



**PC**

**SERVICE MANUAL**

SCREW COMPRESSOR

**PDS100S-6B4**

**PDS130S-6B4**

**FAC-37P (SHIBAURA)**

# Preface

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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 Catalogue” 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 Catalogue” 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.

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.

# Table of Contents

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<b>1. Specification</b>	<b>1-1</b>
1.1 Specifications	1-1
1.2 Set Value	1-3
1.3 Outline drawing	1-4
1.4 Internal Components and Part Names	1-5
1.5 Instrument panel	1-6
1.6 Piping Diagram	1-7
1.7 Fuel piping	1-9
<b>2. Maintenance</b>	<b>2-1</b>
2.1 Cautions for Overhauling	2-1
2.2 Tightening torque	2-2
2.3 How to adjust regulator and how to replace diaphragm	2-3
2.4 Replacement of unloader spare parts	2-6
2.5 Pressure adjustment procedure of pressure control valve and replacement of spare parts	2-7
2.6 Inspection/replacement of auto relief valve spare parts	2-8
2.7 Change Oil Separator	2-8
2.8 Clean inside of Fuel Tank	2-9
2.9 Values of Various Adjustments of Engine	2-9
<b>3. Electric System</b>	<b>3-1</b>
3.1 Engine electric appliances	3-1
<b>4. Troubleshooting</b>	<b>4-1</b>
4.1 Repairing Procedures	4-1
4.2 Failures of compressor and engine	4-3
4.3 Operation of emergency switch	4-9
4.4 Others	4-12
4.5 Explanation of trouble diagnosis	4-13
<b>5. References</b>	<b>5-1</b>
5.1 Comparison between consumable parts and electrical appliances	5-1
5.2 Engine Wiring Diagram	5-3

# 1. Specification

## 1.1 Specifications

Item	unit	PDS100S-6B4	PDS130S-6B4
<b>●Weight · Mass</b>			
Overall length	in.(mm)	※1 116 (2,945)	
Overall length (Bonnet only)	in.(mm)	62 (1,580)	
Overall width	in.(mm)	57 (1,450)	
Overall height	in.(mm)	※1 57 (1,450)	
Net dry mass	lb (kg)	※1 1,742 (790)	※1 1,896 (860)
Operating mass	lb (kg)	※1 1,907 (865)	※1 2,072 (940)
<b>●Compressor</b>			
Free air delivery	cfm (m <sup>3</sup> /min)	99 (2.8)	131 (3.7)
Working pressure	psi (MPa)	100 (0.69)	
Pressure of pressure control valve	psi (MPa)	72.5 (0.5)	58 (0.4)
Burst pressure of safety valve	psi (MPa)	145 (1.0)	
Ambient conditions: temperature	°F (°C)	5-95 (-15 - +35)	
Ambient conditions: altitude	yd (m)	less than 1,640 (1,500)	
<b>●Engine</b>			
Type		IHI SHIBAURA S773L-C-8801	IHI SHIBAURA N843L-C-8801
Rated output	hp/min <sup>-1</sup> (kW/min <sup>-1</sup> )	25.5/3,500 (19/3,500)	37.5/3,000 (28/3,000)
Fuel consumption	g/kW·h	321	272
Rated RPM	min <sup>-1</sup>	3,500	3,000
RPM at unload conditions	min <sup>-1</sup>	2,000	1,600
Net dry mass	lb (kg)	216 (98)	353 (160)
<b>●Lubricating oils</b>			
Engine oil capacity (high-low level)	gal.(L)	1.3-0.7 (4.9-2.7)	1.6-0.8 (6-3)
Compressor oil capacity (including receiver tank and oil cooler etc.)	gal.(L)	2.9 (11)	3.7 (14)
Compressor oil capacity to be filled		Ambient temperature 5°F-95°F (-15°C- 35°C)	
		MOBIL: RARUS 424 SHELL: CORENA OIL RS32 CALTEX: COMPRESSOR OIL RA32	
Coolant capacity	gal.(L)	1.2 (4.5)	1.7 (6.6)
Fuel tank capacity	gal.(L)	18.5 (70)	
<b>●Emergency stop devices</b>			
Actuating pressure of oil pressure switch	psi (kPa)	※2 5.7 / 14.2 (39.2 / 98.1)	※3 5.7 / 14.2 (39.2 / 98.1)
Actuating temperature of water temperature switch	°F (°C)	more than 230 (110)	
Actuating pressure of discharge air temperature switch	°F (°C)	more than 248 (120)	
<b>●Warning devices</b>			
Fuel residual level gauge	gal.(L)	less than about 4.2 (16)	
<b>●Fuel consumption ratio</b>			
At full load (for reference only)	gal./Hr (L/Hr)	1.6 (6.0)	2.1 (8.0)
At 70% load (for reference only)	gal./Hr (L/Hr)	1.2 (4.4)	1.5 (5.5)
At 50% load (for reference only)	gal./Hr (L/Hr)	1.0 (3.8)	1.2 (4.5)
At no load (for reference only)	gal./Hr (L/Hr)	0.7 (2.5)	0.7 (2.8)

# 1. Specification

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※1:Dimensions for units equipped with drawbars and undercarriages locally procured in USA.

※2:Oil pressure switches fitted to PDS100S-6B4 are different in part number, depending upon machine serial numbers.

(Old type) Oil pressure switch with no part number. This was supplied together with engines.

Actuating pressure: 39.2kPa SER.NO ~B6-6B40180

(New type) Oil pressure switch Part No. 44328 06700 Actuating pressure: 98.1kPa SER NO. B6-6B40181~

※3:Oil pressure switches fitted to PDS130S-6B4 are different in part number, depending upon machine serial numbers.

(Old type) Oil pressure switch with no part number. This was supplied together with engines.

Actuating pressure: 39.2kPa SER.NO ~B3-6B40250

(New type) Oil pressure switch Part No. 44328 06700 Actuating pressure: 98.1kPa SER NO. B3-6B40251~

# 1. Specification

## 1.2 Set Value

Item	unit	PDS100S-6B4	PDS130S-6B4
<b>●Safety devices</b>			
Discharge air temperature	°F (°C)	248 (120)	
Engine oil pressure	psi (MPa)	※1 5.7/14.2 (39.2 / 98.1)	※2 5.7/14.2 (39.2 / 98.1)
Engine coolant temperature	°F (°C)	230 (110)	
Fuel residual level	gal.(L)	less than about 4.2 (16)	
<b>●Set value</b>			
Pressure control valve	psi (MPa)	72.5 (0.5)	58 (0.4)
Actuating pressure of safety valve	psi (MPa)	145 (1.0)	
Unload starting pressure	psi (MPa)	100 (0.69)	
<b>●Engine RPM</b>			
Rated RPM	min <sup>-1</sup>	3,500	3,000
RPM at unload	min <sup>-1</sup>	2,000	1,600
<b>●Indications of gauges or instruments during operation</b>			
Discharge pressure gauge (at full load)	psi (MPa)	72.5-102 (0.50-0.70)	58-102 (0.40-0.70)
Discharge pressure gauge (at no load)	psi (MPa)	102-131 (0.70-0.90)	102-131 (0.70-0.90)

※1:Oil pressure switches fitted to PDS100S-6B4 are different in part number, depending upon machine serial numbers.

(Old type) Oil pressure switch with no part number. This was supplied together with engines.

Actuating pressure: 39.2kPa SER.NO ~B6-6B40180

(New type) Oil pressure switch Part No. 44328 06700 Actuating pressure: 98.1kPa SER NO. B6-6B40181~

※2:Oil pressure switches fitted to PDS130S-6B4 are different in part number, depending upon machine serial numbers.

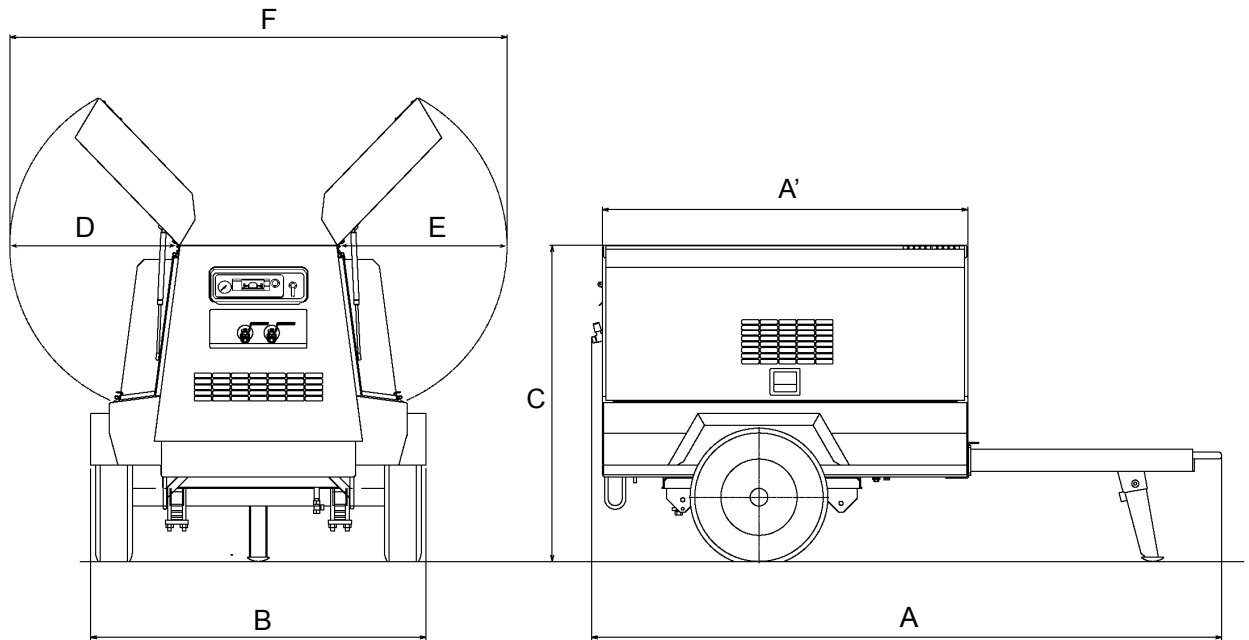
(Old type) Oil pressure switch with no part number. This was supplied together with engines.

Actuating pressure: 39.2kPa SER.NO ~B3-6B40250

(New type) Oil pressure switch Part No. 44328 06700 Actuating pressure: 98.1kPa SER NO. B3-6B40251~

# 1. Specification

## 1.3 Outline drawing



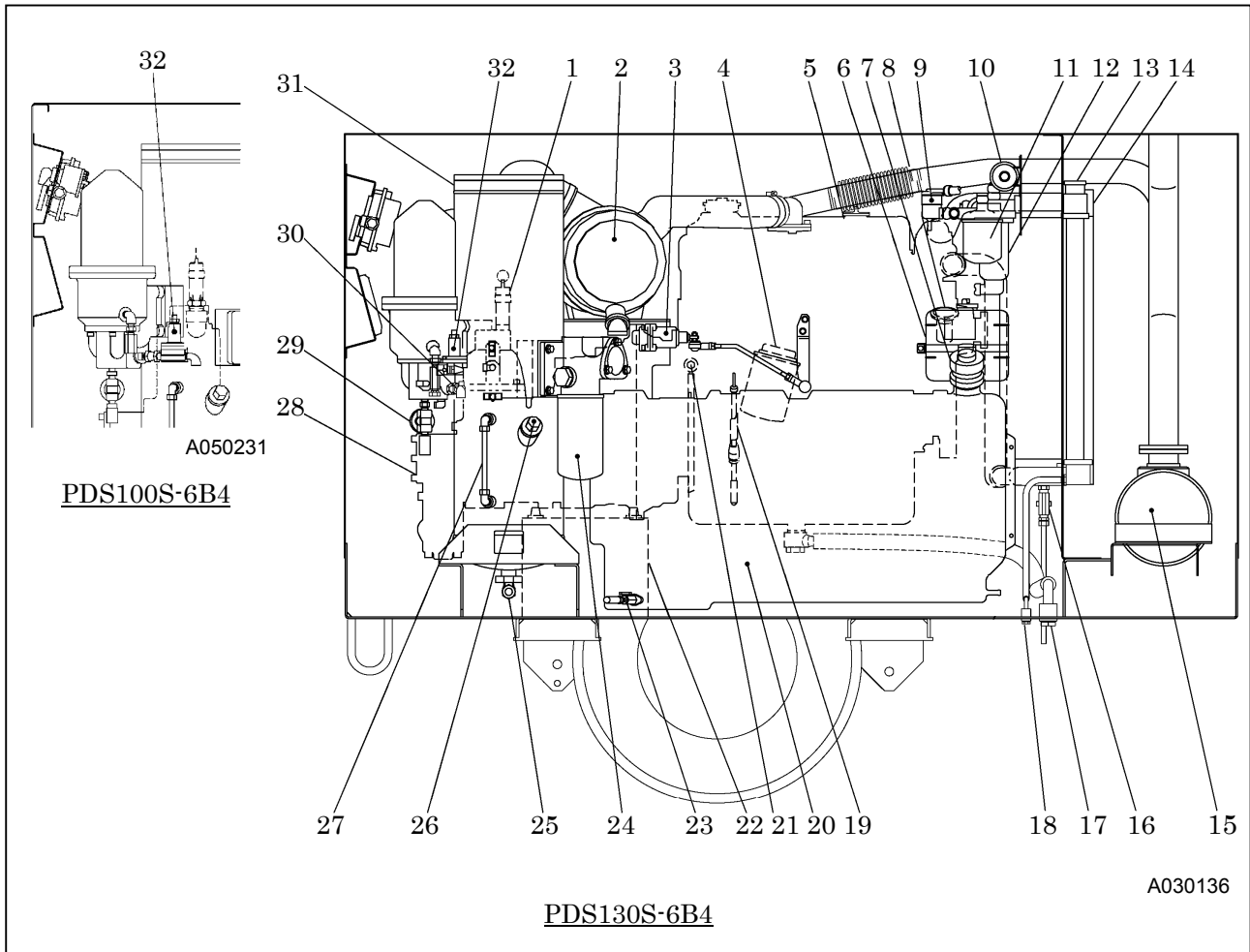
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Item	unit	PDS100S-6B4	PDS130S-6B4
<b>●Outline</b>			
Overall length	A	in.(mm)	※1 116 (2,945)
Overall length	A'	in.(mm)	62 (1,580)
Overall width	B	in.(mm)	57 (1,450)
Overall height	C	in.(mm)	※1 57 (1,450)
<b>●Door size</b>			
Door	D	in.(mm)	29 (730)
Door	E	in.(mm)	29 (730)
Door	F	in.(mm)	85 (2,150)
Exhaust pipe diameter	K	in.(mm)	φ 42.7
			φ 50.8

※1:Dimensions for units equipped with drawbars and undercarriages locally procured in USA.

# 1. Specification

## 1.4 Internal Components and Part Names



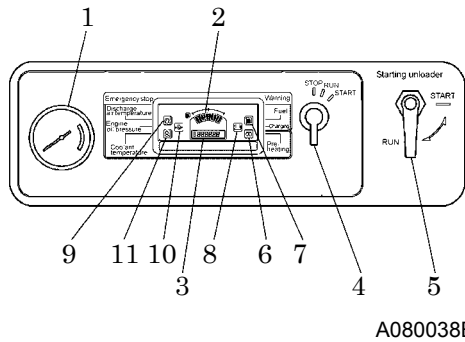
- |  |   |
|--|---|
| 1. Safety valve                            | 17. Engine oil drain plug               |
| 2. Air filter                              | 18. Coolant drain plug (Radiator)       |
| 3. Speed regulator                         | 19. Engine oil dipstick                 |
| 4. Engine oil filter                       | 20. Fuel tank                           |
| 5. Engine                                  | 21. Coolant drain valve (Engine)        |
| 6. Reserve tank                            | 22. Battery                             |
| 7. Fuel filler port                        | 23. Fuel tank drain valve               |
| 8. Engine oil filler                       | 24. Compressor oil filter               |
| 9. Filter for air bleeding electromagnetic | 25. Separator receiver tank drain valve |
| 10. Air bleeding electromagnetic pump      | 26. Compressor oil filler               |
| 11. Fuel filter                            | 27. Compressor oil level gauge          |
| 12. Water sedimentor                       | 28. Air-end                             |
| 13. Radiator                               | 29. Auto-relief valve                   |
| 14. Oil cooler                             | 30. Relief valve (PDS130S only)         |
| 15. Exhaust muffler                        | 31. Separator receiver tank             |
| 16. Oil cooler drain valve                 | 32. Pressure regulator                  |



# 1. Specification

## 1.5 Instrument panel

1. Discharge air pressure gauge
2. Fuel level gauge
3. Elapsed time indicator
4. Starter switch
5. Starting unloader valve



- <Indicator lamp>
- 6. Preheating
- <Warning lamp>
- 7. Fuel residual level
- 8. Charging
- <Emergency stop lamp>
- 9. Discharge air temperature
- 10. Engine oil pressure
- 11. Coolant temperature

### Indicator lamp

Turn the starter switch to “ON” position. Then the lamp will go on.

Item	Trouble	Measures	Monitor
Preheating	Press starter switch “ON” and the lamp goes on and after preheating is finished, the lamp will be off.	—	

### Warning lamp

When some little trouble occurs during operation, the lamp will go on.

When the warning lamp goes on, take appropriate measures to recover the situation swiftly.

Item	Trouble	Measures	Monitor
Fuel residual level	When fuel level of fuel tank becomes lower, the lamp goes on.	Add fuel oil.	
Charging	Lamp goes on when alternator is not charging.	Check wiring. Check alternator.	

### Emergency stop lamp

The compressor stops when the emergency stop lamp goes on.

