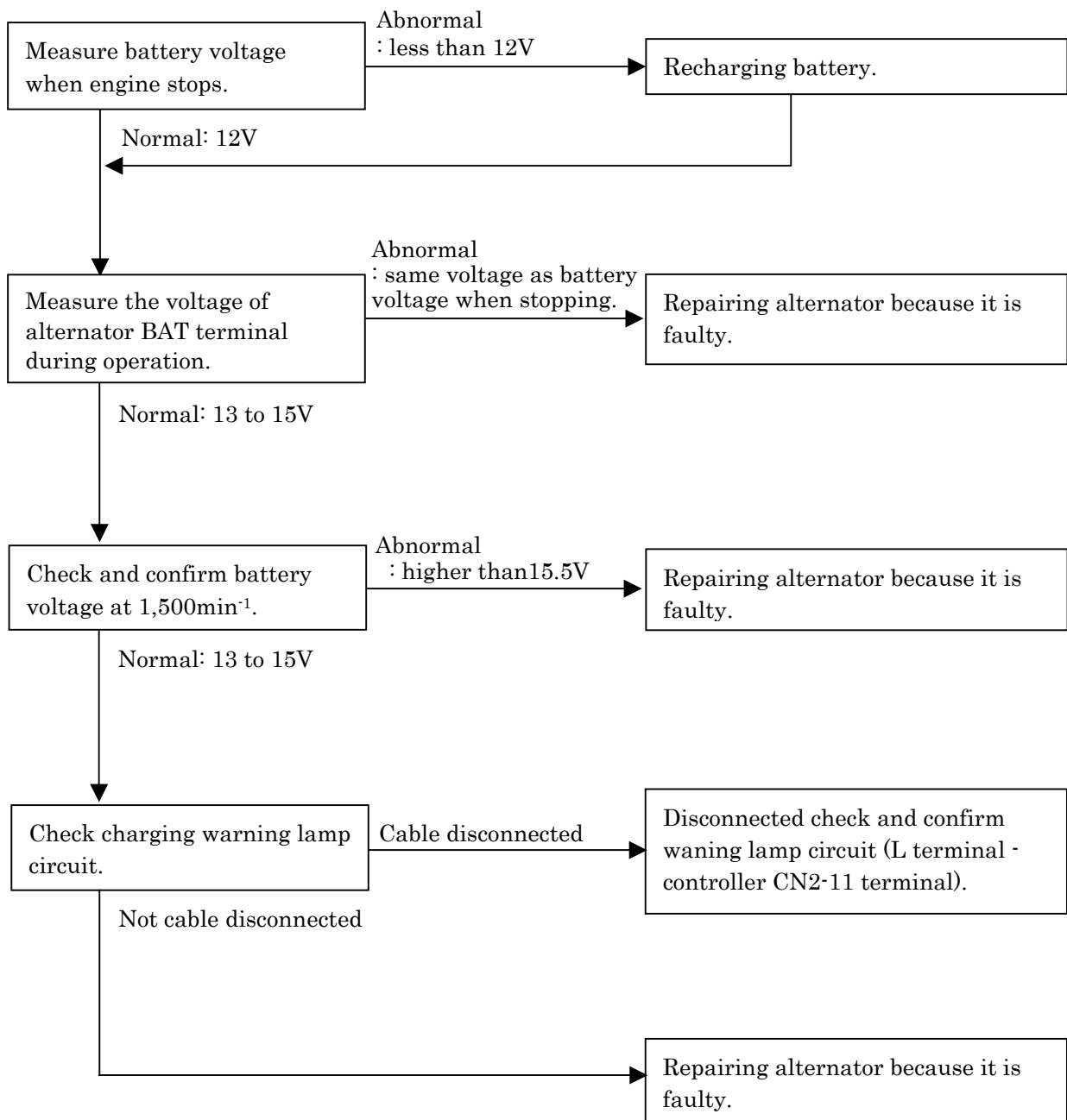
| Pin No. | Line color | Connection                           | Remark  |
|---------|------------|--------------------------------------|---|
| BAT     | R          | Starter motor B terminal             | Power for charging voltage.   |
| IG      | R/B        | 5A Fuse<br>(Through joint connector) | 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<br>(engine rotating speed signal)                   |
| E       | —          | Earth                                | Earth   |

### (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 <sup>-1</sup> .     | 13 to 15V    |

### 3. Electric System

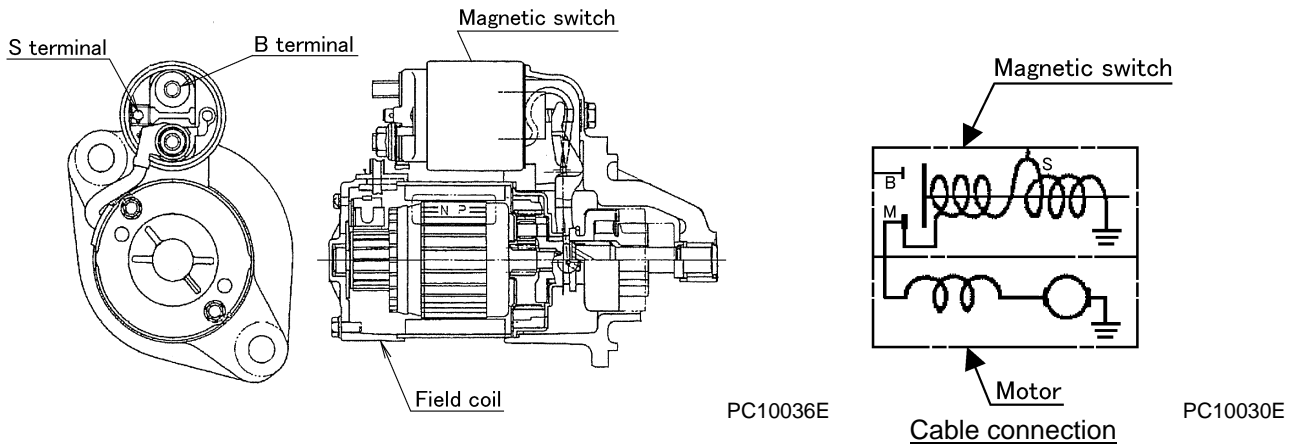
#### (3) Diagnosing when battery charging warning lamp lights



## 3. Electric System

### 3.3 Starter

YANMAR part number: 129242-77010



#### (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. |

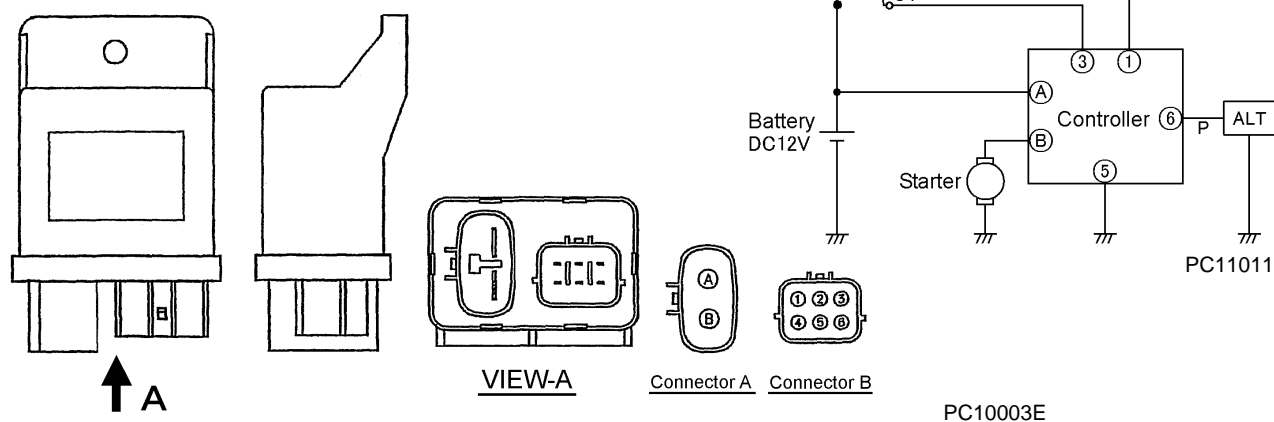
#### (2) Judgement of starter functions

| 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 <sup>-1</sup> . |

## 3. Electric System

### 3.4 Safety relay

Part number:44346 16400

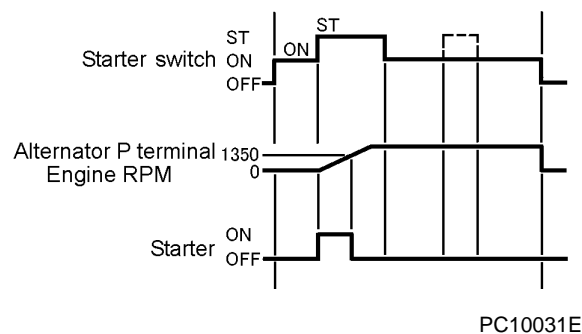


(1) Specification

|  |  |                              |
|--|--|------------------------------|
| 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<br>(-30 to +80°C) |
| 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 <sup>-1</sup>    |
|  | Engine speed for recovery              | 650±150min <sup>-1</sup>     |

※ For the details, see engine service manual.

