Manual de operación

SAS15RD6E

Alpha C
Un lazo para toda la vida.

AIRMAN®

Preface / Table of Contents

This manual explains and illustrates proper handling of the machine, method of daily inspection and maintenance to enhance the performance of AIRMAN's compressors.

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

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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".

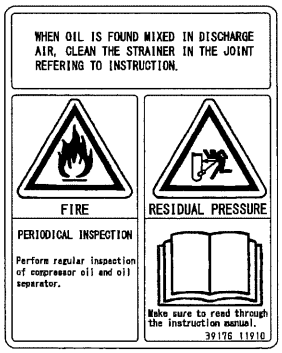
⚠ DANGER	DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	CAUTION indicates a potentially hazardous 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.

[Safety Warning Labels]

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

1



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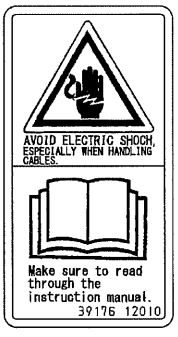

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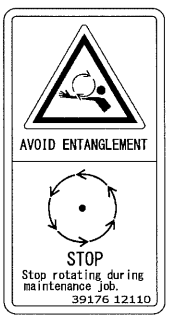

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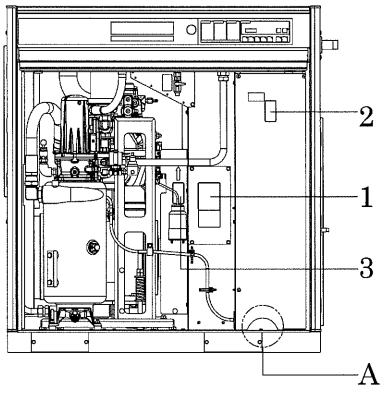
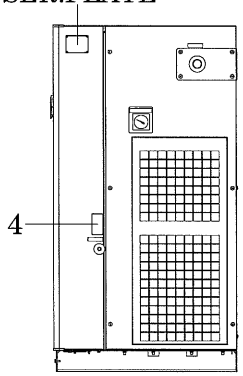
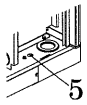
39176 30700



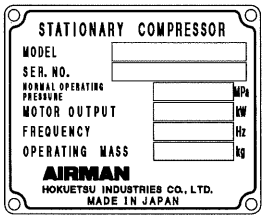
SER.PLATE





Details: A section

A170237



For reference to the machine, please provide us with the MODEL/machine serial number (SER. NO.) mentioned on the SER. PLATE.

DANGER

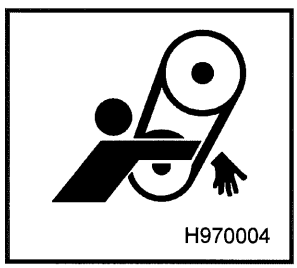
PC005

- 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.

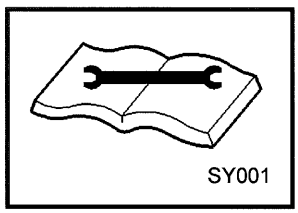
WARNING

TR0092

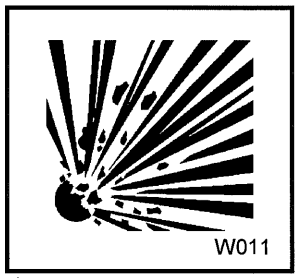
- Never blow compressed air directly at people. Scattered impurities, dust, or foreign objects in the compressed air may cause skin and eyes to be seriously injured.
- As compressed air contains toxic gas etc., compressed air should not be used to be blown or sprayed against food etc.


H970004

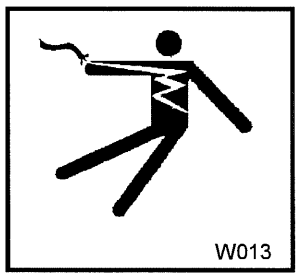
- Never operate the machine uncovered without cover. Never bring your hand(s) or anything inside because revolving parts such as fan belts etc. are hazardous. It could cause serious injuries if hands should be caught in.


SY001

- Turn the power supply "OFF" before starting inspection, and hang a "Now Checking and Maintenance" tag where it can be easily seen. The checker must keep the key during checking and maintenance.


W011

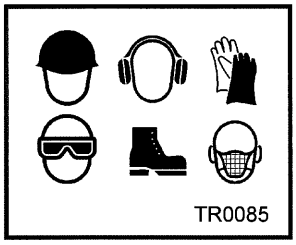
- Before starting inspection make sure to check and confirm that there is no residual pressure by opening service valves. In case there is residual pressure in the receiver tank, both extremely hot compressed air and oil could jet out and you may be scalded or seriously injured.


W013

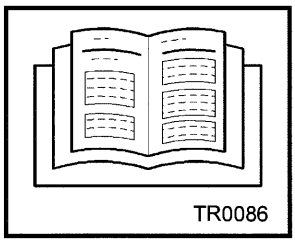
- Be sure to keep a wet hand away from the power source or any other electric equipment. Electric shock can cause serious accident or even death.

⚠ WARNING

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

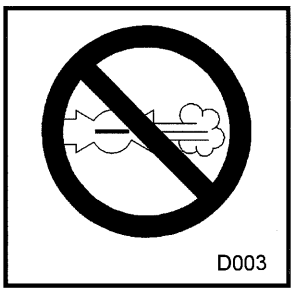


- Wear helmet, safety glasses, earplugs, safety shoes, safety gloves and a dust mask, according to the requirements of each operation.

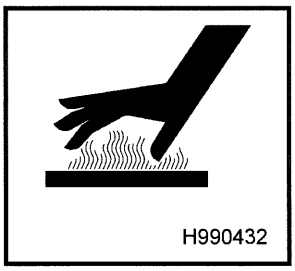


- Never use the machine for the purpose of compression of gases other than air, or as a vacuum pump.
- Do not modify the machine without prior approval. The safety may be compromised, functions may be deteriorated, or machine life may be shortened. Otherwise, serious accidents may occur.

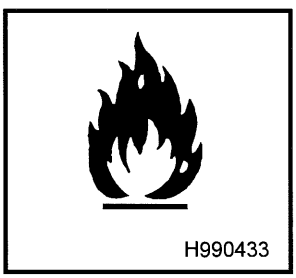
⚠ CAUTION



- 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.



- Do not touch hot portions of the machine while inspecting the machine when running. Especially pipes and discharge pipe are very hot. If you touch them, you can be scalded. So take enough care.



- It is absolutely necessary to regularly check or inspect electrical accessories of motor, compressor oil, oil separator and oil filter without fail. Neglecting checks could cause overheat of the oil, resulting in a fire.
- For preparation for breakout of fire, a fire extinguisher should be always located close to the machine.

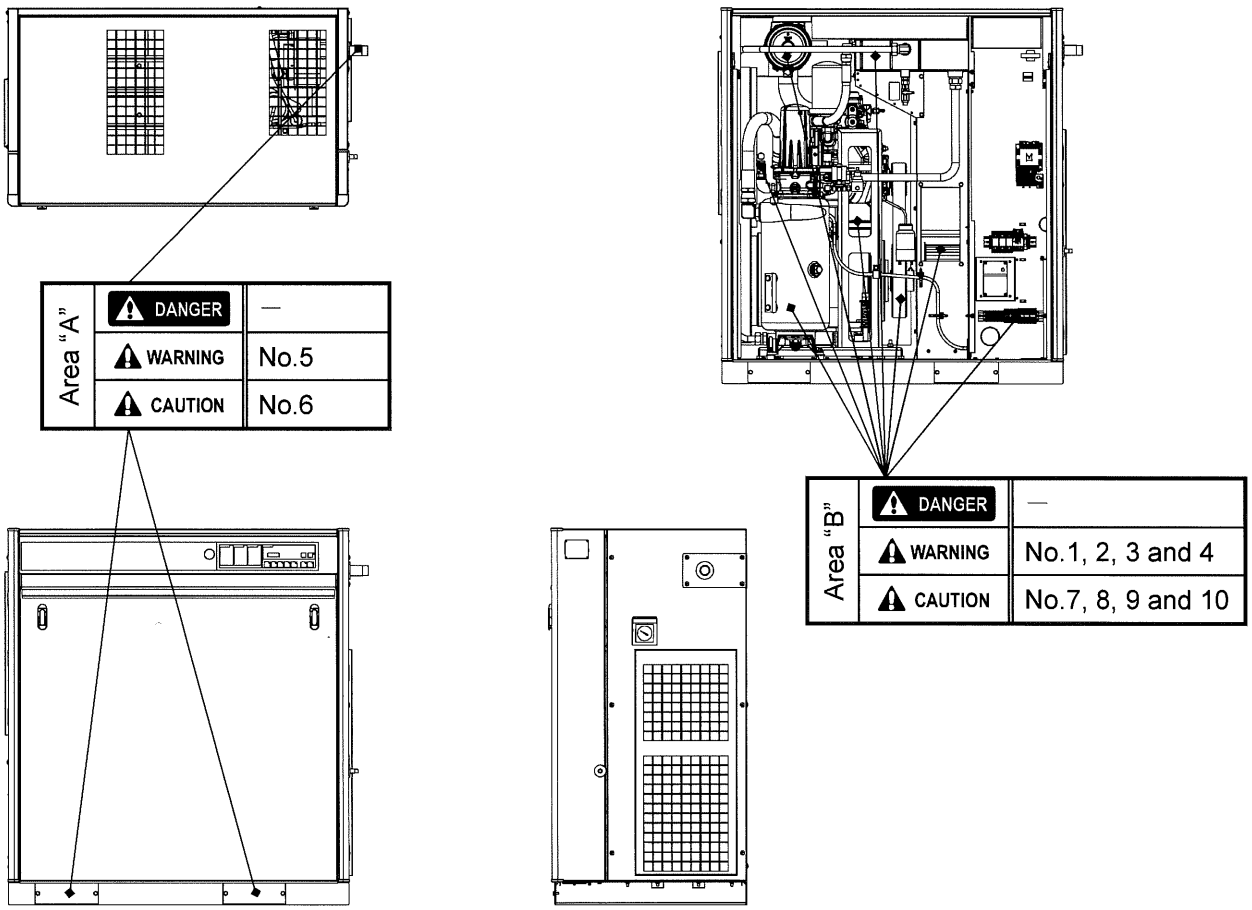
[Residue risk map for which a user must take some protective measures (Abbreviation: residue risk map)]

What is the residue risk: It refers to the risk that neither removal nor decrease of any residues can be achieved in protective measures taken during manufacturing processes of products.

Be sure to read this manual carefully and fully understand the contents before using the machine.
Do not use the machine only after grasping the contents as described below.
The residue risk is classified and described according to the following definitions:

DANGER	Indicates a highly potentially hazardous situation which, if no protective measures are taken, could result in death or cause serious injury to a user.
WARNING	Indicates a potentially hazardous situation which, if no protective measures are taken, could result in death or cause serious injury to a user.
CAUTION	Indicates a potentially hazardous situation which, if no protective measures are taken, may possibly only cause a minor injury to a user.

Each of the numbers shown in the figure is the number related to relevant areas that are described in the "residue risk list" of the machine. For details of individual residue risks, please refer to the "residue risk list".



Area "A"	
DANGER	—
WARNING	No.5
CAUTION	No.6

Area "B"	
DANGER	—
WARNING	No.1, 2, 3 and 4
CAUTION	No.7, 8, 9 and 10

Residue risk in which no area of the machine is specified	
DANGER	—
WARNING	—
CAUTION	No.11

[Residue risk list for which a user must take some protective measures (Abbreviation: residue risk list)]

What is the residue risk: It refers to the risk that neither removal nor decrease of any residues can be achieved in protective measures taken during manufacturing processes of products.

Be sure to read this manual carefully and fully understand the contents before using the machine.
Do not use the machine only after grasping the contents as described below.
※1 The "harm level" is classified and described according to the following definitions:

⚠ DANGER	Indicates a highly potentially hazardous situation which, if no protective measures are taken, could result in death or cause serious injury to a user.
⚠ WARNING	Indicates a potentially hazardous situation which, if no protective measures are taken, could result in death or cause serious injury to a user.
⚠ CAUTION	Indicates a potentially hazardous situation which, if no protective measures are taken, may possibly only cause a minor injury to a user.

※2 Each of the symbols which are shown as "area on the machine" represent the symbols for each area on the machine which are described in the "residue risk map" of machine.
For details of specific areas on the machine, please refer to the "residue risk map".

No.	Operation phase	Work operation	Required qualification and education for work operation	Areas on the machine ※2	Degree of risk ※1	Content of risk	Protective measures to be taken by user
1	Preparation Operation Maintenance	At the time of installation. At the time of operation. When performing maintenance.	—	B	⚠ WARNING	You may get an electric shock.	Turn the power off when carrying out electric wiring or touching any electric components. During operation, do not remove other components than the front cover of machine. Avoid operating the machine with its protective cover or safety equipment being removed. Prior to work operation, be sure to stop operating the machine and turn off the power.
2	Operation Maintenance	At the time of operation. When performing maintenance.	—	B	⚠ WARNING	You will be injured when your hand or any tool is moved closer to the fan.	During operation, do not remove other components than the front cover of machine. Avoid operating the machine with its protective cover or safety equipment being removed.
3	Operation Maintenance	At the time of operation. When performing maintenance.	—	B	⚠ WARNING	You will be injured when your hand and any tool or the like is moved closer to the belt pulley.	During operation, do not remove other components than the front cover of machine. Avoid operating the machine with its protective cover or safety equipment being removed.

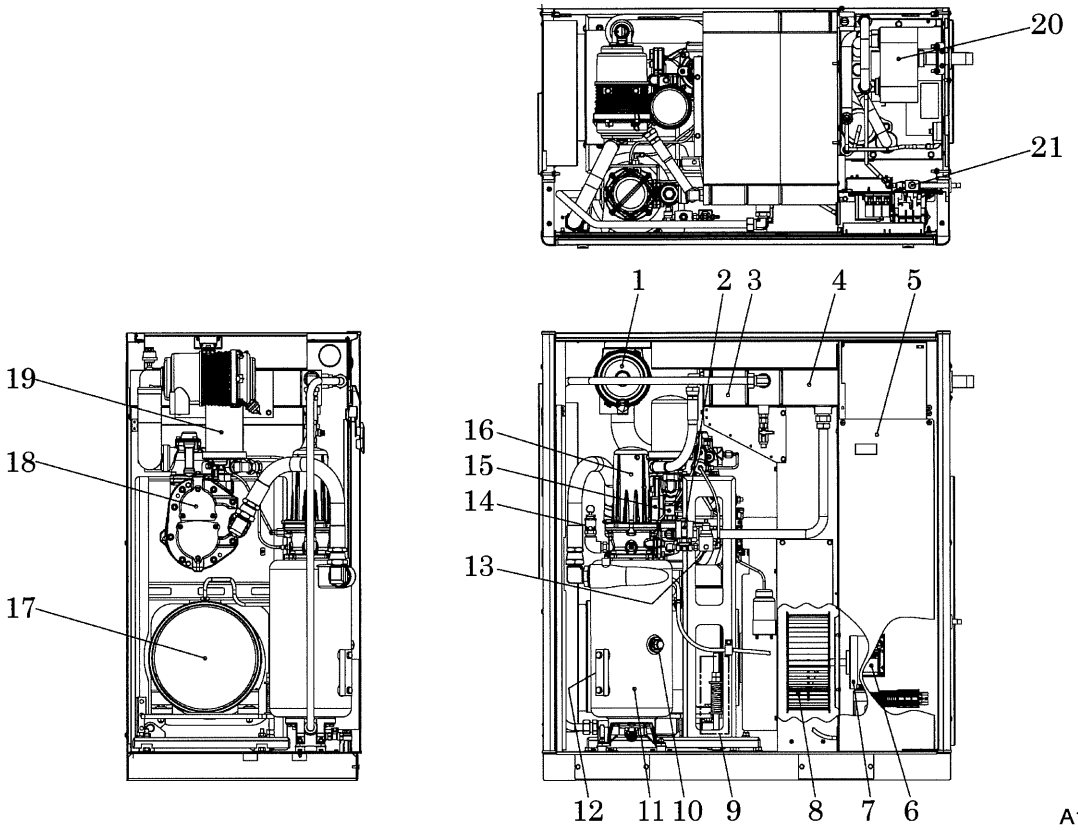
No.	Operation phase	Work operation	Required qualification and education for work operation	Areas on the machine ※2	Degree of risk ※1	Content of risk	Protective measures to be taken by user
4	Operation Maintenance	At the time of operation. When performing maintenance.	—	B	⚠ WARNING	You may be injured because the compressed air could be blown off or any materials could be shattered into fragments.	During operation, do not remove other components than the front cover of machine. Avoid operating the machine with its protective cover or safety equipment being removed. Do not change the settings of any safety equipment without permission. Prior to work operation, close any stop valve that has been installed on or after the outlet port of this machine, and remove any residual pressure from it. Start work operation after no pressure remains inside the machine.
5	Operation	At the time of operation.	—	A	⚠ WARNING	You may be injured when inhaling the compressed air.	Do not use the machine for equipment of respiratory system that takes in the compressed air directly.
6	Preparation	At the time of installation.	Slinging work Crane Forklift	A	⚠ CAUTION	If fingers or body are caught in their moving components or stuck under them, you may get injured.	When moving the machine, take care not to drop it. Be sure to use a wire that is suitable for applicable load.
7	Operation Maintenance	At the time of operation. When performing maintenance.	—	B	⚠ CAUTION	If you bring your ear close to it, hearing loss may be caused.	During operation, do not remove components other than the front cover of machine. Avoid operating the machine with its protective cover or safety equipment being removed. As required, wear earplugs.
8	Operation Maintenance	At the time of operation. When performing maintenance.	—	B	⚠ CAUTION	You may get injured when your hand or clothes is drawn into the machine.	During operation, do not remove components other than the front cover of machine. Avoid operating the machine with its protective cover or safety equipment being removed.
9	Operation Maintenance	At the time of operation. When performing maintenance.	—	B	⚠ CAUTION	You may get burned upon contact with hot portions.	During operation, do not remove components other than the front cover of machine. Avoid operating the machine with its protective cover or safety equipment being removed.

