

AIRMAN

PG

INSTRUCTION MANUAL

SCREW COMPRESSOR

PDS185S-6C1

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

HOKUETSU INDUSTRIES CO., LTD.

Preface

Thank you for having selected our “AIRMAN” product.

- ◆ This manual explains about the proper operation and daily inspection and maintenance of this machine.
- ◆ In order to use a machine safely, people with sufficient knowledge and sufficient technology need to deal with it.
- ◆ Before operating the unit, read the manual carefully, fully understand its operation and maintenance requirement. Maintain “SAFETY OPERATION AND PROPER MAINTENANCE OF THE UNIT”.

Be sure to follow safety warnings and cautions given in the manual. Unsafe operation could cause serious injury or death.

- ◆ For details of handling, maintenance and safety of the engine, see the Engine Operation Manual.
- ◆ Keep the manual available at all times for the operator or safety supervisor.
- ◆ If the manual is lost or damaged, place an order with your dealer for another copy.
- ◆ Be sure that the manual is included with the unit when it is handed over to another user.
- ◆ There may be some inconsistency in detail between the manual and the actual machine due to improvements of the machine. Ask your dealer if you have any questions or problems.
- ◆ If you have any questions about the unit, please inform us the model and serial number. A plate stamped with the model and serial number is attached to side of the unit.

| PORTABLE COMPRESSOR | |
|--|--------------------------|
| MODEL | <input type="text"/> |
| SER. NO. | <input type="text"/> |
| NORMAL OPERATING PRESSURE | <input type="text"/> MPa |
| NET DRY MASS | <input type="text"/> kg |
| AIRMAN MADE IN JAPAN HOKUETSU INDUSTRIES CO., LTD. 22-2, NISHI-SHINJUKU 1-CHOME, SHINJUKU-KU TOKYO JAPAN | |

- ◆ Each illustrated figure (Fig.) has a number of 7 digits (for instance, A990054) at the right bottom. This number is not a part number, but it is used only for our reference number.



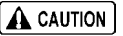

Table of Contents

| | |
|---|-------------|
| 1. Safety | 1-1 |
| 1.1 Caution before Operation | 1-2 |
| 1.2 Caution during Operation | 1-5 |
| 1.3 Caution during Inspection and Maintenance | 1-7 |
| 1.4 Safety Warning Labels | 1-10 |
| 2. Part Names | 2-1 |
| 2.1 Internal Components and Part Names | 2-1 |
| 3. Installation | 3-1 |
| 3.1 Transportation | 3-1 |
| 3.2 Towing the Unit | 3-2 |
| 3.3 Installation | 3-2 |
| 4. Operation | 4-1 |
| 4.1 Instrument panel | 4-1 |
| 4.2 Lubricating oil · Coolant · Fuel | 4-4 |
| 4.3 Check before Starting Unit | 4-6 |
| 4.4 Operation | 4-11 |
| 4.5 Stopping | 4-15 |
| 4.6 Capacity Control Device | 4-16 |
| 5. Periodic Inspection/Maintenance | 5-1 |
| 5.1 Important Items as Periodic Inspection and Maintenance or after Maintenance | 5-1 |
| 5.2 Daily Inspection and Operation Log | 5-2 |
| 5.3 Periodic Inspection List | 5-3 |
| 5.4 Periodic Replacement of Parts | 5-5 |
| 5.5 Maintenance Items | 5-6 |
| 6. Maintenance | 6-1 |
| 6.1 Maintenance of Battery | 6-1 |
| 6.2 Troubleshooting | 6-3 |
| 7. Storage of the Unit | 7-1 |
| 7.1 Preparation for Long-term Storage | 7-1 |
| 8. Specifications | 8-1 |
| 8.1 Specifications | 8-1 |
| 8.2 Outline drawing | 8-2 |
| 9. Wiring Diagram | 9-1 |
| 10. Piping Diagram | 10-1 |

1.Safety

This manual explains and illustrates general requirements for safety.

Read all safety requirements carefully and fully understand the contents before starting the machine.

For your better recognition, according to the degree of potential danger, safety messages are classified into three hierarchical categories, namely, , , and  with a caution symbol  – attached to each message.

When one of these messages is shown, please take preventive measures and carry out “SAFETY OPERATION AND PROPER MAINTENANCE OF THE UNIT”.



DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.



WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



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 indicates important caution messages for the performance or durability of the unit.

Follow warnings mentioned in this manual. 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.

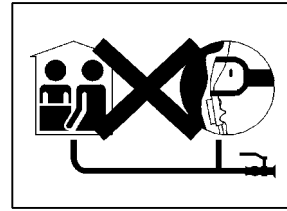
1.Safety

1.1 Caution before Operation

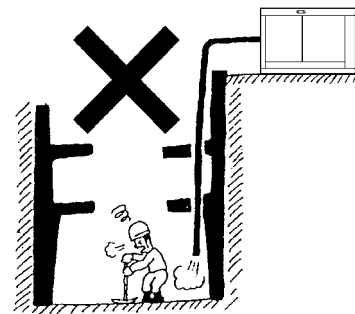


Compressed air is prohibited to be used for human respiration

- Compressed air by this unit contains poisonous materials. Absorption of the compressed air can cause serious injury. Never provide this compressed air for human respiration.
- This unit 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 unit 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.



TR0201-1

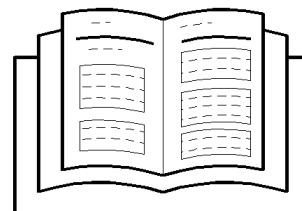


A080001



Follow the safety instructions

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

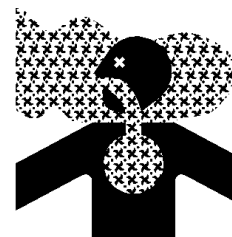


TR0086



Ventilation

- Exhaust gas from the engine is poisonous, and could cause death when inhaled. Avoid using the machine in an insufficiently ventilated building or tunnel.



PC002

1.Safety

WARNING

- Keep flames away from battery.
- Battery may generate hydrogen gas and may explode.
- Battery electrolyte is dilute sulfuric acid.
In case of mishandling, it could cause skin burning.
- When you deal with a battery, please be sure to wear protection implements, such as protection glasses and a glove.
- Dispose of battery, observing local regulations.

Handling battery



D004

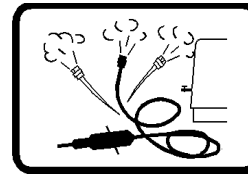


TR0093

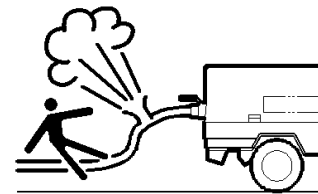
WARNING

Cautions of hose attachment and removal

- Piping or the hose from this machine service valve should use what can be borne enough for the discharge pressure of this machine.
- Please connect piping 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.



TR0088



TR0303A

WARNING

Safety outfit

- When handling machine, do not wear;
 - loose clothes
 - clothes with unbuttoned sleeves
 - hanging tie or scarf
 - accessories such as dangling jewelrySuch outfit could be caught in the machine or dragged in the rotating portion of the machine, and this could cause a serious injury.



TR0084

1.Safety

WARNING

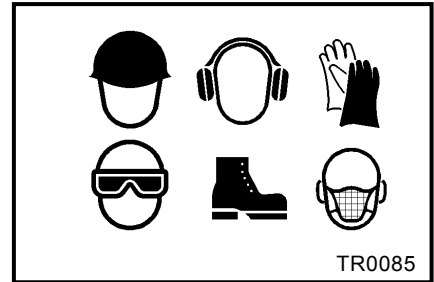
Maintain both physical and mental health

- Do not operate the machine when you are tired or drunk or under the influence of drugs. Otherwise, a hasty conclusion or careless handling may cause unexpected injury or accident. Manage your physical and mental health and be cautious in handling the machine.

CAUTION

Protection equipments

- Please 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.



CAUTION

Safety fittings

- Have first-aid boxes and fire-extinguishers near the unit ready for emergency situations such as injuries and a fire.
- It is advisable to have a list of phone numbers of doctors, ambulance and the fire department available in case of emergency.



CAUTION

Safety around the machine

- Such things as unnecessary equipment and tools, cables, hoods, covers and pieces of wood which are a hindrance to the job, have to be cleaned and removed. This is because operators and/or personnel nearby may stumble on them and may be injured.
- Place safety enclosures at the entrance of and around working site to prevent children or outside people from entering the site.

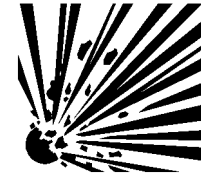
1.Safety

1.2 Caution during Operation

WARNING

Do not replenish compressor oil during operation

- Do not, under any circumstance, open the oil filler cap of separator receiver tank while running or immediately after stopping operation.
It is very dangerous because the oil filler cap could be blown off and high temperature compressed air and oil could jet out from the filler port, and cause serious injury.



W010

WARNING

Draining during operation prohibited

- Do not, under any circumstance, open the portions below during operation:
 - Separator receiver tank drain valve
 - Coolant drain valve and plug
 - Engine oil drain valve
 - Oil cooler drain valve

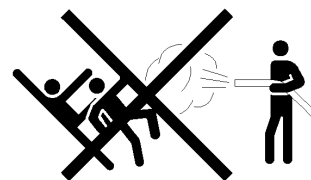


PK0028

WARNING

Never direct the compressed air to people and foods

- 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.
- Blowing compressed air on food is prohibited.



TR0092

WARNING

Hands off from rotating parts and belts

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



TR0304

CAUTION

Do not remove radiator cap during operation

- Do not, under any circumstance, open the radiator cap while running or immediately after stopping operation. Otherwise high temperature steam jets out and this could cause scalding.



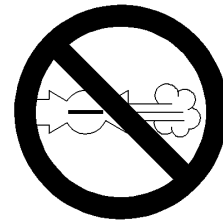
H990432

1.Safety

CAUTION

Operation with 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.



D003

CAUTION

Do not touch hot parts

- Never work nearby hot portions of the machine while it is running.
- 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, compressor, piping, separator receiver tank, and discharging pipe are especially hot, so never touch those parts, because it could cause serious burns.
- Compressor oil, coolant water, and engine oil are also very hot and dangerous to touch. Avoid checking or refilling them while the unit is running.



H990432

CAUTION

Fire prevention

- Do not, under any circumstance, bring lit cigarettes or matches near such oils as engine oil and compressor oil, etc. They are extremely flammable and dangerous, so be careful when handling.
- Refilling oils should be done in an outdoor well-ventilated place.
- Refuel after stopping the engine, and never leave the fuel nearby the machine. Do not spill. It may cause a fire. When it is spilt, wipe it up completely.
- **Do not fill fuel oil up to the cap lever. When fuel tank is filled up to the cap level, fuel oil will be overfilled due to volume expansion caused by rise of ambient temperature. Further, fuel will be possibly spilled from fuel tank due to vibration caused during movement and/or transportation of machine.**
- Such parts as muffler and exhaust pipe can be extremely hot. Remove twigs, dried leaves, dried grass and waste paper, etc. from the exhaust outlet of the muffler.
- Keep a fire extinguisher available by the machine in case of a fire.



D004



H990433

1.Safety

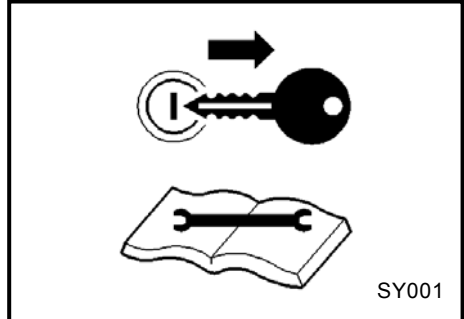
1.3 Caution during Inspection and Maintenance



WARNING

Hang a “Now Checking and under Maintenance” tag

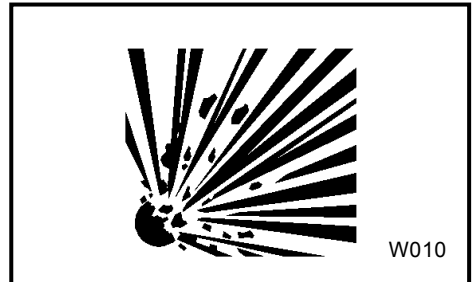
- Remove the starter key from the starter switch before starting inspection, and hang up a “Now Checking and under Maintenance” tag where it can be easily seen. The checker must keep the key during checking and maintenance.
- Remove the negative (-) side cable from the battery.
If the above procedure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



WARNING

Refilling of compressor oil

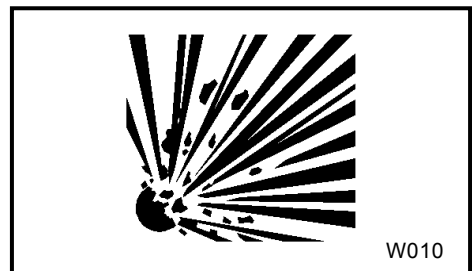
- When you refill the separator receiver tank with compressor oil, stop the engine, and make sure that the pressure gauge indicates 0MPa and there is no residual pressure in it, and then gradually loosen the oil filler cap for refilling oil.
- Note residual pressure in the separator receiver tank could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



WARNING

Be careful of high-pressurized air blowout

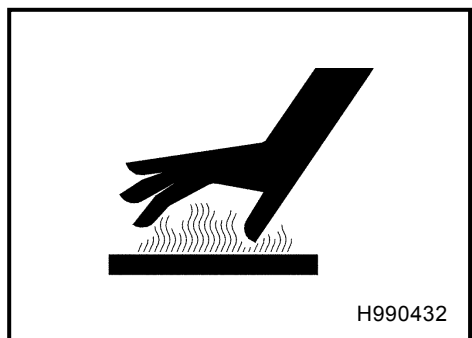
- After stopping the engine, make sure that pressure gauge indicates 0MPa. Even when the gauge shows 0MPa, open a service valve and further do not fail to make sure that there is no residual pressure in the air piping. Then start such a job as repair and maintenance.
- Residual air under pressure will blow off and severely injure operator.



WARNING

Draining separator receiver tank

- 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 separator receiver tank could force both extremely hot compressed air and oil to jet out and you may be scalded or seriously injured.

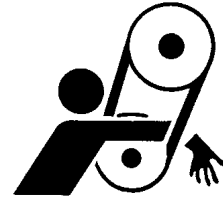


1.Safety

WARNING

- Be sure to stop the engine and remove the starter key whenever the tension of the fan 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 fan belts, and this could cause a serious injury.

Adjusting tension of fan belt

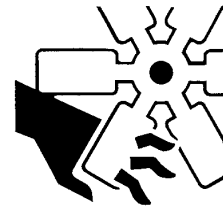


TR0304

WARNING

- Be sure to stop the engine and remove the starter key whenever check or maintenance work is carried out near the cooling fan.
- If the cooling fan is rotating, it may catch the operator or part of his body into the fan, and it could cause a serious injury.

Hands off from cooling fan



W009

WARNING

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

Cleaning by air-blow

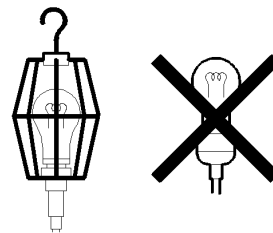


M003

CAUTION

- It is recommended to use a lamp with safety guard fitted where the site is dark.
Operating the machine gropingly or by relying on one's intuition could cause unexpected accidents.
- Any lamps without safety guard are not recommended since they can be broken and they could ignite flammables such as fuel, etc.

Lighting apparatus



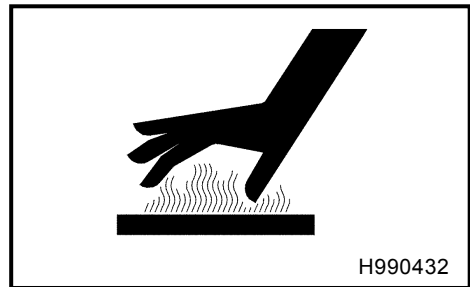
TR0206

1.Safety

CAUTION

Opening coolant water drain valve cap

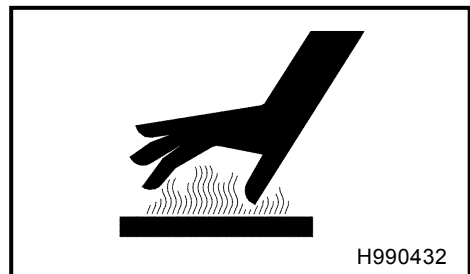
- Be sure to stop the engine, and let the coolant water sufficiently cool down before draining it.
- If the drain valve is opened before the coolant water is cooled enough, hot water could jet out, and it could cause scalding.



CAUTION

Refilling or draining of engine oil

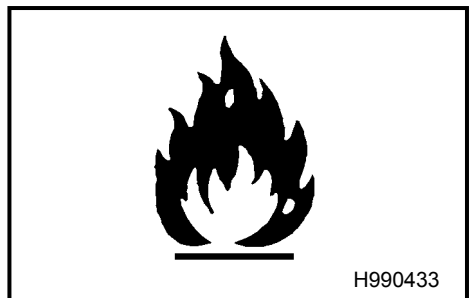
- After stopping the engine, wait for 10 to 20 minutes until the engine oil cools off. Then check the level of the engine oil, or refill or drain the oil.
- Engine oil is very hot and highly pressurized during or just after the operation. Hot oil could blow out of the tank and can cause scalding.



CAUTION

Fear of fire

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



CAUTION

Disposal of waste liquid, etc.

- 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.

1.Safety

1.4 Safety Warning Labels

Following labels are attached to the machine.

