

AIRMAN

PC

INSTRUCTION MANUAL

ENGINE COMPRESSOR


PDS100S-6E1
PDS100SC-6E1

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


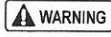
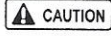

HOKUETSU INDUSTRIES CO., LTD.

Safety

This section explains safety cautions for safety work for operation, inspection, maintenance, installation, movement and transportation. Read these safety requirements carefully and fully understand the contents before starting the machine.


For your better understanding of the precautions in this manual and on this machine, safety precautions are classified into "DANGER", "WARNING" and "CAUTION" message with a warning symbol  marked, according to the degree of hazards.

When one of these messages is found, please take preventive measures for safety to carry out "SAFETY OPERATION AND PROPER MAINTENANCE OF THE MACHINE".

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

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

PROPOSITION 65 WARNING

 **WARNING**

Breathing engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an enclosed area, vent the exhaust system.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary

For more information, go to www.P65warnings.ca.gov/diesel

S-1

Safety


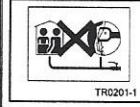


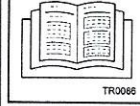



[Safety Warning Labels]

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.

 CAUTION PREVENT FIRE ACCIDENT Periodically check compressor oil and of separator receiver. Failure of this fire accident. 30176 68700	 WARNING BEWARE OF HIGH PRESSURE AIR BLOW OUT Oil supply and/or maintenance gas with residual pressure left in tank are very dangerous. So release the residual pressure first. 30176 68800	 CAUTION PREVENT BURNING ACCIDENT When work is required near hot parts, wait for the parts to cool down fully before starting work. 30176 68900	 WARNING BEWARE OF ENTANGLEMENT Keep your hands AWAY from moving parts such as wheels, pulleys etc. Entanglement in them can cause serious injury. 30176 73800	 WARNING BEWARE OF ENTANGLEMENT Keep your hands AWAY from fan during operation. Entanglement in the fan can cause serious injury. 30176 73900
 LIFTING BAIL 30116 88300	 DANGER EXPLOSIVE GASES This machine is designed to operate with compressed air. NEVER CONNECT TO ANY OTHER GASES. POISON causes serious injury. NEVER CONNECT TO ANY OTHER GASES. KEEP OUT OF REACH OF CHILDREN. 30176 69000	 WARNING BEWARE OF HIGH PRESSURE AIR BLOW OUT Oil supply and/or maintenance gas with residual pressure left in tank are very dangerous. So release the residual pressure first. 30176 69000	 DIESEL FUEL EPA REGULATION ULTRA LOW SULFUR FUEL ONLY Diesel fuel must contain a minimum of 15 ppm sulfur. 30176 82000	
 WARNING BEWARE OF HIGH PRESSURE AIR BLOW OUT Oil supply and/or maintenance gas with residual pressure left in tank are very dangerous. So release the residual pressure first. 30176 69300	 WARNING BEWARE OF RESIDUAL PRESSURE Release residual pressure inside charge and hoses and hose connections. Disconnection with residual pressure will cause serious injury. 30176 72400	 DANGER DO NOT BREATHE COMPRESSED AIR Do not use the compressed air for breathing air because it could cause fatal accidents. Never breathe it. 30176 72600	 CAUTION FOR HIGH LEVEL, TO ELIMINATE POSSIBLE STRESS OF CONCRETE FRAME STRUCTURE. 30176 73000	







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Safety

	 TRO201-1	<ul style="list-style-type: none">• Compressed air by this machine contains poisonous materials. Absorption of the compressed air can cause serious injury. Never provide this compressed air for human respiration.• This machine is not designed to be used for working chambers pressurized by compressed air such as respiratory air provided to persons working inside wells and tunnels such as pneumatic engineering method and pneumatic caisson method. Should this machine stop operation due to trouble, it can cause death and serious injury to the working persons. Refrain from using the compressed air for such pneumatic engineering method or pneumatic caisson method.
	 A080001	
	 TRO066	<ul style="list-style-type: none">• Read each instruction plate which is displayed in the manual or on the machine carefully, understand its content and follow the indications thereof.• Do not modify the machine without prior approval. The safety may be compromised, functions may be deteriorated, or the machine life may be shortened.• Never use the machine for the purpose of compression of gases other than air, or as a vacuum pump. Otherwise, serious accidents may occur.
	 TRO062	<ul style="list-style-type: none">• Never blow compressed air directly at people. Scattered impurities, dust, or foreign objects in the compressed air may cause skin and eyes to be seriously injured.• As compressed air contains toxic gas etc., compressed air should not be used to be blown or sprayed against food etc.
	 TRO304	<ul style="list-style-type: none">• Keep hands off from the rotating portion or belts while running. It could cause serious injuries if hands should be caught in.
	 W011	<ul style="list-style-type: none">• When you refill the separator receiver tank with compressor oil, stop the engine, and make sure that the pressure gauge indicates 0 psi(0 bars) 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.

