FSCURTIS®

INSTRUCTION MANUAL

PORTABLE
SCREW COMPRESSOR

FAC-18B
FAC-18BC

Please be sure to read this manual before using this machine.

Preface / Table of Contents

Thank you for having selected our "FSCURTIS" product.

- ◆ Keep this manual at hand to refer to it always when necessary.
- ◆ When this manual is missing or damaged, order it from our office nearby or distributor. Make sure that the manual is included with the machine when it is handed over to another user.
- ◆ The contents of this manual sometimes may be different from this machine because it has been improved. When you have anything unclear or you want to advise us, contact our office nearby or distributor.

— Table of Contents —

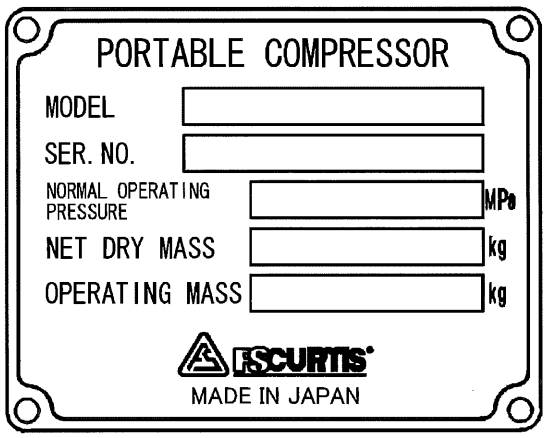
Safety

This section explains safety cautions for safety work for operation, inspection, maintenance, installation, movement and transportation. Read these safety requirements carefully and fully understand the contents before starting the machine.
For your better understanding of the precautions in this manual and on this machine, safety precautions are classified into "DANGER", "WARNING" and "CAUTION" message with a warning symbol ⚠ marked, according to the degree of hazards.
When one of these messages is found, please take preventive measures for safety to carry out "SAFETY OPERATION AND PROPER MAINTENANCE OF THE MACHINE".

⚠ DANGER	DANGER indicates an imminently hazardous situation which, if not avoided by any user, will result in death or serious injury. This signal word is to be limited to the most extreme situations.
⚠ WARNING	WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to a user.
⚠ CAUTION	CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.
IMPORTANT	IMPORTANT indicates important caution messages for the performance or durability of the machine, which has no concern to injury or accident of or to a human body.

This manual does not describe all safety items. We, therefore, advise you to pay special attention to all items (even though they may not be described in the manual) for your safety.

◆ Please tell us a MODEL /SER.No. on the plate of the machine when you inquiry.
A plate stamped with the model and serial number is attached to side of the machine.



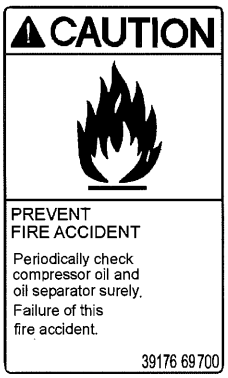
A090188

Each illustrated figure (Fig.) has a number (for instance, A090188) at the right bottom. This number is not a part number, but it is used only for our reference number.

[Safety Warning Labels]

Following labels are attached to the machine.
When they are found damaged or peeled off, order them from our office nearby or distributor and attach them again.

1



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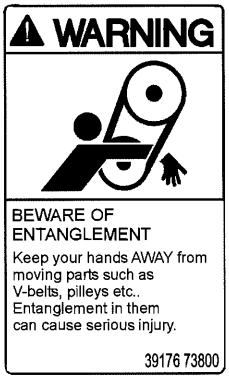

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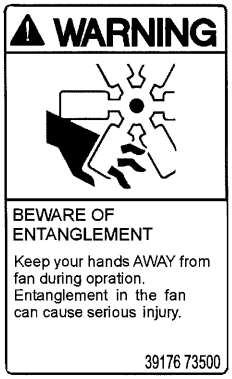

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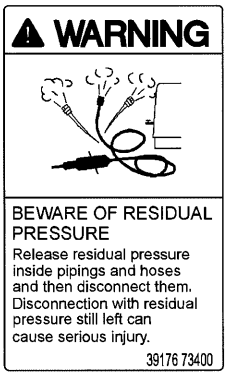

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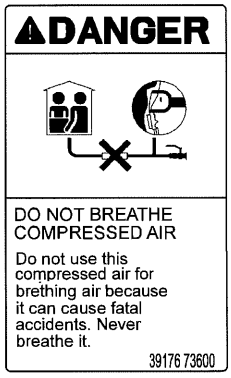

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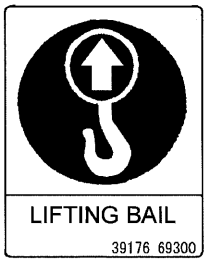

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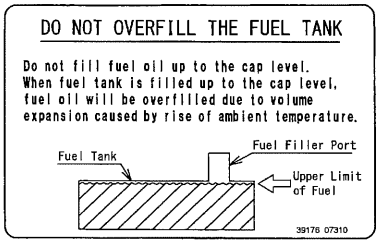
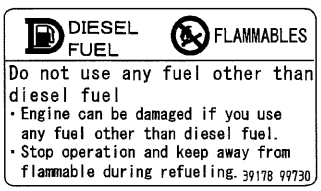
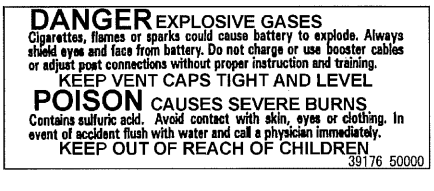


12

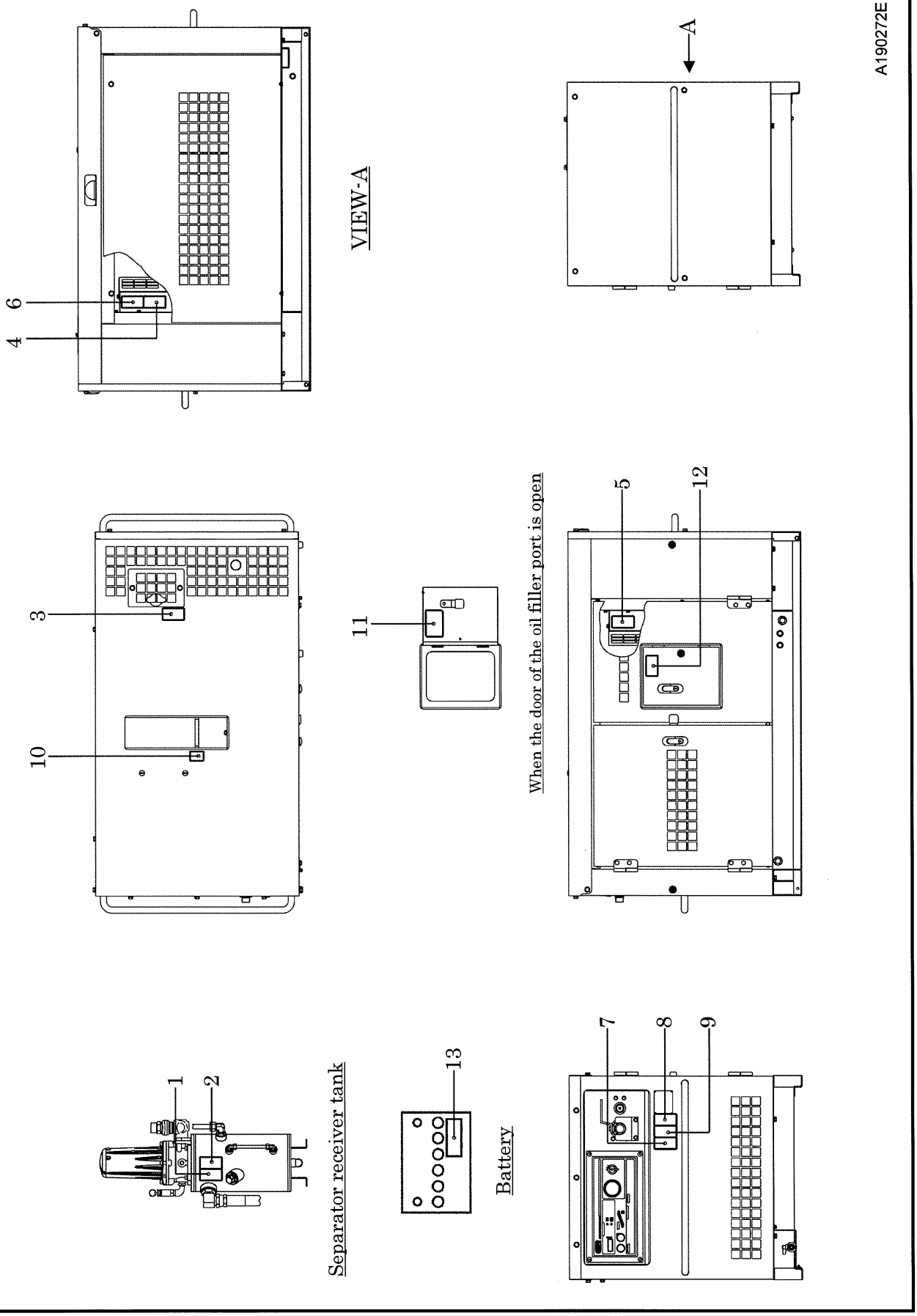


13



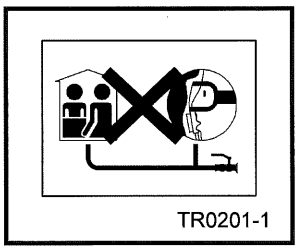
Safety

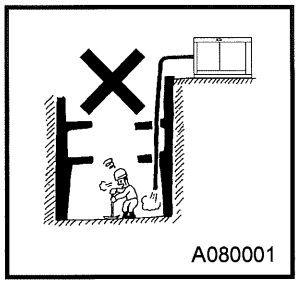
● The pasting position of safety warning labels is as follows.



Safety

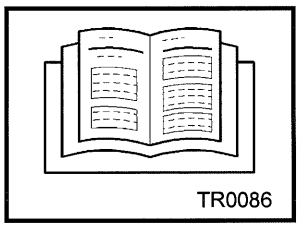
⚠ DANGER


TR0201-1

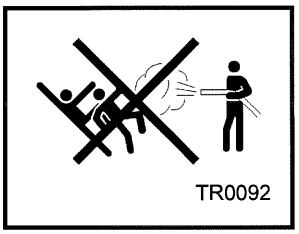

A080001

- Compressed air from this machine contains poisonous materials. Absorption of the compressed air can cause serious injury. Never provide this compressed air for human respiration.
- This machine is not designed to be used for working chambers pressurized by compressed air such as respiratory air provided to persons working inside wells and tunnels such as pneumatic engineering method and pneumatic caisson method. Should this machine stop operation due to trouble, it can cause death and serious injury to the working persons. Refrain from using the compressed air for such pneumatic engineering method or pneumatic caisson method.

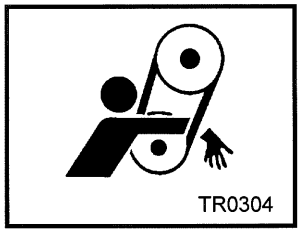
⚠ WARNING


TR0086

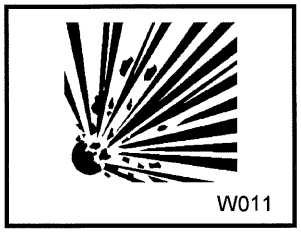
- Read each instruction plate which is displayed in the manual or on the machine carefully, understand its content and follow the indications thereof.
- Do not modify the machine without prior approval. The safety may be compromised, functions may be deteriorated, or the machine life may be shortened.
- Never use the machine for the purpose of compression of gases other than air, or as a vacuum pump. Otherwise, serious accidents may occur.


TR0092

- Never blow compressed air directly at people. Scattered impurities, dust, or foreign objects in the compressed air may cause skin and eyes to be seriously injured.
- As compressed air contains toxic gas etc., compressed air should not be used to be blown or sprayed against food etc.

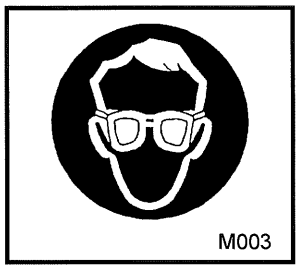

TR0304

- Keep hands off from the rotating portion or belts while running. It could cause serious injuries if hands should be caught in.


W011

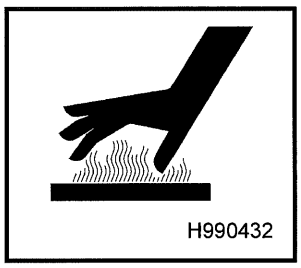
- When you refill the separator receiver tank with compressor oil, stop the engine, and make sure that the pressure gauge indicates 0MPa and there is no residual pressure in it, and then gradually loosen the oil filler cap for refilling oil. Note residual pressure in the separator receiver tank could force both extremely hot compressed air and oil to jet out and you may be scalded or seriously injured.

⚠ WARNING

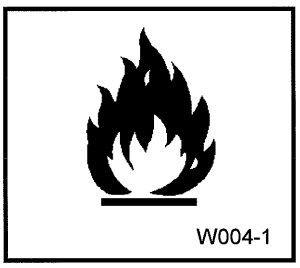


- When cleaning dust accumulated in such devices as the air-filter, by blowing compressed air, wear safety glasses, etc. to protect your eyes.

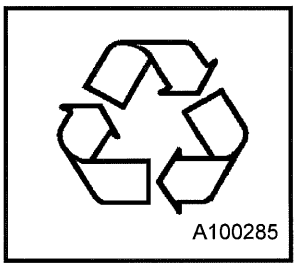
⚠ CAUTION



- Be sure to stop the engine, and let the coolant water sufficiently cool down before draining it.
- If the drain valve is opened before the coolant water is cooled enough, hot water could jet out, and it could cause scalding.



- Be sure to perform the periodic checks of compressor oil and oil separator.
- Neglecting checks could cause overheat of the oil, resulting in a fire.



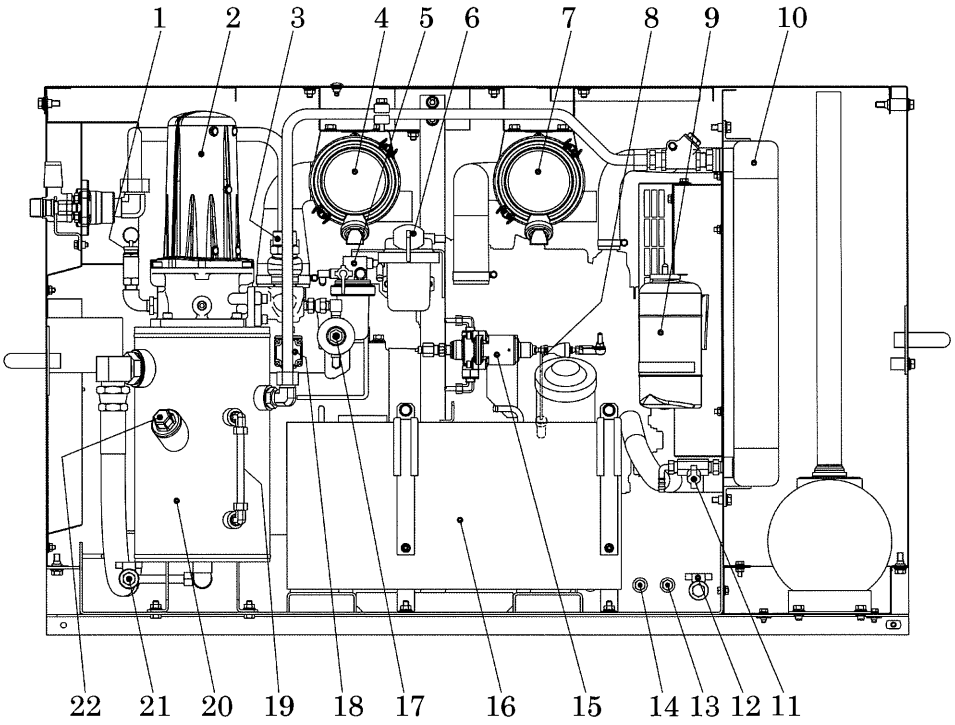
- Waste liquid from the machine contains harmful material. Do not discharge it onto the ground or into the river, lake or sea. Such material will contaminate the environment.
- Be sure to use a container to hold the waste liquid from the machine.
- Be sure to follow the designated regulations when disposing of oil, fuel, coolant (antifreeze), filter, battery or other harmful materials.

- The engine of this machine and electrical parts many electronic devices have been installed. If you perform welding work on this machine, first remove the connector of the electronic control equipment (especially the EMC). Application of excessive current to electronic controls can cause equipment malfunction.

MEMO

1.Part Names

1.1 Internal Components and Part Names

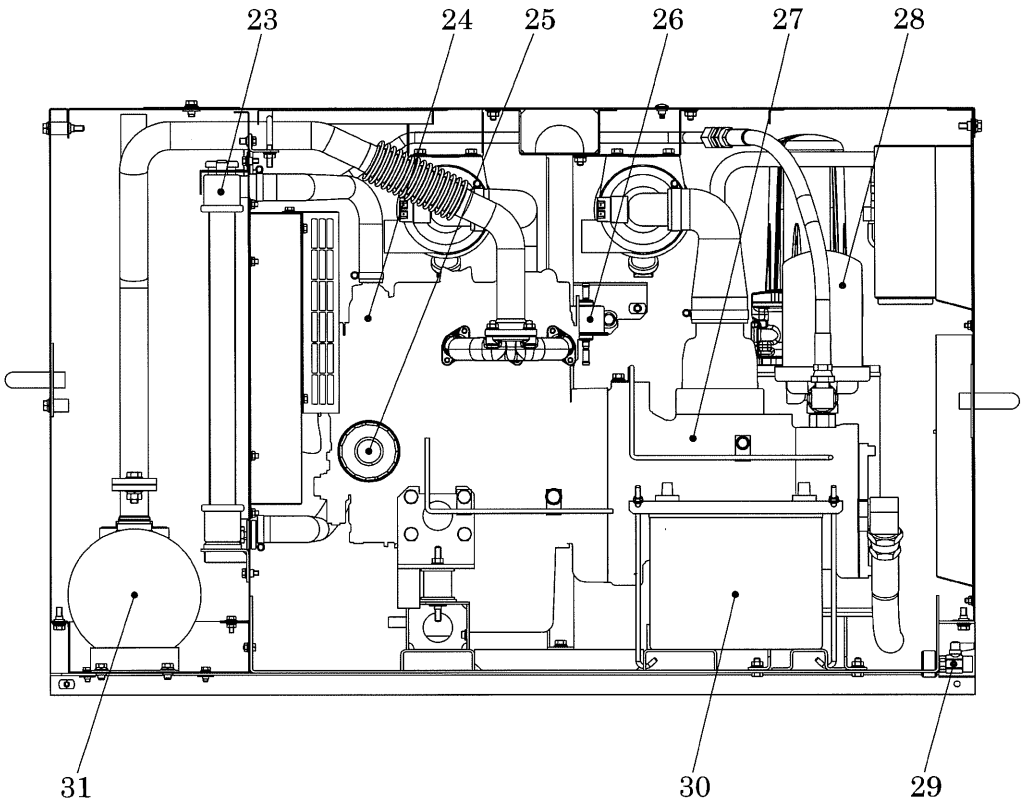


FAC-18B

A190232

No.	Description	Function
1	Safety valve	For releasing compressed air to the atmosphere when the pressure rises higher than the rated pressure in the system.
2	oil separator element	For separating oil mist mixed in compressed air.
3	Pressure control valve	For keeping the pressure in receiver tank constantly higher than a certain level in the system.
4	Air filter (For compressor air-end)	Filtering device for filtering dust floating in intake air.
5	Sedimenter	For separating coolant from fuel in the system.
6	Fuel filter	For filtering foreign matter and dust mixed in fuel.
7	Air filter (For engine)	Filtering device for filtering dust floating in intake air.
8	Engine oil level gauge	For checking quantity and impurity of engine oil.
9	Reserve tank	For checking coolant level and supplying it.
10	Oil cooler	For cooling compressor oil in the system.
11	Oil cooler drain valve	For draining compressor oil from oil cooler and oil line.
12	Engine oil drain valve	For draining engine oil.
13	Radiator drain plug	For draining engine coolant.
14	Fuel tank drain plug	For draining condensates from fuel tank.
15	Speed regulator	For controlling engine speed in the system.
16	Fuel tank	For storing fuel.
17	Pressure regulator	For regulating the compressor pressure in the system.
18	Solenoid valve for starting unload	For regulating operation when starting the machine.
19	Compressor oil level gauge	For checking quantity and impurity of compressor oil.
20	Separator receiver tank	For separating air and oil from compressed air in the system.
21	Separator receiver tank drain valve	For draining condensed water from separator receiver tank.
22	Compressor oil filler port	For supplying or adding compressor oil.