(2) Chart of function



(3) List of functions

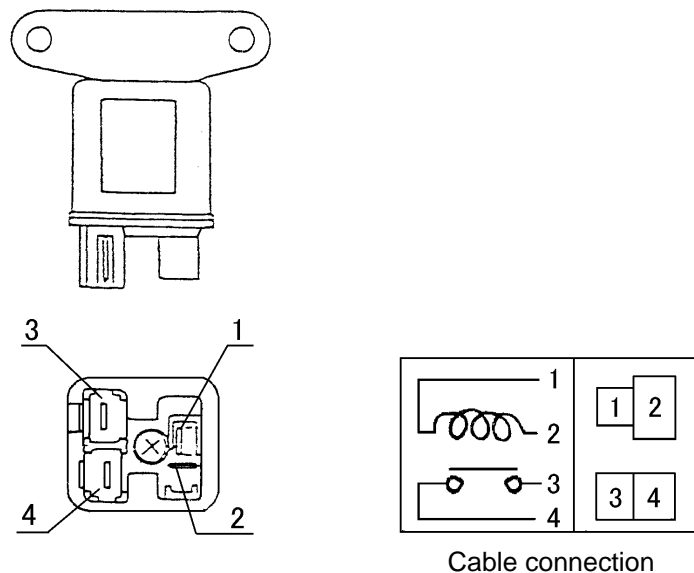
| Pin No. | Line color | Connection                  | Remark  |
|---------|------------|-----------------------------|---|
| 1(C)    | R/B        | Starter switch ACC terminal | Power supply  |
| 2       | —          | NIL                         |   |
| 3(E)    | B/W        | Starter switch C terminal   | Signal of start is inputted<br>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 <sup>-1</sup> ), 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    |   |

## 3. Electric System

### 3.5 Solenoid relay · Heater relay

Part number:44327 05000

YANMAR part number:119650-77910



PC10005

#### (1) Specification

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

#### (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  |  |

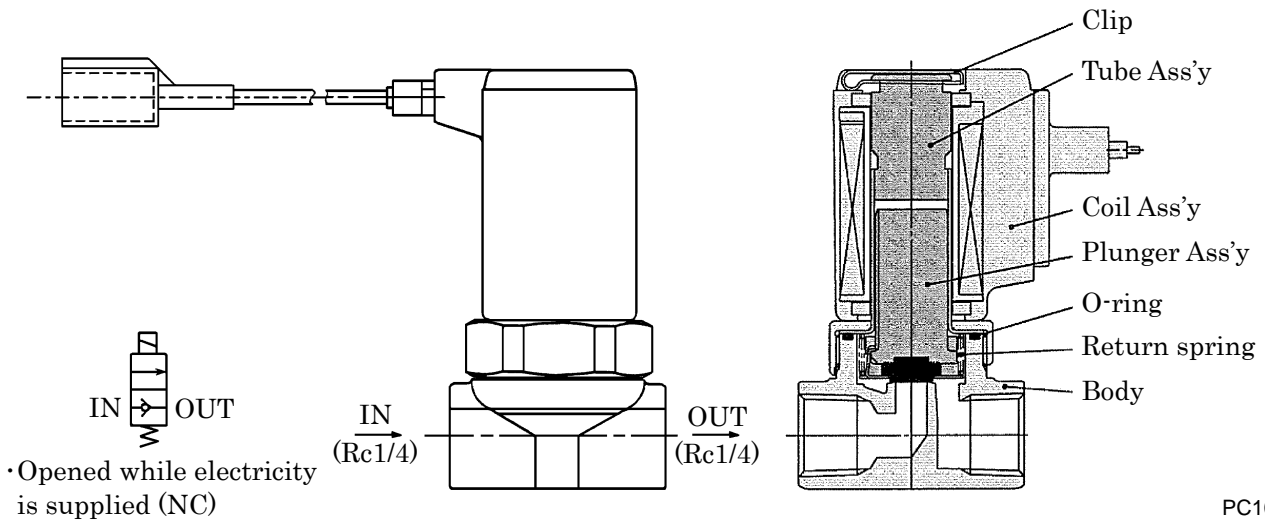
#### (2-2) Heater relay functions list

| 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<br>(Through alternator BAT terminal) | When the contact between No.3 and No.4 terminal is “ON”, preheating begins.   |
| 4       | L          | Glow plug                                     |   |

## 3. Electric System

### 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

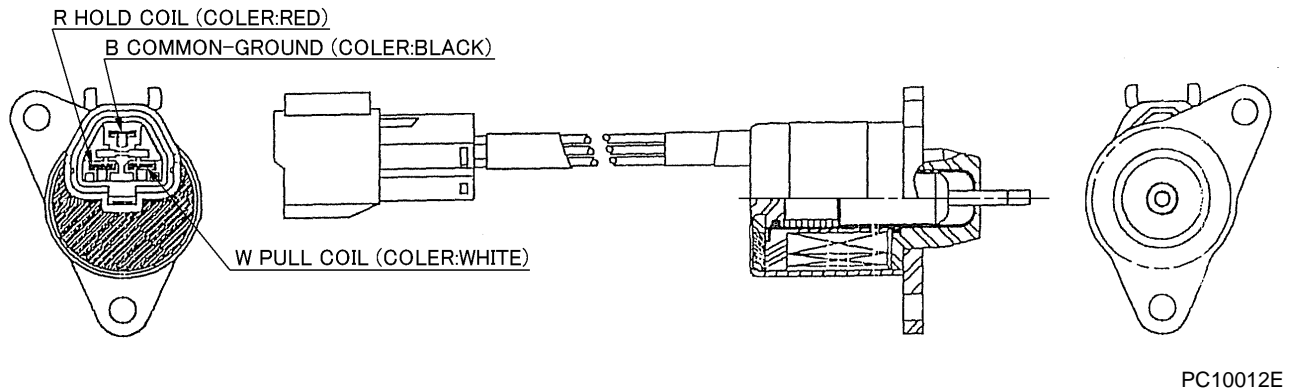
For details of functions, see “NO.6 List of function (CN1-7 terminal) of No.3.1 Controller” .



## 3. Electric System

### 3.7 Stop solenoid

YANMAR part number:119233-77932



#### (1) Specification

|               |               |                         |
|---------------|---------------|-------------------------|
| Rated voltage |               | DC12V                   |
| Suction coil  | Rated current | 36.5A                   |
|               | Resistance    | $0.33\ \Omega \pm 10\%$ |
| Holding coil  | Rated current | 0.49A                   |
|               | Resistance    | $24.5\ \Omega \pm 10\%$ |

#### (2) List of functions

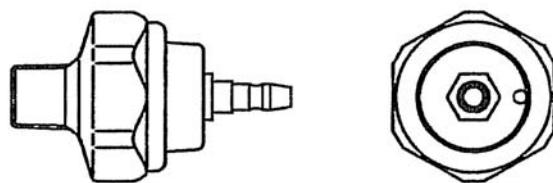
| Pin No. | Line color | Connection  |
|---------|------------|---|
| W       | Y          | 30A Fuse (Power supply)<br>[Suction power supply] |
| R       | W/B        | Controller CN1-3<br>[Holding power supply]        |
| B       | B          | Earth   |

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

## 3. Electric System

### 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         | <ul style="list-style-type: none"> <li>• 10 seconds after engine starts.</li> <li>• 2 seconds during operation ※</li> </ul> |

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

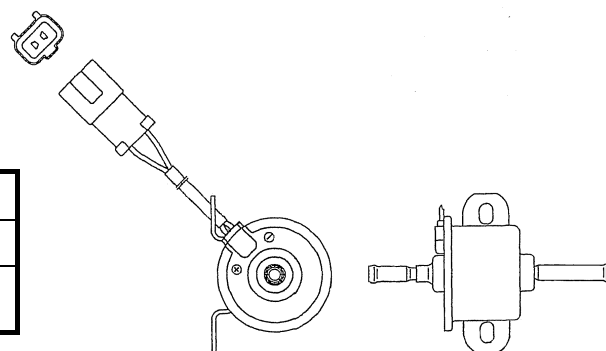
### 3.9 Fuel air-bleeding electromagnetic pump

Part number:43650 02700

YANMAR part number:129612-52100

#### Specification

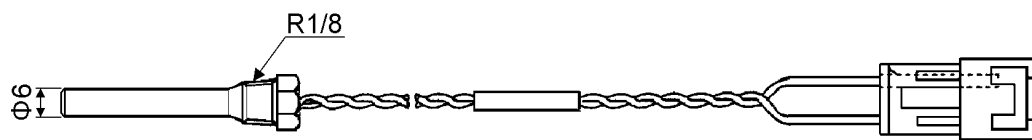
|                   |   |
|-------------------|---|
| Rated voltage     | 12V   |
| Operating current | 1.5A (MAX)  |
| Delivery capacity | More than 0.11 to 0.29gal/min<br>(0.4 to 1.1 L/min) |



PC10014

### 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" .

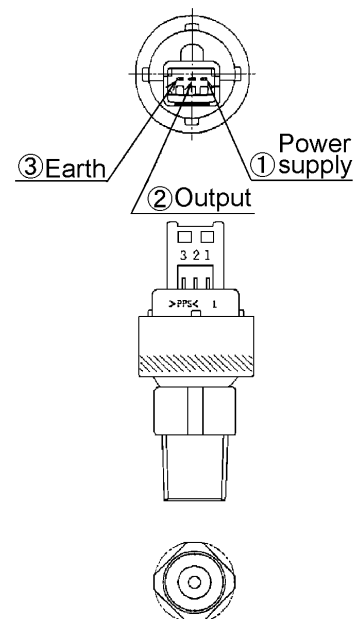
## 3. Electric System

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

Part number:44328 20600

Trouble diagnosis of pressure sensor itself

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

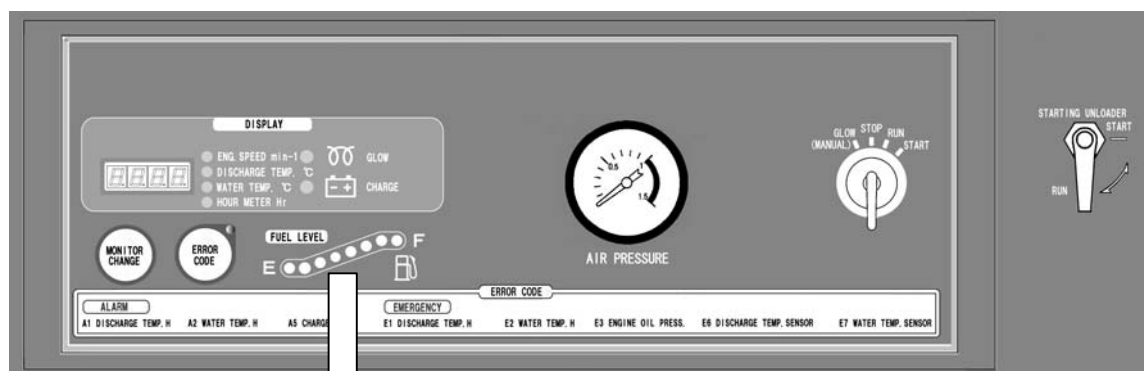


Pressure and output voltage(for reference only)