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Safety


WARNING  CAUTION 	 M003	<ul style="list-style-type: none"> When cleaning dust accumulated in such devices as the air-filter, by blowing compressed air, wear safety glasses, etc. to protect your eyes.
	 H990432	<ul style="list-style-type: none"> 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.
	 W004-1	<ul style="list-style-type: none"> 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.
	 A100285	<ul style="list-style-type: none"> 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.
	<ul style="list-style-type: none"> The engine of this machine and electrical parts many electronic devices have been installed. If you do this please go airborne welding work, remove the connector of the electronic control equipment. Can cause equipment to malfunction due to electronic control of excessive current is applied. 	

S-6

2. Installation

2.2 Towing the Machine

Caution for towing the machine

CAUTION 	<ul style="list-style-type: none"> Before towing the machine, check the following conditions and make sure that there is no problem to start towing it. Make sure that the end of the drawbar is so surely and firmly connected to the coupler of the towing vehicle that disconnection will not occur while the machine is being towed. Make sure that the end of the drawbar is so surely and firmly connected to the coupler of the towing vehicle that the disconnection may not occur while the machine is being towed. Be sure to keep your hand or finger away from any part of the coupling device when coupling or uncoupling a drawing device to a drawbar. Be sure to keep your hand or finger away from any part of the coupling device when coupling or uncoupling a drawing device to a drawbar. If you do not follow the above instructions, it could cause injury or property damage.
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2-2



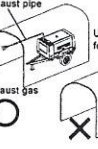

2. Installation

2.3 Installation conditions

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

- The machine has to be parked right-angled on a slope.
- The machine has to be parked on a slope within an angle of 15°
- The machine should be operated in following conditions:
 - Ambient temperature: 5° F to 104° (-15°C to +40°C)
 - Humidity: Less than 80%
 - Altitude: Lower than 4921ft above sea level


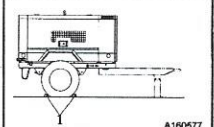
- ※If you use the machine not in the conditions stated above, it may cause serious breakdown.
- The machine has to be installed in the environment where fresh air is always available, temperature is low and ambient air is dry as much as possible.
 - If more than two machines are placed parallel in operation,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

WARNING 	 PC002	<ul style="list-style-type: none"> Exhaust gas from the engine is poisonous. It could cause death or serious injury if 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.
	 A160725	<ul style="list-style-type: none"> When installing the machine in a tunnel or the like, ensure a supply of fresh air and provide adequate ventilation. Be sure to place the exhaust pipe in an outdoor location, so that no exhaust gas will be leaked from any pipe seam.
	 A160726	<ul style="list-style-type: none"> Do not position the exhaust gas outlet in the direction of a house. Because the exhaust gas from the engine is poisonous, avoid positioning it in the direction of passers-by.


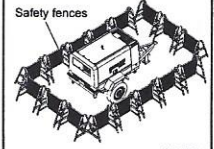
2-3

2. Installation

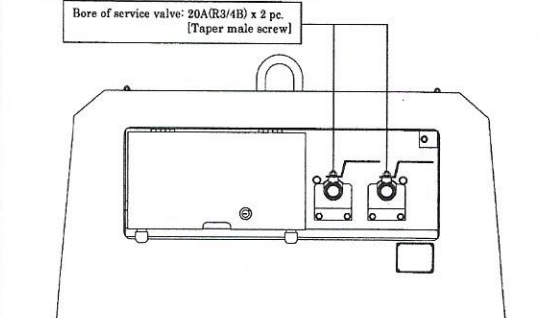
Installation notes

WARNING 	 A160577	<ul style="list-style-type: none"> Be sure to stop the wheels on both wheels "1" on the tire.
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Placing safety fence in position

