Manual de operación

SAS4SD6C

Alpha C
Un lazo para toda la vida.

AIRMAN®

Preface

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

- ◆ Keep the manual available at all times for the operator or safety supervisor.
- ◆ In case the manual is lost or damaged, place an order with your dealer for another copy. Make sure that the manual is included with the unit when it is handed over to another user.
- ◆ There may be some inconsistency in detail between the manual and the actual machine due to improvements of the machine. Ask your dealer if you have any questions or problems.

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Safety

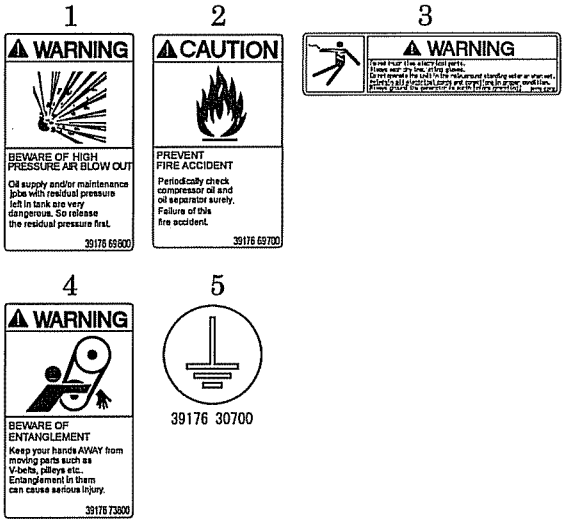
This contains safety precautions on such as operation/handling, inspection/maintenance, installation, transfer/transportation. Read these safety requirements carefully and fully understand the contents before starting the machine.
For your better understanding of the precautions in this manual and on 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 UNIT".

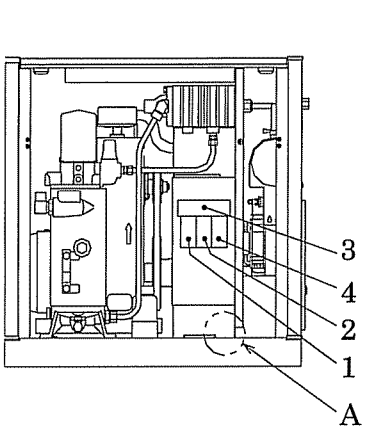
⚠ DANGER	DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.
⚠ WARNING	WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	CAUTION indicates a potential hazardous situation which may possibly only cause a minor injury to operator and damages to property only.
IMPORTANT	IMPORTANT indicates important caution messages for the performance or durability of the unit.

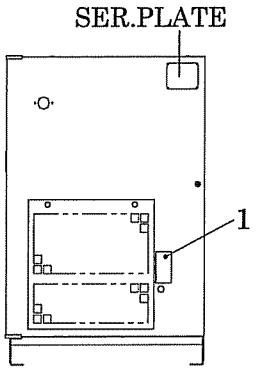
This manual does not describe all safety items. We, therefore, advise you to pay special attention to all items (even though they may not be described in the manual) for your safety.

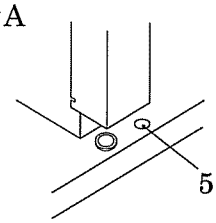
[Safety Warning Labels]

Following labels are attached to the machine. Should they be damaged or peeled off, it is necessary to attach new ones ordered from close parts supply center or distributor.

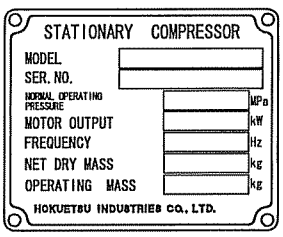








Details: A section



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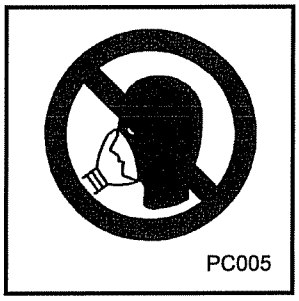
For reference to the machine, please let us have machine serial number mentioned on SER. PLATE.

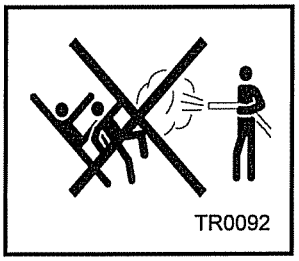
DANGER

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

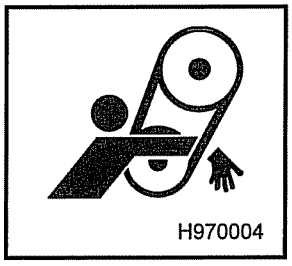

PC005

WARNING

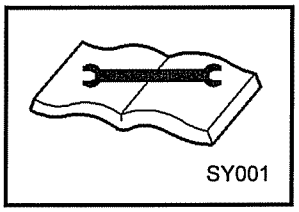
- Never blow compressed air directly at people. Scattered impurities, dust, or foreign objects in the compressed air may cause skin and eyes to be seriously injured.
- As compressed air contains toxic gas etc., compressed air should not be used to be blown or sprayed against food etc.


TR0092

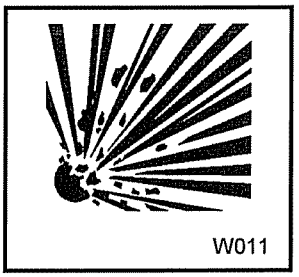
- Never operate the machine uncovered without cover. Never bring your hand(s) or anything inside because revolving parts such as fan belts etc. are hazardous. It could cause serious injuries if hands should be caught in.


H970004

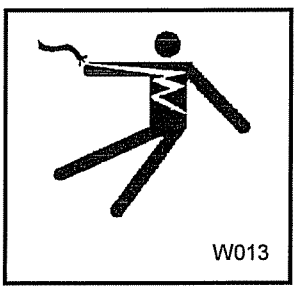
- Turn the power supply "OFF" before starting inspection, and hang a "Now Checking and Maintenance" tag where it can be easily seen. The checker must keep the key during checking and maintenance.

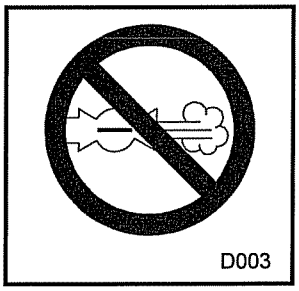
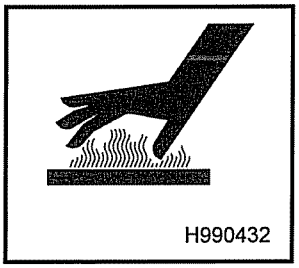
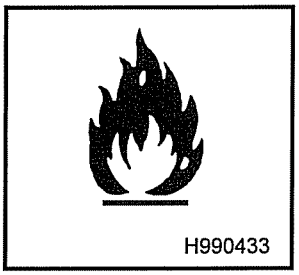

SY001

- 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.


W011

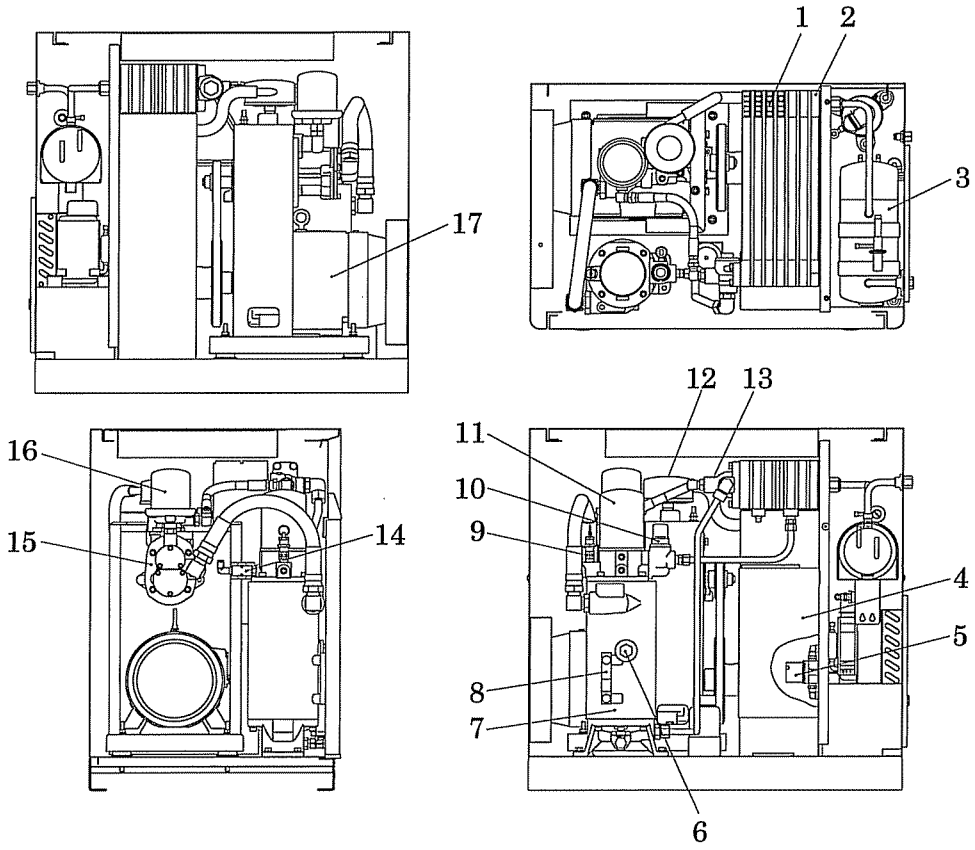
- Be sure to keep a wet hand away from the power source or any other electric equipment. Electric shock can cause serious accident or even death.


W013

⚠ WARNING	● When cleaning dust accumulated in such devices as the air-filter, by blowing compressed air, wear safety glasses, etc. to protect your eyes.	M003
⚠ 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.	 D003
	● 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.	 H990432
	● 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.	 H990433

1. Part Names

1.1 Internal Components



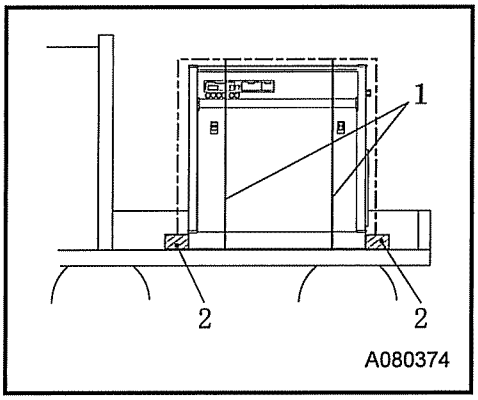
No.	Description	Function
1	Oil cooler	For cooling compressor oil circulating in the system.
2	After cooler	For cooling compressed air.
3	Dryer	For removal of moisture mixed in compressed air.
4	Starter panel	For starting operation of compressor.
5	Solenoid valve for draining condensate in dryer	For periodically draining condensed water by dryer.
6	Compressor oil filler port	For supplying and replenishing compressor oil.
7	Separator receiver tank	For collecting oil mist mixed in compressed air and in compressing air and collecting it in the tank.
8	Oil level gauge	For showing the oil level inside receiver tank.
9	Safety valve	For releasing compressed air to the atmosphere when the pressure rises higher than the rated pressure.
10	Pressure control valve	For keeping the receiver tank pressure higher than 0.39MPa in the tank.
11	Oil separator	For separating oil mist mixed in compressed air.
12	Air filter	For filtering the dust floating in the intake air.
13	By-pass valve	For keeping compressor oil at optimum temperature.
14	Solenoid valve for capacity control	For controlling full load and unload operation.
15	Air-end	For compressing intake air.
16	Oil filter	For filtering compressor oil.
17	Motor	Driving compressor air end.