No.	Operation phase	Work operation	Required qualification and education for work operation	Areas on the machine ※2	Degree of risk ※1	Content of risk	Protective measures to be taken by user
10	Maintenance	When performing maintenance.	—	B	⚠ CAUTION	You may get injured upon contact with any fin of oil cooler dryer of air cooling equipment.	Do not touch the oil cooler or dryer with your bare hands when cleaning the oil cooler and dryer.
11	Maintenance	When performing maintenance.	—	No area is specified in particular.	⚠ CAUTION	Tipping over, due to scattered compressor oil.	Wipe off any scattered compressor oil onto a floor surface.

MEMO

1. Part Names

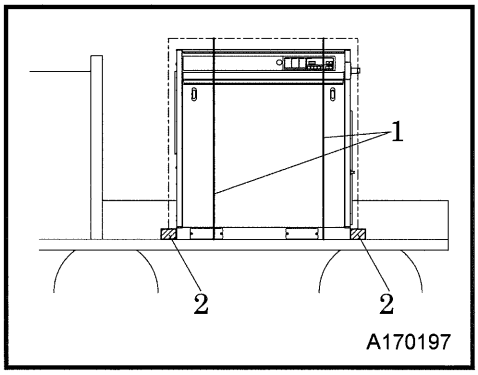
1.1 Internal Components



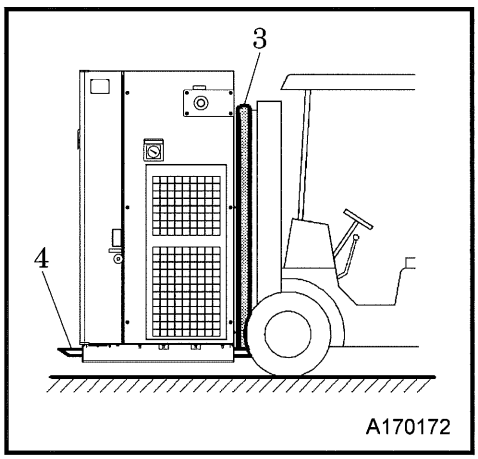
No.	Description	Function
1	Air filter	For filtering the dust floating in the intake air.
2	Solenoid valve for purge control	For releasing compressed air in the separator receiver tank during purge control operation.
3	Oil cooler	For cooling compressor oil circulating in the system.
4	After cooler	For cooling compressed air.
5	Starter panel	For starting operation of the machine.
6	Inverter for fan	For regulating the revolution speed of the motor for the cooling fan.
7	Fan motor	For driving the sirocco fan.
8	Sirocco fan	For cooling compressor room.
9	Automatic belt tensioner	For keeping belt tension and controlling belt serpentine movement.
10	Compressor oil filler port	For supplying and replenishing compressor oil.
11	Separator receiver tank	For collecting oil mist mixed in compressed air and in compressing air and collecting it in the tank.
12	Oil level gauge	For showing the oil level inside receiver tank.
13	Regulator	For adjusting the service air pressure.
14	Safety valve	For releasing compressed air to the atmosphere when the pressure rises higher than the rated pressure.
15	Pressure control valve	For keeping the receiver tank pressure higher than 0.39MPa in the tank at the load operation.
16	Oil separator	For separating oil mist mixed in compressed air.
17	Main motor	Driving compressor air end.
18	Air-end	For compressing intake air.
19	Oil filter	For filtering compressor oil.
20	Dryer	For removal of moisture mixed in compressed air.
21	Solenoid valve for draining condensate in dryer	For periodically draining condensed water by dryer.

2. Installation

2.1 Transportation

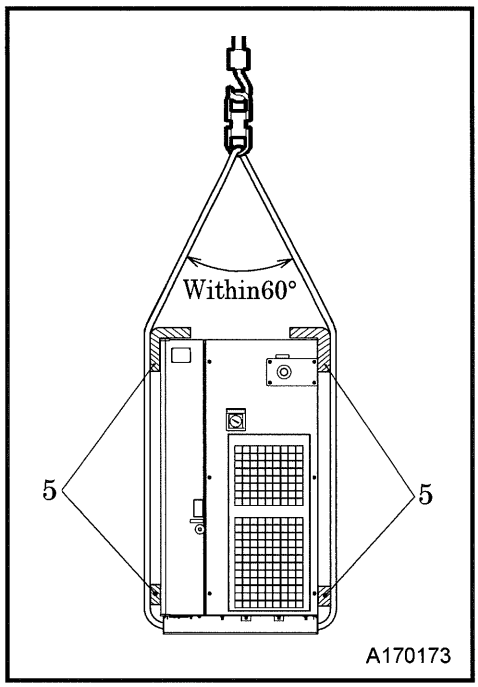


- When moving the machine, be sure to use a forklift or a crane.
- Select an appropriate crane or truck by referring to the mass and dimensions mentioned in "Specification". (See 7)
- When transporting the machine on a truck, securely fix it with ropes "1".
  Be sure to apply chocks "2" on the truck bed.
- When the machine is displaced or transported from its location, securely fix it with ropes.



[Movement with a forklift]

- Protect the package from damage with cushion material "3".
- Make sure to check and confirm that the forks "4" are extruding from bottom as shown in the left figure.



[Lifting with a crane, etc.]

- When lifting the machine with a crane for transportation, lift it with a nylon sling passed through forklift holes provided at the frame. Also, protect the package from being damaged by packing cushion material "5" at these nylon sling touching parts.
- After confirming there is no person near the working area, lift the machine by crane.

[Unloading]

- Unload the machine on an level and flat ground strong enough to sustain weight of the machine

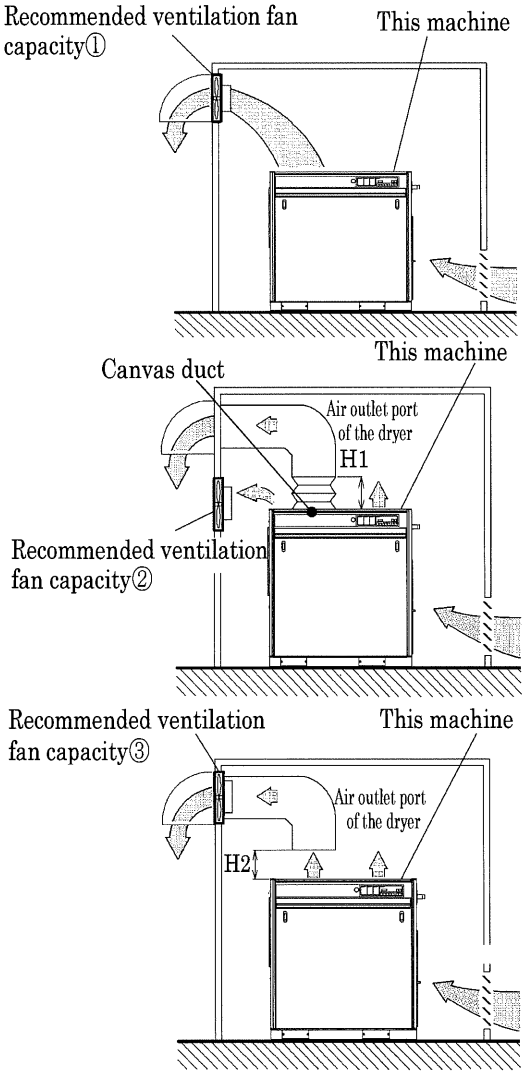
2. Installation

2.2 Location and Installation

- The machine has to be installed horizontally on a level place indoors.
  If there is any gap between the machine and the ground, it may cause a vibration or noise.
- The machine should be operated in following conditions:
- **Ambient temperature··2 to 40℃ (Dryer built-in type) / 0 to 40℃ (Without dryer type)**
  ※ The machine can be operated in ambient temperature up to 50℃. But consumable goods and/or parts such as compressor lubrication oil could become much more deteriorated earlier than in case of normal operation.
- **Humidity·····Less than 80%**
- **Altitude·····Lower than 1,000m above sea level**
- The machine should be installed in a place as dry as possible indoors. Installing the machine in a damp place, a place where puddles are apt to form after rain, or a place with much vapor could result in electric leakage or corrosion.
- Install the machine in a place with no metal powder, cement powder, sand and dust, or fluffy lint so that the compressor can always inhale clean air.
- Avoid installing in a place where the air contains noxious gases such as chlorine gas, hydrogen sulfide gas, sulfurous acid gas, and high density ozone. They can cause oil deterioration and parts corrosion, and it results in earlier trouble to the machine.

CAUTION	● This machine is provided with a square timber for transportation. In case it is installed, remove the timber from the bottom. If it is installed with timber, it may cause higher noise level.

2.2.1 Ventilation



1. General Ventilation
   When the machine is operated in such a confined space as a compressor room, the space must be so well ventilated that the ambient temperature may not rise higher than 40℃. Usually a ventilation fan is installed in it , but pay attention to the installation positions of air intake port and ventilation fan so that the air in the room may not be stagnant.

2. Local Ventilation together with duct
   Even when a duct is installed additionally, an indoor ventilation fan is required because heat is partially emitted in the room too. Further, use a canvas duct and the like because a metal duct riveted directly to the machine is an obstacle to inspection and maintenance. (HI shall be higher than 400mm.)

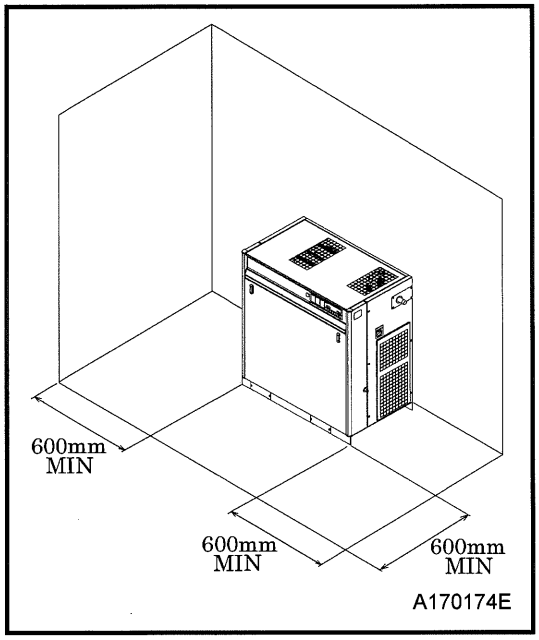
3. A ventilation fan to be installed in duct
   When pressure loss of exhaust duct exceeds 20Pa, install a ventilation fan inside the duct, considering the pressure loss. In this case, make sure to keep 300 to 400mm clearance between the inlet of exhaust duct and the exhaust port of the machine.
   - For a dryer built-in type model, do not install such a duct at the side of air outlet port of the dryer which serves also as a duct for the common use of compressor exhaust vent. It can cause malfunction to the dryer.

Ventilation fan air capacity (Unit:m³/min)

Type		Dryer built-in type	Without dryer type
Allowable pressure loss outside the machine.		20Pa (2mmAq)	
Recommended ventilation fan capacity.	①	170	165
	②	30	25
	③	70	40

- The figures mentioned in above table is based on the assumed allowable temperature of 5℃.
- For the details of duct installation, please contact your nearest distributor or us.

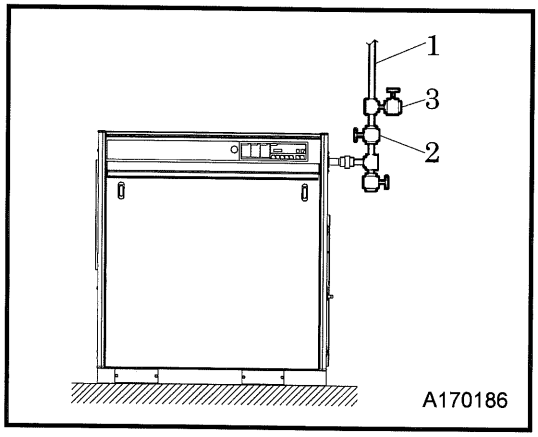
2.2.2 Space required for inspection/maintenance



- Keep necessary space around the machine for inspection and maintenance access.
- For the top surface, keep the space of 1,000mm or more for maintenance, including retention of normal exhaust function, attachment/removal of the top cover, etc.
- It is no problem that the machine can be installed close by wall, but it is recommendable that space for inspection should be reserved at the backside.

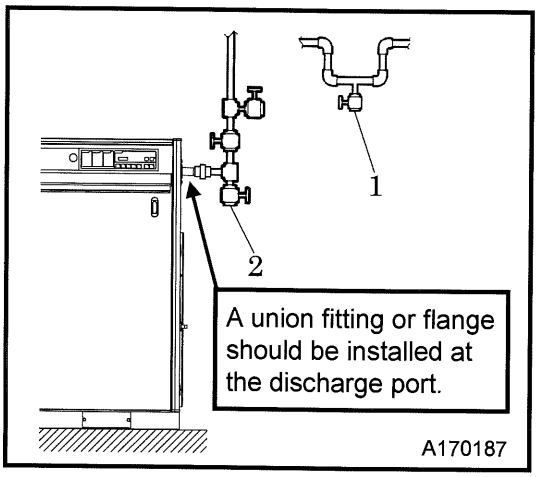
2. Installation

2.3 Piping Work



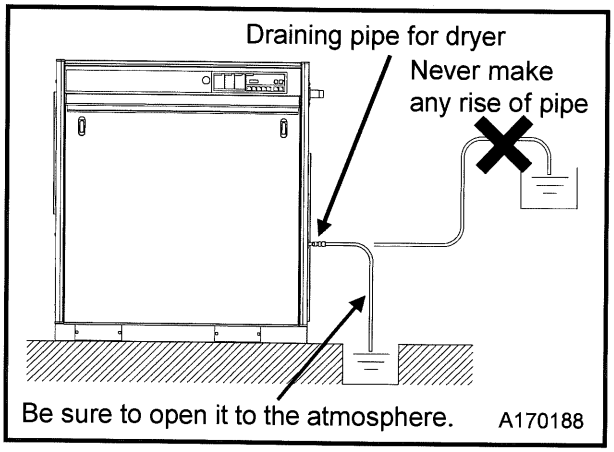
(1) Install a stop valve "2" to the discharge main pipe "1" for inspection and maintenance jobs. Also for parallel operation of several machines it is necessary to install a stop valve to each machine.
(Further, it is recommendable to install a valve "3" to the pipe as shown in the figure for connection to the standby machine.)

- The machine has a built-in check valve. So it is not necessary to install a check valve in the discharge pipe from the compressor. If the check valve is installed, it could sometimes cause malfunction to control system.
- Determine the diameter of discharge pipe considering pressure loss in the piping, if the discharge pipe is long.



(2) Avoid any lower portion in the pipe line.
If the plumbing requires a concave joint or an L-shape upright joint, be sure to install a stop valve "1" beneath such part and drain the condensate. If draining it in piping is neglected, the condensate collected in the pipes will freeze in winter and it will cause an accident.

(3) Install a drain valve "2" to prevent condensate water from returning into compressor air-end from the main discharge pipe.



[Draining pipe for dryer]

Perform drainpipe work, paying attention to the following points.

- Diameter of outlet pipe of the dryer is 8A (R1/4B) [tapered male screw].
- The length of the drain pipe shall be within 3m open to atmosphere. (To be prepared by client.)

⚠ CAUTION

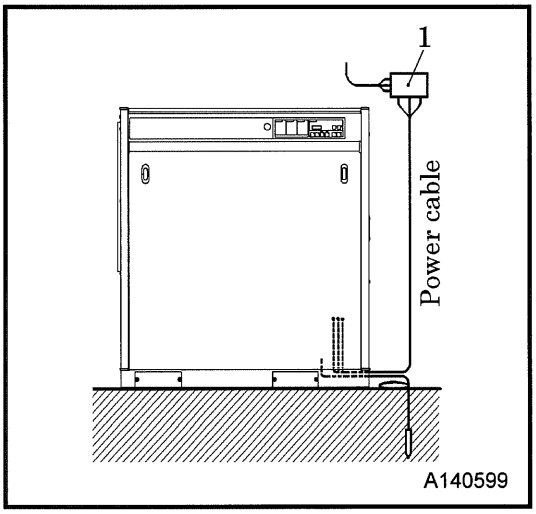
- The drain pipe of the dryer should be plumbed so that it may not rise.
- In cold season condensate in draining pipe gets frozen and blocked so that it can not be drained.

IMPORTANT

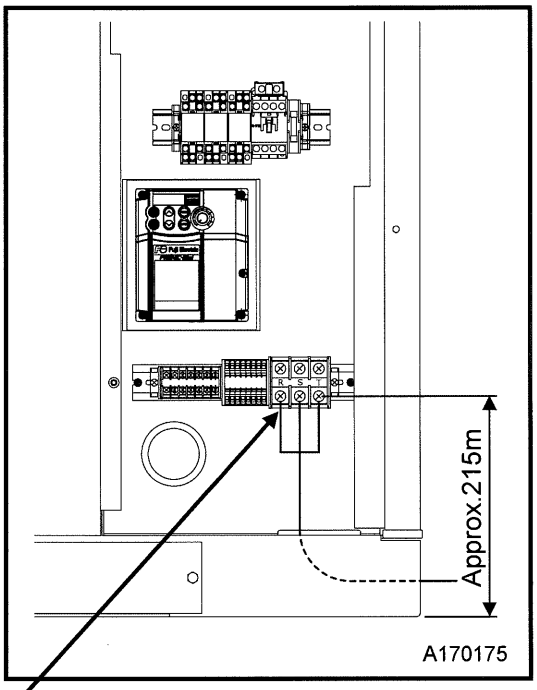
- Can not be directly discharged for the drain of the dryer, a small amount of oil is included. Please be handled properly in accordance with regulations of the installation area.

2. Installation

2.4 Wiring



- All the wirings in the compressor are completed; therefore, power supply and ground connections should be made.
- Fluctuation of the supply power voltage must be kept within ±5% of the rated voltage, and ±2% of the voltage unbalance of each value.
- Be sure to install a ground fault circuit interrupter "1". Also use dedicated circuit for it. Insufficient capacity of the power circuit or improper electric work could cause an accident such as electric shock or fire.
- Only fully qualified and experienced electric technicians should carry out electrical installation.
- Be sure to directly bury a grounding rod in the ground. Never connect it to the in-house steel construction, gas and water pipes.