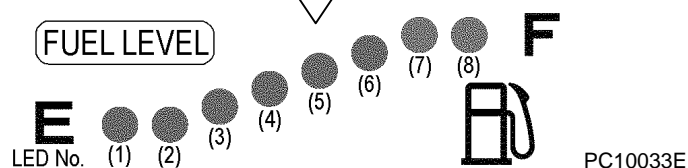
| Electric wire | Signal                                    |
|---------------|---|
| ①VCC          | Power supply （5V）                         |
| ②VOUT         | Output                                    |
|               | Pressure 0psi （0MPa） [0bar] DC0.5V        |
|               | Pressure 14psi （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)

PC08035



A100359E



PC10033E

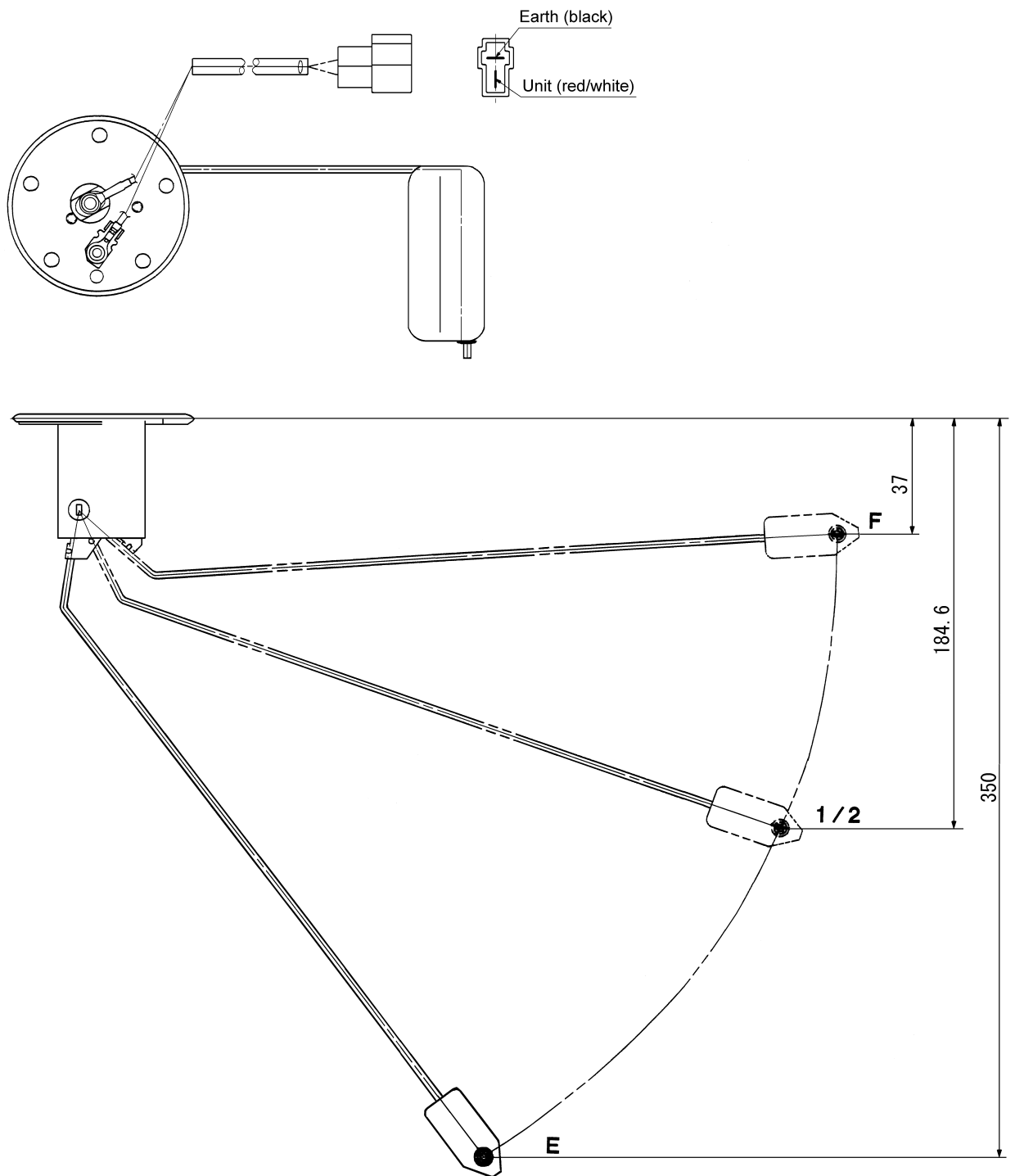
Relation between indicator lamp (LED) and residual fuel level

| Indicator lamp | Remaining fuel gal. (L) | Remark   |
|----------------|-------------------------|----------|
| LED No.1       | OFF (Red)               | 4.2(16)  |
| LED No.2       | ON (Red)                | 6.1(23)  |
| LED No.3       | ON (Green)              | 7.9(30)  |
| LED No.4       | ON (Green)              | 10.6(40) |
| 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        |

## 3. Electric System

### 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” .

# 4. Troubleshooting

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## 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.

- ① You may disassemble the other portions which are not related with the trouble.
- ② The 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.

- ① Is there any other disorder than the trouble he has informed?
- ② Anything abnormal occurred before this trouble?
- ③ Did this trouble happen unexpectedly? Or the unit had been operated in bad conditions before?
- ④ When and how did this trouble occur?
- ⑤ Had he repaired the unit before this trouble occurred?
- ⑥ Did 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.

- ① The engine runs short of engine oil or its oil is not dirty?
- ② Check each wire connection for any disconnection.
- ③ Check 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.

## 4. Troubleshooting

### (5) Procedures of diagnosis

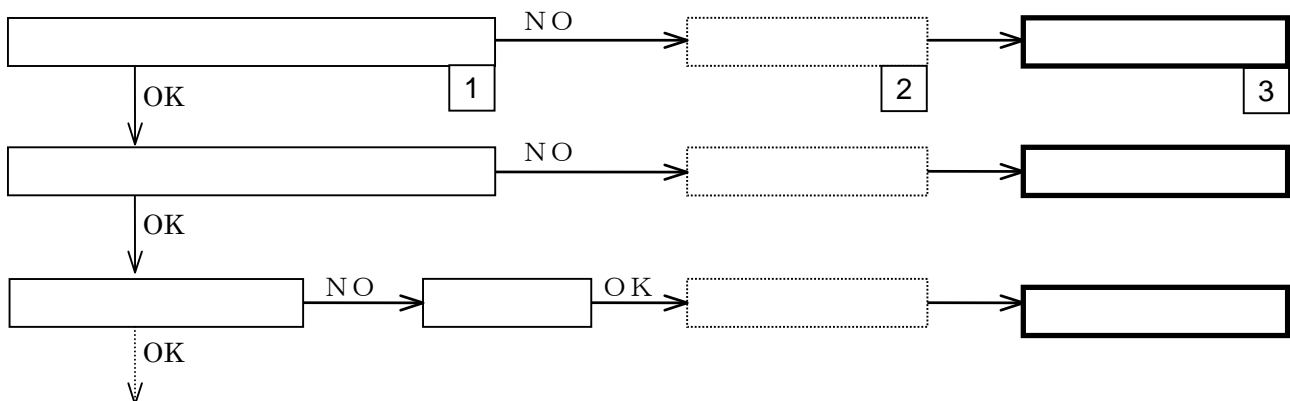
When you become well experienced, you can find out the cause easily during the process of confirmation (4). But easy understanding could cause unexpected failure. So check and judge it according to the following procedures.

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



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

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

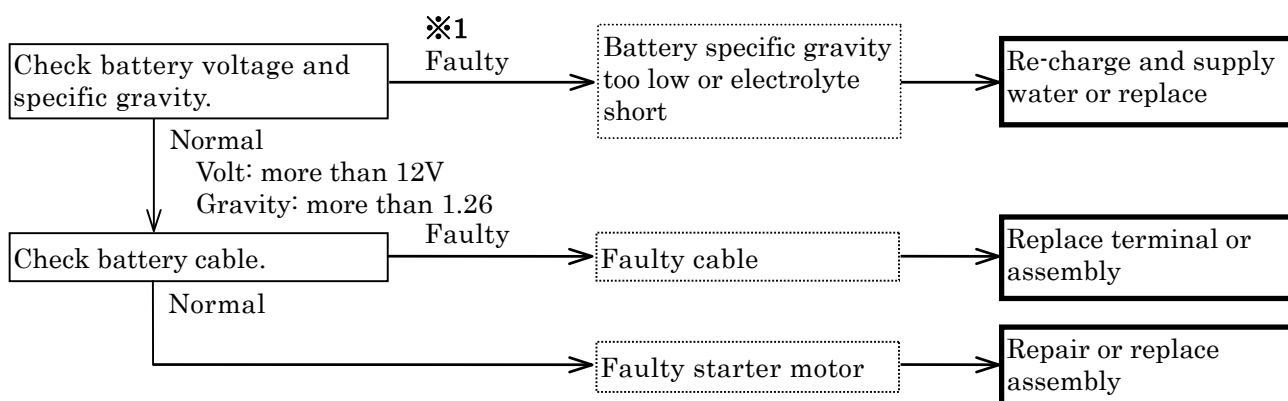
③ In the troubleshooting column the countermeasures or treatment are mentioned in the double lined parenthesis.

