



Operation Manual

PRODUCT NAME

Thermo-dryer

MODEL

Original Instructions

IDH4-10, IDH4-20, IDHA4-23
IDH6-10, IDH6-20, IDHA6-23



This manual is intended to explain the installation and operation of the product. Only people who understand the basic operation of the product, or have basic knowledge and ability to handle industrial machinery, are allowed to work on the product.

Keep this manual available whenever necessary.

SMC Corporation

Dear Customers

Thank you for selecting SMC Air dryer.

This operation manual must be read and understood thoroughly before handling this product. It provides all essential information for maximizing the product operating efficiency, as well as for safety and longer life.

For safe operation of SMC Thermo-dryer, thoroughly read and follow the safety instructions, as well as regulations stated within ISO 4414^{*1} & JIS B 8370^{*2}.

- *1) ISO 4414: Pneumatic fluid power – General rules and safety requirements for systems and their components
- *2) JIS B 8370: Pneumatic fluid power – General rules relating to systems

This manual is intended to explain the installation and operation of the product. Only those who have thorough understanding of the fundamental operating procedure or have basic knowledge and skills of handling industrial products are qualified to perform installation and operation.

This operation manual and other documents provided with the product do not constitute a contract, and will not affect any existing agreements or commitments.

Statements contained in this operation manual cannot be newly guaranteed or modify any existing guarantee certificate.

It is strictly prohibited to copy this manual entirely or partially for use by a third party without prior permission from SMC.

Note: The contents of this operation manual are subject to change without prior notice.

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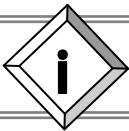
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Safety Instructions



Before using the product, be sure to read and understand all the important actions highlighted in this manual.

i . 1 Warning: Before using the product

This chapter is intended to specifically describe the safety related issues for handling the product.

The THERMODRYER is installed on the downstream side of a compressed air source to remove moisture and foreign matter, regulate the air pressure, and control the temperature of compressed air. SMC does not take any responsibility for any problems that may arise from using the product for any other purpose.

This product is operated at high voltage, and contains components which become hot and rotate. If a component needs to be replaced or repaired, contact a specialized vendor for parts and service.

All personnel who work with or around the product should read and understand the safety related information in this manual carefully before starting work.

This operation manual is not a general safety manual which is practiced by safety training representatives.

People who handle this product or work around this product need to be trained to understand its inherent risks and measures for safety.

The safety manager is responsible for strictly observing safety standards, but responsibility in respect to safety standards during daily work resides with each individual operator and maintenance personnel.

Operators and maintenance personnel should take the safety of the working place and work environment into account.

It is necessary to think of the safety of the working place and work environment for each task.

Undergo sufficient safety training before the operation training. It is very dangerous to do operation training without any safety training.

This manual must be kept available to operators whenever necessary.

i.1.1 Meaning of Signs: Caution, Warning, Danger

These safety instructions are intended to prevent hazardous situations and/or product damage. These instructions indicate the level of potential hazard by signs “**Danger**”, “**Warning**” or “**Caution**”. Contents with these signs are important instructions concerning safety. Confirm where those signs are, and read and comprehend notices and cautionary notices fully before handling.

“**Danger**”, “**Warning**” or “**Caution**” are in order according to severity (Danger>Warning>Caution). The meanings of these signs are as follows.



Danger

"Danger" indicates a hazard with a high level of risk, which will result in death or serious injury if an operator performs incorrect handling during the operation and maintenance of the product or does not follow the instructions necessary to avoid it.



Warning

“Warning” indicates a hazard with a medium level of risk which will result in death or serious injury if an operator does not follow the specified procedures during the operation or maintenance of the product or does not follow the instructions necessary to avoid it.



Caution

“Caution” indicates a hazard of a low level of risk which will result in minor and moderate injury or damage to product and equipment if an operator does not follow the specified procedures during the operation and maintenance of the product or does not follow the instructions to avoid it.

i.2 Danger Classifications / Position of Danger Warning Labels

To ensure the safety of the operator, potential hazards are classified and marked with warning labels. Confirm the potential hazards and positions of the labels before operation.



Warning

This product should only be operated by trained personnel.
Transportation, installation, and maintenance involve risks and should only be carried out by people who have sufficient knowledge and experience about the product and its accessories.
The cover panel of this product should only be opened by service engineers or trained personnel.