2. Installation

2.1 Transportation

CAUTION

- When moving the machine, be sure to use a forklift or a crane.
- When transporting the machine on a truck, securely fix it with ropes"1". If necessary, apply chocks"2"on the truck bed.

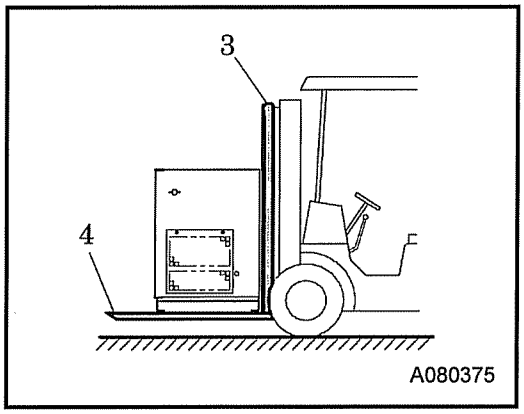


IMPORTANT

- When the machine is displaced or transported from its location, securely fix it with ropes"1".
- Select an appropriate crane or truck by referring to the mass and dimensions mentioned in "SPECIFICATIONS". (See 6)

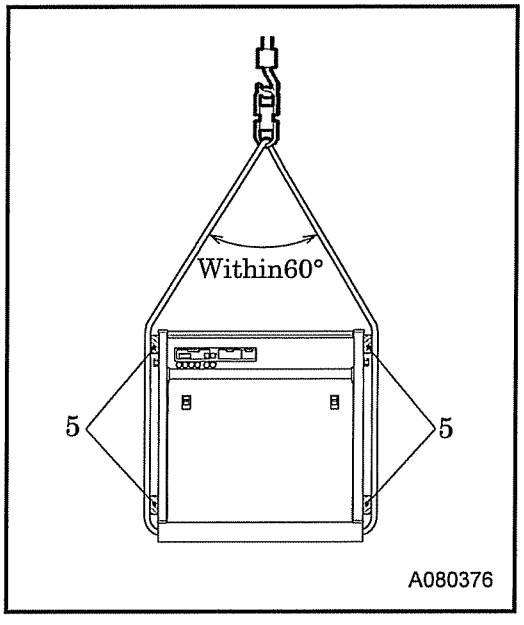
[Movement with a forklift]

- 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 right figure.



[Lifting with a crane, etc.]

① Lift machine with nylon slings passed from machine bottom as shown in the right figure. And protect the package from being damaged by packing cushion material "5" at these nylon sling touching parts.
② After confirming there is no person near the working area, lift the unit by crane.
③ Carefully and safely lift the unit, as the center of gravity of unit is inclined to left side, so be careful not to drop it.



[Unloading]

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

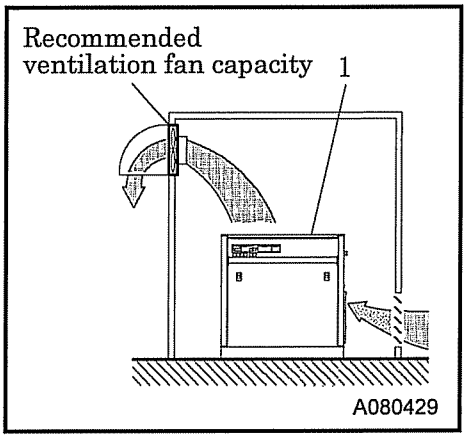
2. Installation

2.2 Location and Installation

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.
- The machine has to be installed horizontally on a level place indoors. Installation of the unit on such place as swampy places and where rain will be collected could cause electric shock.

- The machine should be operated in following conditions:
- Ambient temperature··2℃ to +40℃(Dryer built-in type)
- Humidity·····Less than 85%
- 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.



2.2.1 Ventilation

When the machine is unavoidably installed in such insufficiently ventilated place, ventilation fan having the capacity listed in the right table should be provided indoors so that it may keep ambient temperature around this machine "1" lower than 40℃.

※Above value is only for your reference, based on the assumption that the allowable temperature rise indoors is 5℃. The value varies depending on the size of the room where the machine is installed.

- Installation of a duct at the exhaust outlet of the dryer does not ensure supply of enough cooling wind volume. It causes loss of pressure and leads to overheating. Never provide a duct at the exhaust outlet of the dryer.
- For installation of a duct (for example, calculation of pressure loss within duct), please contact us or our distributor.

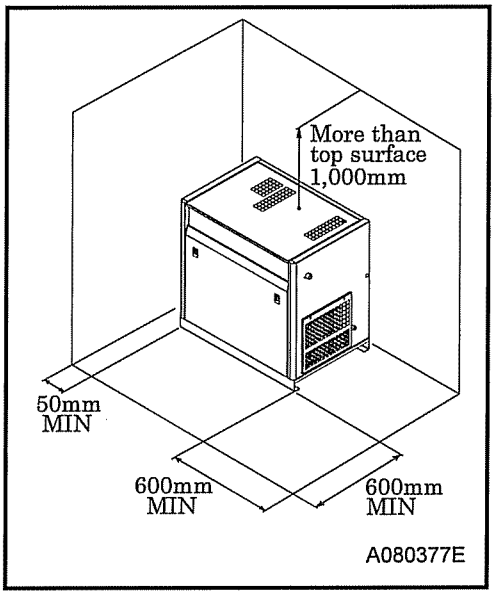
Ventilation fan air capacity

(Unit:m³/min)

Type	Dryer built-in type
Allowable pressure loss outside the unit.	20Pa (2mmAq)
Recommended ventilation fan capacity.	42

2.2.2 Space required for inspection/maintenance

- Keep necessary space around the machine for inspection and maintenance access.
- 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.



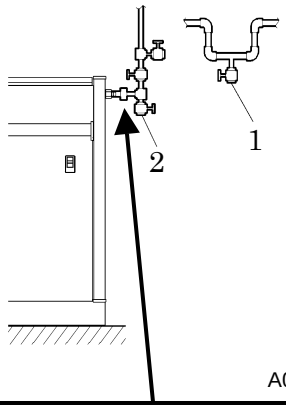
2. Installation

2.3 Piping Work

CAUTION

- 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.
- Install a drain valve “2” to prevent condensate water from returning into compressor air-end from the main discharge pipe.

Discharge port : 10A(Rc3/8B)
[Taper male screw]



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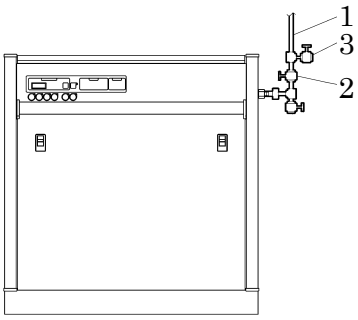
A union fitting or flange should be installed at the discharge port.

IMPORTANT

- Install a stop valve “2” to the discharge main pipe “1” for inspection and maintenance jobs. Also for parallel operation of several units it is necessary to install a stop valve “2” to each unit. Further, it is recommendable to install a valve “3” to the pipe as shown in the figure for connection to the standby unit.
- 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.



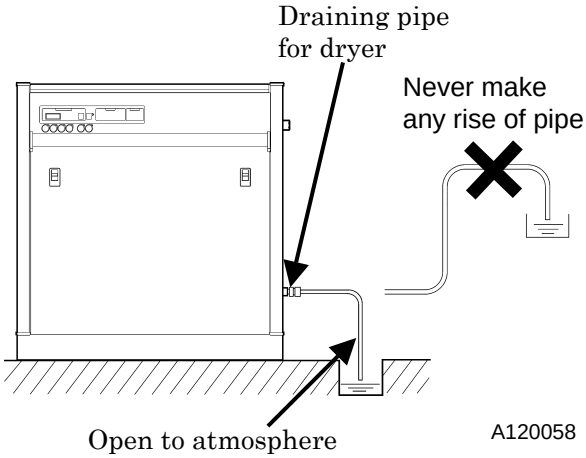
A080379

- Determine the diameter of discharge pipe considering pressure loss in the piping, if the discharge pipe is long.

[Draining pipe for dryer]

Perform drainpipe work, paying attention to the following points.

- Pipe diameter at outlet of drainpipe is 8A (Rcl/4B) [Taper male screw].
- Length of drainpipe shall be within 3m open to atmosphere. (To be prepared by client.)



A120058

CAUTION

- Draining pipe of dryer may not be allowed to rise in pipe line.
- In cold season condensate in draining pipe gets frozen and blocked so that it can not be drained.

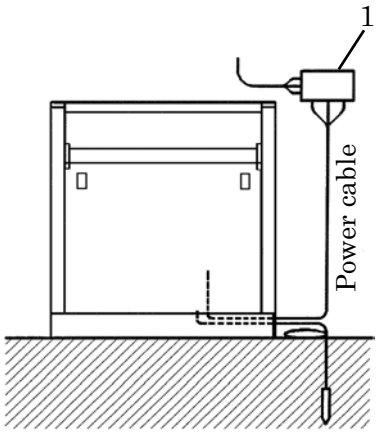
2.4 Wiring

- 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 ±10% of the rated voltage, and ±3% among phases.

⚠ CAUTION

- 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.

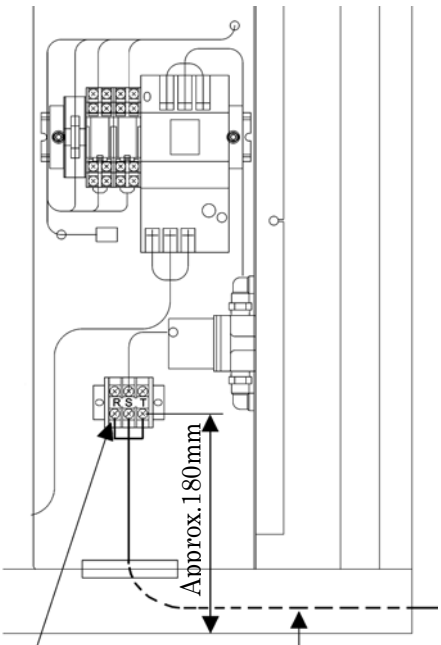
Wiring



[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 cable thickness in the above table are based on the straight line of 10m long.
- However, determine cable specifications such as cable length, taking into account the actual power supply situations.
- Use EV cable for 600V or 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.
- Use 100mA for sensitivity current of the ground fault circuit interrupter.

Voltage of power source	Circuit breaker rated current	Thread size of power supply connection terminal plate	Wire size	Ground cable diameter
200V	50A	M4	3.5mm²	3.5mm²
400V	30A	M4	1.25mm²	2.0mm²



Unscrew round screw 3 pieces for power cable connection terminal plate, using a screwdriver. Be sure to use round terminal and bolts M4.

2. Installation

⚠ CAUTION

Check turning direction of compressor (400/440V type only)

- This unit is not provided with reversed direction indicator.
  After connecting power, make sure to check rotation direction of compressor without fail. When checking rotation direction, perform it within 1 second. Operation in reverse direction can cause reverse flow of compressor oil, resulting in damaging compressor.
  In case that compressor turns in reverse direction, change two of 3 phases for correct connection, and check again the rotation direction for sure.