④ 1 under each column means the index of explanation.  
For details, see 4.5 “Explanation of trouble diagnosis”

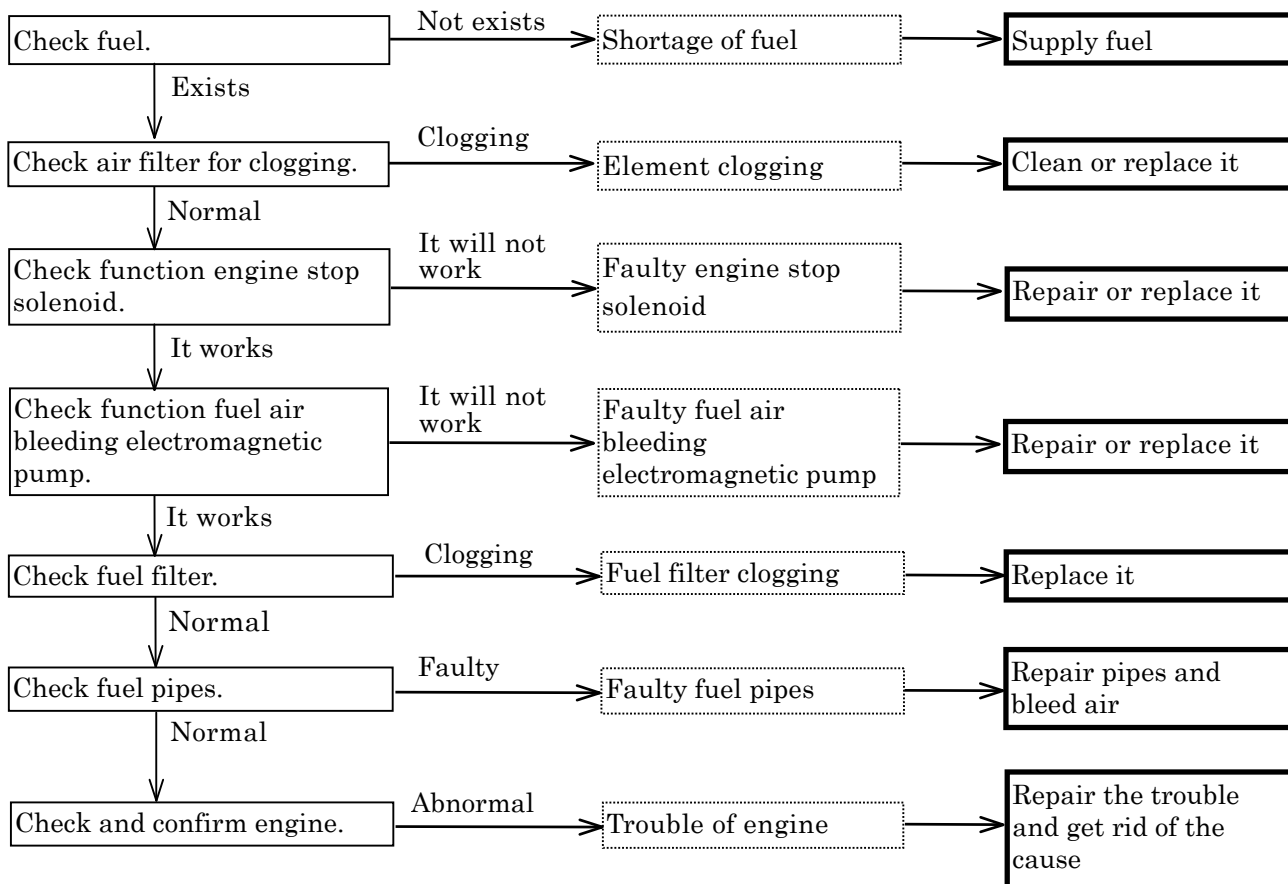
## 4. Troubleshooting

### 4.2 Failures of compressor and engine

#### 4.2.1 At start-up, starter rotates slowly



#### 4.2.2 Starter turns, but engine will not start



## 4. Troubleshooting

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

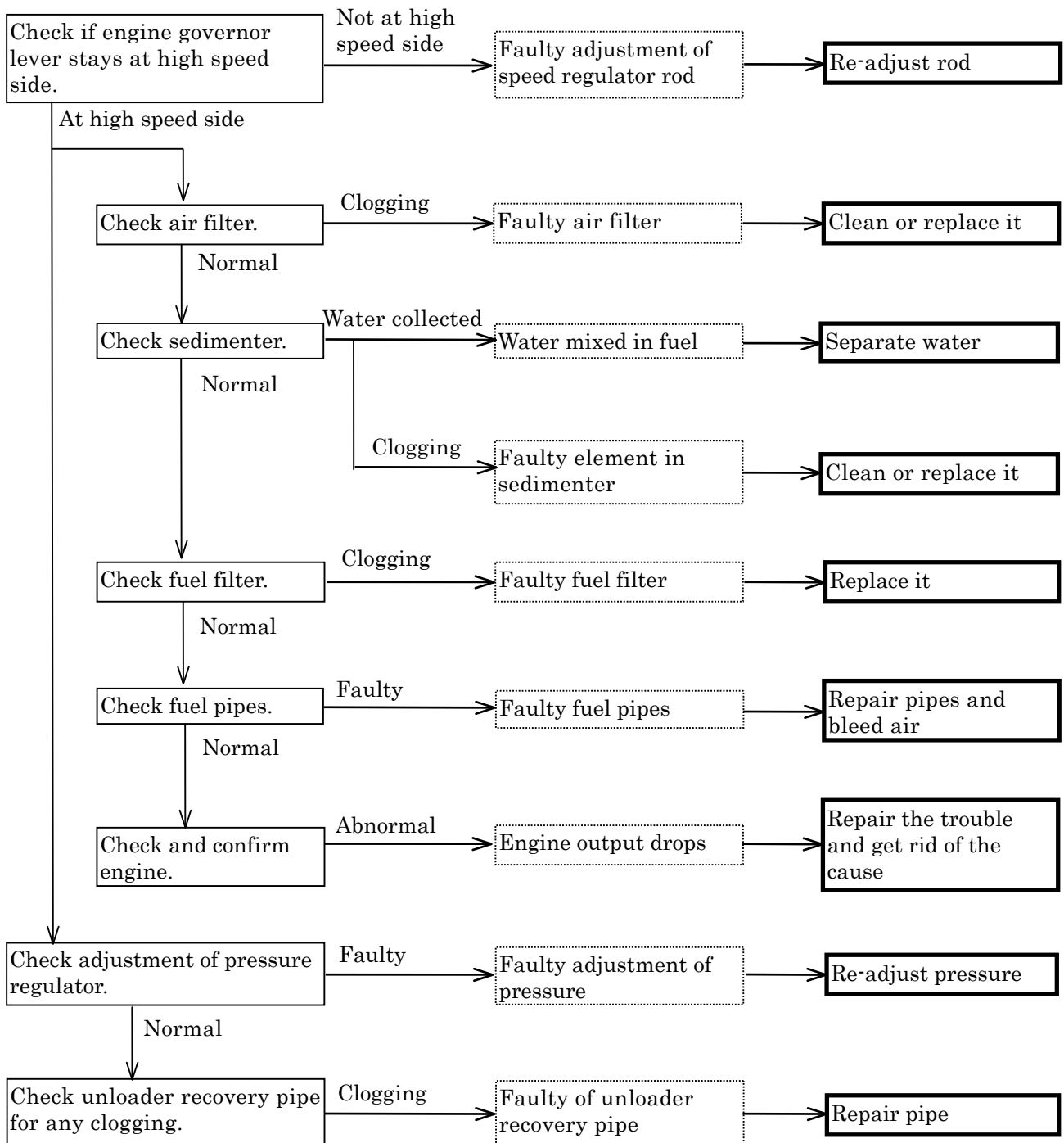


※ [ ] Items in dotted square show failure diagnosis items for US model auto idle operation mode.