Warning

Should any problem occur, take measures as instructed in this manual.

- **Identify problems according to “Chapter 5 Troubleshooting.”**
- **Request repair and maintenance.**



Warning

The product should not be operated in the event of any problems.
If failure occurs, immediately stop the product, and contact maintenance personnel or a person who has sufficient knowledge and experience about the product and its accessories.

i.2.1 Danger Classifications

The specific danger classification of this product is as follows.

Hazards related to electricity

Since this product runs at high voltage, there is a danger of electric shock. This symbol is displayed with indications, “**Caution**”, “**Warning**” or “**Danger,**” on the product and this manual.



Hazards related to heat

Since this product becomes hot while in operation, there is a danger of burns. This symbol is displayed with indications, “**Caution**”, “**Warning**” or “**Danger,**” on the product and this manual.



Hazards related to rotating objects

Since this product has parts that rotate while in operation, there is a danger of catching your fingers or injury. This symbol is displayed with indications, “**Caution**”, “**Warning**” or “**Danger,**” on the product and this manual.




i.2.2 Hazards related to electricity




Inside of this product, there is power-supplying section with high voltage separated by the cover panel. Do not operate the equipment without the cover panel.

Only trained qualified person should operate or inspect inside the power transmission sections.

 Warning
<p>Read with caution and pay attention to the notations on danger warning labels.</p> <p>Do not remove or rub off danger warning labels.</p> <p>Confirm the positions of danger warning labels.</p>


i.2.3 Hazards related to high temperatures



 Warning
<p>Since this product has parts that become hot during operation, there is a danger of burns resulting from contact with these parts. There is also a danger of burns due to residual heat after the power supply is cut. Therefore, wait until the temperature of hot parts has fallen below 50°C.</p>

i.2.4 Hazards related to rotating objects



 Warning
<p>Since this product has parts that rotate during operation, there is a danger of injury resulting from contact with these parts. Also, the rotating parts might stop rotating temporarily and restart during operation. Do not perform work during operation.</p>

i.2.5 Hazards related to Compressed Air Circuit



Warning

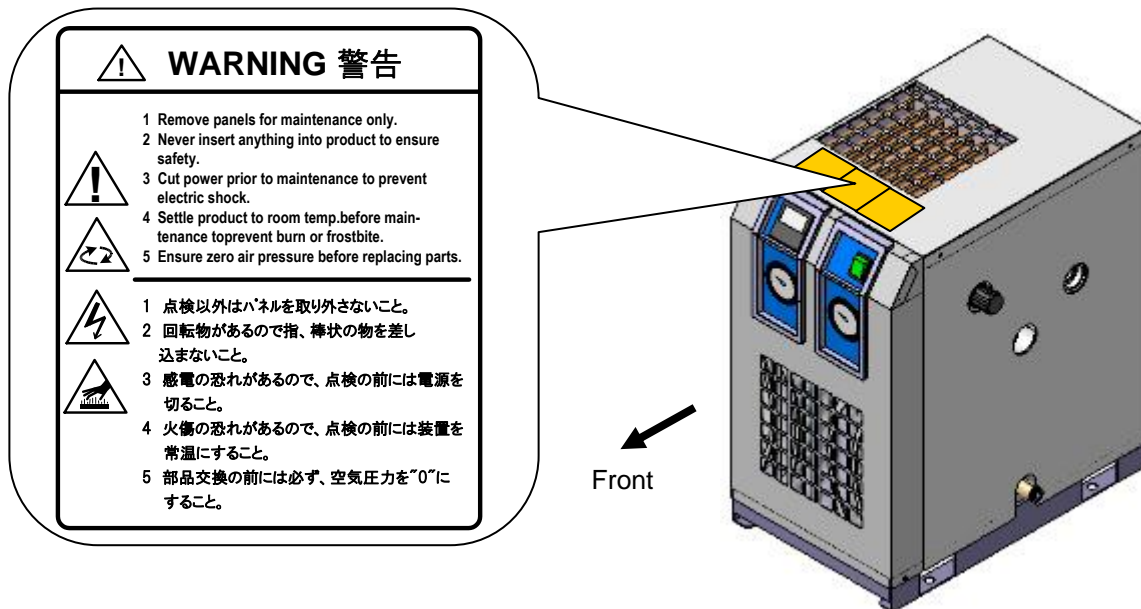
Be sure to release compressed air from the product and ensure the internal pressure is zero before replacing or cleaning the parts of the product. If the compressed air is left in the product, when some part is loosened, it may cause sudden lurching or other unexpected accidents.