1.Part Names



FAC-18B

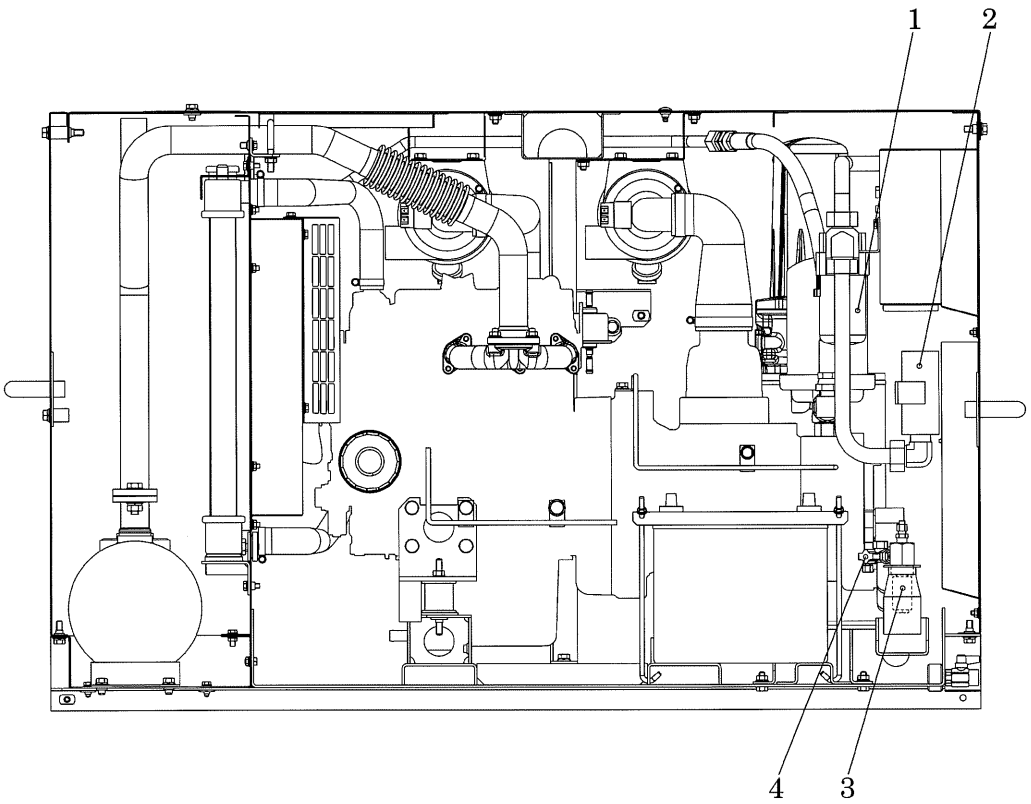
A190233

No.	Description	Function
23	Radiator	For cooling the coolant for engine in the system.
24	Engine	For driving the compressor air-end in the system.
25	Engine oil filter	For filtering engine oil in the system.
26	Fuel air-bleeding electromagnetic pump	For automatically bleeding air from fuel pipes in the system.
27	Compressor air-end	For compressing air in the system.
28	Compressor oil filter	For filtering compressor oil in the system.
29	Oil fence drain valve	For discharging drain collected in oil fence.
30	Battery	For electrically starting engine.
31	Exhaust muffler	For silencing the noise caused before discharging the air.

1.Part Names

[After cooler type]

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



FAC-18BC

A190234

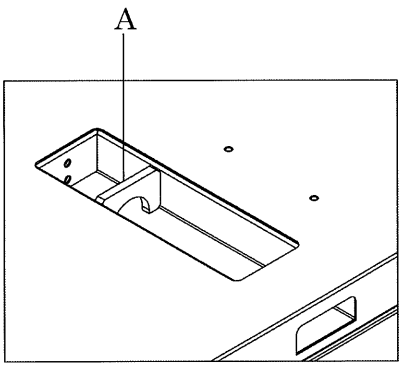
No.	Description	Function
1	Drain separator	For separating water from compressed air cooled in after-cooler in the system.
2	After cooler	For cooling compressed air in the system.
3	Drain port of after-cooler	For draining condensed water filtered by drain separator
4	Switching valve	For switching the flow channel of the filtered water by drain separator to the drain tank side or the air release side.

2.Installation

2.1 Transportation

When loading and unloading the machine, be sure to use the lifting bail provided on the center of the machine top.

2.1.1 Lifting up

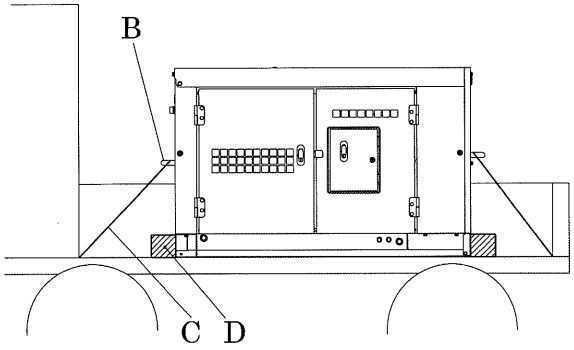


A190101

<Procedure>

1. Before lifting the machine up, make sure to check the lifting bail [A] for any crack or loosened bolts.
2. Connect the hook of the crane or shackle with lifting bail eye fitted at the top center of the machine, and make sure that there is no person standing around the machine. Then perform the hoisting operation.
3. Select a truck or a crane with a capacity sufficient for the size and weight of the machine by referring to the values shown in Chapter 7 "Specifications" of the manual.
4. Any crane operations must be performed by a qualified crane operator.

2.1.2 Mounting the machine on the truck bed



A190102

- When moving the machine from working site, load it to truck, and fix it by the rope [C] with using the handles [B] on front/back side of bonnet, and be sure to place the block [D].

⚠ WARNING Transportation

- Never get under the machine which is lifted up, because it is very dangerous.
- Never lift the machine which is still in operation, or it could cause critical damage to each component or lead to serious accident.

2.Installation

2.2 Installation conditions

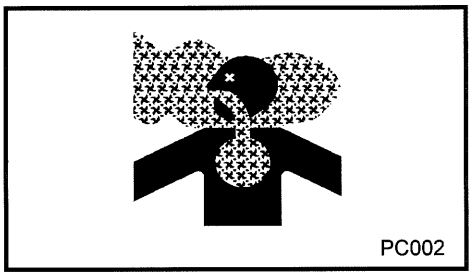
The machine has to be parked horizontally on a level place.

- The machine has to be parked right-angled on a slope.
- The machine has to be parked on a slope within an angle of 5°
- The machine should be operated in following conditions:
- **Ambient temperature---------- -15℃ to +35℃**
- **Humidity---------- Less than 80%**
- **Altitude---------- Lower than1,500m above sea level**

※If you use the machine not in the conditions stated above, it may causes serious breakdown.

- The machine has to be installed in the environment where fresh air is always available, temperature is low and ambient air is dry as much as possible.
- If more than two machines are placed parallel in operation, keep enough distance so that exhaust air from one machine does not affect the other one.
- Also, a machine has to be installed in the environment where fresh air is always available.
- Keep enough space around the machine for inspection and maintenance access.

⚠ WARNING



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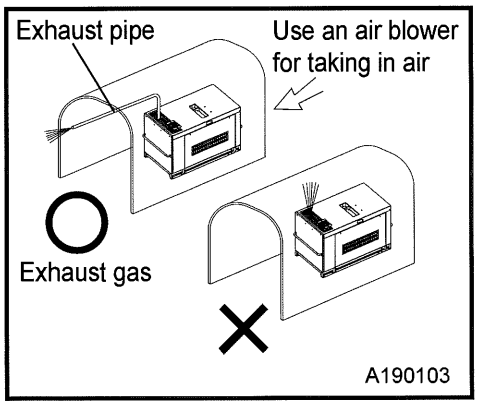
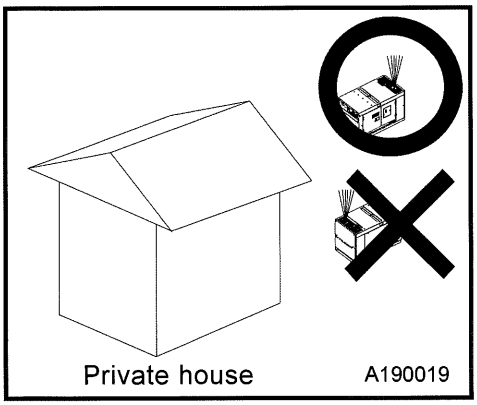
- Never lift the machine which is still in operation, or it could cause critical damage to each component or lead to serious accident.



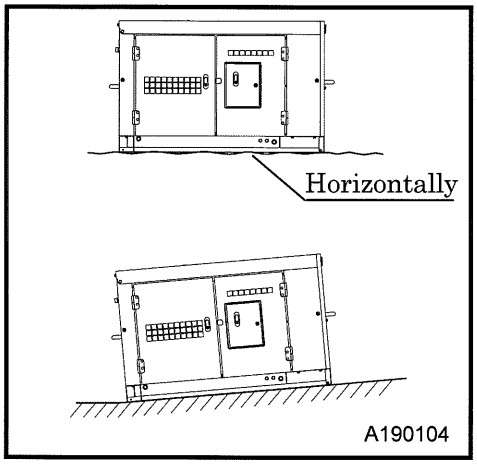
- When installing the machine in a tunnel or the like, ensure a supply of fresh air and provide adequate ventilation.
- Be sure to place the exhaust pipe in an outdoor location, so that no exhaust gas will be leaked from any pipe seam.



- Do not position the exhaust gas outlet in the direction of a house.
- Because the exhaust gas from the engine is poisonous, avoid positioning it in the direction of passers-by.

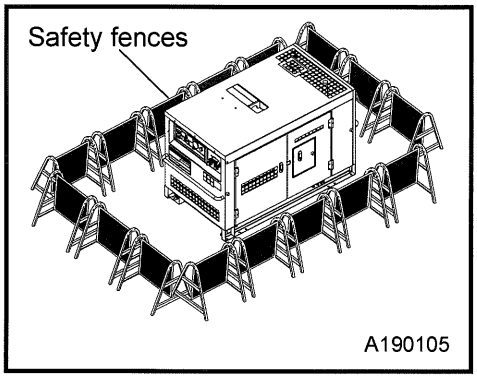
2.Installation

⚠ WARNING Installation notes



- The machine should be installed within 5 ° degree inclination.
- If installation site is not flat, put square bar under the machine in order to install it horizontally.
- When installing the machine in a sandy place, make sure that exhaust from the generator or radiator does not blow the sand up in the air, or into the machine.

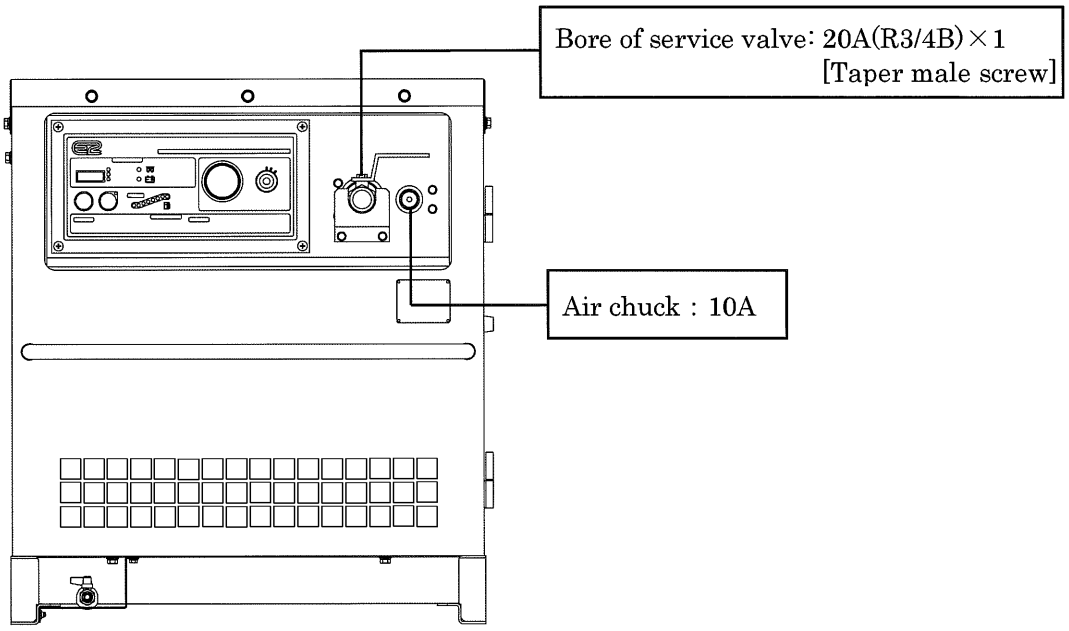
⚠ CAUTION Placing safety fence in position



- Be sure to place the safety fence around the machine in order to prevent other people than those involved in construction work from entering the construction site or from accessing the machine.

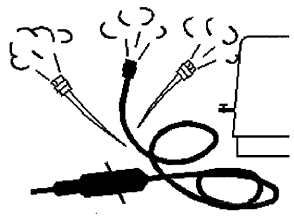
2.Installation

2.2.1 Service valve

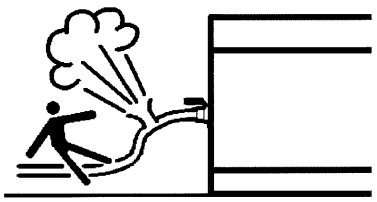


A190106

⚠ WARNING Cautions of hose attachment and removal



TR0088

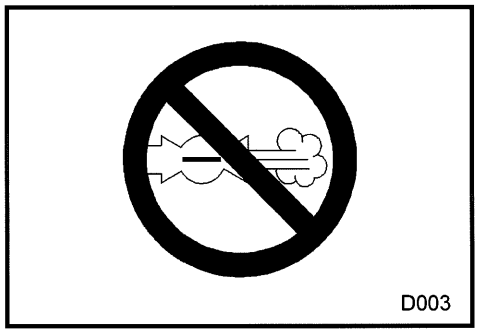


A160511

- Piping or the hose from this machine service valve should use what can be borne enough for the safety valve setting pressure of this machine.
- Please connect piing or a hose to this machine service valve firmly before operation and during operation. If the connection part is loosening, there is a possibility of piping or a hose separating and getting seriously injured.
- Please remove after closing a service valve and extracting pressure remained, in case piping or a hose is removed. If pressure remained should remain, a near thing blows away or there is a possibility of a hose whipping, causing a phenomenon and getting seriously injured.
- In order to use it safely, please read the handling of the work tools often used.

2.Installation

⚠ CAUTION Operation with discharge port (compressed air supply port) opened is prohibited

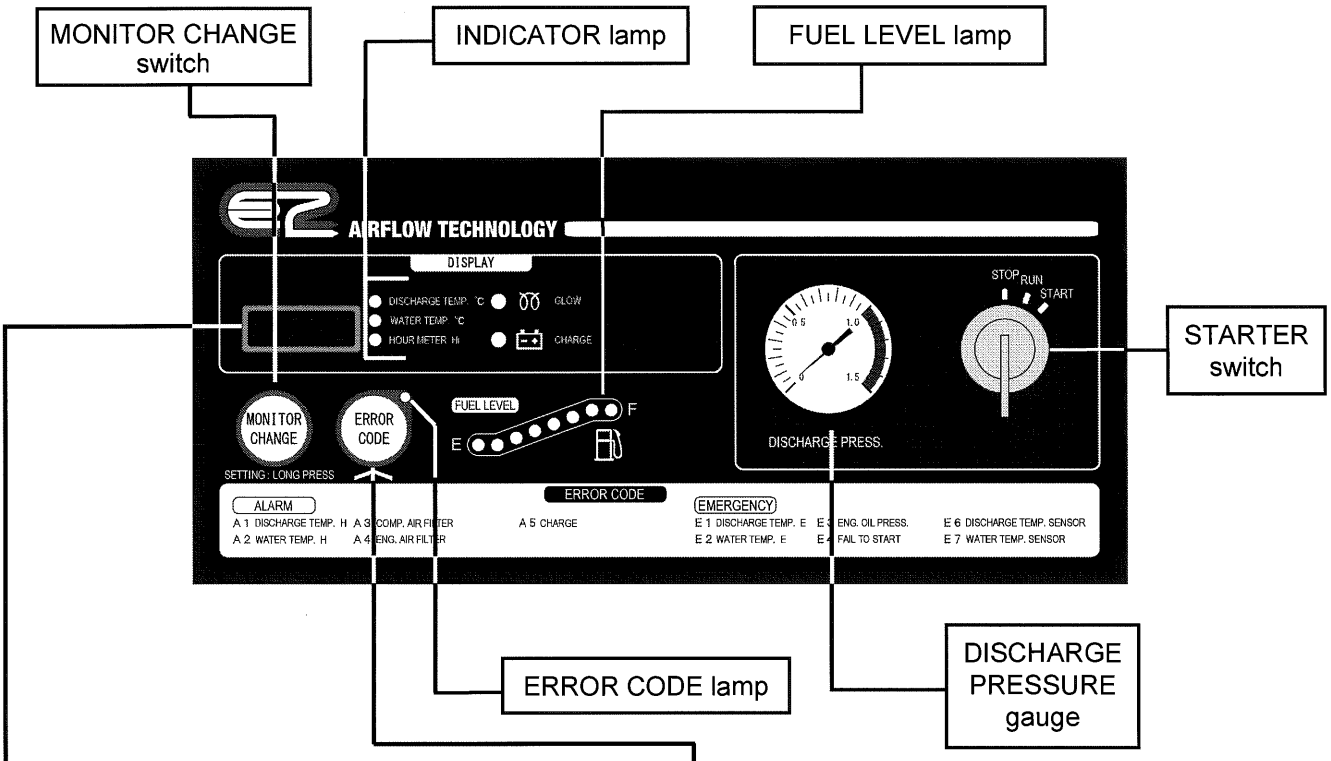


- Do not operate the machine with service valves and relief valve open unless air hoses and/or pipes are connected. High-pressurized air blows out and its air pressure could cause injury to the people nearby.
- When the machine has to be unavoidably temporarily operated with its port open, be sure to mount a silencer to reduce noise and wear protective materials such as earplugs to prevent damage to hearing.

3.Operation

3.1 Instrument Panel

Each display of the operation panel is illustrated as follows.
Read and fully understand the explanations and be sure to operate safely:



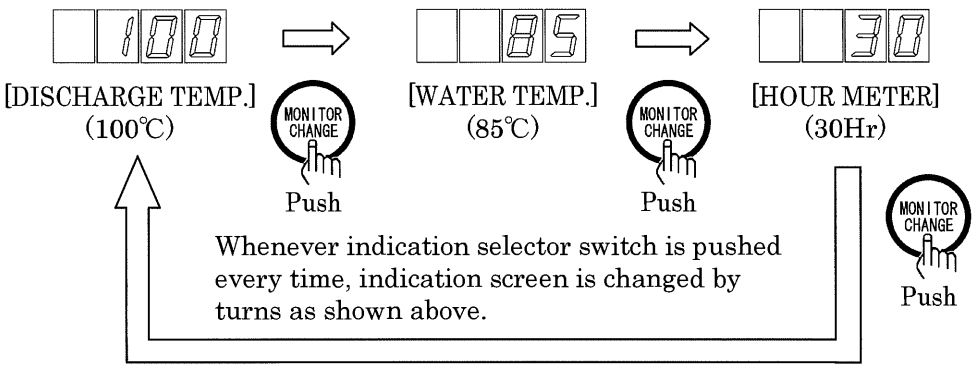
ERROR CODE switch

When this switch is pushed on while lamp is blinking, it shows error code. When starter switch is placed to "STOP", displayed screen is reset.
※ For details of error codes, refer to 4.1.

Digital monitor

When power is supplied, discharge temperature (indicator lamp lighting) is indicated.

[Display example during operation]



3.2 Lubricating oil · Coolant · Fuel

3.2.1 Engine oil

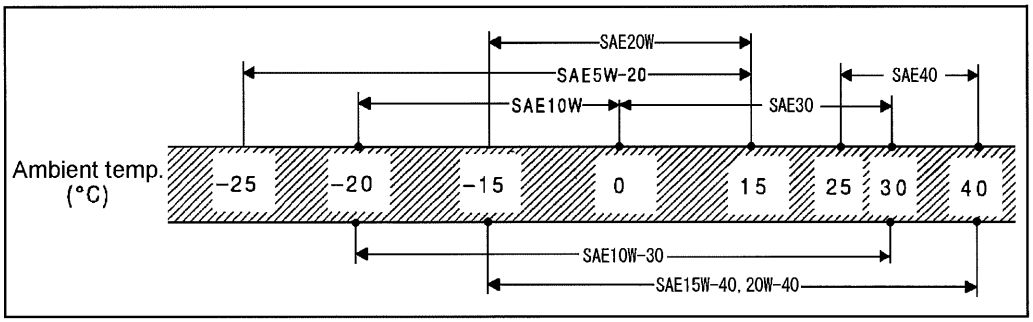
Use engine oil recommended by us.
(Using engine oil with poor quality may shorten the life of the engine).