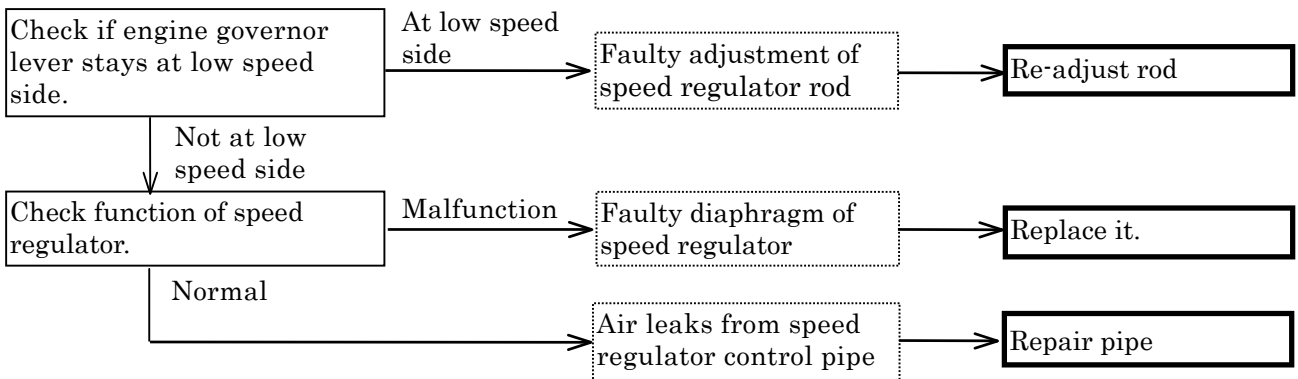
## 4. Troubleshooting

### 4.2.4 Engine will not turn to meet rated revolutions

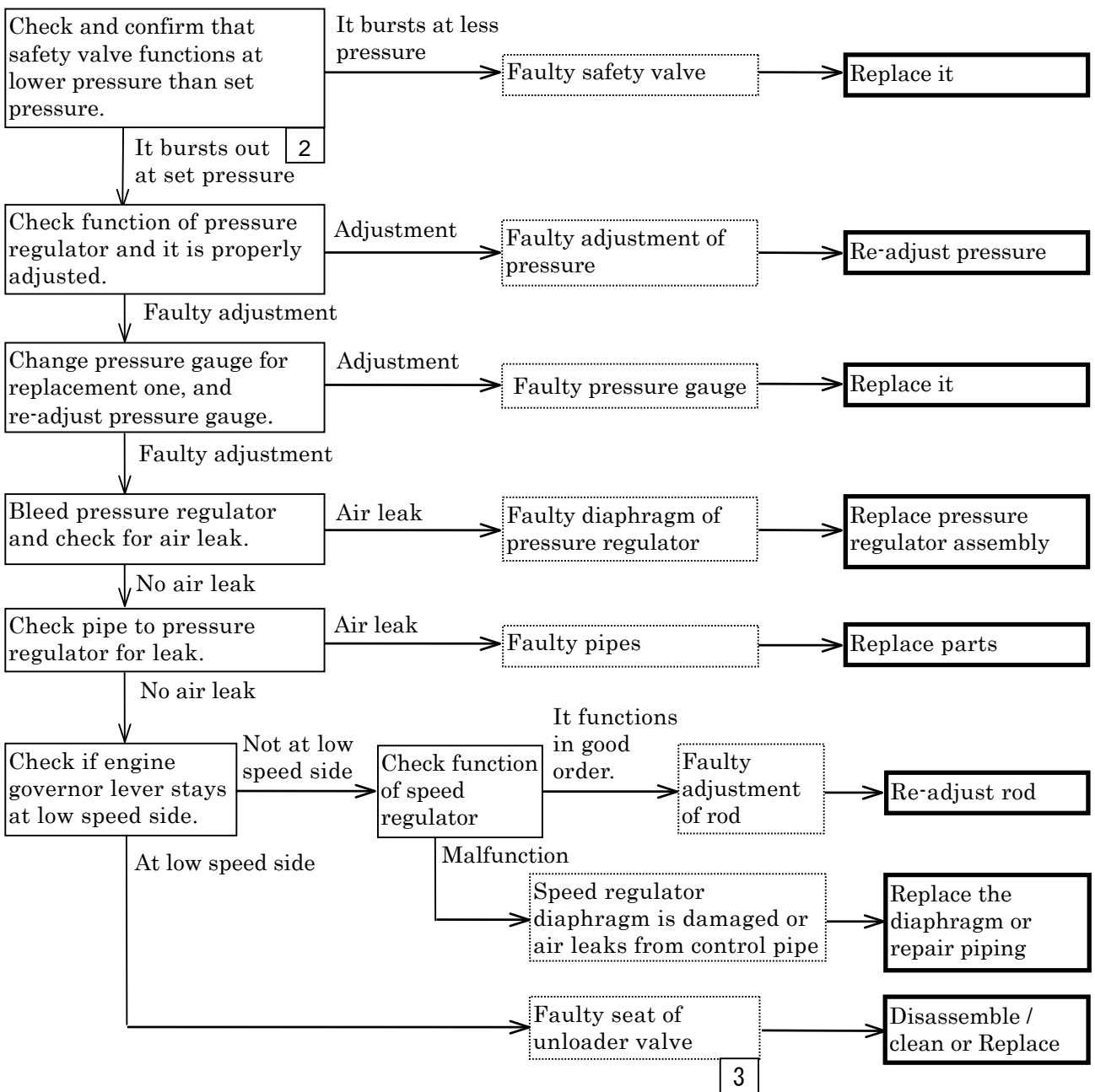


## 4. Troubleshooting

### 4.2.5 Minimum speed not available even upon no-load operation

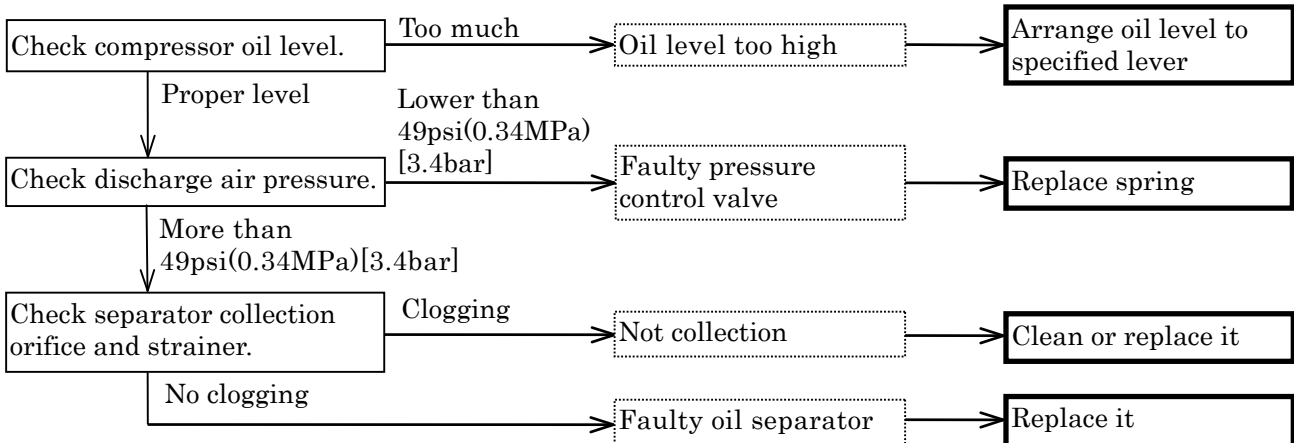


### 4.2.6 Safety valve bursts out during unloaded operation

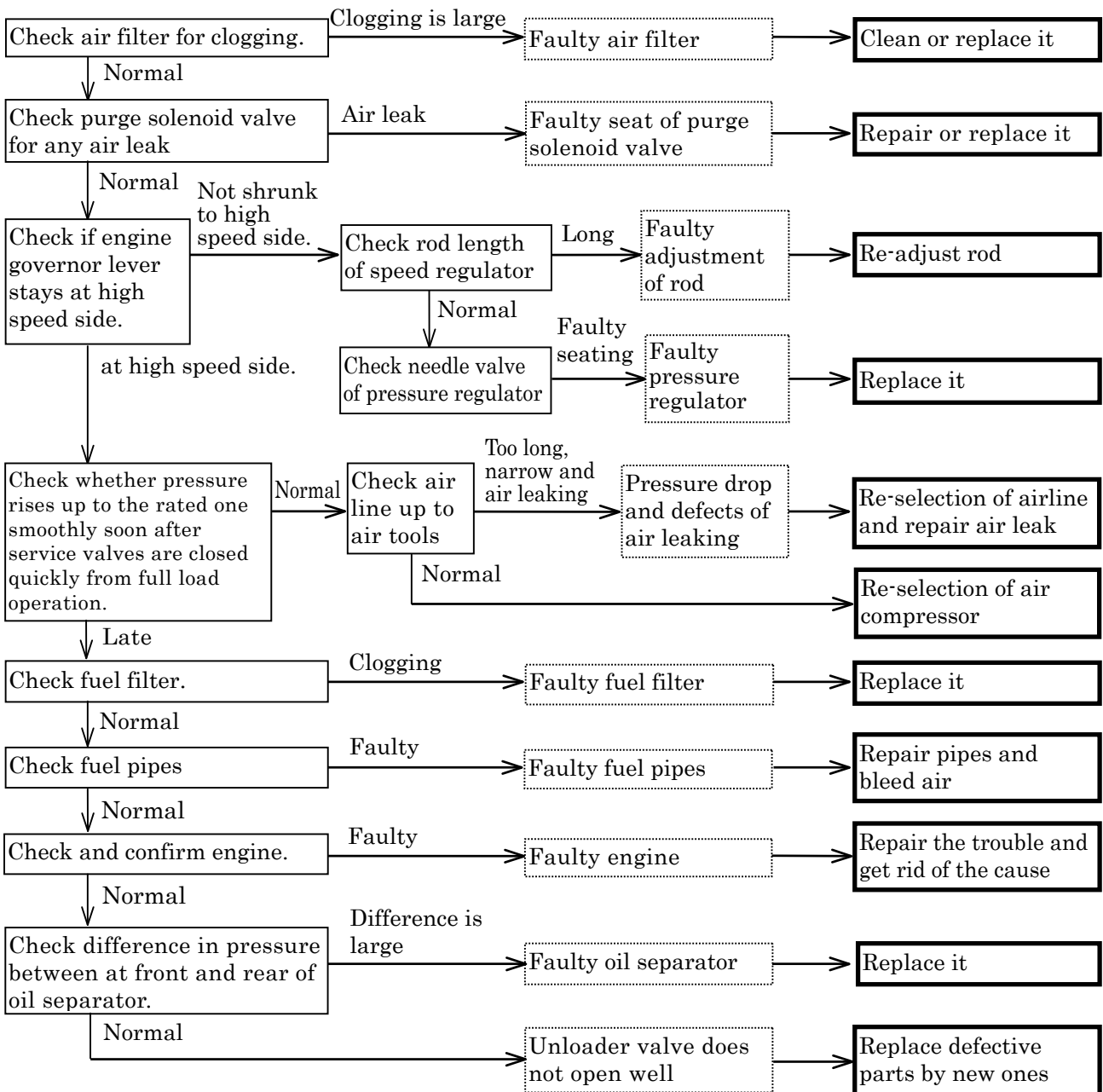


## 4. Troubleshooting

### 4.2.7 Oil mixed found in delivery air

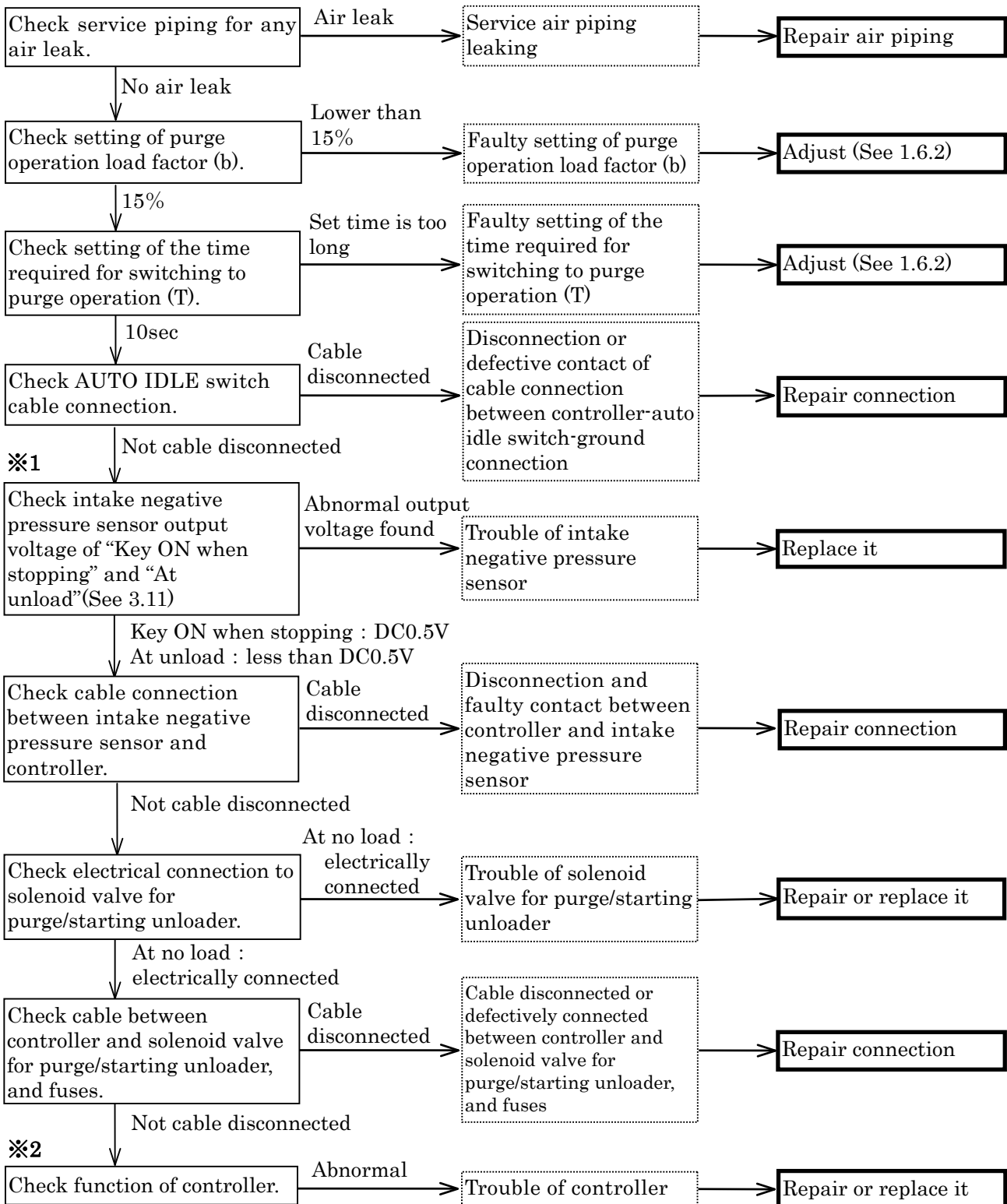


### 4.2.8 Discharge air is insufficient



## 4. Troubleshooting

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