3. Operation

3.1 Operation Panel

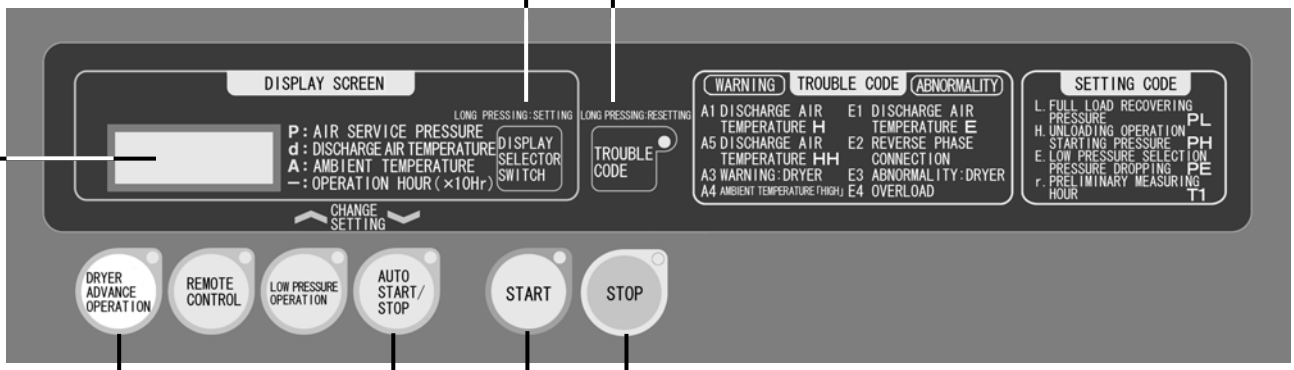
Each display of the operation panel is illustrated as follows.
Read and fully understand the explanations and be sure to operate safely:

Data setting switch

Set various data. Pressing the switch (longer than 3 seconds) goes to data setting mode.

Trouble code/Resetting switch

When pressing the switch while lamp flickering, trouble code is displayed. Pressing longer than 2 seconds, the display will be rest. (See : P5-1)



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Operation mode display/Selector switch

Select various operation mode, according to demand of operation.

Start button

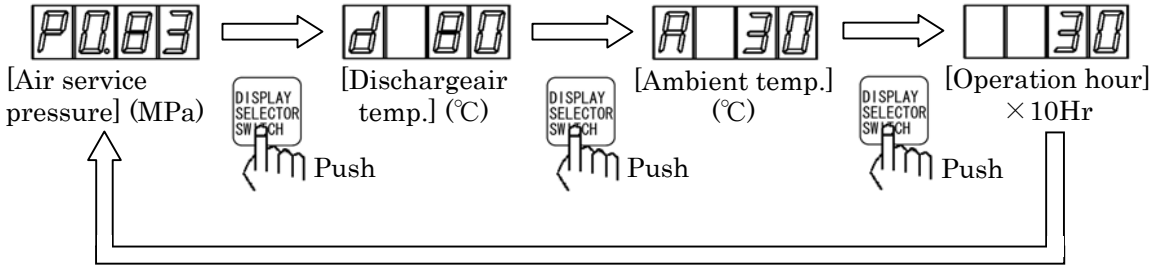
Pressing this button longer than 1 second, the machine starts.

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 discharge air temperature is lower than 20℃, “ ---L ” is displayed.
Ambient temperature is displayed at 0℃.

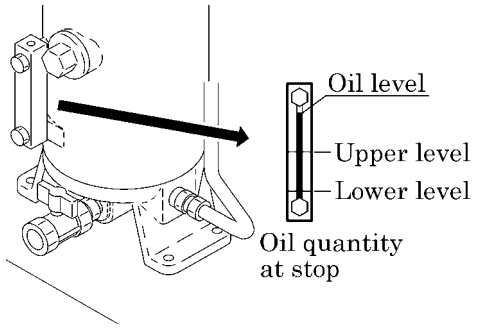
3.2 Operating Method

3.2.1 Check before operation

1. Check compressor oil level

- Make sure that compressor oil level is kept above the red upper limit line of the level gauge. Replenish the oil if short. (See 4.4.7)
  (When starting operation, oil level will be lowered.)

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



A080391E

The amount of supply
(Oil level between red lines)

SAS4SD-5A/6A	Approx.0.33L

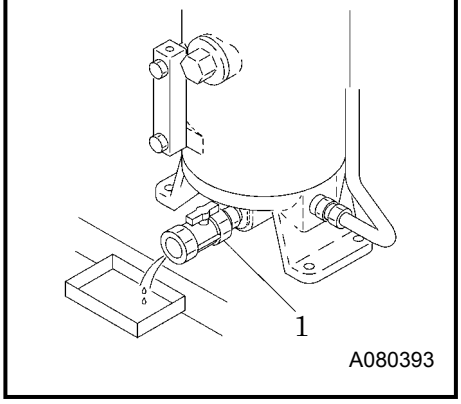
2. Check for condensate in receiver tank

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.

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.
- In case of by-pass valve failure.



A080393

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.

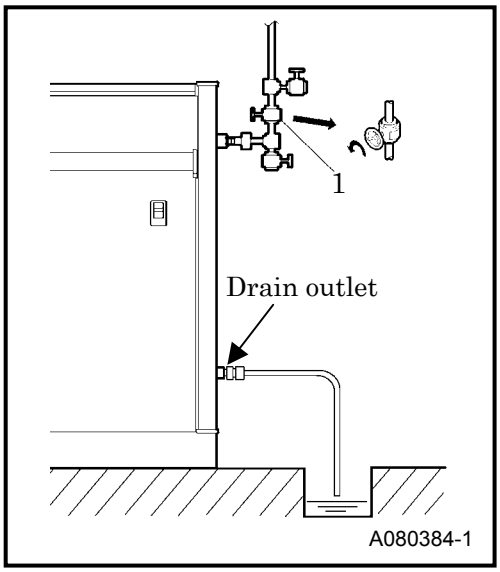
3.2.2 Operation

1. Power input

① Turn the power 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)

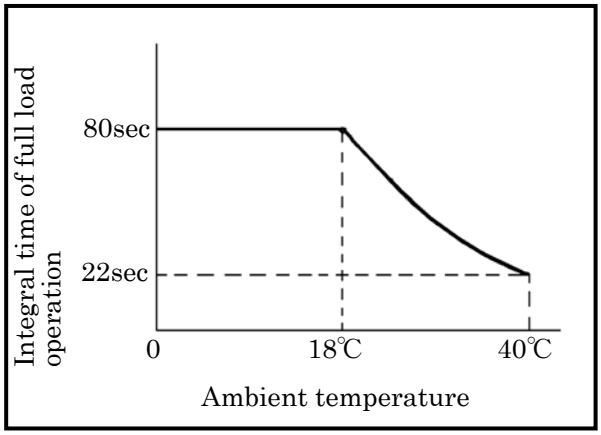
2. Operation

① Pressing start button longer than 1 second, then operation starts.
② Check if the machine reaches its full-load operation 5 seconds after starting, and its service pressure rise gradually.
③ Check and confirm that the oil level is between red lines during operation. If lower, replenish oil.
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 4.4.6)



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

- After the machine starts and unload operation is completed, it automatically continues to drain condensate in dryer 8 seconds.
- Condensate collected in dryer is automatically drained for 1 second, according to ambient temperature whenever elapsed time of full load operation reaches the time shown in right fig.

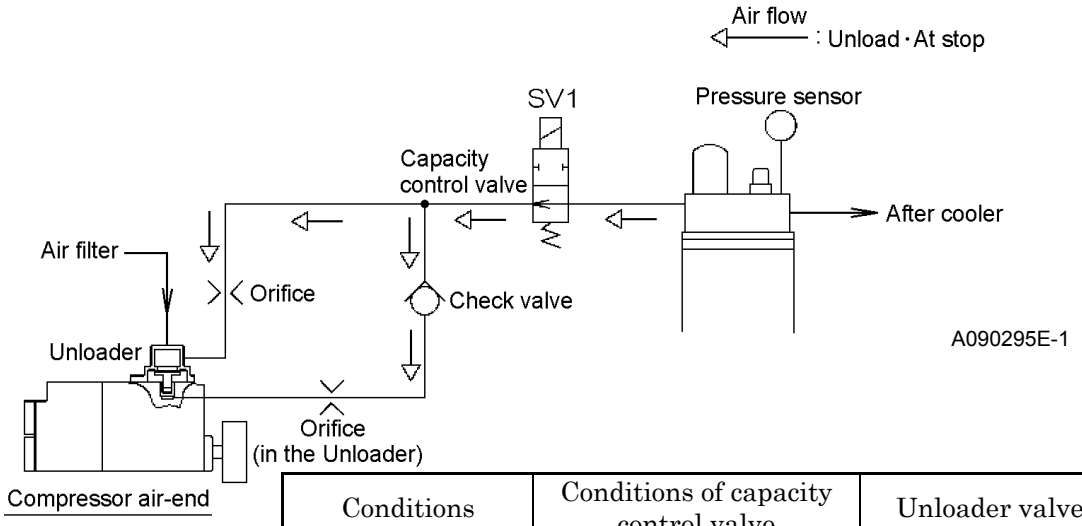


4. Stop

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

3.2.3 Capacity control

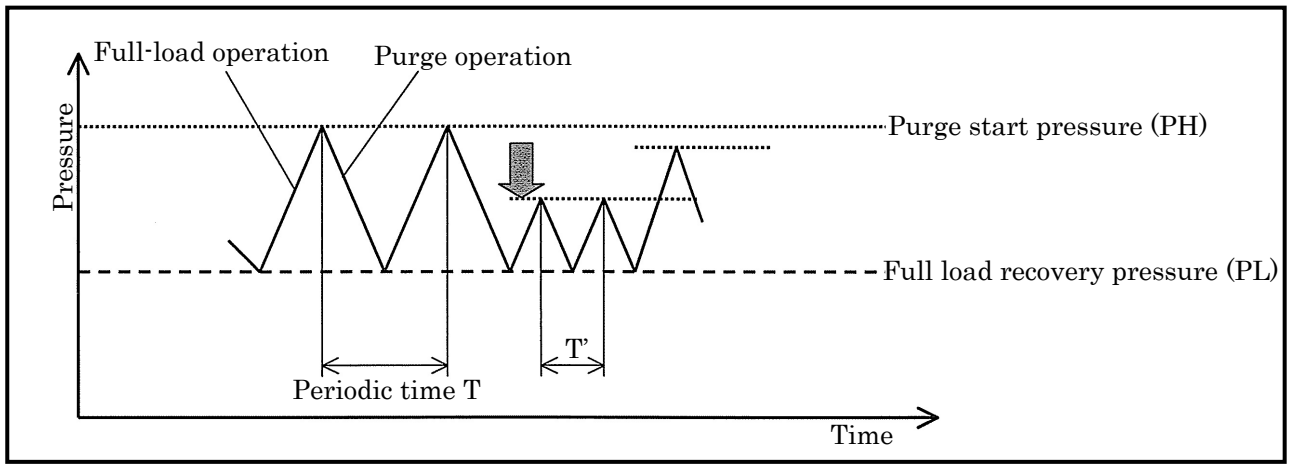
Capacity control system



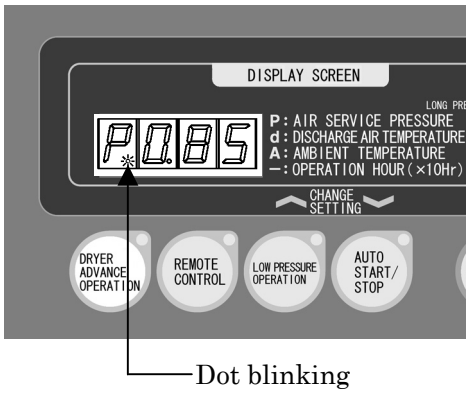
Conditions	Conditions of capacity control valve	Unloader valve
Start Purge operation	Open	At a little open
Full-load	Close	At fully open
Stop	Open	At fully closed

1. A.C.C.S. (This system is designed to automatically control pressure range for power saving)

- Purge operation starting pressure (PH) is automatically controlled "UP" or "DOWN", according to air consumption. Thus power is saved.



- Change purge starting pressure so that periodic time "T" may be 30 seconds＜Periodic time T＜50 seconds.
  (It prevents shortening machine life and deterioration by repeating capacity control so often.)
- When periodic time "T" exceeds 120 seconds, purge operation is compulsorily selected.
- In order to adjust purge operation starting pressure (PH) and full load recovery pressure (PL), please refer to 5.3.
- Operation under A.C.C.S. mode is shown at right bottom "P" flickering on the display.