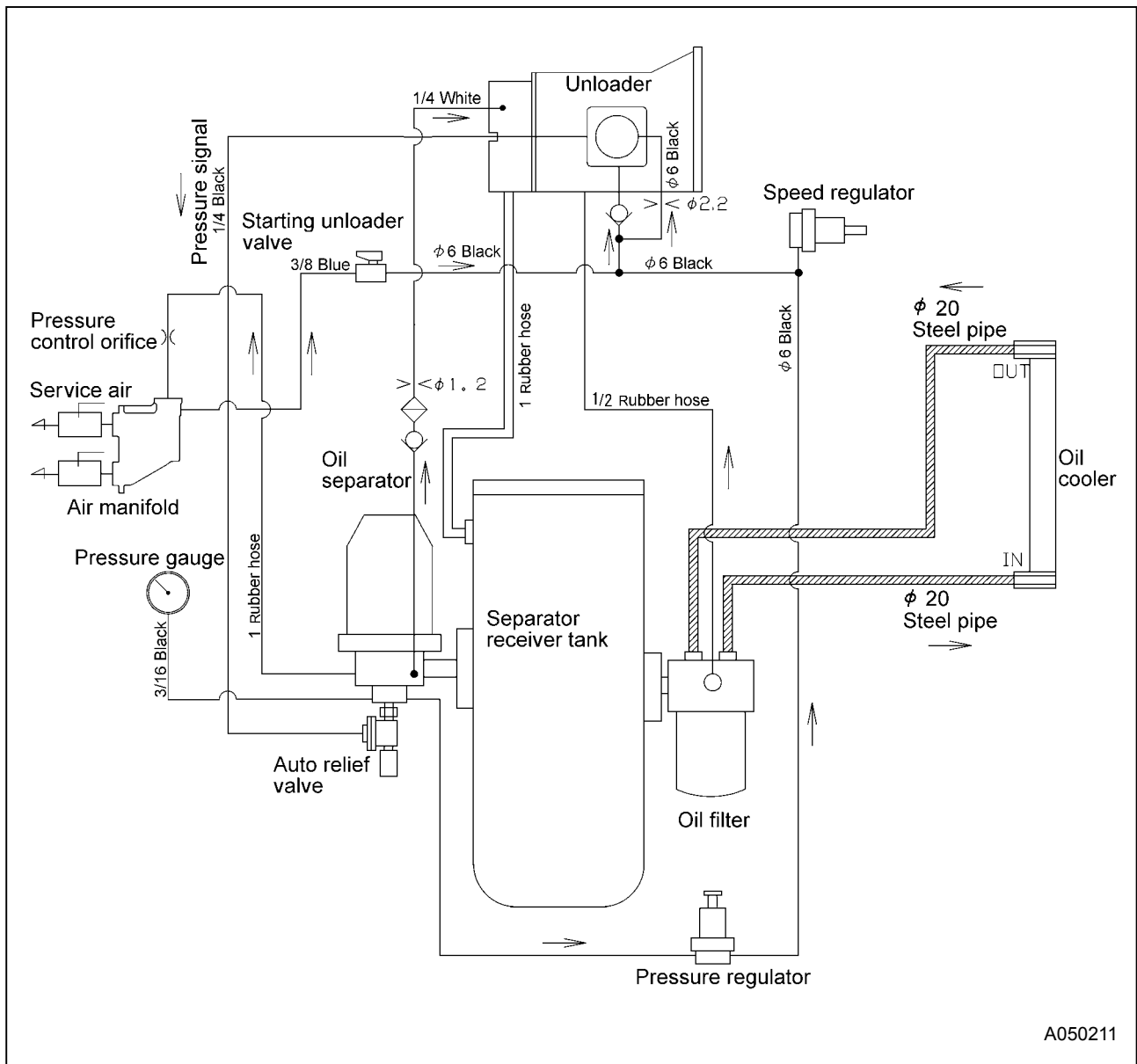
Be sure to follow the measures shown below before starting the unit again.

Item	Trouble	Measures	Monitor
Discharge air temperature	Lamp goes on when the air temperature at the outlet of the air-end reaches the set temperature of 248°F (120°C).	See 4.3 “Function of emergency switch”.	
Engine oil pressure	Lamp goes on when engine oil pressure drops. The function pressure is below 14.2psi (98.1kPa).		
Coolant temperature	Lamp goes on when coolant temperature reaches 230°F (110°C).		

# 1. Specification

## 1.6 Piping Diagram

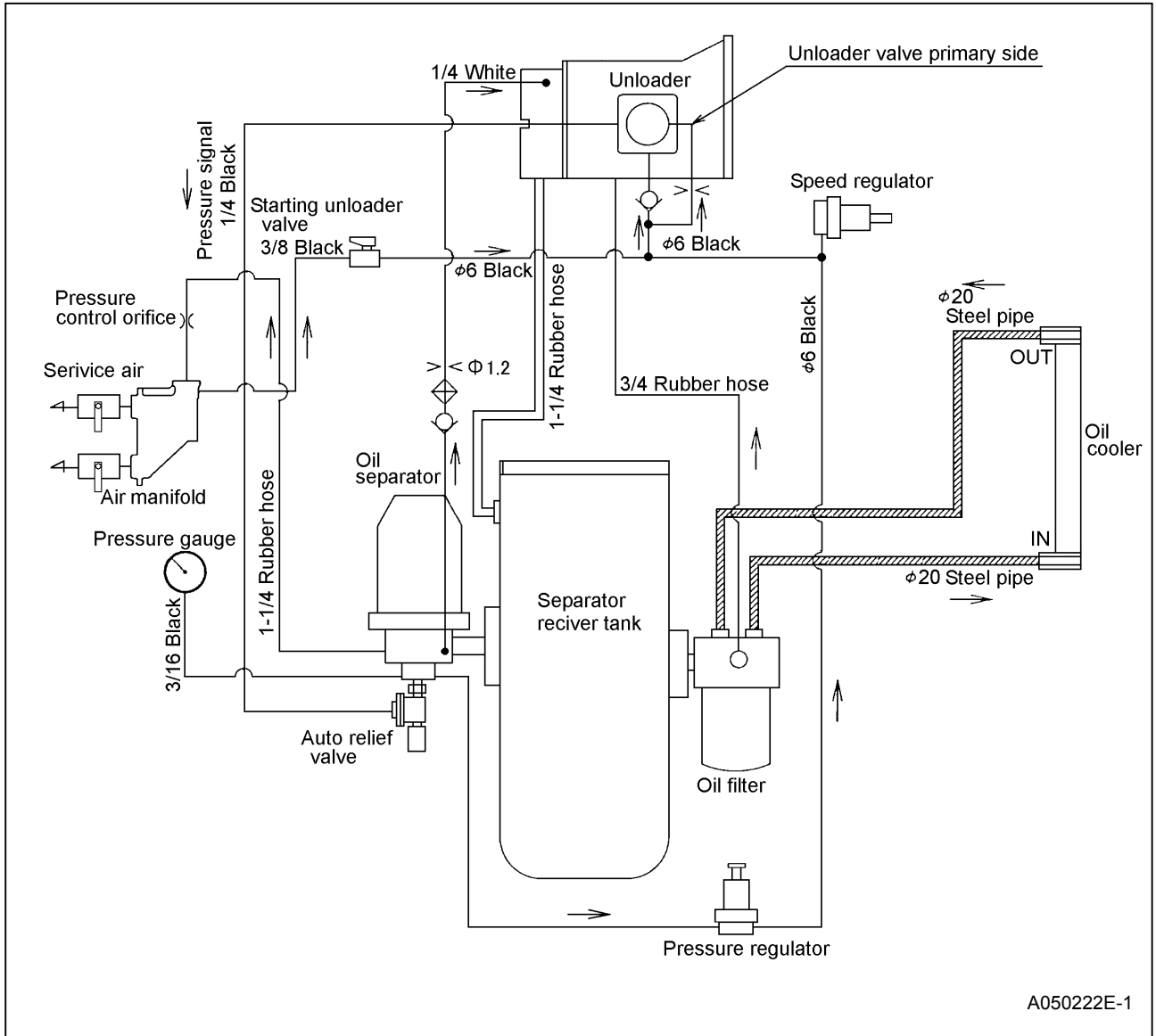
(1) PDS100S-6B4



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# 1. Specification

(2) PDS130S-6B4

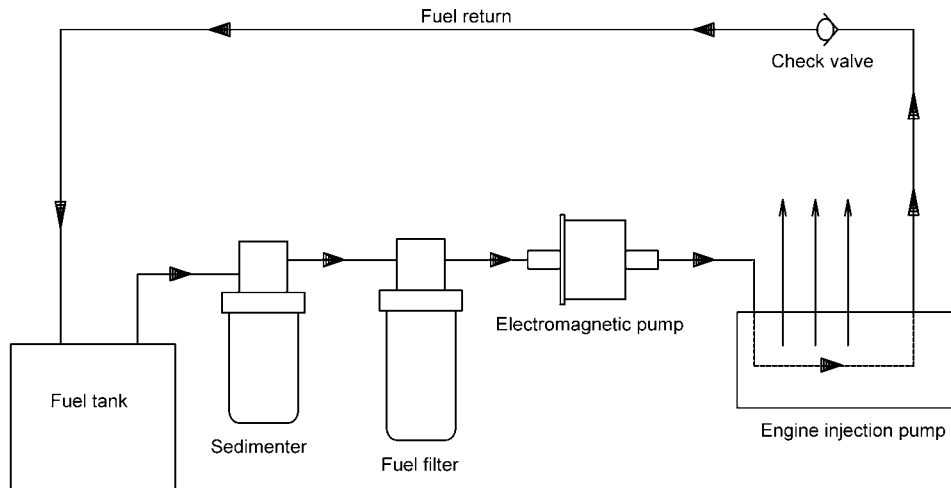


# 1. Specification

## 1.7 Fuel piping

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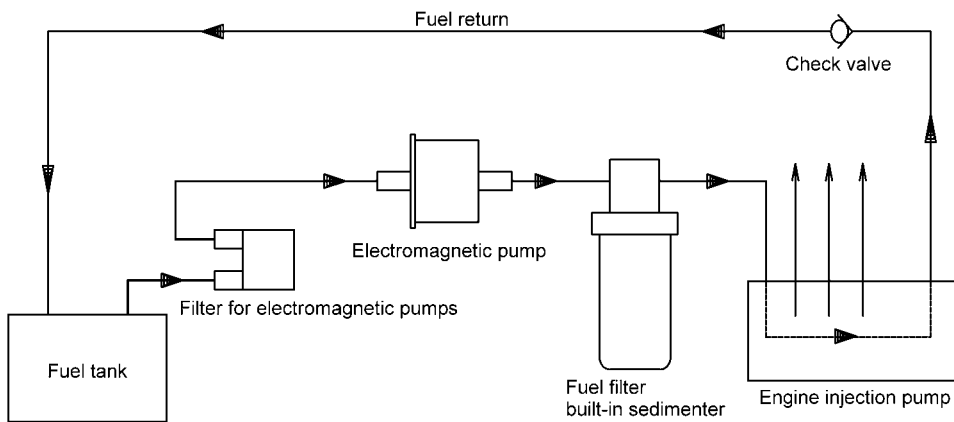
PDS100S-6B4, PD130S-6B4 : This is applied for units planned to be produced February 2009



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※

PDS100S-6B4, PD130S-6B4 : This is applied for units planned to be produced March 2009.



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※:Modification plan of fuel line may be possibly changed. So for details, refer to operation manual and/or part catalogue.

## 2. Maintenance

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### 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.

(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)

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) Install O-ring and oil seal which should be coated with clean lithium extreme pressure type grease (CALTEX MULTIFAK EP1).

(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.

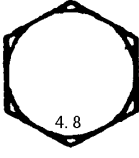
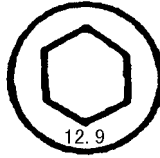
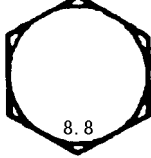
(13) Before starting the machine after disassembly, run it at low idle to check for unusual noises, etc. to prevent engine or generator damage.

## 2. Maintenance

### 2.2 Tightening torque

#### General bolts and nuts tightening torque

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

Kind	Low or Middle carbon steel bolt (SS400B etc...)		High tensile strength bolt (SCM435 etc...)		
	4.6~6.8 (4T~6T)		8.8~12.9 (7T~12T)		
Strength and sorting	 Hexagon bolts		  Socket bolts      Hexagon bolts		
Width of across flat · Tightening torque	Hexagon bolts	Tightening torque lbf·in. (kgf·cm)	Socket bolts	Hexagon bolts	Tightening torque lbf·in. (kgf·cm)
Bolt diameter in.(mm)	Width of across flat in.(mm)		Width of across flat in.(mm)	Width of across flat in.(mm)	
0.24 (6)	0.39 (10)	44 (51)	0.20 (5)	0.39 (10)	87 (100)
0.31 (8)	0.51 (13)	108 (124)	0.24 (6)	0.51 (13)	213 (245)
0.39 (10)	0.67 (17)	213 (245)	0.31 (8)	0.67 (17)	421 (485)
0.47 (12)	0.75 (19)	370 (425)	0.39 (10)	0.75 (19)	734 (845)
0.55 (14)	0.87 (22)	586 (675)	0.47 (12)	0.87 (22)	1172 (1350)
0.63 (16)	0.94 (24)	916 (1055)	0.55 (14)	0.94 (24)	1823 (2100)
0.71 (18)	1.06 (27)	1260 (1450)	0.55 (14)	1.06 (27)	2517 (2900)
0.79 (20)	1.18 (30)	1780 (2050)	0.67 (17)	1.18 (30)	3560 (4100)
0.87 (22)	1.26 (32)	2430 (2800)	0.67 (17)	1.26 (32)	4861 (5600)
0.94 (24)	1.42 (36)	2995 (3450)	0.75 (19)	1.42 (36)	6163 (7100)
Applied sections.	For general sections such as bonnet and frame.		For specified sections.		

#### IMPORTANT

- 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

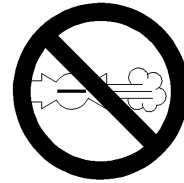
### 2.3 How to adjust regulator and how to replace diaphragm

#### 2.3.1 Method of adjustment



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

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

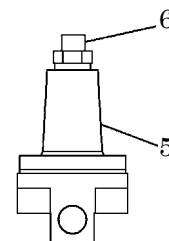
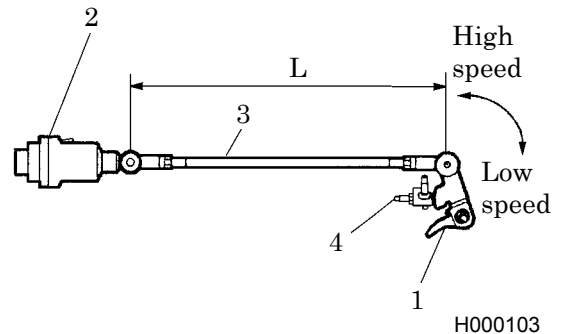


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- The speed regulator is already adjusted prior to delivery ex.works. Never change the setting of the regulator by turning bolt and rod recklessly.
- If it is necessary to re-adjust the speed regulator due to overhauling or any trouble, adjust it in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

#### <Adjustment procedure>

- ① Adjust the length of the rod "3" connecting speed regulator "2" so that engine governor lever "1" can be fully pulled toward high speed side, with compressor kept stopping. (Making the rod length short, engine speed increases.) If engine governor lever "1" does not touch high speed side stopper "4", it is impossible to get a determined engine speed at full load operation. But it is not necessary to adjust unload operation speed.
- ② Adjust this system so that when pressure exceeds 102psi (0.7MPa) by turning pressure adjusting screw, speed regulator "2" can start to function to lower engine RPM. (Tightening the screw, the pressure rises, and loosening it, the pressure drops.)



- Make sure to adjust engine speed in accordance with the above adjustment procedure so that engine governor lever can touch high speed side stopper at full load operation. When separator receiver tank pressure drops below 43.5psi (0.3MPa) at full load operation with engine speed set lower than rated set speed, discharge air temperature rises and it will result in a serious trouble.

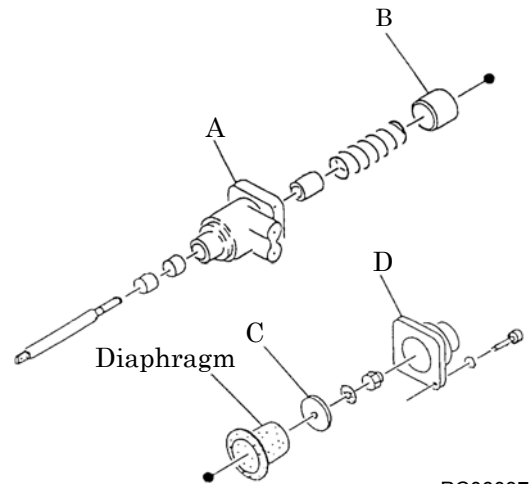
## 2. Maintenance

### 2.3.2 Change Diaphragm

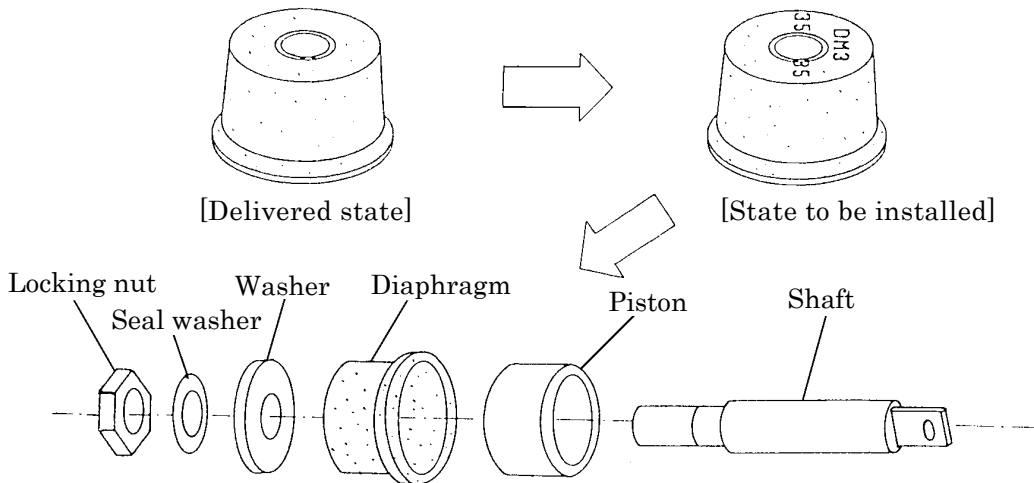
#### Speed Regulator

<Procedure>

- ① Remove the speed regulator from the bracket and disassemble it.
- ② Replace diaphragms with new ones.
- ③ Check A to D shown in figure for any burrs.
- ④ Diaphragm is delivered in different state from the state in which it should be installed. So install diaphragm which should be turned inside out, as shown in the following Fig.