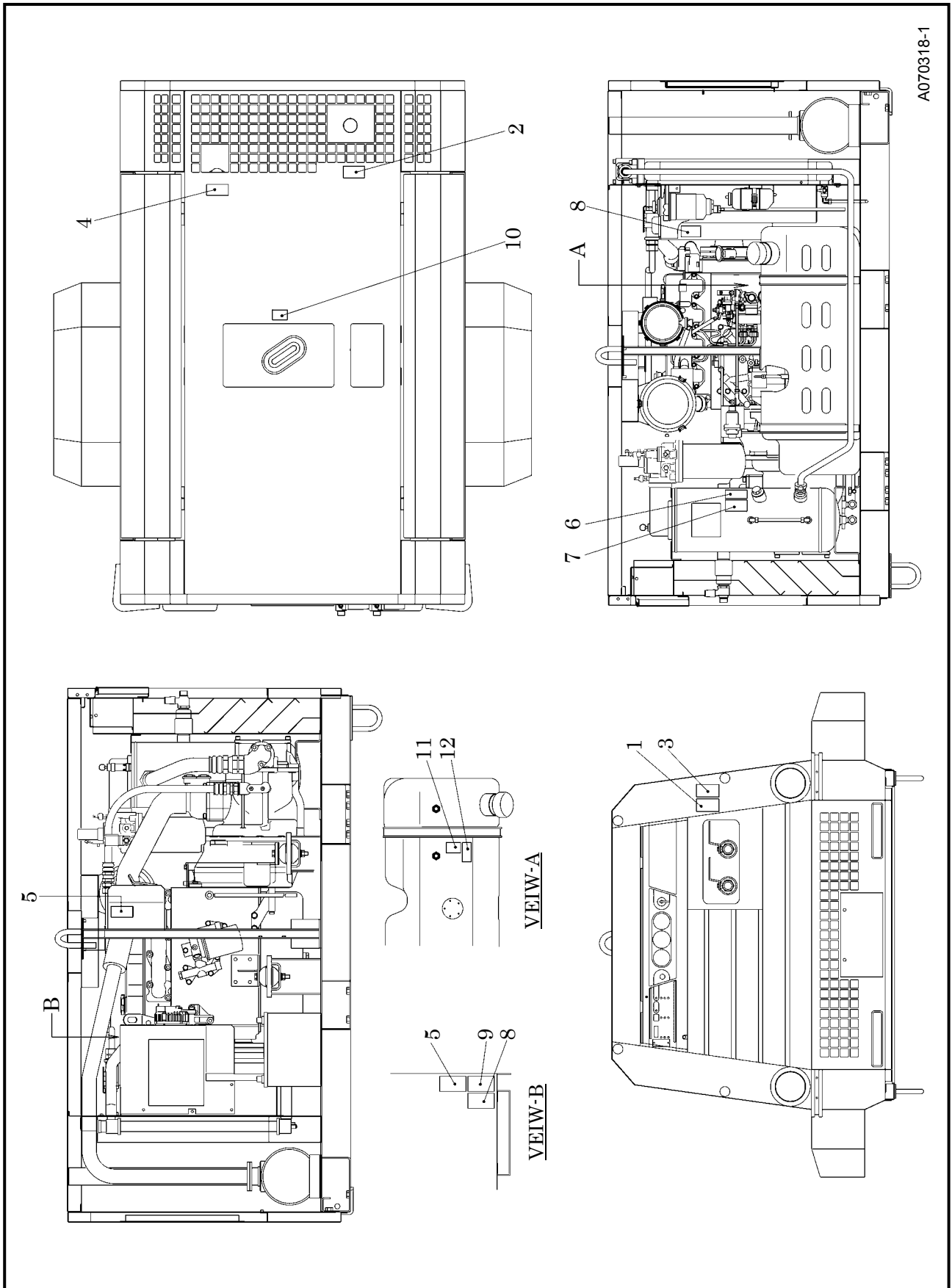
Keep them clean at all times. If they are damaged or missing, immediately place an order with your nearest dealer for replacement. Part numbers are indicated on the lower right corner of the label.

Adhere a new one to the original location.



1.Safety

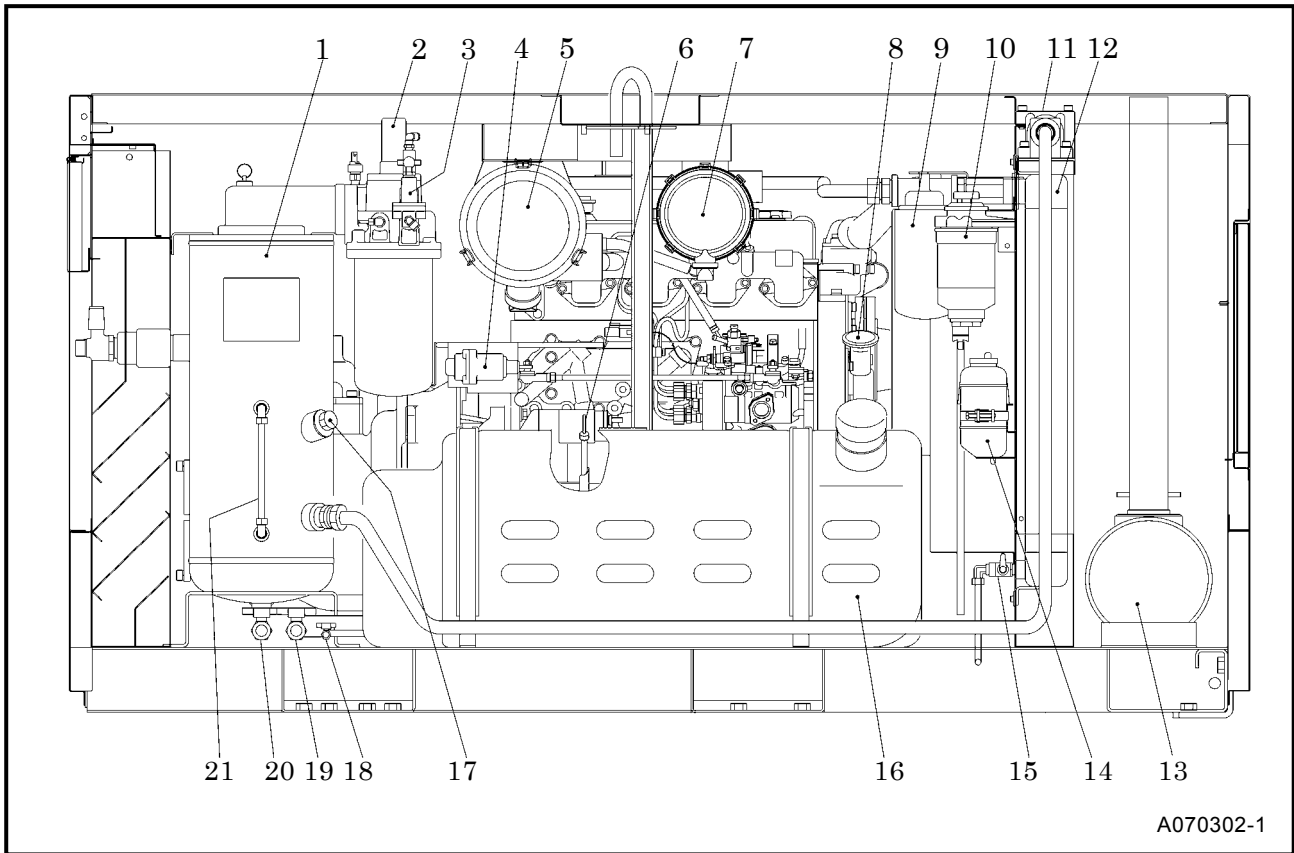
- The pasting position of safe warning label is as follows.



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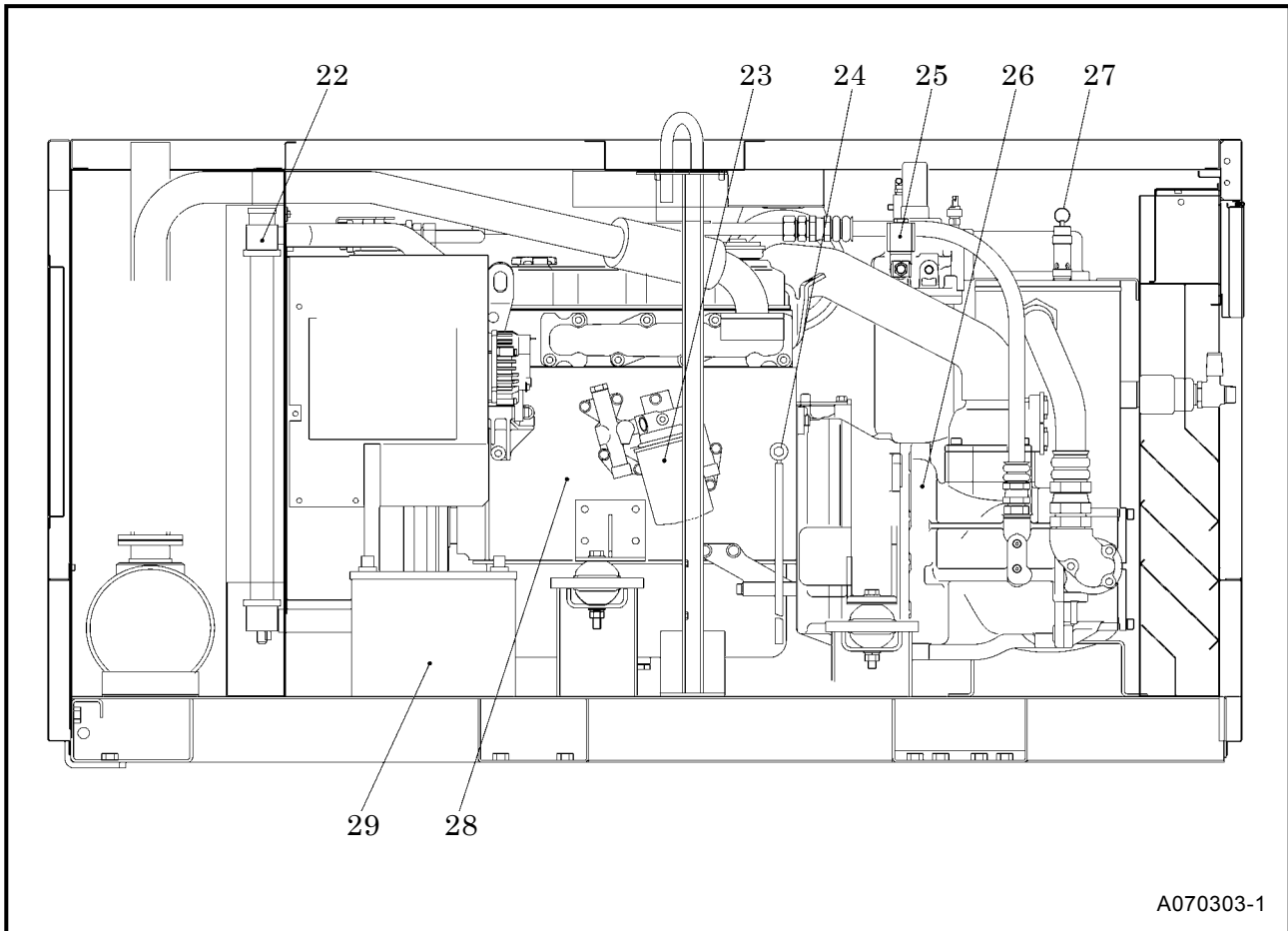
2.Part Names

2.1 Internal Components and Part Names



| No. | Description | Function |
|-----|---|---|
| 1 | Separator receiver tank | For separating compressor oil from compressed air sent into the tank. |
| 2 | Pressure control valve | For keeping the receiver tank pressure higher than 0.4MPa in the tank. |
| 3 | Pressure regulator | For regulating intake air volume. |
| 4 | Speed regulator | For regulating compressor revolution speed. |
| 5 | Air filter(For compressor) | For filtering the dust floating in the intake air. |
| 6 | Engine oil level gauge | For checking engine oil level. |
| 7 | Air filter(For engine) | For filtering the dust floating in the intake air. |
| 8 | Engine oil filler port | For supplying and replenishing engine oil to engine. |
| 9 | Compressor oil filter | For filtering compressor oil circulating in the system. |
| 10 | Fuel filter (sedimenter built-in type) | For filtering dust and foreign matter mixed or to be mixed in the fuel oil.and for separating water mixed or to be mixed in the fuel oil. |
| 11 | By-pass valve | For keeping compressor oil at proper temperature. |
| 12 | Oil cooler | For cooling compressor oil circulating in the system. |
| 13 | Exhaust muffler | Equipment which muffles an engine exhaust sound. |
| 14 | Reserve tank | For feeding cooling water. |
| 15 | Oil cooler drain valve | For draining condensate accumulated at the bottom of oil cooler. |
| 16 | Fuel tank | For storing diesel fuel oil. |
| 17 | Compressor oil filler port | For supplying and replenishing compressor oil. |

2.Part Names



| No. | Description | Function |
|-----|-----------------------------------|--|
| 18 | Fuel tank drain valve | For draining condensate and water accumulated at the bottom of the fuel tank. |
| 19 | Engine oil drain valve | For draining engine oil for replacement of it and for maintenance. |
| 20 | Compressor oil drain valve | For draining compressor oil from separator receiver tank. |
| 21 | Compressor oil level gauge | Scale for measuring compressor oil level. |
| 22 | Radiator | For cooling the coolant for engine because it is water-cooled. |
| 23 | Engine oil filter | For filtering engine oil. |
| 24 | Coolant drain valve | For draining condensate from engine. |
| 25 | Solenoid valve for AUTO IDLE mode | Control device for reduction of power under unloaded operation |
| 26 | Air-end | For compressing intake air. |
| 27 | Safety valve | For releasing compressed air to the atmosphere when the pressure rises higher than the rated pressure. |
| 28 | Engine | For driving the compressor. |
| 29 | Battery | For electrically starting engine. |

3. Installation

3.1 Transportation



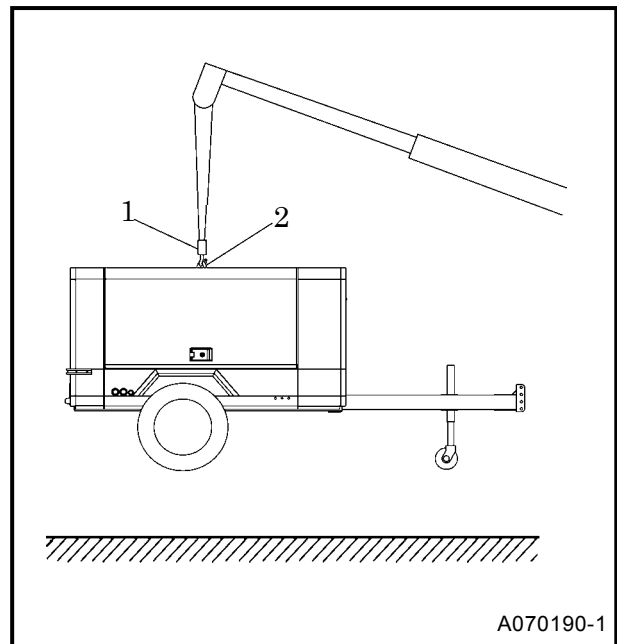
WARNING

Transportation

- When loading and unloading unit, be sure to use the lifting bail provided on the center of the unit top.
- Never get under the unit which is lifted up, because it is very dangerous.
- When unit is transferred or moved from working site, be sure to place it on truck bed, and fasten it by ropes at the front eye and rear stand. Also be sure to put a set of chocks to fix its wheels firmly on the truck bed.
- Never lift unit which is still in operation, or it could cause critical damage to each component or lead to serious accident.
- When lifting unit up, make sure that all the fixing bolts on the bonnet are surely tightened because it is feared that the unit may fall.
- If towing unit : Make sure machine is towed level.
- Check tire pressure and tire condition before towing.
- Attach safety chains and use correct tow hitch.
- Check operation of lights and brakes before towing.
- Check wheel lug nuts for proper torque.

3.1.1 Lifting up

- ① Before lifting the unit up, make sure to check the lifting bail for any crack and loosened bolts.
- ② Connect the hook “1” of the crane or shackle with lifting bail “2” eye fitted at the top center of the unit, and make sure that there is no person standing around the unit. Then perform hoisting operation.
- ③ Select a truck or a crane with capacity sufficient for weight and size of the unit by referring to the values shown in Chapter 8 “Specifications“ of the manual.



3.1.2 Lowering the unit from the truck bed pulling down

- Lower the unit down onto a level place which can sustain the weight of the unit.
- After placing the unit down, put chocks to lock the wheels before unfastening the crane’s shackles.

3. Installation

3.2 Towing the Unit

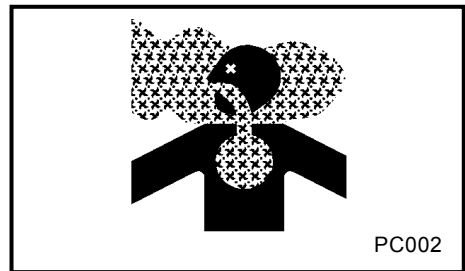


- Before towing the unit, check the following points and be sure to repair failures, if any:
 - Air-pressure in the tires.
 - Loose wheel bolts or nuts.
 - Abnormal wear or damage to the tires.
 - Damage of drawbar.
- Be sure to use a vehicle with enough capacity to tow the unit in operating weight.
- Do not tow the unit without unfastening tool, equipment, and hoses.
Keep hands and fingers clear during hook-up or unhooking drawbar.
- If you do not follow the above instructions, it could cause serious injury or big damage.

3.3 Installation



- Exhaust gas from the engine is poisonous, and could cause death when inhaled.
Avoid using the machine in an insufficiently ventilated building or tunnel.
- Do not position the exhaust gas outlet in direction of a person or a house.



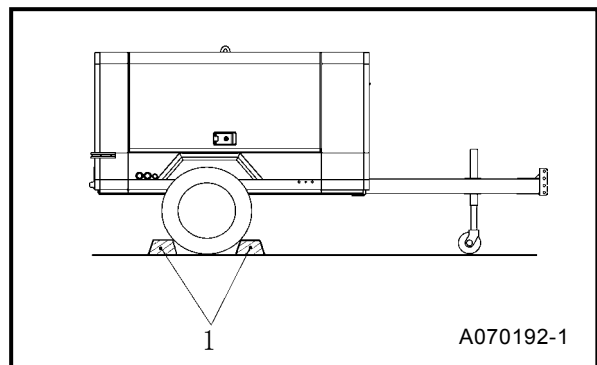
3.3.1 Installation

- The machine should be operated in following conditions:
 - **Ambient temperature** **5°F to 104°F (-15°C ~ +40°C)**
 - **Humidity** **Less than 90%**
 - **Altitude** **Lower than 1,500 m above sea level**
- Install the machine in a place with good ventilation, lower temperature and with surroundings as dry as possible.
- If more than two machines are placed parallel in operation, keep enough distance so that exhaust air from one machine does not effect the other one.
- Also, a machine has to be installed in the environment where fresh air is always available.
- Keep enough space around the unit for inspection and maintenance access.