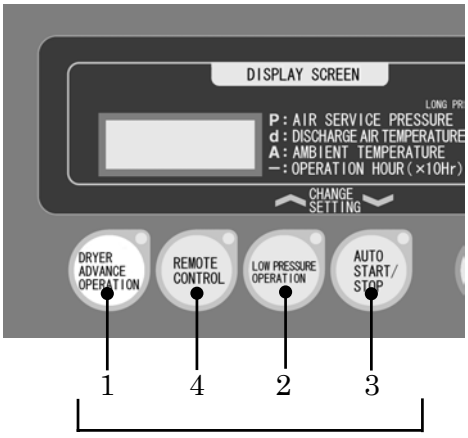
3. Operation

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.



Operation mode selection switch

Operation procedures

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

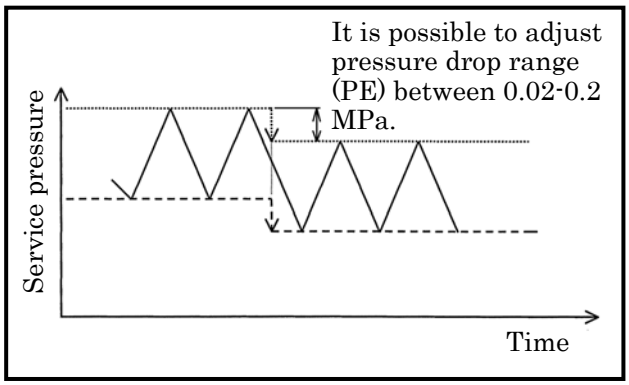
② In order to stop dryer advance operation mode, press again the button “1” of dryer advance operation mode.

- 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.

- Selection of service unit and stand-by unit.
- Alternate operation of 2 machines.



Operation procedures

[Operation at monitor panel]

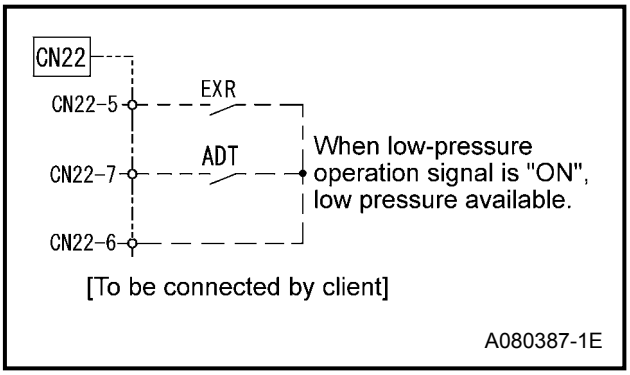
① Press low pressure operation button “2”. Indicator light goes on and low-pressure operation starts.

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

[Operation at exterior signal]

- In case of operation at exterior signal, perform cable connection as shown in the right fig. using a connecter terminal provided in starter panel.
- Pressing “ON” low-pressure operation signal (ADT), low-pressure operation is selected.

※For adjustment of pressure drop range PE, refer to 5.3.



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

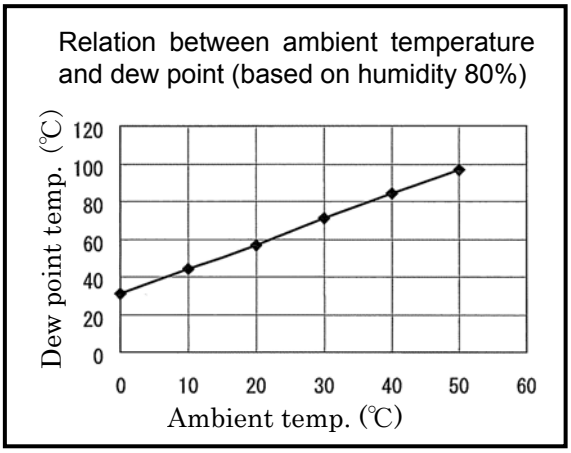
WARNING

- 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.

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.

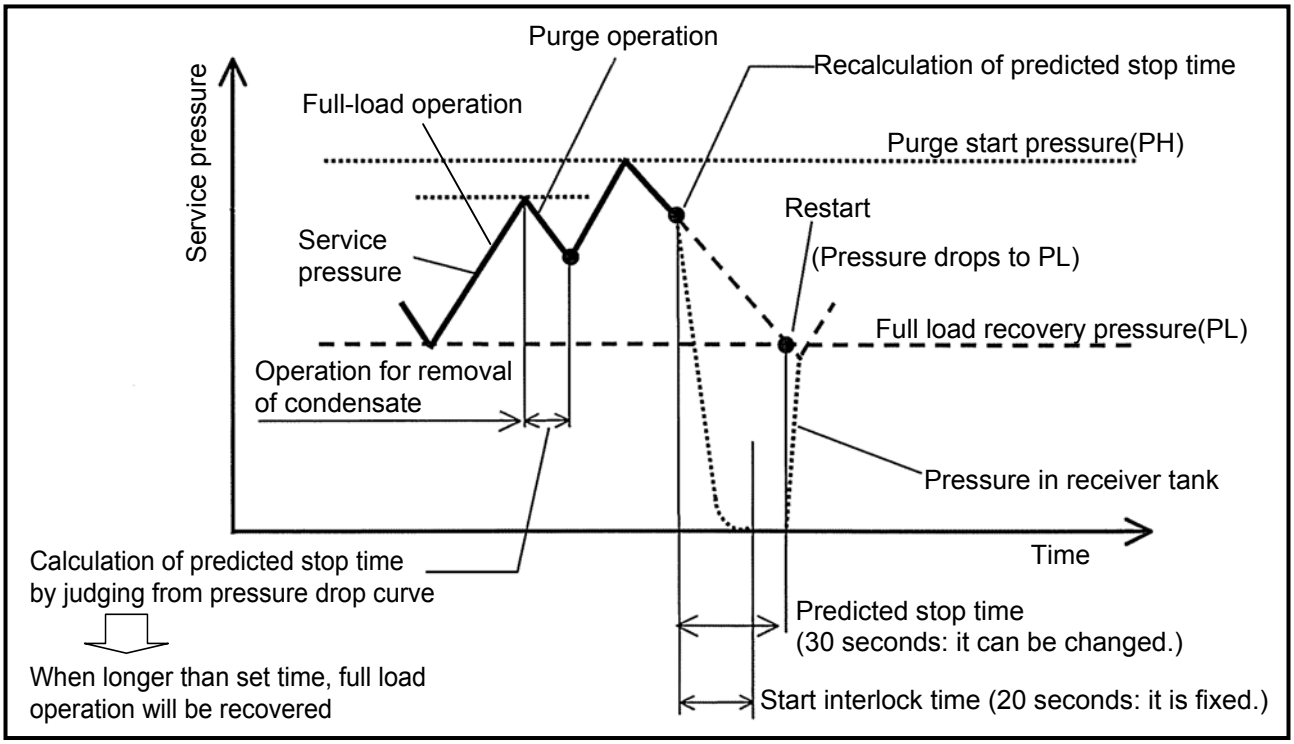
- Operation for removal of condensate

The condensate is caused at start-up when discharge air temperature exceeds the dew point temperature in the right fig, and when 2 integrated minutes of purge operation passes the condensate will be removed completely, thus emulsification of compressor oil will be prevented and the operation for removal of condensate will be made shorter to prevent frequent start/stop of the machine operation.



- Start/stop mode operation

When air consumption decreases after operation for removal of condensate at start-up, service pressure is raised as shown in the following figure. And when enough stop time is possibly available by judging from the pressure slope line, compressor automatically stops. And when the service pressure drops to PL level and the stop time is longer than start interlock time, it starts again. It is possible to change preset stop time, referring to 5.3.



3. Operation

Operation 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 "3" 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.

3.3.4 Remote control

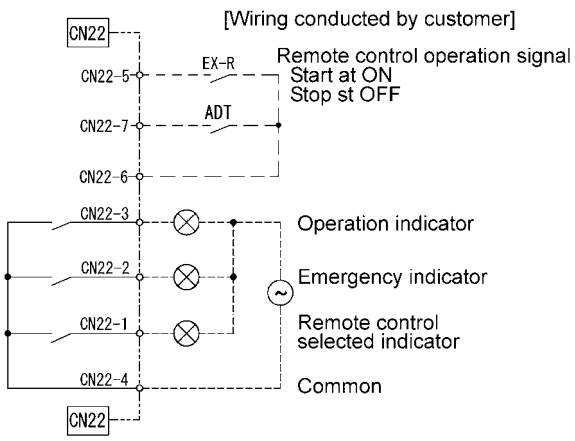
WARNING

- In remote control operation the compressor can be started by remote control far from it even while the compressor is stopping. Therefore, do not put your hands inside the machine.
- Make sure that the power is "OFF" before doing wiring work.

PK0028

1. Wiring work of remote control switch

There is a terminal board for remote control provided in the starter panel. Wiring connection should be done for remote control operation as shown in the under-mentioned figures. Make sure that the power is "OFF" before doing wiring work.



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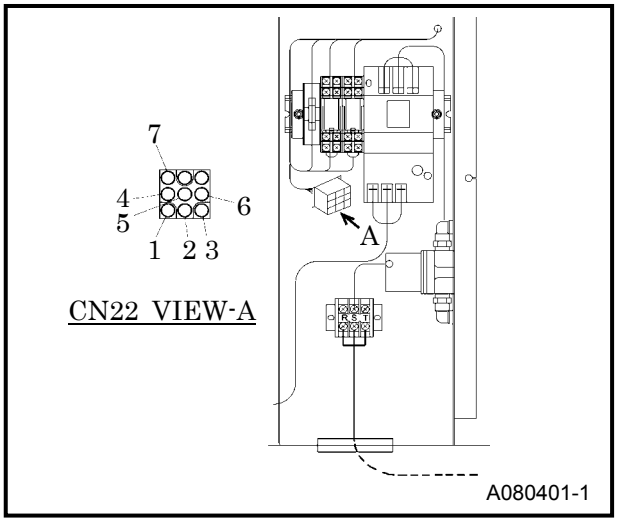


A080401-1

- Operation indication : Lamp goes on when the compressor starts.
- Emergency indication : Lamp goes on when the compressor abnormally stops.
- Remote control select indication : Lamp goes on when remote control operation is selected.

＊Indication signal is no-voltage with contact (RY5,RY6,RY7) [Contact capacity･･･AC250V 1.0A]

	Part number	Quantity	Remarks
Connector	46935 01400	1	molex 3191-09P
Terminal	05641 11001	7	molex 1190T

2. Operation procedures

① Press the remote control button "4" . Indication lamp goes on. In order to release this mode, press again remote control mode button "4" .
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.)

② Pressing "ON" remote control signal will make machine start operation and pressing "OFF" this signal will make machine stop operation.

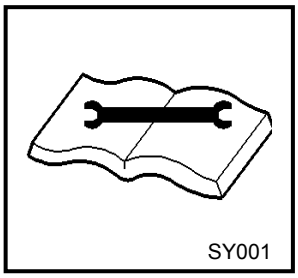
4. Periodic Inspection/Maintenance

4.1 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 unit even if the above conditions are performed according to the intervals listed in the above table.

WARNING

- 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 bring you electric shock accident, or even fire due to short-circuit.
- Keep the electric components away from water or steam. Otherwise, electric shock accident or short circuit could cause fire.


SY001

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 your nearest dealer for detail if such work is needed.
- Keep the electric components away from water or steam. Otherwise, electric shock accident or short circuit could cause fire.
- 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 unit.
- The pressure displayed on operation panel shows service pressure. For periodic inspection, wait for enough time (2 - 3 minutes) after stopping the machine. Then start inspection job.
- If harmful materials such as oil, solution or filters are disposed of in such places as river, lake, etc. without official permission, you will be punished by the authority.