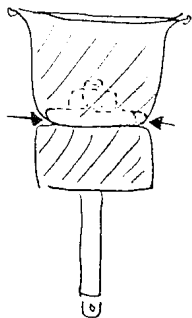


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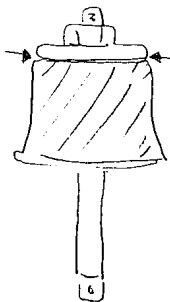


- ⑤ Internal face of body and cap and also both internal face and external face of diaphragm should be coated with molybdenum oxide spray.  
How to spray molybdenum oxide paste : The areas in oblique line should be sprayed with this paste.

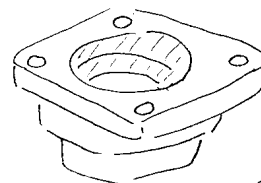
Diaphragm should be rolled up and back face and piston should be sprayed.



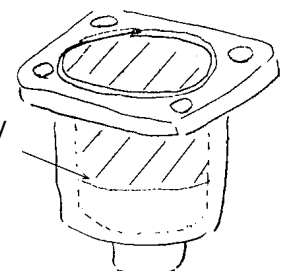
Then it should be returned and be sprayed.



Inside of body should be sprayed.



Inside face of body should be sprayed till middle line.



※ Jointed portion should be sprayed enough.



## 2. Maintenance

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

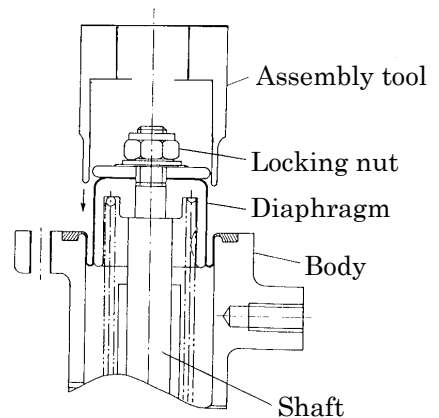
Tightening torque : 69.4 lbf·in. (80 kgf·cm)

**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.

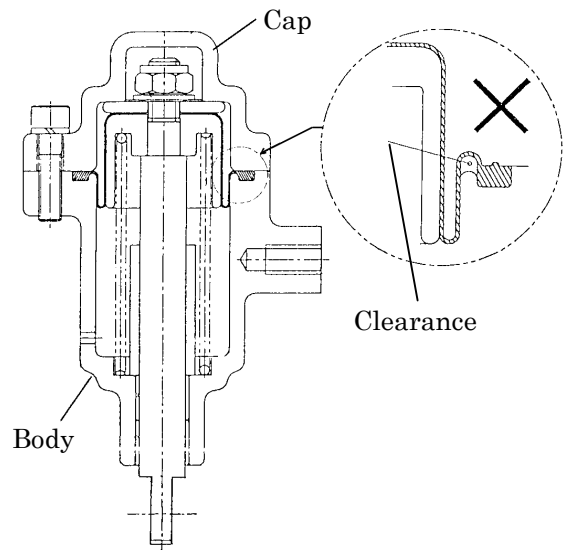
**Important** : Once diaphragm is settled in, turn slowly the tool for secure installation. When turning the tool, hold the diaphragm not to be afloat.

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



- 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.



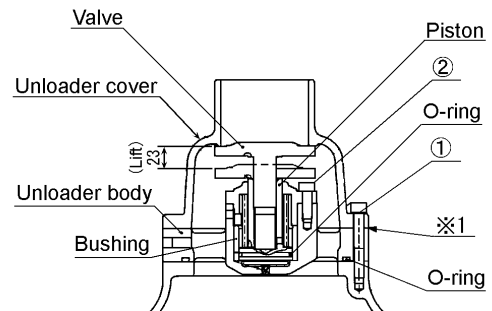
- ⑨ After re-assembling the speed regulator, adjust it according to the adjustment method of speed regulator (See 2.3.1).

## 2. Maintenance

### 2.4 Replacement of unloader spare parts

<Procedure>

- ① Disassemble unloader, and replace O-rings (2 points) and bushing with new ones.
- ② When changing O-rings, fully coat O-rings, O-ring groove, sliding portions of valve and piston with Lithium base extreme pressure grease.
- ③ When re-assembling it, coat the seating faces of unloader body and cover with liquid sealing packing LOCTITE FMD127 and retighten them according to the specified torque mentioned in the following table.



PC07006

#### IMPORTANT

- When reassembling, apply sufficient grease to O-ring slot, sliding surface of piston, O-ring. Use CALTEX MULTIFAK EP1 grease.

Tightening torque of unloader assembling bolts

No.	Item	Bolt diameter (mm)	Socket bolts Width of across flat (mm)	Tightening torque N·m (kgf·cm)
①	Tightening torque of unloader cover assembling bolts	10	8	75.5(770)
②	Unloader inner cover assembling bolts	10	8	75.5(770)

※1 : When assembling unloader cover and body, coat the contacting faces with liquid sealing packing LOCTITE FMD-127.

## 2. Maintenance

### 2.5 Pressure adjustment procedure of pressure control valve and replacement of spare parts

Venturi tube orifice type pressure control valve

Item	PDS100S	PDS130S
Set pressure	72.5psi (0.5MPa)	58psi (0.4MPa)
Screw size	R1	R1

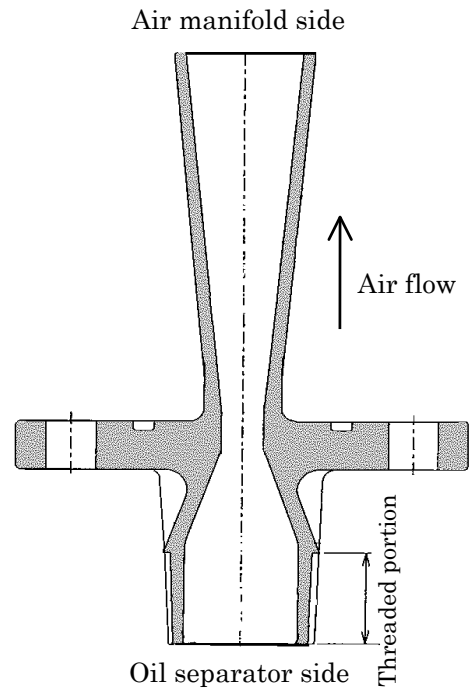
<Note>

- Make sure to fully open service valve when stopping operation.

If air in connected line flows in reverse direction into receiver tank, auto-relief valve will continue working.

- At start-up, close service valve fully.

If you start with valve open, at start position where starting unloader is placed, starting unloader valve will not work and it will raise engine speed.



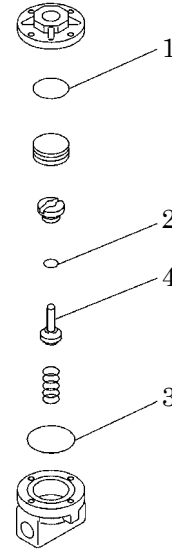
## 2. Maintenance

### 2.6 Inspection/replacement of auto relief valve spare parts

Disassemble and clean the component, and check O-ring “1”, “2”, “3” and needle valve “4”. Then, replace O-ring “1”, “2”, “3” and needle valve “4” if its rubber is hardened.

#### IMPORTANT

- When reassembling, apply sufficient grease to O-ring slot, sliding surface of piston, O-ring.  
Use CALTEX MULTIFAK EP1 grease.



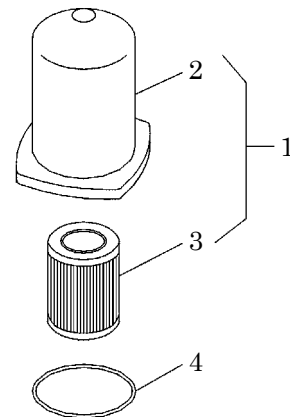
H000057

### 2.7 Change Oil Separator


- When replacing oil separator “3”, do not fail to replace cover “2”, an element “3”, and the O-ring “4”.


<Procedure>

- ① Stop operation, and confirm that there is no residual pressure both in separator receiver tank and air line.
- ② Remove all the bolts for installing the cover “2” of oil separator “1”.
- ③ Replace cover “2”, element “3” and O-ring “4” with new ones.
- ④ Supply grease to O-ring “4” after replacement.  
Grease: CALTEX MULTIFAX EP1
- ⑤ Tighten the fixing bolts of separator cover “1” according to the specified torque. (Tighten the bolts diagonally and after tightening all the bolts, ultimately tighten them again in full circumference.)



H000056

 : 17 mm

 : 62.8 N·m (640kgf·cm)

#### IMPORTANT

- Clean dust, paints and traces of paint, if any from O-ring fitting face, and install O-ring after coating it with enough grease.  
Use CALTEX MULTIFAK EP1 grease.

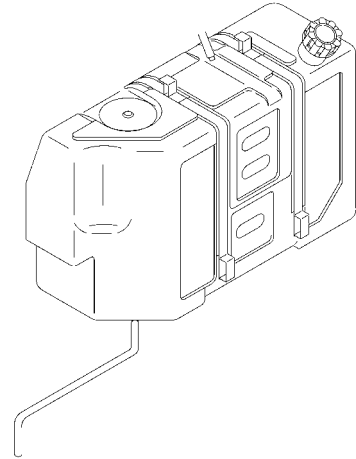
## 2. Maintenance

### 2.8 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 Dismantle the door and side covers of bonnet.
- 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.



PDS130S-6B4

PC08059

### 2.9 Values of Various Adjustments of Engine

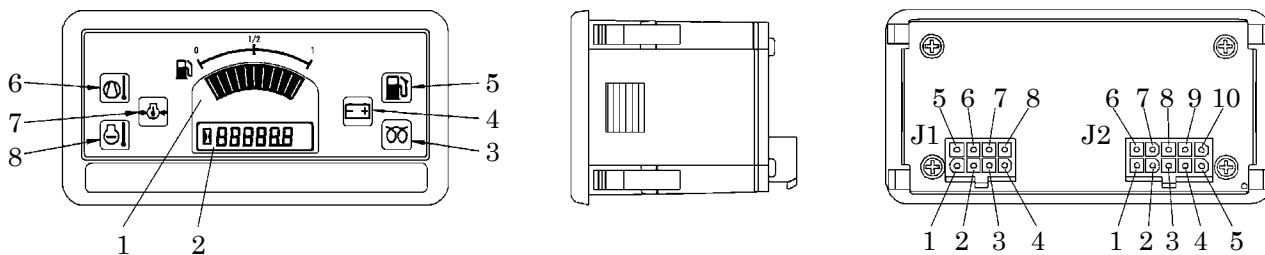
Item		unit	PDS100S-6B4	PDS130S-6B4
Engine model			IHI SHIBAURA S773L-C	IHI SHIBAURA N843L-C
Tightening torque of head bolts		lbf·in. (kgf·cm)	434-460(500-530)	868-911(1000-1050)
Valve clearance	Air intake	in.(mm)	0.008 (0.2) (in cold season)	
	Discharge	in.(mm)	0.008 (0.2) (in cold season)	
Firing order			1-2-3	
Injection timing (BTDC)		°	24±1°	22±1°
Nozzle injection pressure		psi (MPa)	2016 (13.9)	2132 (14.7)
Compression		psi (MPa)	426 (2.94) (Rotation speed 300min <sup>-1</sup> )	
Thermostat	Temperature for start of release	°F (°C)	167 (75)±2	160 (71)±2
	Full open temperature	°F (°C)	189 (87)	180 (82)
	Valve lift	in.(mm)	0.24 (6)	0.32 (8)

# 3. Electric System

## 3.1 Engine electric appliances

### 3.1.1 Instrument panel (Control)

Part Number:36100 07200



A08060

<Instruments>

- 1. Fuel level gauge
- 2. Elapsed time indicator

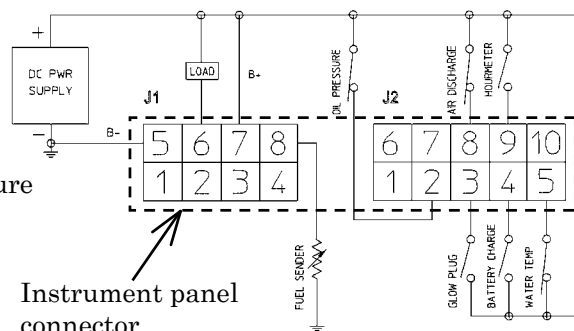
<Indicator lamp>

- 3. Preheating

<Warning lamp>

- 4. Charging
- 5. Fuel residual level
- 6. Discharge air temperature
- 7. Engine oil pressure
- 8. Coolant temperature

<Emergency stop lamp>



Instrument panel connector

Cable connection

A08061

(1) Residual fuel oil in fuel gauge

Pointer position	Resistance ( $\Omega$ )	Remaining fuel (%)
1/10	95.2	10
2/10	70.3	20
3/10	54.4	30
4/10	43.1	40
5/10	32.6	50
6/10	24.5	60
7/10	19.1	70
8/10	12.4	80
9/10	6.9	90
10/10	3	100

### 3. Electric System

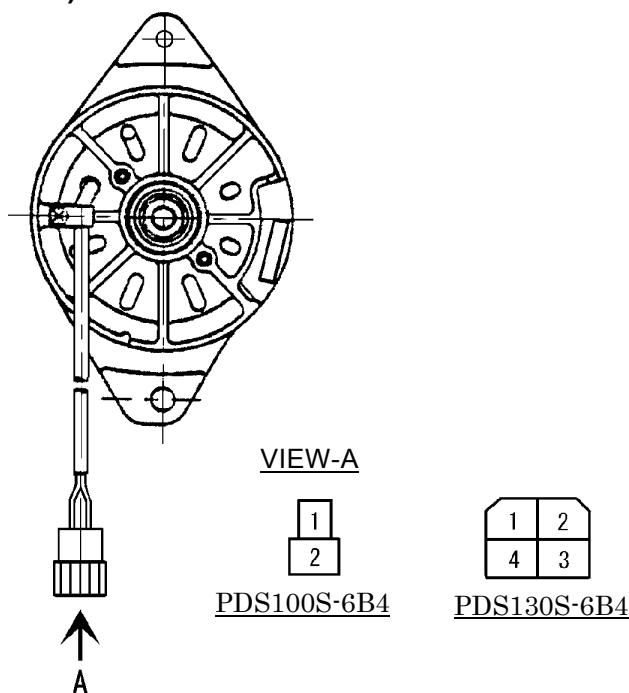
(2) List of functions

Pin No.	Line color	Connection	Remark	
Connector J1	1	—	NIL	
	2	—	NIL	
	3	—	NIL	
	4	—	NIL	
	5	B	Earth	
	6	Y/G	Solenoid No.2 terminal	It is electrically connected during normal operation. When emergency stop system works, internal contact between J1-5 (ground connection) and J1-6 terminal will be "OFF" and power supply to stop solenoid will be cut and it will cause engine emergency stop.
	7	G/Y	10A Fuse	Power supply
	8	L/Y	Sending unit No.1 terminal	It detects residual fuel.
Connector J2	1	—	NIL	
	2	L/R	※1 Engine oil pressure switch	It is electrically connected during normal operation. When engine oil pressure drops and oil pressure switch is "OFF", power supply to J2-2 terminal will be cut. Then emergency stop system functions to break internal contact between J1-5 (ground connection) and J1-6 terminal to cut power supply to stop solenoid, causing engine emergency stop. ●Set pressure of emergency stop oil pressure below 14.2psi (0.098MPa)
	3	G	Glow plug	During preheating operation, it supplies power to light preheat lamp.
	4	Y/B	Dynamo regulator Male terminal	Bad charging, Charging lamp is caused to light on. During normal operation, warning lamp for bad charging will not go on because both poles of warning lamp (J2-4 terminal) are equally potential. When there is no voltage coming from female connector of dynamo regulator, current flows to dynamo regulator to make warning lamp light on.
	5	L/B	Coolant temp. switch	It is electrically connected during normal operation. When engine water temperature switch becomes "OFF" with rise of engine coolant temperature, power supply is cut to J2-5 terminal. It actuates emergency stop circuit to break the internal contact between J1-5 (ground connection) and J1-6 terminal and then power supply is cut to stop solenoid to cause engine emergency stop. ●Emergency stop set temperature 230°F(110°C)
	6	—	NIL	
	7	—	NIL	
	8	L/W	Discharge air temp. switch	It is electrically connected during normal operation. When discharge air temperature switch becomes "OFF" with rise of discharge air temperature, power supply is cut to J2-8 terminal. It actuates emergency stop circuit to break the internal contact between J2-5 (ground connection) and then power supply is cut to stop solenoid to cause engine emergency stop. ●Emergency stop set temperature 248°F(120°C)
	9	W/G	Dynamo regulator No.4 terminal	Generating signal inputted Inputting of generating signal actuates both hour-meter and detection circuit (timer built-in) for abnormal oil pressure.
	10	—	NIL	

※1:Detection circuit for abnormal oil pressure will start to work 10 seconds after detecting generating signal of alternator with J2-9 terminal.