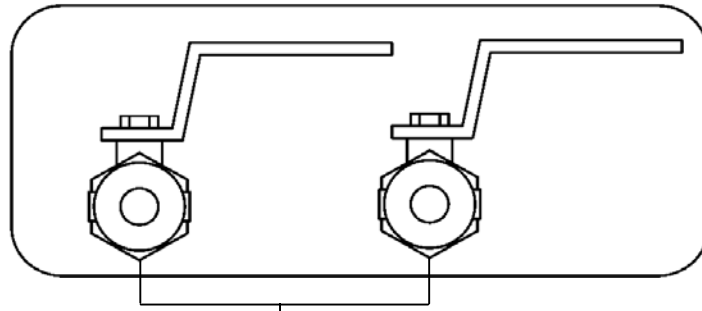
Installation

- The machine has to be parked horizontally on a level place.
- In case the machine has to be parked on a slope, place it across grade so that the machine does not tend to roll downhill.
- Following grades on a slope for the machine are recom- mended within 15° degrees.
- In case of trailer type, be sure to put one set of chocks “1” to the wheels.



3. Installation

3.3.2 Service valve

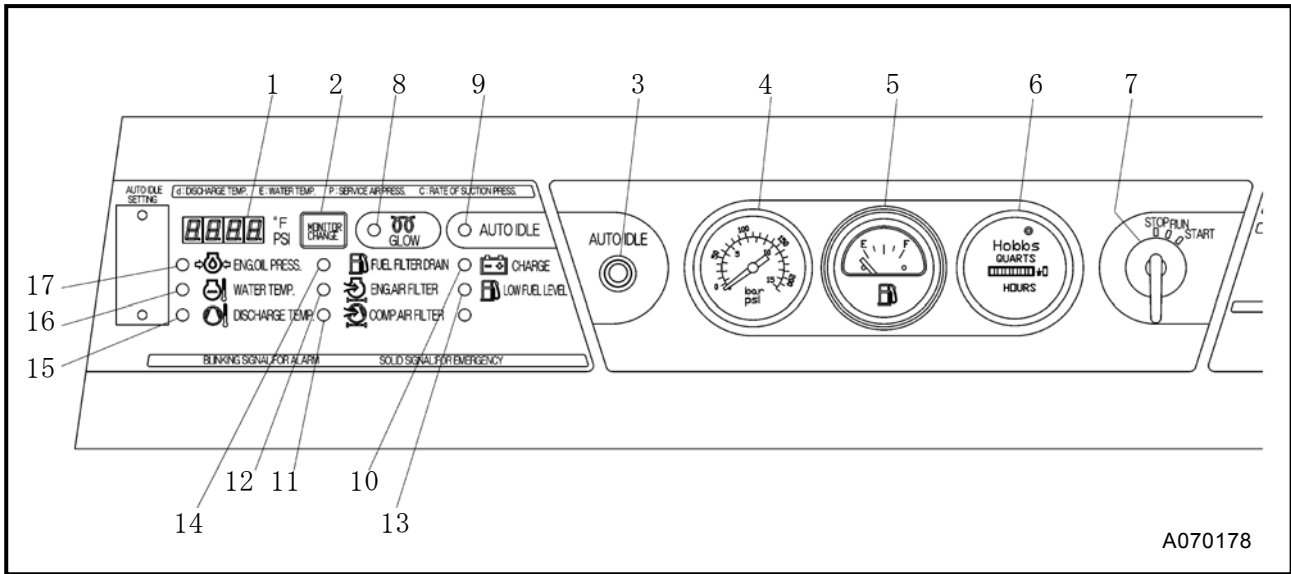


Discharge port : $20A(Rc3/4B) \times 2$
[Taper male screw]

A090556

4. Operation

4.1 Instrument panel

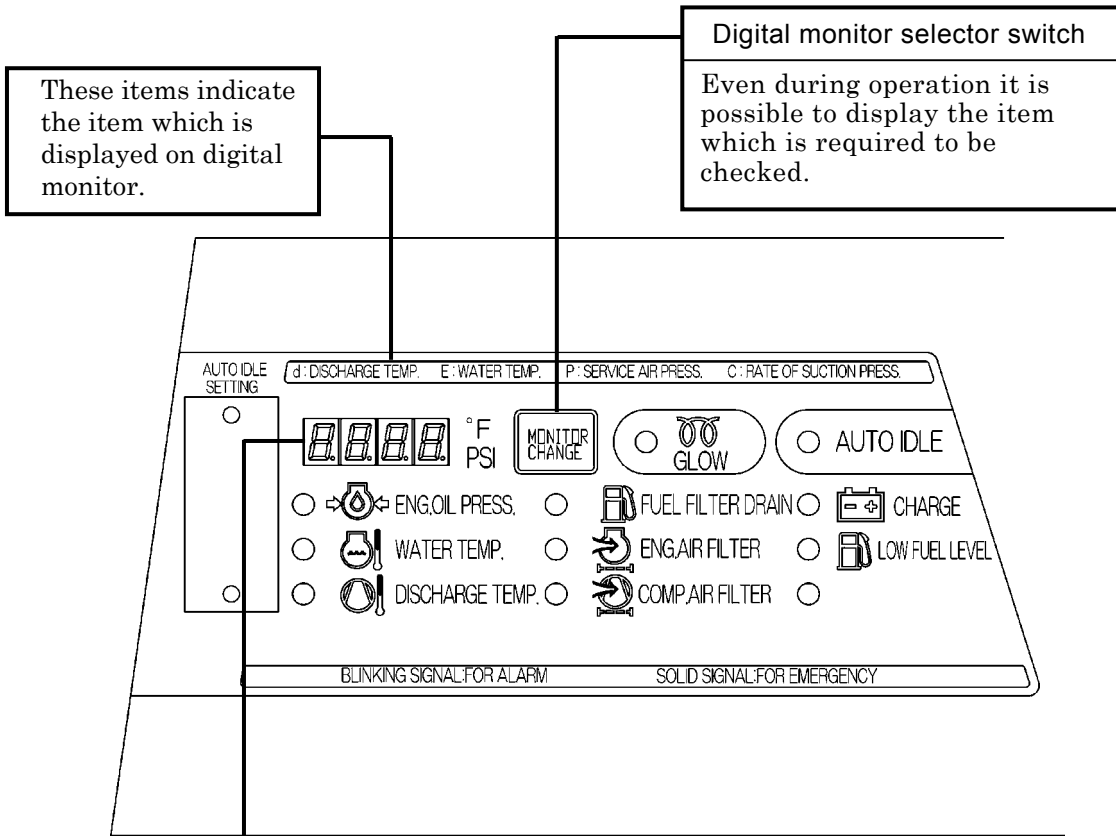


- | | |
|---|------------------------------------|
| 1. Digital monitor indicator (temperature/pressure) | <Indicator lamp> |
| 2. Selector switch for digital monitor indication | 8. Glow |
| 3. Auto idle switch | 9. Auto idle |
| 4. Discharge air pressure | <Warning lamp> |
| 5. Fuel level gauge | 10. Charge |
| 6. Hour meter | 11. Compressor air filter clogging |
| 7. Starter switch | 12. Engine air filter clogging |
| | <Emergency stop lamp> |
| | 13. Low fuel level |
| | 14. Fuel filter drain |
| | 15. Discharge air temperature |
| | 16. Water temperature |
| | 17. Engine oil pressure |

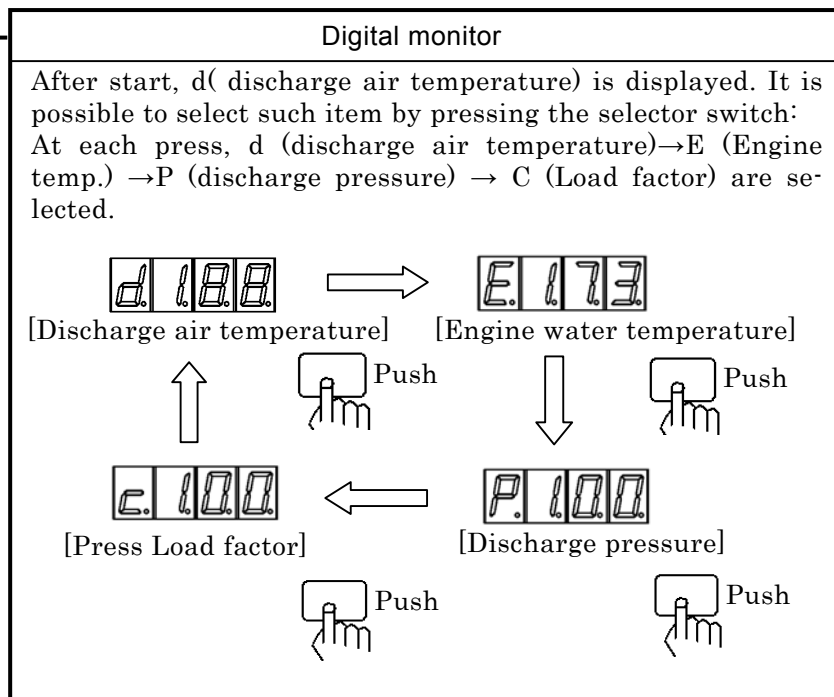
4. Operation

4.1.1 Digital monitor indicator

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



A070272-1




4. Operation

4.1.2 Indicator lamp

Indicator lamp




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

| Item | Contents | Measures | Monitor |
|-----------|---|----------|---|
| GLOW | Press starter switch “ON” and the lamp goes on and after pre-heating is finished, the lamp will be off. | _____ |  |
| AUTO IDLE | AUTO IDLE Switch “ON” and then lamp goes on. | _____ | _____ |

Warning lamp

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






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

| Item | Contents | Measures | Monitor |
|------------------|---|------------------------------------|---|
| CHARGE | Lamp goes on when alternator is not charging. | Check wiring. Check alternator. |  |
| COMP. AIR FILTER | Lamp goes on when air filter gets clogged and suction resistance increases. | Clean Replace |  |
| ENG. AIR FILTER | Actuating resistance is more than 6.2kPa. | |  |

Emergency stop lamp

The compressor stops when the emergency stop lamp goes on.

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

| Item | Contents | Measures | Monitor |
|-------------------|--|-----------------------|---|
| LOW FUEL LEVEL | When fuel level in fuel tank drops and it becomes necessary to replenish fuel, the lamp goes on. | See “Troubleshooting” |  |
| FUEL FILTER DRAIN | When fuel filter gets clogged with condensate inside, the lamp goes on. | Drain condensate |  |
| DISCHARGE TEMP. | Lamp goes on when the air temperature at the outlet of the air-end reaches the set temperature of 248°F (120°C). | See “Troubleshooting” |  |
| WATER TEMP. | Lamp goes on when coolant temperature reaches 230°F (110°C). | |  |
| ENG. OIL PRESS. | Lamp goes on when engine oil pressure drops. The function pressure is below 0.06MPa. | |  |

4. Operation

4.2 Lubricating oil · Coolant · Fuel

4.2.1 Engine oil

IMPORTANT

Oil should use the recommendation oil

- Viscosity of engine oil greatly affects startability, performance, oil consumption of the engine, as well as wear of the moving parts.
- Choose appropriate oil based upon the table below according to the outside air temperature.

Relation between viscosity (SAE) and temperature

| SAE Viscosity number | Temperature |
|----------------------|---------------------------------|
| 10W | -22° F to 50° F (-30°C to 10°C) |
| 30 | 14° F to 104° F (-10°C to 40°C) |
| 40 | 32° F to 122° F (0°C to 50°C) |
| 15W/40 | -4° F to 104° F (-20°C to 40°C) |

- Be sure to use CD class engine oil or superior class. (Using engine oil with poor quality may shorten the life of the engine).
- Follow the designated regulations to dispose of engine oil.

4.2.2 Compressor oil

IMPORTANT

Oil should use the recommendation oil

- Be sure to use recommended oil listed below.

Maker and Brand of Recommended Oil

| Maker | Brand |
|--------|----------------|
| HULS | ANDEROL 3032 |
| MOBIL | RARUS SHC 1024 |
| TEXACO | SYN-STAR DE32 |

- Even continuous oil replenishment cannot improve its deteriorated condition. Be sure to change the oil completely at every scheduled interval.
- Do not mix it with other brand oil, or it will cause poor performance and shorten the life of the compressor oil. (But fresh compressor oil could accept a mixture of small amount of different brands.)
- Running the unit with old and deteriorated compressor oil will cause damage to bearings, or serious accident like ignition in a separator receiver tank. Be sure to change the oil completely at every scheduled interval.
- Follow the designated regulations to dispose of compressor oil.

4. Operation

4.2.3 Coolant

IMPORTANT

Quality of coolant and antifreeze

- Use soft water of good quality such as tap water for coolant.
- 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.
- When the unit is used in a cold region and possible freezing is expected, it is recommended to use LLC (Antifreeze) for the coolant.
- Adjust mixing ratio of LLC (Antifreeze) with water according to the temperature.
- Use LLC (Antifreeze) within the range of its mixing ratio between 35 and 60%.
(Upon delivery from the works, LLC density is 55%)
- If LLC (Antifreeze) in the water exceeds more than 60%, it may decrease its antifreezing effect.
- Follow the designated regulations to dispose of LLC (Antifreeze).

4.2.4 Fuel

IMPORTANT

Choose appropriate

- Be sure to use diesel fuel oil.
(Using other oil will cause low power output or damage the engine.)
- 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.

4. Operation

4.3 Check before starting unit



CAUTION

Check before starting unit

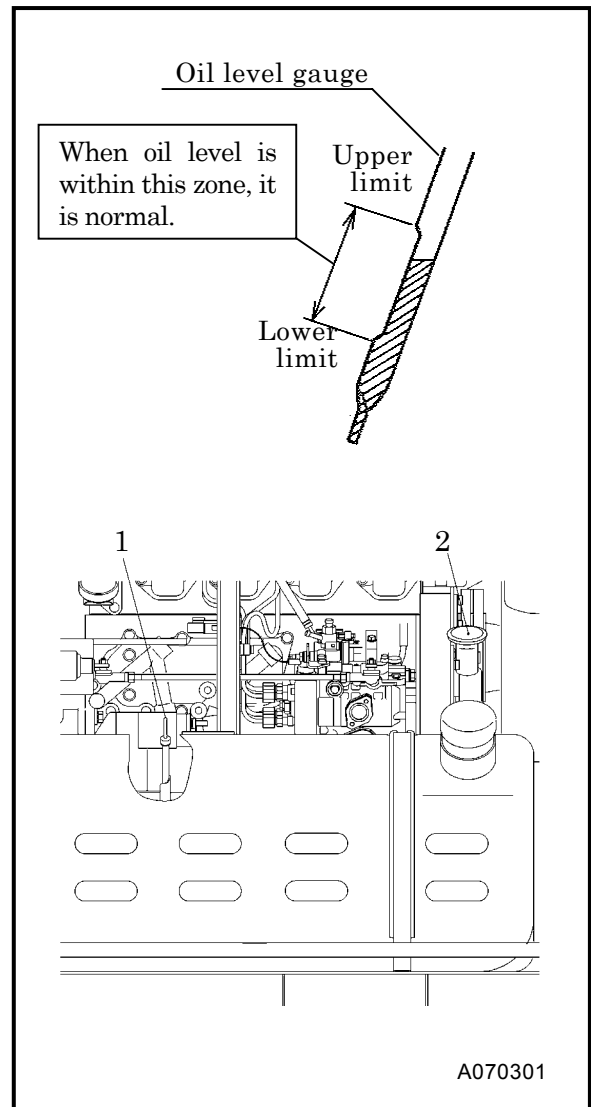
- Be sure to check the unit before operation.
When any abnormality is found, be sure to repair it before restarting the unit.
- Be sure to make daily checks before operation. If the unit is operated without prior check and without noticing its abnormality, such operation could cause seizure of components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

4.3.1 Check Engine Oil Level

- Unit should be on level before checking oil level.
- When you check oil level after you have once started operation, wait 10 to 20 minutes after stopping engine, before checking the oil level.

<Procedure>

- ① Pull out the engine oil dipstick, and wipe it with a clean cloth.
 - ② Then, re-insert the dipstick fully and pull it out again. If the dipstick shows the oil level between Upper limit and Lower limit, it is normal.
 - ③ When the oil level is below its Lower limit, add engine oil.
- 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 5.5.1)
 - Never fill oil more than Upper limit level.



4. Operation

4.3.2 Check Coolant Level

CAUTION

- Be sure to stop the machine and allow time to cool. Then loosen the radiator cap one notch. After the coolant water is sufficiently cooled and the inner pressure is released, take the cap off.

If this procedure is neglected, the inner pressure can blow off the cap. Steam jetting out of the radiator could result in causing scalding. Follow this procedure under all circumstances.

Taking off the radiator cap



H990432

IMPORTANT

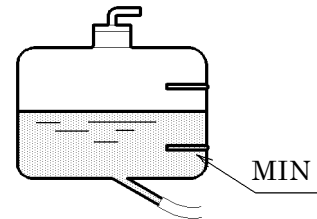
- Do not continue operation at low coolant level. Air bubble is mixed into radiator, and it causes damage to the radiator.

- 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 MIN mark.)

- When there is a little water or no water in the reserve tank, remove the radiator cap and make sure to check the water level. Then supply coolant to the radiator and also the tank, if necessary.

(See 5.5.13)



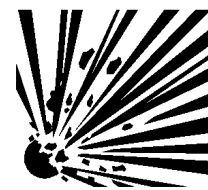
TR0314

4.3.3 Check compressor oil level

WARNING

- 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.
- 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.