Classification	API service classification CF class or higher
Viscosity	SAE10W-30 (as ex-factory)

IMPORTANT

- Viscosity of engine oil greatly affects startability, performance, oil consumption of the engine, as well as wear of the moving parts.

Ambient temperature range and oil viscosity (SAE)



A100293E

- When two or more different brands of oil are mixed, its performance can be deteriorated. Do not mix oils.
- **Follow the designated regulations to dispose of engine oil.**

3.2.2 Compressor oil

Be sure to use recommended oil listed below.
Even continuous oil replenishment cannot improve its deteriorated condition. Be sure to change the oil completely at every scheduled interval.

Maker and Brand of Recommended Oil

Maker	Brand
SHELL	SHELL CORENA S3R (VG32)
JX NIPPON OIL & ENERGY CORPORATION	FAIRCOL RA32

IMPORTANT

- Mixture of different brands compressor oil could cause an increase of viscosity and make compressor oil sticky. In the worst case, it could cause sticking trouble of compressor air-end "Compressor air-end will not turn". Also repairing of such air-end needs expensive cost. Therefore, be sure to avoid mixing different brands oil. In case compressor oil brand in use has to be unavoidably changed, it is absolutely necessary to completely clean up the interior of compressor air-end. In such a case, contact "AIRMAN" dealer or us directly.
- **Follow the designated regulations to dispose of compressor oil.**

3.2.3 Coolant

Coolant freezing could cause cracks of cylinder and radiator. Be sure to always use mixture of LLC (antifreezing solution) and soft water like tap water which quality is good.

IMPORTANT

- When water with dirt, sand, and/or dust contained, or hard water such as well water (ground water) is used, this will cause deposits inside radiator or on cylinder head, and will cause engine overheat due to poor flow of coolant.
- Adjust mixing ratio of LLC (Antifreeze) with water according to the temperature. (When the machine is delivered from factory, it is filled with the oil of density 35%)
  Use LLC (Antifreeze) within the range of its mixing ratio between 30 and 60%.
  (If LLC (Antifreeze) in the water exceeds more than 60%, it may decrease its antifreezing effect.)

Mixing ratio of LLC (antifreeze) (reference)

Outside temperature (°C)	-15	-20	-25	-30	-35	-40	-45
Mixing ratio (%)	30	35	40	45	50	55	60

- **Follow the designated regulations to dispose of LLC (Antifreeze).**

3.2.4 Fuel

- As for fuel, use diesel fuel oil (having higher than 45 cetane number).
- Use of diesel fuel oil having lower than 45 cetane number will cause inferior function to engine and, what is worse, it will cause serious accident to the engine.

IMPORTANT

- You will be punished if you use mixture of light oil and heavy oil/coal oil or fuel other than light oil in region there is regulation for illegal light oil.
- **Follow the designated regulations to dispose of fuel.**

3.3 Check before starting unit

Be sure to check the unit before operation.
When any abnormality is found, be sure to repair it before restarting the unit.
Be sure to make daily checks before operation. If the unit is operated without prior check and without noticing its abnormality, such operation could cause seizure of components or may even cause fire.

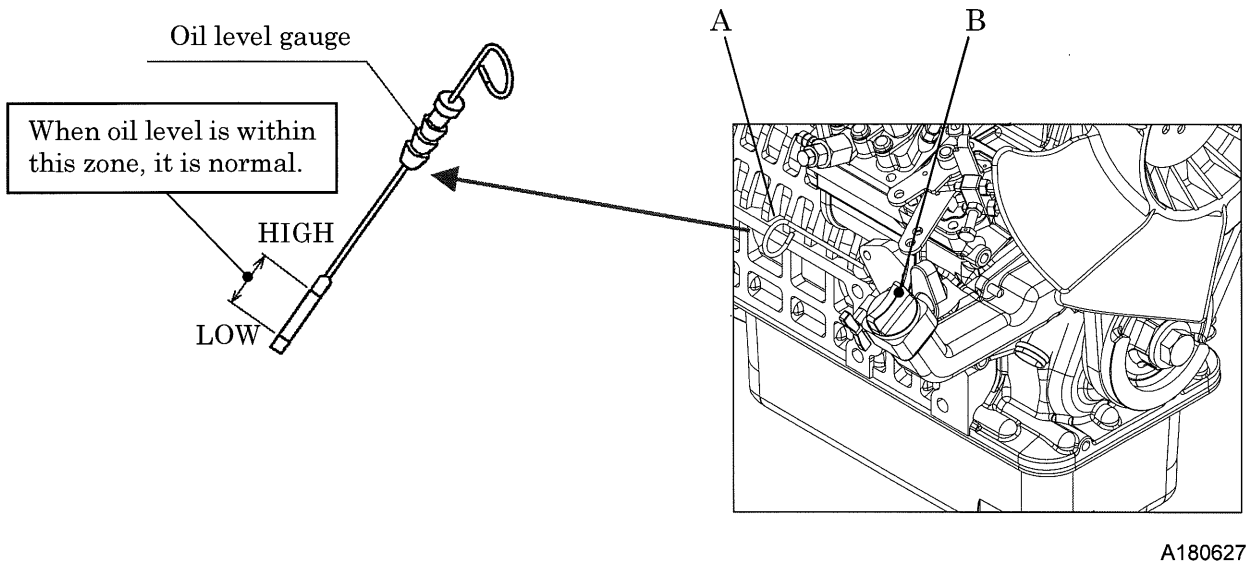
3.3.1 Check engine oil level

Unit should be on level before checking oil level.
If you check engine oil level after starting operation, be sure to check it after the elapse of 10 minutes or more since engine stoppage.

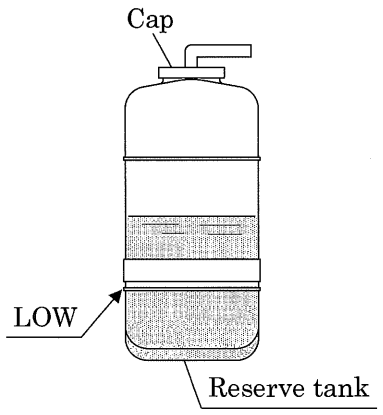
<Procedure>

1. Pull out the oil level gauge [A] and wipe it with a clean cloth.
2. Then, re-insert the oil level gauge fully and pull it out again. If the oil level gauge shows the oil level between LOW and HIGH, it is normal.
3. When the oil level is below its LOW, add engine oil from engine oil filler port [B].

- While checking oil level, check also for contamination. If the oil is found dirty, contaminated or should it be changed according to the periodic inspection list, change the oil. (See 5.4.1)
- To cause of the engine output reduction when oil level is too high, do not put oil in more than the upper limit.



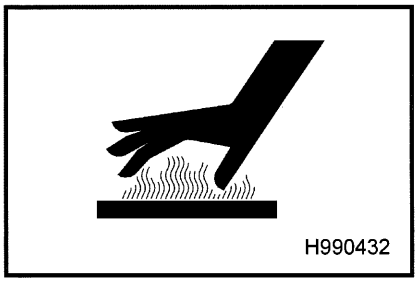
3.3.2 Check coolant level



- Check the coolant level in the reserve tank. If it is lower than the limit, open the cap and replenish the coolant. (Level must be kept above LOW mark.)
- If the coolant level in the reserve tank is low or empty, remove the radiator cap, check the quantity of the coolant, and then refill the coolant in the radiator and the reserve tank.

(See 5.4.18)

⚠ CAUTION

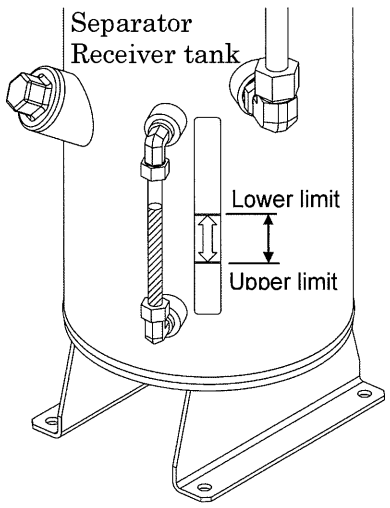


- When removing radiator cap, unfasten it to decrease internal pressure while unlocking first step. After checking internal pressure decreased, unfasten the radiator cap more until second step unlocked. If you fail to conduct these processes, it might causes blowing radiator cap by internal pressure or gushing hot scalding vapor.

IMPORTANT

- Do not operate the machine while being lack enough the coolant amount.
  An air bubble is involved and leads to damage of a radiator.

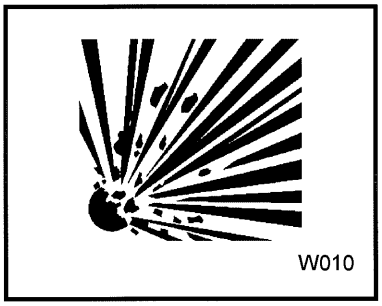
3.3.3 Check compressor oil level



- Place the machine on level ground when checking the oil level.
- After checking and confirming that the residual pressure in separator receiver tank is 0MPa, replenish the tank with compressor oil so that the oil level is kept higher than the lower limit of level gauge plate. Be sure to check the surface of compressor oil is in the range between upper limit and lower limit when machine operating. (See 5.4.6)

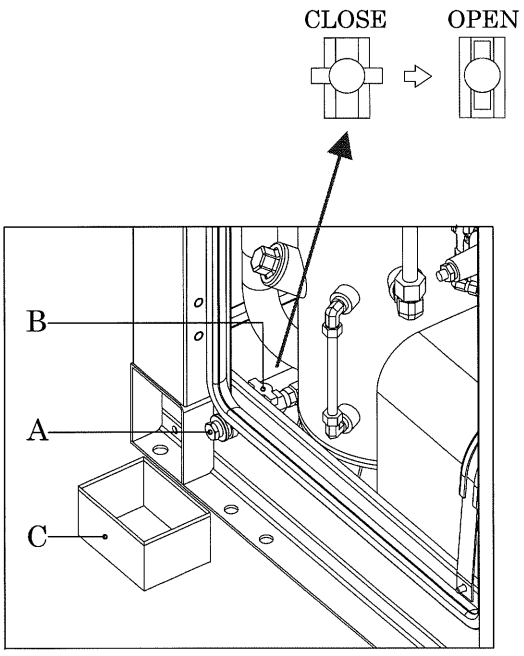
※ Supply of excessive oil can cause deterioration of oil separation performance and the like.

⚠ WARNING



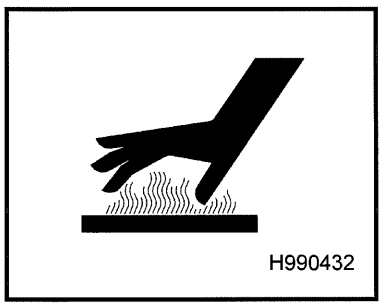
- When you fill the separator receiver tank with compressor oil, stop the engine, and make sure that the discharge pressure gauge indicates 0MPa and there is no residual pressure in it, and then gradually loosen the oil filler cap for refilling oil.
- Should any residual pressure be left in the separator receiver tank, hot compressed air and hot compressor oil jetting out could cause burning or serious injury to persons nearby.

3.3.4 Drain separator receiver tank



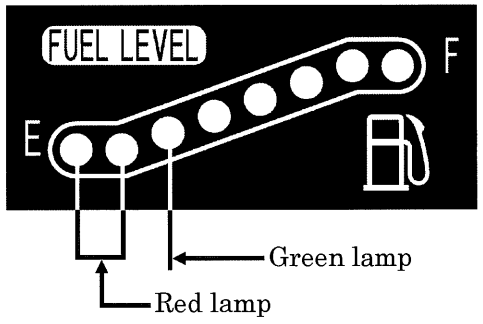
- Remove the drain plug [A]. Then, gradually open the drain valve [B] and discharge the drain from the drain separator receiver tank.
- Make sure to close the drain valve when all drain is drained and compressor oil starts coming out.
- Drain the condensate in drain container [C], and then dispose of condensate according to the designated regulations.
- Touch the fluid and check its viscosity to determine whether it is condensate or compressor oil, and when it is difficult to distinguish between the two.

⚠ WARNING



- After stopping the engine, confirm that the pressure gauge indicates 0MPa and there is no residual pressure in it, then open the drain valve gradually to drain the compressor oil.
- Note residual pressure in the receiver tank could force both extremely hot compressed air and oil to jet out and you may be scalded or seriously injured.

3.3.5 Check fuel



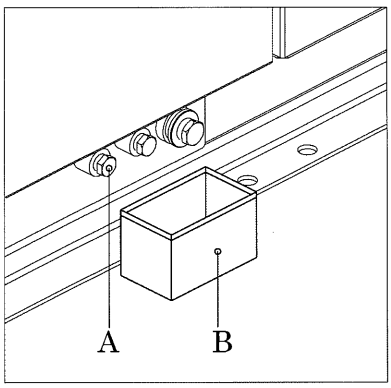
Before starting operation, make sure to check the level of residual fuel so that fuel shortage during operation can be avoided. Drain condensate accumulated at the bottom of fuel tank whenever necessary.

- Refilling fuel tank should be done in an outdoor well-ventilated place.
  Lamp is ON according to fuel level when starter switch of instrument panel is set to "RUN" position. Two red lamps are ON when fuel level is about 1/3 or less of maximum level. Only one red lamp blinks when fuel level becomes more less. Replenish fuel quickly when lamp is ON as red.
- **Never let oil reach the filler pipe of the filler port. Otherwise, high temperature may cause fuel to expand and spill out. Also, fuel may spill out due to vibrations during movement or carriage.**

⚠ CAUTION

- Do not, under any circumstance, bring lit cigarettes and/or matches to the fuel.
- The fuel is extremely flammable and dangerous. Be careful of fire because it is very likely to catch fire.
- Refuel only after stopping the machine, and never leave open fuel can near the machine. Do not spill. It could cause a fire. When it is spilt, wipe it up completely.

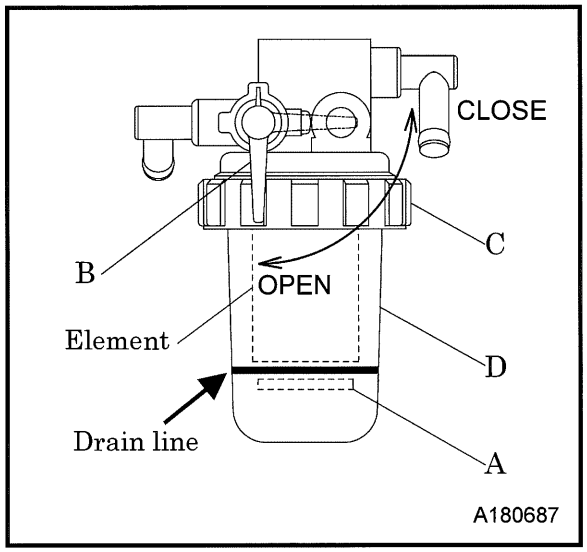
3.3.6 Drain fuel tank



- Gradually loosen the drain plug [A] and discharge the accumulated drain of the fuel tank.
- Make sure to close the drain plug when all drain is drained and fuel starts to be released.
- Drain the condensate in drain container [C], and then dispose of condensate according to the designated regulations.

3.3.7 Check sedimenter for condensate

If the red float [A] in the sedimenter is up to the bottom of the drain line, please discharge it.



<Procedure>

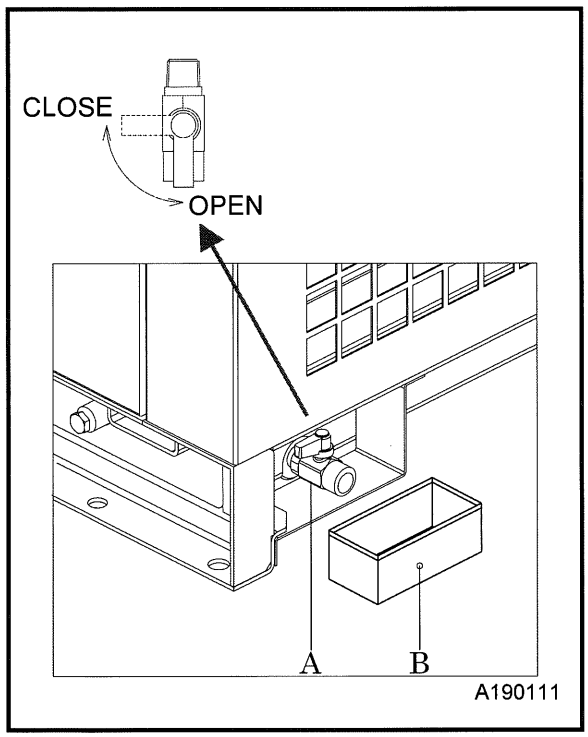
1. Place the lever [B] of sedimenter to "CLOSE" position.
2. Loosen the ring nut [C] and remove the cup [D].

● Carefully handle the cup because it is filled with fuel, and never spill the fuel inside the machine.

3. After draining the water collected inside, clean the cup and then installs it.
4. Turn the lever to "OPEN" position and fill the cup with fuel. Then bleed air. (See 3.4.7)

● Drain the condensate in drain container, and then dispose of condensate according to the designated regulations.

3.3.8 Check condensate in the oil fence



<Procedures>

1. Drain outlet of the oil fence is installed under the operation side. If condensate collected in the oil fence, open drain valve [A] and discharge it.
2. After making sure that all condensate is completely drained out, close drain valve.

● Drain the condensate in drain container [B], and then dispose of condensate according to the designated regulations.

3.3.9 Check wiring of each part

Check each wiring for any loose connection, damage to insulating sheathed portion, disconnection, and short-circuit.

3.3.10 Check piping of each part

Check each piping for any loose connection and also check each hose and pipe for any tear and leaks.

3.3.11 Check in the machine

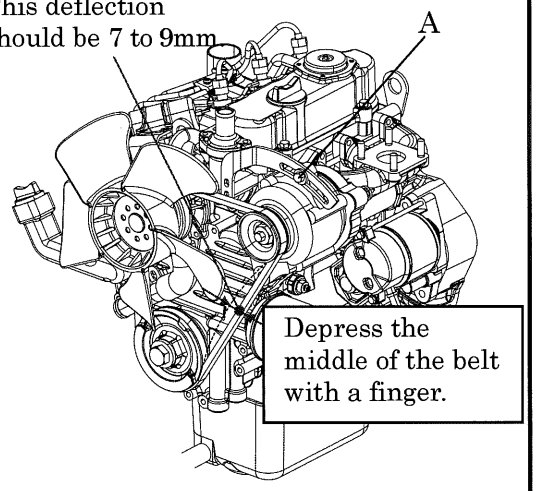
Periodically check the inside of the machine for dust and flammables.

⚠ CAUTION

- Be sure to wear protector such as helmet, protective glasses, earplug, safety shoes, gloves and dust protective mask for safety operation conforming with details of work.
- Temperature of muffler and exhaust valve will become high. Be sure to remove combustibles such woodchip, dead leaf, waste paper nearby it.
- Just in case for fire, be sure to set fire extinguisher nearby machine.
- It is helpful to keep emergency contact numbers for urgent visit clinic, ambulance and firehouse.

3.3.12 Check belt tension

Follow the procedure below to adjust tension of fan belt.
Adjust the tension by gradually loosening the fastening bolt [A].

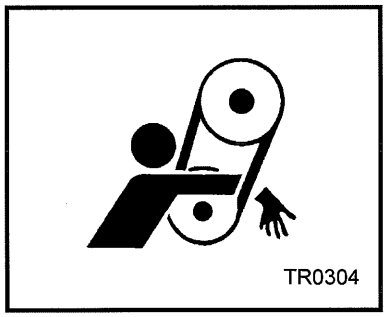


<Procedure>

1. Visually check if there are any cracks or tears in the belt.
2. Check if the tension is 7 to 9 mm (98N) when you press the center of the belt with your finger. If not, loosen the adjustment bolt [A] of the alternator once and adjust again.
3. Tighten the alternator mounting bolt when the adjustment is completed.

- Replace the belt if it has no adjustment range or if any cut, crack or other defect found.
- Be careful not to leave any grease or LLC on a belt while changing it. If any such material is left, wipe it off completely.

⚠ WARNING



- Be sure to stop the engine and remove the starter key whenever the tension of the belt is to be adjusted.
- Remove the negative (–) side cable from the battery.
- If the machine is running, it might catch the operator's hand into the belts, and this could cause a serious injury.
- Be sure to stop the engine and remove the starter key whenever the tension of the belt is to be adjusted.
- If the machine is running, it might catch the operator's hand into the belts, and this could cause a serious injury.

IMPORTANT

- Too tight belt tension could damage shaft and shorten bearing life. Too loose belt tension may result in damaging belt earlier and machine components due to overheat.

3.3.13 Door opening and closing

When opening the door, pull the handle toward you and rotate it to release the latch. When closing the door, close the door so that the latch is firmly caught by the hook.