[The connection method of a power cable]

- This table is indicated as a standard.
  (Keep in mind that it may change with power supply situations.)
- The figures of wire size in the above table are based on the straight line of 10m long for single machine connection.
- However, determine cable specifications, taking into account the actual power supply situations and the cable length.
- Use an EV cable for 600V or a CV cable for 600V for the wire.
  EV: Polyethylene insulated PVC sheathed electric power cable.
  CV: Cross-link polyethylene insulated PVC sheathed electric power cable.
- For sensitivity current of the ground fault circuit interrupter, use 200mA.

Unscrew three round screws for power cable connection terminal plate, using a screwdriver or a tool like that. Be sure to use a round terminal as the connection terminal having the size as shown in the table below.

Voltage of power source	Circuit breaker rated current	Thread size of power supply connection terminal plate	Wire size	Ground cable diameter
200V	100A	M6	$22mm^2$	$14mm^2$
400V (380V)	60A	M6	$8mm^2$	$5.5mm^2$

3. Operation

3.1 Operation Panel

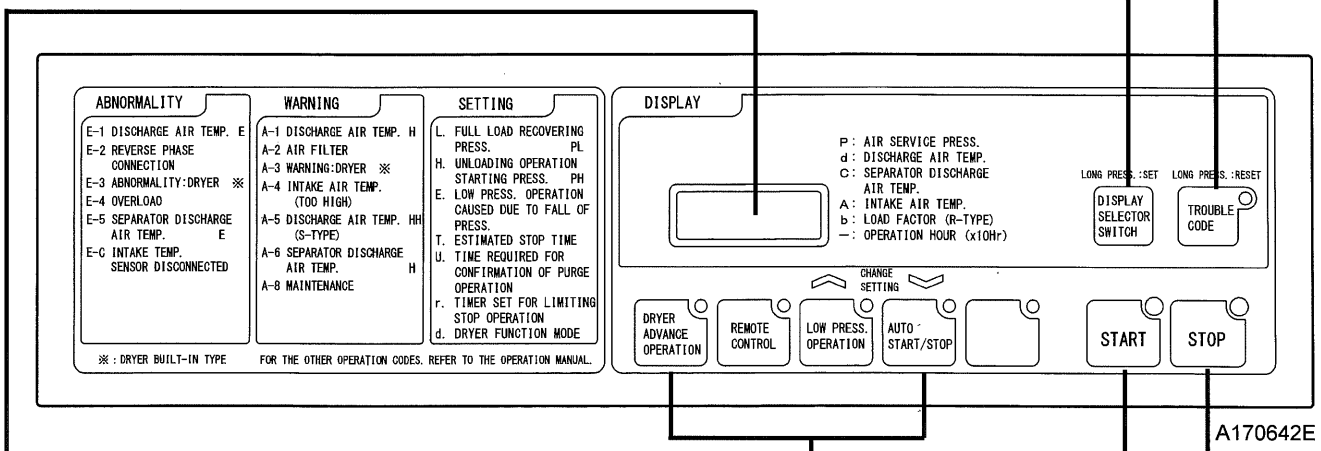
Each display of the operation panel is illustrated as follows.
Read and fully understand the explanations and be sure to operate safely:

Data setting switch

Set various data. Pressing the switch (longer than 2 seconds) goes to data setting mode.

Trouble code/Resetting switch

When pressing the switch while lamp flickering, trouble code is displayed. Pressing the switch (longer than 2 seconds), the display will be rest. (See : P4-1)



A170642E

Operation mode display/Selector switch

Select various operation mode, according to demand of operation.

Start button

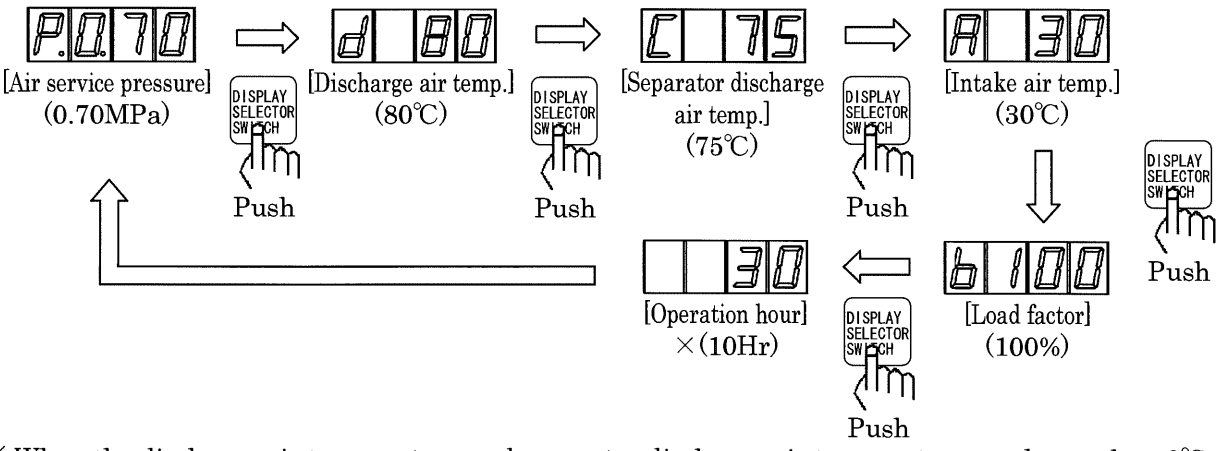
Pressing this button longer than 1 second, the machine starts.

Stop button

Stop the machine, using this button.

Digital monitor

After start, P: AIR SERVICE PRESSURE is displayed.
Each time display selector switch is pressed, the following is displayed by turns.



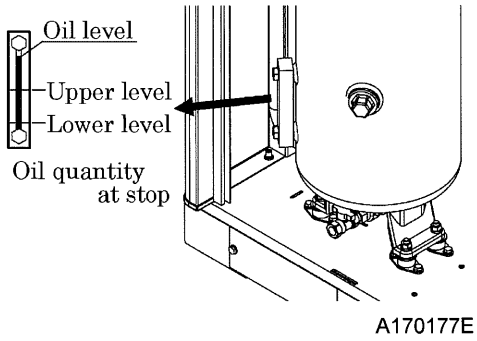
※ When the discharge air temperature and separator discharge air temperature are lower than 0℃, "———L" is displayed. The intake air temperature is displayed at 0℃ or higher.

3. Operation

3.2 Operating Method

3.2.1 Check before operation

1. Check compressor oil level



The amount of supply
(Oil level between red lines)

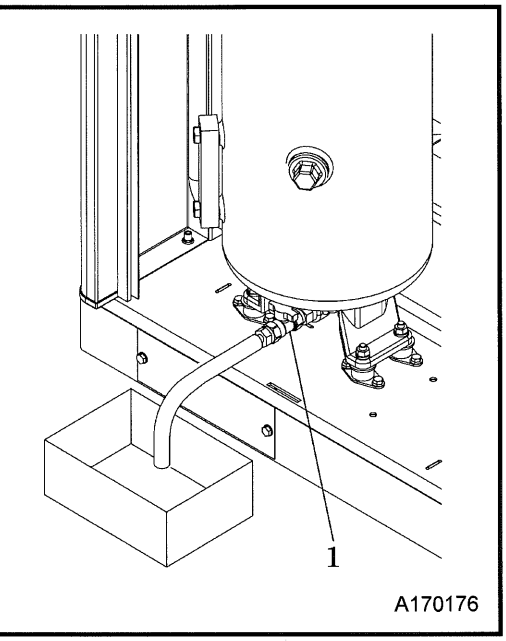
SAS15RD-5E/6E SAS15R-5E/6E	Approx.1.3L

- Make sure that compressor oil level is kept above the red upper limit line of the level gauge. Replenish the oil if short. (See 5.4.8)
  (When starting operation, the oil level will be lowered.)

- Standard of supply
  Supply every 2,000 to 2,500 hours. However, the amount of supply changes with load states.

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

2. Check for condensate in separator receiver tank



The machine is designed and controlled so that no condensate may be collected in separator receiver tank during normal operation. However, in the following cases, sometimes condensate may be accumulated in the tank and so be sure to open the drain valve "1" to check for condensate at least once a week and drain it if any.

- In case that a small quantity of air consumption is required.
- In case that the machine is operated under the conditions of high temperature and high humidity.

Prior to the drainage, make a joint for drainage (following table), a drain hose (approximately 300 mm in length) and a drain-keeping container available at the tip of drain valve "1".

	SAS15RD-5E/6E SAS15R-5E/6E
Joint for drainage	R3/8B

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. When the degree of viscosity becomes higher, it indicates that the compressor oil starts coming out.

⚠ WARNING

- Be sure to check for condensate in tank while the machine is stopping. Never open drain valve during operation. High-pressure compressor oil jets out, resulting in scalding or serious injury.
- A long-time operation with condensate accumulated could cause rust in the interior of compressor air-end, resulting in serious trouble.

3. Operation

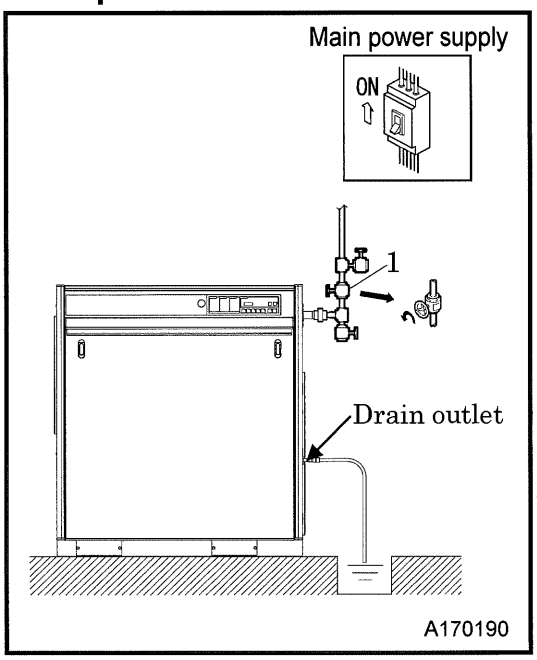
3.2.2 Operation

1. Power input

<Procedures>

① Turn the main power supply "ON".
② Check and confirm that trouble code lamp is off.
③ Fully open stop valve "1" at discharge side.
④ Check and confirm operation mode and select desired operation mode. (See 3.3)

2. Operation



<Procedures>

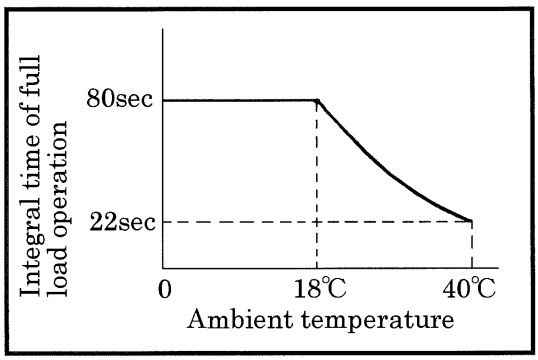
① Pressing start button of the operation panel longer than 1 second, then operation starts.
② Check and confirm that after unload operation (starting unloader operation) is performed for a certain time it becomes full load operation and gradually service pressure rises.

- The period of starting unloader operation varies upon the discharge air temperature at start-up (Including re-start of auto start-stop operation) as shown in the following table.

Discharge air temperature	Starting unloader operation period
Higher than 0℃	15 seconds
Less than 0℃	60 seconds

③ Check and confirm that oil level is between red lines of level gauge during operation. If lower, replenish oil. (See 5.4.8)
④ Check if the belt creaks at the time of startup or in operation. If it does, check the belt tension. And also check for oil leakage and/or abnormal noise. (See 5.4.7)
※ Record operation conditions and inspection results on logbook. This information surely serves for earlier discovery of abnormalities of the machine.

3. Check and confirm that condensate in dryer has been drained



- After the machine starts and starting unloader operation is disengaged, it is automatically drained according to service pressure.

Service pressure	Drainage time
0.2MPa or less	8 seconds
0.2MPa or more	1 second

- When full load operation time reaches during operation the time in the left figure, it is automatically drained for 2 seconds, according to ambient temperature.

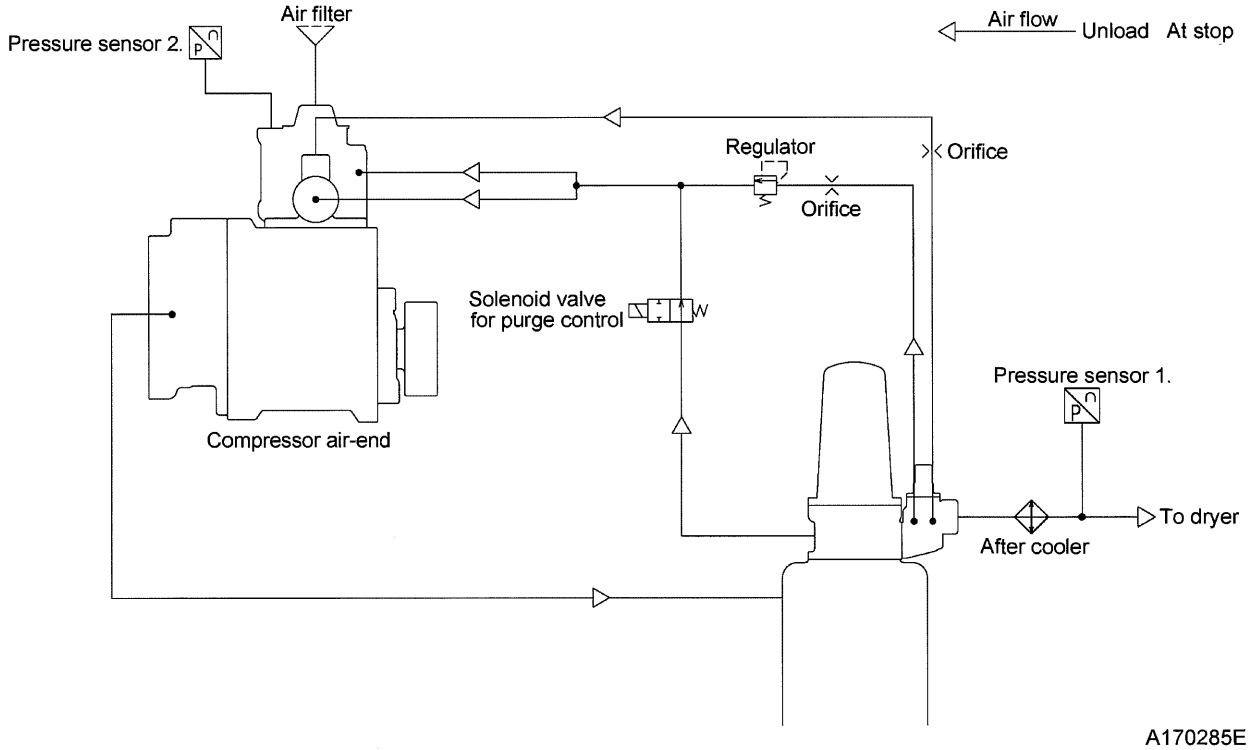
4. Stop

<Procedures>

① Push stop button to stop the operation panel.
② Condensate water in dryer is automatically drained for 4 seconds. (This prevents freezing in winter and also rusting.)
③ Be sure to turn the main power supply "OFF" after stopping.
※ The pressure displayed on the digital monitor will not become 0MPa as long as there is residual pressure left in the air tank of separate type, because it is from the air service side.

3.2.3 Capacity control

Capacity control system



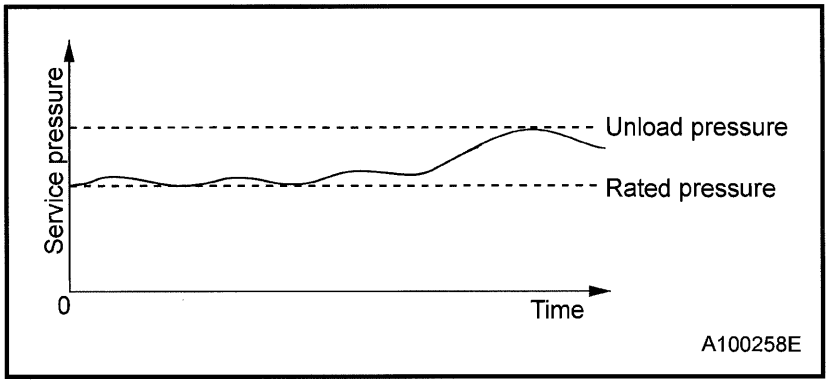
Conditions	Conditions of solenoid valve for purge	Unloader valve
Start Purge operation	Open	At a little open
Full-load	Close	At fully open
Stop	Open	At fully closed

1. Suction port closing operation

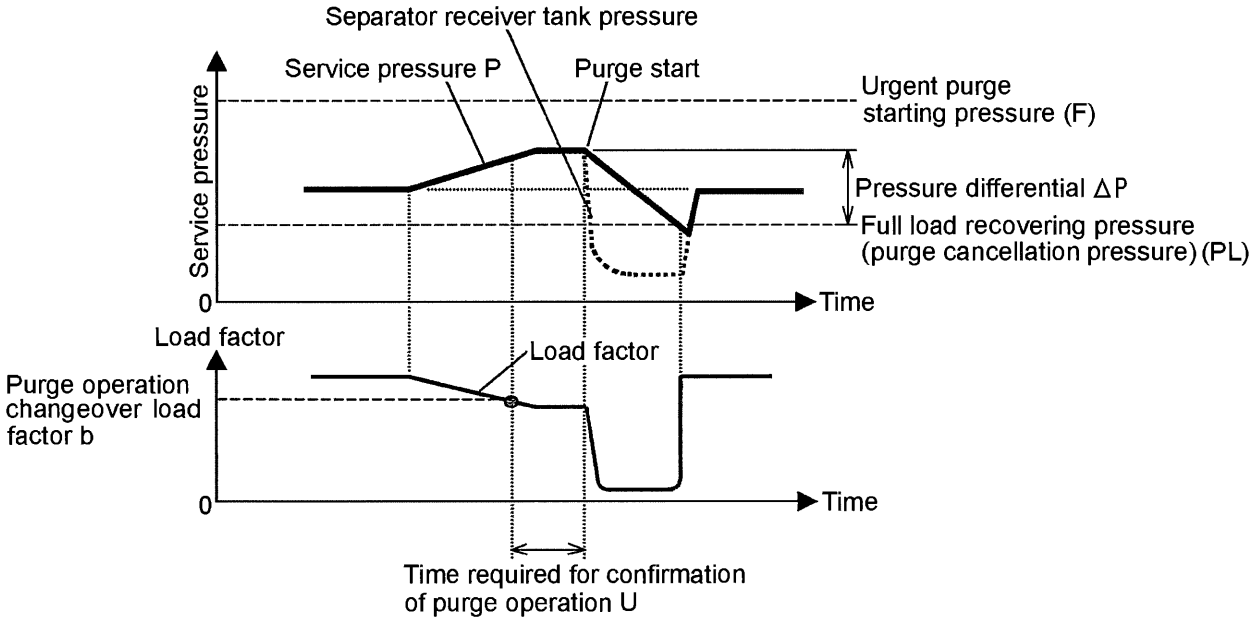
Intake air is controlled steplessly from 0 to 100%, according to air consumption.