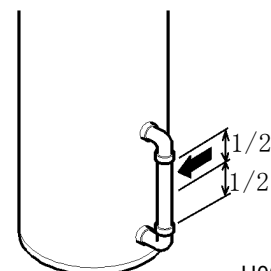
Refilling of compressor oil



W010

- Place the machine on level ground when checking the oil level.
- Make sure to confirm that the level of compressor oil shall be higher than the lower limit of the plate “stopping”. If not, replenish oil.

(See 5.5.5)



H000037

4. Operation

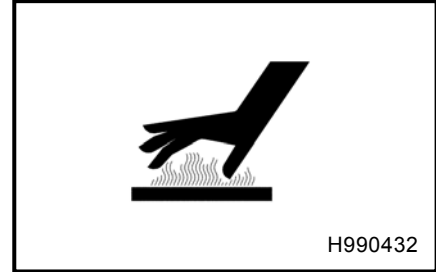
4.3.4 Drain separator receiver tank



WARNING

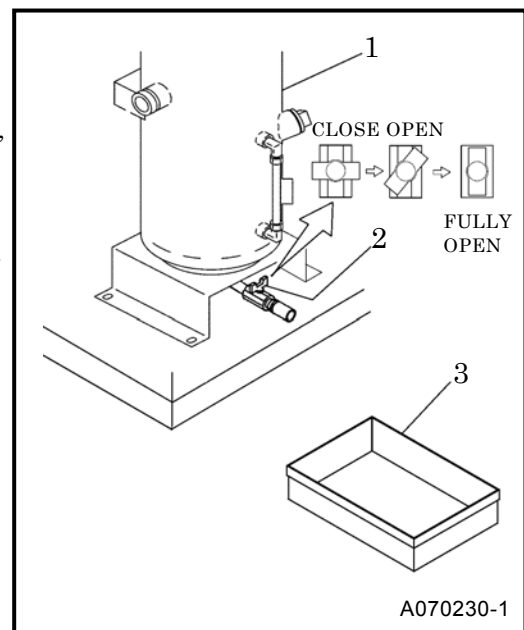
Draining of Separator receiver tank

- 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.



H990432

- Gradually opening the drain valve “2” fitted under the separator receiver tank “1” as shown in the fig, drain the condensate.
- Be careful not to fully open the drain valve “2”. Otherwise, much oil may be lost.
- After draining the oil completely, close the drain valve “2” firmly.
- Drain the condensate in container “3”, and then dispose of condensate according to the designated regulations.



A070230-1

4.3.5 Check fuel

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



CAUTION

Fire prevention

- 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 engine, 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.
- Refilling fuel tank should be done in an outdoor well-ventilated place.
- **Do not fill fuel oil up to the cap lever. When fuel tank is filled up to the cap level, fuel oil will be overfilled due to volume expansion caused by rise of ambient temperature. Further, fuel will be possibly spilled from fuel tank due to vibration caused during movement and/or transportation of machine.**

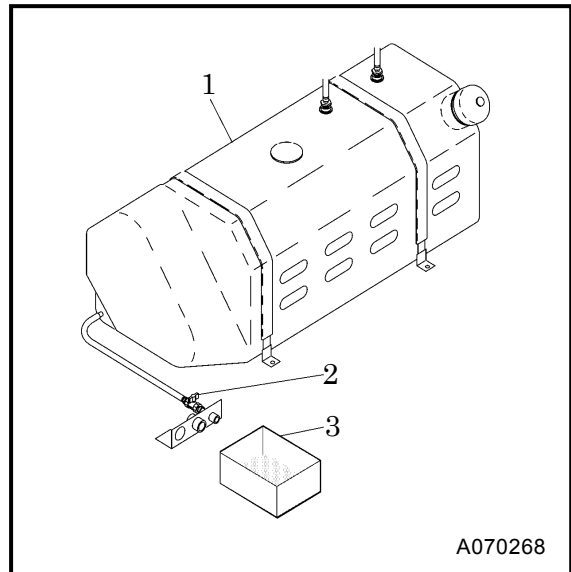


D004

4. Operation

4.3.6 Drain fuel tank

- Opening the drain valve “2” fitted under the fuel tank “1” , drain the condensate from the tank.
- When completely drained, firmly close the drain valve “2” .
- Drain the condensate in container “3” ,and then dispose of condensate according to the designated regulations.

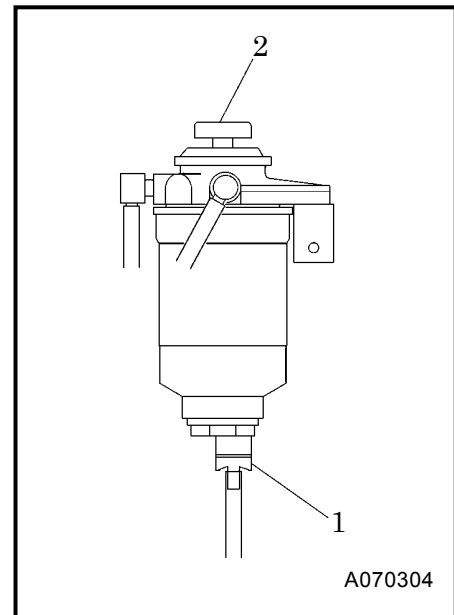


4.3.7 Check fuel filter(sedimenter built-in type) for condensate

- Whenever interval of periodical replacement of Condensate in fuel filter comes or the warning lamp Drain condensate accumulated goes on,in the filter.

<Procedures>

- ① Loosen drain valve “1” and then drain the condensed water accumulated in the filter.
 - ② Make sure to tighten the drain valve “1” securely, after draining the condensate.
 - ③ Finally carry out air bleeding in fuel system, pushing the priming pump “2” up and down. continue this operation till the pump moves heavily.
- Drain the condensate in container, and then dispose of condensate according to the designated regulations.



4. Operation

4.3.8 Check V-belt tension

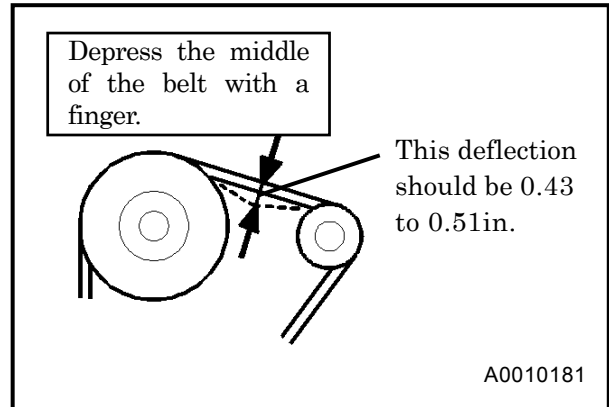
IMPORTANT

- 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.

Follow the procedure below to adjust tension of fan belt and V-belt for alternator.

<Procedure>

- ① Adjust the tension by gradually loosening the fastening bolt of the alternator.
- ② Visually check if there are any cracks or tears in the belt.
- ③ Adjust the belt tension by loosening the fixing bolt of the alternator so that the belt can deflect 0.43 to 0.51in(11 to 13 mm) when pressed at the center of the belt with approx.22lbf (98N) force.
- ④ 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.



4.3.9 Check wiring of each part

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

4.3.10 Check piping of each part

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

4. Operation

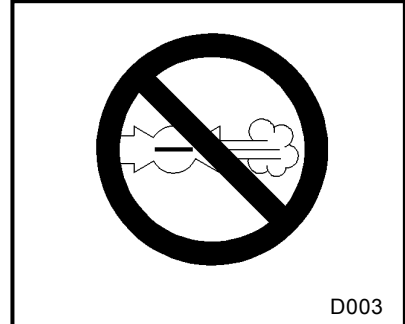
4.4 Operation



CAUTION

Operation with 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.



Quick Glow System

- Since this equipment is provided with a quick glow system (quick preheating device), **you do not have to turn the starter switch counterclockwise from STOP position.**
- Turn the starter switch to the “RUN” position, and the preheating will be completed in several seconds and the preheating lamp will go out. Then, turn the Starter Switch to the Start position to start up the engine.
- When the engine is already warm, the preheating operation is automatically omitted. Even though the preheating lamp lights up momentarily, ignore the lamp status, and start up the engine.

WARNING – Because of the quick glow system, never use ether to start engine.



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. Careless touch may cause serious injury.
- Pull the handle forward to open the door.
- Be sure to close the door tightly so that its latch is firmly caught.



4. Operation

4.4.1 Procedure to start the unit

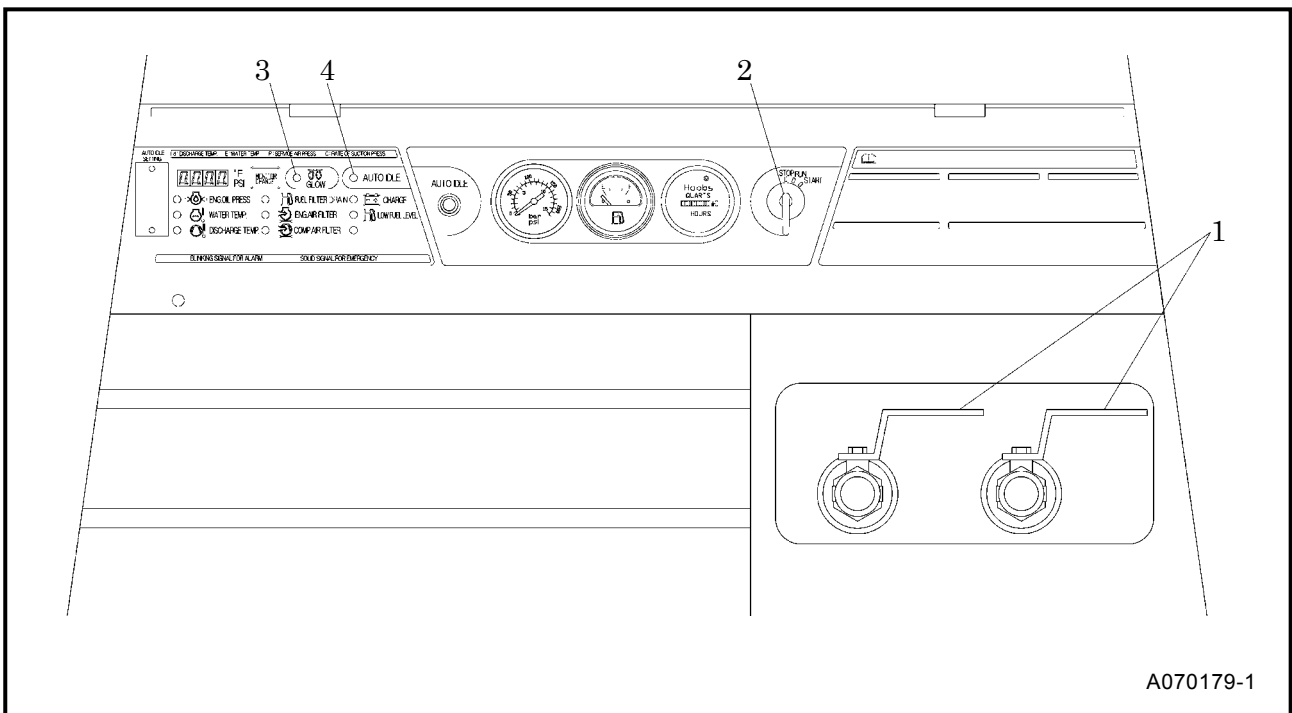
IMPORTANT

Be sure to warm-up

- 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.
- During the warm-up operation, examine the different parts of the equipment for any looseness, leakage of water, oil, fuel, and other irregularities.
- Also, make sure that monitor lamps are off.

<Procedure>

- ① Close fully air valves "1" .
- ② Turn the starter switch "2" to "RUN" position, and the preheating lamp "3" and auto idle lamp "4" goes on.
- ③ As soon as the preheating lamp "3" and auto idle lamp "4" has gone out, turn the starter switch "2" fully clockwise to start up the engine.
- ④ Once the engine has started up, leave it running to warm-up for 5 minutes.
- ⑤ After finishing warming up operation, open the air valve "1" provided at the outlet of compressed air and start service job.



4. Operation

4.4.2 Operating Procedures when Engine Fails to Start up on First Attempt

- When the engine fails to start up even after performing the startup procedures ① to ③, do not keep the starter running, but set the starter switch back to "STOP" and wait about 30 seconds. Then, repeat the startup procedure once again.
- If the repeated procedure does not allow the engine to run, the following causes are suspected. Therefore, check the following:
 - No fuel
 - Clogging of fuel filter
 - Discharge of battery (Low cranking speed)

4.4.3 How to start the unit at low temperature

IMPORTANT

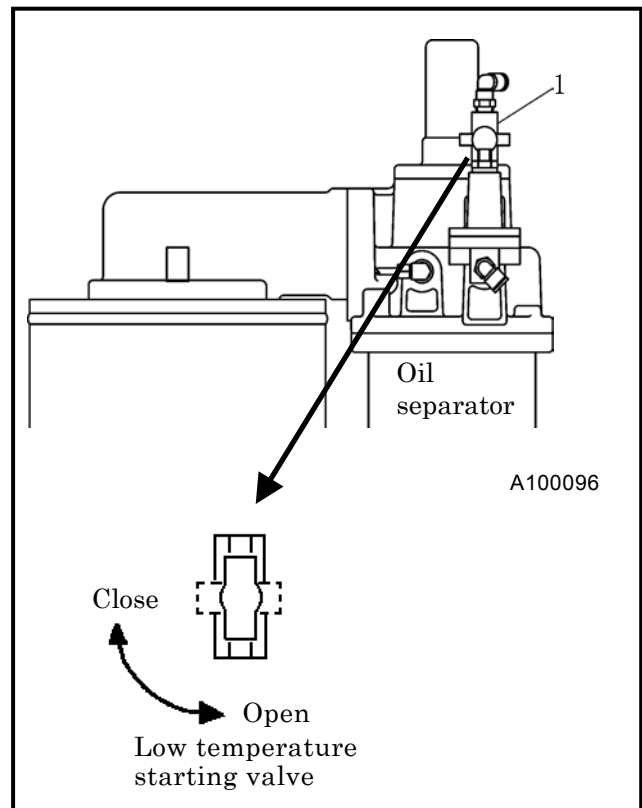
Operation under Cold Weather Conditions below 23°F(-5°C)

- Use SAE10W-30 (CD class) for the engine oil.
- Use LLC (antifreeze). Use correct amount to provide freeze protection, according to the ambient temperature.
- Battery should always be kept fully charged.

When it is difficult to start engine in cold weather, take the following measures.

<Procedure>

- ① Fully close the air valve, and fully open the valve "1" which is provided at the top of separator for starting under the conditions of low temperature.
- ② Perform normal starting operation first and gradually close the low temperature starting air valve "1", watching the rising engine speed.













4. Operation

4.4.4 Gauge Indication while Operating

IMPORTANT

- Minimum discharge air pressure is 0.39MPa during load operation.
 - Continuing equipment operation at a lower pressure than the above pressure may cause overheating, since it affects the separation of lubricating oil inside the oil separator and reduces the oil flow to the compressor air-end, resulting in temperature rise.
-
- Be sure to check at times to see if gauges or each component of the unit are properly working, or if there is any air-leak, oil-leak, water-leak or fuel-leak etc.
 - During normal operation, each indication of instruments is shown in the table below. Refer to the table for daily checks.
 - The above table gives standard values. They may vary slightly depending on the operating conditions and other factors.

| Protection device | | Emergency stop Lamp | | | | |
|-------------------|--------------------------------------|---|---|---|--|---|
| | | Discharge temperature | Water temperature | Engine oil pressure | Low fuel level | Fuel filter drain |
| Monitor | |  |  |  |  |  |
| Starting | Starter switch set to "RUN" position | ● OFF | ● OFF | ● OFF | ● OFF | ● OFF |
| In Operation | | ● OFF | | | | |

| Protection device | | Warning Lamp | | | Indicator lamp | |
|-------------------|--------------------------------------|---|---|---|--|-----------|
| | | Charge | Compressor air filter | Engine air filter | Glow | Auto idle |
| Monitor | |  |  |  |  | AUTO IDLE |
| Starting | Starter switch set to "RUN" position |  ON | ● OFF | ● OFF | * ● OFF | ● OFF |
| In Operation | | ● OFF | | | | |

Note: *: Lamp goes off after preheating completed.

| | | Discharge air pressure gauge |
|--------------|-----------|--------------------------------|
| In operation | Full load | 72.5-100 psi (5-6.9 bar) |
| | Unload | 104-131 psi (7.2-9.0 bar) |
| | Auto idle | 65.3-79.8 psi (4.5-5.5 bar) |

4. Operation

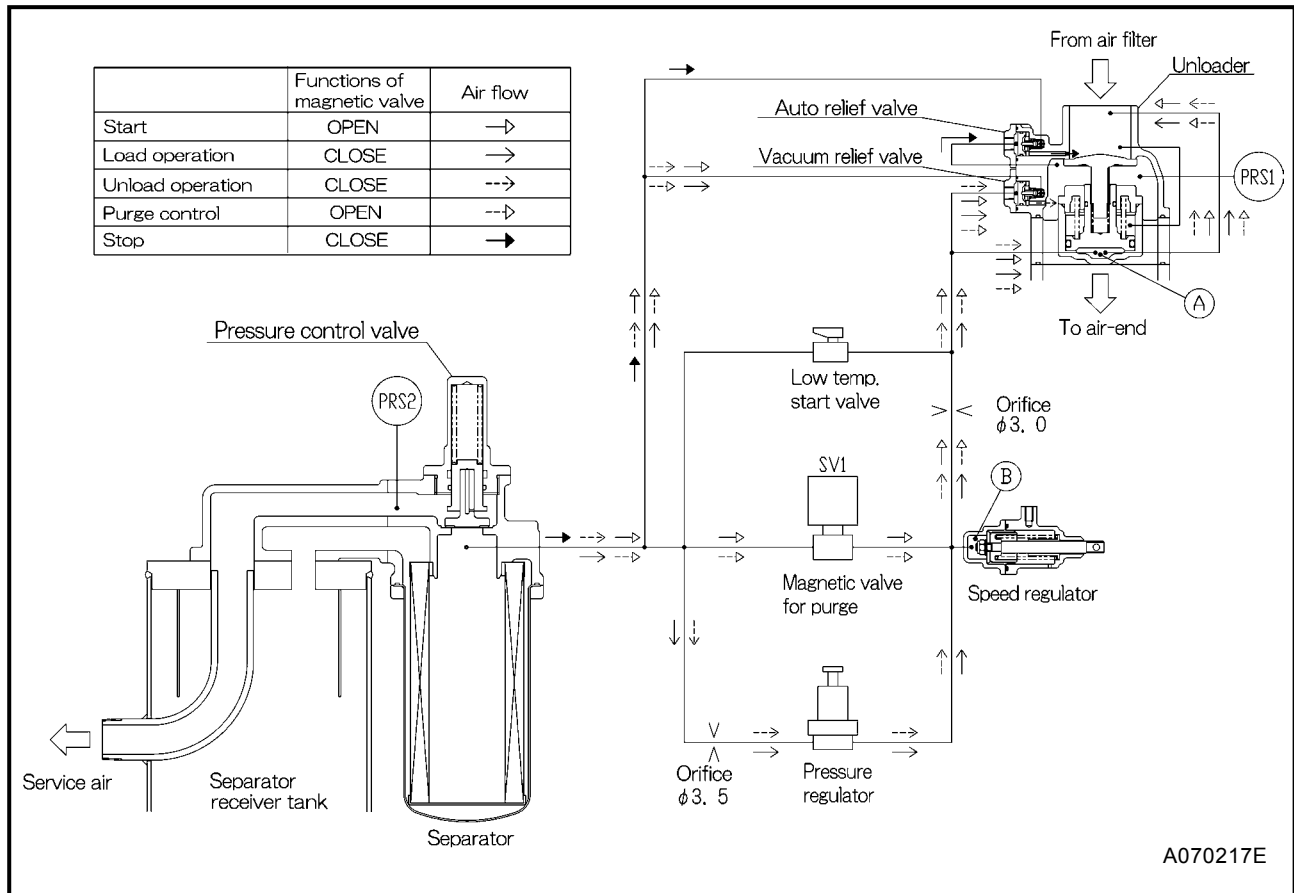
4.5 Stopping

<Procedure>

- ① Close the air 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. (Starting unloader valve should stop with “operation” position.)
 - 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 air valves.