CAUTION 	 A160727	<ul style="list-style-type: none"> Be sure to place the safety fence around the machine in order to prevent other people than those involved in construction work from entering the construction site or from accessing the machine
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2.3.1 Service valve



Bore of service valve: 20A(R3/4B) x 2 pc.
[Taper male screw]

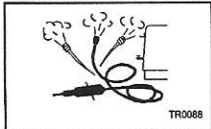
A170320

2-4

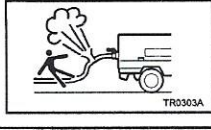
2. Installation

Cautions of hose attachment and removal

WARNING



- 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.

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

CAUTION



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

2-5

3. Operation

3.3 Check before starting unit

Be sure to check the unit before operation.

When any abnormality is found, be sure to repair it before restarting the unit.

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

3.3.1 Check engine oil level

Unit should be on level before checking oil level.

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>

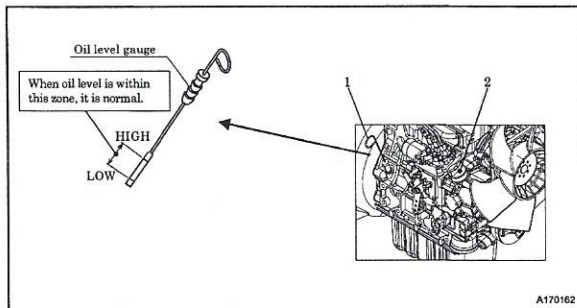
① Pull out the oil level gauge "1" and wipe it with a clean cloth.

② Then, re-insert the oil level gauge "1" fully and pull it out again. If the oil level gauge "1" shows the oil level between LOW and HIGH, it is normal.

③ When the oil level is below its LOW, add engine oil from oil filler port "2".

● While checking oil level, check also for contamination. If the oil is found dirty, contaminated or should it be changed according to the periodic inspection list, change the oil. (See 5.4.1)

● To cause of the engine output reduction when oil level is too high, do not put oil in more than the upper limit.



A170162

3-4

3. Operation

3.1 Instrument Panel

Each display of the operation panel is illustrated as follows.

Read and fully understand the explanations and be sure to operate safely:

Error code switch

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

A160556

ECO/ECO AUTO Switch

The switch is used for minimizing fuel consumption at no-load operation. (It functions when the lamp goes on.)

Digital monitor

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

0100 → 3200 → 210 → 190

[DISCHARGE PRESS.] (100FSD)

MONITOR CHANGE Push

[[ENG. SPEED]] (3,200min⁻¹)

MONITOR CHANGE Push

[DISCHARGE TEMP.] (210°F)

MONITOR CHANGE Push

[WATER TEMP.] (190°F)

MONITOR CHANGE Push

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

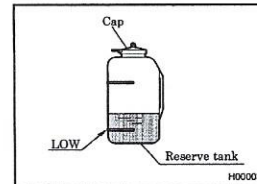
MONITOR CHANGE Push

[[HOUR METER]] (80Hr)

3-1

3. Operation

3.3.2 Check coolant level



- Check the coolant level in the reserve tank. If it is lower than the limit, open the cap and replenish the coolant. (Level must be kept above LOW mark.)
- Check the coolant level in the reserve tank. If it is lower than the limit or empty, open the cap and check the coolant, then replenish the coolant to radiator and reserve tank. (See 5.4.18)

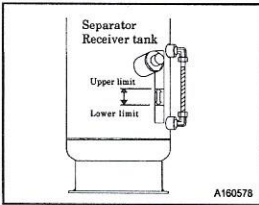
IMPORTANT

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

3-5

3.Operation

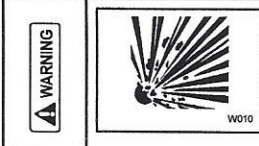
3.3.3 Check compressor oil level



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

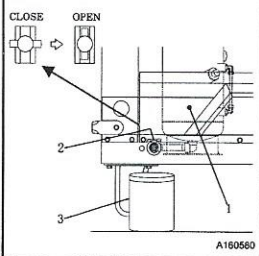
(See 5.4.6)

※ Supply of excessive oil can cause deterioration of oil separation performance and the like. Never supply oil at a higher level than the "proper level" of oil level gauge when the machine is on standstill.