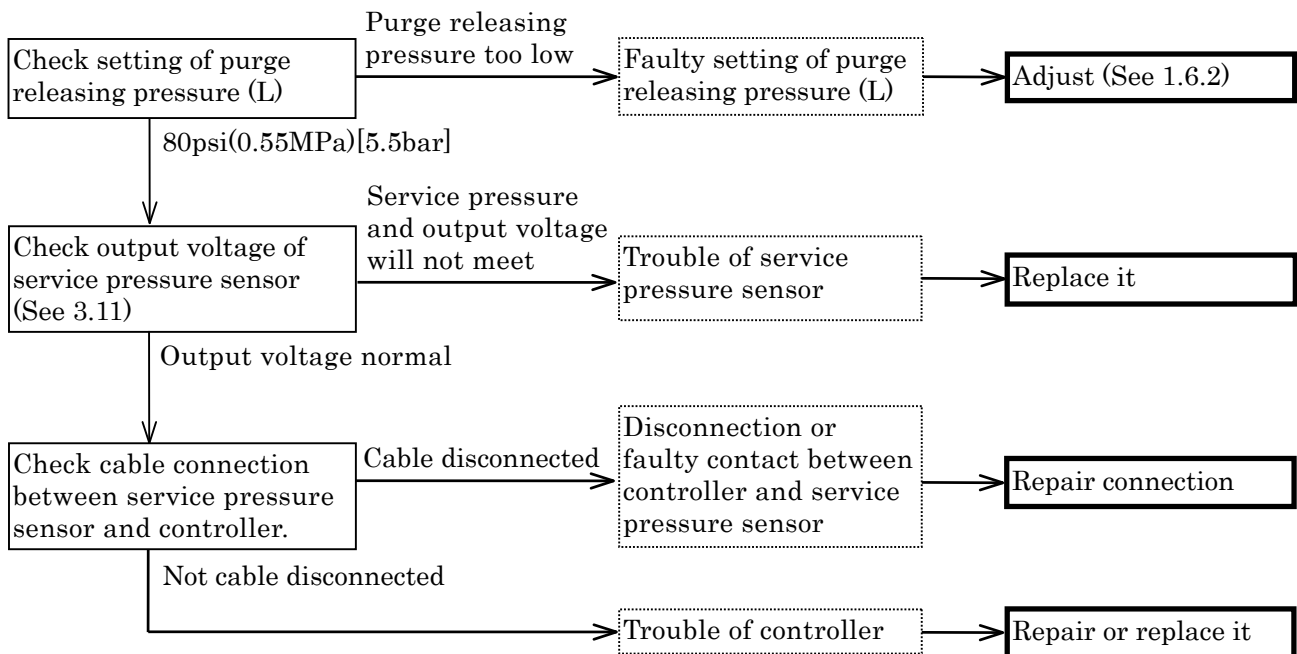


※1 : As the output voltage of intake negative pressure sensor at unload operation is very little, it is better to check the function of purge control operation after replacing the sensor with new one, if it is found difficult to diagnose the trouble.

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

## 4. Troubleshooting

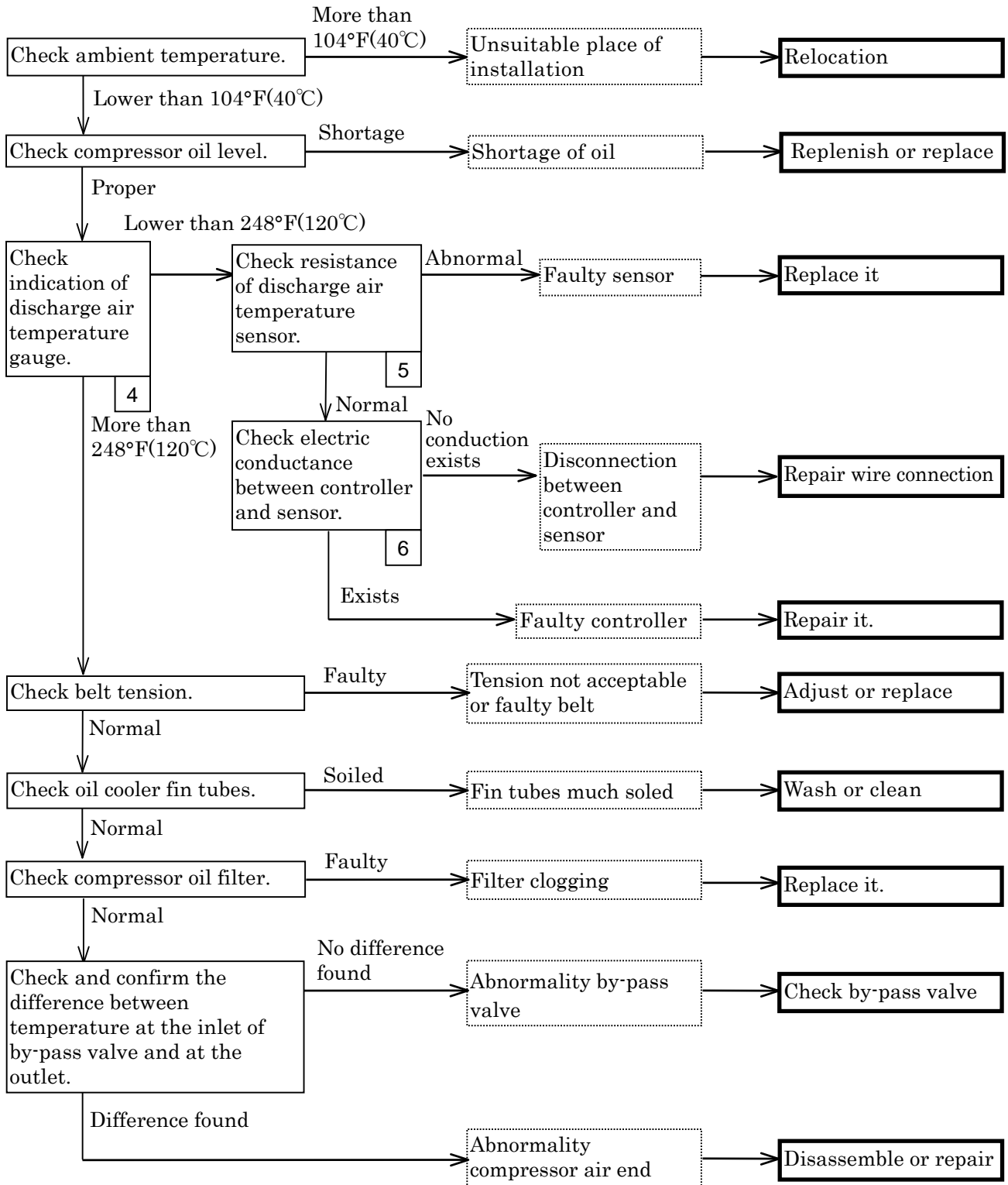
### 4.2.10 Even when the pressure at consumer's side drops, it will not recover from purge control operation. (US model only)