4. Operation

4.6 Capacity Control Device



| Step | Response |
|---------------------------------------|--|
| Start | When starting operation, purge solenoid valve SV1 opens. And compressed air is sent to unloader chamber (A) and speed regulator chamber (B). The pressure in chamber (A) rises soon, and unloader valve fully closes due to low pressure. Thus the load required for starting is reduced. |
| Load operation | After starting operation, SV1 valve closes after 10 seconds have passed. The air volume sent to the chambers (A) and (B) from pressure regulator increases or decreases according to the rise and drop of discharge air pressure. Thus according as unloader valve position and engine speed change, free air delivery is steplessly and automatically regulated from 0 to 100%. |
| Suction port closing unload operation | When air consumption is reduced, and the pressure exceeds the rated one, speed regulator functions to lower the engine speed in proportion to the pressure rise and, at the same time, to close unloader valve. Under unloaded operation, the interior of compressor air-end becomes vacuum and vacuum noise is caused. In order to prevent occurrence of vacuum noise, it functions to open the vacuum relief valve, detecting the secondary pressure of pressure regulator and thus it prevents high vacuum state inside the compressor air end from being caused. |

4. Operation

| | |
|--------------------------------|---|
| Purge control unload operation | When the certain set time (it can be changed.) has passed at lower pressure than the set negative pressure, detecting the negative pressure inside the compressor air end with a pressure sensor PRS1, solenoid valve SV1 opens and it closes unloader valve. At the same time, it functions to relieve the compressed air from separator receiver tank to the atmosphere and thus it lowers the pressure. Thus the compressor power is saved. When air consumption increases, and the pressure used for load drops below the set pressure, pressure sensor PRS2 detects it and it disengages the purge control (SV1 closes) to start full load operation. |
| Stop | When stopping operation, it opens Auto relief valve to relieve the compressed air in separator receiver tank to atmosphere, detecting the pressure inside compressor air-end. |

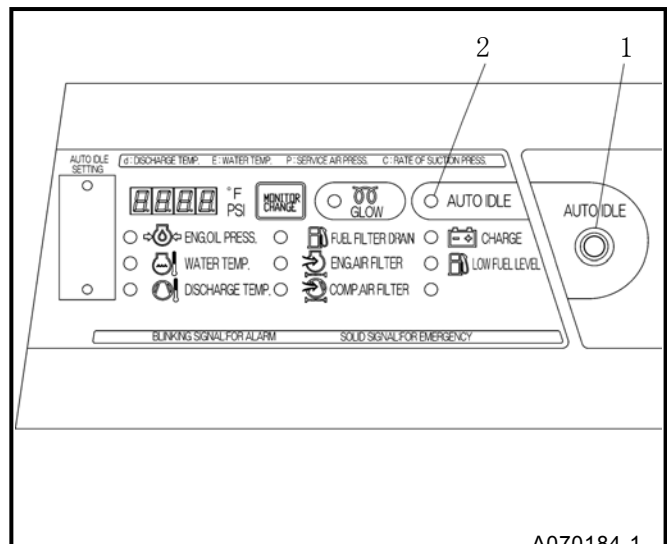
4.6.1 AUTO IDLE

This model is equipped with AUTO IDLE (PURGE CONTROL MODE OPERATION). This operation mode is recommendable for such use : not so much air consumption is required and it is used continuously and also power consumption under unloaded operation is required to be saved. Use this mode, depending upon the need and demand. For the selection of this mode, switch on“AUTO IDLE” on the operation panel.

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

<Procedure>

- ① During operation, push on the switch “1” “AUTO IDLE”.
- ② Then the indicator lamp “AUTO IDLE” “2” goes on.
- ③ In order to stop this operation mode, push again “AUTO IDLE” switch “1” and then the lamp “2” goes out to disengage this purge mode.



4. Operation

[FUNCTION OF AUTO IDLE CONTROL]

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

[Standard set values prior to delivery ex-works]

| Item | Set prior to delivery ex-works | Setting range |
|---|--------------------------------|-------------------------|
| Purge releasing pressure VR3 | 80 psi(5.5bar) | 50-95 psi(3.5 – 6.6bar) |
| Purge starting intake negative pressure VR2 | 30% | 0 - 80% |
| Timer set to be expected for purge mode VR1 | 10 seconds | 10 - 112 seconds |

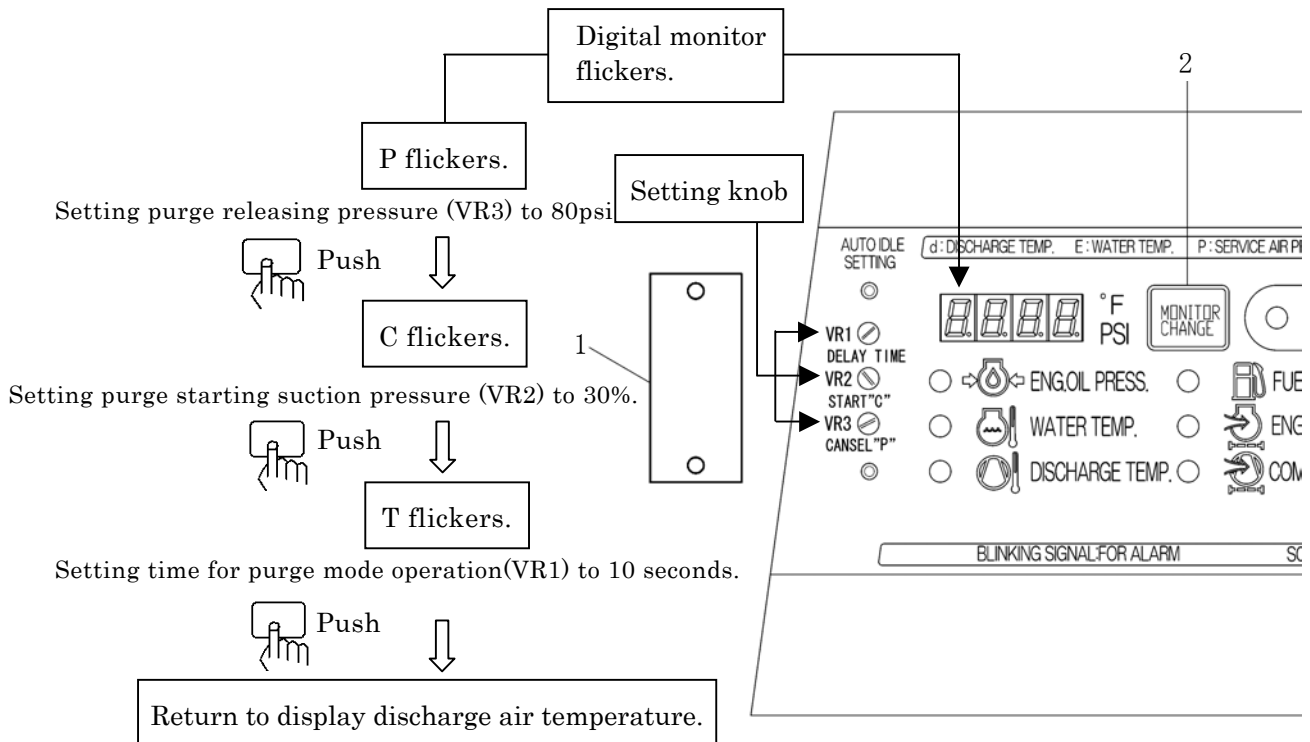
4. Operation

CAUTION

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

<Procedure>

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



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5. Periodic Inspection/Maintenance

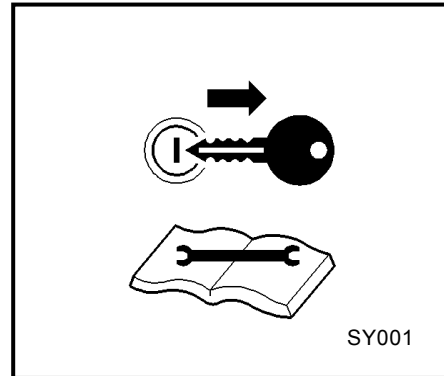
5.1 Important Items at Periodic Inspection and Maintenance or after Maintenance

The manual shows proper interval for periodic inspection and maintenance under normally operating conditions. Inspection and maintenance should be performed more often under extremely harsh conditions.

WARNING

Hang a "Now Checking and under Maintenance" tag

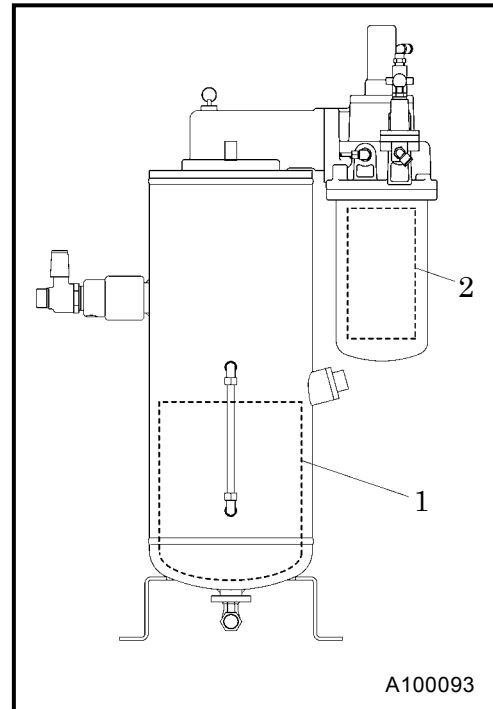
- Remove the starter key from the starter switch before starting inspection, and hang up a "Now Checking and under Maintenance" tag where it can be easily seen. The checker must keep the key during checking and maintenance.
- Remove the negative (-) side cable from the battery.
If the above procedure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



CAUTION

Prevention of oil separator from catching fire

- Be sure to perform oil change basically according to the specified interval. But if such oil is found much more contaminated before the interval, change the oil even before the specified period comes. In doing so, replace the oil completely and use our recommended oil.
- Be sure to perform following periodic inspection and maintenance:
 1. Check and change compressor oil
 2. Change oil separator
- Never mix the oil of different brands, or the mixed oil may deteriorate the oil quality.



5. Periodic Inspection/Maintenance

IMPORTANT

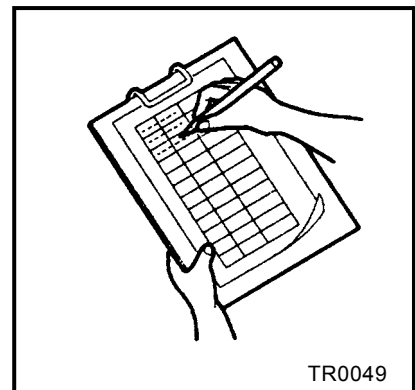
Directions: Prohibition of any other jobs or works than directed herein

- Be sure to use recommended fuel, oil, grease, and antifreeze.
- Do not disassemble or adjust engine, compressor 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 leakproof 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.

5.2 Daily Inspection and Operation Log

- Be sure to carry out daily inspection every morning before operation. See Chapter 4 "Operation" of the manual for the details of inspection.
- Pay attention to and carefully observe the following points during daily operation or inspection and maintenance work. If any trouble or abnormality is found, immediately investigate its cause and make repairs. If the cause is unknown or not traceable, or if the trouble involves a part or component not described in the manual, ask your nearest dealer for information.

- (a) Controls and instruments function properly.
- (b) Quantity and any leak of water, fuel, and oil or any contamination should be checked.
- (c) Appearance, abnormal noise or excessive heat should be checked.
- (d) Loose bolt or nut should be checked.
- (e) Any damage, wear or shortage of machine components and parts should be checked.
- (f) Performance of each part or component should be proper.



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

It is very useful to record information such as discharge pressure, oil level, as well as running hour, maintenance items and replenishment of lubricant on a daily maintenance log.

5. Periodic Inspection/Maintenance

5.3 Periodic Inspection List

(Unit:Hour)

| Maintenance | Daily | Every 250 | Every 300 | Every 500 | Every 1,000 | Every 2,000 | Every 3,000 | Page |
|---|-------|--------------|-----------|---------------|-------------|-------------|-------------|------|
| Check compressor oil level. | ○ | | | | | | | 4-7 |
| Drain separator receiver tank. | ○ | | | | | | | 4-8 |
| Check looseness in pipe connecting part, and wear and tear of pipe. | ○ | | | | | | | 4-10 |
| Check oil, water, fuel and air leak. | ○ | | | | | | | 4-14 |
| Check performance of gauge and indication lamps. | ○ | | | | | | | 4-14 |
| Change compressor oil. | | | ※1○ | ○ | | | | 5-8 |
| Change compressor oil filter. | | | ※1○ | | ○ | | | 5-9 |
| Clean strainer in the scavenging orifice. | | | | ○ | | | | 5-9 |
| Clean and change air filter element. | | ○ (Clean) | | ○ (Change) | | | | 5-10 |
| Clean outside of the oil cooler. | | | | | ○ | | | 5-11 |
| Change diaphragm of speed regulator. | | | | | ☆● | | | 5-11 |
| Change oil separator. | | | | | | ● | | 5-13 |
| Change nylon tubes. | | | | | | ● | | 5-13 |
| Change o-ring of unloader. | | | | | | | ★● | 5-14 |
| Change spacer of unloader. | | | | | ※2○ | | ★● | |
| Change pressure regulator. | | | | | | | ● | 5-14 |
| Check hoses. | | | | | | | ★● | 5-14 |
| Check o-ring and needle valve of auto-relief valve. | | | | | | | ● | 5-15 |
| Check o-ring and needle valve of vaccum relief valve. | | | | | | | ● | 5-15 |
| Performance check of pressure control valve | | | | | | | ● | 5-15 |
| Check/Change pressure control valve of o-ring. | | | | | | | ★● | 5-16 |
| Check/Change pressure control valve of piston. | | | | | | | ● | 5-16 |
| Check of solenoid valve ※3 | | | | | | | ● | |

Such items marked ○ shall be carried out by customers.

For the following items or clauses marked ●, contact us directly or our distributors because they require expert technical knowledge on them.

The following table shows the inspection and maintenance intervals under normal operation conditions. In case the unit is operated under harsh environmental conditions and operation conditions, the intervals should be shortened.

The items or parts marked ※1 show that they should be replaced primarily.

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 as time passes.

Also for the same reason, the parts marked ★ should be replaced every three years.

Regarding the item marked ※2, check the function of the unloader. In case the unloader malfunctions, change O-ring or bushing of unloader. This is because either of both parts may be worn out.

The items or parts marked ※3, re-use is possible when normal.

5. Periodic Inspection/Maintenance

◎ Refer to engine operation manual for inspection and maintenance of an engine.

(Unit:Hour)

| Maintenance | | Daily | Every 50 | Every 250 | Every 500 | Every 1,000 | Every 2,000 | Every 3,000 | Page |
|-------------|---|-------|----------|--------------|---------------|-------------|-------------|-------------|------|
| Engine | Drain fuel tank (Including sedimenter). | ○ | | | | | | | 4-9 |
| | Check fuel | ○ | | | | | | | 4-8 |
| | Check engine oil level. | ○ | | | | | | | 4-6 |
| | Check coolant level. | ○ | | | | | | | 4-7 |
| | Check looseness in pipe connectors, terminals and tear in wiring. | ○ | | | | | | | 4-10 |
| | Check V-belt tension. | ○ | | | | | | | 4-10 |
| | Change engine oil. | | ※○ | ○ | | | | | 5-6 |
| | Change engine oil filter. | | ※○ | | ○ | | | | 5-6 |
| | Check battery electrolyte. | | | ○ | | | | | 5-7 |
| | Clean and change air-filter element. | | | ○ (Clean) | ○ (Change) | | | | 5-7 |
| | Change fuel filter (sedimenter built-in type) | | | | ○ | | | | 5-10 |
| | Change coolant. | | | | | ☆○ | | | 5-12 |
| | Clean outside of radiator. | | | | | ○ | | | 5-11 |
| | Clean inside of radiator. | | | | | ● | | | 5-11 |
| | Change fuel rubber hose. | | | | | | ★● | | 5-14 |
| | Clean inside of fuel tank. | | | | | | ● | | 5-13 |
| | Change radiator hoses. | | | | | | | ★● | 5-16 |

The items or parts marked ※ show that they should be replaced primarily.