4.2 Periodic Replacement of Parts

Part Name	Part Number	Quantity
Dustproof air filter	32163 15400	1
Air filter element	32143 16300	1
Oil filter	37438 05001	1
Oil separator	34220 10802	1

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

4. Periodic Inspection/Maintenance

4.3 Periodic Inspection List

4.3.1 Periodic inspection/maintenance of compressor

Inspection items		Inspection points	Maintenance interval						Remarks	Page
			Daily	1 month	Every 1 year	Every 2 years	Every 4 years	Every 6 years		
Indication of each gauge			○						See the item "Operating method"	
Motor	Coil	Insulation resistance				●			Dry or change if less than 1M Ω.	
	Bearing	Change						●		
	Sirocco fan	Check			○				Clean if too dirty.	4-5
Compressor air-end	Bearing	Change						●		
	Oil seal	Change						●		
	Collar	Change						●		
	O-ring	Change						●	Check for oil leak	
	Consumable part of unloader	Change						●		
Air-filter element		Clean /Change		○ (Clean)		○ (Change)				4-5
Dustproof air filter		Clean /Change	○ (Clean)		○ (Change)					4-4
Separator receiver tank	Compressor oil level	Check	○						In case of oil shortage, replenish it.	3-2
	Receiver tank drain	Drain	○ (Every week)							3-2
	Compressor oil	Change			○				Change if too dirty.	4-7
	Oil level gauge	Clean /Change				○ (Clean)	● (Change)			
	O-ring of oil filler	Check			○				Re-usable after check, if normal.	4-7
	Oil separator	Change			○					4-8
Pipe system	Scavenging orifice strainer	Clean strainer			○					4-4
	Scavenging orifice o-ring	Check			○				Re-usable after check, if normal.	4-4
	Oil filter	Change			○					4-8
	Rubber hose	Check/Change			○ (Check)		● (Change)			
	Nylon tube	Check/Change			○ (Check)	● (Change)				
Oil cooler/ After cooler		Clean				●			Clean if too dirty.	
Safety equipment	Safety valve	Check performance		○						4-4
	Consumable part of pressure control valve	Check/Change O-ring					●			
		Check/Change piston					●		Re-usable after check, if normal.	
	Discharge air temp. / Ambient temp. sensor	Check					●		Re-usable after check, if normal.	
	Bypass valve	Change Pellet					●			
Solenoid valve		Change					●		Re-usable after check, if normal.	
Belt		Adjust tension			○				If abnormal, replace it.	4-5
		Change					●		Replace the pulley, depending on its conditions.	

4.3.2 Periodic inspection 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		
Pressure switch for fan control	Check					●			
Refrigerating compressor	Check						●		
Fan motor	Check						●		
Draining condensate in dryer	Check		○					Make sure condensate is properly drained.	

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 ●, please contact us or distributor, because they need special technical knowledge.
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, and 18,000 hours/6 years.

- ● 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.

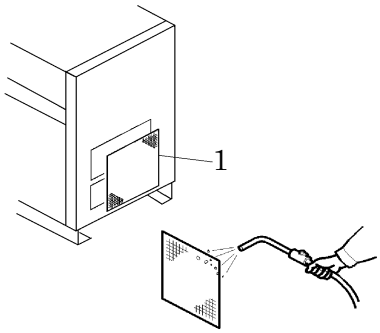
※When such parts which are not mentioned in the table need inspection and or maintenance, please contact us or distributor.

4. Periodic Inspection/Maintenance

4.4 Items and Places of Inspection

4.4.1 Check, clean and change of dustproof air filter

- Check dustproof air filter "1" for dust or dirt. If dust is found heavy, remove sticking dust and 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 filter if it is heavily damaged.
  (For Replacement parts, See 4.2)



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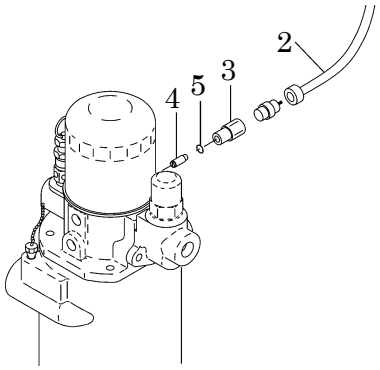
4.4.2 Clean strainer in scavenging orifice

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

＜Procedures＞

① Remove a nylon tube "2" off the oil scavenging line on top of the separator receiver tank.
② Remove the bushing "3".
③ Remove strainer "4" from bushing "3" 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, please make sure to check O-ring "5" fitted on bushing "3" and replace it with a new one if it is found hardened or damaged.



Separator receiver tank A080389-3

4.4.3 Performance check of safety valve

WARNING

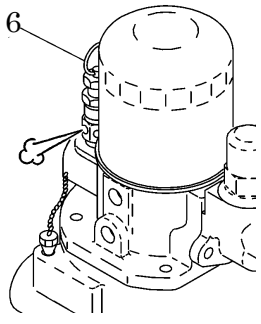
- During inspection of safety valve function, never bring your face to safety valve because compressed air may burst out. It is very dangerous.

＜Procedures＞

① Close the service valves completely and pull the test ring "6" 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 "6".

- Set pressure

Service pressure	0.83 MPa
Set pressure for safety valve	0.98 MPa



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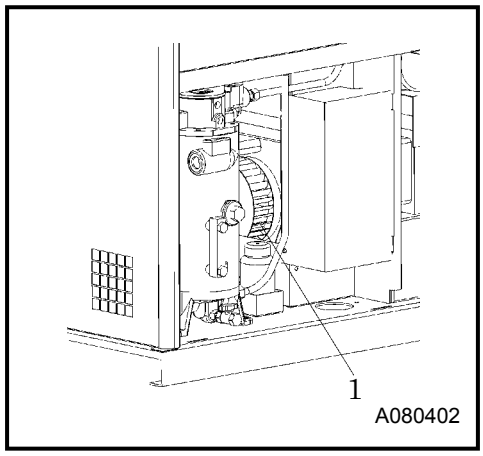
4.4.4 Check sirocco fan



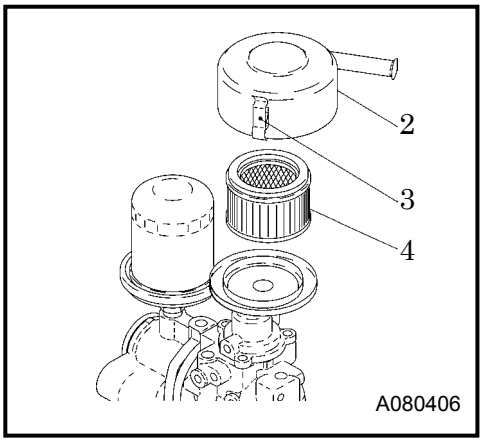
① Turn the motor pulley by hand to check if there is any crack on sirocco fan "1" Change the fan, if any.

- When replacing it, contact directly us or distributor because it requires expert technical knowledge.

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.
- Sirocco fan "1" can be easily deformed by giving a strong force on it. Never rotate the sirocco fan "1" with hands.

4.4.5 Clean and change air filter element



＜Procedures＞

① Remove latch "3" of the cup "2" and remove cup "2".

② Remove element "4" and clean dust and dirt.
Take care to prevent dust and dirt from entering into compressor air-end.

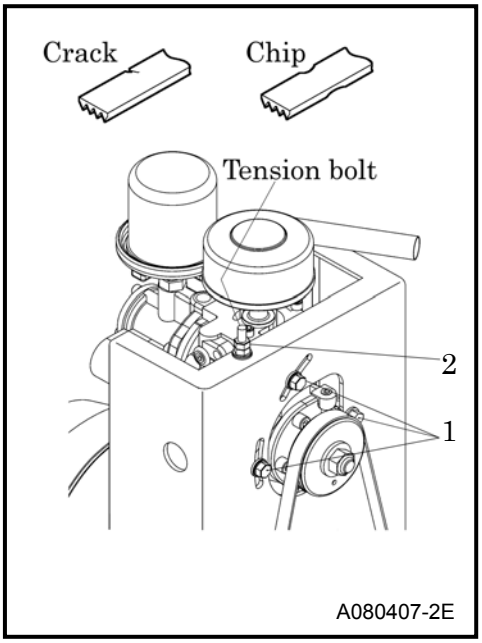
③ After finishing cleaning, reassemble element "4" and cup "2" as they were and engage the latch "3" surely.

④ Even before periodic inspection interval comes, clean or replace them when they are found dusty or dirty.
(For Replacement parts, see 4.2)

4.4.6 Adjustment and change of belt tension

Adjust the belts tension.

IMPORTANT	● If an old belt is replaced by a new one, the new belt must be checked and adjusted again after 2 hours of full load operation because it has initial belt tension.



- Visually check the belts and pulley for cracks, wears or chips with your own eyes. Replace all the other belts as well as defective ones.
- When replacing it, contact directly us or distributor because it requires expert technical knowledge.

＜Procedures of belt tension adjustment＞

① Compressor air-end is raised by tension bolt by loosening fixing bolt "1" and nut "2" in tension bolt. As a result, the belt will be expanded.

② After finishing the adjustment, fix bolt and nut in reverse order.

※It is not necessary to align compressor air-end because it is moved only in belt extension direction.

4. Periodic Inspection/Maintenance

[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 Perform the measurement twice because it is necessary to measure the data of new belt and readjusted belt. (As primary elongation of new belt is caused, it is required to be measured 2 hours after full load operation.)
③ Note that tension load of new belt is different from that of readjusted belt.
④ It is OK that the measured results are within the allowable limits (±10%) mentioned in the following table, but try to make the results equal to the allowable values in it.

Values entered by sonic belt tension meter				Belt tension values	
Type	Unit (g/m) (MASS)	Number of rib (WIDTH)	Span length (mm) (SPAN)	New belt (N) (Allowable limit)	At readjustment (N) (Allowable limit)
SAS4SD-5A	19	4	201	371 (334～408)	321 (289～353)
SAS4SD-6A	19	4	206	359 (323～395)	311 (280～342)

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

[How to measure belt tension by tension gauge]

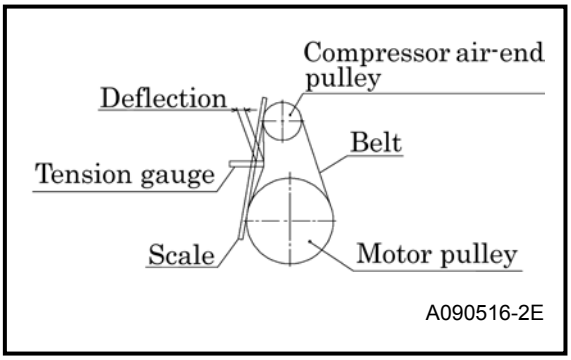
① Set a ruler to the face of the belt as shown in the left figure.
② Place tension gauge on the center of belt, and measure tension load and deflection to check that both measured values are within the values listed in the following table.

Adjustment value for tension load deflection

New belt		At readjustment	
Tension load	Deflection	Tension load	Deflection
22.5N (2.3kgf)	3.2 mm	20N (2.0kgf)	3.2 mm

Type of belt

50Hz		60Hz	
Belt type	Number of belt	Belt type	Number of belt
4PK 825	1	4PK 775	1



4.4.7 Replenishment and change of compressor oil

IMPORTANT

- Be sure to use recommended oil listed below.
- Mixture of different brands compressor oil could cause 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 case, please contact "Airman" dealer or directly us.

Maker and Brand of Recommended Oil.