⚠ WARNING

- Keep the door closed and locked while running the unit.
- When the door has to be opened, be careful not to touch portions that are rotating or very hot.

3.4 Operation

Make sure the door is closed securely.

3.4.1 Procedure of starting and stopping

Follow the steps below to start up.

During the warm-up operation, examine the different parts of the equipment for any looseness, leakage of water, oil, fuel, and other irregularities.

Also, set the service valve to "Fully close". Make sure that the error code lamp on the operation panel is also off.

<Procedure>

1. Make sure that the discharge pressure indicates 0MPa.
2. Turn the starter switch [A] to "RUN" position, and the glow lamp [B] goes on.
3. As soon as the glow lamp has gone out, turn the starter switch fully clockwise to start up the engine.
   Limit the time of operating the starter switch to 30 seconds. (Operating said switch for more than 30 seconds activates the emergency engine stop.) Wait at least one minute for any subsequent starting operation; otherwise, the starter may overheat and become damaged. (See 3.4.3)
4. Once the engine has started up, leave it running to warm-up for 5 minutes.

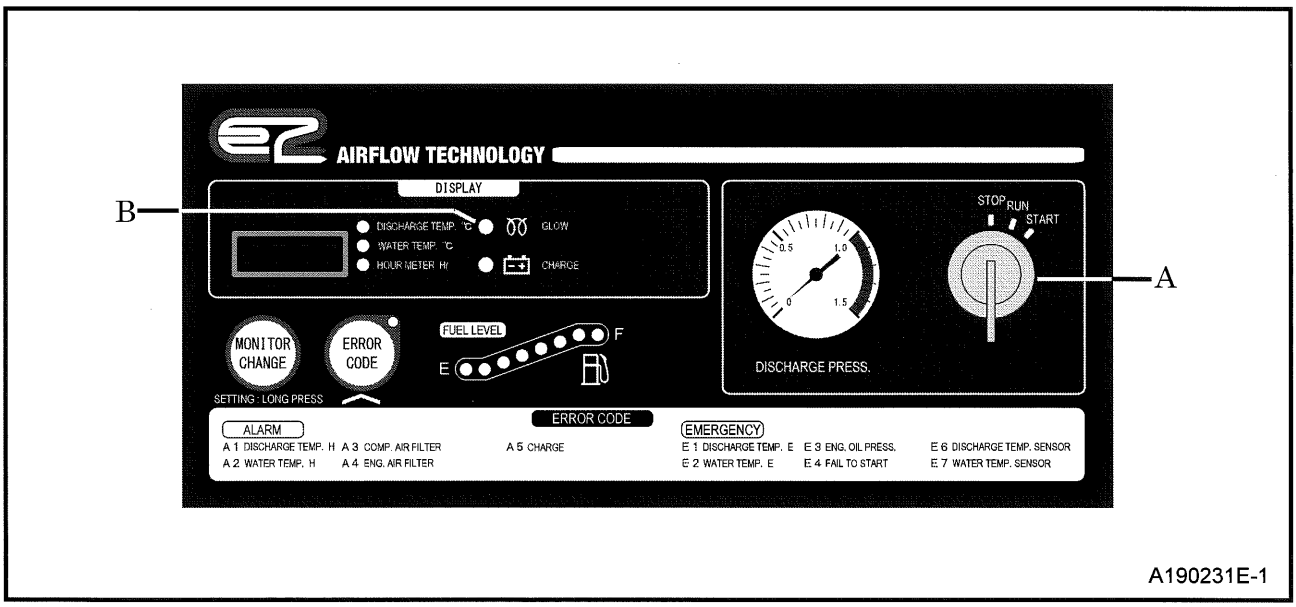
- After the engine start, it starts automatically and starting unloader operation. The time of starting unloader operation changes according to the discharge air temperature as mentioned in the following table. Display of the discharge pressure at this time is 0.2 to 0.3MPa.

Discharge air temperature	Required time for starting unloader operation
Lower than 60℃	Original set : 20sec. (Available from 10sec to 120sec) But it will be canceled when the discharge air temperature exceeds 60℃ after 10 sec.
Higher than 60℃	10 sec.

During starting unloader operation, compressed air is not discharged.

After the starting unloader operation, the discharge pressure display is 0.7 to 0.9 MPa.

5. After finishing warming up operation, open the service valve and start service job.



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⚠ CAUTION

- Do not operate the machine with service valves and relief valve open unless air hoses and/or pipes are connected.
  High-pressurized air blows out and its air pressure could cause injury to the people nearby.
- When the machine has to be unavoidably temporarily operated with its port open, be sure to mount a silencer to reduce noise and wear protective materials such as earplugs to prevent damage to hearing.

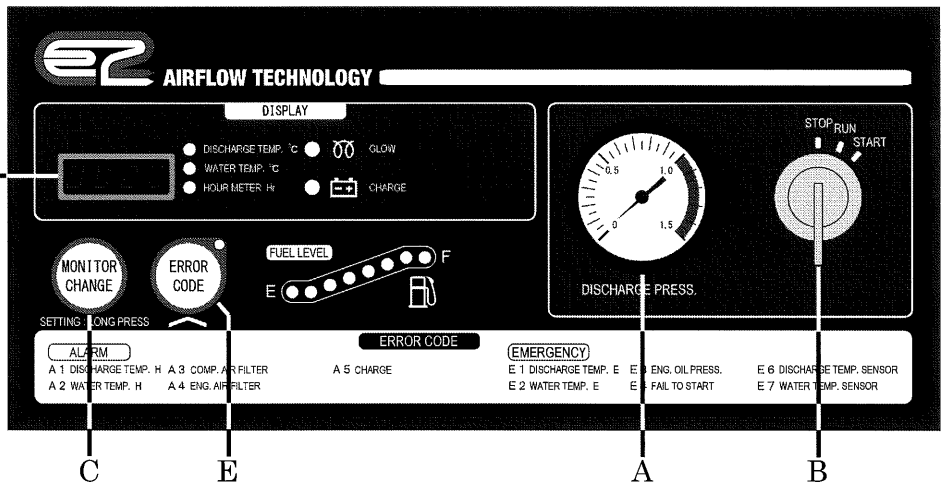
IMPORTANT

- Be sure to let unit warm-up after starting for smooth operation of the engine and the compressor. Do not operate the engine at full load immediately after it starts up. This will shorten the equipment life.

3.4.2 How to set the start time for unload operation

<Procedure>

1. Make sure that the discharge pressure gauge [A] indicates 0MPa.
2. Turn starter switch [B] to the "RUN" position.
3. Push MONITOR CHANGE switch [C] long.
4. "T" is displayed on the display [D] of the digital monitor.
5. Press the ERROR CODE switch [E], you can set value. Each press increases by 10 seconds.
6. Push MONITOR CHANGE switch [C] again to complete setting.



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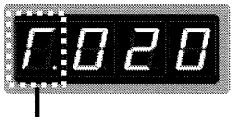
Digital monitor



D

The figure on the left shows the display when the start unload operation time (display T) is set. Change the setting when this is displayed.

3.4.3 Operating procedures when engine fails to start up on first attempt

If the engine did not start even when you performed Steps 1 through 3 of Section 3.4.1, return the starter switch to the [Stop] position and wait one minute or more. Then, perform the engine-starting operation again.
If the repeated procedure does not allow the engine to run, the following causes are suspected. Therefore, check the following items.

- No fuel
- Lack of air bleeding in fuel line (See 3.4.7)
- Clogging of fuel filter
- Discharge of battery (Low cranking speed)

⚠ CAUTION

- If you do starting manipulation successively, the starter will not stop fully and it causes damages to pinion ring gear and breakdown of the starter.

3.4.4 How to start the machine at low temperature

- Use engine oil of a viscosity that meets the ambient temperature according to 3.2.1.
- Use compressor oil of a viscosity that meets the ambient temperature according to 3.2.2.
- Use LLC (antifreeze). Use correct amount to provide freeze protection, according to the ambient temperature.
- Use fuel of the kind which is compatible with the outside temperature according to 3.2.4 for fuel.
- Battery should always be kept fully charged.
- If it is difficult to start the engine in cold weather, adjust the start unload operation time.

⚠ CAUTION

- Should change a different types of engine oil, compressor oil, LLC, or fuel when operating a machine in cold weather.

3.Operation

3.4.5 Display of each panel device in operation

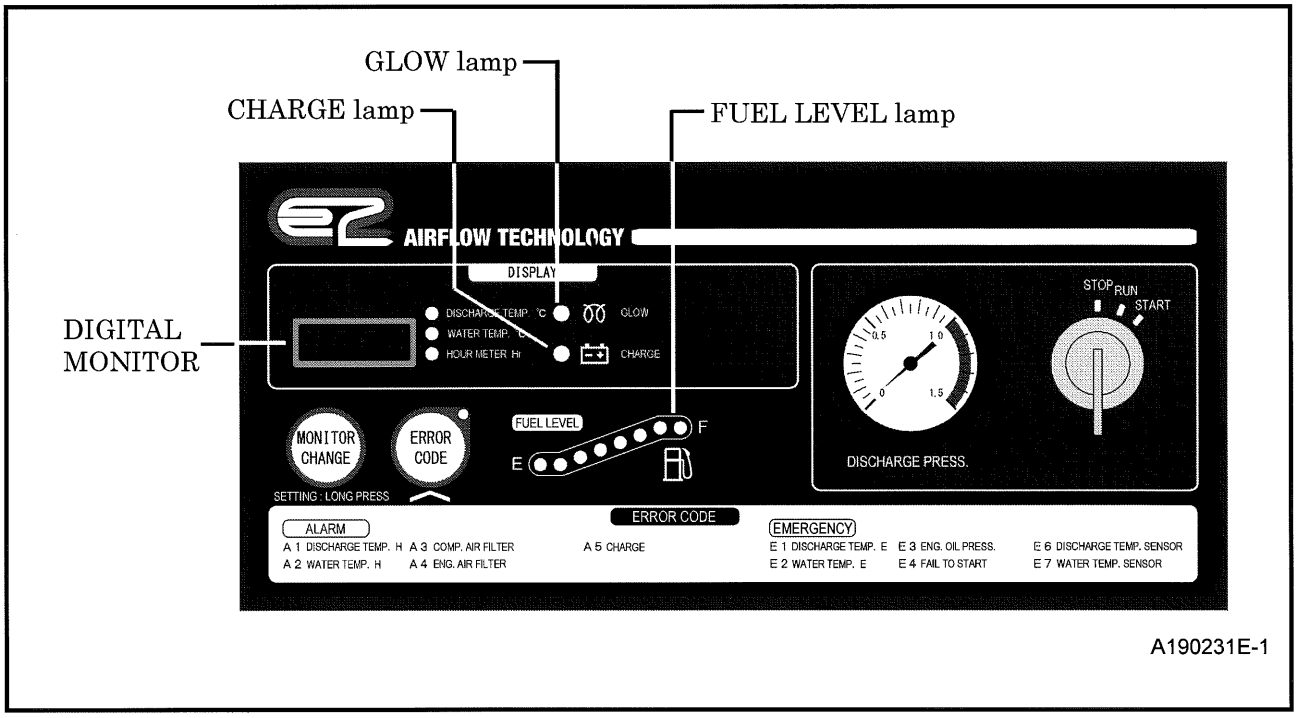
During operation, you should sometimes check that all panel devices are working properly and that there are no air leaks, oil leaks, water leaks, fuel leaks, etc. During normal operation, each indication of instruments is shown in the table below. Refer to the table for daily checks.

		Indicator lamp		
		GLOW	CHARGE	FUEL LEVEL
Monitor				
Starting	Starter switch set to "RUN" position	● OFF ※	☼ ON	☼ ON Changes depending on the remaining quantity
In operation		● OFF		

※1: This lamp will be OFF in 3 to 10 seconds, (varying upon ambient temperature.)

They may vary slightly depending on the operating conditions and other factors.

		Discharge pressure gauge
In operation	Full load	0.4 to 0.7MPa
	No load (Unload)	0.83 to 0.92MPa



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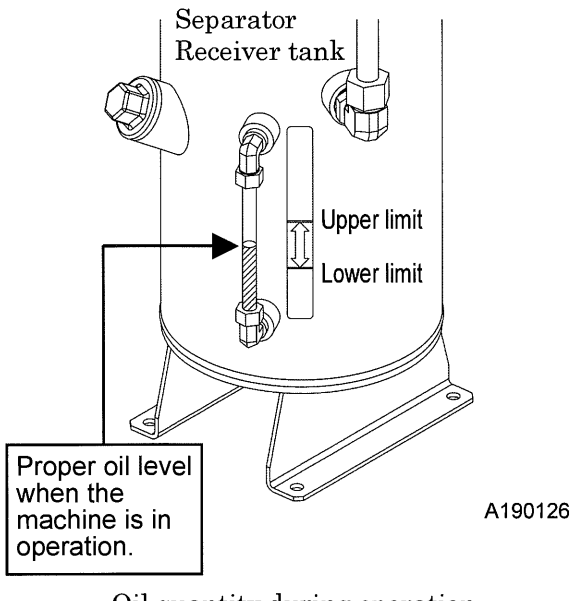
3.Operation



Oil quantity during operation

● When the machine is in operation under load, check to see that the compressor's oil level falls within the range between the lower limit and upper limit of the level gauge if the level is found to be insufficient, replenish the oil.

※Keep the operation log to record constant inspection of each component, so that trouble of the machine can be easily discovered and preventive measures can be taken.

⚠ CAUTION

- Do not open the valves below listed when operating.
- Separator receiver tank drain valve
- Radiator drain plug
- Engine oil drain valve
- Oil cooler drain valve
- Fuel tank drain valve

IMPORTANT

- Minimum discharge air pressure is 0.375MPa during operation.
- If you keep operating with less than 0.375MPa, it will causes less separation of lubricating oil at oil separator, or baking caused by overheat of compressor body.

3.4.6 Procedure to stop the machine

<Procedure>

1. Close the service valve completely and operate the machine about 5 minutes, until it cools down.
2. Turn the starter switch to "STOP" position to stop the engine.
3. Remove the key from the compressor every time when you stop the engine. Keep the key and be careful not to lose it.

● Unless all the service valves are fully closed upon stopping operation, the compressed air will be sent in reverse direction in the hoses (pipes) connected to air tools and relieved to atmosphere continuously through the auto-relief valve. Further, when re-starting operation next time, compressed air will be jetted out through service valves.

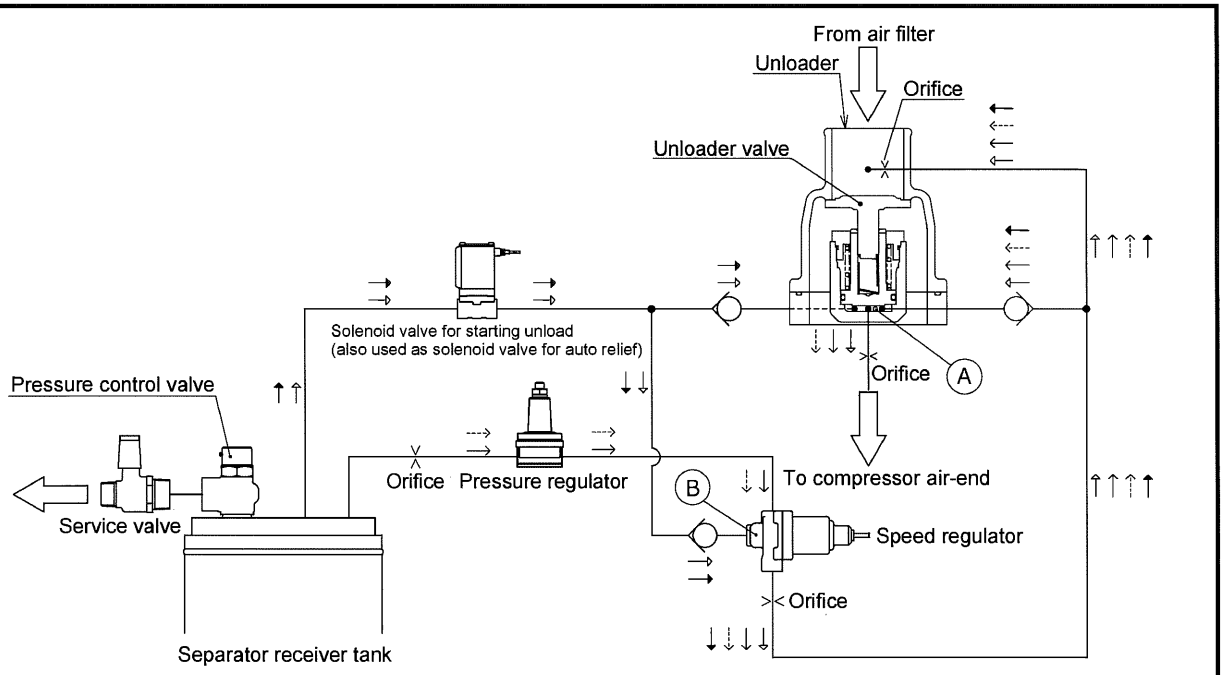
3.4.7 Air bleeding in fuel line

Should the machine stop due to fuel shortage, perform air bleeding according to the following steps.

<Procedure>

1. Replenish fuel.
2. When starter switch is turned to "RUN" position, electromagnet pump starts to automatically bleed air in fuel line.
3. Air bleeding is completed about 1 minute.

3.5 Capacity Control Device



	Function of solenoid valve	Air flow
Start	OPEN	→
Load operation	CLOSE	→
Suction port closing unload operation	CLOSE	→
Stop	OPEN	→

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Step	Response
Start	Compressed air flows into unloader chamber (A) because solenoid valve for starting unload is opened at start-up. The pressure in chamber (A) rises soon to close unloader valve (A) fully and accordingly it can reduce the load at start-up.
Load operation	After startup, the unload operation is performed automatically, the solenoid valve for starting unload is closed, and the flow volume of air flowing from the pressure regulator to the (A) ,(B) chamber increases or decreases according to the increase or decrease of the discharge pressure. As a result, the degree of opening of the unloader valve and the engine speed change, and the amount of air is automatically controlled steplessly in the range of 0 to 100%.
Suction port closing unload operation	When the air consumption decreases and the rated pressure is exceeded, the speed regulator operates to reduce the engine speed in proportion to the pressure increase, and at the same time the amount of air flowing from the pressure regulator into the unloader room (A) increases. Close the valve. When unloading, if the inside of the compressor body gets high vacuum, a vacuum noise is generated. In order to prevent this, air is returned from the orifice in the lower part of unloader (A) chamber to the inside of the compressor body to prevent high vacuum.
Stop	When stopping operation, it opens solenoid valve for auto relief valve to relieve the compressed air in separator receiver tank to atmosphere, detecting the pressure inside compressor air-end.

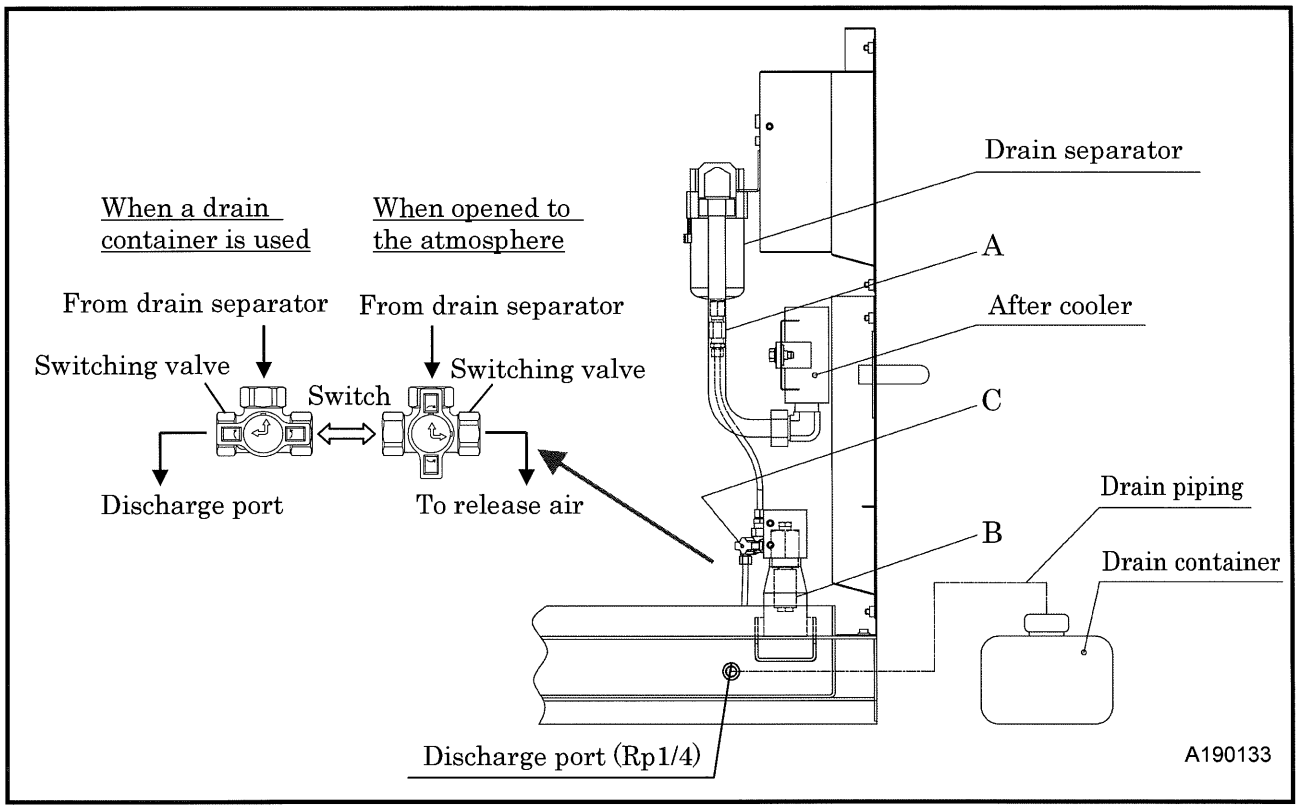
3.6 Operation of after cooler type

3.6.1 Treatment of the after cooler drain

As an extremely small amount of an oil component is contained in the after cooler drain, please be careful in treating the drain.