# 3. Electric System

## 3.1.2 Alternator (Dynamo)



PC08062

### (1) List of functions

#### PDS100S-6B4

Pin No.	Line color	Connection	Remark
1	R/B	Dynamo regulator No.1 terminal	Outputting charging voltage to dynamo regulator.
2	R/W	Dynamo regulator No.3 terminal	

#### PDS130S-6B4

Pin No.	Line color	Connection	Remark
1	R/B	Dynamo regulator CN2-2 terminal	Outputting charging voltage to dynamo regulator.
2	R/B	Dynamo regulator CN2-1 terminal	
3	R/W	Dynamo regulator CN2-4 terminal	
4	R/W	Dynamo regulator CN2-3 terminal	

### (2) Judgement of alternator (Dynamo) functions

Test method	Normal value
Measure voltage at no load condition during operation (at full speed). (Measure AC current between 2 dynamo lead lines.)	Above AC30V
Check for electric conductivity of coiled line while stopping. (Check for electric conductivity between 2 dynamo lead lines.)	Electric conductivity found.
Measure insulation resistance. (Measure insulation resistance between 1 dynamo lead line and coil plate.)	More than 3MΩ
Remove V-belt, and turn pulley by hand.	Due to magnetism repulsion occurs 12 times reactions per one turn, but it turns comparatively smoothly.

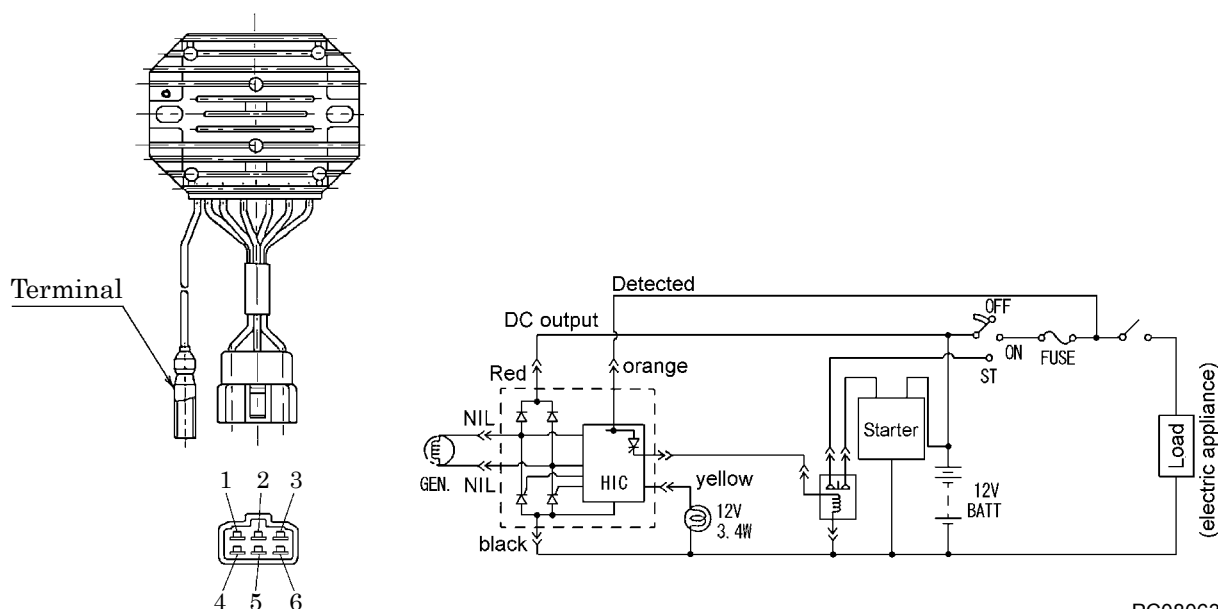


# 3. Electric System

## 3.1.3 Dynamo regulator

PDS100S-6B4

Part Number:44323 06600



PC08063E

### (1) Specification

Combination battery	12V
Adjusted voltage	14.5 ± 0.5V
Allowable output current	16A
Actuating RPM of safety relay	1700 ± 140min <sup>-1</sup> (Dynamo RPM)

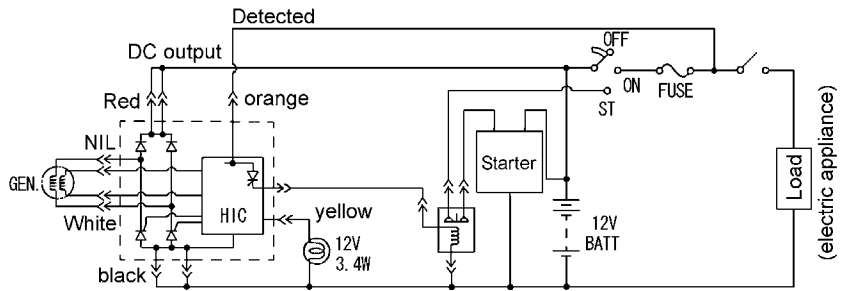
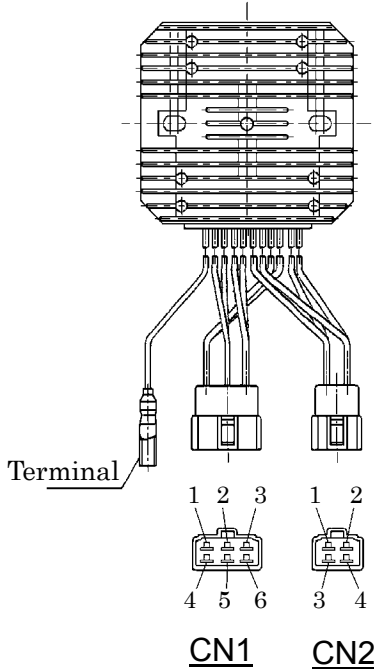
### (2) List of functions

Pin No.	Line color	Connection	Remark
Terminal 1	Y/B	Instrument panel J2-4 terminal	Bad charging causes warning lamp to go on.
1	R/B	Dynamo No.1 terminal	Power source of dynamo regulator. (between pin No.1 and 3)
2	B	Earth	
3	R/W	Dynamo No.2 terminal	Power source of dynamo regulator. (between pin No.1 and 3)
4	W/G	Safety relay No.3 terminal	Generator signal output.
5	G/Y	10A Fuse	Detection of output voltage of dynamo regulator.
6	R	Starter switch B terminal	Power for charging voltage.

# 3. Electric System

PDS130S-6B4

Part Number:44323 06900



PC08064E

## (1) Specification

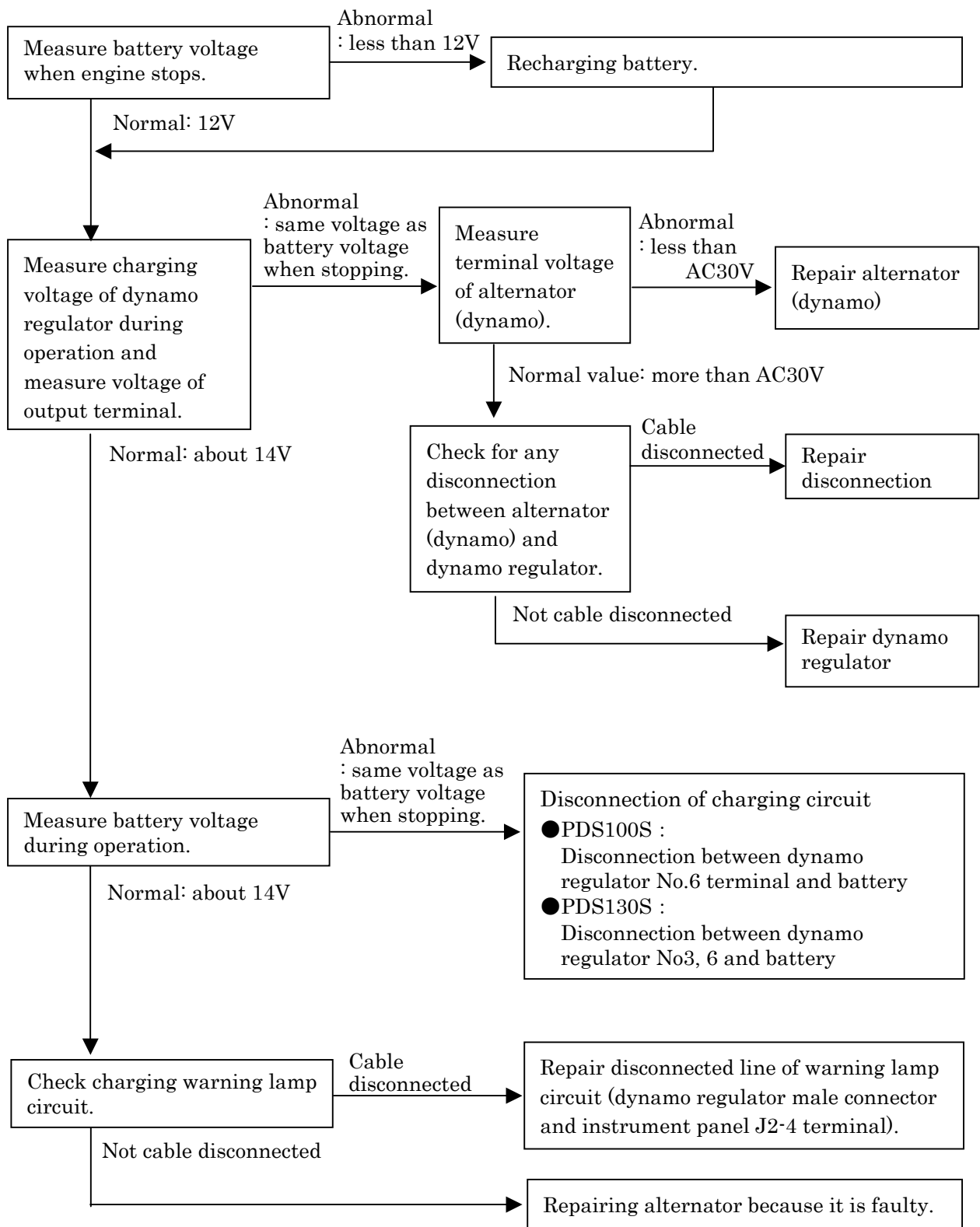
Combination battery	12V
Adjusted voltage	14.5 ± 0.5V
Allowable output current	27A
Actuating RPM of safety relay	2150 ± 140min <sup>-1</sup> (Dynamo RPM)

## (2) List of functions

Pin No.	Line color	Connection	Remark	
Terminal	Y/B	Instrument panel J2-4 terminal	Bad charging causes warning lamp to go on.	
Connector CN1	1	B	Earth	
	2	G/Y	10A Fuse	Detection of output voltage of dynamo regulator.
	3	R	Starter switch B terminal	Power for charging voltage.
	4	B	Earth	
	5	W/G	Safety relay No.3 terminal	Generator signal output.
	6	R	Starter switch B terminal	Power for charging voltage.
Connector CN2	1	R/B	Dynamo No.2 terminal	Power source of dynamo regulator.
	2	R/B	Dynamo No.1 terminal	
	3	R/W	Dynamo No.4 terminal	
	4	R/W	Dynamo No.3 terminal	

# 3. Electric System

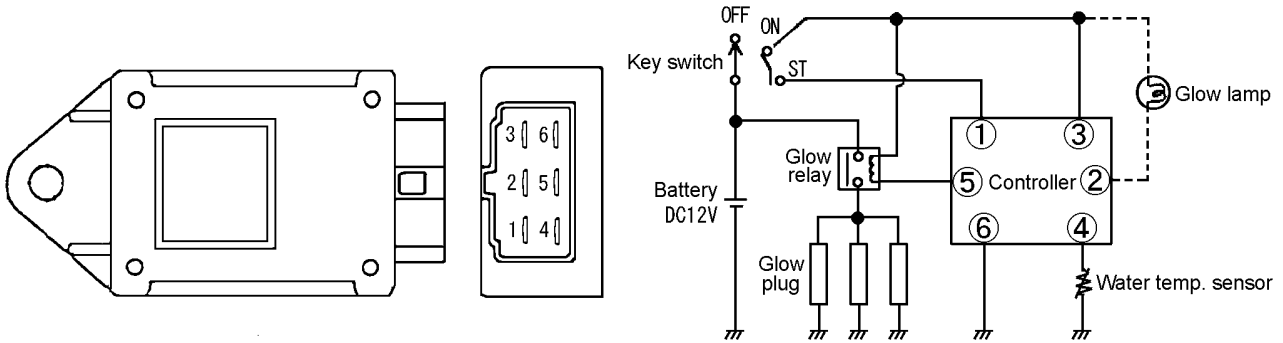
## (3) Diagnosing when battery charging warning lamp lights



# 3. Electric System

## 3.1.4 Glow controller

Part Number:44346 12500



PC08065E

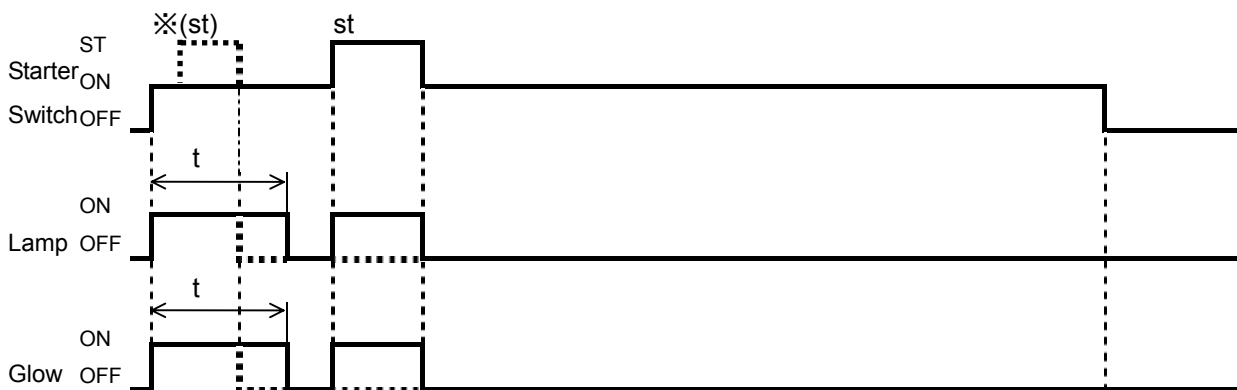
(1) Coolant temperature · glow instantaneous characteristic ( at the time of key-OFF-ON)

Water temp. °F (°C)	Lamp lights · glow time t (sec)
5 (-15)	8.9
32(0)	5.8
68(20)	2.7

(2) List of functions

Pin No.	Line color	Connection	Remark
1	W/B	Starter switch R2 terminal	Detection of starter signal
2	—	NIL	
3	G/Y	10A Fuse	Power supply
4	G/R	Water temperature sensor	Detection of water temperature
5	G/W	Glow relay No.3 terminal	Power supply for glow relay. During preheating operation, connect to No.6 ground connection and it will be magnetically excited. When the start signal is inputted to No.1 terminal, it preheats, regardless of coolant temperature.
6	B	Earth	

(3) Chart of function



※: The chart marked ※ 1 shows the function chart at which the starter switch is placed at “st” position.