Maker	Brand
SHELL	SHELL CORENA OIL RS32
MOBIL	MOBIL RARUS 424
CALTEX	FAIRCOL RA32

- Compressor oil can be deteriorated depending on the environment in which it is used. Change the oil if it is too dirty, even before the scheduled interval.
  Even continuous oil replenishment cannot improve its deteriorated condition. Be sure to change the oil completely at every scheduled interval.
- When compressor oil is replaced by new one, wait for enough time (2 to 3 minutes) after stopping operation.
- Follow the designated regulations to dispose of compressor oil.

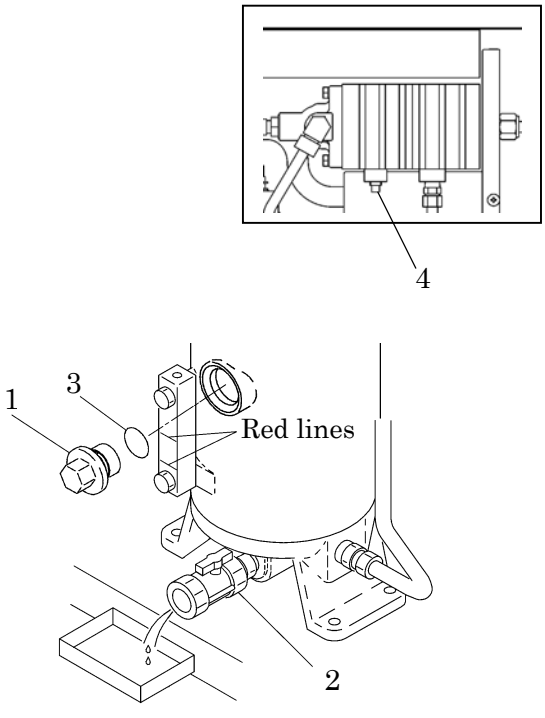
＜Procedures＞

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.
After removing drain plug "4" on oil cooler to drain residual oil in oil cooler.

② After draining compressor oil, tighten drain valve "2" surely.

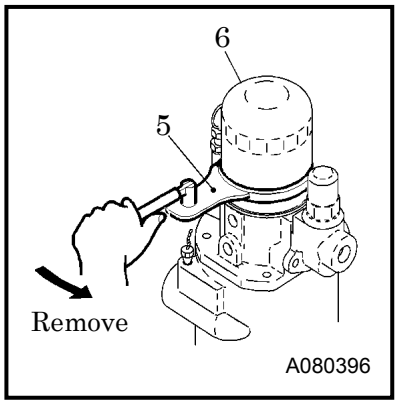
③ After filling fresh oil up to the upper level of level gauge, close the oil filler cap "1". Check o-ring "3" of oil filler cap "1" for damage or hardening. If any, replace it with a new one.

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



Quantity of oil between the red lines	0.33L
Quantity of change oil	2.5L

4.4.8 Change oil separator



＜Procedures＞

① Use a filter wrench “5” to remove the cartridge “6”.
② Spread thin film of oil on a packing of a new cartridge and screw it in.
③ When the packing touches the seal surface, tighten the cartridge by turning it about 2/3 times, using the filter wrench “5”.
④ After installing oil separator, be sure to check for oil leak during the operation.

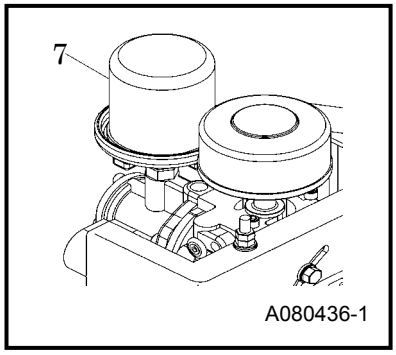
- When consumption of the oil is still unusual even after cleaning strainer in the scavenging orifice (See4.4.2), change the oil separator with a new one. (For Replacement parts, see 4.2)

4.4.9 Change oil filter

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

＜Procedures＞

① Use a filter wrench to remove the cartridge “7”.
② Spread thin film of oil on a packing of a new cartridge and screw it in. (For Replacement parts, see 4.2)
③ When the packing touches the seal surface, tighten the cartridge by turning it about 2/3 times.
④ After installing oil filter, be sure to check for oil leak during the operation.



5. Maintenance/Adjustment

5.1 Warning･Emergency display

5.1.1 Details of warning and emergency indication

[Warning Display] Whenever a little disorder or trouble occurs during operation, the operation continues. When failure code indicator flickers, at once take necessary measures for reparation.

Item	Failure code	Trouble	Measures
DISCHARGE AIR TEMPERATURE H	A-1	When air temperature at outlet of compressor air end exceeds 105℃ or thermal sensor is disconnected, it warns.	Lower ambient temperature. (lower than 40℃) Check compressor oil level. Clean and change oil filter. Adjust service pressure to proper one. Cleaning oil cooler. Check by-pass valve.
DISCHARGE AIR TEMPERATURE HH	A-5	When discharge air temperature at outlet of compressor air-end reaches 108℃, it warns. And it lowers purge starting pressure (PL+0.04MPa) and also lowers discharge air temperature.	
WARNING: DRYER	A-3	When abnormality is caused to dryer, it warns.	Lower ambient temperature. Check dryer.
AMBIENT TEMPERATURE	A-4	When ambient temperature reaches 45℃, it warns.	Lower ambient temperature.

[Emergency Display] Whenever abnormalities occur during operation, each lamp goes on and it makes emergency stop. After having taken the following countermeasures, re-start operation.

Item	Failure code	Trouble	Measures
DISCHARGE AIR TEMPERATURE	E-1	When temperature of air discharged at outlet of compressor air-end reaches 110℃, it displays emergency.	Lower ambient temperature. (lower than 40℃) Check compressor oil level. Clean and change oil filter. Adjust service pressure to proper one. Cleaning oil cooler. Check by-pass valve.
REVERSE PHASE CONNECTION	E-2	When power supply is connected in reverse phase, it displays emergency.	Change connection between R and T phase.
※1 (ABNORMALITY: DRYER)	(E-3)	When abnormality occurs at dryer, it displays emergency.	Lower ambient temperature. Check dryer.
OVERLOAD	E-4	When motor gets overloaded, it displays emergency.	Check service pressure. Check and confirm voltage of power supply. Check thermal relay.
DISCONNECTION OF DISCHARGE AIR TEMPERATURE SENSOR	E-6	When the temperature sensor gets disconnected, it displays abnormality.	Check cable and connector for any faulty contact, and also check for any disconnection.

Reset

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

※1 : When abnormality occurs at dryer prior to delivery ex.works, it is set to display “WARNING”. When it is necessary to stop the machine also in case of dryer failure, it is possible to do this function by modifying internal setting of controller. For the details, contact us or your distributor.

5. Maintenance/Adjustment

5.2 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. Such items marked ◎ require special knowledge. So contact your nearest distributors or directly contact us.**

5.2.1 Compressor

	Trouble status	Cause	Countermeasures	Remarks
Trouble of capacity adjuster	Unloader does not operate and safety valve blows.	(1) Malfunction of pressure sensor.	Check	◎
		(2) Air-leak from unloader system piping.	Check/repair	◎
		(3) Trouble of safety valve. (It blows below the set pressure.)	Change	◎
		(4) Trouble of solenoid valve (SV1). Wrong cable connection and faulty contact.	Check/repair	◎
		(5) Defective seating face failure of unloader valve.	Disassemble/repair	◎
		(6) Defect of oil seal.	Disassemble/check	◎
		(7) Malfunction of controller.	Check/change	◎
Other status	Oil is mixed in discharged air (Much oil is consumed).	(1) Separator oil scavenging orifice clogging.	Disassemble/check	◎
		(2) Discharge pressure is low.	Check pressure control valve.	
		(3) Deterioration of oil separator.	Check/change	◎
		(4) Oil level is too high.	Drain excessive oil to proper level.	See4.4.7
	Abnormal noise from belt.	(1) Belt slipping.	Adjust belt tension, or change.	See4.4.6
	Frequently compressor starts and stops automatically even when compressed air is not consumed.	(1) Air leakage from pipes.	Check	
		(2) Malfunction of pressure control valve seat.	Check/change	
	Even when each switch is pushed ON, machine will not run.	(1) Defective connection of switch.	Check/change	◎
		(2) Malfunction of controller.	Check/repair	◎
	No emergency lamp glows, but the machine often stops with unknown cause.	(1) Malfunction of controller is caused by noise.	Use the other power source than that of noise source.	
		(2) Malfunction of controller.	Check/change	◎
	Start lamp glows, but the machine does not start.	(1) Electromagnetic switch failure.	Check/change	◎
		(2) Malfunction of controller.	Check/change	◎
	Oil leaks from oil seal portion.	(1) Damage of oil seal.	Check/change	◎

5.2.2 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) Low voltage of power source	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 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.	Repair	◎
	(4) Malfunction of the capacity control valve (Inside of the heat exchanger is frozen)	Check/maintenance	◎
	(5) Open air temperature is lower than 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	
	(9) Filter of dustproof clogged.	Check/clean	See4.4.1
It starts, but stops soon.	(1) Ambient temperature is high.	Make it lower than 40℃.	
	(2) Low voltage of power source.	Adjust to rated voltage.	
	(3) Malfunction of electromagnetic switch.	Check/change	◎
	(4) High pressure switch malfunction.	Check/change	◎
	(5) Malfunction of refrigerating compressor.	Check/change	◎
Air is blowing from drain outlet.	(1) Foreign matter stuck in seating face of solenoid valve for draining.	Change/ clean	◎

⚠ WARNING

- Nonflammable, innoxious and odorless refrigerant (Freon gas R407C) 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 fore, and ventilate the surroundings by sweeping the floor. And contact us or your distributor. close by.

5. Maintenance/Adjustment

5.3 Adjustment of Various data

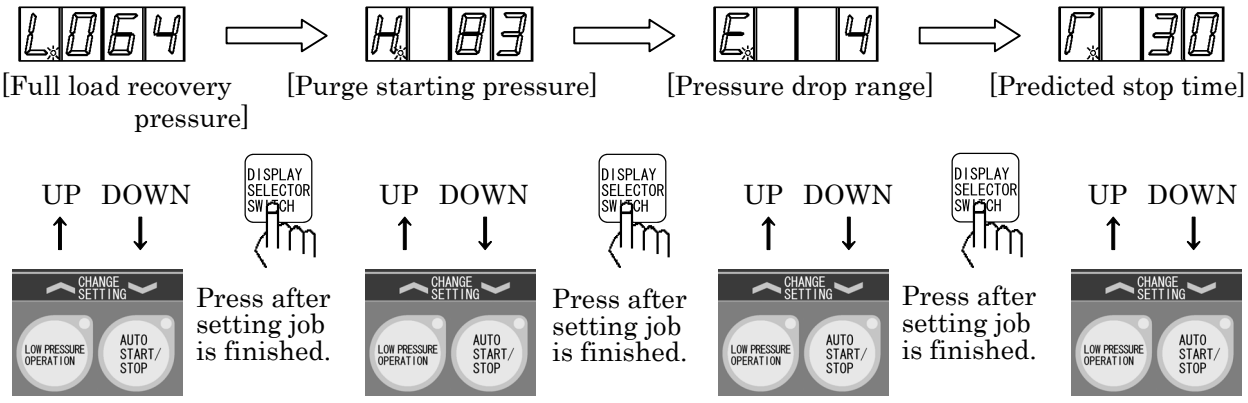
- The following set values can be altered and adjusted.

No.	Item	Indication	Primary set value	Range of set values		Page
				Set value	Pressure (MPa)	
1	Full load recovery pressure	L	64	50 - 85	0.5 - 0.85	3-4
2	Purge starting pressure	H	83	※Full load recovery pressure set value+4 - 95	Full load recovery pressure + 0.04 - 0.95	3-4
3	Range of pressure drop	E	4	2 - 20	0.02 - 0.2	3-5
4	Predicted stop time	T	30	30 - 120 sec	—	3-6

※Purge starting pressure should be lower than the primary set value.