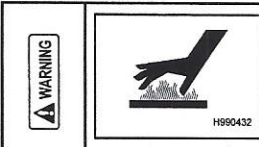


- Before adding oil into the separator receiver tank, always stop the engine and make sure that the discharge pressure is 0 psi (0 bars). Then, gradually loosen and remove the filler cap.
- Should any residual pressure be left in the separator receiver tank, hot compressed air and hot compressor oil jetting out could cause burning or serious injury to persons nearby.

3.3.4 Drain separator receiver tank



- 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.
- Touch the fluid and check its viscosity to determine whether it is condensate or compressor oil, and when it is difficult to distinguish between the two.



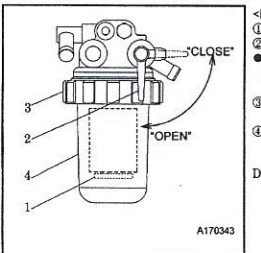
- After stopping the engine, confirm that the pressure gauge indicates 0psi(0bar) and there is no residual pressure in it, then open the drain valve gradually to drain the compressor oil.
- Note residual pressure in the receiver tank could force both extremely hot compressed air and oil to jet out and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

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3.Operation

3.3.7 Check for condensate of sedimenter

When the red float "1" of fuel filter is lowered at the bottom, drain condensate from it.



<Procedure>

- ① Place the lever "2" of sedimenter to "CLOSE" position.
 - ② Loosen the ring nut "3" and remove the cup "4".
 - In this case, carefully remove the cup because it is filled with diesel oil, so that it may not be spilled to soil the interiors.
 - ③ After draining the condensate (water) accumulated in the cup, wash the cup in diesel oil. Then install it.
 - ④ After turning the lever to "OPEN" position and filling the cup with diesel oil, carry out the air bleeding operation. (See 3.4.6)
- Drain the condensate in container, and then dispose of condensate according to the designated regulations.

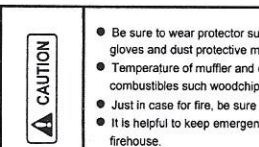
3.3.8 Check wiring of each part

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

3.3.9 Check piping of each part

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

3.3.10 Check in the machine



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

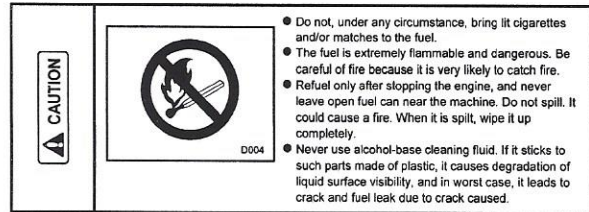
3-8

3.Operation

3.3.5 Check fuel

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

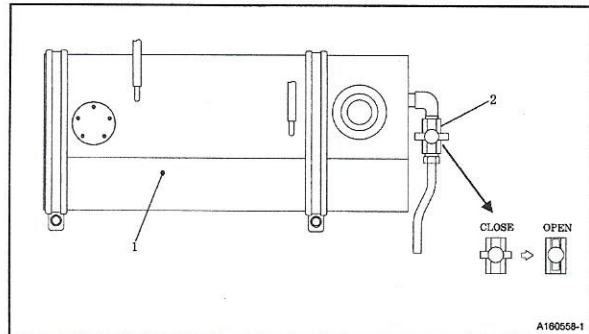
- Refilling fuel tank should be done in an outdoor well-ventilated place.
- Never let oil reach the filler pipe of the filler port. Otherwise, high temperature may cause fuel to expand and spill out. Also, fuel may spill out due to vibrations during movement or carriage.



- 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 spilled, wipe it up completely.
- Never use alcohol-base cleaning fluid. If it sticks to such parts made of plastic, it causes degradation of liquid surface visibility, and in worst case, it leads to crack and fuel leak due to crack caused.

3.3.6 Drain fuel tank

Gradually opening drain valve "2" under fuel tank "1" and discharge drain. After drain is discharged completely, make sure to close drain valve "2". Drain should be discharged to container and disposed according to regulations.

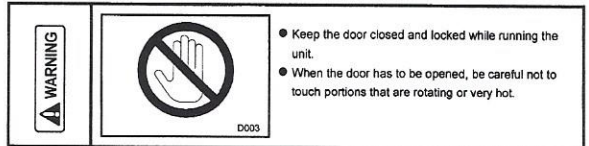


3-7

3.Operation

3.4 Operation

Pull the handle forward to open the door.
Be sure to close the door tightly so that its latch is firmly caught.