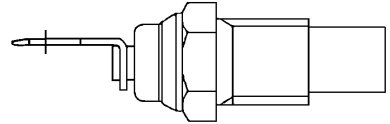
# 3. Electric System

## 3.1.5 Water temperature sensor for preheating

Part Number:44334 14800

Coolant temperature · Resistance characteristics

Water temp. °F (°C)	Resistance (Ω)
95 (35)	670.0±80
176 (80)	118.0±6
221 (105)	54.5±2.7
239 (115)	42.0±2.5

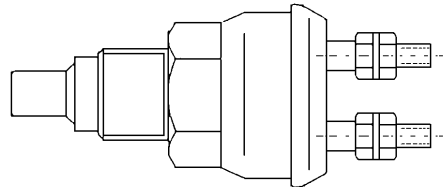


## 3.1.6 Discharge air temperature switch

Part Number:44334 16500

Specification

Setting temp. °F (°C)	OFF	248±35.6 (120±2)
	ON	230±35.6 (110±2)
Contact type		B contact switch (Contact "OFF" in excess of set pressure)

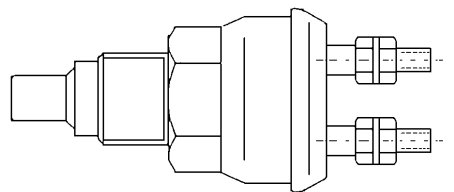


## 3.1.7 Engine coolant temperature switch

Part Number:44334 17500

Specification

Setting temp. °F (°C)	OFF	230±35.6 (110±2)
	ON	217.4±35.6 (103±2)
Contact type		B contact switch (Contact "OFF" in excess of set pressure)

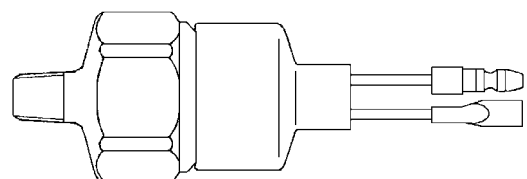


## 3.1.8 Engine oil pressure switch

Part Number:44328 06700

Specification

Setting pressure	14.2psi (98.1kPa)
Contact type	A contact switch (Contact "ON" in excess of set pressure)



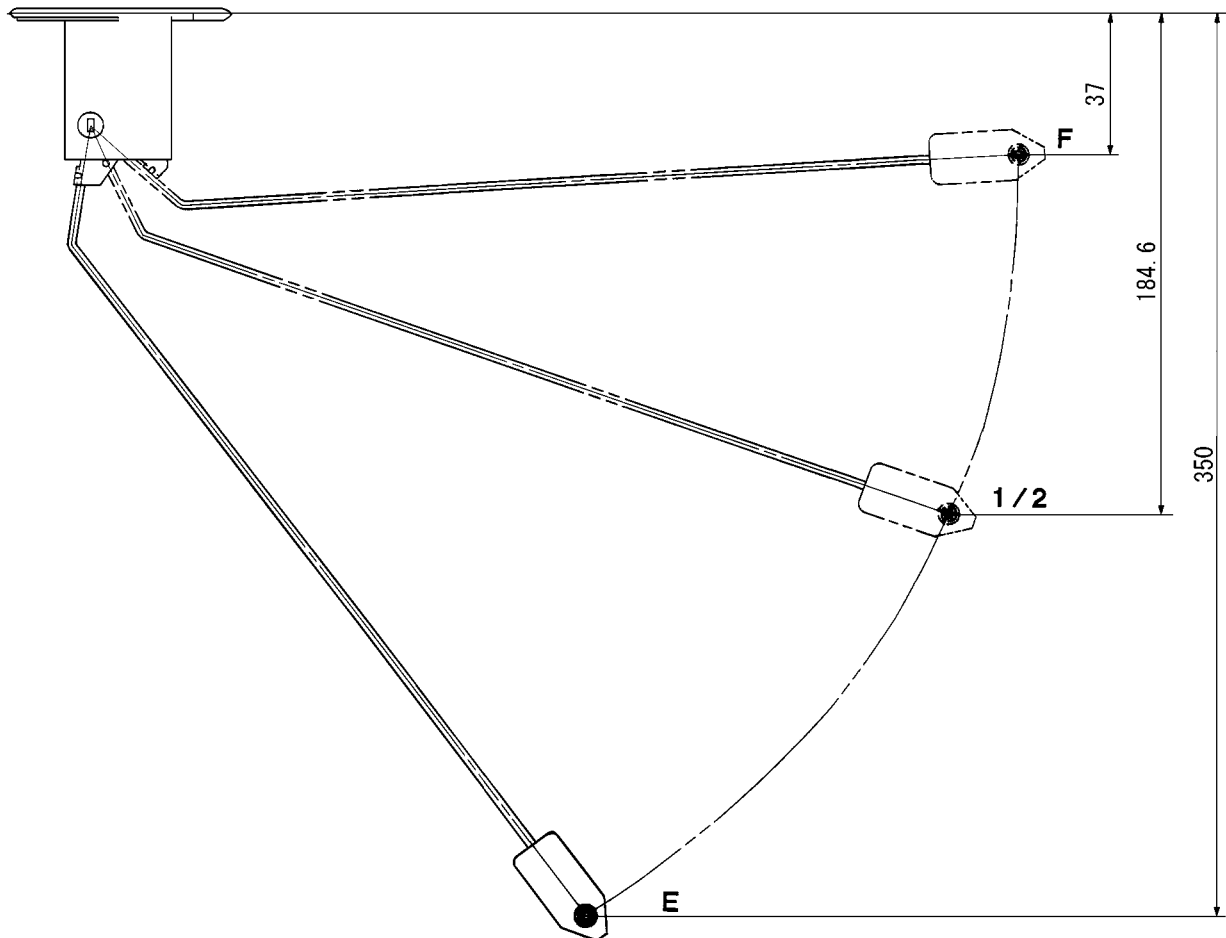
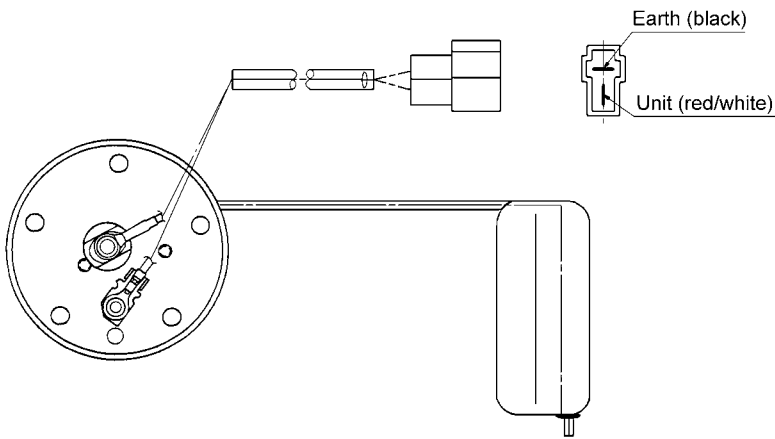
PC08066

# 3. Electric System

## 3.1.9 Sending unit

Pointer position	PDS100,130S-6B4	Resistance (Ω)
	Remaining fuel gal.(L)	
E	3 (11.5)	110
1/2	10 (38.0)	32.5
F	16.8 (63.5)	3

Part Number:36159 02202

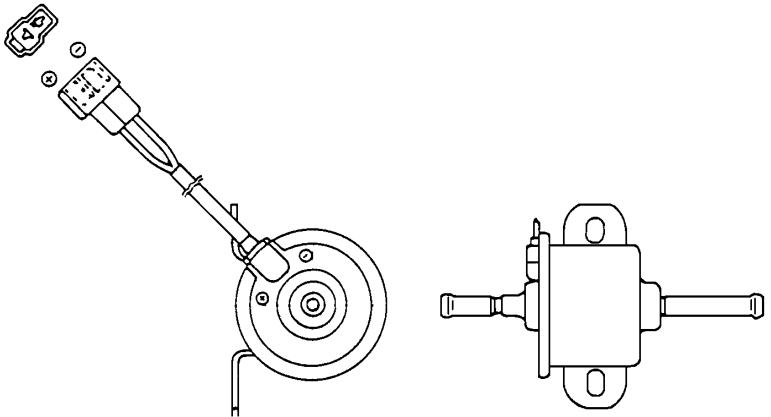


PC08069E

# 3. Electric System

## 3.1.10 Fuel air-bleeding electromagnetic pump

Part Number:43650 01500



### (1) Specification

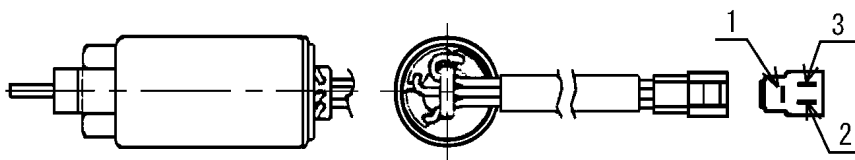
Rated voltage	12V
Operating current	1.5A(MAX)
Delivery capacity	More than 0.8L/min

### (2) Functions

When the key switch is turned “ON”, electromagnet pump No.2 terminal will be electrically conducted to work. On the contrary, when “OFF” or emergency stop circuit works, solenoid relay No.3 is switched to cut connection to electronic pump solenoid.

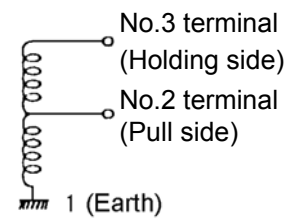
PC08087

## 3.1.11 Stop solenoid



PC08084

### Cable connection



PC08086E

### (1) Specification

		PDS100,130S-6B4
Maker		HITACHI
Rated voltage		12V
Rated current	Pull side	Less than 25A
	Holding side	less than 1A

# 3. Electric System

## (2) List of functions

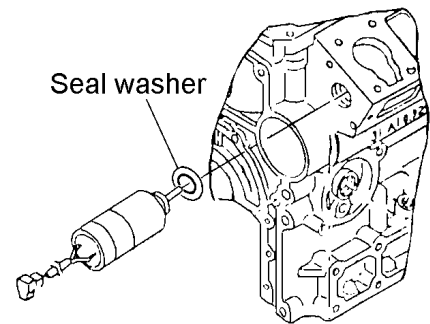
Pin No.	Line color	Connection	Remark
1	B	Earth	
2	L	Starter switch R2 terminal	Pull coil
3	Y/L	Solenoid relay No.3 terminal	Holding coil

## (3) Functions

When key switch is "ON", stop solenoid No.3 terminal (holding circuit) is electrically conducted. When key switch is turned to "START", stop solenoid No.2 terminal is electrically conducted. And the plunger inside stop solenoid is pulled to open the rack of engine fuel filler port. After engine starts, rack of fuel filler port is kept open because stop solenoid No.3 terminal (holding circuit) is electrically conducted. When key switch is "OFF" or emergency stop circuit functions, contact of solenoid relay No.3 terminal is switched to cut electric conduction to stop solenoid. Thus fuel supply to engine is cut to make engine stop.

### Caution upon installation of stop solenoid

- Replace seal washer with new one, which is to be fitted on the fitting face of stop solenoid.
- Screw in stop solenoid from the back of cylinder block (back of No.3 injection pump rack) and tighten it according to the set torque.  
Tighten torque 15.0-20.0 N·m (1.5-2.0 kg·m)



PC08082



# 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

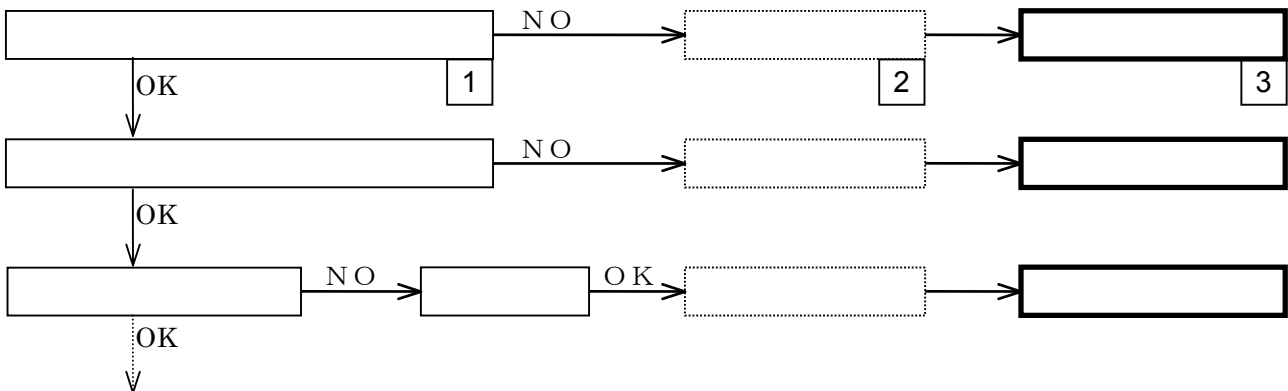
When you become well experienced, you can find out the cause easily during the process of confirmation (4). But easy understanding could cause unexpected failure. So check and judge it according to the following procedures.

- 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.

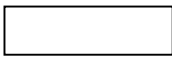
## (6) Prevention of repeated occurrence of similar trouble

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.



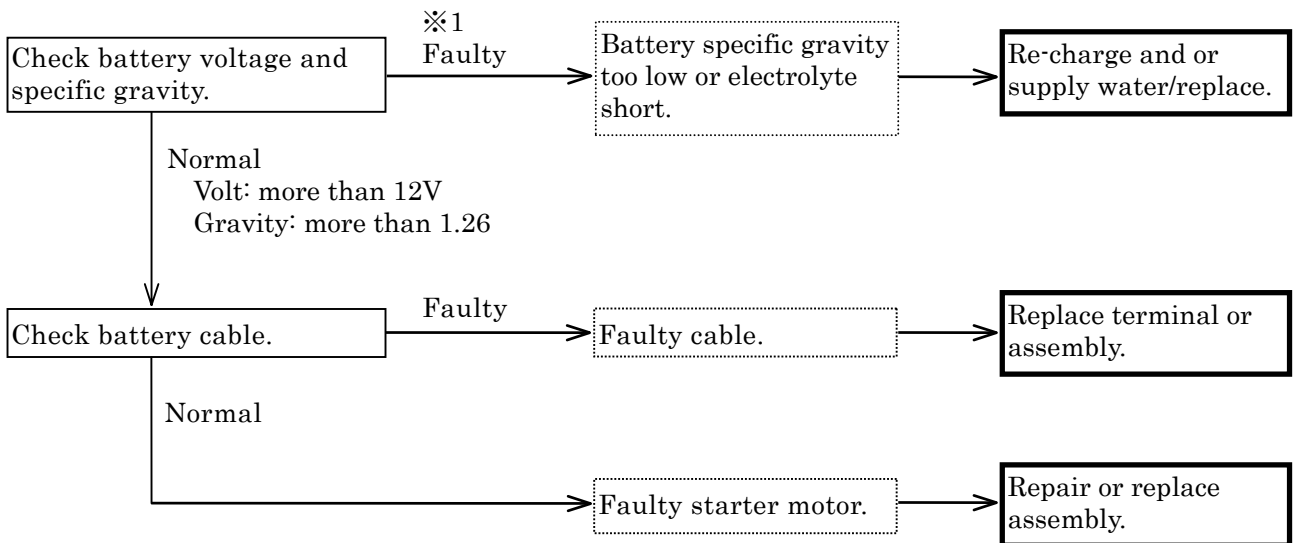
④ 1 under each column means the index of explanation.

For details, see 4.5 “Explanation of trouble diagnosis”

# 4. Troubleshooting

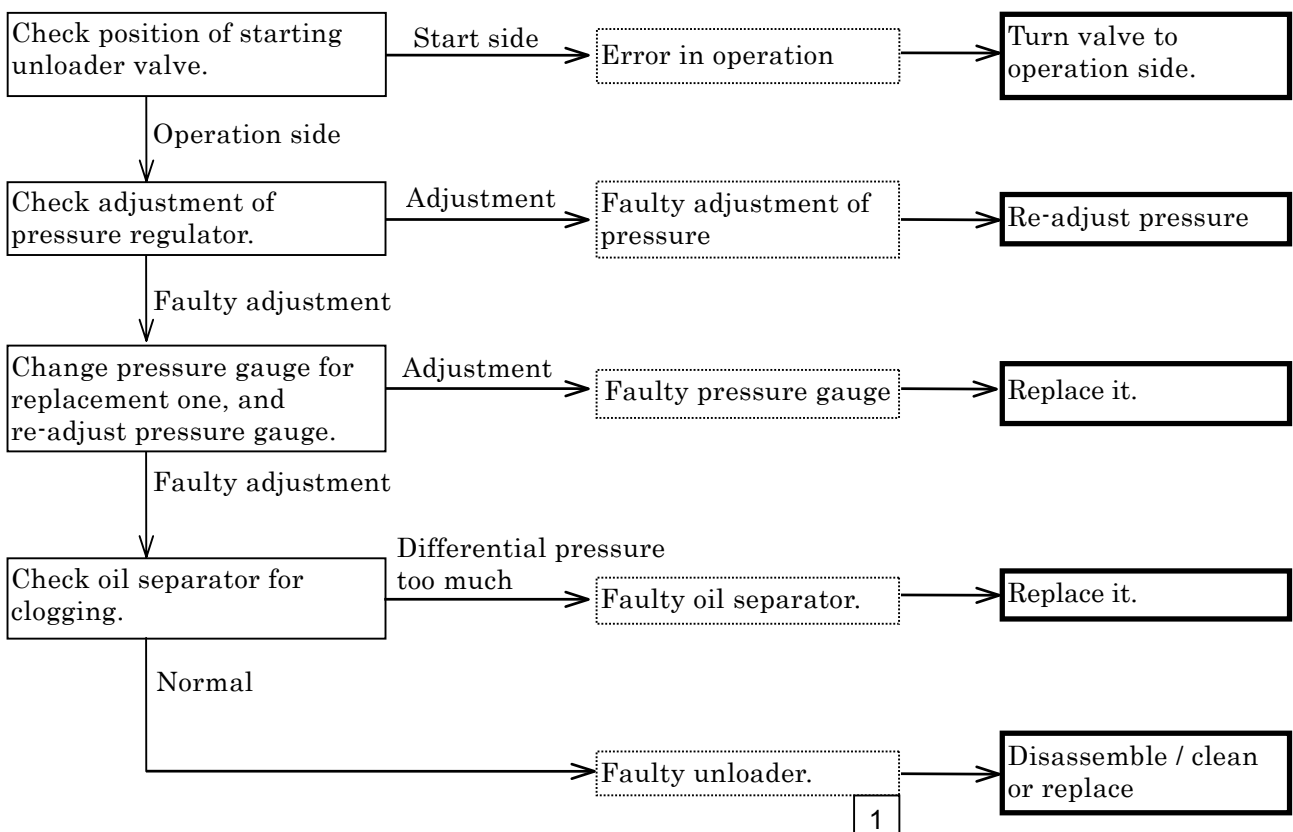
## 4.2 Failures of compressor and engine

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



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

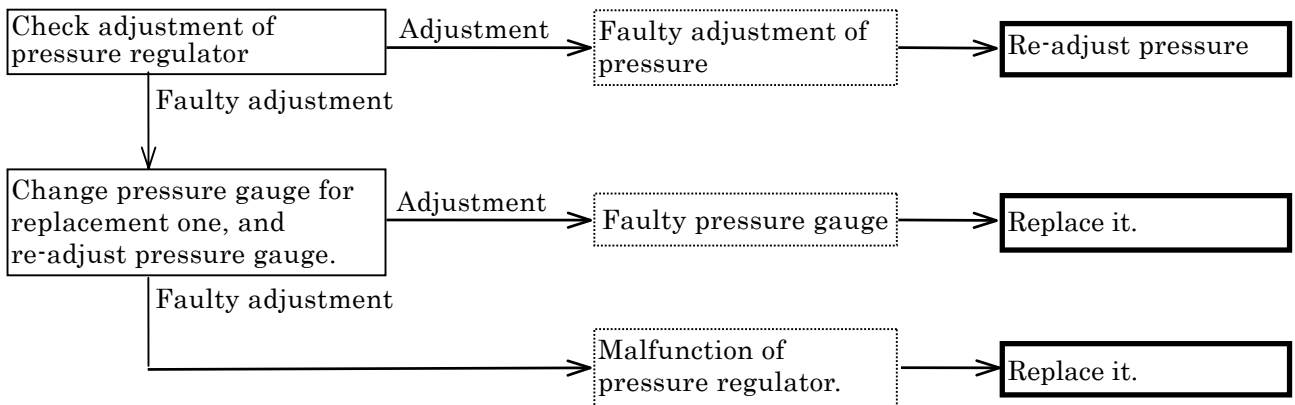
### 4.2.2 Receiver tank gauge pressure will not rise up to rated pressure during unloaded operation