<Procedures of adjustment>

When indication selection switch is pressed longer (than 3 minutes), first L (full load recovery 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 (purge starting pressure PH) is switched to E (Range of pressure drop PE) and to T (predicted stop time), according to the set orders.



5.4 Preparation for Long-term Stoppage

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

- Turn the power OFF.
- Close the service valves at discharge port.
- 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 5.2 “Troubleshooting”.

6. Specification

6.1 Specifications

6.1.1 Dryer built-in type

Model		Unit	SAS4SD-5A	SAS4SD-6A
COMPRESSOR	Type		Rotary-twin screw, single stage, oil cooled	
	Free air delivery	m^3/min	0.44	
	Working pressure	MPa	0.83	
	Capacity control system		A.C.C.S. control, Purge control, Auto start/stop	
	Lubrication system		Forced oil injection by compressed air pressure	
	Driving system		Belt drive	
	Lubrication oil capacity	L	2.5	
MOTOR	Type		Totally-enclosed fan cooled three-phase squirrel cage induction	
	Power output	kW	3.7	
	Poles	P	2	
	Starting system		Direct starting	
Air outlet port			10A(Rc3/8B)	
DRYER	Dew-point of discharged air	℃	Under the ambient pressure less than 10	
	Power consumption	kW	0.20	0.20/0.21
	Refrigerant		R407C (Refrigerant enclosed: 150g)	
DIMENSIONS (APPROX.)	Width	mm	760	
	Length	mm	510	
	Height	mm	750	
Approx. dry weight		kg	142	
Approx. weight for maintenance		kg	145	

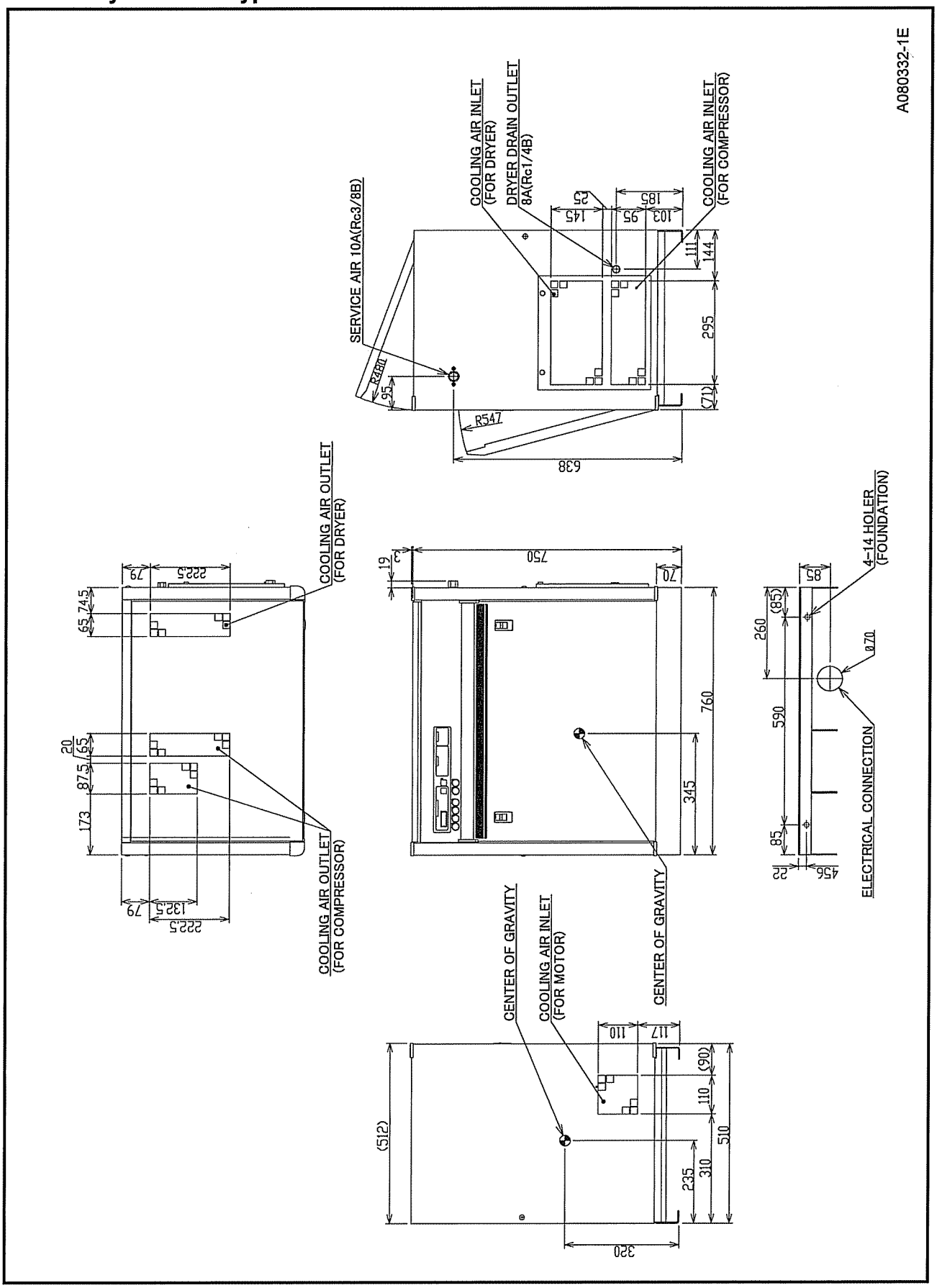
- Free air delivery is the value calculated, being converted into suction conditions of compressor air-end (at the primary stage of air filter).
- The dew point of discharge air is the value measured at the ambient temperature of 30℃, discharge pressure of 0.83MPa.
- When the dryer discharges sediment, the air quantity will decrease due to the deposit of sediment.
- Ask your nearest dealer for the guaranteed value of free air delivery.

6.1.2 Motor specifications (Totally-enclosed fan cooled type)

Power output		kW	3.7	
200V	Frequency	Hz	50	60
	Power source	V	200	200/220
	Rating current	A	15.0	14.4/13.2
	Thermal relay standard set value	A	15.0	14.5/13.5
	Number of poles		2P	
	Insulation		F	
400V	Frequency	Hz	50	60
	Power source	V	400	400/440
	Rating current	A	7.5	7.2/6.6
	Thermal relay standard set value	A	8.0	7.5/6.5
	Number of poles		2P	
	Insulation		F	

6.2 Size and Dimensions

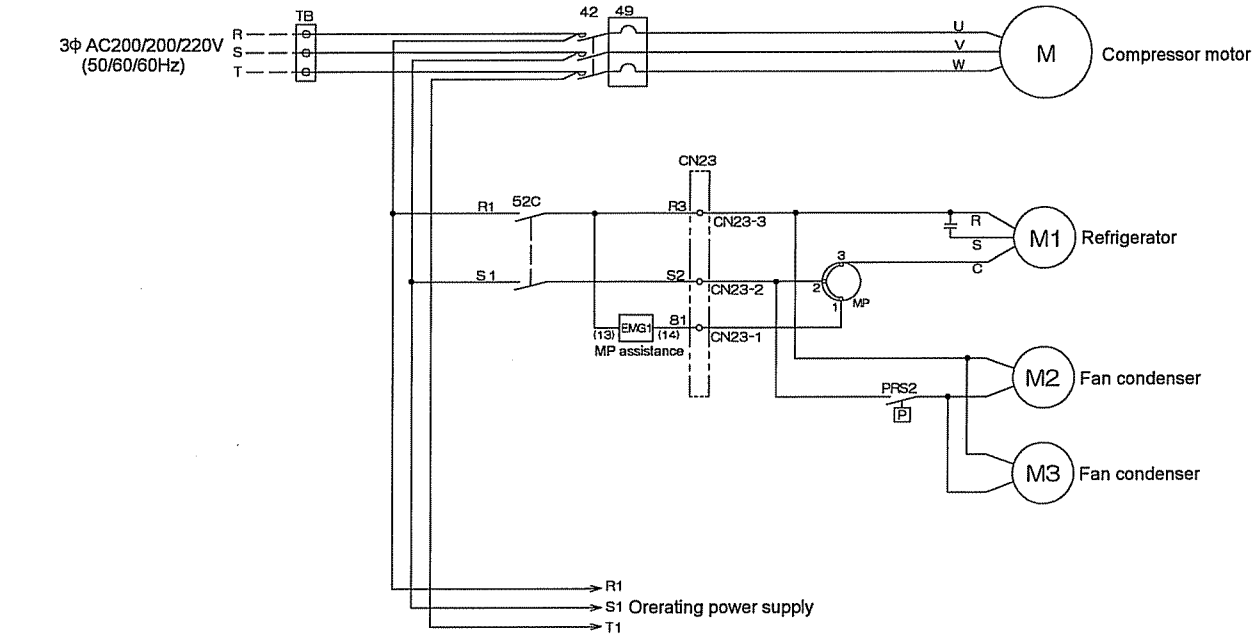
6.2.1 Dryer built-in type

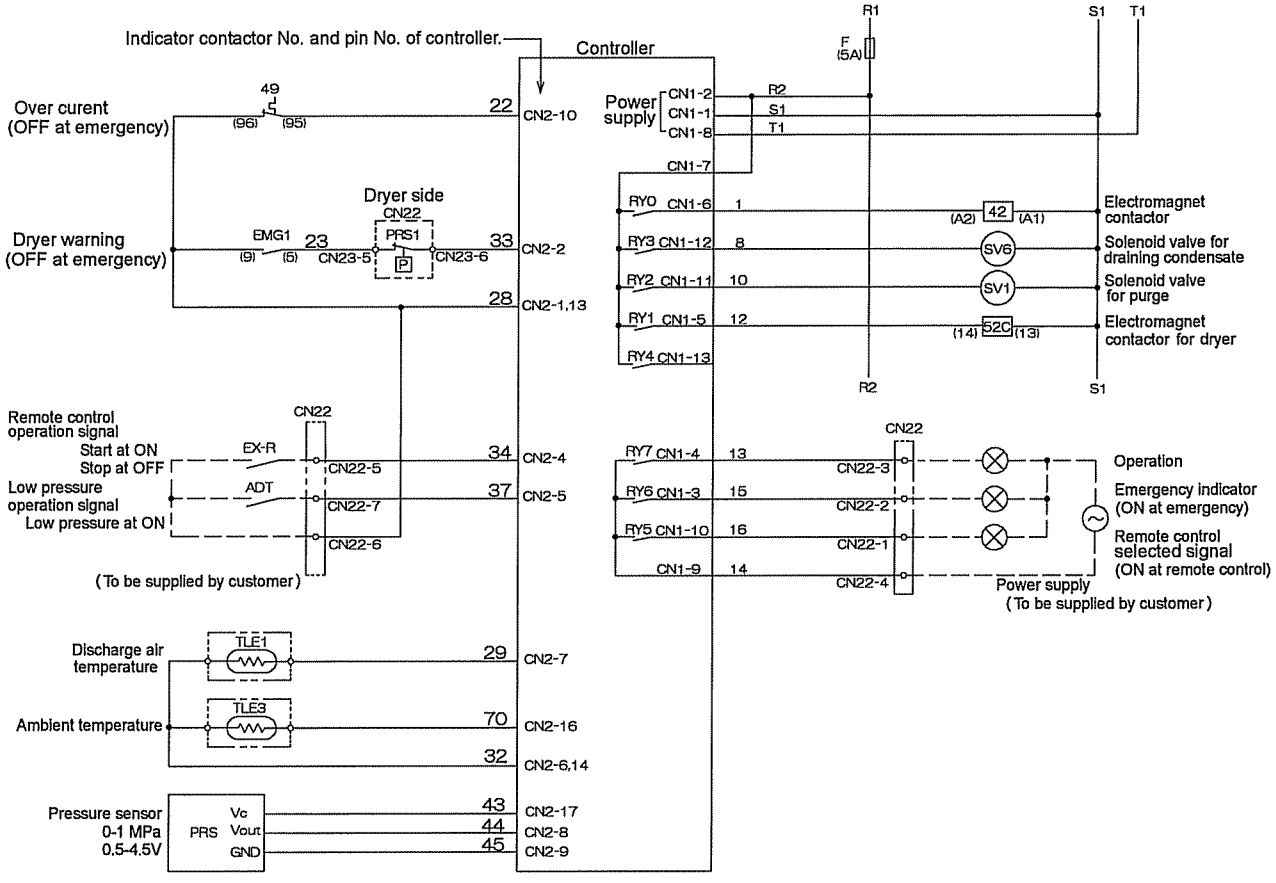


6.3 Wiring Diagram

6.3.1 Dryer built-in type

SAS4SD-5A/6A (200/220V type)