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

3.4.1 Procedure to start the unit

When warming up operation, be sure to check if there is no loosening in each part of machine or any leaks of water, oil, fuel and air. Also check putting out of the lamp "GLOW/TROUBLE".

<Procedure>

- ① Make sure that the pressure gauge indicates 0psi(0bar).
- ② Close fully service valve.
- ③ Turn the starter switch "2" to "RUN" position, and the glow lamp "2" goes on.
- ④ As soon as the glow lamp "2" has gone out, turn the starter switch "1" fully clockwise to start up the engine.

Limit the time of operating the starter switch to 30 seconds. (Operating said switch for more than 30 seconds activates the emergency engine stop.) Wait at least one minute for any subsequent starting operation. Otherwise, the starter motor may overheat and become damaged.

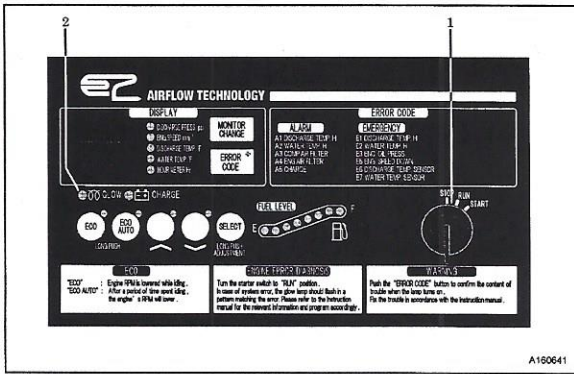
- See the table below for required time for starting unloader operation. It varies according to discharge air temperature.

Discharge air temperature	Required time for starting unloader operation
Lower than 50°F(10°C)	It exceeds 120 seconds or certain seconds until discharge air temperature becomes 140°F or more degrees which comes first.
Higher than 60°F(10°C)	30 seconds

- ⑤ Once the engine has started up, leave it running to warm-up for 5 minutes.
The discharge air pressure gauge "4" in this condition ranges from 44 to 102psi(3 to 7bar)
- ⑥ After finishing warming up operation, open the service valve provided at the outlet of compressed air and start service job.

3-10

3.Operation



IMPORTANT

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

3-11

3.Operation

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

When the engine fails to start even after performing the startup procedures ① to ④, do not keep the starter running, but set the starter switch back to the "STOP" position and wait approximately 60 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 items.

- No fuel
- Lack of air bleeding in fuel line (See 3.4.6)
- Clogging of fuel filter
- Discharge of battery (Low cranking speed)

CAUTION

- Do not operate the starter more than 30 or more seconds at one operation. (See 3.4.1)
- If you do starting manipulation successively, the starter will not stop fully and it causes damages to pinion ring gear and breakdown of the starter.

3.4.3 How to start the machine at low temperature

Use engine oil of a viscosity that meets the ambient temperature according to 3.2.1. Use LLC (antifreeze). Use correct amount to provide freeze protection, according to the ambient temperature.
Battery should always be kept fully charged.

<Procedure>

- ① Close fully service valve.
- ② Do normal starting manipulation and start the engine.

CAUTION

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

3-12

3.Operation

3.4.4 Gauge indication while operating

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.

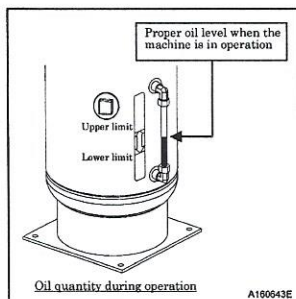
Protection device	Indicator lamp			
	GLOW/TROUBLE	CHARGE	ECO	ECO AUTO
Monitor			ECO	ECO AUTO
Before startup	● OFF ※1・※2	● ON	● OFF ※3	● OFF ※3
In operation	● OFF	● OFF ※3	● OFF ※3	● OFF ※3

※1-Turn OFF after 3 to 10 seconds (It varies by ambient temperature).

※2-GLOW lamp blinks when engine trouble.

※3-Push SELECT switch long to select ON/OFF (until operation mode is changed).