i.2.6 Positions of Danger Warning Labels



Warning

Read with caution and pay attention to the danger warning labels.
 Do not remove or rub off danger warning labels.
 Confirm the positions of danger warning labels.



i.2.7 Hazards related to Refrigerant



Caution

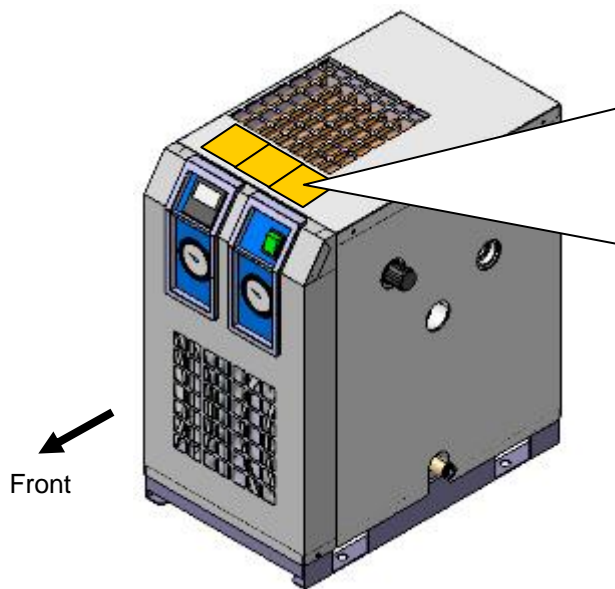
This product uses Fluorocarbon (HFC) as a refrigerant.

This product is categorized as category 1 under the fluorocarbon recovery and destruction law in Japan.

It is strictly forbidden to emit Fluorocarbon to the atmosphere. Before you repair this product, the refrigerant must be recovered and disposed of correctly. Only people who have sufficient knowledge and experience about the product and its accessories are allowed to recover the refrigerant.

Only a service engineer or qualified personnel should remove the cover panel of the product.

The quantity and type of Fluorocarbon are described on the specification label.



Act for Rationalized Use and Proper Management of Fluorocarbons
 フロン排出抑制法 第一種特定製品

- This product uses Fluorocarbon (HFC) as a refrigerant.
- 1 It is prohibited to release fluorocarbons without permission.
 - 2 For the disposal of the product, fluorocarbons must first be collected.
 - 3 The number and quantity of the refrigerant of the fluorocarbon used for this product is shown on the product label.
 - 4 GWP values of the calculated leakage of fluorocarbons to be reported are as in the table below.

- この製品には冷媒として、フロン類 (HFC) が使用されています。
- 1 フロン類をみだりに大気中に放出することは禁じられています。
 - 2 この製品を廃棄する場合には、フロン類の回収が必要です。
 - 3 本製品に使用している、フロン類の冷媒番号、量は、型式銘板に記載されています。
 - 4 算定漏えい量の報告に使用する、フロン類のGWP値は以下になります。

Refrigerant No.	R134a	R407C	R410A	R404A
GWP values	1430	1770	2090	3920

i.2.8 Cautions for use



Warning

Read with caution and pay attention to the notations on the danger warning labels.

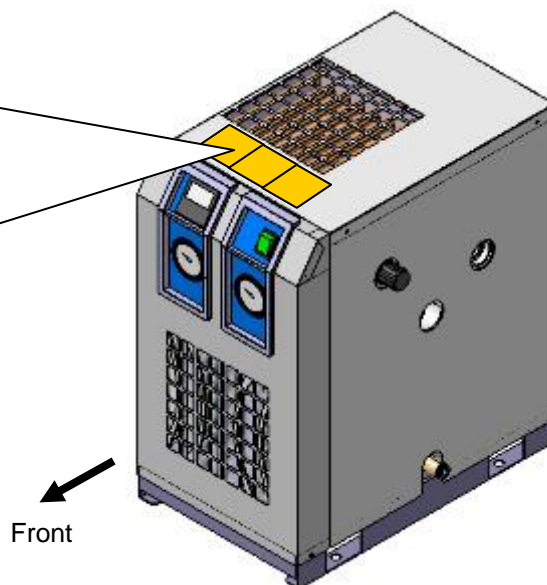
Do not remove or rub off danger warning labels.