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 as time passes.

Also for the same reason, the parts marked ★ should be replaced every three years.

5. Periodic Inspection/Maintenance

5.4 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 | | NISSAN 15208 43G0A | 1 |
| Air filter element | Compressor side | 32143 11800 | 1 |
| | Engine side | 32143 11500 | 1 |
| Compressor oil filter | | 37438 05501 | 1 |
| Fuel filter element (sedimenter built-in type) | | NISSAN 16403 59E0A | 1 |
| Oil separator | Separator | 34220 16100 | 1 |
| | O-ring | 03402 15140 | 1 |
| Diaphragm of speed regulator | | 36437 01500 | 1 |
| Pressure regulator | | 36400 19000 | 1 |
| Auto-relief valve & vacuum-relief valve | O-ring "1" | 21221 02100 | 2 |
| | O-ring "2" | 03402 25021 | 2 |
| | O-ring "3" | 03402 25008 | 2 |
| | Needle valve "4" | 36429 00800 | 2 |
| Unloader valve | O-ring "1" | 03402 10125 | 2 |
| | O-ring "2" | 03402 10070 | 1 |
| | O-ring "3" | 21441 04800 | 1 |
| | O-ring "4" | 21441 04900 | 1 |
| Pressure control valve | O-ring "1" | 03402 15075 | 1 |
| | O-ring "2" | 03402 25032 | 1 |
| | Spring "3" | 22144 07700 | 1 |
| | Piston "4" | 35303 03300 | 1 |
| Solenoid valve | For auto idle mode | 46811 24100 | 1 |

5. Periodic Inspection/Maintenance

5.5 Maintenance Items

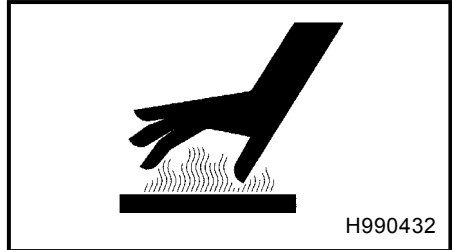
5.5.1 Change engine oil

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



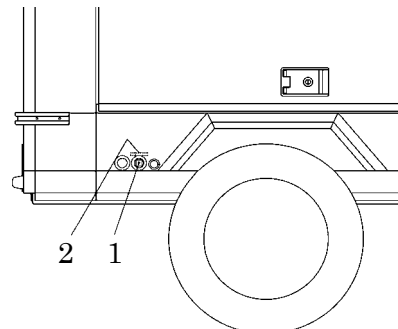
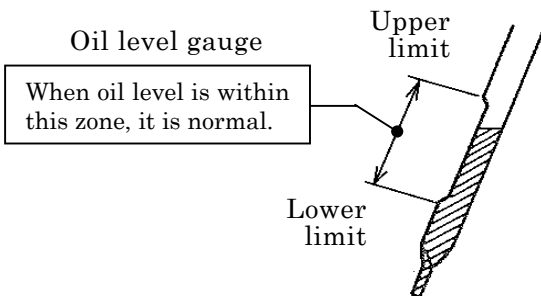
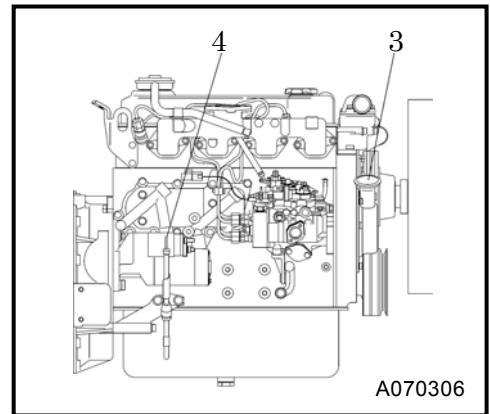
Caution in filling or discharging engine oil

- After stopping the engine, wait for 10 to 20 minutes 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.



< Procedure >

- ① Remove the drain plug “1” attached outside the plane, open a drain valve “2” inside the plane, and discharge engine oil drain.
- ② When the oil is completely drained, close the drain plug “1” and drain valve “2” firmly and refill new engine oil through the engine oil filler “3” .
[Quantity of oil : approx.2.64gal.(10L)]
- ③ After supplying oil, pull out the oil level gauge “4” and wipe it out.
- ④ Then, re-insert the oil level gauge “4” fully and pull it out again. If the dipstick shows the oil level between Upper limit and Lower limit, it is normal.

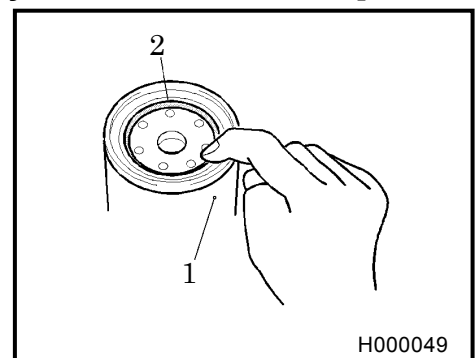


5.5.2 Change engine oil filter

[At 50 hours for the first change and at every 500 hours thereafter]

< Procedure >

- ① Remove the cartridge “1” , using a filter wrench.
- ② Screw in the new cartridge “2” with the packing coated slightly with oil. (See 5.4)
- ③ After the packing touches the sealing face, further tighten it by turning it 3/4 time with the filter wrench.
- ④ After installing the oil filter, check it for any leak during operation.



5. Periodic Inspection/Maintenance

5.5.3 Check battery electrolyte [Every 250 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:

1. 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 6.1. for method of specific gravity measurement and recharging the battery.

2. Enclosed type battery:

Check the indicator on top surface of the battery.

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

5.5.4 Check and clean air filter element [Every 250 hours]

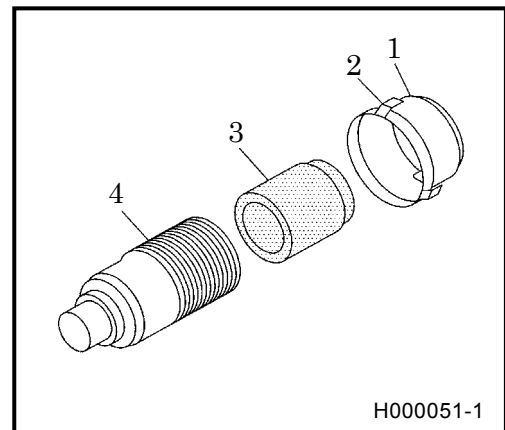
IMPORTANT

Cleaning of Air Filter Element should be perfectly performed

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

< Procedure >

- ① After removing the cap "1" by loosening its latch "2", clean its interior properly.
- ② Remove the element "3", and clean it.
- ③ When installing the cap "1" after finishing the cleaning job, push the element into the case "4" surely by hand, and then make sure that the latch "2" fixing the cap surely hooks the case "4". Finally tighten it.
- ④ If the element is found heavily dusty, replace it with a new one. (See 5.4)



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5. Periodic Inspection/Maintenance

5.5.5 Change compressor oil

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



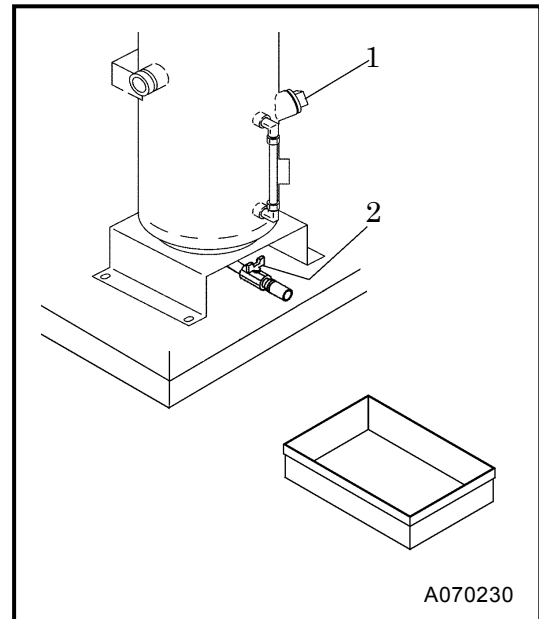
Refilling of compressor oil

- 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 receiver tank could force both extremely hot compressed air and oil to jet out and you may be scalded or seriously injured.
- Even continuous oil replenishment cannot improve its deteriorated condition. Be sure to change the oil completely at every scheduled interval.
- Do not mix it with other brand oil, or it will cause poor performance and shorten the life of the compressor oil. (But fresh compressor oil could accept a mixture of small amount of different brands.)
- Running the unit with old and deteriorated compressor oil will cause damage to bearings, or serious accident like ignition in a separator receiver tank. Be sure to change the oil completely at every scheduled interval.
- Follow the designated regulations to dispose of compressor oil.



< Procedure >

- ① Remove the oil filler cap “1” of separator receiver tank.
- ② Open drain valve “2” to discharge waste oil from the tank.
- ③ Completely discharge all the oil left separator receiver tank, pipes and oil cooler. If wasted oil is left in the unit, this residual oil will greatly shorten the life of the newly replenished oil.
- ④ Be sure to close drain valve “2” after the used oil is completely discharged.
- ⑤ Fill the designated quantity of new oil through the oil filler port. **[Quantity of oil : approx.3.96gal.(15L)]**
- ⑥ After oiling, tighten the cap “1” in its place while paying attention not to let dust get in the tank.
- ⑦ Start the engine for a short while, then replenish the oil to fill shortage. Repeat this procedure for 1 to 2 times to check if the oil level has reached its appropriate point. Be careful not to overfill the oil.



5. Periodic Inspection/Maintenance

5.5.6 Change compressor oil filter

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

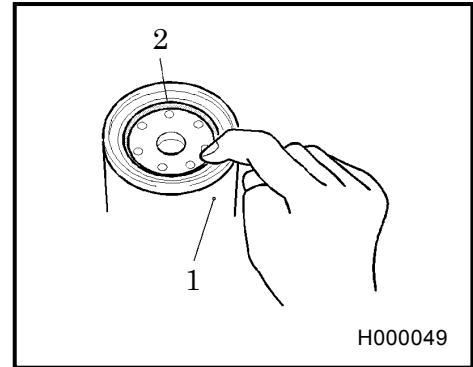
IMPORTANT

Use our genuine oil filter

- Poor quality oil filters do not trap dust sufficiently and will cause damage to the bearings in a short period.

< Procedure >

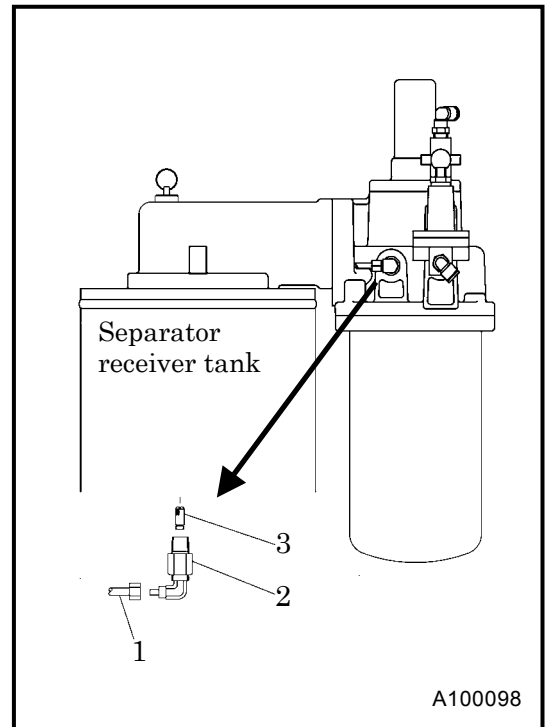
- ① Remove the cartridge "1", using a filter wrench.
- ② Screw in the new cartridge "1" with the packing "2" coated slightly with oil. (See 5.4)
- ③ After the packing touches the sealing face, further tighten it by turning it 3/4-1 time with the filter wrench.
- ④ After installing the oil filter, check it for any leak during operation.



5.5.7 Clean strainer in the scavenging orifice [Every 500 hours]

< Procedure >

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



5. Periodic Inspection/Maintenance

5.5.8 Change air filter element [Every 500 hours]

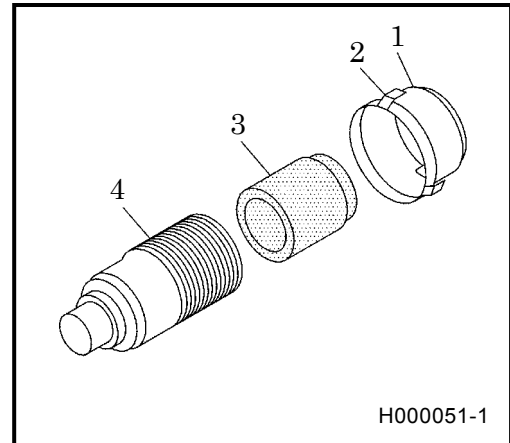
IMPORTANT

Use our genuine part

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

<Procedure>

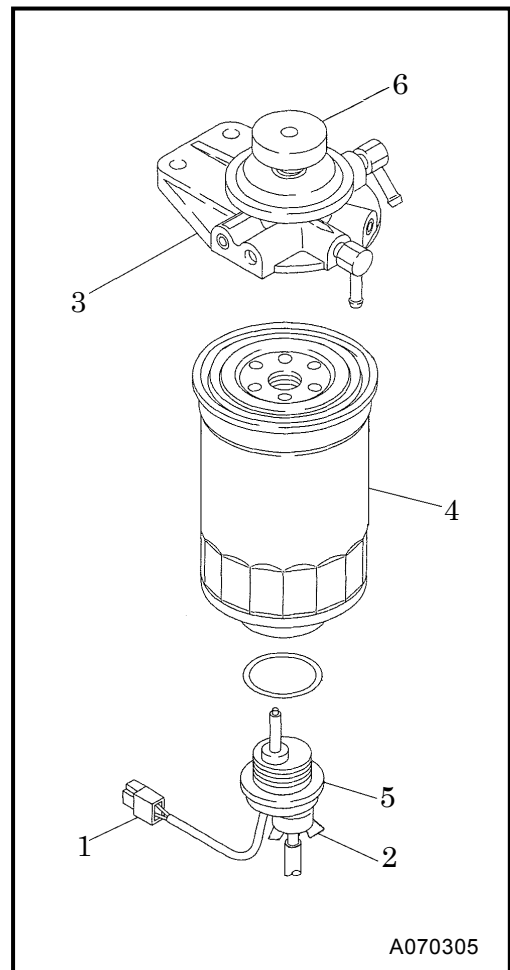
- ① After removing the cap "1" by loosening its latch "2", clean its interior properly.
- ② Remove the element "3" and then replace it with a new one. (See 5.4)
- ③ When installing the cap "1" after replacing it, properly push the element into the case "4" by hand and then make sure that the hooks for fixing the cap are surely set. Finally tighten it.



5.5.9 Change fuel filter (sedimenter built-in type) [Every 500 hours]

<Procedure>

- ① Separate the sensor connector "1" (provided at the lower part of fuel filter) from the main wiring portion.
- ② Loosen the drain valve "2" and then drain condensate and residual fuel staying inside the filter into a container etc.
- ③ Remove the cartridge "4" from the cover "3", using a filter wrench.
- ④ Remove the sensor assembly "5" from the cartridge "4".
- ⑤ Install the sensor assembly "5" to the new cartridge "4". (See 5.4)
- ⑥ New cartridge "4" please bind tight using a filter wrench.
- ⑦ After finishing the installation, install the removed connector "1" to where it was.
- ⑧ Finally, press the priming pump "6" up and down a few times for air bleeding in fuel line. Continue it till the pump moves heavily.

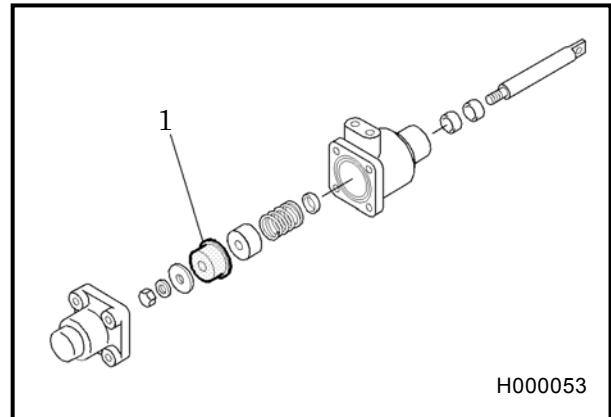


5. Periodic Inspection/Maintenance

5.5.10 Change diaphragm of speed regulator [Every 1,000 hours]

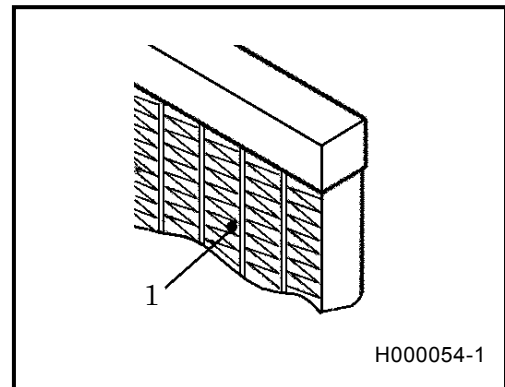
<Caution during diaphragm replacement>

- When installing diaphragm “1” , be sure to use the special jig to prevent it from twisting.
- Before installing diaphragm “1” , be sure to apply molybdenum disulfide (paste spray) to inside of the diaphragm “1” .
- Install it so that its outside surface should be rubber and its inside cloth. (See 5.4)
- When replacing speed regulator, contact directly us or distributor because it requires expert technical knowledge.