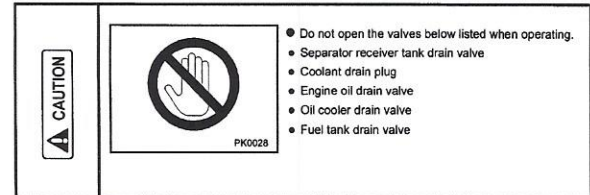
		Discharge pressure indication
In operation	No load (Unload)	58 to 100psi (4.0 to 6.9bar)
	Full load	112 to 131psi (7.7 to 9.0bar)



- When the machine is in operation under load, check to see that the compressor's oil level falls within the range between the lower limit and upper limit of the level gauge if the level is found to be insufficient, replenish the oil.
- ※ Keep the operation log to record constant inspection of each component, so that trouble of the machine can be easily discovered and preventive measures can be taken.

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3.Operation



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

IMPORTANT

- Minimum discharge air pressure is 58psi (4bar) during 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.

3.4.5 Stopping

<Procedure>

- ① Close the service valve completely and operate the machine about 5 minutes, until it cools down.
- ② Turn the starter switch to "STOP" position to stop the engine.
- ③ Remove the key from the compressor every time when you stop the engine. Keep the key and be careful not to lose it.
- Unless all the service valves are fully closed upon stopping operation, the compressed air will be sent in reverse direction in the hoses (pipes) connected to air tools and relieved to atmosphere continuously through the auto-relief valve. Further, when re-starting operation next time, compressed air will be jetted out through air valves.

3.4.6 Air bleeding in fuel line

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

<Procedure>

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

3-14

3.Operation

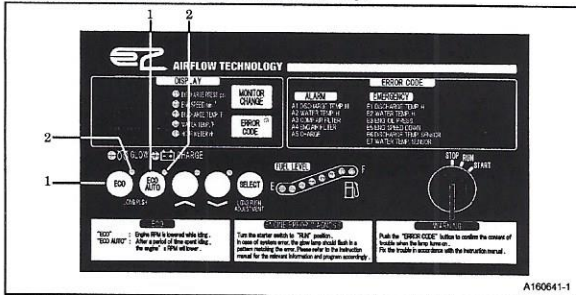
3.5.1 ECO/ECO AUTO mode

This machine features ECO/ECO AUTO modes. These modes are suitable if you want to minimize fuel consumption during continuous no-load operation with less air consumption. Referring to the table below, choose a mode according to your usage. Select the operation mode via the ECO or ECO AUTO switch on the operation panel.

Each mode is available according to the consumption of compressed air.

<Procedure>

- ① Push ECO and ECO AUTO switch "1" long when operation.
- ② The indicator of ECO or ECO AUTO "2" turns on, with each mode selected.
- ③ Push the ECO or ECO AUTO switch "1" for an extended time to release the mode. (If you don't release it, the selected mode remains active at next start-up.)



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Each mode function

Mode selection	ECO/ECO AUTO lamp status
<ul style="list-style-type: none"> ● Normal mode Unload revolving speed will be 1,800min⁻¹. Suitable for usage that requires responsiveness like chippings. 	ECO/ECO AUTO lamp OFF. It shows the switch is not pushed.
<ul style="list-style-type: none"> ● ECO mode Unload revolving speed will be 1,400min⁻¹. You can lower fuel consumption and noises. 	ECO lamp ON. It shows ECO switch is pushed.
<ul style="list-style-type: none"> ● ECO AUTO mode If unload revolving speed is kept 1,800min⁻¹ for a certain time, you have good responsiveness and smooth working. Then you stop working, it will be 1,800 to 1,400min⁻¹ and you can lower fuel consumption and noises. 	ECO AUTO lamp ON. It shows ECO AUTO switch is pushed.