Service pressure	0.70 MPa [STD.spec.]	0.85 MPa [Factory opt.]	0.90 MPa [Factory opt.]
Unload pressure	0.75 MPa	0.90 MPa	0.95 MPa

Unload pressure: Service pressure at air volume 0%.



2. Purge control operation



2-1. Purge control selection (Normal purge control)

- When air consumption decreases, and the load factor calculated on suction load becomes lower than the "Purge operation changeover load factor b", it will be in the waiting condition for purge control mode operation. When this condition continues during the "Time required for confirmation of purge operation U" decrease, purge control mode operation starts to relieve the air out of a separator receiver tank, thus it saves power.

2-2. Purge control selection (Urgent purge)

- When air consumption quickly drops, and the service pressure rises up to the urgent purge starting pressure (F), purge control operation starts to prevent the service pressure from rising.

2-3. Purge control operation releasing

- When air consumption increases and the service pressure drops to the full load recovering pressure (purge cancellation pressure) (PL), it cancels purge control operation and starts full load operation.

2-4. Purge control operation cancel

- When the "Time required for confirmation of purge operation U" of air volume is set at 0, perform suction port closing mode operation instead of purge control mode operation. In this case, auto start/stop operation is cancelled. But when service pressure rises up to urgent purge starting pressur (F), purge control operation starts.
- In case that during normal purge operation the pressure difference △P between the service pressure P when it is switched to purge operation and the full load recovering pressure (purge cancellation) (PL) is 0.05MPa, purge operation mode is not used.
  In this case, lower the full load recovering pressure (purge cancellation pressure) (PL) so that the pressure △P can be larger.

※For the details of change of each set-up values, and confirmation methods, refer to 5.6 "Adjustment of various data".

3. Operation

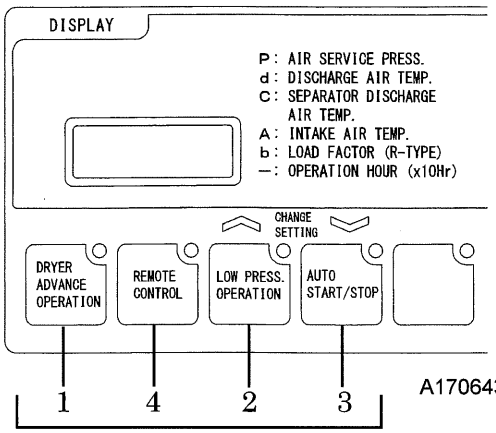
3.3 Operation Mode

Select operation mode with operation mode selection switch on operation panel.

3.3.1 Dryer advance operation

When starting operation of the machine with dryer advance operation mode switched on, first dryer starts, and 3 minutes later machine automatically starts. Therefore, soon after starting operation, fresh quality dried air is available soon.

1.Operation procedures



Operation mode selection switch

<Procedures>

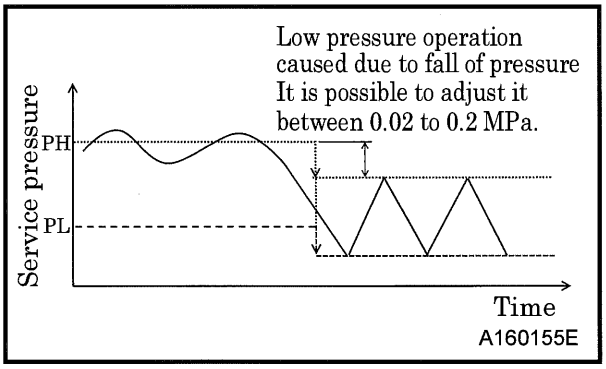
① Press the dryer advance operation button "1". Indication lamp goes on.

② In order to stop dryer advance operation mode, press again the button of dryer advance operation mode.

- When the dryer advance operation is not in use, the machine and dryer start at the same time.
- When stopping dryer advance operation mode during dryer advance operation, at the time, machine starts.

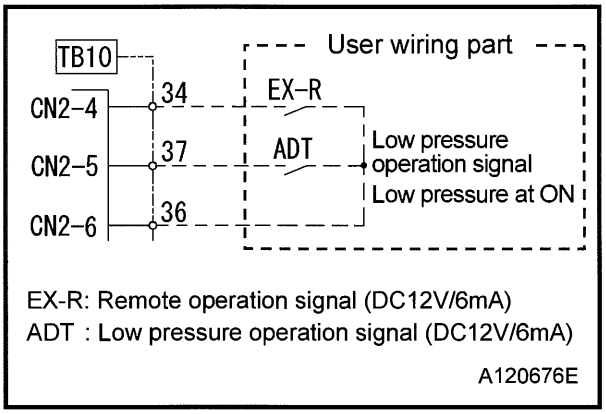
3.3.2 Low pressure operation (2 stages pressures selection function)

By switching low-pressure operation signal (ADT), 2 stages pressures are available.



- In the period during which the discharge pressure is allowed to remain at a low level, including during nighttime hours.
- Selection of service machine and stand-by machine.
- Two machines are operated alternately.

1.Operation procedures



[Operation at operation panel]

<Procedures>

① Press low pressure operation button "2". Indicator light goes on and low-pressure operation starts.

② In order to stop low pressure operation, press low pressure operation button again.

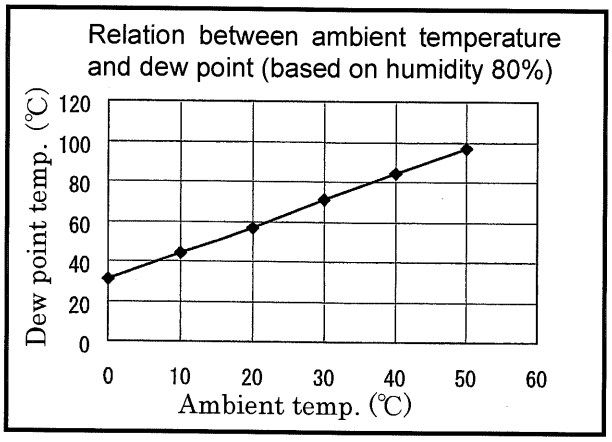
[Operation at exterior signal]

- In the case of operation by exterior signal, perform cable connection as shown in the figure on the left using a terminal plate (TB10) provided in the starter panel.
- Pressing "ON" low-pressure operation signal (ADT), low-pressure operation is selected.

※ For the adjustment of low pressure operation caused due to fall of pressure, please refer 5.6 clause.

3.3.3 Automatic start/Stop (auto-start/Stop) operation

When this machine is started, it starts to first remove condensate. And then it is automatically started and stopped, according to increase or decrease of air consumption. Thus power saving is accomplished.



● Operation for removal of condensate

Depending on ambient temperature, when the discharge air temperature exceeds the dew point temperature in the figure on the left, and when 5 integrated minutes or longer of purge operation elapse, the condensate that is caused at start-up will completely be removed and emulsification of compressor oil will be prevented.
This can cause the operation for removal of condensate to become shorter and to prevent frequent start/stop of the machine operation.

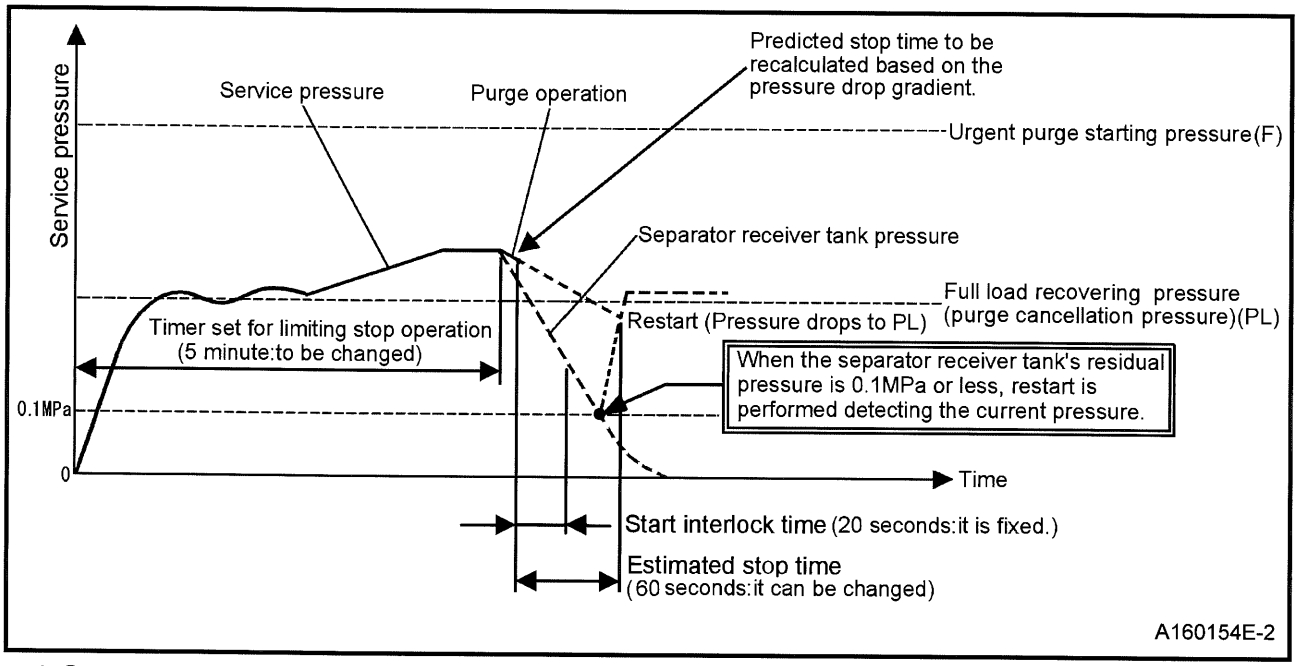
● Start/stop mode operation

After completion of condensate removal operation when starting, the machine will automatically stop in the case enough stop time can be estimated upon pressure drop gradient when unloading. The same way applied to the case unload time continues for the fixed time (J) (60 seconds but can be changed). The machine will restart in the case service pressure drops to full road recovering pressure (purge cancellation pressure) (PL) and meet the following conditions (1) or (2).

(1) 20 seconds or more has elapsed after stoppage and separator receiver tank's residual pressure drops to 0.1MPa or less.

(2) 90 seconds or more has elapsed after stoppage.

It is possible to change estimated stop time, refer to 5.6.



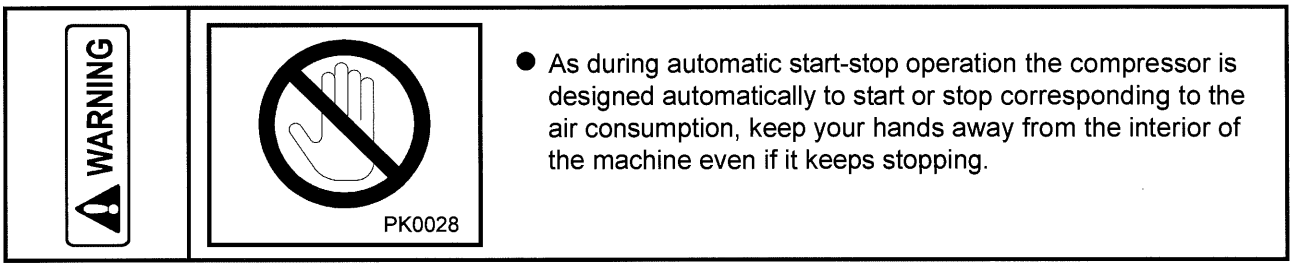
1.Operation procedures

<Procedures>

① Press auto start/stop button "3". Indicator light goes on.

② In order to stop auto start/stop operation, press auto start/stop button again.
Releasing auto start/stop mode even while it stops in this mode, this mode will be switched to continuous operation mode.
But it keeps stopping till the service pressure drops to re-start, and when it drops to re-start pressure, it starts operation again.

3. Operation

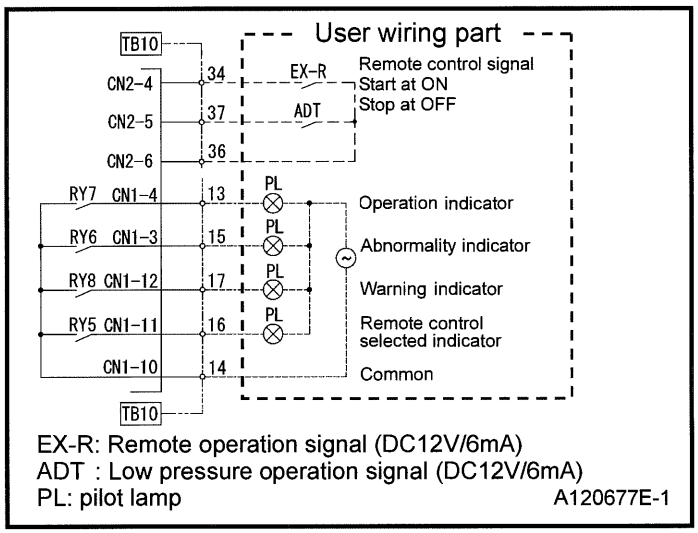


- As during automatic start-stop operation the compressor is designed automatically to start or stop corresponding to the air consumption, keep your hands away from the interior of the machine even if it keeps stopping.

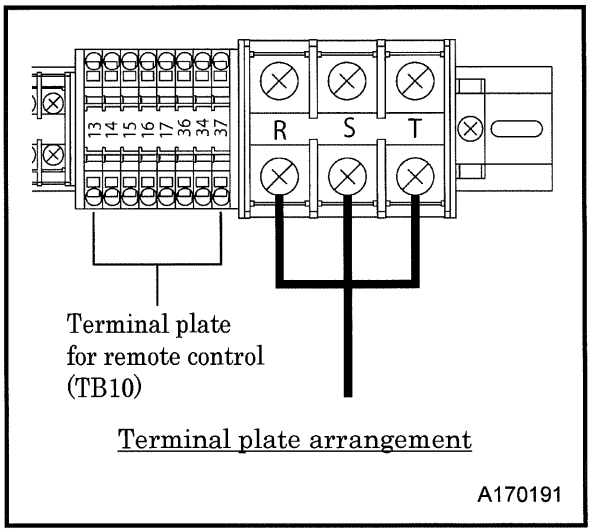
3.3.4 Remote control

1. Wiring work of remote control switch

Remote operation terminal board (TB10) is provided inside the starting panel. If you wish to operate this machine remotely please prepare power, pilot lamp (PL), switch (EX-R,ADT) and wiring as the drawing below. Power should be turned"OFF" when wiring.



EX-R: Remote operation signal (DC12V/6mA)
ADT : Low pressure operation signal (DC12V/6mA)
PL: pilot lamp A120677E-1



Terminal plate arrangement

A170191

- Operation pilot lamp : Lamp goes on when the compressor starts.
- Abnormal pilot lamp : Light up when stop under abnormal condition.
- Warning pilot lamp : Light up when warning of abnormal condition appears.
- Remote operation selected pilot lamp : Lamp goes on when remote control operation is selected.

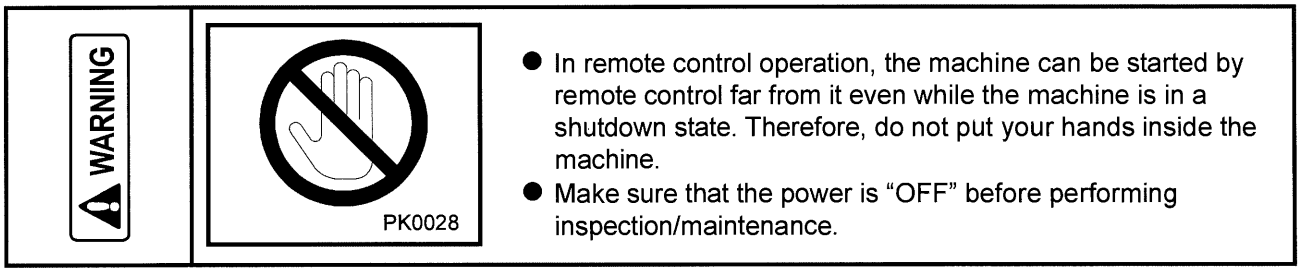
＊ Indication signal is no-voltage with contact (RY5,RY6,RY7,RY8) [Contact capacity･･･AC250V 1.0A]
＊ Connecting cable size of remote control terminal plate:[Applicable cable･･･0.08-2.5mm^2]

2. Operation procedures

<Procedures>
① Press the remote control button "4". Indication lamp goes on.
② Machine runs when remote operation signal (EX-R) is "ON" and stops when this signal is "OFF".

- In order to release remote operation, press again remote control mode button.
  Even while remote control mode operation continues, it is possible to stop operation, using stop button provided on the operation panel.
  (In this case, the remote control mode is released; operation by machine side will be selected.)
- Once the machine stopped at the emergency stop during remote operation mode then it can not be remotely reset.
  Please check for the cause of trouble at the operation panel and repair it. Then restart the operation by resetting the remote control mode.