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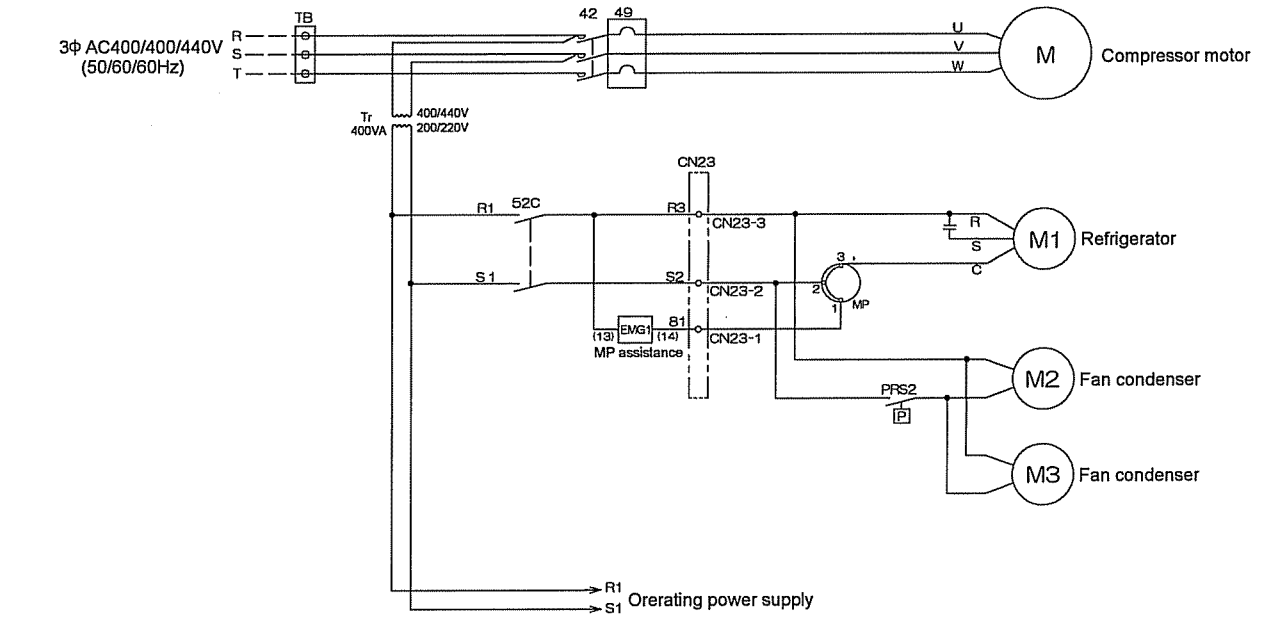
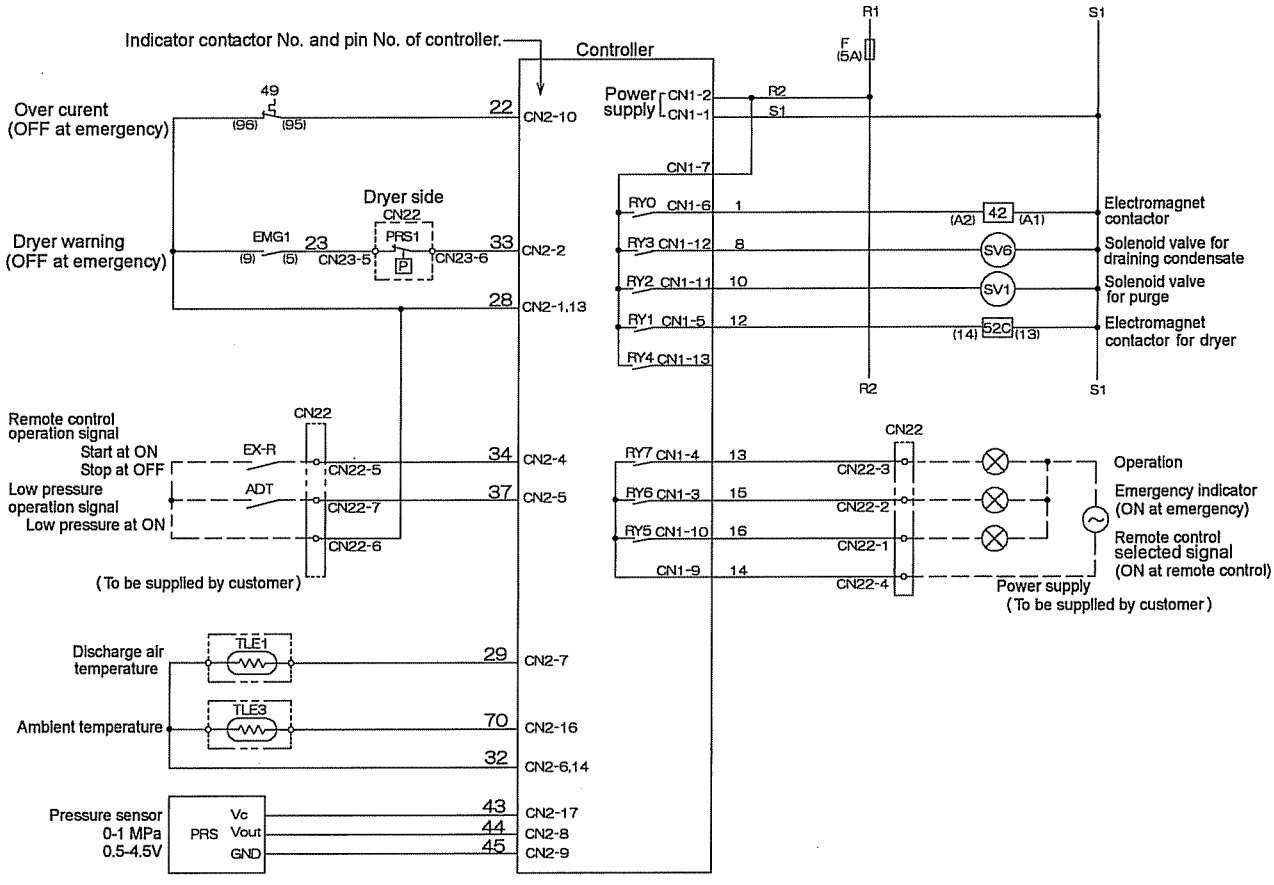
SAS4SD-5A/6A (400/440V type)





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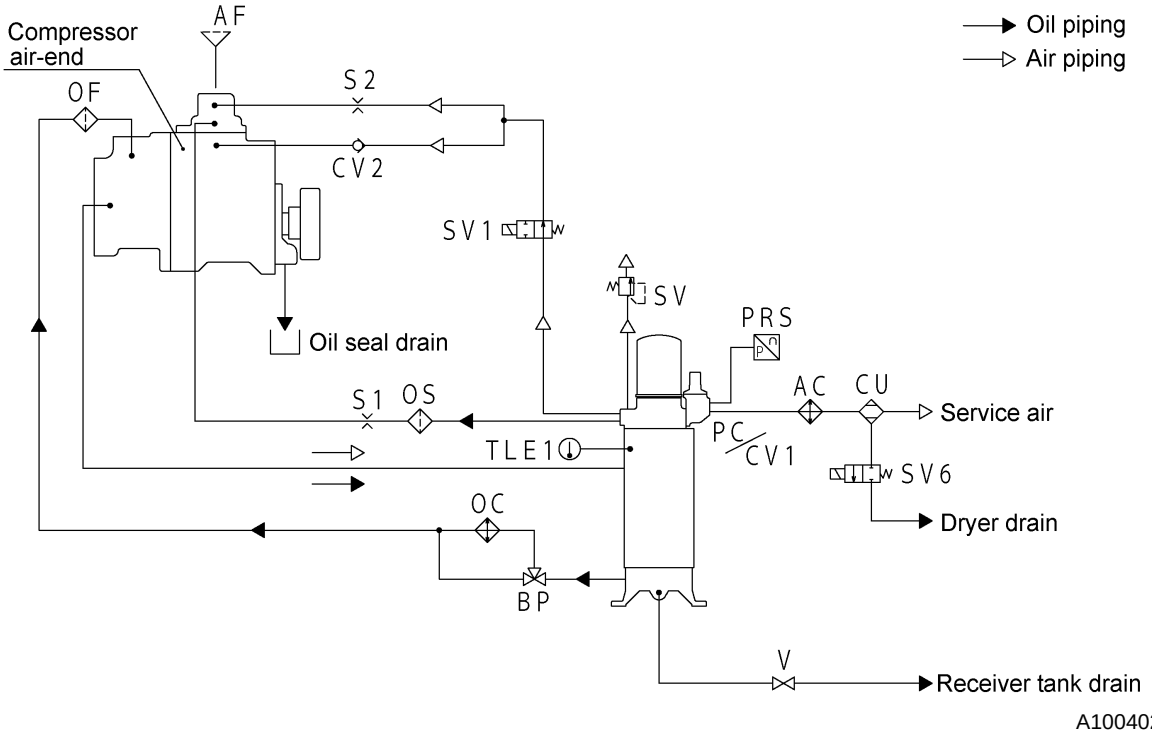
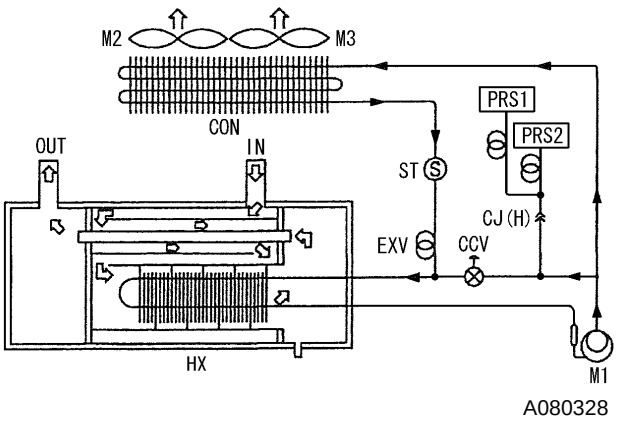
6.4 Piping Diagram

6.4.1 Compressor



AC	Aftercooler	PC	Pressure control valve
AF	Air filter	PRS	Pressure sensor
BP	By-pass valve	S1	Orifice
CU	Dryer	S2	Orifice
CV1	Check valve	SV	Safety valve
CV2	Check valve	SV1	2-way solenoid valve (for capacity control)
OC	Oil cooler	SV6	2-way solenoid valve (for drain condensate)
OF	Oil filter	TLE1	Discharge air temperature sensor
OS	Strainer	V	Stop valve

6.4.2 Dryer



CCV	Capacity control valve
CON	Condenser
CJ(H)	High pressure side check joint
EXV	Capillary tube
HX	Cooler
PRS1	High pressure switch
PRS2	Pressure switch for fan control
ST	Strainer
M1	Refrigerating compressor
M2,M3	Fan motor

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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