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4 Failure cause and measures

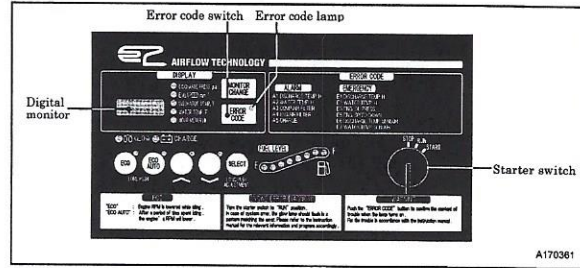
4.1 Indicator lamp and Warning / Emergency display

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

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

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

Item	Failure code	Contents	Measures
DISCHARGE TEMP.H	A-1	Lamp flickers when the air temperature at the outlet of the air-end reaches 239°F(115°C).	See 4.2 "Troubleshooting"
WATER TEMP.H	A-2	Lamp flickers when coolant temperature reaches 221°F(105°C).	
COMP. AIR FILTER	A-3	Lamp flickers when air filter gets clogged and suction resistance increases.	Clean or Replace
ENG. AIR FILTER	A-4	[Actuating resistance is more than 6.2kPa.]	
CHARGE	A-5	Belt loosened and/or cut Faulty generation of alternator	See 4.2 "Troubleshooting"



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4 Failure cause and measures

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

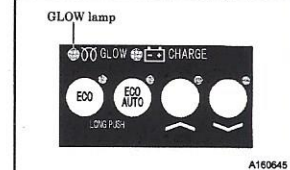
Item	Failure code	Contents	Measures
DISCHARGE AIR TEMP. E	E-1	When the air temperature at the outlet of the air-end reaches 248°F (120°C), lamp comes on.	See 4.2 "Troubleshooting"
WATER TEMP. E	E-2	When coolant temperature reaches 230°F (110°C), lamp comes on.	
ENGINE OIL PRESS	E-3	The lamp comes on when engine oil pressure drops. [The function pressure: 98.1kPa.]	
ENG. SPEED DOWN	E-5	The lamp comes on when engine revolution speed is slow down. [Operation speed: less than 950min ⁻¹]	
DISCHARGE AIR TEMP. SENSOR DISCONNECTION	E-6	The lamp comes on when the air temperature sensor at the outlet port of compressor air end is disconnected.	
COOLANT TEMP. SENSOR DISCONNECTION	E-7	The lamp comes on when the engine coolant temperature sensor is disconnected.	

4-2

4 Failure cause and measures

4.1.1 Engine emergency stop

- When the machine detects any trouble listed on below table, its engine will stop and GLOW lamp will flick. You can find which trouble occurs by its flickering pattern.



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Trouble	Detective way and contents	Flickering pattern	Note
Engine over-rotation	Number of revolution exceeds 115% (3,876min ⁻¹) which is maximum number of revolution in operation range.	L1 and S1	Engine stops immediately
Drop of engine oil pressure	After engine starts, oil pressure switch turns "ON" for 1 or more seconds.	L1 and S2	Engine stops after 10 or more seconds later than started.
Battery charging faulty	After engine starts, alternator "L" terminal keeps no voltage status (0V) for more than 1 or more seconds.	L1 and S3	Engine stops after 10 or more seconds later than started.
Water temperature emergency	Coolant temperature exceeds 239°F (115°C) for 1 or more seconds.	L1 and S6	Engine stops after 10 or more seconds later than started.
Emergency stop	The No.35 pin of the Controller (ECU) turns on for 0.1 seconds or longer (+B connection).	L1 and S5	Engine stops immediately
Malfunction of RPM sensor	Even though the alternator L terminal supplies voltage after the engine starts, the RPM is indicated as "0 min ⁻¹ ".	L2 and S1	Engine stops after 10 or more seconds later than started.
Trouble of solenoid	Detect by solenoid driver IC or current value.	L2 and S2	Engine stops immediately
Trouble of coolant temperature sensor	Disconnection detected (becoming -104°F (-40°C) or lower) Short circuit detected (becoming 284°F [140°C] or higher)	L2 and S4 L2 and S5	Engine stops after 10 or more seconds later than started.
Trouble of alternator L terminal	After key is "ON" (engine does not start), alternator "L" terminal has voltage although number of revolution is 0min ⁻¹ .	L2 and S6	Engine stops after 10 or more seconds later than started. (It can start even on error)
Excessive voltage	Power source voltage exceeds 18V or more.	L3 and S1	Engine stops immediately
Trouble of power source for sensor	Detect short circuit at power source (analog 5V drops to 4 or less V)	L2 and S7	Engine stops after 10 or more seconds later than started.
Protection of starter	Starter keeps "ON" for 30 or more seconds.	L1 and S7	Engine stops immediately
Detection of engine stoppage	After engine starts, number of revolution is 0 and no oil pressure.	L3 and S2	Engine stops immediately
Trouble of accelerator sensor	Detect open circuit (0.244 or less V) Detect short circuit (4.432 or more V)	L3 and S3	Engine stops after 10 or more seconds later than started.