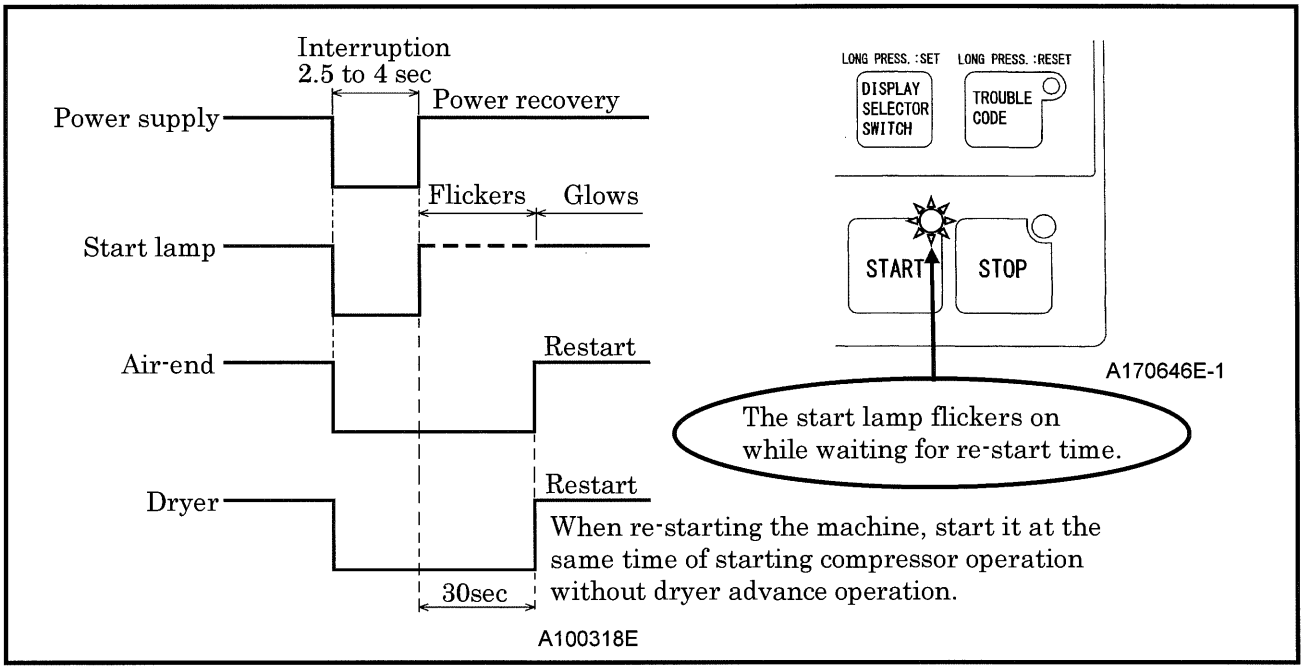
※ When using remote operation please surely follow the order above for operation. Any misoperation might keep the machine from regular running or suddenly stop.



- In remote control operation, the machine can be started by remote control far from it even while the machine is in a shutdown state. Therefore, do not put your hands inside the machine.
- Make sure that the power is "OFF" before performing inspection/maintenance.

3.3.5 Momentary stop restart operation

When the machine stops by momentary power supply interruption and if it is about 2.5 to 4 seconds, the compressor automatically restarts its operation about 30 seconds after the power recovery.



※ The factory default setting has been made in such a way that the machine operation will resume automatically at the time of power return. If such a setting that prevents automatic restart is desired, that setting can be established by modifying the internal setting of the controller. For the details, contact our office nearby or distributor.

⚠ WARNING

- When the machine is stopped due to instantaneous power supply interruption, machine is automatically restarted after the power is supplied again.
  Therefore, do not put your hands inside the machine.
- Make sure that the power is "OFF" before doing wiring work.

4. Failure and Troubleshooting

4.1 Warning·Abnormality display

4.1.1 Details of warning and abnormality indication

[Warning Display] When ever a little abnormality occurs during operation, the operation continues. When error code lamp flashes, rapidly take the following countermeasures and correct it soon.

Item	Failure code	Trouble	Measures
DISCHARGE AIR TEMPERATURE H	A-1	When air temperature at outlet of compressor air end exceeds 105℃, it warns.	Lower ambient temperature. (lower than 40℃) Check compressor oil level. Check and change oil filter. Adjust service pressure to proper one. Cleaning oil cooler. Cleaning dustproof air filter.
AIR FILTER CLOGGING	A-2	When differential pressure reaches 6.23kPa due to air filter clogging, a warning is indicated. (It continues longer than 10 seconds.)	Clean or change
WARNING: DRYER ※1	A-3	When abnormality occurs at dryer, it displays emergency.	Lower ambient temperature. Check dryer.
INTAKE AIR TEMPERATURE 「HIGH」	A-4	When ambient temperature reaches 52℃, it warns.	Lower ambient temperature.
SEPARATOR DISCHARGE AIR TEMPERATURE H	A-6	When air temperature at outlet of separator exceeds 105℃, it warns.	Faulty separator element. Change oil separator element and compressor oil.
MAINTENANCE WARNING ※2	A-8	When operation time reaches set time, it warns.	Do maintenance in accordance with the table of Periodical Inspection and Maintenance.

4. Failure and Troubleshooting

[Abnormality Display] When ever abnormality occurs during operation, each lamp goes on and it makes emergency stop. When error code lamp flashes, take the following countermeasures soon and repair it try to operate the machine.

Item	Failure code	Trouble	Measures
DISCHARGE AIR TEMPERATURE E	E-1	When discharge air temperature at outlet of compressor air-end reaches 110℃, it warns.	Lower ambient temperature. (lower than 40℃) Check compressor oil level. Check and change oil filter. Adjust service pressure to proper one. Cleaning oil cooler. Cleaning dustproof air filter.
REVERSE PHASE CONNECTION	E-2	When power supply is connected in reverse phase, it displays emergency. Change connection between R and T phase.	Switch the R·T phase of power supply.
ABNORMALITY: DRYER ※1	E-3	When abnormality occurs at dryer, it displays emergency.	Lower ambient temperature. Check dryer.
OVERLOAD	E-4	When main motor gets overloaded, it displays emergency.	Check service pressure. Check and confirm voltage of power supply. Check thermal relay.
		When will display when an error occurs in the fan motor inverter and when the fan motor is overloaded.	Check fan motor. When want to see the error of fan motor inverter. Check and confirm voltage of power supply.
SEPARATOR DISCHARGE AIR TEMPERATURE E	E-5	When temperature of air discharged at outlet of separator exceeds 110℃, it displays emergency.	Faulty separator element. Change oil separator element and compressor oil.
DISCONNECTION OF DISCHARGE AIR TEMPERATURE SENSOR	E-6	When the discharge air temperature sensor becomes disconnected, it displays an abnormality.	Check cable and connector for any faulty contact, and also check for any disconnection.
DISCONNECTION OF SEPARATOR DISCHARGE AIR TEMPERATURE SENSOR	E-7	When the separator exit temperature sensor gets disconnected, it displays abnormality.	
EMERGENCY STOP DUE TO EXCESSIVE RISE OF DISCHARGE TEMPERATURE	E-8	When discharge air temperature at outlet of compressor air-end reaches 120℃, it warns.	Same as the countermeasures for failure code E-1.
INTAKE TEMP. SENSOR DISCONNECTED	E-C	When ambient temperature sensor is disconnected, it warns.	Check cable and connector for any faulty contact, and also check for any disconnection.

Reset

- If switch is pressed while failure code lamp is flickering, it displays failure code.
  And if it is pressed longer, its display is reset.

※1 : When an abnormality occurs at a dryer prior to delivery ex.works, it is set to display "Abnormality".
If you wish to continue operating the machine even when a fault occurs in the dryer, such operation is made available using the data setting switch on the operation panel.
For the details, contact our office nearby or distributor.

※2 : When the maintenance warning A-8 appears, it cannot be reset if the maintenance time is "0". On this occasion, please reenter maintenance time. Refer to 5.6 for details of reenter method.

4. Failure and Troubleshooting

4.2 Troubleshooting

- Should any trouble occur during operation, do not leave it. Investigate the cause and take appropriate measures.
- In this chapter the most important troubles, causes and countermeasures are described. For such items or parts marked ◎, contact our office nearby or distributor because technical knowledge is required.

4.2.1 Compressor

	Trouble status	Cause	Countermeasures	Remarks
Trouble of capacity adjuster	Unloader does not operate and safety valve blows.	(1) Regulator set pressure is too high. (2) Air-leak from unloader system piping. (3) Trouble of safety valve. (It blows below the set pressure.) (4) Defective seating face failure of unloader valve. (5) Defect of oil seal.	Check/readjust Check/repair Change Disassemble/repair Disassemble/check	 ◎ ◎ ◎ ◎
Other status	Oil is mixed in discharged air (Much oil is consumed).	(1) Separator oil scavenging orifice clogging. (2) Discharge pressure is low. (3) Deterioration of oil separator element. (4) Oil level is too high.	Disassemble/check Check pressure control valve. Check/change Drain excessive oil to proper level.	 ◎ ◎ See5.4.8
	Abnormal noise from belt.	(1) Belt slipping.	Check belt, or change.	See5.4.7
	Frequently compressor starts and stops automatically even when compressed air is not consumed.	(1) Air leakage from pipes. (2) Malfunction of pressure control valve seat.	Check Check/change	
	Even when each switch is pushed ON, machine will not run.	(1) Defective connection of switch. (2) Malfunction of controller.	Check/change Check/repair	◎ ◎
	No abnormality lamp glows, but the machine often stops with unknown cause.	(1) Malfunction of controller is caused by noise. (2) Malfunction of controller.	Use a power source other than that of the source of the noise. Check/change	 ◎
	Start lamp glows, but the machine does not start.	(1) Electromagnetic switch failure. (2) Malfunction of controller.	Check/change Check/change	◎ ◎
	Oil leaks from oil seal portion.	(1) Damage of oil seal.	Check/change	◎

4. Failure and Troubleshooting

4.2.2 Dryer

Trouble status	Cause	Countermeasures	Remarks
It will not run.	(1) No power supplied.	Check/repair	
	(2) Breaking, or disconnecting of wire.	Check/repair	
	(3) Abnormality of power supply voltage.	Adjust to rated voltage	
	(4) Malfunction of refrigerating compressor.	Check/change	◎
	(5) Malfunction of electromagnetic switch.	Check/change	◎
	(6) Thermal relay activates.	Check/change	◎
	(7) High pressure switch malfunction.	Check/change	◎
Water drips at outlet.	(1) Drain pipe broken or clogged.	Check/repair	
	(2) The solenoid valve for draining condensate (SV6) is frozen.	Melt frozen parts and drain them. Wrap the valve with freezing protection band.	◎
	(3) Cable disconnection in line to solenoid valve for draining condensate (SV6).	Repair	◎
	(4) Malfunction of the hot gas by-pass valve.(Inside of the heat exchanger is frozen)	Check/maintenance	◎
	(5) The open air temperature is lower than the dew-point temperature.	Wrap piping with heat insulation material.	◎
	(6) Cooling capacity drops.	Check coolant leak.	◎
	(7) Ambient temperature is too high.	Lower ambient temperature.	
	(8) Fins of condenser clogged.	Clean condenser	See5.4.1
	(9) Filter of dustproof clogged.	Check/clean	
It starts, but stops soon.	(1) Ambient temperature is high.	Make it lower than 40℃.	
	(2) Abnormality of power supply voltage.	Adjust to rated voltage.	
	(3) Malfunction of electromagnetic switch.	Check/change	◎
	(4) High pressure switch malfunction.	Check/change	◎
Air is blowing from drain outlet.	(1) Foreign matter stuck in seating face of solenoid valve for draining condensate (SV6).	Change/ clean	◎

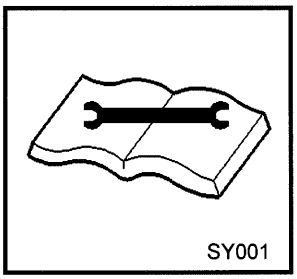
WARNING

- Nonflammable, innoxious and odorless refrigerant (Freon gas) is used for dryer. Should this gas leak from this machine and contact fire, noxious gas will be caused and it can sometimes cause stimulus to eyes and throat. Further, as the gravity of this gas is heavier than air, it covers surroundings floor space and it could cause oxygen deficient situations. In case this gas should leak、stop using fire, and ventilate the surroundings by sweeping the floor. And contact our office nearby or distributor.

5. Periodic Inspection List

5.1 Precautions on Periodic Inspection/Maintenance

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

⚠ WARNING	 SY001 ● Before inspection, be sure to turn the power "OFF" and hang up a "Now Checking and Maintenance" tag in front of the switch. Accidental turning on of the power can cause an electric shock accident, or even a fire due to short-circuit. ● Keep the electric components away from water or steam. Otherwise, electric shock accident or short circuit could cause fire.
IMPORTANT	● Be sure to use recommended oil and grease. ● Use genuine parts for replacement. ● Never disassemble or readjust the components like motor and compressor air-end because such things are not mentioned in this manual. Ask our office nearby or distributor for detail if such work is needed. ● Never make any modification to the machine without prior approval. ● Any breakdown, caused by using unapproved parts or by wrong handling, will be out of the scope of "WARRANTY". ● Place a container or a pan underneath the oil port to receive waste liquid so that such liquid cannot be spilt out on the floor or inside the machine. ● The pressure displayed on the operation panel shows the service pressure. For periodic inspection, wait for enough time (2 - 3 minutes) after stopping the machine. Then start inspection job. ● Dispose of the waste fluid properly. Do not dispose of such harmful fluids to the ground, rivers, lakes or ponds, and sea. Doing so contaminates the environment. It should be noted especially that unauthorized disposal of the oil, solvent, filters, and other toxic substances is subject to punishment.

5.2 Easy inspection of the dryer

IMPORTANT	● For prevention of leak of refrigerant from dryer, it is necessary to perform dryer easy inspection more times than 1 time every 3 months. <Details of inspection> (1) Check the dryer for abnormal noise. (2) Check for any corroded refrigerant pipe or leak of refrigerant and the like an also for oil oozing. (3) Check for frost sticking to radiator. ※Should refrigerant leak, immediately take action for reparation.

5. Periodic Inspection List

5.3 Periodic Inspection List

5.3.1 Periodical Inspection and maintenance (A):
In case that total operation hours per one year are less than 3,000 hours

[A: It refers to the inspection items of dryer.]

Inspection items		Inspection points	Maintenance interval							Remarks	Page
			Daily	1 month	Every 1 year	Every 2 years	Every 4 years	Every 6 years	Every 8 years		
Indication of each gauge			○							See the item "Operating method"	
Compressor oil level		Check	○							Oil level to be between red lines at loaded operation.	3-2
Refrigerant pressure gauge	A	Check	○							In the range 0.41 to 0.73MPa	
Separator receiver tank drain		Drain	○ (Every week)								3-2
Dustproof air filter		Check / clean	○								5-6
Safety valve		Check performance		○							5-6
Air-filter element		Clean		○							5-7
Strainer at draining portion of dryer drain	A	Clean		○						Status confirmation of drain discharge Clean it depending on its conditions	5-11
Dustproof air filter		Change			○						5-6
Scavenging orifice strainer		Clean			●						5-6
Scavenging orifice O-ring		Check			●					Re-usable after check, if normal.	5-6
Sirocco fan		Check / clean			●					When it is heavily stained, clean it as soon as possible.	5-7
Belt / Pulley		Check			●					If abnormal, replace it.	5-8
Rubber hose		Check			●						
Nylon tube		Check			●						
Coil of main motor		Insulation resistance			●					More than 1MΩ at DC500V Mega.	
Coil of fan motor		Insulation resistance			●					More than 1MΩ at DC500V Mega.	
Fan inverter		Check / clean			●						
Air-filter element		Change				○					5-7
Compressor oil		Change				※3○				When it is heavily stained, change it as soon as possible.	5-10
Oil filter		Check / Change				●					5-7
O-ring of oil filler		Change				●					5-10
Oil separator element		Change				●					5-11
Nylon tube		Change				●					
Oil cooler/ After cooler		Clean				●				When it is heavily stained, clean it as soon as possible.	
Oil level gauge		Change				●				When it is heavily stained, change it as soon as possible.	
Condenser of dryer	A	Clean				●				Removal of debris and dust	
Dryer fan motor	A	Check				●					
Consumable part of regulator		Change					●				
Bearing of main motor		Change					●				
Bearing of fan motor		Change					●			Re-usable after check, if normal.	

5. Periodic Inspection List

Inspection items	Inspection points	Maintenance interval							Remarks	Page
		Daily	1 month	Every 1 year	Every 2 years	Every 4 years	Every 6 years	Every 8 years		
Oil seal for compressor air-end	Change					●				
Consumable part of unloader	Change					●				
Consumable part of vacuum relief valve	Change					●			Built-in components of unloader.	
Rubber hose	Change					●				
Consumable part of pressure control valve	O-ring Check / change					●				
	Piston Check / change					●			Re-usable after check, if normal.	
Discharge air temp. / Separator discharge air temp. / Ambient temp. sensor	Check					●			Re-usable after check, if normal.	
Solenoid valve	Change					●			Re-usable after check, if normal.	
Belt	Change					●			Replace the pulley, depending on its conditions.	5-8
Compressor for freezing dryer A	Change					●			Re-usable after check, if normal.	
Fan control pressure switch for dryer A	Change					●			Re-usable after check, if normal.	
Collar for oil seal for compressor air-end	Check					●			Re-usable after check, if normal.	
	Change						※2●	※1●		
Bearing of compressor air-end	Change						※2●	※1●		
Smoothing capacitor for inverter (cooling fan)	Change							●	Re-usable after check, if normal.	

Regarding the items or parts marked ○ in the table of periodical maintenance customers or users should perform periodical maintenance of the items or parts marked ○ by themselves.
For such items or parts marked ●, contact our office nearby or distributor because technical knowledge is required.
Also the maintenance interval in the table shall be based on the normal operation conditions.
Regarding the periodical maintenance between inspection period and operation hours, maintenance or inspection should be performed, roughly according to 250 hours/month, 3,000 hours/year, 6,000 hours/2 years, 12,000 hours/4 years, 18,000 hours/6 years and 24,000hours/8 years.

※1 shows the interval time of bearing replacement for the compressor of the pressure of 0.70 and 0.85MPa.
※2 shows the interval time of bearing replacement for the compressor of the pressure of 0.90MPa.
※3 Please make sure to use the AIRMAN genuine dedicated oil "LONG-LIFE HP".
However, in case AIRMAN dedicated oil is un-acquirable, using the recommendation oil of a statement in 5.4.8, and please reduce by half all the periods those are suggested in the table of periodic inspection/ maintenance.

- Only main components are mentioned in the table.
- Maintenance interval means that periodical maintenance should be repeatedly carried out.
- Use AIRMAN genuine parts and recommended oil for replacement.

* When such parts which are not mentioned in the table need inspection and or maintenance, contact our office nearby or distributor.

5. Periodic Inspection List

5.3.2 Periodical Inspection and maintenance (B):

In case that total operation hours per one year are less than 6,000 hours

[A: It refers to the inspection items of dryer.]