## 4. Troubleshooting

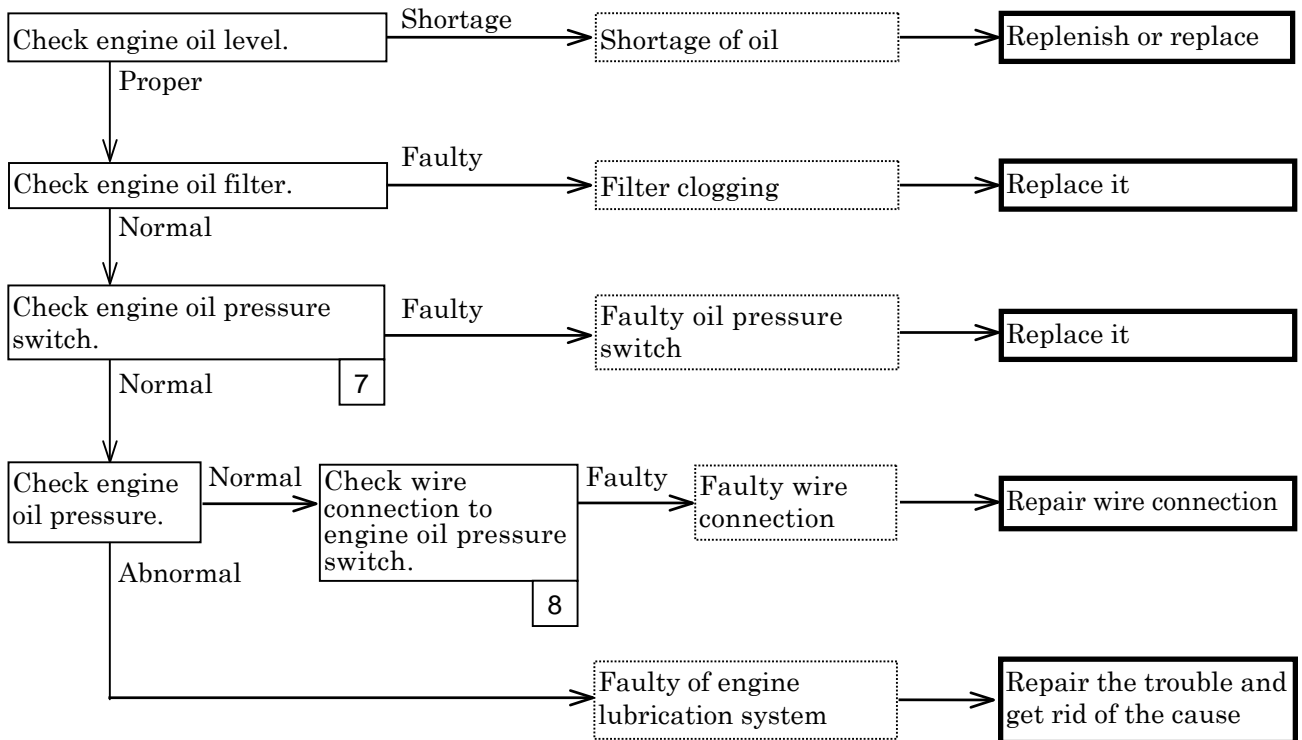
### 4.3 Operation of emergency switch

#### 4.3.1 Discharge air temperature indication lamp glows and engine stops.



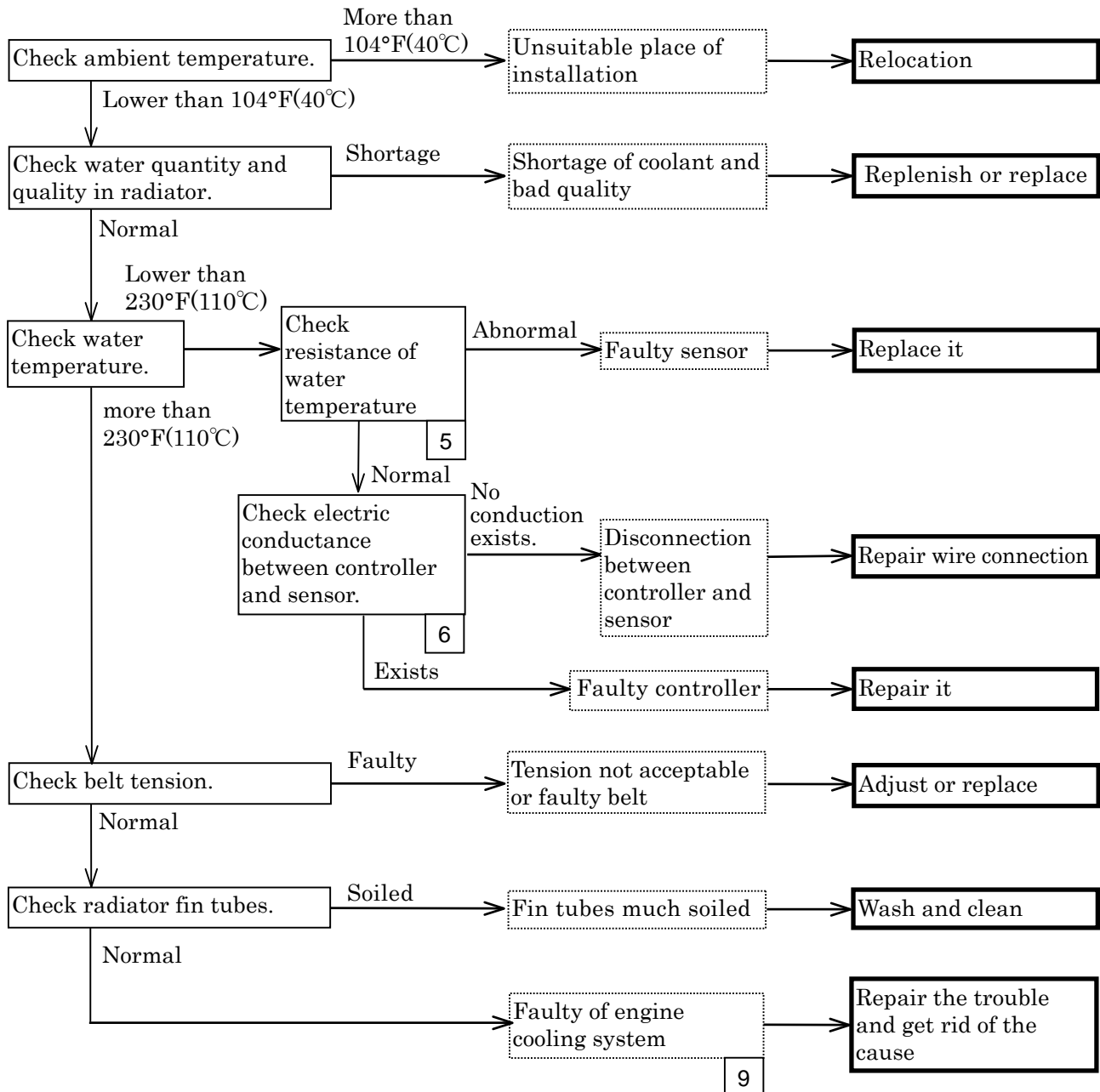
## 4. Troubleshooting

### 4.3.2 Engine oil pressure emergency indication lamp glows and engine stops



## 4. Troubleshooting

### 4.3.3 Engine coolant temperature lamp glows and engine stops



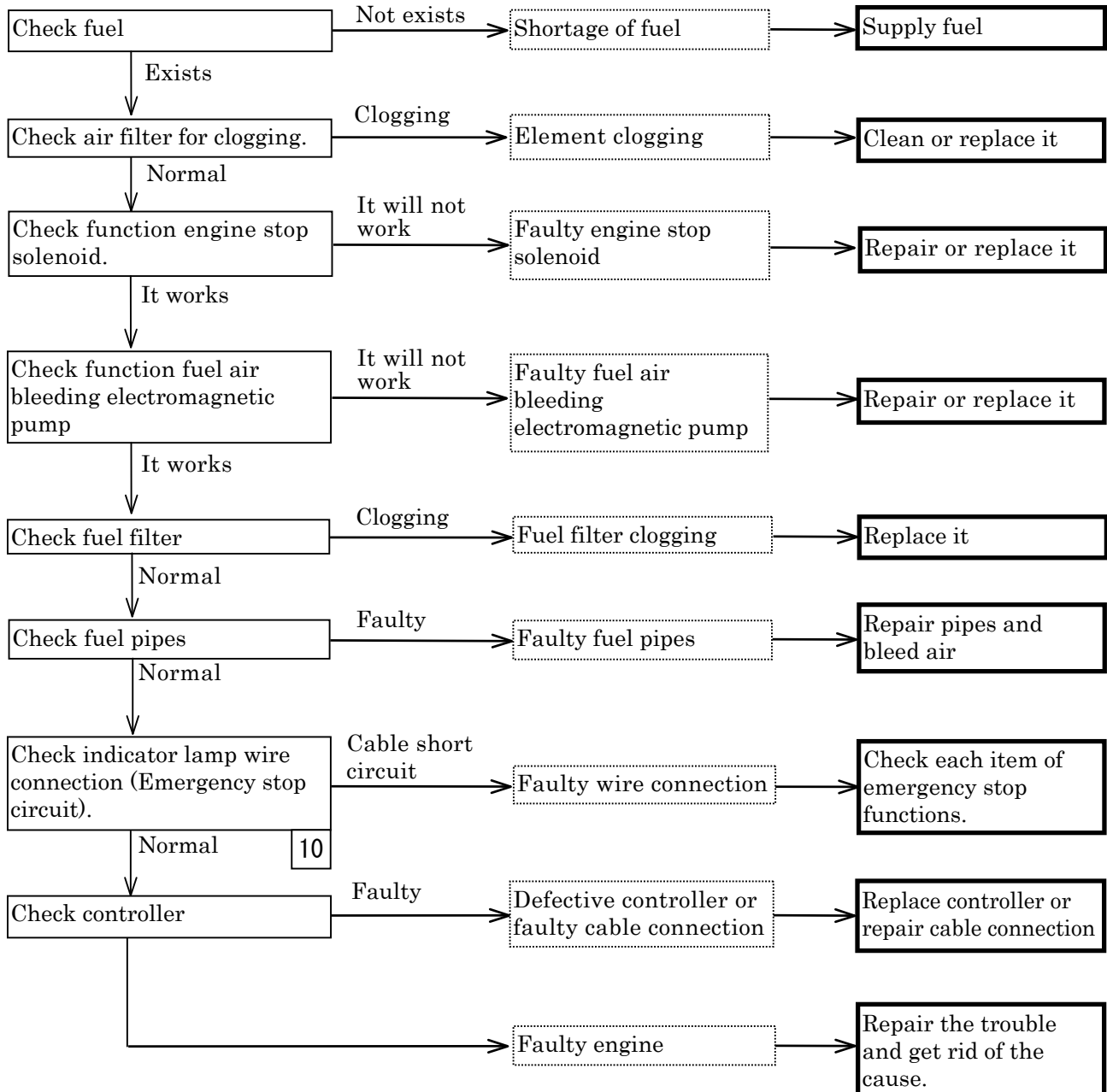


## 4. Troubleshooting

### 4.4 Others

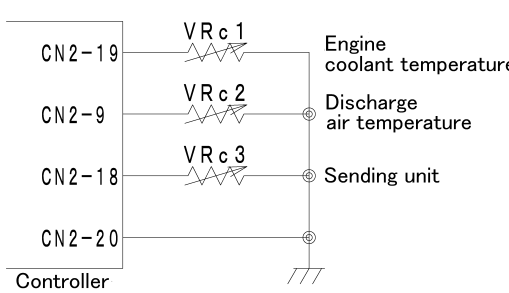
#### 4.4.1 Indicator lamps will not glow, but engine stops.