# 4. Troubleshooting

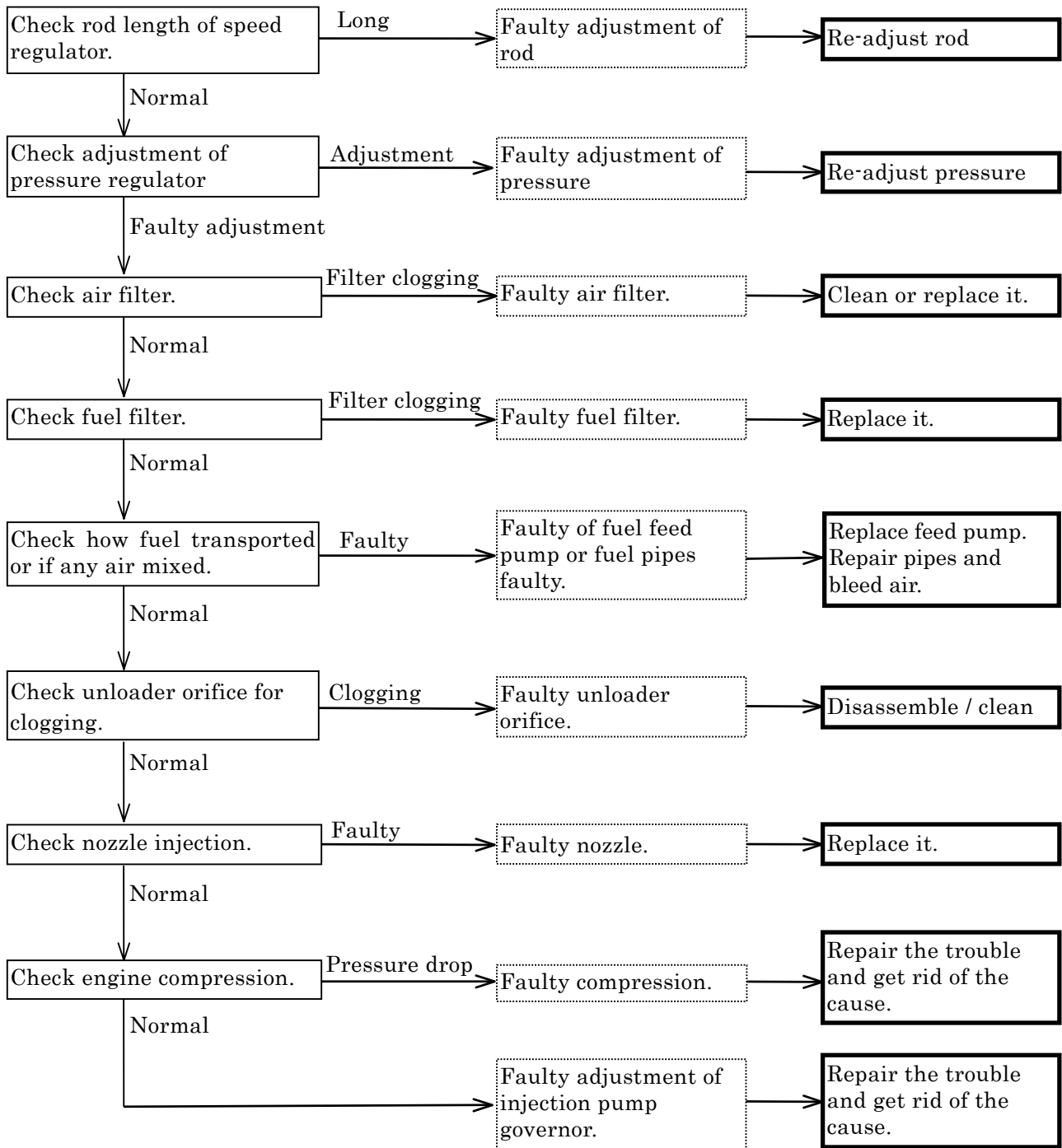
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## 4.2.3 Engine revolutions will drop before pressure rises up to rated one



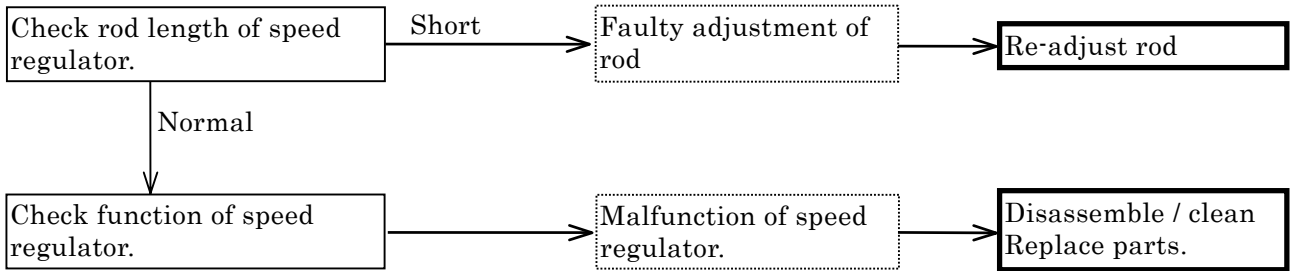
# 4. Troubleshooting

## 4.2.4 Engine will not turn to meet rated revolutions

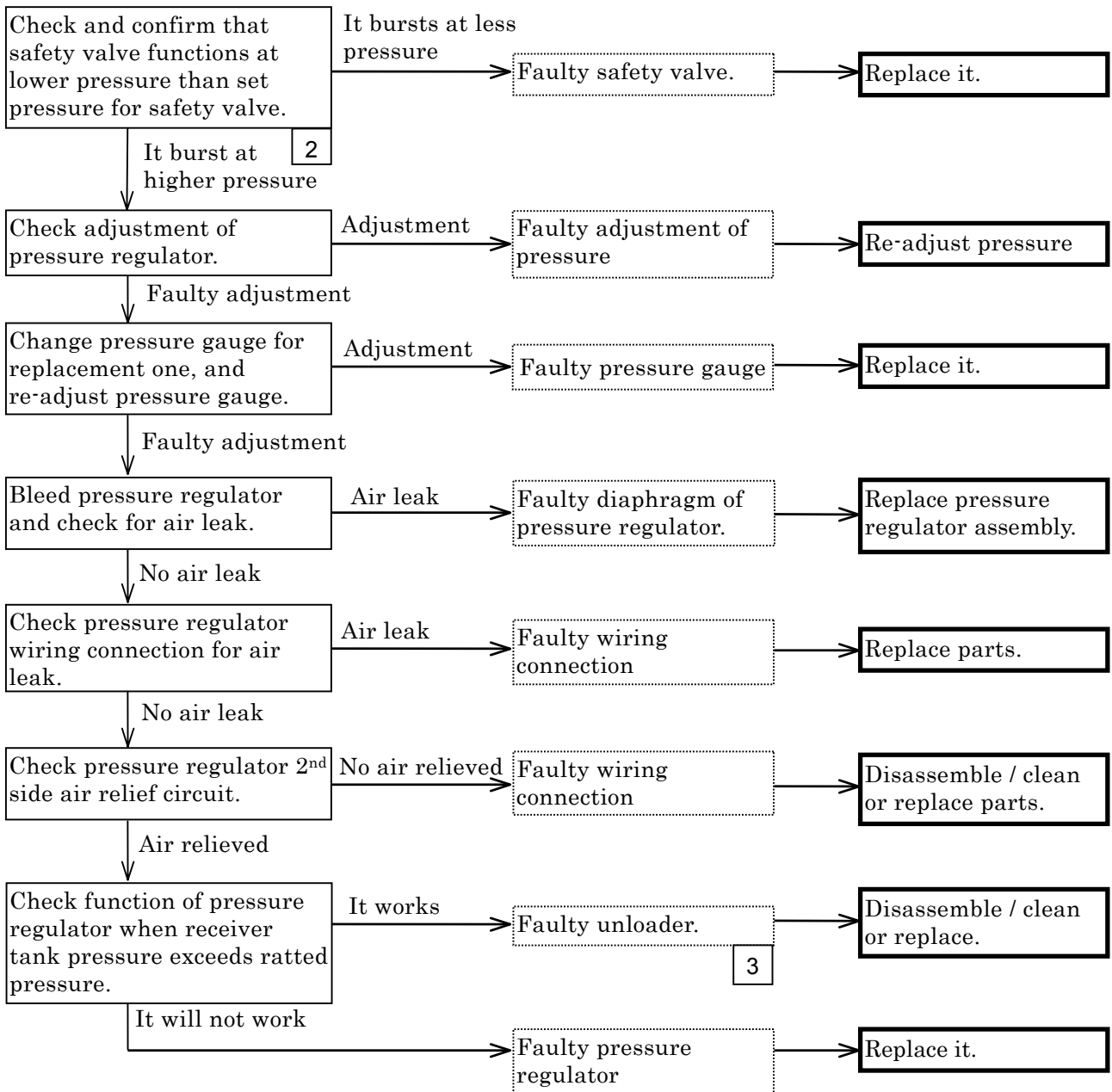


# 4. Troubleshooting

## 4.2.5 Engine RPM will not drop to lowest RPM during unloaded operation



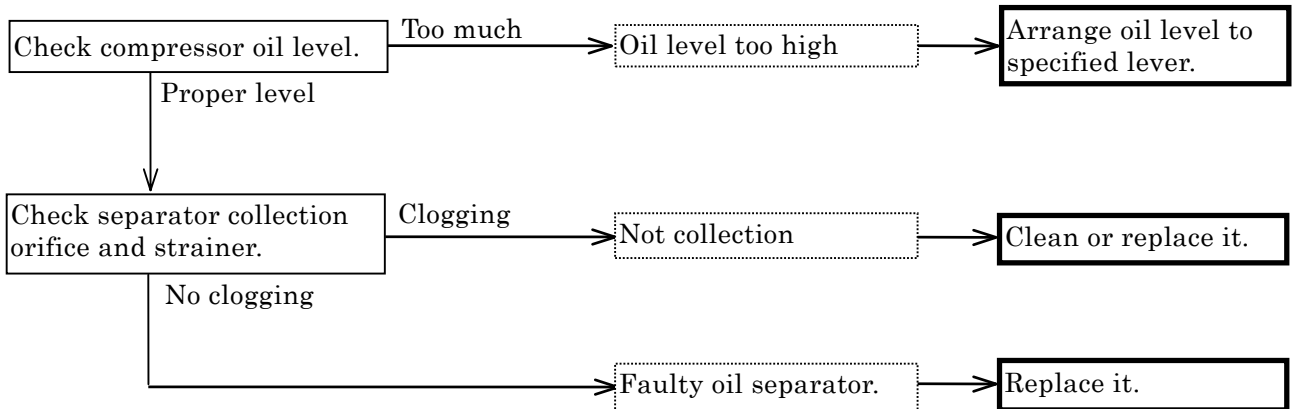
## 4.2.6 Safety valve bursts out during unloaded operation



# 4. Troubleshooting

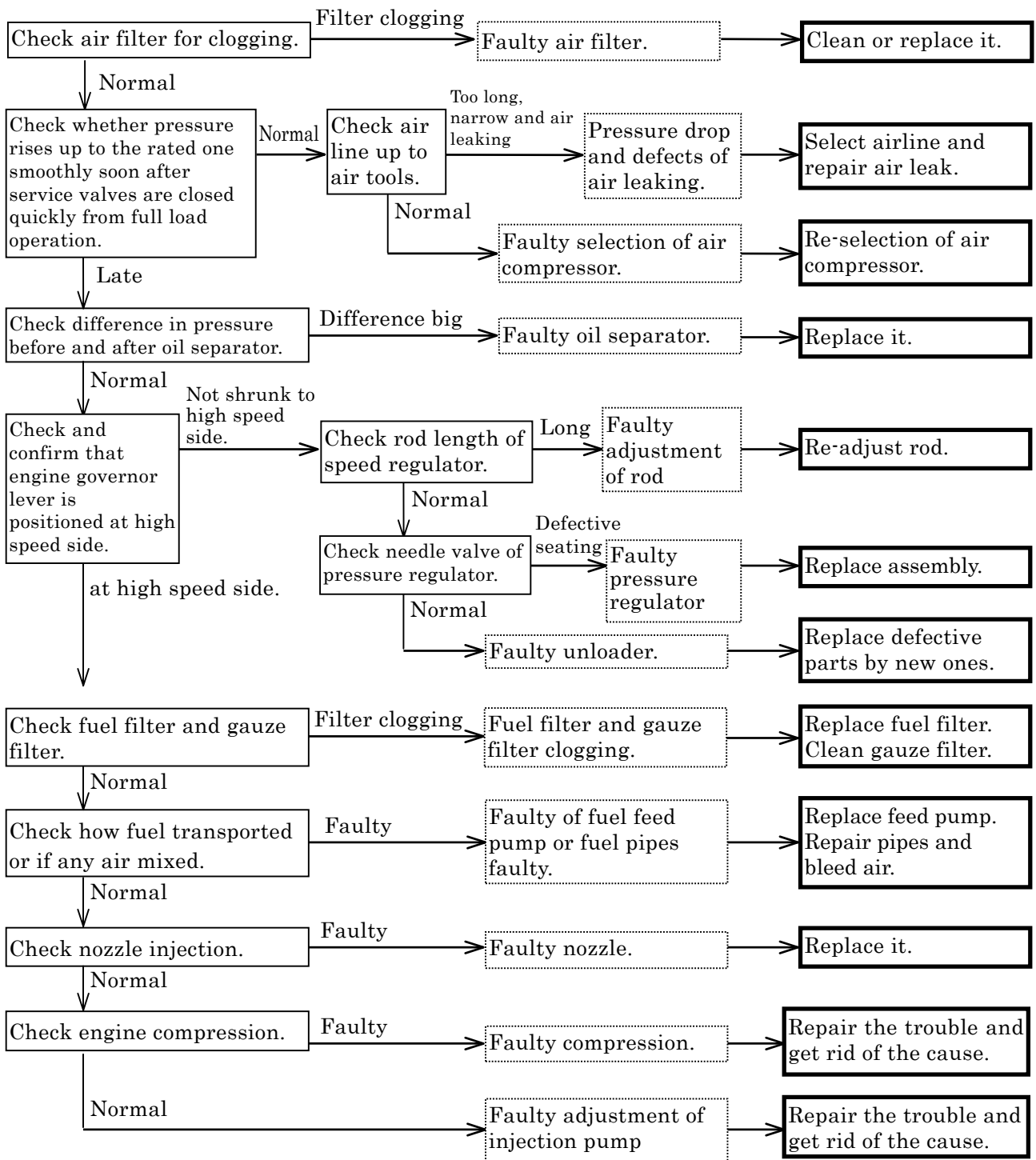
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## 4.2.7 Oil mixed found in delivery air