Inspection items		Inspection points	Maintenance interval							Remarks	Page
			Daily	1 month	Every 1 year	Every 2 years	Every 4 years	Every 6 years	Every 8 years		
Indication of each gauge			○							See the item "Operating method"	
Compressor oil level		Check	○							Oil level to be between red lines at loaded operation.	3-2
Refrigerant pressure gauge	A	Check	○							In the range 0.41 to 0.73MPa	
Separator receiver tank drain		Drain	○ (Every week)								3-2
Dustproof air filter		Check / clean	○								5-6
Safety valve		Check performance		○							5-6
Air-filter element		Clean		○							5-7
Strainer at draining portion of dryer drain	A	Clean		○						Status confirmation of drain discharge Clean it depending on its conditions	5-11
Dustproof air filter		Change			○						5-6
Air-filter element		Change			○						5-7
Compressor oil		Change			※3○					When it is heavily stained, change it as soon as possible.	5-10
Scavenging orifice strainer		Clean			●						5-6
Scavenging orifice O-ring		Check			●					Re-usable after check, if normal.	5-6
Sirocco fan		Check / clean			●					When it is heavily stained, clean it as soon as possible.	5-7
Oil filter		Check / change			●						5-7
Belt / Pulley		Check			●					If abnormal, replace it.	5-8
Oil separator element		Change			●						5-11
Rubber hose		Check			●						
Nylon tube		Check			●						
Coil of main motor		Insulation resistance			●					More than 1MΩ at DC500V Mega.	
Coil of fan motor		Insulation resistance			●					More than 1MΩ at DC500V Mega.	
Fan inverter		Check / clean			●						
Oil cooler/ After cooler		Clean			●					When it is heavily stained, clean it as soon as possible.	
Condenser of dryer	A	Clean			●					Removal of debris and dust	
Dryer fan motor	A	Check			●						
Belt		Change				●				Replace the pulley, depending on its conditions.	5-8
O-ring of oil filler		Change				●					5-10
Nylon tube		Change				●					
Consumable part of regulator		Change				●					
Consumable part of pressure control valve		O-ring Check / change				●					
		Piston Check / change				●				Re-usable after check, if normal.	

5. Periodic Inspection List

Inspection items	Inspection points	Maintenance interval							Remarks	Page
		Daily	1 month	Every 1 year	Every 2 years	Every 4 years	Every 6 years	Every 8 years		
Consumable part of unloader	Change				●					
Consumable part of vacuum relief valve	Change				●				Built-in components of unloader.	
Oil level gauge	Change				●				When it is heavily stained, change it as soon as possible.	
Bearing of main motor	Change					●				
Bearing of fan motor	Change					●			Re-usable after check, if normal.	
Oil seal for compressor air-end	Change					●				
Rubber hose	Change					●				
Discharge air temp. / Separator discharge air temp. / Ambient temp. sensor	Check					●			Re-usable after check, if normal.	
Solenoid valve	Change					●			Re-usable after check, if normal.	
Compressor for freezing dryer A	Change					●			Re-usable after check, if normal.	
Fan control pressure switch for dryer A	Change					●			Re-usable after check, if normal.	
Collar for oil seal for compressor air-end	Check					●			Re-usable after check, if normal.	
	Change						※2●	※1●		
Bearing of compressor air-end	Change						※2●	※1●		
Smoothing capacitor for inverter (cooling fan)	Change							●	Re-usable after check, if normal.	

Regarding the items or parts marked ○ in the table of periodical maintenance customers or users should perform periodical maintenance of the items or parts marked ○ by themselves.
For such items or parts marked ●, contact our office nearby or distributor because technical knowledge is required.
Also the maintenance interval in the table shall be based on the normal operation conditions.
Regarding the periodical maintenance between inspection period and operation hours, maintenance or inspection should be performed, roughly according to 500 hours/month, 6,000 hours/year, 12,000 hours/2 years, 24,000 hours/4 years, 36,000 hours/6 years and 48,000hours/8 years.

※1 shows the interval time of bearing replacement for the compressor of the pressure of 0.70 and 0.85MPa.
※2 shows the interval time of bearing replacement for the compressor of the pressure of 0.90MPa.
※3 Please make sure to use the AIRMAN genuine dedicated oil "LONG-LIFE HP".
However, in case AIRMAN dedicated oil is un-acquirable, using the recommendation oil of a statement in 5.4.8, and please reduce by half all the periods those are suggested in the table of periodic inspection/ maintenance.

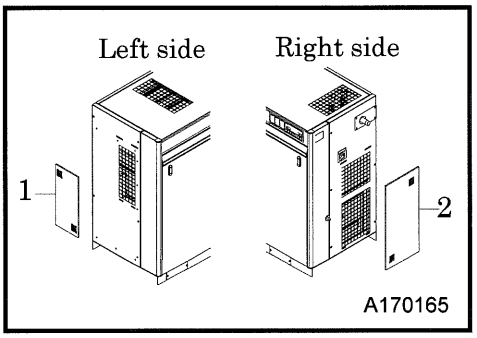
- Only main components are mentioned in the table.
- Maintenance interval means that periodical maintenance should be repeatedly carried out.
- Use AIRMAN genuine parts and recommended oil for replacement.

* When such parts which are not mentioned in the table need inspection and or maintenance, contact our office nearby or distributor.

5. Periodic Inspection List

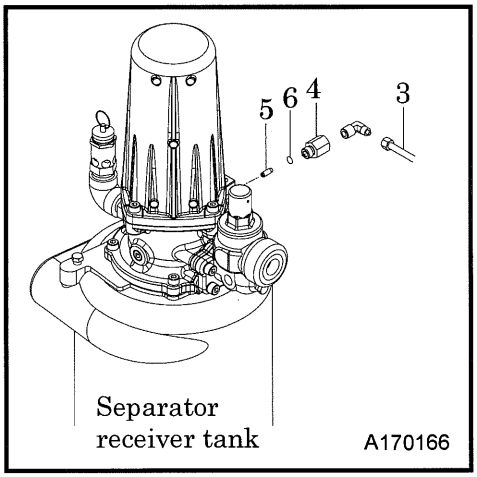
5.4 Items and Places of Inspection

5.4.1 Check·clean and change of dustproof air filter



- Check the dustproof air filter "1" and "2" for dust or dirt. If dust is found to be heavy, remove any dust or dirt.
- If the dust and dirt could not be cleaned away from the filter wash the filter using a detergent. Such washings should be limited up to max 5 times.
  Then replace the filter with a new one after it has been washed 5 times.
- Change the dustproof air filter if it is heavily damaged. (For Replacement parts, See 5.5)

5.4.2 Clean strainer in scavenging orifice

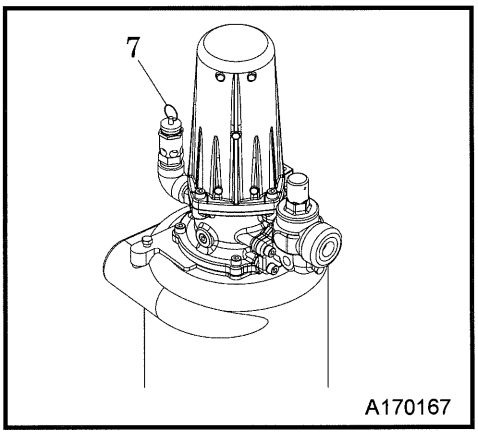


When compressor oil is found mixed in discharge air, clean strainer.

<Procedures>

① Remove a nylon tube "3" off the oil scavenging line bottom of the oil separator.
② Remove the bushing "4".
③ Remove strainer "5" from bushing and wash it in diesel oil and clean dust or dirt from it by air blow. When the cleaning is finished, assemble the strainer in the reverse order. When cleaning the strainer, make sure to check O-ring "6" fitted on bushing and replace it with a new one if it is found hardened or damaged.

5.4.3 Performance check of safety valve



<Procedures>

① Close the service valves completely and pull the test ring "7" to check the performance. It is performing normally when the compressed air jets out with turning by slight force.
② When compressed air bursts out, leave your hand from test ring.

Set pressure

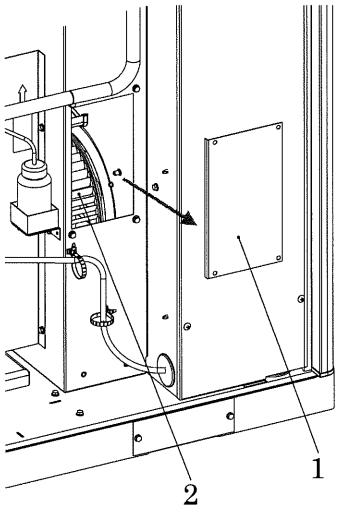
Service pressure	0.70 MPa [STD.spec.]	0.85 MPa [Factory opt.]	0.90 MPa [Factory opt.]
Set pressure for safety valve	1.0 MPa		

WARNING

- During inspection of safety valve function, never bring your face to safety valve because compressed air may burst out.
  It is very dangerous because high-pressure compressed air is blown from there.

5. Periodic Inspection List

5.4.4 Check and clean of sirocco fan

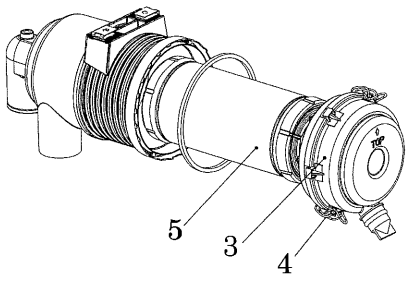


<Procedures>
① Remove the fan cover "1" and check if there is any crack on sirocco fan "2". Change the fan, if any are found.
- When replacing it, contact our office nearby or distributor because technical knowledge is required.

② Clean dust or dirt from fan blades.
- If too much dust is stuck on the fan, the fan will get unbalanced and the abnormal vibration due to such unbalance may cause crack to it. More often clean the fan even before scheduled maintenance interval, when the machine is used in especially dusty environment.

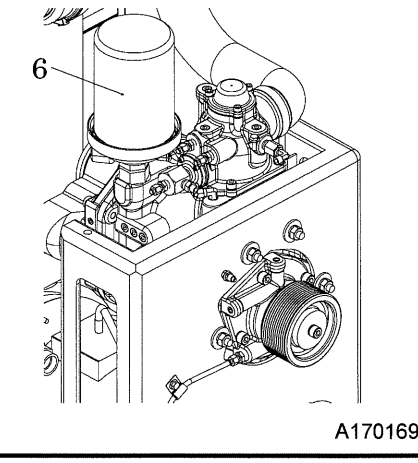
⚠ CAUTION	Great care should be taken to handle the sirocco fan "2" because it will be deformed and damaged if a strong force is applied to it when rotating it.

5.4.5 Clean and change air filter element



<Procedures>
① Loosen the latch "4" of the latch fixing the cup "3" and remove it.
② Remove the element "5" and clean dust and dirt.
③ After cleaning, install element and cup as they were, and surely set the latch fixing the cup.
④ Even before periodic inspection interval comes, clean or replace them when they are found dusty or dirty.
(For Replacement parts, See 5.5)

5.4.6 Check and change oil filter



<How to check>
- Check for oil leak around oil filter "6". Replace it according to following procedures if reached at the timing of replacement.

<How to replace>
① Remove oil filter using things like filter wrench.
② After coating the oil filter packing thinly with oil, screw it in.
(For Replacement parts, See 5.5)
③ After the packing "4" touches the sealing face, tighten another 3/4 to 1 turn with a filter wrench.
④ After installing oil filter, be sure to check for oil leak during the operation.

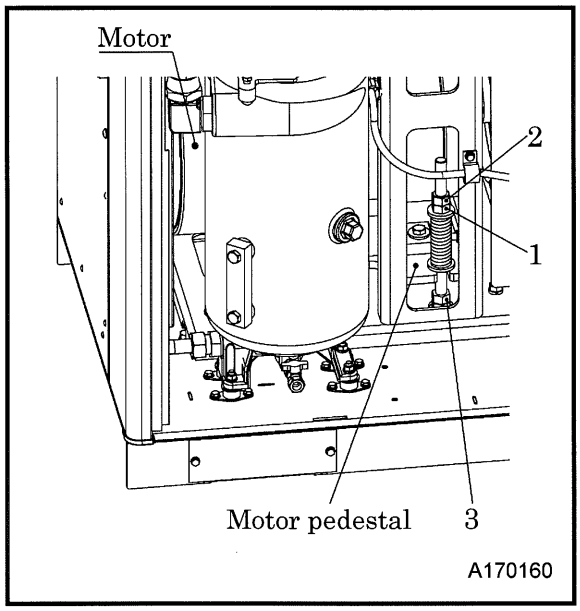
IMPORTANT	• Use our genuine oil filter, because other filter of bad quality can not catch sludge properly and it could cause damage to bearings.

5. Periodic Inspection List

5.4.7 Change and check of belt

Make belt tension adjustment.

- Perform visible inspection to check the belt for any crack, chip, wear or the like. Replace all the other belts as well as defective ones.
- When replacing it, contact our office nearby or distributor because technical knowledge is required.



<Belt tension adjustment procedures>

① Use a wrench or a similar tool to secure the nut "1", and unlock the nut "2".

② Rotating the nut "1" clockwise causes the belt tension to increase, whereas the tension will be decreased if the nut is rotated counterclockwise.

③ After the adjustment is completed, tighten the nut "2" to lock it in place.

<Belt replacement procedures>

① Use a wrench or a similar tool to secure the nut "1", and unlock the nut "2".

② Use a wrench or a similar tool to loosen the nut "3", and rotate the nut "3" counterclockwise after it comes into contact with the motor pedestal, using a wrench again. Then, the motor will be moved upward together with the pedestal and the belt tension will decrease.

③ Replace the belt with a new one.

※If the fixing bolts of the compressor machine and motor are not loosened, the centering is basically not required.

④ Tighten the nut "3" first, and secure the belt in position firmly.
The belt will be tightened by the weight of the motor and the pedestal.

⑤ As the belt can be further tightened by tightening the nut "1" under this condition, tighten and lock the nut "2" in place to prevent the nut "1" from being loosened from the moment when the specified tension is achieved.

IMPORTANT

- Because there is an initial elongation in the belt when it is replaced with a new one, be sure to make the belt tension adjustment again after performing the loaded operation for about two hours.

5. Periodic Inspection List

[How to measure belt tension load using sonic belt tension meter]

① Place the tip (sensor) of tension meter about 2cm away from the center of belt. In this position, carry out measurement by strumming the center of belt with a finger or hitting on it slightly with a handle of screwdriver.
② Conduct a measurement twice (after performing the loaded operation for about two hours, as there is an initial belt elongation) for [a new belt] and [at the time of readjustment] after the belt is replaced with a new one.
③ Note that the belt tension values differ from each other for [a new belt] and [at the time of readjustment].
Check if the belt tension values stay within the range of [at the time of readjustment] after the load operation for two hours. If not, adjust the belt tension values.
④ It is good if the measured value stays within the range of tolerance (±10%) as shown in the table below. It is better, however, that it be adjusted to be approximate to the center value.

Type	Working pressure (MPa)	Values entered by sonic belt tension meter			Belt tension values	
		Unit (g/m) (MASS)	Quantity of rib (WIDTH)	Span length (mm) (SPAN)	New belt (N) (Allowable limit)	For readjustment (N) (Allowable limit)
SAS15RD-5E SAS15R-5E	0.70 [STD.spec.]	19	12	333	1,521 (1,369 to 1,673)	1,318 (1,186 to 1,450)
	0.85 [Factory opt.]			327	1,513 (1,362 to 1,664)	1,311 (1,180 to 1,442)
	0.90 [Factory opt.]			337	1,500 (1,350 to 1,650)	1,300 (1,170 to 1,430)
SAS15RD-6E SAS15R-6E	0.70 [STD.spec.]			336	1,470 (1,323 to 1,617)	1,274 (1,147 to 1,401)
	0.85 [Factory opt.]			330	1,462 (1,316 to 1,608)	1,267 (1,140 to 1,394)
	0.90 [Factory opt.]			344	1,451 (1,306 to 1,596)	1,257 (1,131 to 1,383)

※How to enter data by sonic tension meter, please refer to sonic tension meter manual.

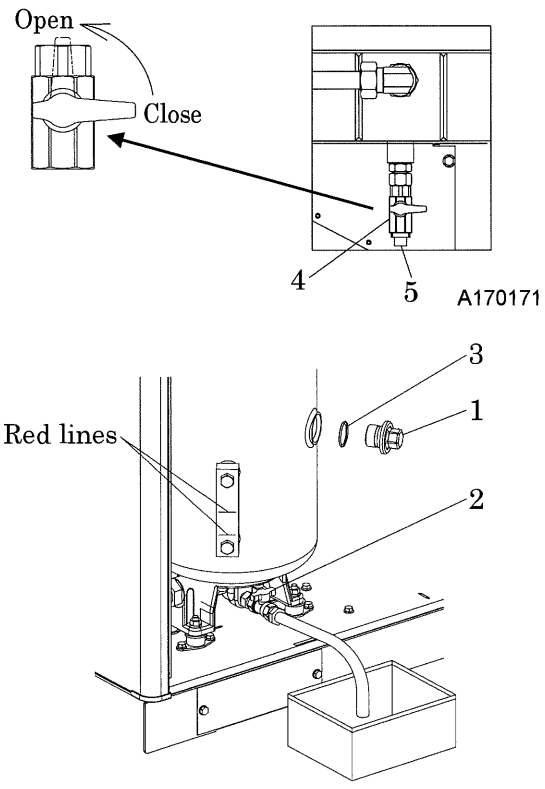
Belt type

Type	SAS15RD-5E/6E・SAS15R-5E/6E			
Working pressure	50Hz		60Hz	
	Belt type	No. of pieces	Belt type	No. of pieces
0.70MPa [STD.spec.]	12PK-1250	1	12PK-1180	1
0.85MPa [Factory opt.]	12PK-1250	1	12PK-1180	1
0.90MPa [Factory opt.]	12PK-1280	1	12PK-1220	1

5. Periodic Inspection List

5.4.8 Replenishment and change of compressor oil

- For prevention of fire caused due to deteriorated oil separator, in principle change of compressor oil is to be performed in accordance with the schedule mentioned in the regular maintenance table. However, it is heavily influenced by operation conditions and environmental conditions. If it has been found more dirty and corrupted, it should be changed.
- Even continuous oil replenishment cannot improve its deteriorated condition. Be sure to change the oil completely at every scheduled interval.
- If machine is continuously operated in such bad conditions, it could damage bearings and degraded oil sticks oil separator to cause accumulated oxidation heat of reaction to lead oil separator fire. For this reason, regular maintenance work should be done surely and perfectly.
- When compressor oil is replaced by new one, wait for enough time (2 to 3 minutes) after stopping the operation of the machine.