5.5.11 Clean outside of the Radiator and Oil cooler [Every 1,000 hours]

- When the fin tubes diaphragm “1” , 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 “1” , even before maintenance schedule.
- Do not use a high pressure washer to protect fin tubes diaphragm “1” , from being damaged.



5.5.12 Clean inside of Radiator [Every 1,000 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.
- Internal cleaning of the hoses requires expert technical knowledge. So contact directly us or distributor.

5. Periodic Inspection/Maintenance

5.5.13 Change Coolant [1,000 hours or every 2 years]



Caution in filling or discharging engine oil

- Be sure to stop the machine and allow time to cool. Then loosen the radiator cap one notch. After the coolant water is sufficiently cooled and the inner pressure is released, take the cap off.

If this procedure is neglected, the inner pressure can blow off the cap. Steam jetting out of the radiator could result in causing scalding. Follow this procedure under all circumstances.

- LLC (Antifreeze) is a toxic material.
- When a person has drunk LLC (Antifreeze) by accident, make him vomit and see a doctor immediately.
- 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.

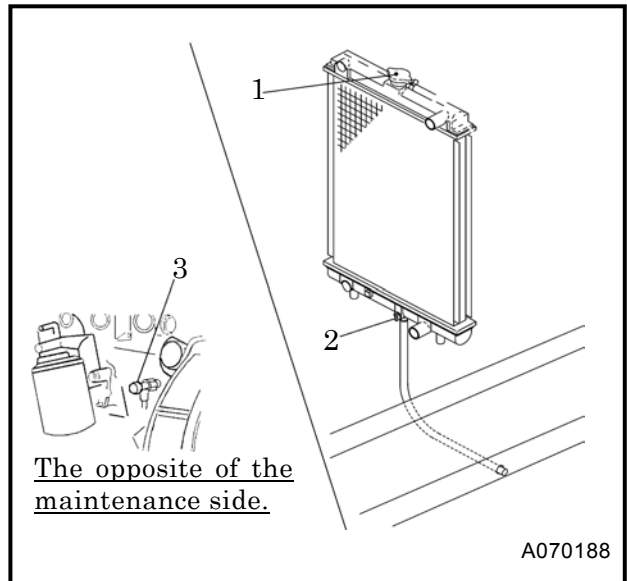


<Procedure>

- ① To drain coolant, first unfasten and take off the cap "1" of the radiator, open the drain valve "2" .
- ② Loosen the drain plug "3" provided on engine to drain engine.
- ③ When the drainage has been completed, fasten drain valve "2" drain plug "3" again and fill coolant into the radiator through its filler port.

[Quantity of water : approx.2.51gal.(9.5L)]

- ④ After changing the coolant, operate the machine for 2 to 3 minutes at the unloaded condition and stop it. Then check the coolant level again, and replenish if it is short.



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5. Periodic Inspection/Maintenance

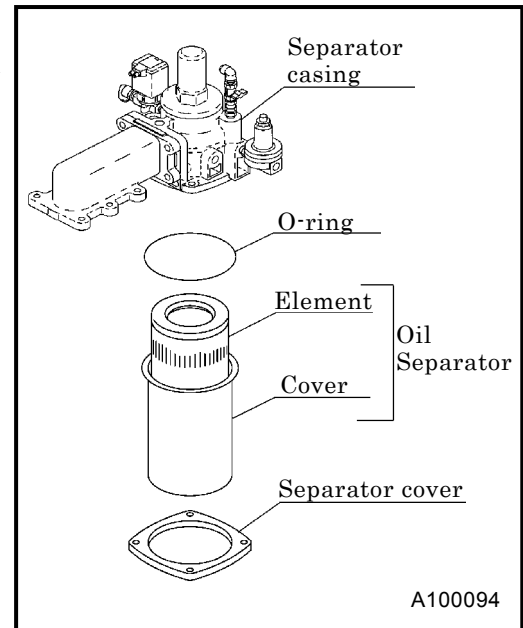
5.5.14 Change Oil Separator

[Every 2,000 hours]

IMPORTANT

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

- Even before the periodic interval time of replacement, replace the oil separator whenever the oil consumption increases and also oil is found mixed in the discharge air.
- When consumption of the oil is still unusual even after cleaning strainer in the scavenging orifice (See 5.5.7), change the oil separator with a new one. (See 5.4)
- When replacing oil separator, contact directly us or distributor because it requires expert technical knowledge.



5.5.15 Change Nylon Tubes

[Every 2,000 hours]

- Replace nylon tubes used for the oil and air pipings.
- When replacing nylon tube, contact directly us or distributor because it requires expert technical knowledge.

5.6.16 Clean inside of Fuel Tank

[Every 2,000 hours]

- Cleaning the inside of fuel tank. requires expert technical knowledge. So contact directly us or distributor.

5. Periodic Inspection/Maintenance

5.5.17 Change Fuel rubber hose

[2,000 hours or every 3 years]

- In case various rubber hoses for fuel system and engine lubrication system are hardened or deteriorated, replace them even before the specified replacement time.
- Replacement of the hoses requires expert technical knowledge. So contact directly us or distributor.

5.5.18 Change Pressure Regulator

[Every 3,000 hours]

- Remove pressure regulator and rebuild or replace with a new unit. (See 5.4)

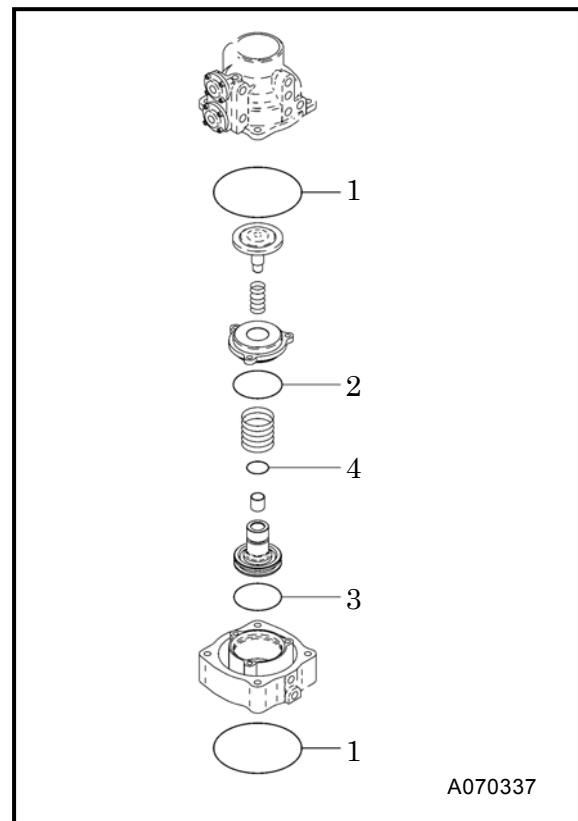
5.5.19 Change O-Ring of Unloader

[3,000 hours or every 3 years]

(Caution during O-ring replacement)

Supply grease to O-ring “1” , “2” , “3” , “4” after replacement. (See 5.4)

Grease: CALTEX MULTIFAX EP1



5.5.20 Check Hoses

[3,000 hours or every 3 years]

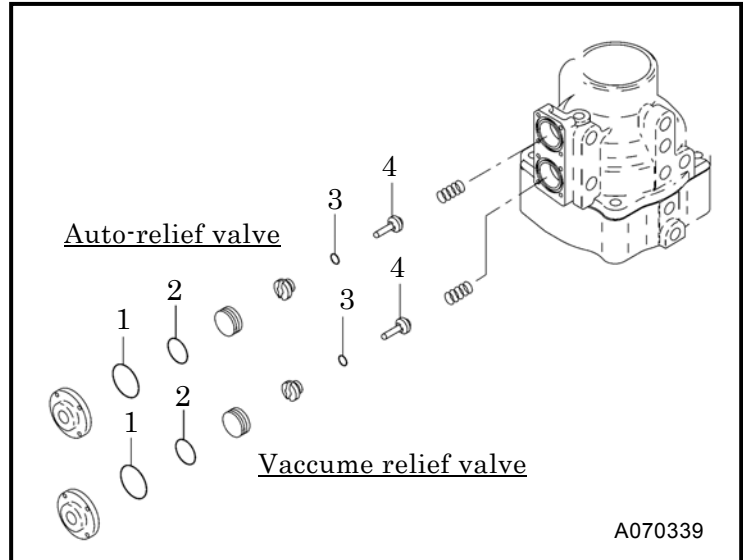
- Check hoses used for oil piping for any crack or tear, and replace when an abnormality is found.
- Replacement of the hoses requires expert technical knowledge. So contact directly us or distributor.

5. Periodic Inspection/Maintenance

5.5.21 Check O-ring and Needle Valve of Auto-relief Valve and Vaccume relief valve

[3,000 hours or every 3 years]

- Disassemble and clean the component, and check O-ring “1” , “2” , “3” and needle valve “4” . Then, replace O-ring “1” , “2” , “3” and rubber on the needle valve “4” , if hardened. (See 5.4)



5.5.22 Performance Check of Pressure Control Valve

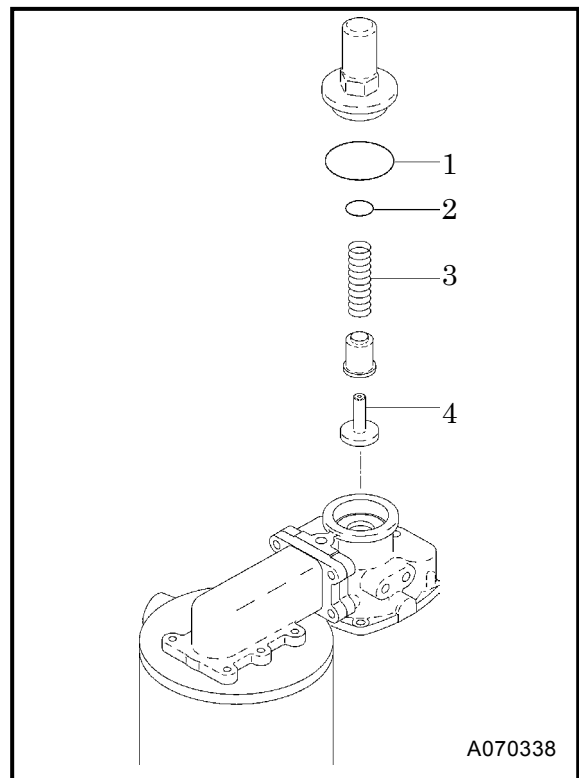
[3,000 hours or every 3 years]

IMPORTANT

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

<Procedure>

- ① When closing stop valve and fully opening service valve while the machine is running, make sure that the discharge pressure gauge shows the figure between 49-68psi (3.4-4.7bar).
- ② When the pressure is lower than 49psi(3.4 bar) , replace spring “3” with a new one. (See 5.4)
- ③ When the indicator shows excessively higher pressure, you will find that the piston does not move smoothly due to foreign material and rust stuck inside valve. In such a case, disassemble the component for checking and cleaning.



5. Periodic Inspection/Maintenance

5.5.23 Check Pressure Control Valve O-Ring and Piston

- Disassemble and clean the component, and check O-ring “1” , “2” and the piston “4” shown in 5.5.22 Then, replace O-ring “1” , “2” and rubber on the piston “4” , if they are hardened. (See 5.4)
- Ask your nearest dealer for its replacement.
- After replacement, run the machine to check its function (See 5.5.22), air-leak or any disorder.

5.5.24 Change Radiator Hoses

[3,000 hours or every 3 years]

- When any crack or wear is found on the hoses, change it even before the scheduled time.
- Replacement of the radiator hoses requires expert technical knowledge. So contact directly us or distributor.

6. Maintenance

6.1 Maintenance of Battery

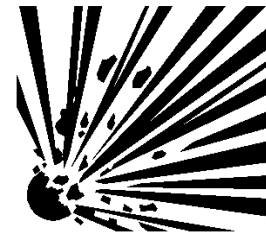
WARNING

- Keep flames away from battery.
- Battery may generate hydrogen gas and may explode.
- Therefore, recharging should be done at a well-ventilated place.
- Do not spark near the battery nor light a match, nor bring lit cigarette and match close to the battery.
- 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" and "LOWER" level without any delay.
- 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.
- When you deal with a battery, please be sure to wear protection implements, such as protection glasses and a glove.
- 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.
- Dispose of battery, observing local regulations.

Handling battery



D004



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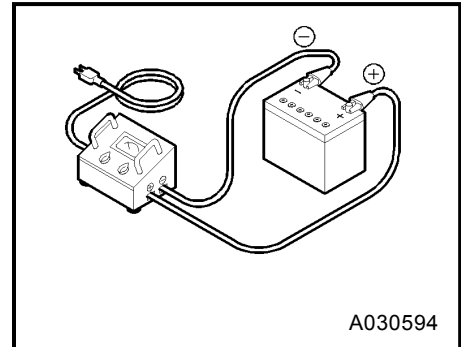


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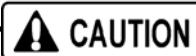
6. Maintenance

6.1.1 Charge Battery

- Be sure to read the operation manual of the battery charger to know if it is applicable, before using it.
- Disconnect the cable between battery and the unit, and charge the battery with a 12V battery charger. Do not charge two batteries at the same time.
- Be sure not to connect (+) and (-) terminals backwards.



6.1.2 How to Use Booster Cable

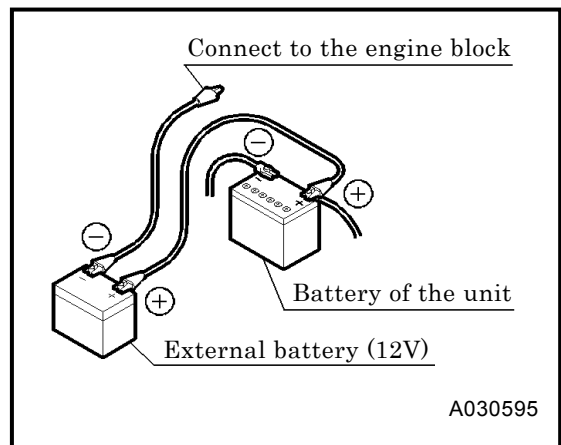


Do not connect the cable reversely

- If a booster cable has to be used or when cables are connected at battery replacement, be careful not to connect (+) and (-) terminals backwards. Such a wrong-connection will cause spark and damage each component.

<Procedure for using a booster cable>

- ① Stop the engine.
- ② Connect one end of the (+) cable to the (+) terminal of the machine battery.
- ③ Connect the other end of the (+) cable to the (+) terminal of the external battery.
- ④ Connect the (-) cable with the terminal (-) of the external battery.
- ⑤ Connect the other end of the (-) 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.



6. Maintenance

6.2 Troubleshooting

- Should any trouble occur 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 unit, the faster you can find a problem and solution.
- This chapter describes the state, cause and countermeasures of important troubles in detail:

| Symptom | Cause | Countermeasures |
|--|--|---|
| Low starter revolution speed. | (1) Battery malfunction. | Check battery→ Charge, change |
| Starter rotates but engine does not start. | (1) Fuel filter clogging. (2) Malfunction of fuel cut motor stopper. (3) No fuel. | Disassemble, clean, and change Check fuse Change motor stopper Check connector Replenish fuel |
| Discharge air pressure does not reach 100psi(6.9bar). | (1) Pressure regulator insufficient adjustment. | Re-adjust (Fasten) |
| Engine does not reach its maximum speed. | (1) Improper length in speed regulator rod. (2) Faulty speed regulator. (3) Engine trouble. (4) Fuel filter clogging. | Re-adjust Disassemble/Check Call your nearest dealer Disassemble/Change |
| Revolution drops before discharge air pressure reaches 100psi(6.9bar). | (1) Pressure regulator insufficient adjustment. (2) Trouble of pressure regulator. | Re-adjust (Fasten) Change |
| Engine does not reach minimum revolution at unload. | (1) Improper length in speed regulator rod. (2) Faulty speed regulator. | Re-adjust Disassemble/Check |
| Safety valve relieves at unload. | (1) Pressure regulator insufficient adjustment. (2) Speed regulator diaphragm damaged. (3) Unloader valve damaged and seat malfunction. (4) Faulty safety valve. (5) Improper length of speed regulator rod (6) Clogging orifice built-in speed regulator | Re-adjust (loosen) Change Change Re-adjust (elongate) Disassemble/Check |
| Oil mixes in Air. (Poor oil separation) | (1) Scavenging orifice strainer clogging. (2) Excessive oil in tank. (3) Low discharge pressure. (4) Oil separator deteriorated. | Disassemble/Clean Drain to its proper level Disassemble/pressure Control valve/check Disassemble/Change |
| Insufficient free air delivery. | (1) Air filter element clogging. (2) Unloader valve cannot fully open. (3) Engine does not reach rated speed. | Clean element or change Call your nearest dealer Call your nearest dealer |

6. Maintenance

| Symptom | Cause | Countermeasures |
|---|---|---|
| Engine oil pressure lamp goes on. and engine stops. | (1) Engine oil shortage. (2) Engine oil filter clogging. (3) Faulty oil pressure switch. (4) Loosened or disconnected wiring or connector. | Replenish oil Change Change Check/Fasten |
| Water temperature lamp goes on. and engine stops. | (1) Radiator clogging. (2) Faulty thermostat. (3) Faulty coolant temp. switch. (4) Low coolant level. (5) Fan belt slippage. (6) Loose wiring, connectors and disconnection | Clean Change Change Replenish Re-adjust tension Check/retighten |
| Discharge air temperature lamp goes on. and engine stops. | (1) Oil cooler clogging. (2) Oil filter clogging. (3) Faulty discharged air temp. switch. (4) Loose wiring connectors and disconnection. (5) Slippage of fan belt. (6) Shortage of compressor oil. | Clean Change Check/inspect Check and retighten Re-adjust tension Replenish oil |
| Low fuel level lamp goes on. and engine stops. | (1) Fuel runs short. (2) Malfunction of sending unit for fuel oil level drop. (3) Loosened and disconnected wiring connection and connectors. | Add fuel oil Inspect/replace Inspect/retighten |

- Contact your nearest dealer if you find it difficult to repair by yourselves.
- Refer to the engine operation manual for trouble concerning the engine.