[If drain components are mixed with discharge air]

- While the machine is operating, check if air is discharged from the after cooler drain outlet. If any drain components are mixed in the service air, clean the orifice [A] at the lower part of the separator and the silencer [B] of the outlet. Or, replace these if they are very dirty. Cleaning or replacement must be performed by a personnel with expertise. Please consult our branch or a sales office in your vicinity.



3.6.2 Regarding switching valve operation and drain container installation

- Switching valve [C] is installed under drain separator. Switch the after cooler drain to either the discharge port side or to the air release side as necessary. (Under a condition of 5°C or less, the drain in the drain container may be frozen, so be sure to switch the after cooler drain to the air release side.)
- This machine is equipped with a discharge port (Rp1/4) so that the drain container can be installed outside the machine. If you discharge the after cooler drain to the drain container, please prepare a drain container and a drain pipe by yourself, and then remove the drain port plug and perform piping as shown in the figure above. After piping, switch the switching valve [C] to the discharge port side before use.
- When you switch the switching valve [C] to the discharge port side, be sure to remove the discharge port plug. If you operate the machine with the plug attached, the drain can be mixed in service air.

3.6.3 To prevent freezing

- If cease the operation and storage the machine under use environment in winter season, be sure to open the service valve 2 to 3 times in order to remove water droplet in air piping such as after-cooler before stoppage of engine.
  If water removal is inadequate, the internal areas of the after cooler could be frozen and damaged.

4 Failure cause and measures

4.1 Indicator lamp and Warning / Emergency display

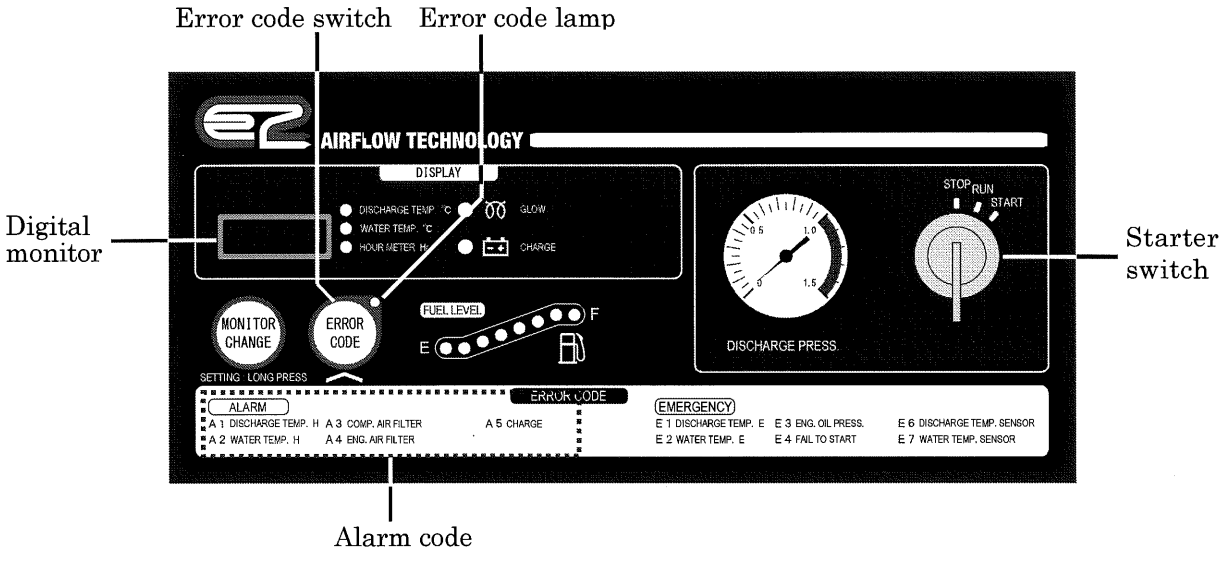
[Indicator lamp] Turn the starter switch to "RUN" position. Then the lamp goes on.

Item	Contents	Operation when not charging	Monitor
Glow	Press starter switch "RUN" and the lamp goes on and after preheating is finished, the lamp will be off.	–	○
Charge	Lamp goes on when alternator is not charging.	Check wiring. Check alternator.	○

4.1.1 Alarm 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 digital monitor.

Item	Failure code	Contents	Measures
DISCHARGE TEMP.H	A-1	Air temperature of the discharge air outlet is 115℃.	See 4.2 "Troubleshooting"
WATER TEMP.H	A-2	Water temperature is 105℃.	
COMP.AIR FILTER	A-3	Air filter clogged and suction air resistance increased. [Actuating resistance is more than 6.2kPa.]	Clean or replace
ENG. AIR FILTER	A-4		
CHARGE	A-5	Belt loosened and/or cut Faulty generation of alternator	See 4.2 "Troubleshooting"



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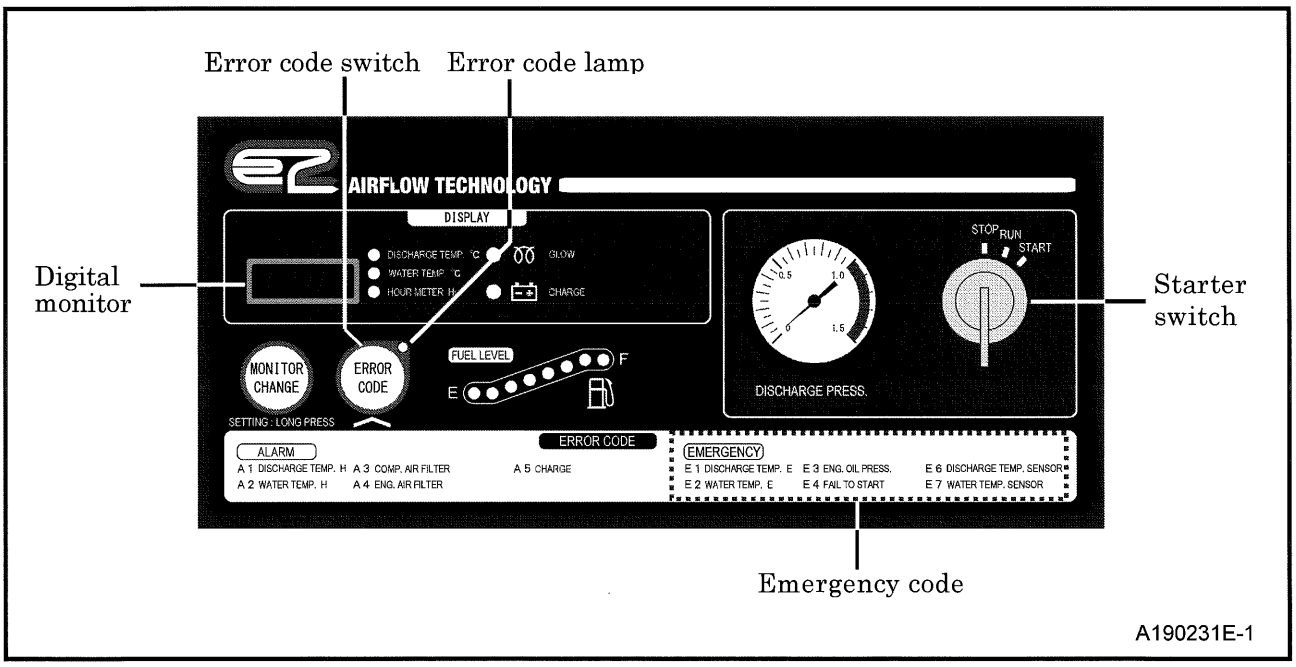
4 Failure cause and measures

4.1.2 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 digital monitor.

Item	Failure code	Contents	Measures
DISCHARGE TEMP.E	E-1	Air temperature of the discharge air outlet is 120℃.	See 4.2 "Troubleshooting"
WATER TEMP.E	E-2	Water temperature is 110℃.	
ENG.OIL PRESS	E-3	Engine oil pressure decreased. [The function pressure: 0.098MPa]	
FAIL TO START	E-4	Displayed when the starter is turned continuously for 30 seconds.	
DISCHARGE TEMP. SENSOR	E-6	Discharge air temperature sensor of the discharge air outlet disconnected.	
WATER TEMP. SENSOR	E-7	Engine coolant temperature sensor disconnected.	



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4 Failure cause and measures

4.2 Troubleshooting

If any trouble occurs during operation, do not leave it. Investigate the cause and take appropriate measures. Read the manual carefully and fully understand what to do in case of trouble.

- The better you understand the construction and function of the machine, the faster you can find a problem and solution.
- This chapter describes the symptom, cause and countermeasures of important troubles in detail.

4.2.1 Compressor version

If a problem occurs with the compressor, take appropriate inspection and measures referring to the table below.

Symptom	Cause	Countermeasures
The discharge air pressure will not raise 0.7MPa.	(1)Pressure regulator insufficient adjustment. (2)Trouble of solenoid valve for starting unloader	Re-adjust (Fasten) Change
If the discharge pressure will not increase to the specified one, RPM will drop.	(1)Pressure regulator insufficient adjustment. (2)Trouble of pressure regulator	Re-adjust (Fasten) Change
Engine does not reach minimum revolution at unload.	(1)Faulty speed regulator rod length (2)Operation error of speed regulator	Re-adjust Disassemble/Check
Safety valve relieves at unload.	(1)Pressure regulator insufficient adjustment. (2)Unloader valve damaged/Faulty seat (3)Faulty safety valve (4)Speed regulator diaphragm damaged (5)Faulty speed regulator rod length	Re-adjust (loosen) Call your nearest dealer Change Call your nearest dealer Change
Oil mixes in air. (poor oil separation)	(1)Scavenging orifice strainer clogging (2)Excessive oil in separator receiver tank (3)Low discharge pressure (4)Oil separator deteriorated	Disassemble/Clean Drain to its proper level Disassemble and check of pressure control valve Check/Change
Water found mixed in air. (Condensate separation malfunctioned.) For after cooler type only	(1)Clogging of silencer at after cooler drain outlet (2)Orifice garbage clogging (3)Insufficient switching valve adjustment	Disassemble/Clean/Change Disassemble/Clean Check the switching valve
Insufficient free air delivery.	(1)Air filter element clogging (2)Unloader valve cannot fully open (3)Engine does not reach rated speed	Clean or change of element Call your nearest dealer Call your nearest dealer
Discharge air temperature alarm (A-1) Discharge air temperature error (E-1) and engine stoppage	(1)Shortage of compressor oil. (2)Slippage of belt. (3)Oil cooler clogging. (4)Oil filter clogging. (5)Loose wiring connectors and disconnection. (6)Faulty discharged air temp. sensor. (7)Discharge air temp. sensor is disconnected.	Replenish oil Re-adjust tension Clean Change Check/Fasten Disassemble/Check Repair and replace

4 Failure cause and measures

Symptom	Cause	Countermeasures
Coolant temperature alarm (A-2) Coolant temperature error (E-2) and engine stoppage	(1)Low coolant level. (2)Belt slippage. (3)Radiator clogging. (4)Faulty thermostat. (5)Loose wiring, connectors and disconnection. (6)Faulty coolant temp. sensor. (7)Coolant temp. sensor is disconnected.	Replenish coolant Re-adjust tension Clean Change Check/Fasten Change Repair/Replace
Engine oil pressure error (E-3) and engine stoppage.	(1)Engine oil shortage (2)Engine oil filter clogging (3)Loose wiring, connectors and disconnection. (4)Faulty oil pressure sensor.	Replenish oil Change Check/Fasten Change
Charge error (A-5)	(1)Belt damage. (2)Belt slippage. (3)Alternator wiring/connector loosen/come off. (4)Alternator trouble	Change Re-adjust tension Check/Loosen Call your nearest dealer
Discharge air temperature sensor disconnection (E-6) or coolant temperature sensor disconnection (E-7) is displayed, and the engine is stopped.	(1)Each sensor's wiring/connector loosen/come off. (2)Each sensor has error. (3)Each sensor disconnects.	Check/Fasten Disassemble/Check Repair/Replace
Engine oil temperature (E-5) and engine stoppage.	(1)Engine oil shortage (2)Low coolant level. (3)Belt slippage. (4)Radiator clogging.	Replenish Replenish Re-adjust tension Clean

- Contact our office nearby or distributor if you find it difficult to repair by yourselves.
- Refer the section "4.2.2 Engine body version" when facing engine trouble.

4 Failure cause and measures

4.2.2 Engine body version

In case engine trouble occurs, refer below table and do appropriate check and maintenance.

Symptom	Cause	Countermeasures
Low starter revolution speed.	(1)Faulty battery. (2)Failure of battery charging (3)Failure of alternator (4)Failure of starter	┐ Check battery → Charge ┘ Change Change Change
The starter rotates normally but the engine does not start.	(1)No fuel (2)Air entry into fuel line system (3)Fuel filter element clogging (4)Clogging of sedimenter (5)Nozzle clogging	Fuel replenishment Bleed the air Disassemble/Clean/Change Disassemble/Clean/Change Disassemble/Clean
The engine does not reach the rated revolution speed.	(1)Engine trouble. (2)Fuel filter element clogging (3)Sedimenter clogging (4)Water is accumulated in sedimenter (5)Air filter element clogging.	Call your nearest dealer Disassemble/Clean/Change Disassemble/Clean/Change Drain water Clean or change of element
In case hard to start engine	(1)Fuel would not flow	(1)Check fuel tank and remove impurities and water
		(2)Check fuel filter and replace it if it is dirty
	(2)Air and water are mixed in fuel oil piping	(1)Check pipe and tightening band and replace it with new one or repair it if it is damaged
		(2)Remove air
		(3)Remove water or change fuel
	(3)Oil viscosity is high at cold time. Engine rotation speed is low.	(1)Use oil properly according to temperature
	(4)Battery tends to go flat. Engine rotation speed is low. Engine would not work to start compression.	(1)Charge battery
In case output shortage	(1)Fuel shortage (2)Fuel filter element clogging	(1)Fuel replenishment
		(2)Check fuel system (Especially beware of air mixing)
	(3)Air filter element clogging.	(1)Clean or change of element
In case engine stops suddenly	(1)Run out of fuel	(1)Fuel replenishment
		(2)Check fuel system (Especially beware of air mixing)
In case exhaust gas color is bad	(1)Bad fuel is used	(1)Replace fuel with good one
	(2)Excessive quantity of engine oil is used	(2)Change oil quantity as regulated one
In case overheat	(1)Cooling water boiling	(1)Check shortage and leakage of cooling water
		(2)Check tightness and looseness of fan belt
		(3)Clean dust in radiator fin tube

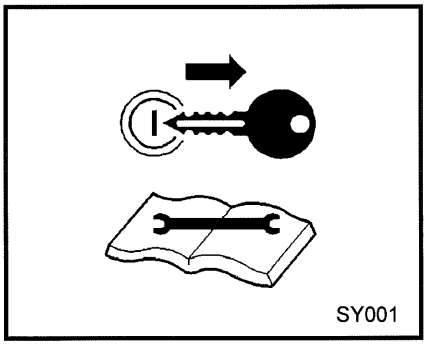
5.Periodic inspection/Maintenance

5.1 Important Items at Periodic Inspection and Maintenance or after Maintenance

The following table shows the inspection and maintenance intervals under normal operation conditions. When used or operated under hard environmental conditions, it is impossible to warrant the unit even if the above conditions are performed according to the intervals listed in the above table.

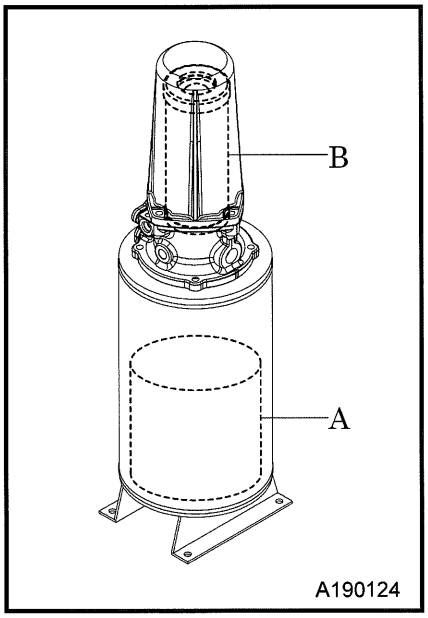
- Pease wear protection implements, such as a helmet, protection glasses, earplugs, safety shoes, a glove, and a protection-against-dust mask, according to the contents of work for safety.
- Do not touch hot portions of the machine while inspecting the machine when running.
  Such parts as engine, exhaust manifold, exhaust pipe, muffler, radiator, oil cooler, air-end, pipe, separator receiver tank, and discharging pipe are especially hot, so never touch those parts, because it could cause serious burns.

⚠ WARNING Hang a "Now Checking and under Maintenance" tag


SY001

- Remove the starter key from the starter switch before starting inspection, and hang up a "Now Checking and under Maintenance" tag where it can be easily seen. The checker must keep the key during checking and maintenance.
- Remove the negative (–) side cable from the battery. If the above procedure is neglected, and another person starts operating the machine during check or maintenance, it could cause serious injury.

⚠ CAUTION Prevention of oil separator from catching fire



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- Be sure to perform following periodic inspection and maintenance:
  A. Check and change compressor oil quantity
  B. Change oil separator

5.Periodic inspection/Maintenance

IMPORTANT **Directions: Prohibition of any other jobs or works than directed herein**

- Be sure to use recommended fuel, oil, grease, and antifreeze.
- Do not disassemble or adjust engine, compressor air-end or part(s) for which inspection or maintenance is not referred to in this manual.
- Use genuine parts for replacement.
- Any breakdown, caused by using unapproved parts or by wrong handling, will be out of the scope of "WARRANTY".
- Keep the electrical components away from water or steam.
- Waste from machines contains harmful material. Do not dispose of such harmful fluids to the ground, rivers, lakes or ponds, and sea. It contaminates the environment.
- When draining waste fluid from machines, use leak proof containers to hold such fluids from machine.
- Be sure to follow the designated regulations when disposing of oil, fuel, coolant, filters, battery and other harmful things.

5.Periodic inspection/Maintenance

5.2 Periodic Inspection List

(Unit:Hour)

	Maintenance	Daily	250	300 (First time)	500	1,000	2,000	3,000	Page
Compressor	Check compressor oil level	○							3-6
	Drain separator receiver tank	○							3-7
	Check for looseness in pipe connecting part, and wear and tear of pipe	○							3-10
	Check oil, water, fuel and air leak	○							3-15
	Check functions of all instruments and devices	○							3-15
	Check and clean clogging air filter element		○						5-9
	Change compressor oil			○	※1○				5-10
	Change compressor oil filter element			○		○			5-11
	Change air filter element				○				5-11
	Clean strainer in the scavenging orifice				○				5-12
	Check and clean drain outlet port of after cooler (After cooler type)				※2○				5-13
	Clean outside of the oil cooler					○			5-14
	Clean outside of the after cooler (After cooler type)					○			5-14
	Change speed regulator diaphragm					☆●			5-14
	Change oil separator element						●		5-16
	Change nylon tubes						☆●		5-16
	Change rubber hoses						☆●		5-17
	Change solenoid valve for starting unload							●	5-17
	Change oil seal and bearing							●	5-17
	Change O-ring of the unloader							★●	5-17
	Change pressure regulator							★●	5-17
	Change pressure control valve ASSY							★●	5-17

Such items marked ○ shall be carried out by customers. For the items marked ●, contact our office nearby or distributor because technical knowledge is required.

Regarding the item marked ※1:When water is found mixed in the discharged air, perform cleaning work even before the specified interval comes.