<Procedures>

① When the pressure in the separator receiver tank has been found completely relieved in the course of enough time after compressor stopped, remove oil filler cap "1" and open the drain valve "2" to drain compressor oil.
Remove drain plug "5" of oil cooler and open drain valve "4" so as to drain oil in the cooler.

② After draining compressor oil, surely retighten drain valve "2" and "4". Lastly, attach drain plug "5".

③ After filling fresh oil up to the upper level of level gauge, close the oil filler cap. Check the O-ring "3" of oil filler cap for damage or hardening. If there is any damage, replace it with a new one.

④ After starting operation, check and confirm that oil level is within red lines of oil revel gauge.

Type	SAS15RD-5E/6E SAS15R-5E/6E
Quantity of oil between the red lines	1.3 L
Quantity of change oil	8.0 L

IMPORTANT

- Please make sure to use the AIRMAN genuine dedicated oil "LONG-LIFE HP". **However, in case AIRMAN dedicated oil is un-acquirable, using of the below mentioned oil is strongly recommended, and please reduce by half all the periods those are suggested in the table of periodic inspection/ maintenance.**

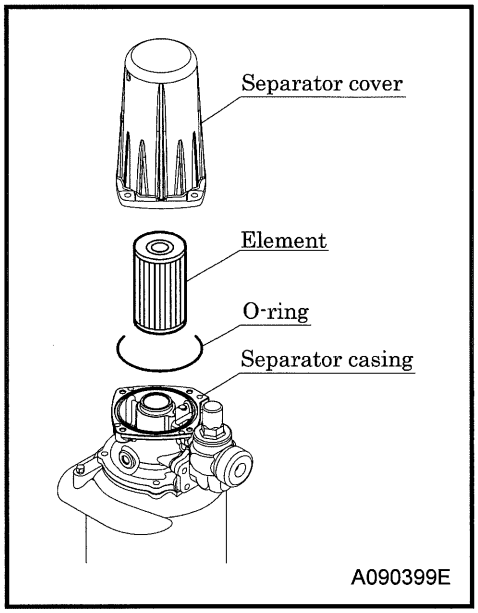
Maker and Brand of Recommended Oil.

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

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

5.4.9 Change oil separator element

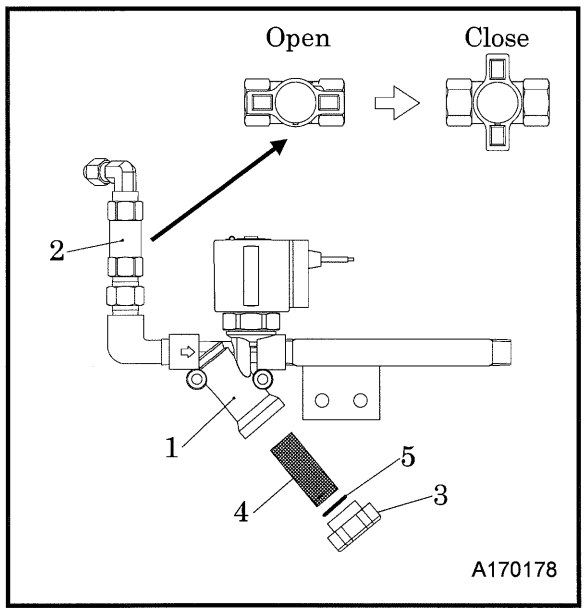
- Even before the periodic interval time of replacement, replace the oil separator element with a new one whenever the oil consumption increases and also oil is found to have been mixed in the discharge air.



<Procedures>
① Remove separator cover bolts 4 pieces.
② Replace element and O-ring by a new one.
③ After installing element, be sure to check for oil leak during the operation.

- When consumption of the oil is still unusual even after cleaning strainer in the scavenging orifice (See5.4.2), change the oil separator element with a new one.
  (For Replacement parts, See 5.5)

5.4.10 Clean of strainer at draining portion of dryer drain



<Procedures>
① When cleaning of Y type strainer "1" at draining portion of dryer drain, close drain valve "2".
② Remove nut "3" of Y type strainer, and pull out screen "4".
③ Clean the screen and inside of Y type strainer.

- Then, when installing the nut, check O-ring "5" and replace it immediately if it is found damaged.
  (For Replacement parts, See 5.5)

※ Drain valve "2" should be always kept "OPEN" except when it is to be cleaned.

5. Periodic Inspection List

5.5 Periodic Replacement of Parts

Part Name	Part Number		Quantity
	SAS15RD-5E/6E	SAS15R-5E/6E	
Dustproof air filter "1"	32163 21100		1
Dustproof air filter "2"	32163 23200	32163 23900	1
Air filter element	32143 16500		1
Oil filter	37438 08900		1
Oil separator element	34224 02801		1
O-ring (for oil separator)	03402 15110		1
O-ring (for the strainer in the solenoid valve for draining condensate in dryer)	21221 05400		1

※ Above mentioned parts are to be changed or replaced by customer only.
When parts other than the ones in the following table are required, contact our office nearby or distributor.

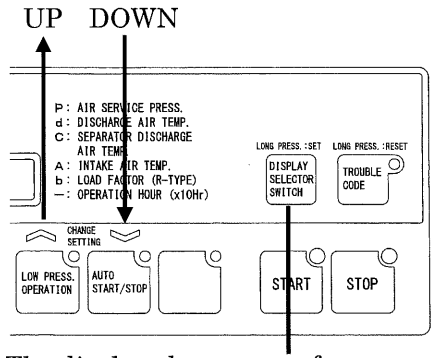
5. Periodic Inspection List

5.6 Adjustment of Various data

The following set values can be altered and adjusted.
However, as far as unloading operation starting pressure (purge starting pressure) PH is concerned, never adjust operation at higher pressure than specified initial setting value.
※In case of operation at higher pressure than each specified set value would lead to motor overloading and motor burning and parts.

No.	Item	Indication	Initial set value classified by working pressure			Range of set values		Page
			0.70MPa [STD.spec.]	0.85MPa [Factory opt.]	0.90MPa [Factory opt.]	Set value	Pressure (MPa)	
1	Full load recovery pressure (purge cancellation pressure) PL	L	60 (0.60MPa)	70 (0.70MPa)	75 (0.75MPa)	–	–	–
2	Unloading operation starting press. (purge starting pressure) PH ※	H	Max.70 (0.70MPa)	Max.85 (0.85MPa)	Max.90 (0.90MPa)	–	–	–
3	Low pressure operation caused due to fall press.	E	4 (0.04MPa)			2 to 20	0.02 to 0.2	3-6
4	Estimated stop time	T	60 (60 seconds)			20 to 180 seconds	–	3-7
5	Time required for confirmation of purge operation	U	20 (20 seconds)			5 to 60 seconds (At 0 set, purge control mode operation is cancelled.)	–	3-5
6	Timer set for limiting stop operation	r	5 (5 min.)			5 to 60 min.	–	3-7
7	Purge operation changeover load factor	b	20 (20 %)			10 to 50%	–	3-5
8	–	y	0 (0 seconds)			Invalid	–	–
9	Dryer function mood setting	d	0			0: Abnormal stop with dryer available 1: Abnormal warning with dryer available 2: Dryer unavailable・–	–	–
10	–	c	1			Invalid	–	–
11	Urgent purge starting pressure	F	84 (0.84MPa)	98 (0.98MPa)		–	–	–
12	Timer set for judging long time unloading operation	J	60 (60 seconds)			60 to 300 seconds	–	3-7
13	Model setting	A	6			6	–	–
14	Maintenance warning time	o	300 (3,000Hr)			0 to 700	–	–

[How to change primary set value and to switch indication]



The display change over from display mode to setting mode when indication selection switch is pressed longer (than 2 seconds).

A170643E-2

<Procedures>

① When changing each set value, it is possible to change set value within setting range by pressing right and left arrow marks on operation panel.

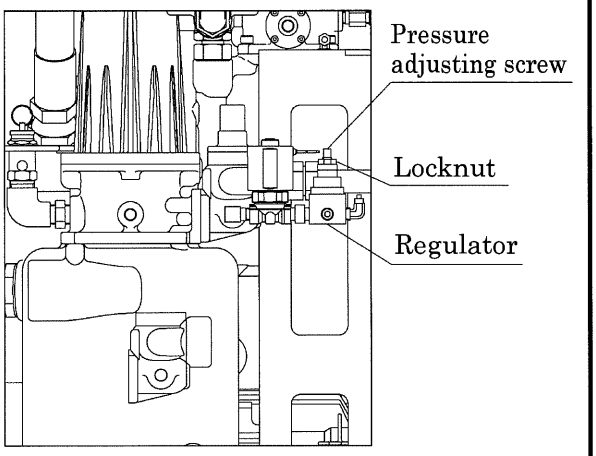
② After set value is changed, setting is completed by pressing indication changing switch.

When indication selection switch is pressed longer (than 2 second), first L.(Full load recovery pressure (purge cancellation pressure) PL) is displayed. Each time indication selection switch is pressed, each indication will be selected.
Then each time it is pressed one time, H.(Unloading operation starting pressure (purge starting pressure) PH) is switched to E.(Low pressure operation caused due to fall pressure), to T.(Estimated stop time), to U.(Time required for confirmation of purge operation), to r.(Timer set for limiting stop operation), to b.(Purge operation changeover load factor), to y.(-), to d.(Dryer function mood setting), to c.(-), to F.(Urgent purge starting pressure), to J.(Timer set for judging long time unloading operation), to A.(Model setting), to o.(Maintenance warning time), and to L.(Full load recovery pressure (purge cancellation pressure) PL), according to the set orders.

5. Periodic Inspection List

5.7 Adjustment of Service Pressure

Procedure of the service pressure value setting is followings.



<Procedures>

① After starting operation, set to "0" the time for time required for confirmation of purge operation. (See5.6)

② In case that purge control function is released, auto start/stop mode operation will be cancelled. (See3.2.3)

③ Loosen locknuts of regulator.

④ Close the stop valve slowly until the valve is completely closed. Then adjust the pressure adjusting screw of regulator until pressure indication at operation panel meets the value of unload pressure detailed in the table below. (Clockwise rotation increases the service pressure.)
(For selection of service pressure and load factor, See3.1.)

⑤ Tighten the locknut.

⑥ Then, set to more than "0" the time for time required for confirmation of purge operation so that purge control operation can be made available.

Service pressure list

Service pressure	0.70 MPa [STD.spec.]	0.85 MPa [Factory opt.]	0.90 MPa [Factory opt.]
Unload pressure	0.75 MPa	0.90 MPa	0.95 MPa

<How to check state of service pressure setting>

① When service pressure is raised by gradually closing service valve, it is switched to purge control operation. (See3.2.3)

② Next, open the stop valve gradually, to lower service pressure. Then it releases purge control operation mode and it will be switched to full load operation. (See3.2.3)

⚠ CAUTION

- As the service pressure is adjusted before shipment, do not readjust it during the normal operation.
- Operation at higher pressure than specified set value would lead to motor overloading and motor burning and parts.

6. Long-term Storage and Disposal of Product

6.1 Preparation for Long-term Stoppage

If the machine will not be used for a long period, follow the advice below:

- Turn the main power supply "OFF".
- Keep the stop valves at discharge port closed.
- Carry out a running-in operation for approx. 20 minutes at an interval of about a week.
- Perform operation in accordance with the article 3.2 "Operating method".
- If you find something wrong with the equipment, take appropriate measures according to 4.2 "Troubleshooting".

6.2 Disposal of Product

- When disposing of this product, be sure to remove the compressor oil from it.
  When you have anything unclear or you want to advise us, contact our office nearby or distributor.

7. Specification

7.1 Specifications

7.1.1 Dryer built-in type

[OPT.: Factory option]

Model		Unit	SAS15RD-5E			SAS15RD-6E		
COMPRESSOR	Type		Rotary-twin screw, single stage, oil cooled					
	Free air delivery	m^3/min	2.65	2.35	2.15	2.65	2.35	2.15
	Working pressure	MPa	0.70 [STD.]	0.85 [OPT.]	0.90 [OPT.]	0.70 [STD.]	0.85 [OPT.]	0.90 [OPT.]
	Capacity control system		Regulator control, Purge control, Auto start/stop					
	Lubrication system		Forced oil injection by compressed air pressure					
	Driving system		Belt drive					
	Lubricating oil		LONG-LIFE HP					
	Lubrication oil capacity	L	8					
MAIN MOTOR	Type		Totally-enclosed fan cooled three-phase squirrel cage induction					
	Power output	kW	15 (SF 1.15)					
	Number of poles	P	4					
	Starting system		Direct starting					
FAN MOTOR	Type		Fully closed three-phase cage induction					
	Power output	kW	0.75					
	Number of poles	P	4					
	Insulation		F					
Air outlet port			25A (R 1B)					
DRYER	Dew-point of discharged air	℃	Under the ambient pressure less than 10					
	Power consumption	kW	0.51			0.58/0.60		
	Refrigerator nominal output	kW	0.5					
	Refrigerant		R407C (Refrigerant enclosed: 300g)					
DIMENSIONS (APPROX.)	Width	mm	1,160					
	Length	mm	670					
	Height	mm	1,270					
Approx. weight for maintenance		kg	200V type	505				
			380/400V type	530				

- Free air delivery is the value calculated, being converted into suction conditions of compressor air-end (at the primary stage of air filter).
- The dew point of discharge air is the value measured at the ambient temperature of 30℃, discharge pressure of 0.70MPa.
- When the dryer discharges sediment, the air quantity will decrease due to the deposit of sediment.
- Ask our office nearby or distributor for the guaranteed value of free air delivery.

7. Specification

7.1.2 Without dryer type

[OPT.: Factory option]

Model		Unit	SAS15R-5E			SAS15R-6E		
COMPRESSOR	Type		Rotary-twin screw, single stage, oil cooled					
	Free air delivery	m³/min	2.65	2.35	2.15	2.65	2.35	2.15
	Working pressure	MPa	0.70 [STD.]	0.85 [OPT.]	0.90 [OPT.]	0.70 [STD.]	0.85 [OPT.]	0.90 [OPT.]
	Capacity control system		Regulator control, Purge control, Auto start/stop					
	Lubrication system		Forced oil injection by compressed air pressure					
	Driving system		Belt drive					
	Lubricating oil		LONG-LIFE HP					
	Lubrication oil capacity	L	8					
MAIN MOTOR	Type		Totally-enclosed fan cooled three-phase squirrel cage induction					
	Power output	kW	15 (SF 1.15)					
	Number of poles	P	4					
	Starting system		Direct starting					
FAN MOTOR	Type		Fully closed three-phase cage induction					
	Power output	kW	0.75					
	Number of poles	P	4					
	Insulation		F					
Air outlet port			25A(R 1B)					
DIMENSIONS (APPROX.)	Width	mm	1,160					
	Length	mm	670					
	Height	mm	1,270					
Approx. weight for maintenance		kg	200V type	480				
			380/400V type	505				

- Free air delivery is the value calculated, being converted into suction conditions of compressor air-end (at the primary stage of air filter).
- Ask our office nearby or distributor for the guaranteed value of free air delivery.

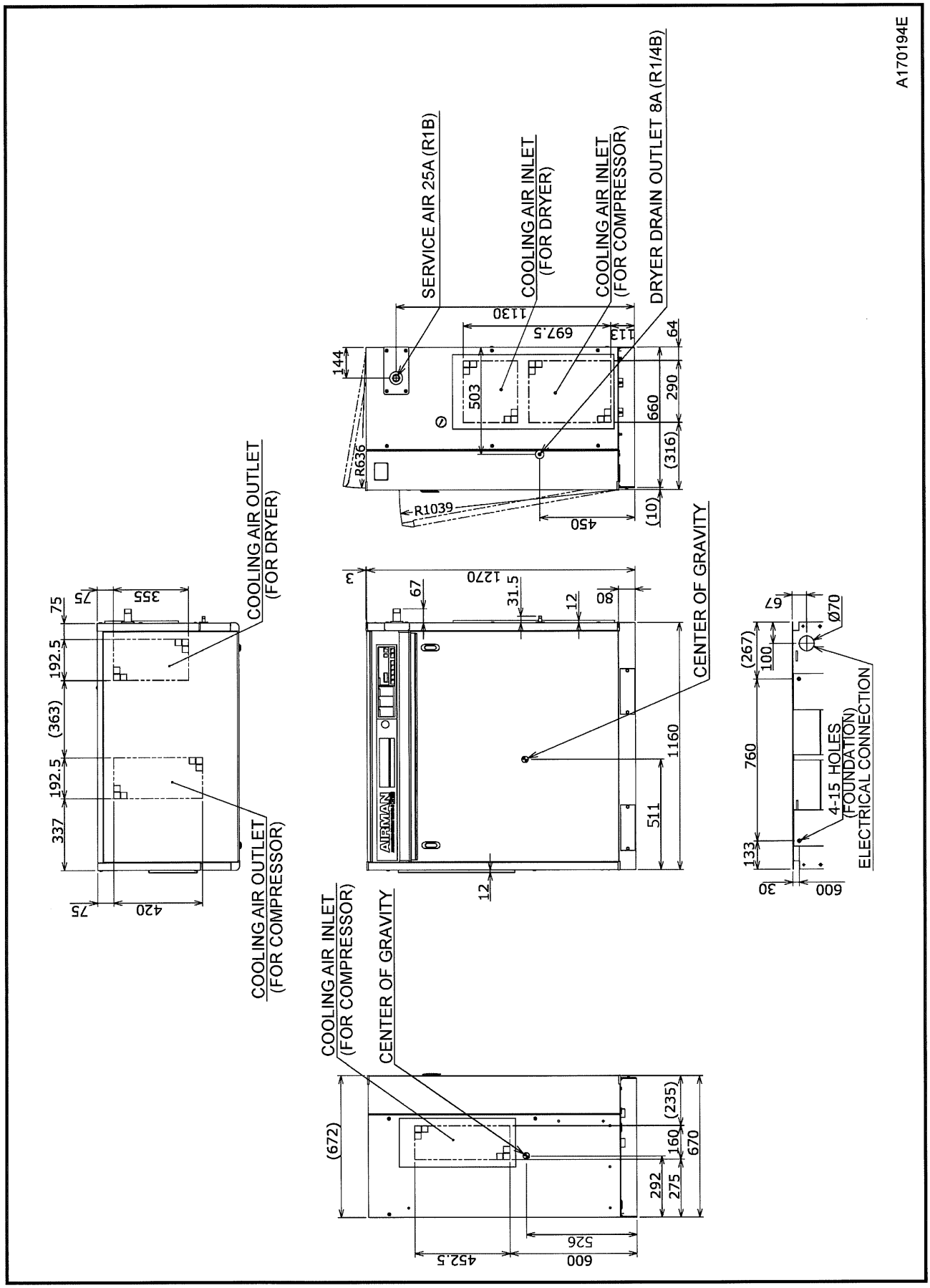
7.1.3 Motor specifications (Totally-enclosed fan cooled type)