*When engine is brought to emergency stop, some of the above flashing patterns is indicated. L and S mean Long time and short time alternatively. Also the numbers of each L and S mean repeated time of flickering lamp.

4-3

4 Failure cause and measures

4.2 Troubleshooting

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

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

Symptom	Cause	Countermeasures
Low starter revolution speed.	(1)Faulty battery. (2)Failure of battery charging (3)Failure of alternator (4)Failure of starter	Check battery → Charge Change
Starter rotates normally but engine does not start up.	(1)No fuel (2)Air entry into fuel line system (3)Fuel filter clogging. (4)Clogging of sedimenter (5)Nozzle clogging	Fuel replenishment Bleed the air Disassemble, clean, and change Disassemble, clean, and change Disassemble/Clean
The discharge air pressure will not rise 100psi (6.9bar).	(1)Pressure regulator insufficient adjustment. (2)Trouble of solenoid valve for starting unloader	Re-adjust (Fasten) Change
The engine does not reach the rated revolution speed.	(1)Faulty engine controller (2)Engine trouble. (3)Fuel filter clogging (4)Sedimenter clogging (5)Water is accumulated in sedimenter (6)Air filter element clogging.	Call your nearest dealer Call your nearest dealer Disassemble/Change Disassemble/Change Drain water Clean or change of element
If the discharge pressure will not increase to the specified one, RPM will drop.	(1)Pressure regulator insufficient adjustment. (2)Trouble of pressure regulator	Re-adjust (Fasten) Change
Engine does not reach minimum revolution at unload.	(1)Faulty engine controller (2)Trouble of emergency controller	Call your nearest dealer Call your nearest dealer
Safety valve relieves at unload.	(1)Pressure regulator insufficient adjustment. (2)Unloader valve damaged/Faulty seat (3)Faulty safety valve (4)Faulty engine speed sensor (5)Faulty of pressure switch	Re-adjust (loosen) Call your nearest dealer Change Call your nearest dealer Change
Oil mixes in air. (poor oil separation)	(1)Scavenging orifice strainer clogging (2)Excessive oil in separator receiver tank (3)Low discharge pressure (4)Oil separator element deteriorated	Disassemble/Clean Drain to its proper level Unloader disassembly/inspection Check/Change

4 Failure cause and measures

Symptom	Cause	Countermeasures
Water found mixed in air. (Condensate separation malfunctioned.) For after-cooler type only	(1)Drain valve under drain separator is closed (2)Clogging of silencer at after cooler drain outlet (3)Orifice garbage clogging	Open valve Disassemble/Clean/Change Disassemble/Clean
Insufficient free air delivery.	(1)Air filter element clogging (2)Unloader valve cannot fully open (3)Engine does not reach rated speed	Clean or change of element Call your nearest dealer (See 4-4 pages)
It is indicated that engine oil pressure is abnormal, and engine stops.	(1)Engine oil shortage (2)Engine oil filter clogging (3)Loose wiring, connectors and disconnection. (4)Faulty oil pressure switch	Replenish oil Change Check/Fasten Change
It is indicated that coolant temperature is abnormal, and engine stops.	(1)Low coolant level. (2)Belt slippage. (3)Radiator clogging. (4)Faulty thermostat. (5)Loose wiring, connectors and disconnection. (6)Faulty coolant temp. sensor (7)Coolant temp. sensor is disconnected.	Replenish Re-adjust tension Clean Change Check/retighten Change Repair and replace
It is indicated that discharge air temperature is abnormal, and engine stops.	(1)Shortage of compressor oil. (2)Slippage of belt. (3)Oil cooler clogging. (4)Oil filter clogging. (5)Loose wiring connectors and disconnection. (6)Faulty discharged air temp. sensor. (7)Discharge air temp. sensor is disconnected.	Replenish oil Re-adjust tension Clean Change Check/Fasten Disassemble/Check Repair and replace
Engine failure lamp glows.	(1)Engine in trouble	※1

※1: Contact our dealer nearby to make countermeasure according to the cause which is specified by glow lamp flickering pattern.

- Contact our office nearby or distributor if you find it difficult to repair by yourselves.
- Refer to the engine operation manual for trouble concerning the engine.