# 4. Troubleshooting

## 4.2.8 Discharge air is insufficient

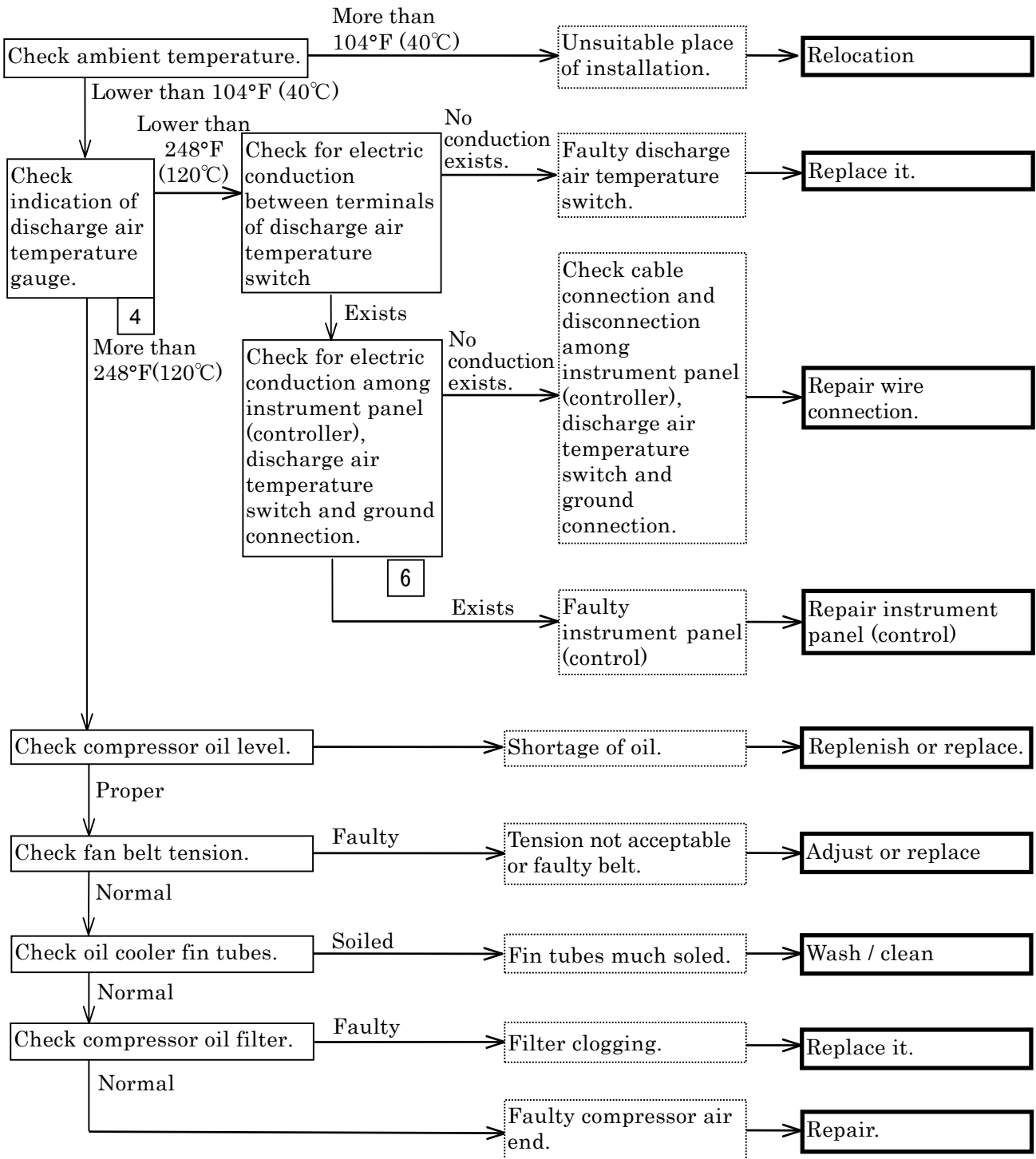




# 4. Troubleshooting

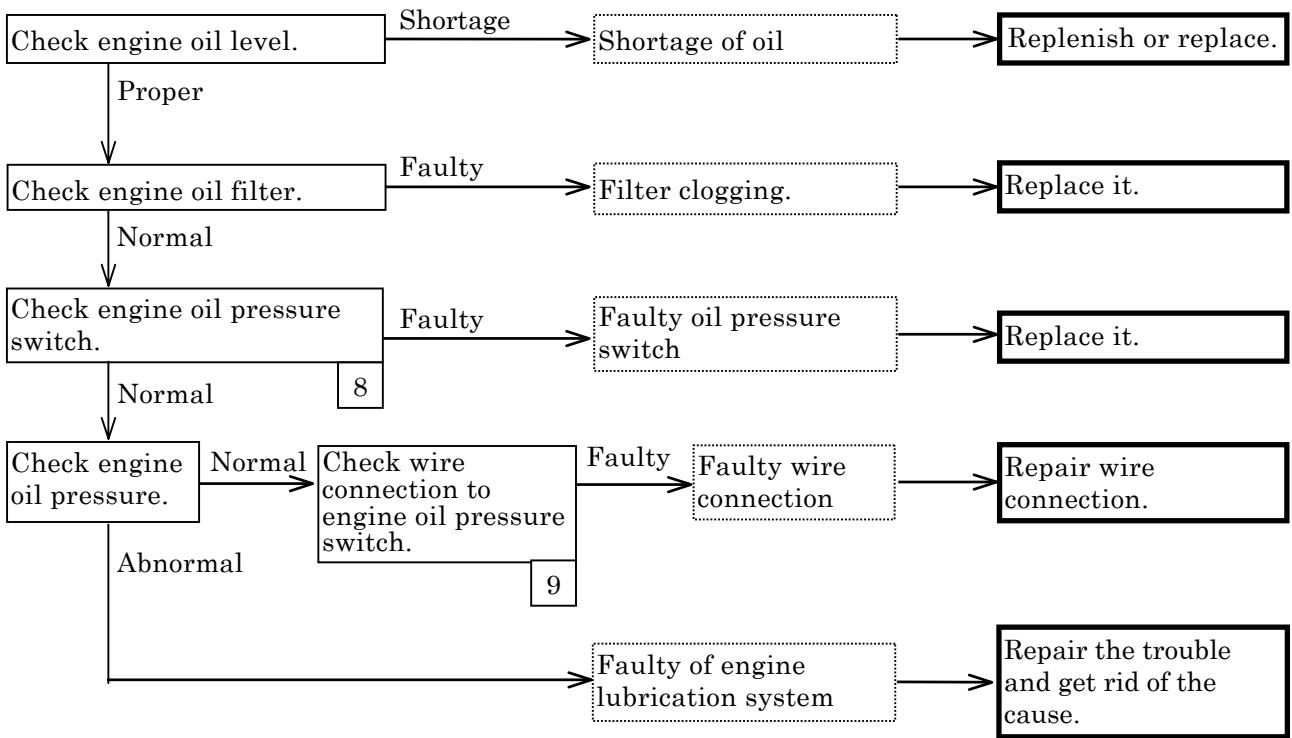
## 4.3 Operation of emergency switch

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



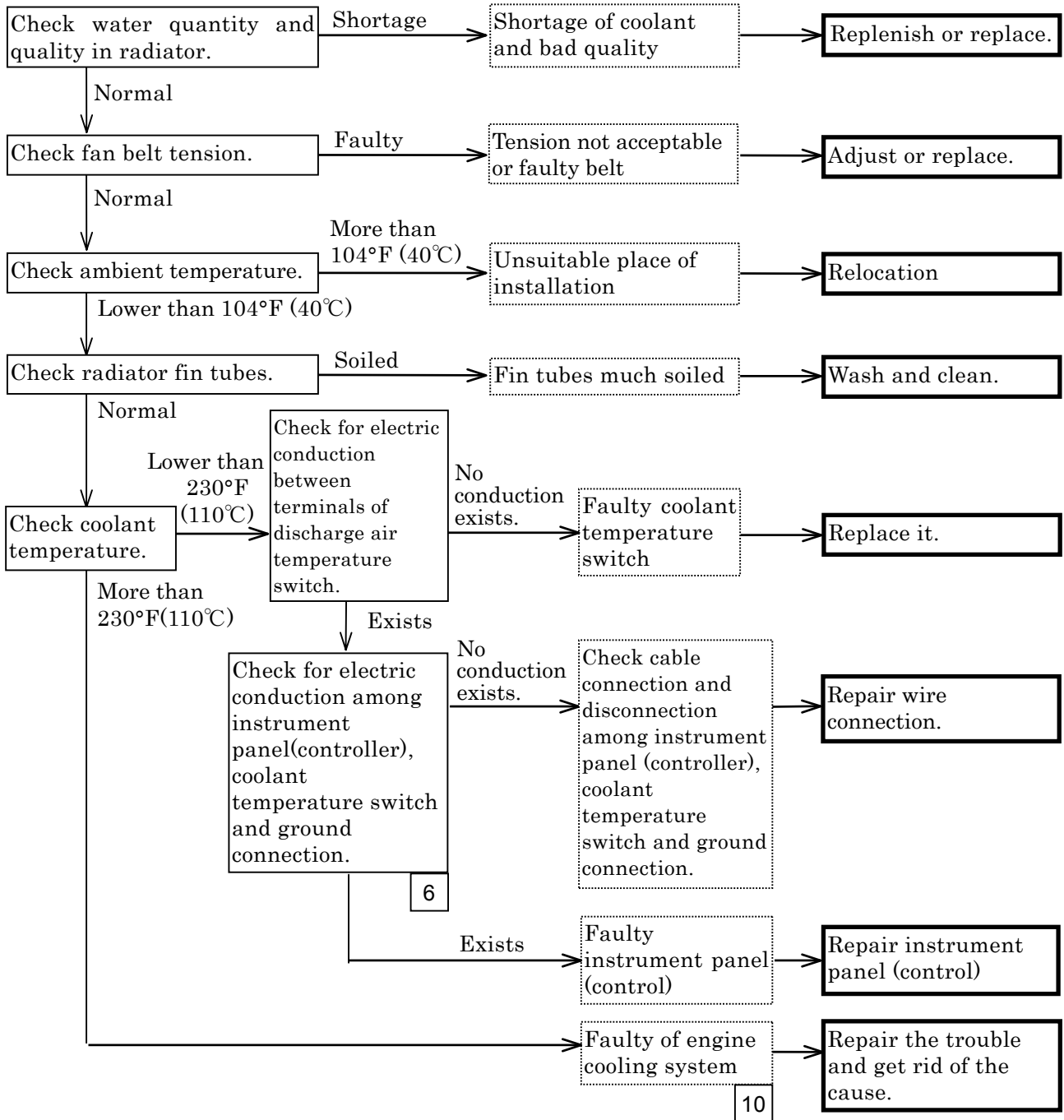
# 4. Troubleshooting

## 4.3.2 Engine oil pressure warning lamp glows and engine stops



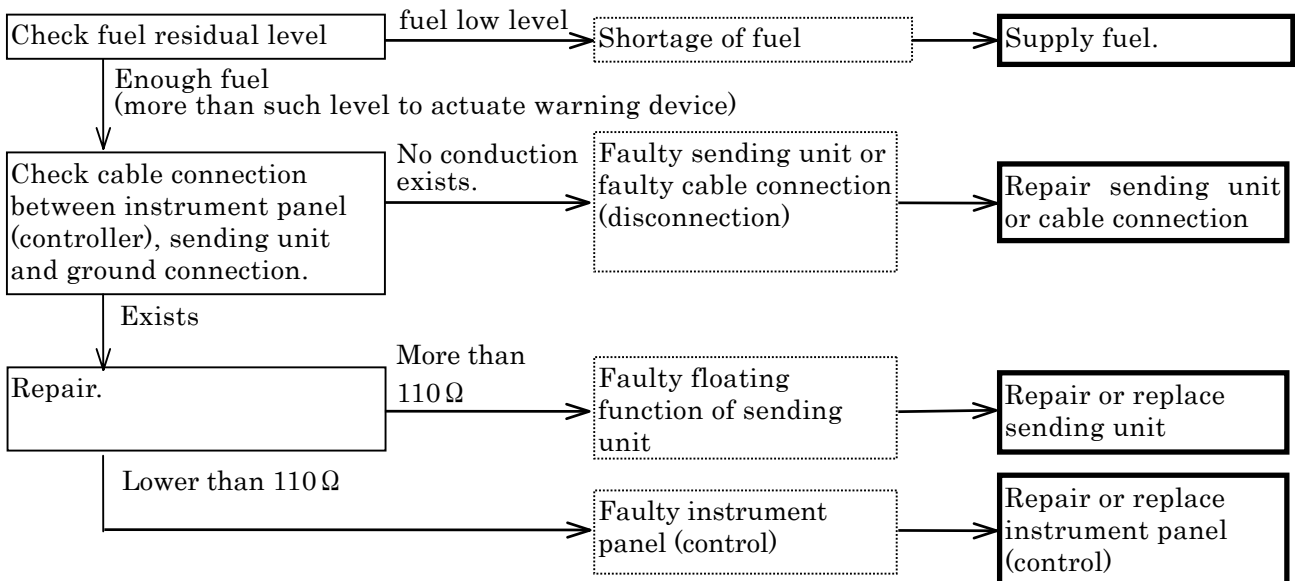
# 4. Troubleshooting

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



# 4. Troubleshooting

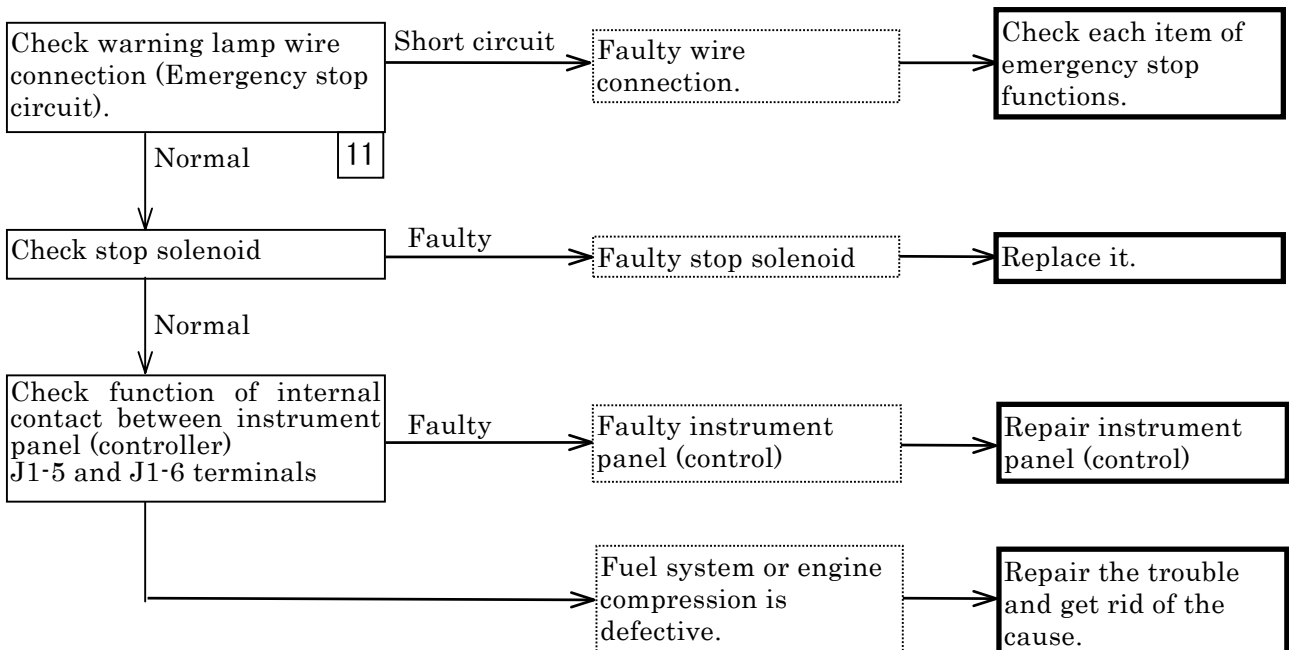
## 4.3.4 Residual fuel level warning lamp goes on



## 4.4 Others

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

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



## 4. Troubleshooting

### 4.5 Explanation of trouble diagnosis

No.	Item	Cause	Remedy
1	Faulty unloader.	Unloader valve cannot be open.	Disassemble unloader valve, and check the function of valve and piston. Further check unloader orifice 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 unloader.	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.	Check whether actual rise of discharge air temperature stops engine or any failure of electrical circuit stops engine.	
6	Check for electric conduction between instrument panel (controller), discharge air temperature switch / coolant temperature switch and ground connection.	<p>Check for disconnection among instrument panel (controller), discharge air temperature switch and ground connection. Judge whether trouble is caused to disconnection between each line or trouble of instrument panel (controller).</p> <p>When discharge air temperature / coolant temperature becomes higher than the set temperature [248°F(120°C) / 230°F(110°C)], the internal contact between J1-5 and J1-6 terminal becomes "OFF" to cut electric supply to stop solenoid to cause engine emergency stop.</p>	

## 4. Troubleshooting

No.	Item	Cause	Remedy
8	Check engine oil pressure switch.	For actuation pressure of oil pressure switch, See 1.2 “List of set values”.	
9	Check for any defective connection.	Check and make sure that no disconnection has been found for engine oil pressure switch (Switching “OFF” engine oil pressure switch enables engine emergency stop.)	
10	Faulty of engine cooling system.	When any trouble is not found in thermostat, coolant pump can be in disorder.	For the temperature at which thermostat valve opens, refer to 2.6.
11	Check warning 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.	
12	Check function of internal contact between instrument panel (controller) J1-5 and J1-6.	During normal operation, internal contact between J1-5 and J1-6 terminal instrument panel (controller) becomes “ON” and when it is “OFF”, it causes emergency stop.	