Power output		kW	15		
200V class	Frequency	Hz	50		60
	Power source	V	200		200/220
	Rating current	A	66.4		63.8/59.0
	Thermal relay standard set value	A	64.0		61.0/56.5
	Number of poles		4P		
	Insulation		F		
400V class	Frequency	Hz	50		60
	Power source	V	380	400	400/440
	Rating current	A	35.5	33.2	31.9/29.5
	Thermal relay standard set value	A	35.5	32.0	30.5/28.5
	Number of poles		4P		
	Insulation		F		

7. Specification

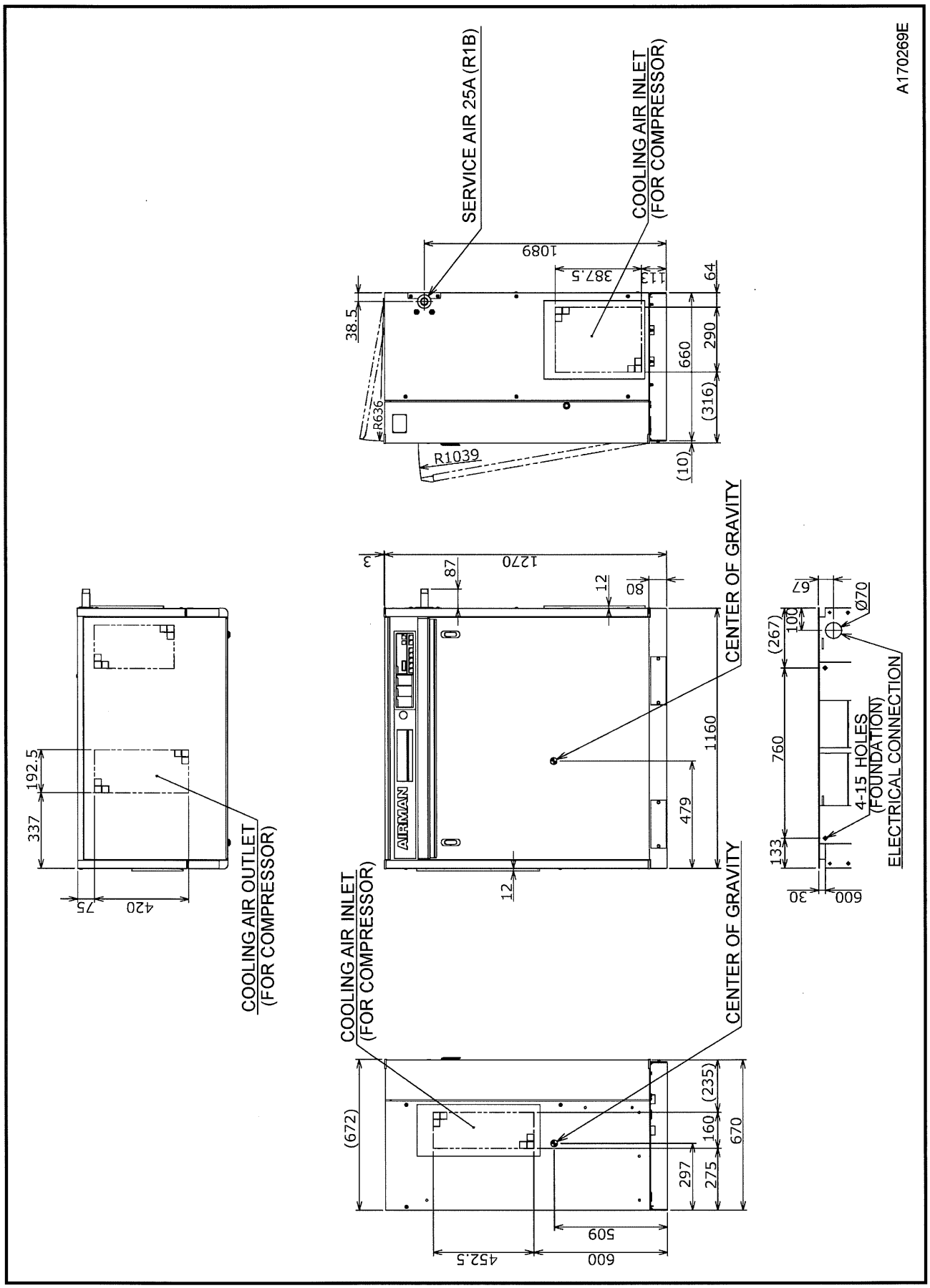
7.2 Size and Dimensions

7.2.1 Dryer built-in type



7. Specification

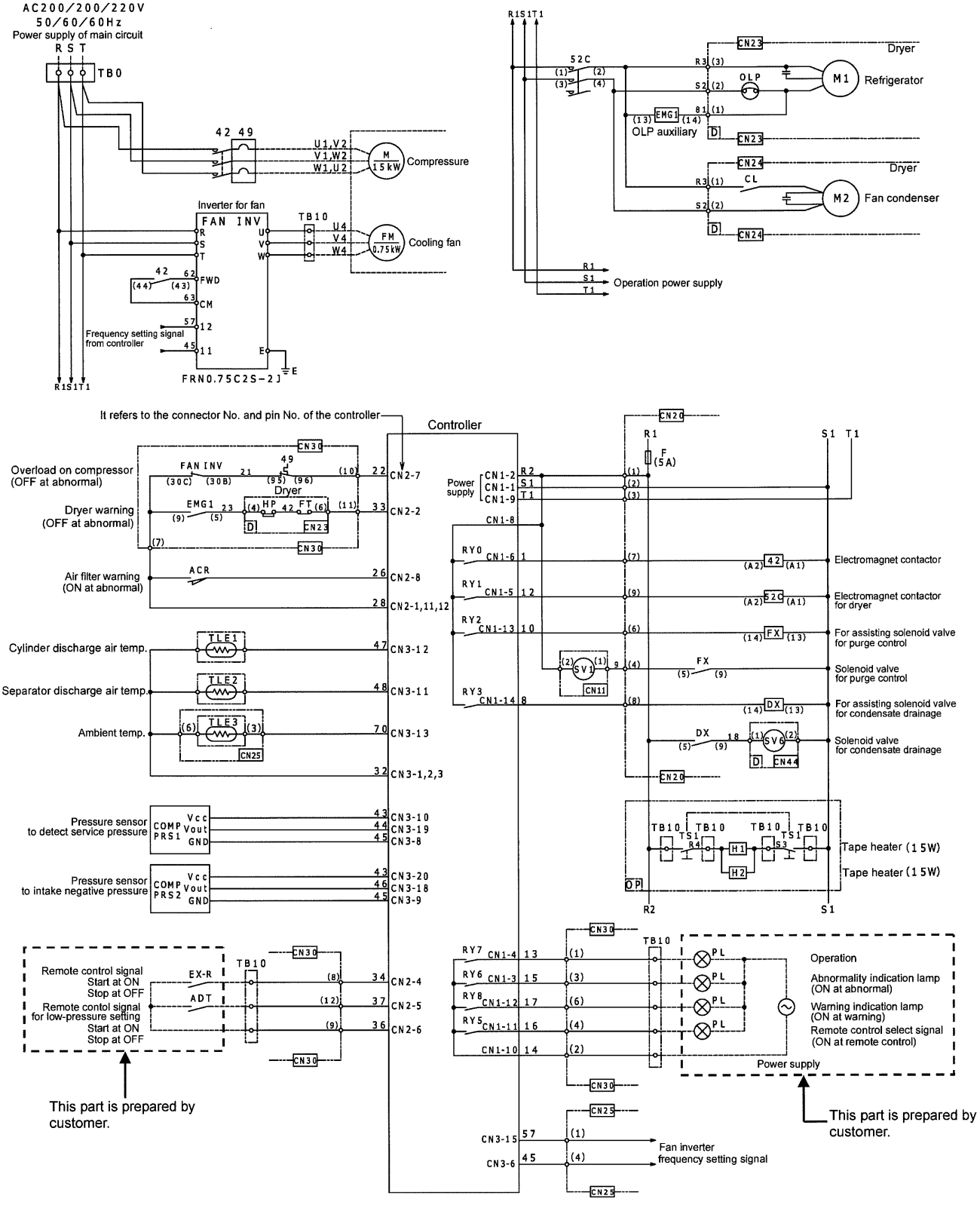
7.2.2 Without dryer type



7. Specification

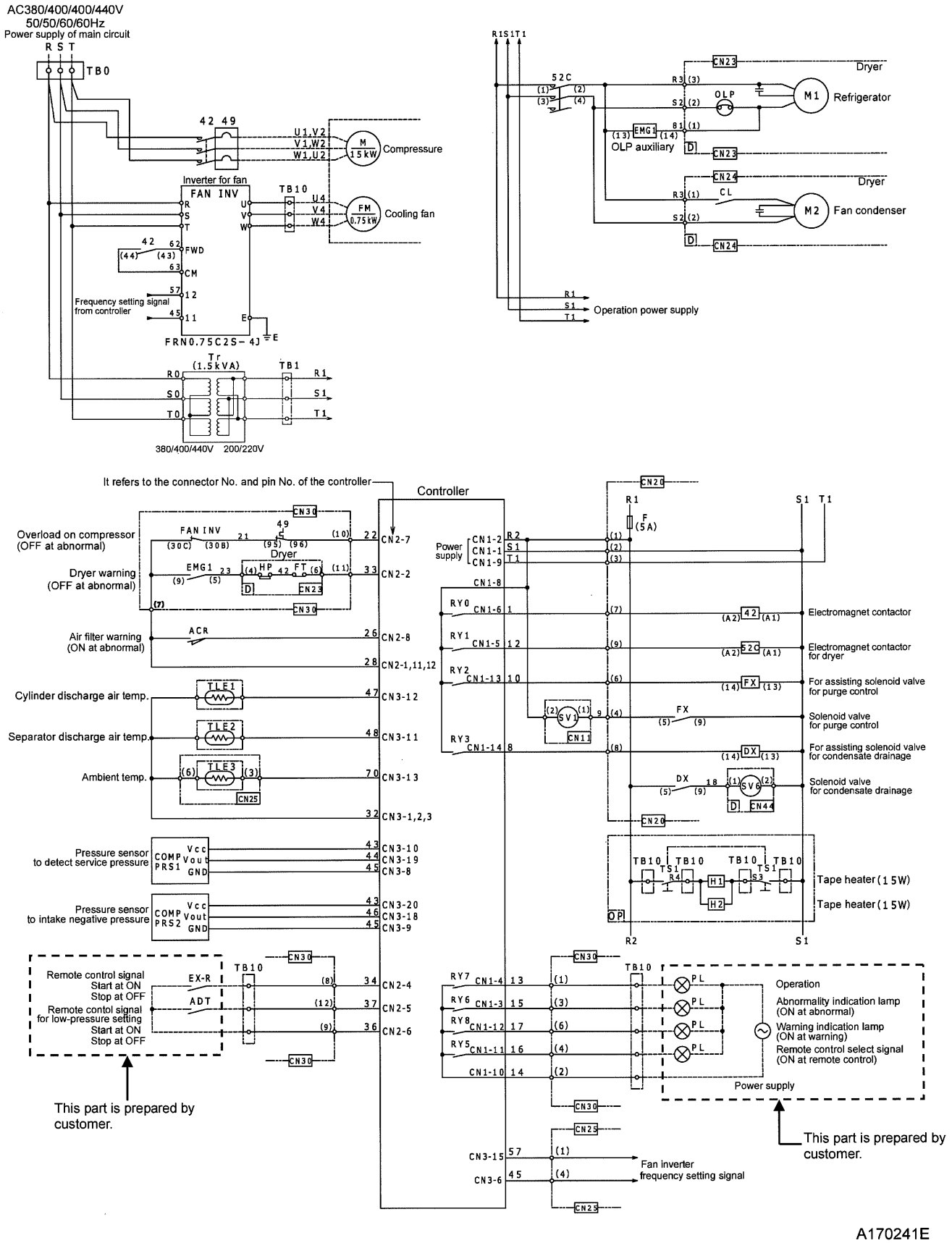
7.3 Wiring Diagram

SAS15RD-5E/6E (200/220V type)
SAS15R-5E/6E (200/220V type)



7. Specification

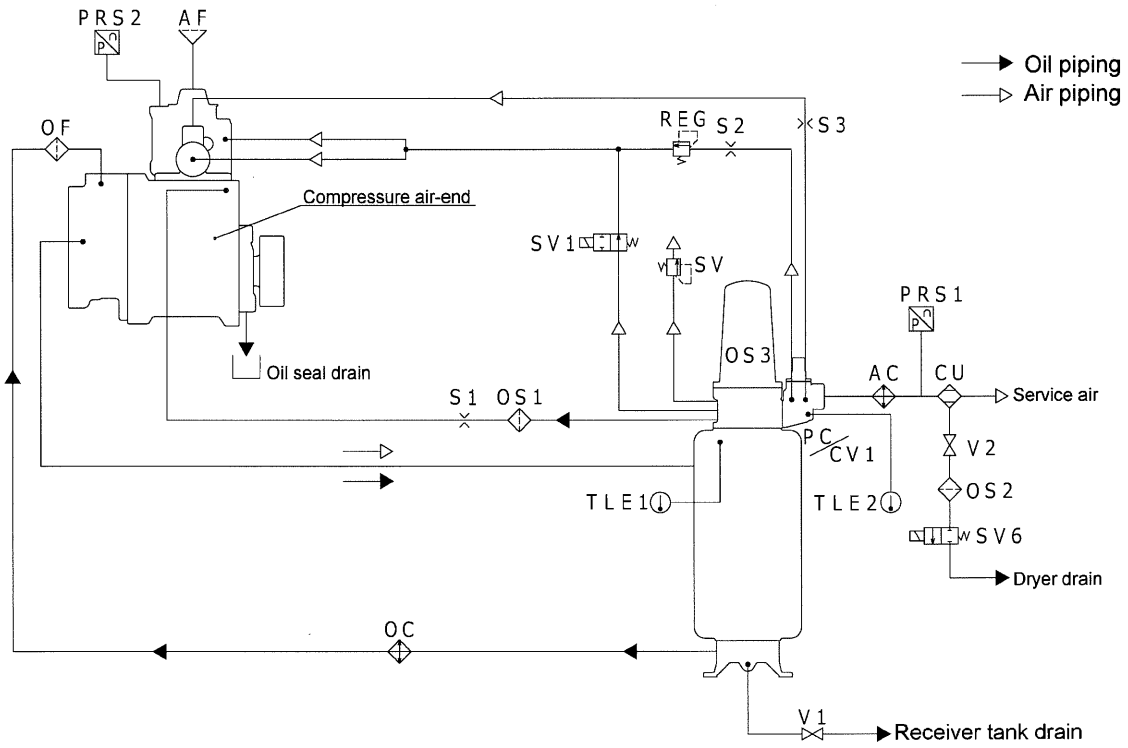
SAS15RD-5E/6E (380/400/440V type)
SAS15R-5E/6E (380/400/440V type)



7. Specification

7.4 Piping Diagram

7.4.1 Compressor



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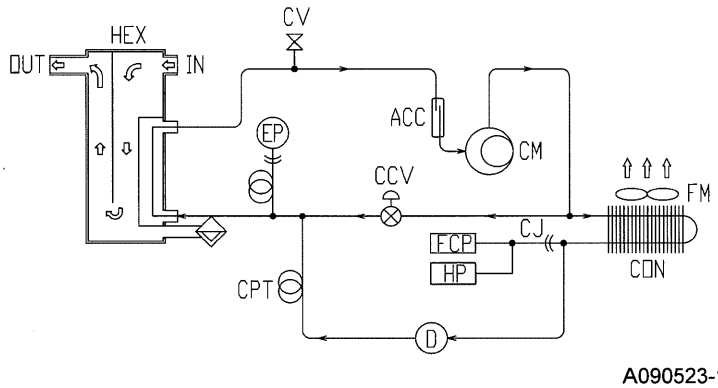
AC	Aftercooler	PRS1,PRS	Pressure sensor
AF	Air filter	REG	Regulator
CU	Dryer	S1,S2,S3	Orifice
CV1	Check valve	SV	Safety valve
OC	Oil cooler	SV1	2-way solenoid valve (for purge control)
OF	Oil filter	SV6	2-way solenoid valve (for drain condensate)
OS1,OS2	Strainer	TLE1	Discharge air temperature sensor
OS3	Oil separator	TLE2	Separator discharge air temperature sensor
PC	Pressure control valve	V1,V2	Stop valve

7.4.2 Dryer



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ACC	Accumulator
CCV	By-pass valve for hot gas
CON	Condenser
CM	Compressor
CPT	Capillary tube
CJ	Check joint
CV	Charge valve
D	Dryer
EP	Refrigerant pressure gauge
FCP	Fan-control switch
FM	Fan motor
HEX	Cooler
HP	High pressure switch

MEMO

OPERATION LOG

OPERATION DATE	OPERATION TIME		TOTAL OPERATION HOURS(h)	DISCHARGE AIR PRESS. (MPa)	INPUT VOLTAGE (V)	INPUT CURRENT (A)	INHALATION AIR TEMP. (℃)	DISCHARGE AIR TEMP. (℃)	COMP.OIL SUPPLY (L)	REMARKS (INSPECTION/PART CHANGE HISTORY ETC.)
	START TIME	STOP TIME								
. .	:	:								
. .	:	:								
. .	:	:

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