The items or parts marked ☆ should be replaced every two years even if they are not in disorder within their periodical maintenance interval because their materials will change or become degraded over the course of as time passes. Also for the same reason, the parts marked ★ should be replaced every three years.

◎The indicated replacement periods are rough estimates. Depending on the usage conditions or environment, inspection/maintenance should be conducted earlier.

5.Periodic inspection/Maintenance

(Unit:Hour)

	Maintenance	Daily	50	250	500	1,000	2,000	3,000	Page
Engine related	Check engine oil level	○							3-4
	Check coolant level	○							3-5
	Check fuel	○							3-8
	Drain fuel tank	○							3-8
	Check sedimenter for condensate	○							3-9
	Check looseness in pipe connectors, terminals and tear in wiring	○							3-10
	Check belt tension	○							3-11
	Change engine oil		○ (First time)	○					5-6
	Change engine oil filter element		○ (First time)	○					5-7
	Check battery electrolyte			○					5-7
	Check and clean clogging of air filter element			○					5-9
	Check specific gravity of battery electrolyte				○				5-7
	Change air filter element				○				5-11
	Change fuel filter element				○				5-12
	Change sedimenter element				○				5-13
	Clean inside of radiator				●				5-13
	Clean outside of the radiator					○			5-14
	Change coolant					☆○			5-15
	Clean inside of fuel tank						●		5-16
	Change fuel hose		○ (Check)				☆●		5-16
	Change radiator hoses							☆●	5-17
Others	Check condensate in the oil fence	○							3-9
	Clean inside of the oil fence and check it for any rust					●			5-14

Such items marked ○ shall be carried out by customers. For the items marked ●, contact our office nearby or distributor because technical knowledge is required.

The items or parts marked ☆ should be replaced every 2 years even if they are not in disorder within their periodical maintenance interval because their materials will change or become degraded as time passes.

◎The indicated replacement periods are rough estimates. Depending on the usage conditions or environment, inspection/maintenance should be conducted earlier.

(Unit:Hour)

Maintenance		50	800	1,500	3,000	Remarks
Engine body	Check engine valve clearance		●			Please contact nearby distributor or engine distributor for inspection and maintenance.
	Check and clean fuel injection nozzle			●		
	Check fuel injection pump				●	

5.3 Periodic Replacement of Parts

Part number changes upon modification.
For replacement of parts, make sure whether the part number is correct or applicable.

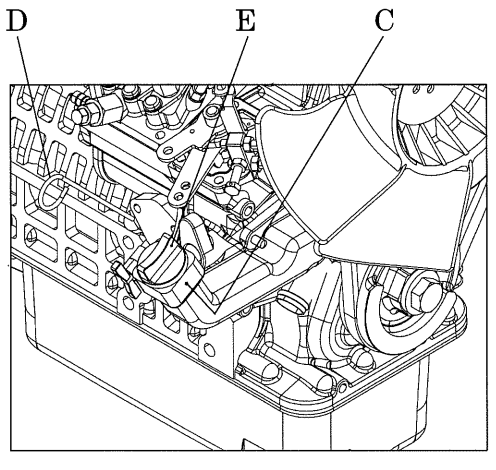
Part Name		Part Number	Quantity
Engine oil filter element		41290 01700 KUBOTA 16271-32092	1
Air filter element	for compressor air-end side	32143 11400	1
	for engine side	32143 11400	1
Compressor oil filter element		37438 08900	1
Compressor oil filler port O-ring [C]		03402 25030	1
Fuel filter	Element [D]	43541 01300 KUBOTA RA211-51281	1
	O-ring [E]	KUBOTA 04811-50650	1
	O-ring [F]	KUBOTA 04816-00160	1
Sedimenter	Element [D]	43541 02600 KUBOTA RD819-51281	1
	O-ring [E]	KUBOTA 1G311-43571	1
Solenoid valve for starting unload		46811 30000	1
Oil separator	Separator	34224 02801	1
	O-ring	03402 15110	1
Pressure control valve ASSY		35300 18700	1
Diaphragm for speed regulator		36437 01500	1
Pressure regulator		36400 19000	1
Belt		KUBOTA 15868-9701-0	1

5.Periodic inspection/Maintenance

5.4 Maintenance Items

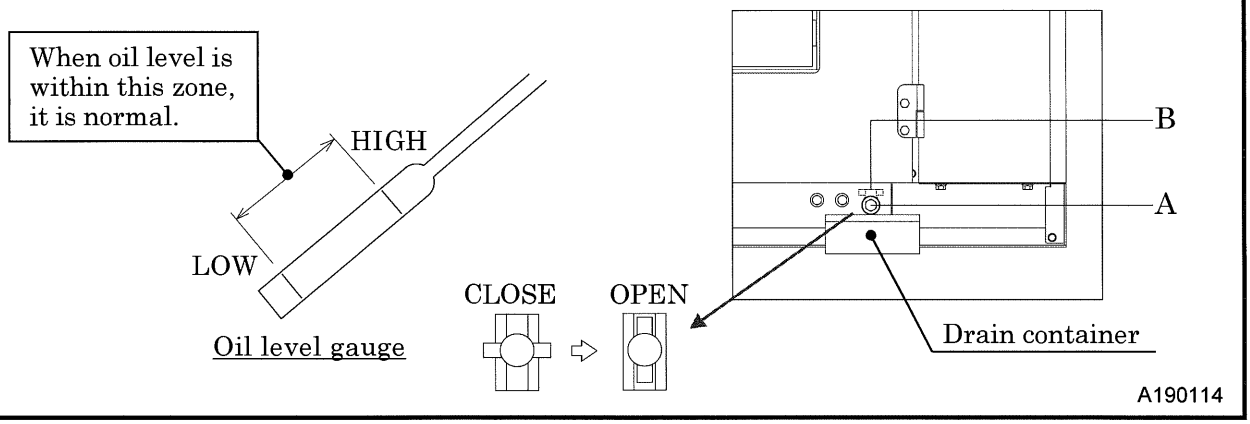
5.4.1 Change engine oil (Change the engine oil filter at the same time.)

At 50 hours for the first change and at every 250 hours thereafter

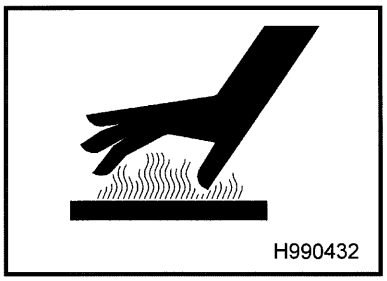


<Procedure>

1. After removing the engine oil filler cap [E], remove the drain plug [A] attached outside the machine, open the drain valve [B] attached inside the machine, and drain the oil.
2. After drainage of used engine oil has been completed, close drain plug and drain valve, and supply new engine oil through the oil filler port [C] which is used as oil level gauge also.
   [Quantity of oil : approx. 3.8L]
3. After supplying oil, pull out the oil level gauge [D] and wipe it out.
4. Then, re-insert the oil level gauge fully and pull it out again. If the dipstick shows the oil level between LOW and HIGH, it is normal.
5. As you finish refilling, make sure to close filler port cap and to firmly reinsert oil level gauge.



⚠ CAUTION Prevention of oil separator from catching fire



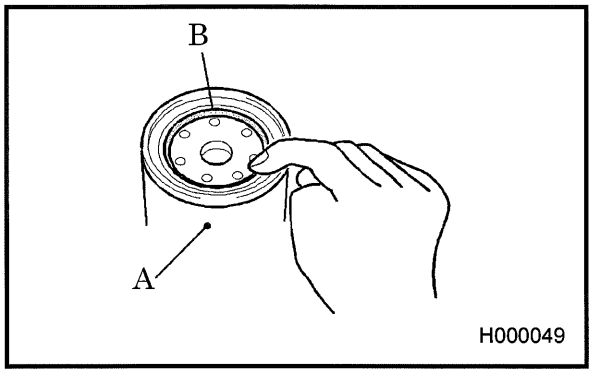
- After stopping the engine, wait of 10 minutes or more until the engine oil cools off. Then check the level of the engine oil, or refill or drain the oil.
- Engine oil is very hot and highly pressurized during or just after the operation. Hot oil could blow out of the tank and can cause scalding.
- Never supply more engine oil than the proper level. Too much oil could cause white smoke out of the exhaust, and it can cause damage and accident to engine.

IMPORTANT

- Follow the designated regulations to dispose of engine oil.

5.4.2 Change engine oil filter element

At 50 hours for the first change and at every 250 hours thereafter



<Procedure>

1. Remove the filter [A], using a filter wrench.
2. Screw in the new filter with the gasket [B] coated slightly with oil.
   (For part number, See 5.3)
3. After the packing touches the sealing face, tighten another 1 times with a filter wrench.
4. After installing the oil filter element, check it for any oil leak during operation.

5.4.3 Check battery electrolyte and specific gravity of battery electrolyte

Battery electrolyte: every 250 hours

Specific gravity of battery electrolyte: every 500 hours

If there seems to be a problem in starting an engine due to a flat battery, carry out the checks by following the procedures below:

- **Ordinary type battery:**

  Check battery electrolyte level and if the level is not within the specified level, add distilled water.

  Measure specific gravity of battery electrolyte, and if it shows below 1.24, recharge the battery immediately.

  Refer to 5.4.4 for method of specific gravity measurement and recharging the battery.

- **Enclosed type battery:**

  Check the indicator on top surface of the battery.

  If the indicator shows that charge is needed, recharge the battery immediately.

If specific gravity of battery electrolyte does not rise in spite of replenishing distilled water or charging battery, be sure to replace battery with new one quickly.

5.4.4 Maintenance of Battery

Battery may generate hydrogen gas and may explode.
Therefore, recharging should be done at a well-ventilated place.

- Do not check the battery by short-circuiting the positive and negative terminals with a metallic piece.
- Never operate the machine nor charge the batteries with the battery liquid level being kept lower than the lower level. Continuing operation at this lower level will cause deterioration of such parts as pole plates etc., and also it may cause explosion as well as reduction of battery life.
  Add distilled water so that the liquid level may reach the middle level between the "UPPER LEVEL" and "LOWER LEVEL" without any delay.
- Wear protective gloves and safety glasses when handling a battery.
  - When such battery electrolyte contacts your clothes or skin, wash it away with large amount of water immediately.
  - If the battery electrolyte gets into your eyes, wash it away immediately with plenty of water and see a doctor at once, because it is feared that eyesight might be lost.

⚠ WARNING Handling battery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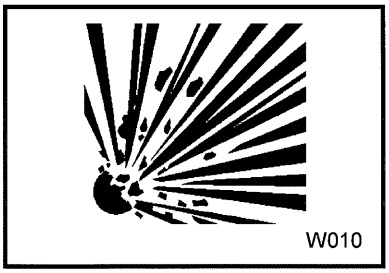
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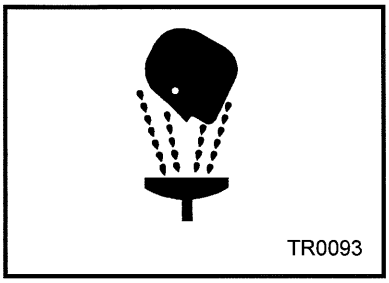
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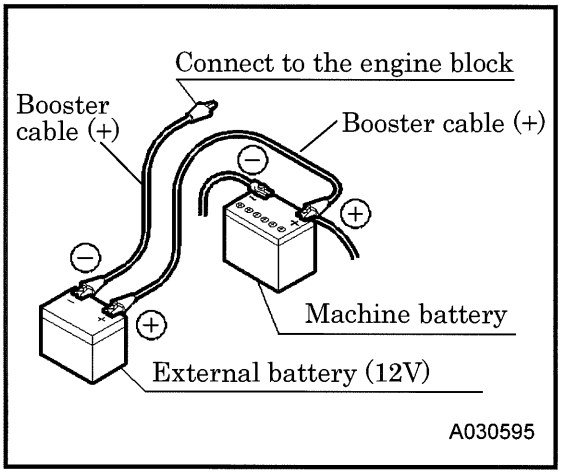
- Keep flames away from battery.
- Do not spark near the battery nor light a match, nor bring lit cigarette and match close to the battery.
- Do not charge the frozen battery. Otherwise it may explode. If the battery is frozen, warm it up until the battery temperature becomes 16°C to 30°C.
- Battery electrolyte is dilute sulfuric acid. In case of mishandling, it could cause skin burning.
- Dispose of battery, observing local regulations.

[Charge battery]

- Use the battery charger after make sure to confirm whether it's fulfill a condition with the battery you charge.
- Disconnect the cable between battery and the machine, and charge the battery with a 12V battery charger.
- Be sure not to connect (+) and (–) terminals backwards.

[How to use booster cable]



<Procedure for using a booster cable>

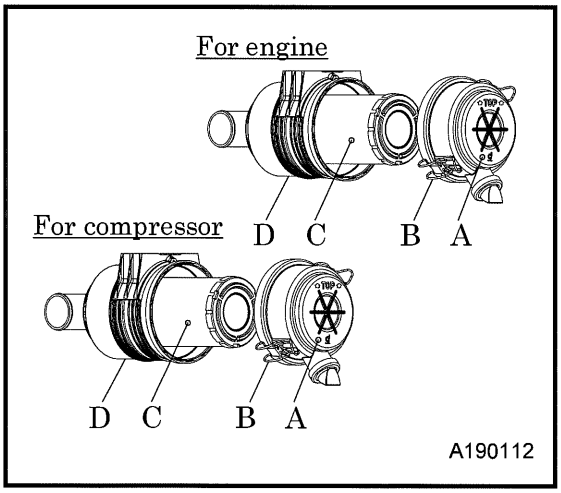
1. Stop the engine.
2. Connect one end of the (+) booster cable to the (+) terminal of the machine battery.
3. Connect the other end of the (+) booster cable to the (+) terminal of the external battery.
4. Connect one end of the (–) booster cable to the (–) terminal of the external battery.
5. Connect the other end of the (–) booster cable to the engine block of the machine.
6. Start up the engine.
7. Disconnect the booster cable by following the procedure back in the reverse order.

⚠ CAUTION Do not reverse the cable connection

- When a booster cable has to be used or when cables are connected again after an battery is replaced, be careful not to connect (+) and (–) terminals backwards.
  Such wrong-connection will cause spark and damage to each component.

5.4.5 Check and clean clogging of air filter element

Every 250 hours



<Procedure>

1. Loosen the cap fix latch [B] at cap [A], then remove cap and clean inside.
2. Remove the element [C], and clean it.
3. When putting cap after cleaning, push it into case [D] with your hand and fasten it after checking the hook of cap fix latch is set to case.

- If the element is found heavily dusty, replace it with a new one. **(For part number, See 5.3)**

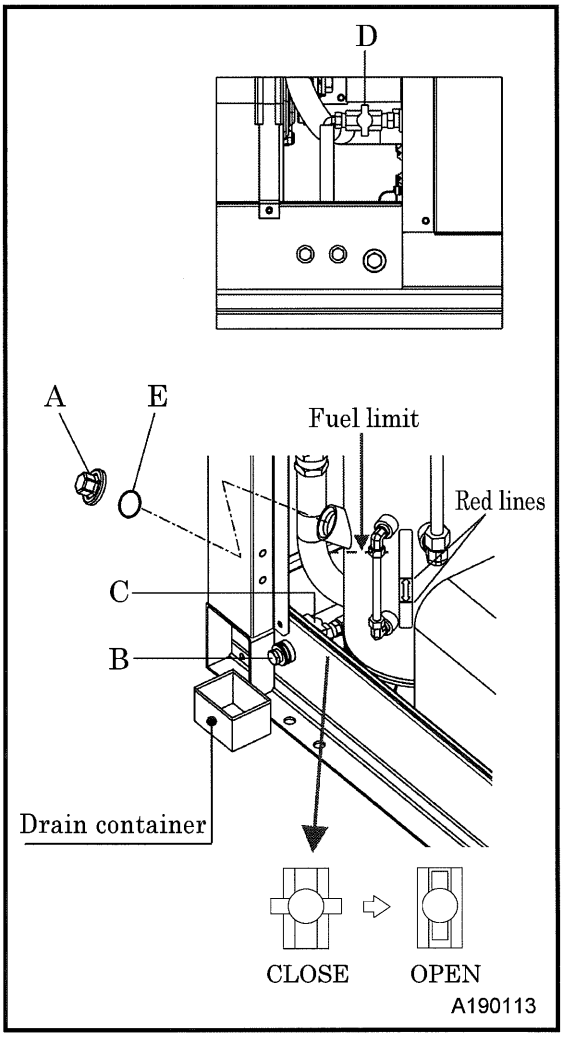
IMPORTANT

- Clogged or cracked or pitted element could allow entrance of dust into engine and compressor air-end to cause earlier wear of moving parts. Periodical inspection and cleaning of element should be performed to maintain life of compressor air-end and engine long.

5.4.6 Change compressor oil

At 300 hours for the first change and at every 500 hours thereafter

- For prevention of fire caused due to deteriorated oil separator, in principle change of compressor oil is to be performed in accordance with the schedule mentioned in the regular maintenance table. However, it is heavily influenced by operation conditions and environmental conditions. If it has been found more dirty and corrupted, it should be changed.
- If machine is continuously operated in such bad conditions, it could damage bearings and degraded oil sticks oil separator to cause accumulated oxidation heat of reaction to lead oil separator fire. For this reason, regular maintenance work should be done surely and perfectly.
- Conduct changing compressor oil after checking machine stoppage for about 2 to 3 minutes and dropping pressure of separator receiver tank to zero.



<Procedures>

1. Stop the operation of this machine. Wait until enough time has passed and for the pressure in the separator receiver tank to be completely released. Then, slowly remove the filler cap [A] and remove the drain plug [B], and then open the drain valve [C] and drain the compressor oil. Also, open the oil cooler drain valve [D] and discharge the oil collected in the cooler into the drain container.
2. After discharging the compressor oil, firmly close the drain valves [C] and [D], and then attach the drain plug [B].
3. Fill the tank with new compressor oil up to the height indicated by the dotted line (Fuel Limit). Then, close filler cap. Inspect O-ring [E] of filler cap and replace it with a new one if any hardening or damage is found. **(For part number, See 5.3)**
4. After starting operation, check and confirm that oil level is within red lines of oil revel gauge.

Quantity of oil between the red lines	Approx.1.0L
Quantity of change oil	Approx.7.0L

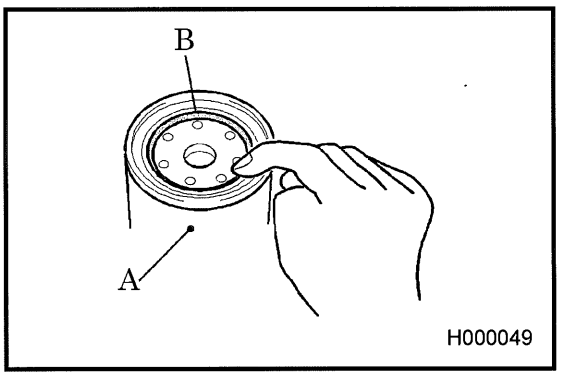
IMPORTANT

- Mixture of different brands compressor oil could cause an increase of viscosity and make compressor oil sticky. In the worst case, it could cause sticking trouble of compressor air-end "Compressor air-end will not turn". Also repairing of such air-end needs expensive cost. Therefore, be sure to avoid mixing different brands oil. In case compressor oil brand in use has to be unavoidably changed, it is absolutely necessary to completely clean up the interior of compressor air-end. In such a case, contact "AIRMAN" dealer or us directly.
- Follow the designated regulations to dispose of compressor oil.

5.4.7 Change compressor oil filter element

At 300 hours for the first change and every 1,000 hours thereafter

Be sure to use genuine oil filter element.



<Procedure>

1. Remove the oil filter element [A], using a filter wrench.
2. Screw in the new oil filter element with the packing [B] coated slightly with oil.
   (For part number, See 5.3)
3. After the packing touches the sealing face, tighten another 3/4 to 1 turn with a filter wrench.
4. After installing the oil filter element, check it for any leak during operation.

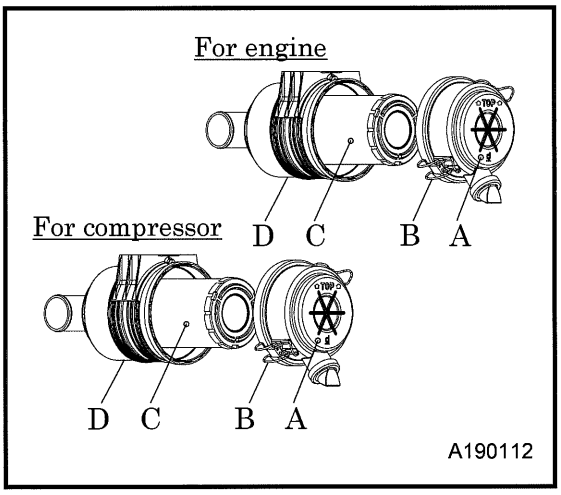
IMPORTANT

- Poor quality oil filter element do not trap dust sufficiently and will cause damage to the bearings in a short period. Be sure to use genuine parts.