## 5. References

### 5.1 Comparison between consumable parts and electrical appliances

Item	PDS100S-6B4	PDS130S-6B4
●Element		
Air filter ASS'Y	32100 38701	32100 40900
Air filter element	32143 11700	32143 11800
Oil Separator	34220 12801	←
Gasket (O-ring)	Gasket : 03737 16802×2 O-ring: 03402 15140	O-ring : 03402 15140
Compressor oil filter ASS'Y	37400 13000	←
Oil filter cartridge	37438 05201	←
Engine oil filter element	SHIBAURA: 140517020	←
Fuel filter element	SHIBAURA: 360720060	←
O-ring (Small)	—	—
O-ring (Big)	SHIBAURA: 052100440	←
Sedimenter element	SHIBAURA: 130366110	←
O-ring	SHIBAURA: 052100440	←
●Air control		
Speed regulator ASS'Y	36400 18901	←
Diaphragm	36437 01500	←
Pressure regulator ASS'Y	36400 19000	←
Auto relief valve ASS'Y	36600 03501	←
Needle valve	36429 00800	←
O-ring (Small)	03402 25008	←
O-ring (Medium)	03402 25021	←
O-ring (Big)	21221 02100	←
Unloader valve ASS'Y	22100 37303	←
Bushing	23124 14400	←
O-ring (Medium)	21441 03000	←
O-ring (Small)	—	—
O-ring (Big)	—	—
Pressure control valve ASS'Y	— (Pressure control orifice)	←
O-ring (Small)	—	—
O-ring (Big)	—	—
Spring	—	—
Piston	—	—

## 5. References

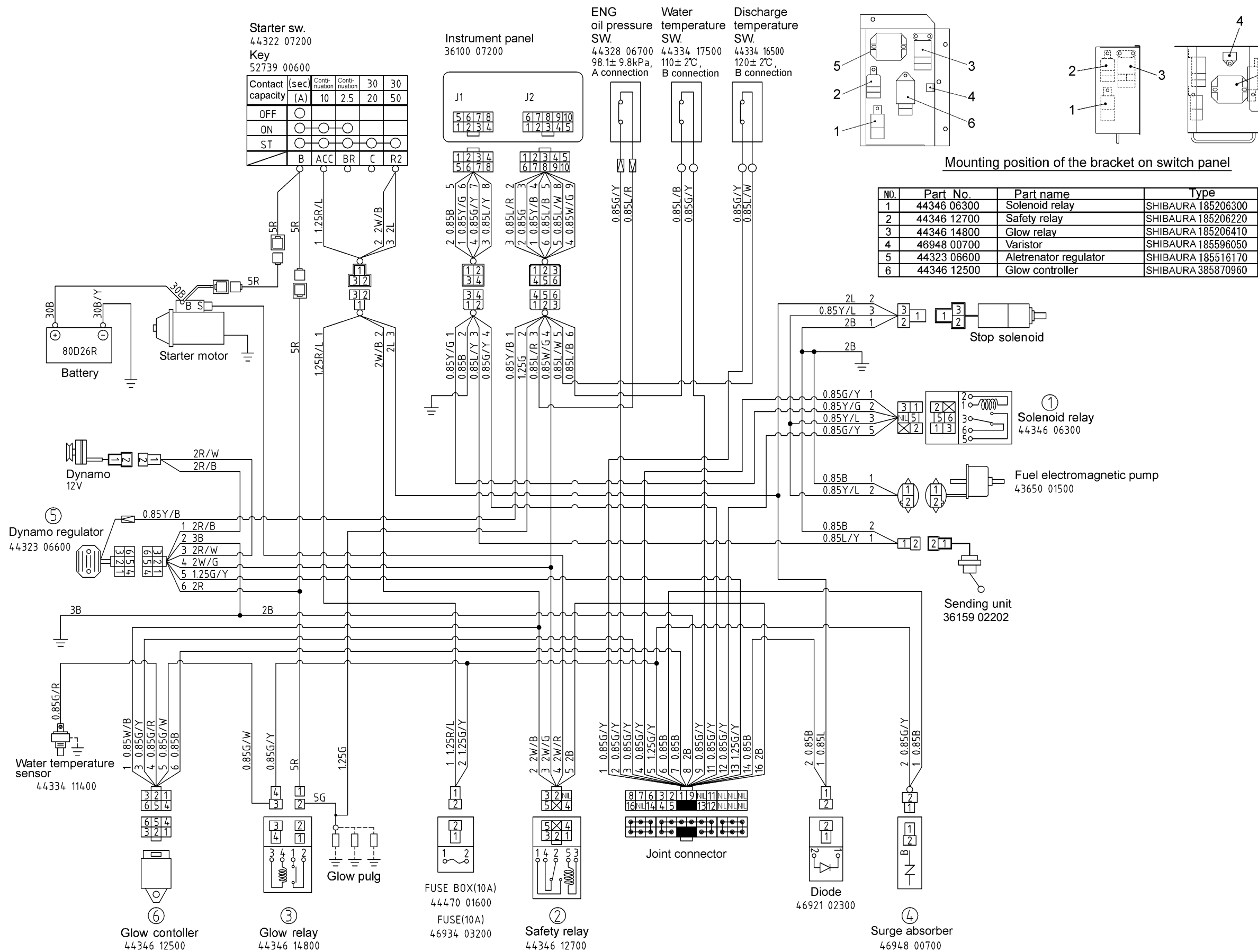
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Item	PDS100S-6B4	PDS130S-6B4
●Instruments on panel		
Starter switch	44322 07200	←
Pressure gauge	36141 15503	←
●Electrical appliances		
Instrument panel (controller)	36100 07200	←
Glow controller	44346 12500 (SHIBAURA: 385870960)	←
Coolant temp. sensor (for glow)	44334 14800	←
Glow relay	44346 14800	←
Starter relay	44346 12700	←
Solenoid relay	44346 15800	44346 06300
Dynamo regulator	44323 06600 (SHIBAURA: 185516170)	44323 06900 (SHIBAURA: 185516180)
Fuel air bleeding solenoid pump	43650 01500 (SHIBAURA: 130506240)	←
Sending unit	36159 02202	←
Fuse 10A	46934 03200	←
Discharge air temp. switch	44334 16500	←
Coolant temp. switch	44334 17500	←
Engine oil pressure switch	44328 06700 (SHIBAURA: 185246160)	←

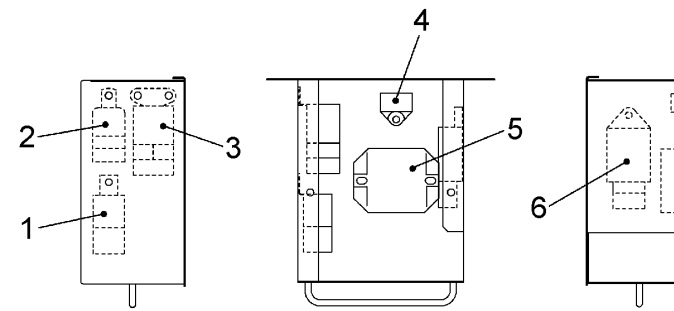


## 5.2 Engine Wiring Diagram

(1) PDS100S-6B4

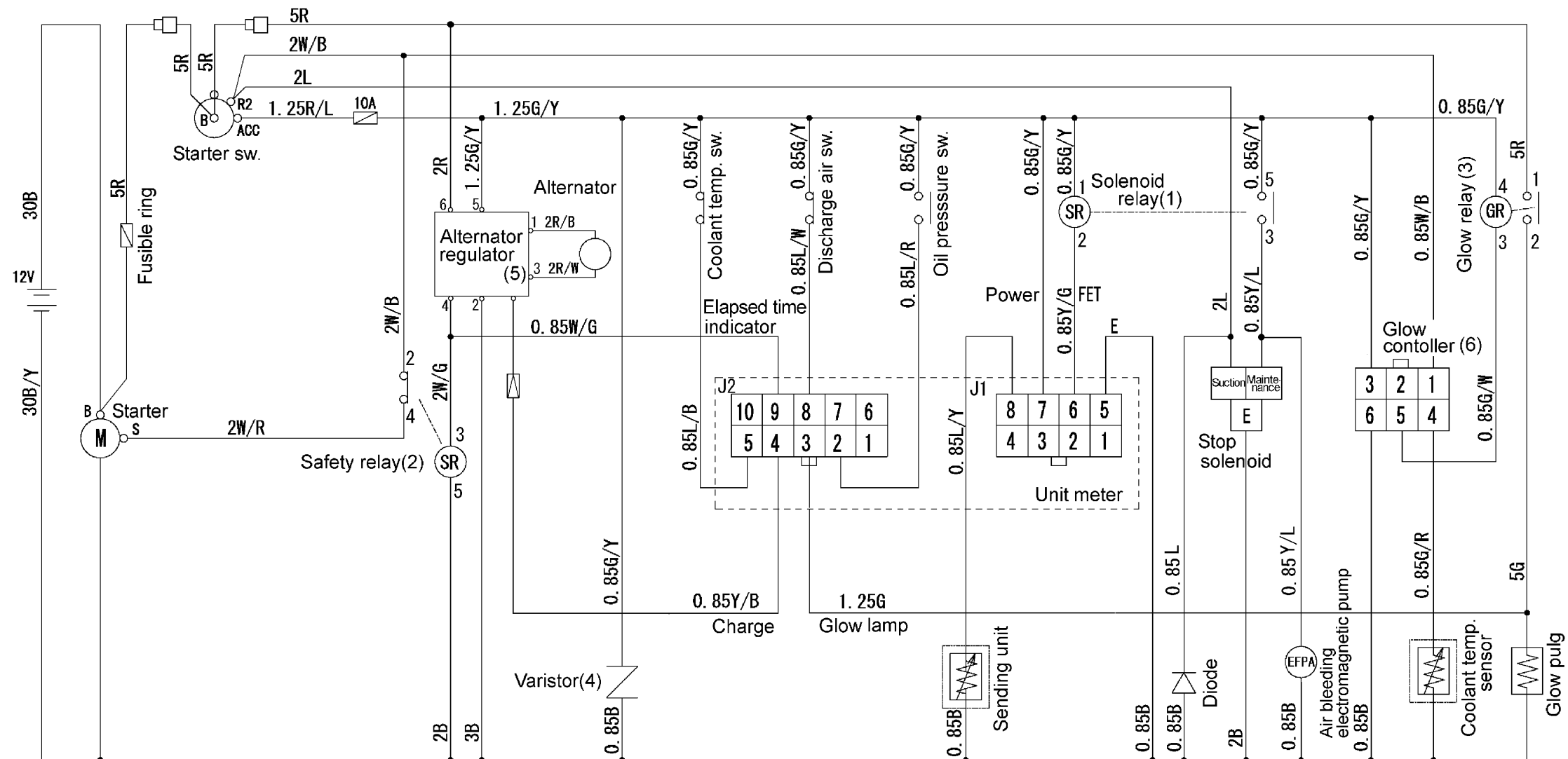


**Sequence**  
(1) PDS100S-6B4



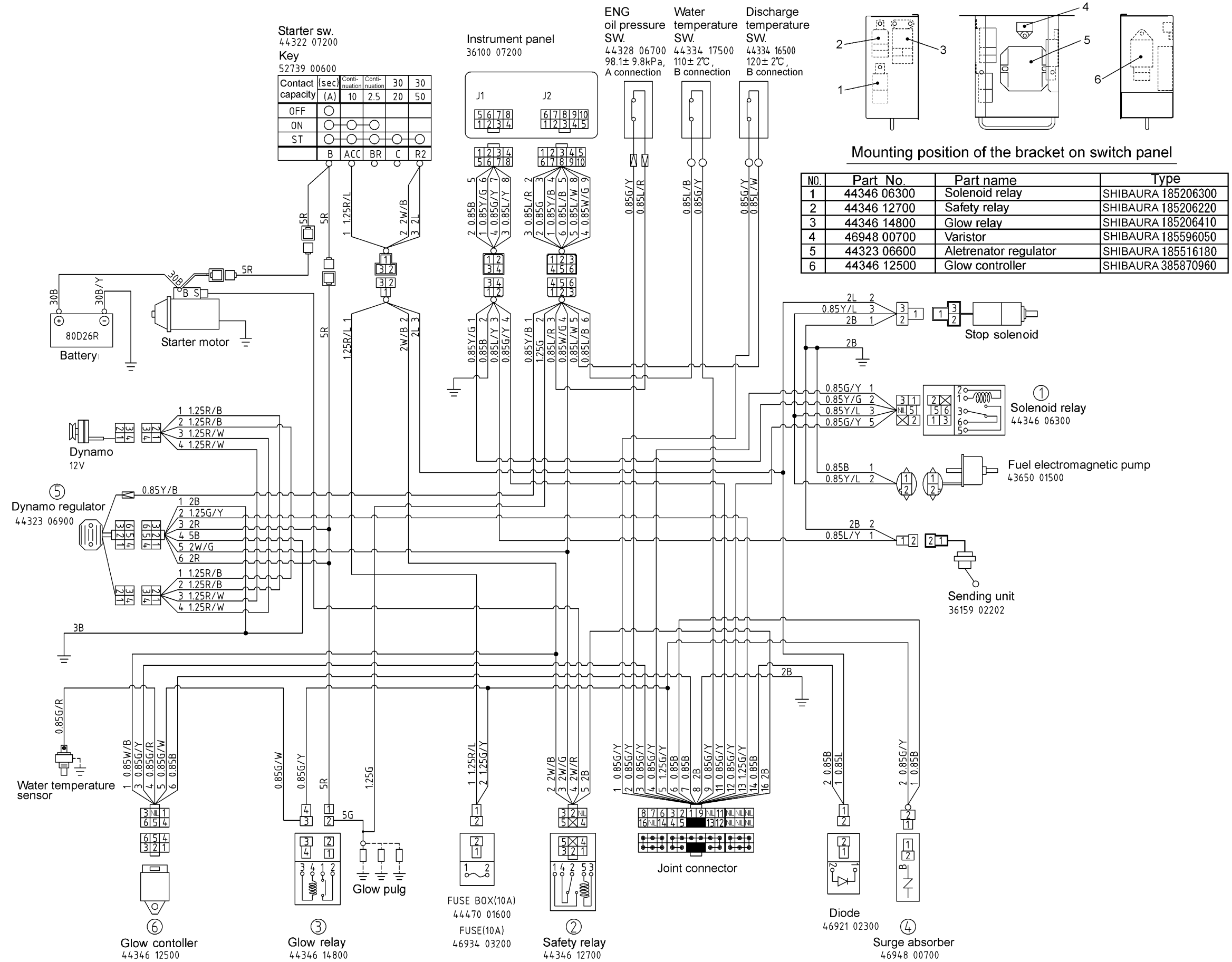
Mounting position of the bracket on switch panel

NO.	Part No.	Part name	Type
1	44346 06300	Solenoid relay	SHIBAURA 185206300
2	44346 12700	Safety relay	SHIBAURA 185206220
3	44346 14800	Glow relay	SHIBAURA 185206410
4	46948 00700	Varistor	SHIBAURA 185596050
5	44323 06600	Alternator regulator	SHIBAURA 185516170
6	44346 12500	Glow controller	SHIBAURA 385870960

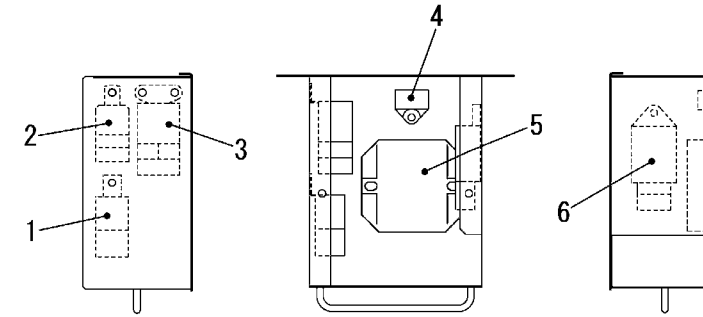


# Engine Wiring Diagram

## (2) PDS130S-6B4

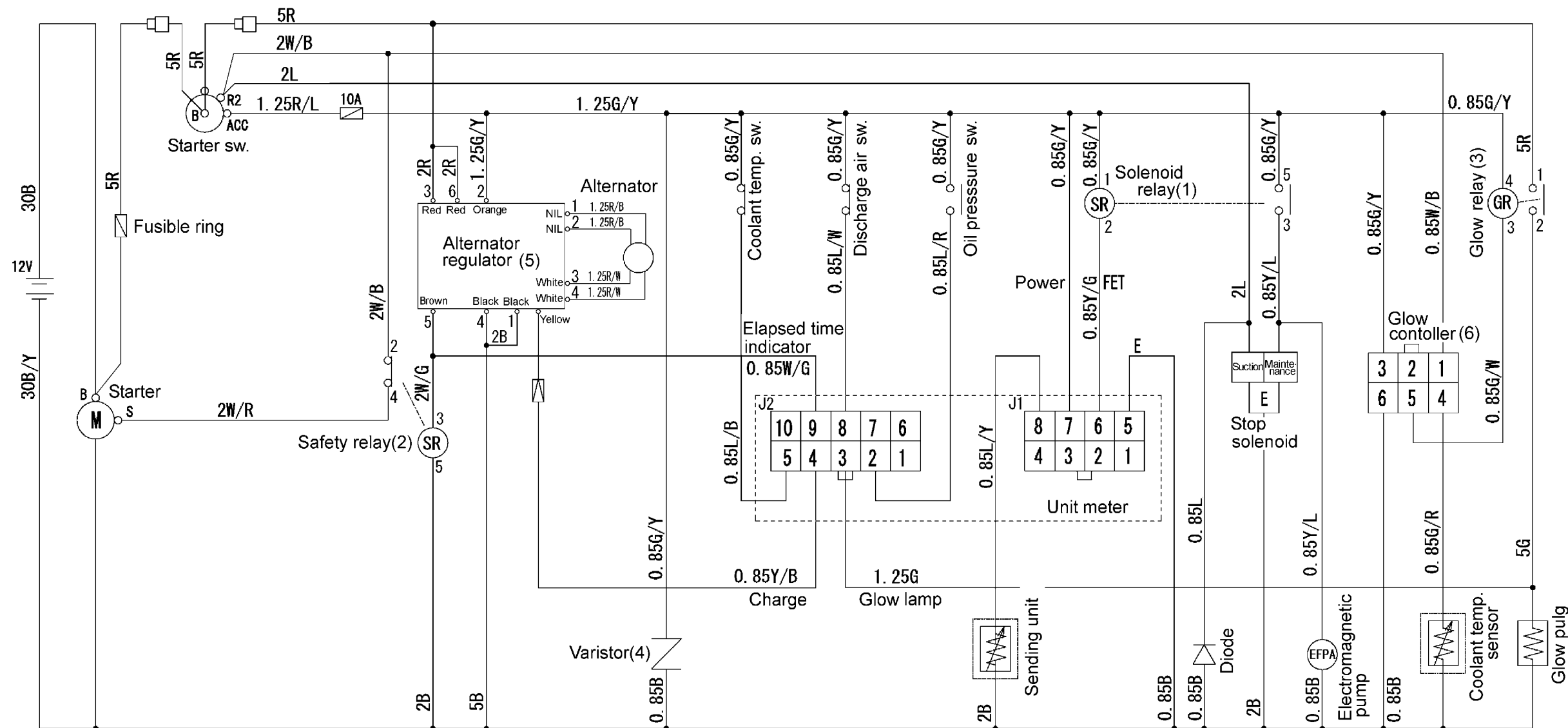


**Sequence**  
(2) PDS130S-6B4



Mounting position of the bracket on switch panel

NO.	Part No.	Part name	Type
1	44346 06300	Solenoid relay	SHIBAURA 185206300
2	44346 12700	Safety relay	SHIBAURA 185206220
3	44346 14800	Glow relay	SHIBAURA 185206410
4	46948 00700	Varistor	SHIBAURA 185596050
5	44323 06900	Alternator regulator	SHIBAURA 185516180
6	44346 12500	Glow controller	SHIBAURA 385870960



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**HOKUETSU INDUSTRIES CO., LTD.**

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

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