7. Storage of the Unit

7.1 Preparation for Long-term Storage

When the unit 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.

- Put the unit in a temporary cabin if it is stored outside. Avoid leaving the unit outside with a sheet cover directly on the paint for a long time, or this will cause rust to the unit.
- 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 Spread lubricant on moving parts like speed regulator and rod end, beforehand.
- ③ Completely charge the battery and disconnect grounding wires. Remove the battery from the unit, if possible, and store it in a dry place. (Charge the battery at least once every month.)
- ④ Drain coolant and fuel from the unit.
- ⑤ 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 getting in the unit.
- ⑥ Be sure to repair any trouble and maintain the unit so that it will be ready for the next operation.

8. Specifications

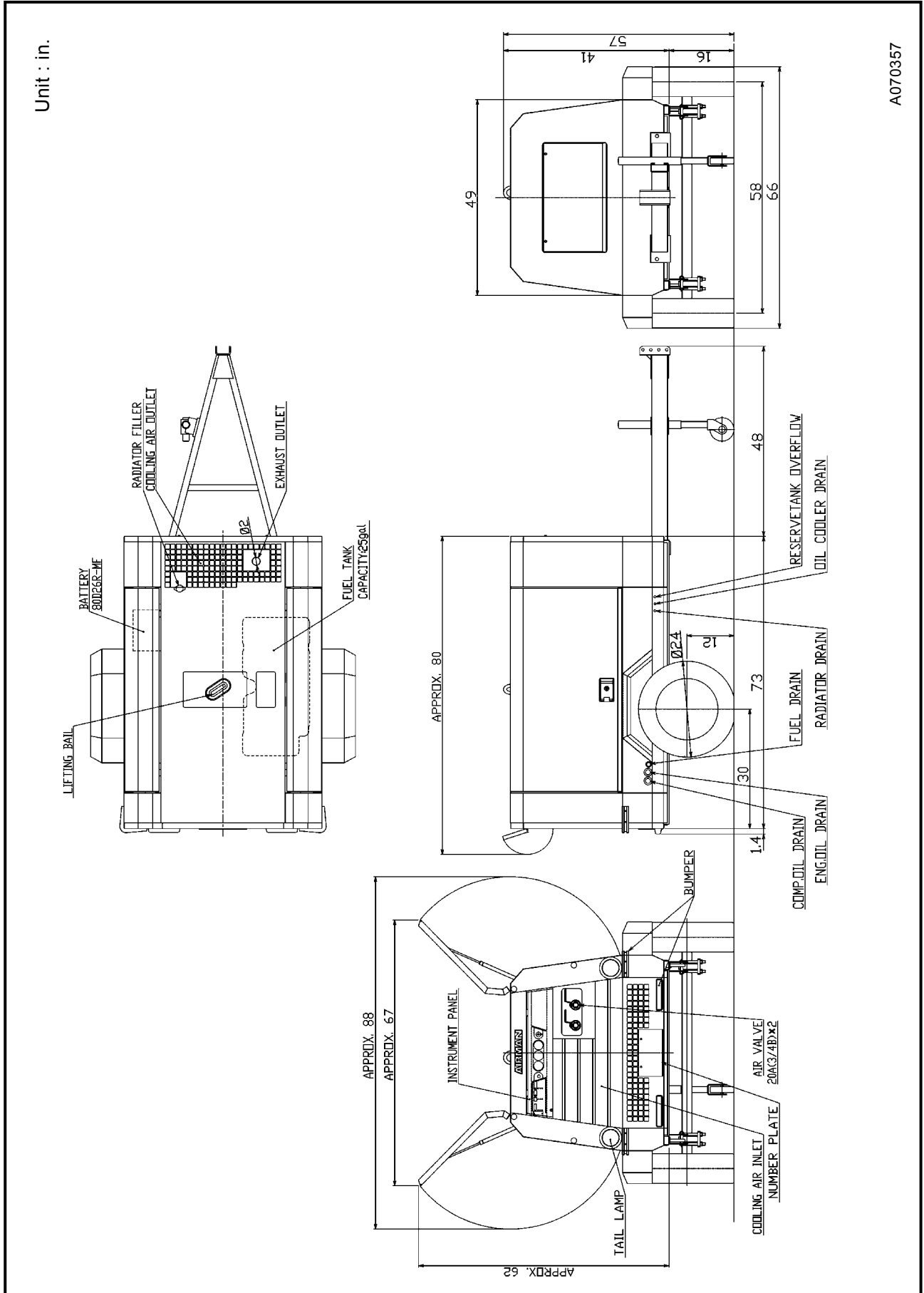
8.1 Specifications

< > Shows 49HP specifications

| Model | | PDS185S-6C1 | |
|------------------------|--|-------------------------------|--|
| Compressor | Type | | Single-stage oil cooled, screw type compressor |
| | Free air delivery | cfm (m ³ /min) | 185 < 166 > (5.2) < (4.7) > |
| | Working pressure | psi (bar) | 100 (6.9) |
| | Lubricating system | | Forced Lubrication by compressed pressure |
| | Driving system | | Direct driving with gear coupling |
| | Receiver tank capacity | cu in. (m ³) | 1,221 (0.020) |
| | Lubricating oil capacity | gal. (L) | 3.96 (15) |
| Engine | Model | | NISSAN TD2714 |
| | Type | | Water-cooled 4-cycle swirl chamber type |
| | Number of cylinders, bore stroke | in. (mm) | 4-3.78in. × 3.62in. (4- 96mm × 92 mm) |
| | Total displacement | cu in. (L) | 162.5 (2.663) |
| | Rated output | kW/min ¹ | 37.0 / 2,450 < 33.0 / 2,100 > |
| | Lubricating oil capacity | gal. (L) | 2.64 (10) (The amount of initial filling) |
| | | | Approx. 2.64 (10) (The amount of exchange) |
| | Coolant capacity (including radiator) | gal. (L) | 2.51 (9.5) |
| | Battery | | 80D26R (12V) equivalent |
| | Fuel tank capacity | gal. (L) | 25.1 (95) |
| General Specifications | Overall length | in. (mm) | 121 (3,070) |
| | Overall length (Bonnet only) | in. (mm) | 73 (1,860) |
| | Overall width | in. (mm) | 66 (1,665) |
| | Overall height (Bonnet only) | in. (mm) | 57 (1,450) |
| | Net dry mass | lb (kg) | 2,070 (940) |
| | Operating mass | lb (kg) | 2,290 (1,040) |

8. Specifications

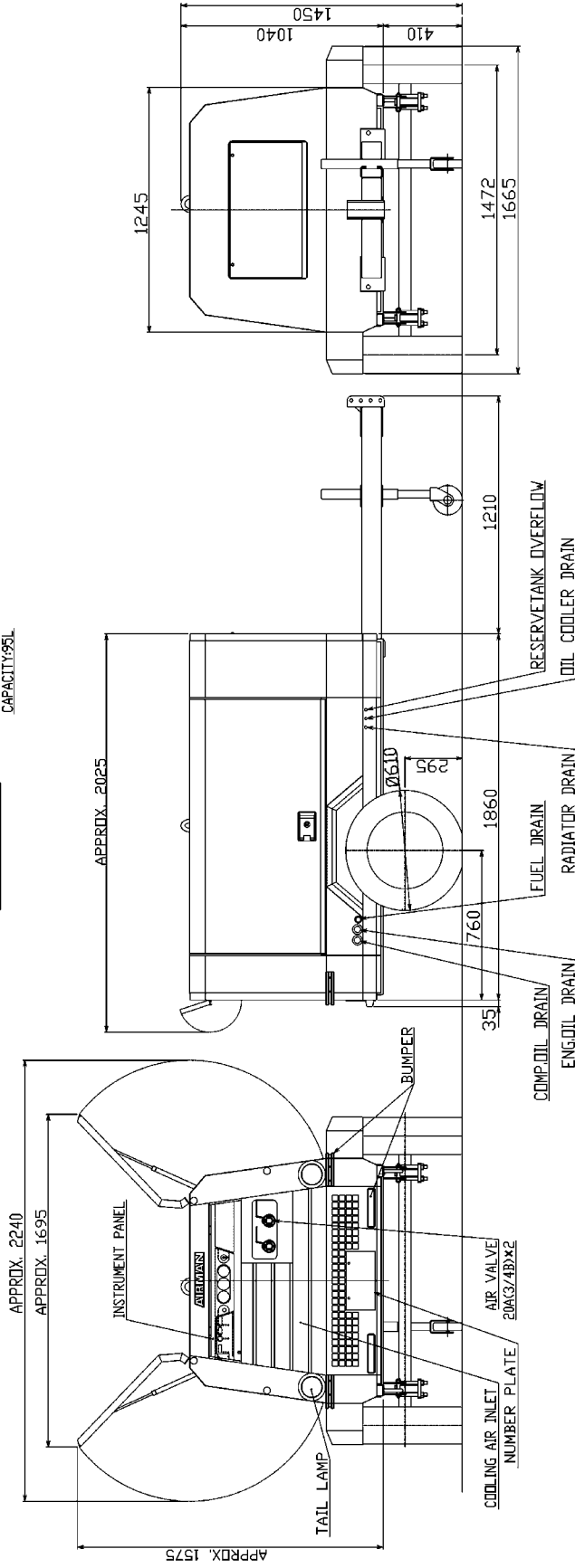
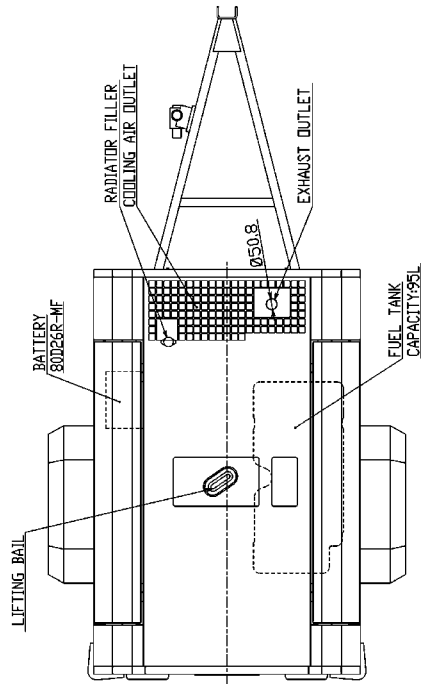
8.2 Outline drawing



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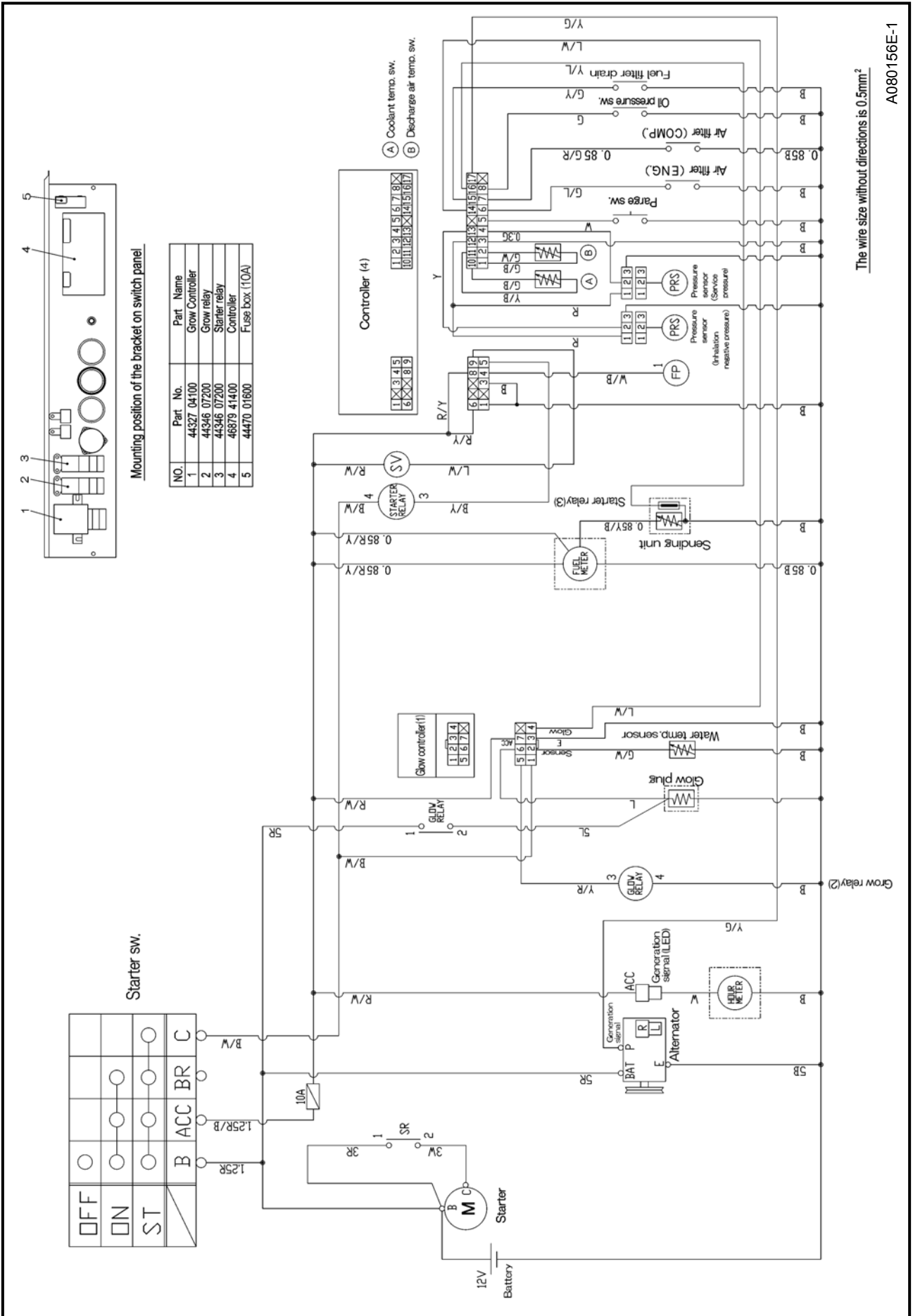
8. Specifications

Unit : mm



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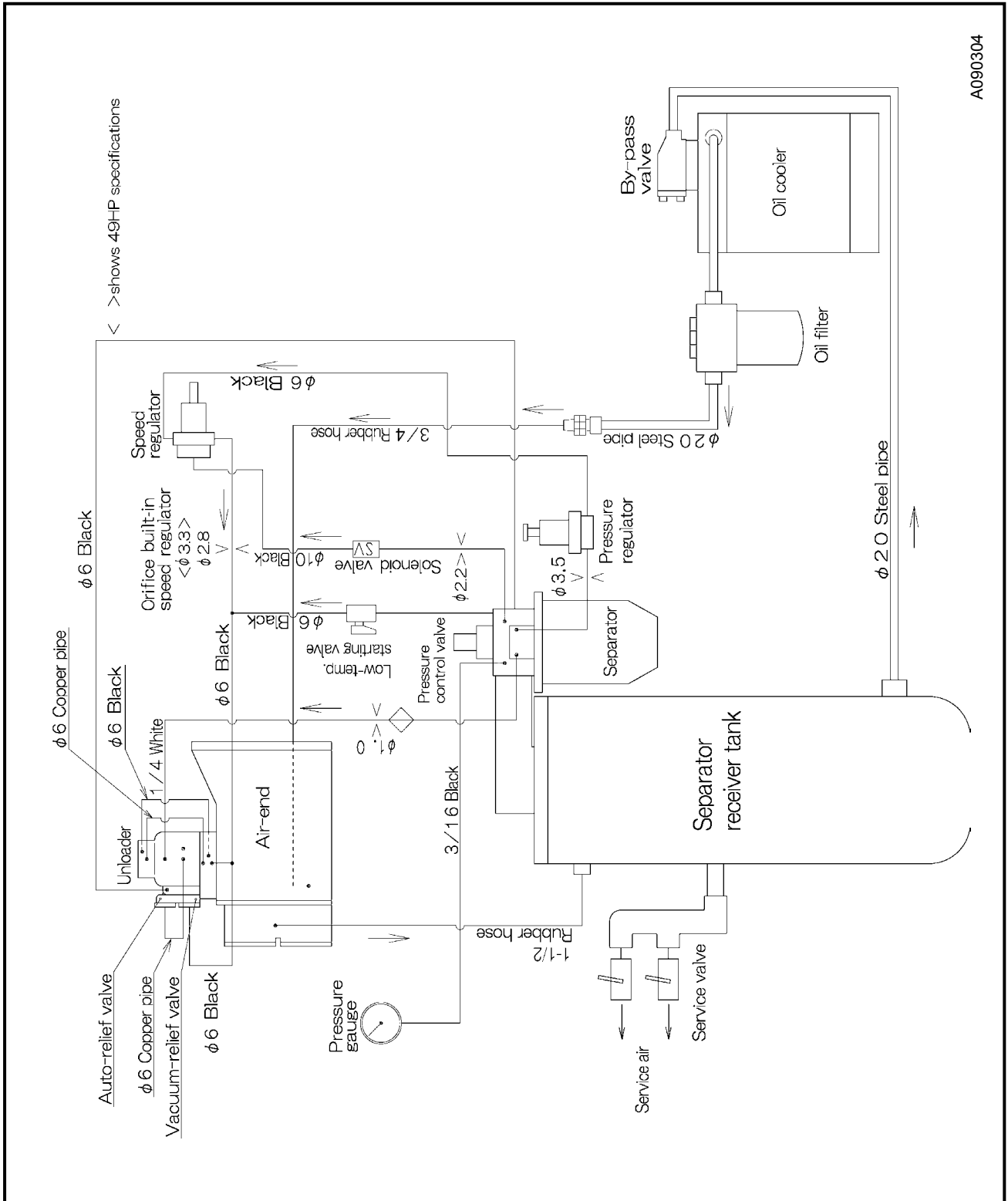
9. Wiring Diagram



The wire size without directions is 0.5mm²

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10.Piping Diagram



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HOKUETSU INDUSTRIES CO., LTD.

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

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