5.4.8 Change air filter element

Every 500 hours

Be sure to use genuine air filter element.



<Procedure>

1. Loosen the cap fix latch [B] at cap [A], then remove cap and clean inside.
2. Remove element [C] and replace it with new one.
   (For part number, See 5.3)
3. When putting cap after replacing, push it into case [D] with your hand and fasten it after checking the hook of cap fix latch is set to case.

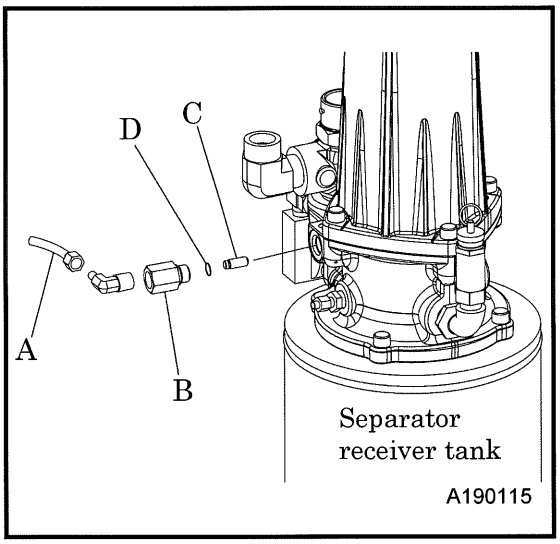
- When used or operated under bad conditions, it is better to remove all the elements, check them, clean them and replace them earlier before the intervals listed in maintenance table, if they are found difficult to be repaired.

IMPORTANT

- Air filter is an important part which is crucial to machine's performance and life. Be sure to use genuine parts.

5.4.9 Clean strainer in the scavenging orifice

Every 500 hours



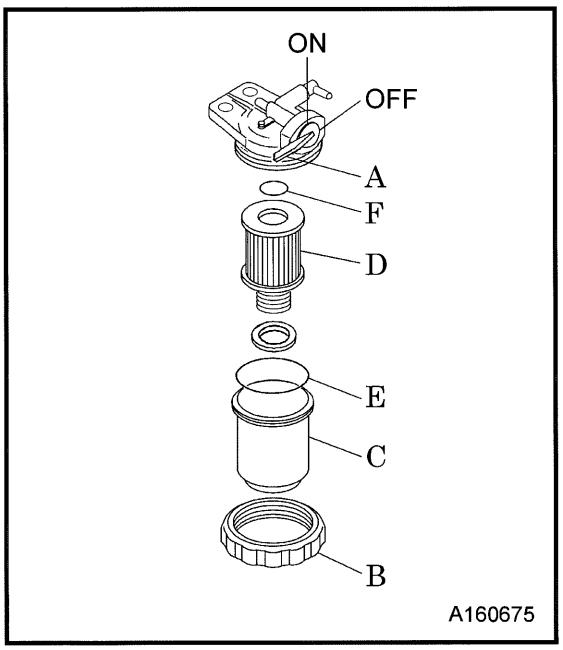
<Procedure>

1. Remove the pipe [A], using a spanner.
2. First remove the bushing [B].
3. Then remove the strainer [C].
4. Wash the removed strainer in diesel oil and blow out "dust" by air blowing.
5. After finishing the cleaning, install the strainer again in the reverse procedure.

● When cleaning the strainer, also check the O-ring [D] attached on the bushing [B], and if it is hardened or damaged, replace it with a new one.

5.4.10 Change fuel filter element

Every 500 hours

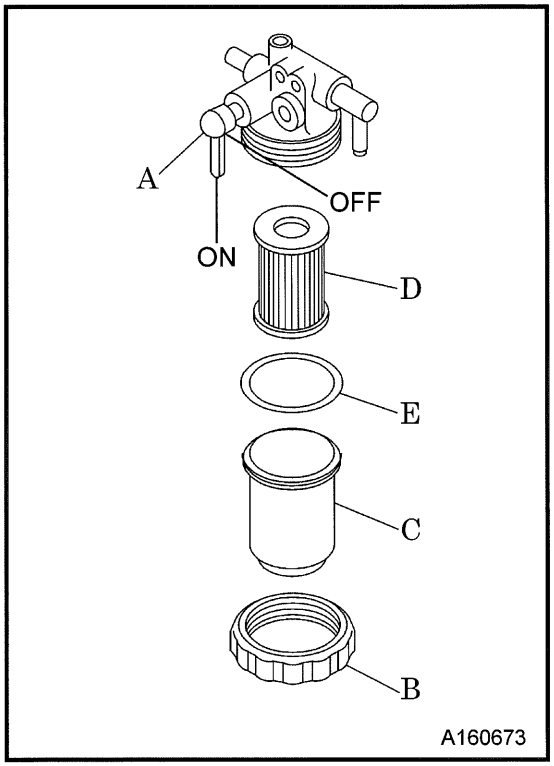


<Procedure>

1. Turn the lever [A] of fuel filter to "OFF" and cut off fuel supply.
2. Remove the cup [C] after loosening the ring nut [B], and then take off the element [D] from the inside.
3. Clean the cup and then install the new element and O-ring [E], [F]. **(For part number, See 5.3)**
4. Install to the body the element equipped with the element. Then tighten the ring nut securely.
5. Turning lever of fuel filter to "ON" position, supply fuel in the cup. Then bleed air completely from fuel system. (See 3.4.7)

5.4.11 Change sedimenter element

Every 500 hours



<Procedure>

1. Turn the lever [A] of fuel valve of sedimenter to the direction of "OFF"mark to cut off the fuel flow.
2. Loosen the ring nut [B] to remove cup [C], take out the element [D].
3. Clean the cup, fit a new element in, and installs a new O-ring [E]. **(For part number, See 5.3)**
4. After installing the cup with the element built in to the body, securely fasten it by the ring nut.
5. After pouring the fuel into the cup by turning the lever of fuel valve to the direction of "OPEN", bleed the air. (See 3.4.7)

5.4.12 Clean inside of radiator

Every 500 hours

- When the inside of a radiator and water conduits of an engine are dirty with scale and rust, its cooling efficiency will be deteriorated. Clean the interiors of such components periodically.
- When cleaning it, contact directly us or distributor because it requires expert technical knowledge.

5.4.13 Check and clean drain outlet port of after cooler (After-cooler type)

Every 500 hours

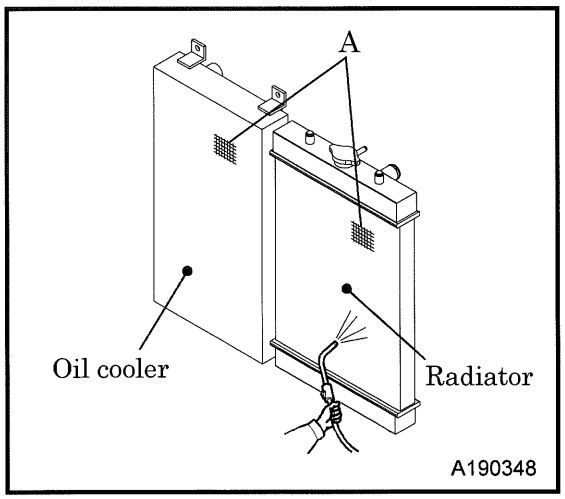
See 3.6 "Operation of after cooler type" for the after cooler drain.

IMPORTANT Cleaning it completely and keeping it cleaned

- If the discharge air water is mixed in, it could be clogging of the silencer unit. When inspection and cleaning it, contact directly us or distributor because it requires expert technical knowledge.

5.4.14 Clean outside of the radiator·oil cooler

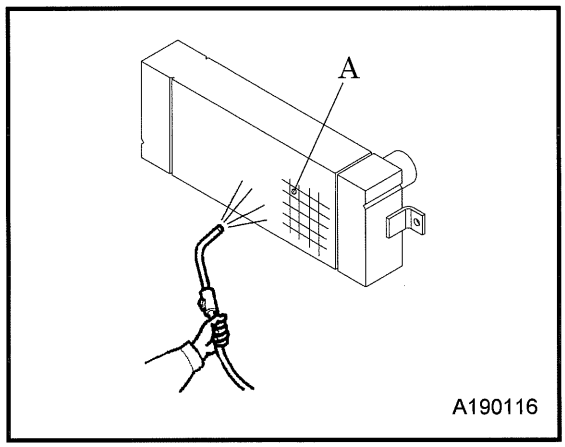
Every 1,000 hours



- When the fin tubes diaphragm [A], of a radiator, and an oil cooler are clogged with dust or other foreign materials, the heat exchange efficiency drops and this will raise coolant temperature and discharge air temperature. These tubes and fins should be cleaned depending on the state of clogged tubes diaphragm, even before maintenance schedule.
- Do not use a high pressure washer to protect fin tubes from being damaged.
- Take steam cleaning with removing cooler when there is a lot of dirt.
- When cleaning it, contact our office nearby or distributor.

5.4.15 Clean outside of the after cooler (After-cooler type)

Every 1,000 hours



- If fin tube [A] of the after-cooler clogged with dust, it may cause troubles (heat exchange efficiency becomes lower and discharge air will not be at low temperature, or water in the discharge air will not be removed). Clean the tube properly according to clogging status even if not at periodic cleaning time.
- Do not use a high pressure washer to protect fin tubes from being damaged.
- Take steam cleaning with removing cooler when there is a lot of dirt.
- When cleaning it, contact our office nearby or distributor.

5.4.16 Change speed regulator diaphragm

Every 1,000 hours

When replacing it, contact our office nearby or distributor because technical knowledge is required.

5.4.17 Clean inside of the oil fence and check it for any rust

Every 1,000 hours

Expert knowledge is required to clean the inside of the oil fence and to check it for rust. Contact our office nearby or distributor

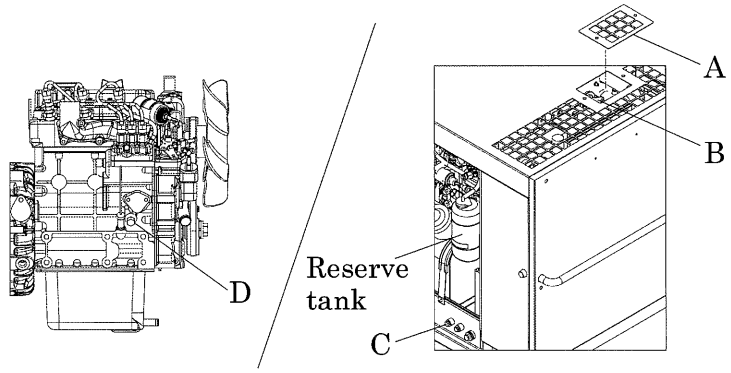
5.4.18 Change coolant

1,000 hours or every 2 years

Be sure to stop the machine and loosen the radiator cap slowly after the coolant water is sufficiently cooled and the inner pressure is released, and then take the cap off.

<Procedure>

1. For discharging the coolant, remove inlet cover [A], and remove radiator cap [B], then remove drain plug [C] with setting drain container.
2. When discharging the drain via the drain plug [D] found on the engine body, first attach a drain valve and a drain hose (to be prepared by yourself) to the leading edge of the drain plug. Then, prepare a drain container and discharge the drain by loosening the drain plug [D].
3. Drain coolant of reserve tank.
4. After discharge is completed, attach drain plug and tighten drain plug on engine body, then replenish coolant from radiator water inlet and reserve tank water inlet.
   [Quantity of water : approx. 4.0L]
5. After replenish is completed, attach the removed parts by reverse procedures.
6. After changing the coolant, operate the machine for 5 minutes at the unloaded condition and stop it. Then check the coolant level again, and replenish if it is short.



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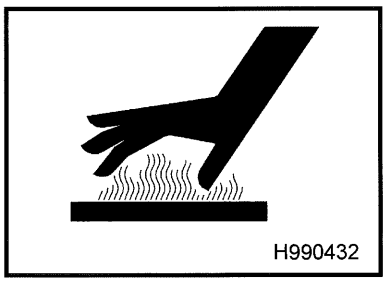
⚠ CAUTION Caution changing coolant



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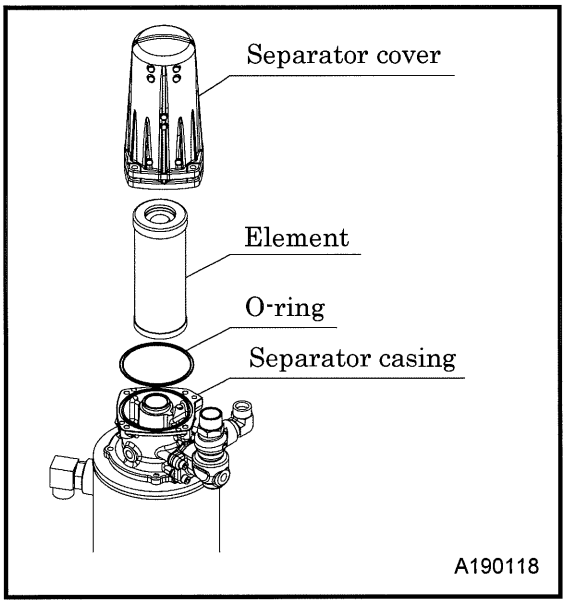
- When removing radiator cap, unfasten it to decrease internal pressure while unlocking first step. After checking internal pressure decreased, unfasten the radiator cap more until second step unlocked. If you fail to conduct these processes, it might causes blowing radiator cap by internal pressure or gushing hot scalding vapor.
- LLC (Antifreeze) is a toxic material.
- If it should be swallowed by mistake, it is necessary to see a doctor immediately instead of being sent out enforcedly.
- When a person gets LLC (Antifreeze) in his eyes, wash the eyes with clean running water and make him see a doctor immediately.
- When LLC (Antifreeze) is stored, put it in a container with an indication saying "LLC (Antifreeze) inside" and seal it up, then Keep it in a place away from children.
- Beware of flames.

IMPORTANT

- Follow the designated regulations to dispose of LLC (Antifreeze).

5.4.19 Change oil separator element

Every 2,000 hours



<Procedure>

1. Remove separator cover bolts 4 pieces.
2. Replace element and O-ring by a new one.
3. Lightly lubricate the O-ring with oil, and then attach the O-ring to the groove of the separator casing.
4. After installing element, be sure to check for oil leak during the operation.

● When consumption of the oil is still unusual even after cleaning strainer in the scavenging orifice (See5.4.9), change the oil separator element with a new one.
(For Replacement parts, See 5.3)

5.4.20 Clean inside of fuel tank

Every 2,000 hours

When cleaning inside of fuel tank it, contact our office nearby or distributor because technical knowledge is required.

5.4.21 Change nylon tubes

2,000 hours or every 2 years

Replace nylon tubes used for the oil and air piping's.
When replacing it, contact our office nearby or distributor because technical knowledge is required.

5.4.22 Change fuel hose

Check every 50 hours/replace every 2,000 hours or every 2 years

If the various rubber hoses in the fuel system and engine oil system are hardened or deteriorated, replace them even before the replacement time.
When replacing it, contact our office nearby or distributor because technical knowledge is required.

5.4.23 Change rubber hose

2,000 hours or every 2 years

Check hoses used for oil piping for any crack or tear, and replace when an abnormality is found.
When replacing it, contact our office nearby or distributor because technical knowledge is required.

5.4.24 Change solenoid valve for starting unload

Every 3,000 hours

When replacing it, contact our office nearby or distributor because technical knowledge is required.

5.4.25 Change oil seal and bearing

Every 3,000 hours

When replacing it, contact our office nearby or distributor because technical knowledge is required.

5.4.26 Change radiator hoses

3,000 hours or every 2 years

When any crack or wear is found on the hoses, change it even before the scheduled time.
When replacing it, contact our office nearby or distributor because technical knowledge is required.

5.4.27 Change O-ring of unloader

3,000 hours or every 3 years

When replacing it, contact our office nearby or distributor because technical knowledge is required.

5.4.28 Change pressure regulator

3,000 hours or every 3 years

When replacing it, contact our office nearby or distributor because technical knowledge is required.

5.4.29 Change pressure control valve ASSY

3,000 hours or every 3 years

When it is out of the minimum pressure normal range (See 3.4.5) at full load, replace the pressure control valve ASSY even before replacement time. **(For part number, See 5.3)**
When replacing it, contact directly us or distributor because it requires expert technical knowledge.

6. Storage of the Machine and Disposal of Product

6.1 Preparation for Long-term Storage

When the machine is left unused or not operated longer than half a year (6 months), store it at the dry place where no dust exists after the following treatments have been done to it.

- If you store the machine outside, ensure that it is kept in a covered area, etc. Avoid leaving the machine outside with a sheet cover directly on the paint for a long time, or this will cause rust to the machine.
- Perform the following treatments at least once every three months.

<Procedure>

1. Drain existing lubricant from the engine oil pan. Pour new lubricant in the engine to clean its inside. After running it for a while, drain it again.
2. Completely charge the battery and disconnect grounding wires. Remove the battery from the machine, if possible, and store it in a dry place. (Charge the battery at least once every month.)
3. Drain coolant and fuel from the machine.
4. Seal the engine, air-intake port and other openings like the muffler with a vinyl sheet, packing tape, etc., to prevent moisture and dust from entering the machine.
5. Be sure to repair any breakdowns and maintain the machine so that it will be ready for the next operation.

6.2 Disposal of Product

In case of disposal of this machine, at first drain the cooling water and oils.
When you have anything unclear or you want to advise us, contact our office nearby or distributor.

7.Specifications

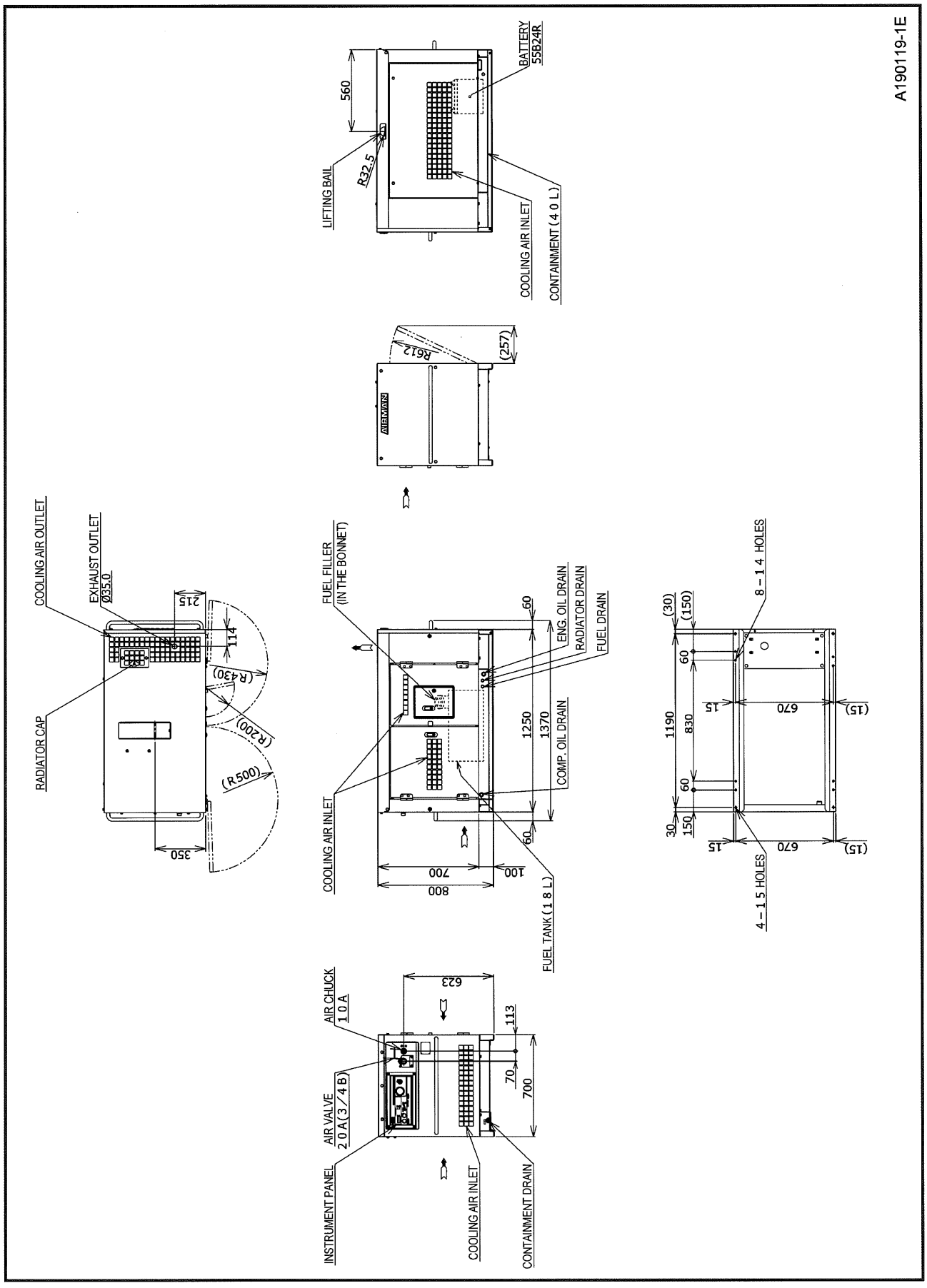
7.1 Specifications

Model			FAC-18B	FAC-18BC (After cooler type)
COMPRESSOR	Type		Single-stage oil cooled, screw type compressor	
	Free air delivery	m^3/min	1.84	
	Working pressure	MPa	0.7	
	Safety valve setting pressure	MPa	1.0	
	Rotation speed	min^{-1}	Full load:3,600 / Unload:1,900	
	Lubricating system		Forced Lubrication by compressed pressure	
	Driving system		Direct driving with gear coupling	
	Receiver tank capacity	m^3	0.009	
	Lubricating oil capacity	L	7.0	
ENGINE	Model		KUBOTA D722-K3A	
	Type		Water-cooled 4-cycle direct injection	
	Cylinder quantity - Cylinder diameter × Cylinder stroke		3-67mm×68mm	
	Total displacement	L	0.719	
	Rated output	kW/min^{-1}	14.1/3,600	
	Lubricating oil capacity	L	3.8(The amount of initial filling) Approx. 3.3(The amount of exchange)	
	Coolant capacity (including radiator)	L	4.0	
	Battery		55B24R(12V)	
	Fuel tank capacity	L	18.0	
DIMENSION・MASS	Overall length	mm	1,370	
	Overall length (only for bonnet)	mm	1,250	
	Overall width	mm	700	
	Overall height	mm	800	
	Net dry mass	kg	310	315
	Operating mass	kg	340	345
OTHERS	The capacity of oil fence	L	40	40