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



## 4. Troubleshooting

### 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°C)/230°F(110°C)], interior contact (RY3) between controller CN1-9 and CN1-3 terminals turns OFF to cut electrical connection to stop solenoid and making engine stop. | <p>Connect variable resistor (1k <math>\Omega</math>) as shown in the following figure and gradually lower resistance value of variable resistor. 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)</p>  <p>The diagram illustrates the electrical connections for temperature sensors. On the left, the Controller has four terminals: CN2-19, CN2-9, CN2-18, and CN2-20. On the right, there are three sensor inputs: Engine coolant temperature, Discharge air temperature, and Sending unit. Each sensor input is connected to the Controller via a variable resistor (VRc 1, VRc 2, and VRc 3 respectively). The Discharge air temperature and Sending unit inputs also have a ground connection symbol (three parallel lines) shown.</p> |

## 4. Troubleshooting

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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.<br>(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.             |   |

## 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<br>(YANMAR:119005-35151) | ←                   |
| Fuel filter cartridge                   | 43543 01400<br>(YANMAR:129907-55801) | ←                   |
| Fuel pre-filter ASS'Y                   | 43540 08100                          | —                   |
| Element                                 | 43541 02400<br>(YANMAR:41650-550800) | —                   |
| O-ring                                  | (YANMAR:123325-36140)                | —                   |
| O-ring                                  | (YANMAR:24311-000120)                | —                   |
| Sedimenter ASS'Y                        | 43550 02900<br>(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                          | ←                   |

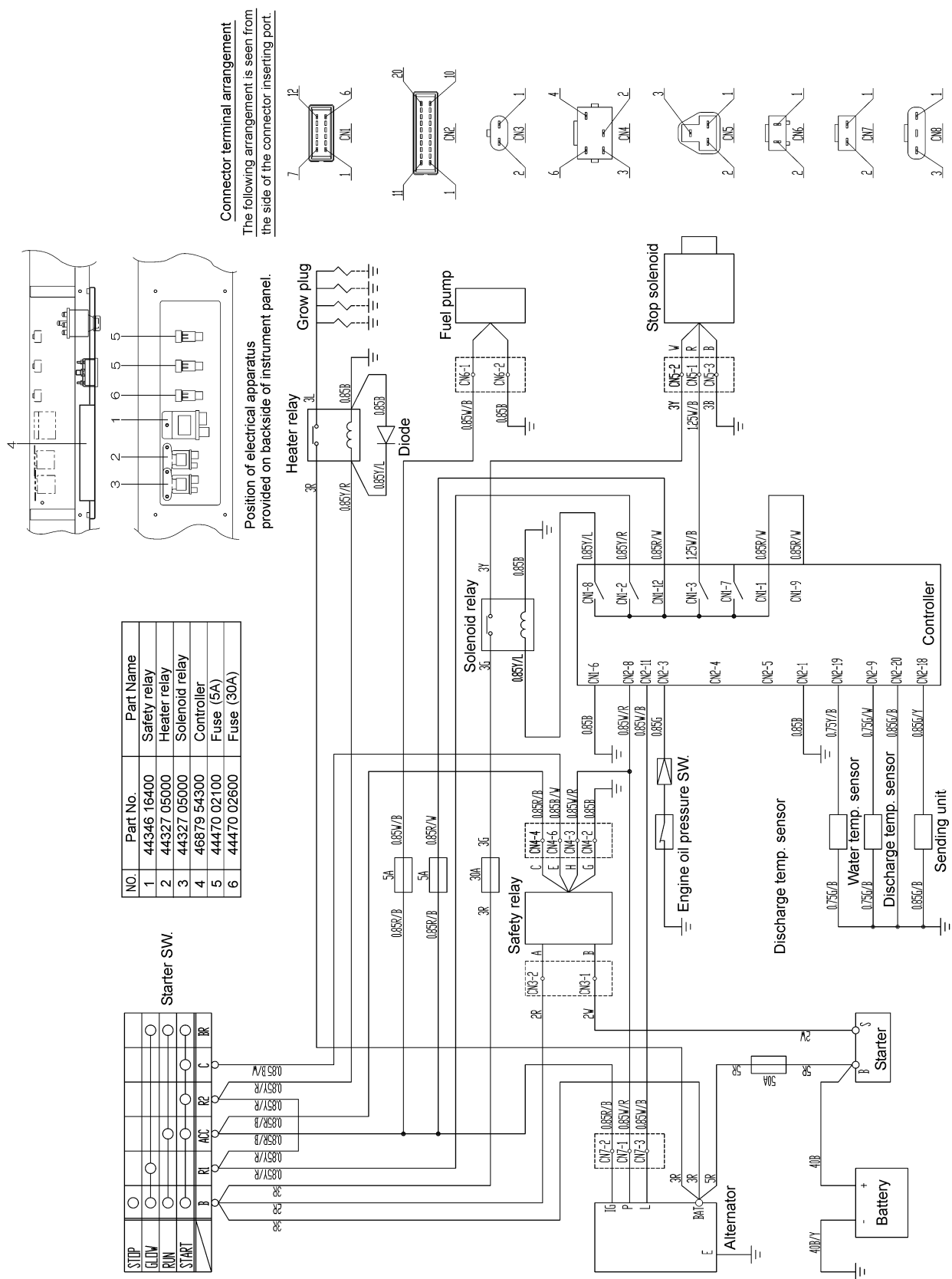
## 5. References

| Item  | Part Number                          |             |
|---|--------------------------------------|-------------|
|   | Export model                         | US model    |
| ●Oil line   |                                      |             |
| By-pass valve ASS'Y<br>(Built-in compressor oil filter) | —                                    | —           |
| Pellet  | 37231 02100                          | ←           |
| O-ring  | 03402 25045                          | ←           |
| ●Electrical appliances                                  |                                      |             |
| Controller  | 46870 51901                          | 46870 54000 |
| Safety relay  | 44346 16400<br>(YANMAR:119802-77200) | ←           |
| Solenoid relay  | 44327 05000<br>(YANMAR:119650-77910) | ←           |
| Heater relay  | 44327 05000<br>(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<br>(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 |

# 5. References

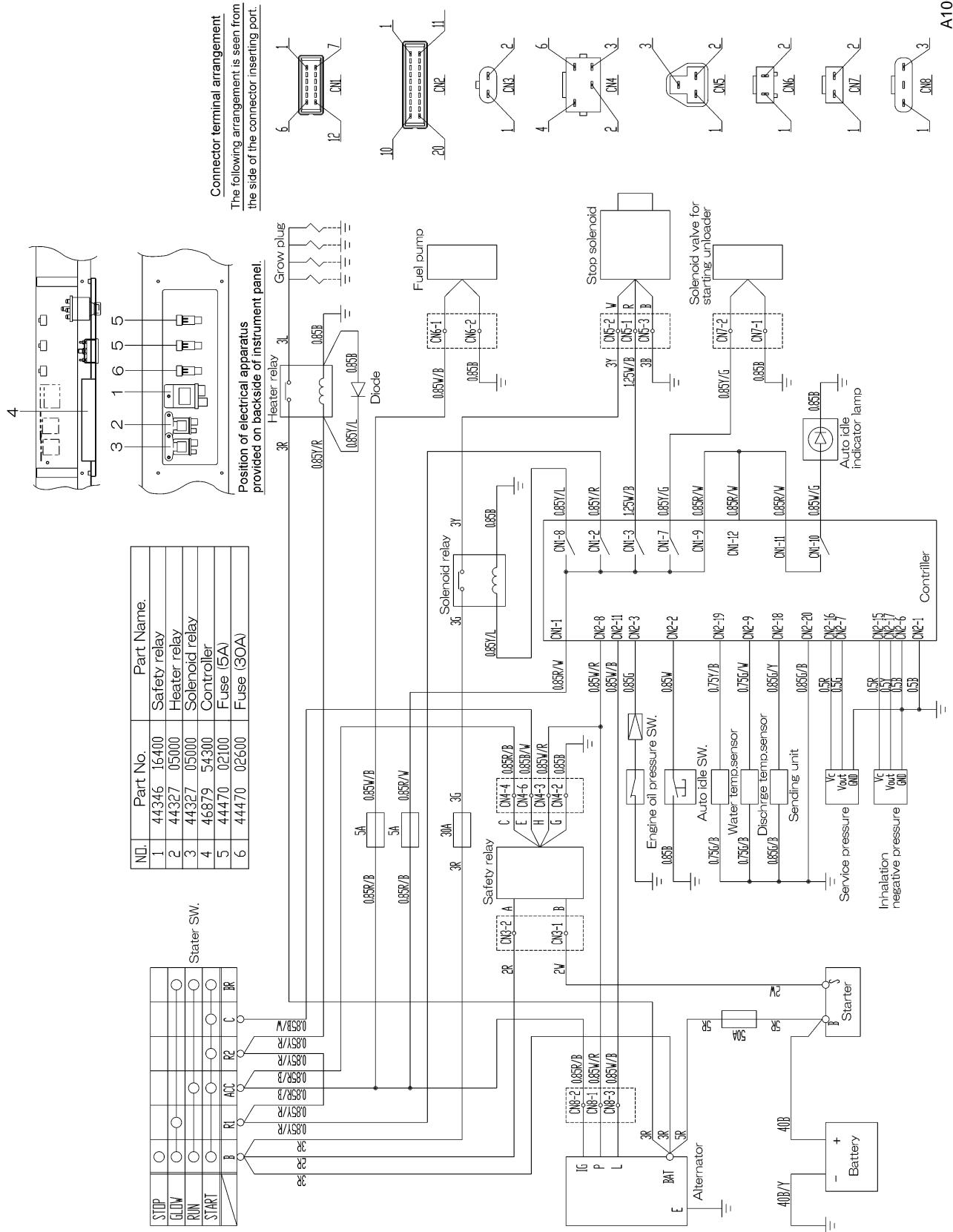
## 5.2 Engine Wiring Diagram

### (1) Export model



A100392E

## (2) US model



A100445E

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