7.Specifications

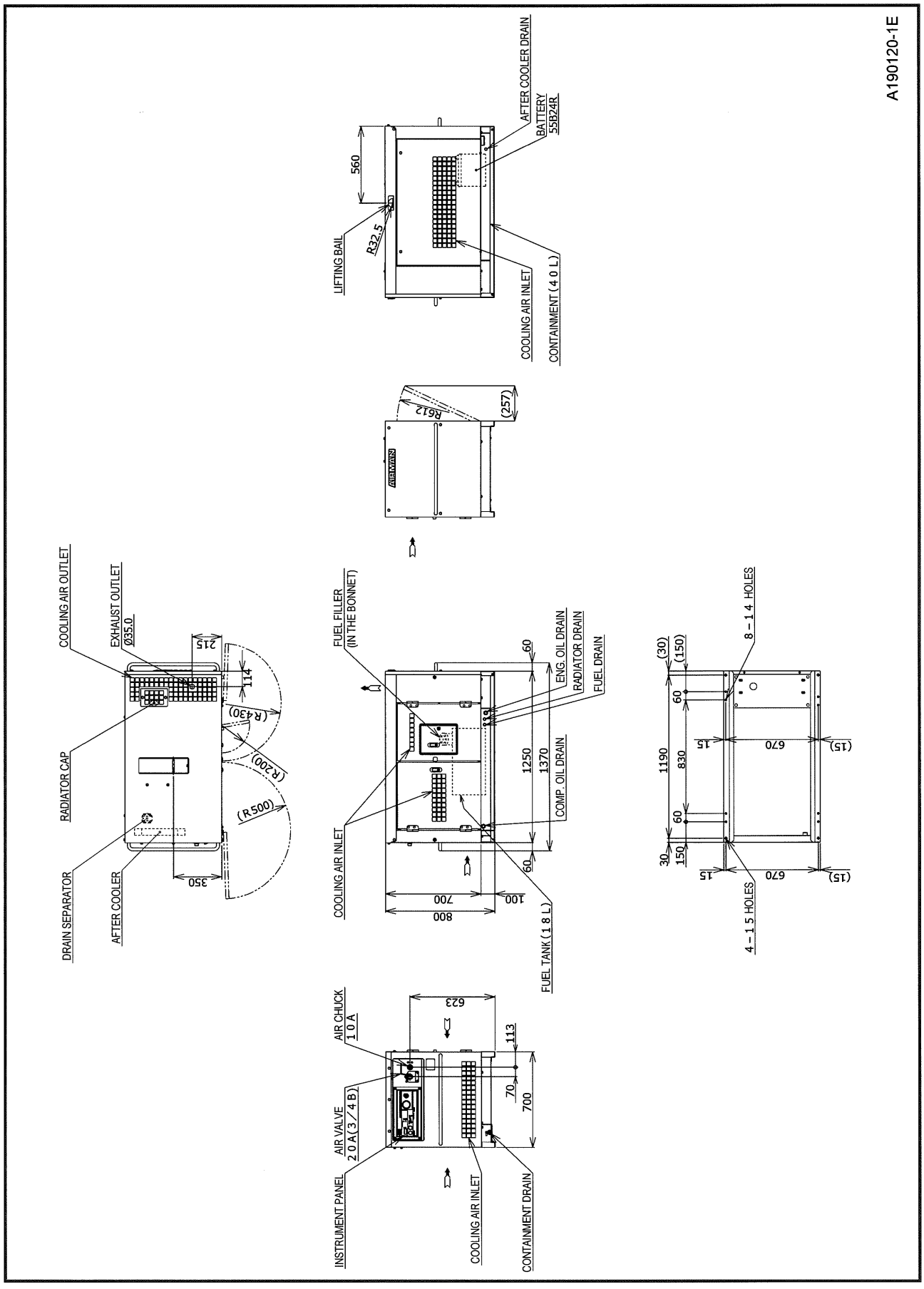
7.2 Outline drawing

FAC-18B



7.Specifications

FAC-18BC (After cooler type)



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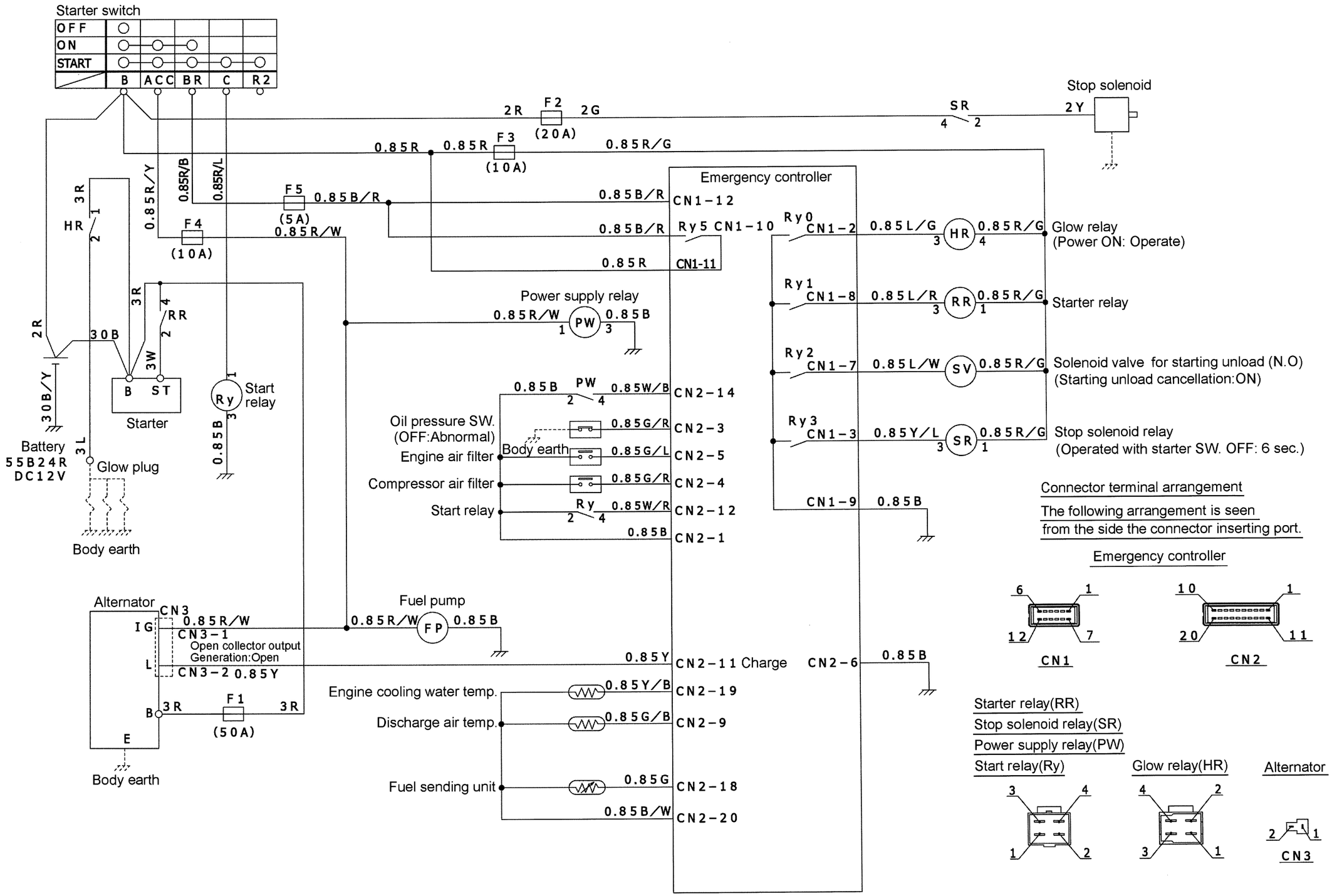
7.3 Wiring Diagram

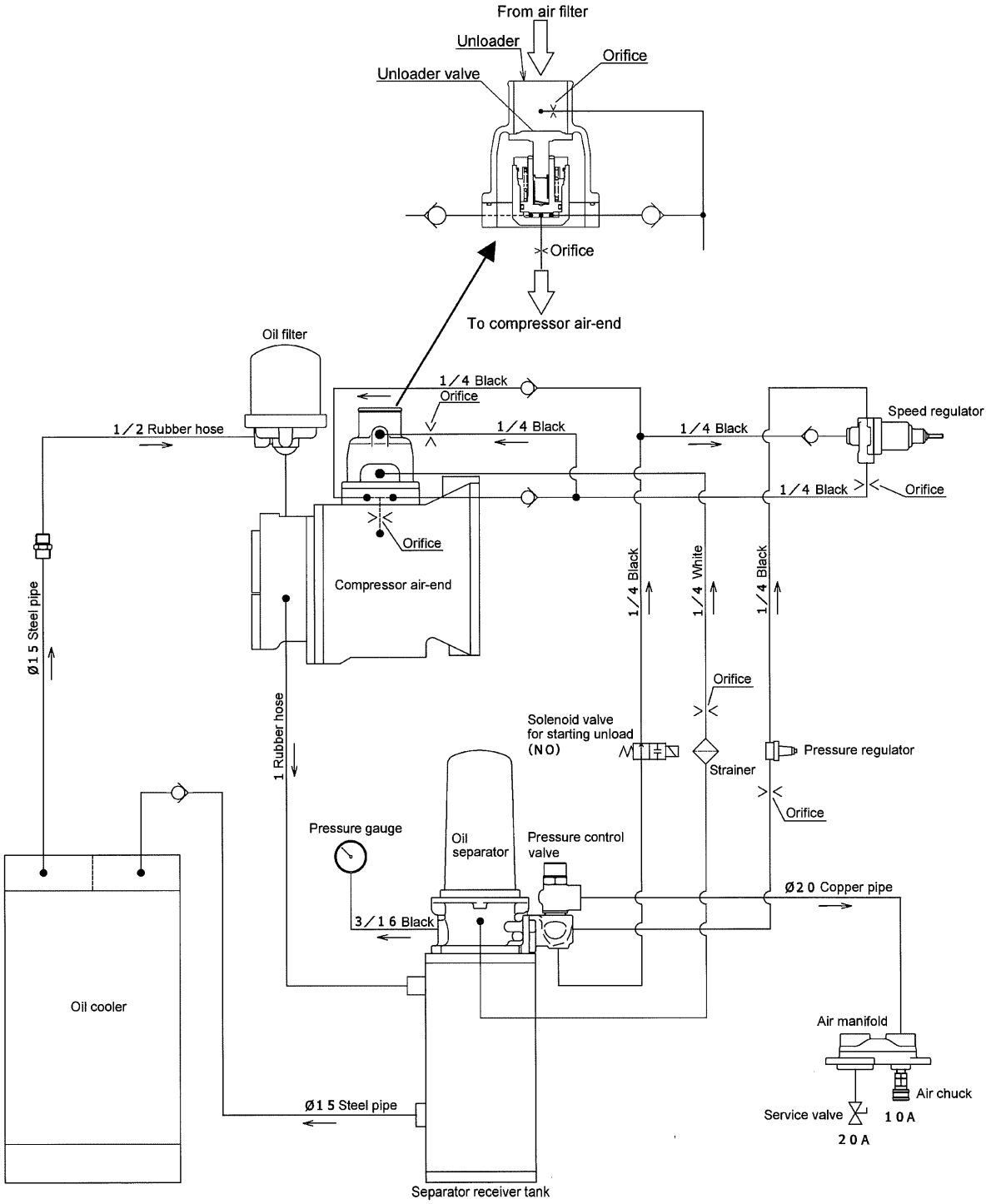


7.Specifications

7.4 Piping Diagram

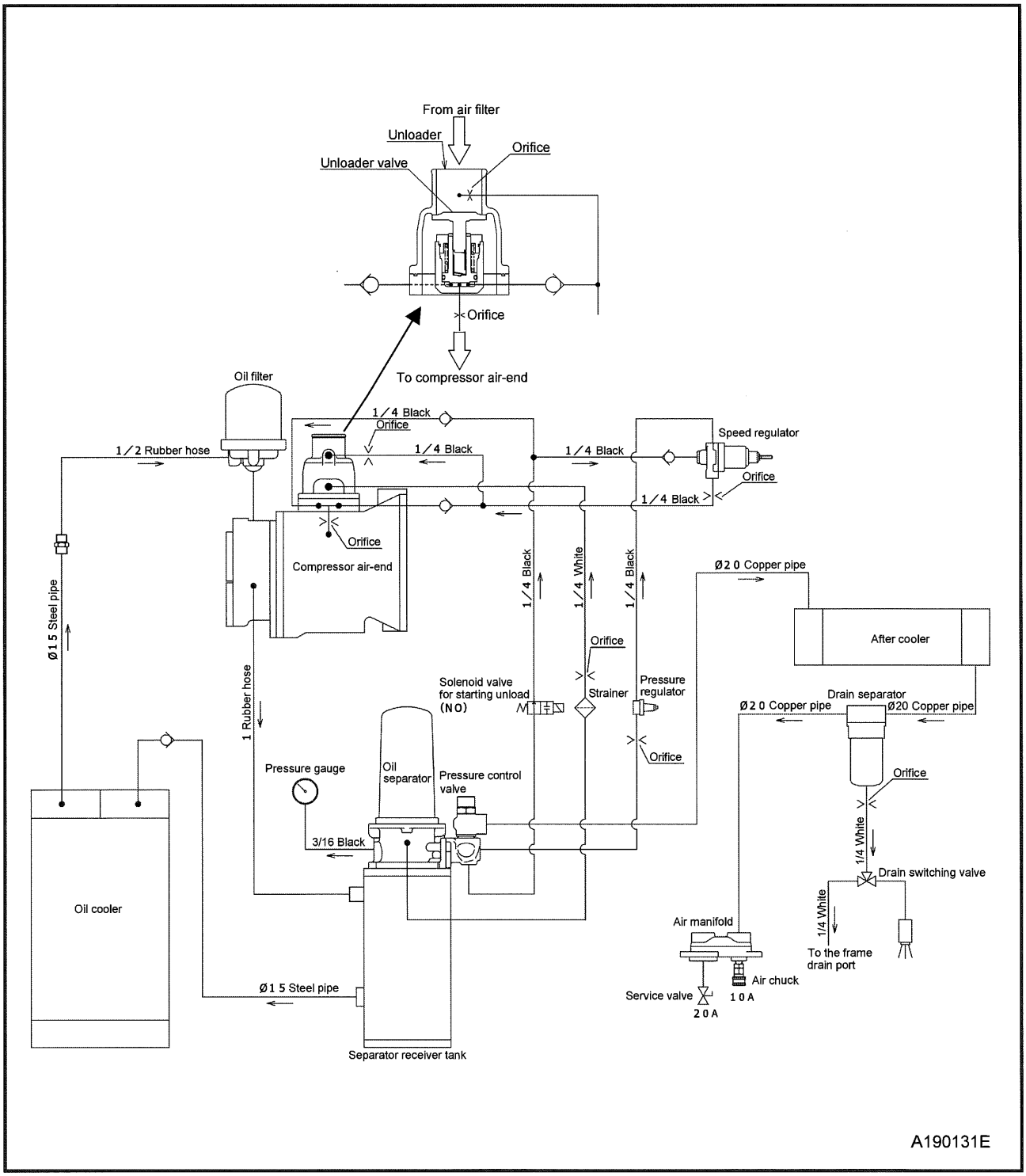
7.4.1 Compression air · Compressor oil

FAC-18B

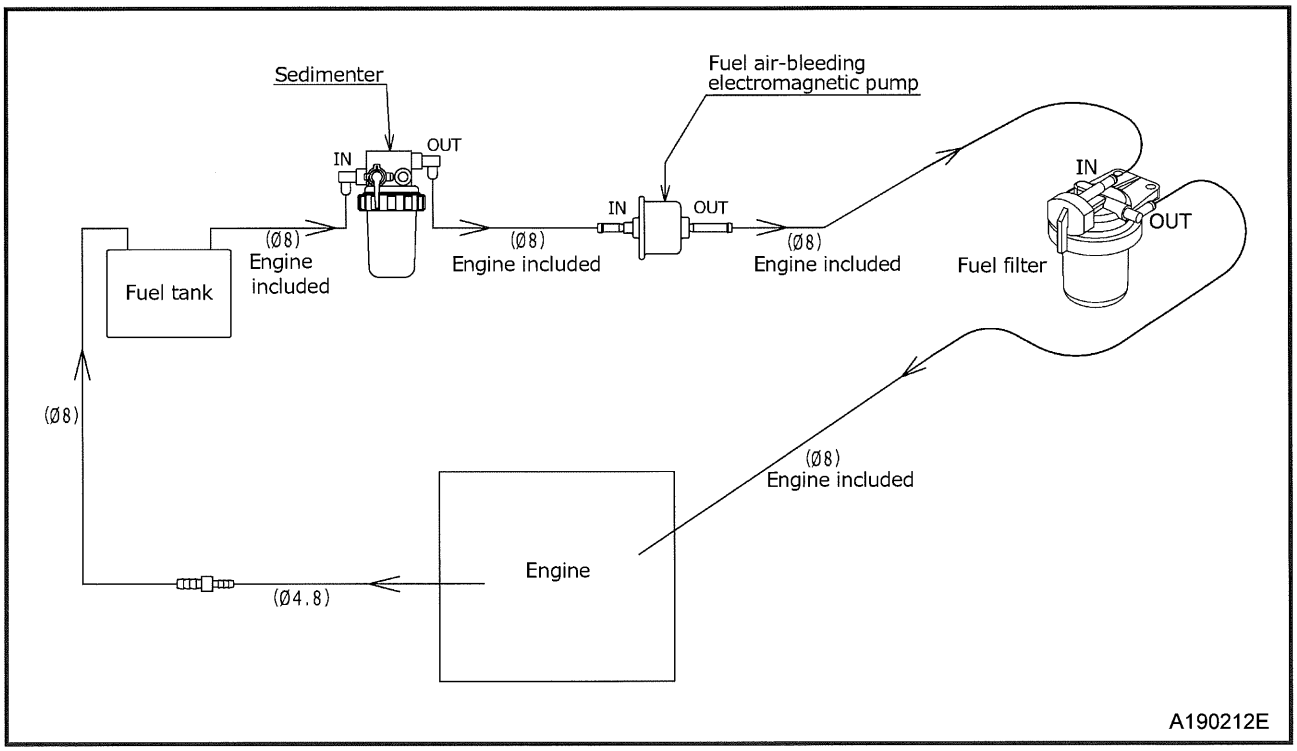


7.Specifications

FAC-18BC (After cooler type)



7.4.2 Fuel Piping



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OPERATION LOG

OPERATION DATE	OPERATION TIME		TOTAL OPERATION HOURS (h)	DISCHARGE AIR PRESS.(MPa)	AMBIENT TEMP.(°C)	DISCHARGE AIR TEMP. (°C)	COOLANT TEMP.(°C)	RATED RPM (rpm,min^{-1})	ENG.OIL REPLACEMENT HOUR (h)	COMP.OIL SUPPLY(L)	REMARKS (INSPECTION/PART CHANGE HISTORY ETC.)
	START TIME	STOP TIME									
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. .	:	:									
. .	:	:									
. .	:	:									
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