Confirm the positions of danger warning labels.

CAUTION 注意

- 1 Read manual before operation.
- 2 Ensure ventilation and maintenance space.
- 3 Keep water away from the product.
- 4 Secure In / Out connector with spanner during piping.
- 5 Wait 3 minutes before restart.
- 6 Ensure Running Condition / Evaporating Temp. in green zone.

- 1 ご使用前に必ず取扱説明書を読んでください。
- 2 通風、メンテナンススペースを確保してください。
- 3 雨や水滴がかからないようにしてください。
- 4 IN/OUTポートをスパナで固定して配管してください。
- 5 再起動は運転停止3分後に行ってください。
- 6 RUNNING CONDITION・蒸発温度計はグリーン帯で使用してください。



i . 3 Disposal

When disposing of this product, the refrigerant enclosed in the refrigerant circuit must be recovered.



Caution

Dispose of the refrigerant and refrigerant oil according local laws or regulations.

Do not dispose of refrigerant oil together with domestic garbage, and, do not burn it in unauthorized incinerators.

Only people who have sufficient knowledge and experience about the product and its accessories are allowed to recover the refrigerant.

Only a service engineer or qualified personnel should remove the cover panel of the product.

If anything is unclear, please contact SMC.

i . 4 Limited warranty and Disclaimer / Compliance Requirements

The product is used subject to the following “Limited Warranty and Disclaimer“ and “Compliance Requirements”.
Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

Compliance Requirements

1. The use of SMC products for the manufacture of weapons of mass destruction (WMD) or other weapons is strictly prohibited.
2. The export of SMC products or technology from one country to another are governed by the relevant security laws and regulation of those countries involved in the transaction. Prior to the shipment of a SMC product to another country, ensure that all local rules governing that export are known and followed.



Caution

This product is provided in the use of manufacturing industries.
The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

1 Names and Functions of Parts

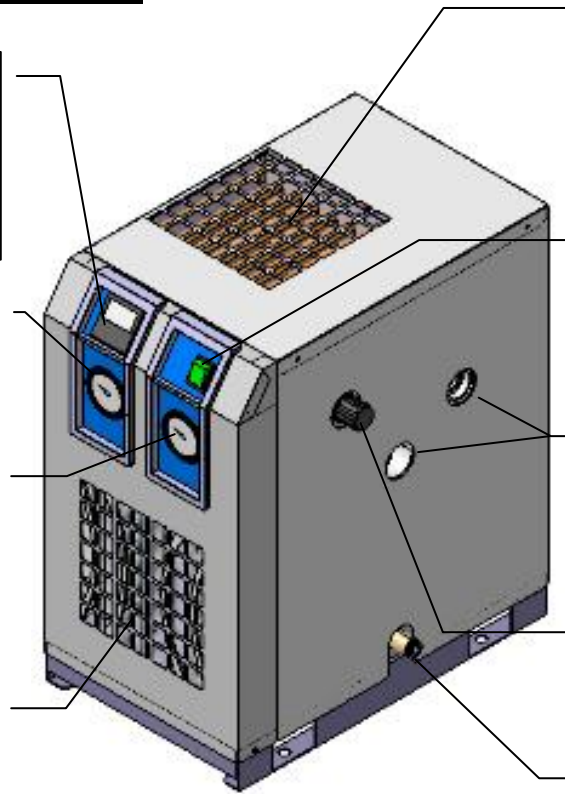
1.1 Names and Functions of Parts

Temperature controller
 For setting and display of the dryer outlet air temperature.
 * For details, please refer to Section 1.2

Air pressure gauge
 Displays the dryer outlet air pressure.

Evaporation thermometer
 Displays the evaporation temperature of the refrigerant. While running, it is normal if it displays within the green zone.

Ventilation air inlet
 Inlet for cooling air for condenser, with built-in dust filter. Please ensure that ventilation is not obstructed.



Main body

Ventilation air outlet
 Outlet for cooling air for condenser. Please ensure that ventilation is not obstructed by any object etc.

ON/OFF switch
 Operation start/ stop control switch. Green light is lit during operation.

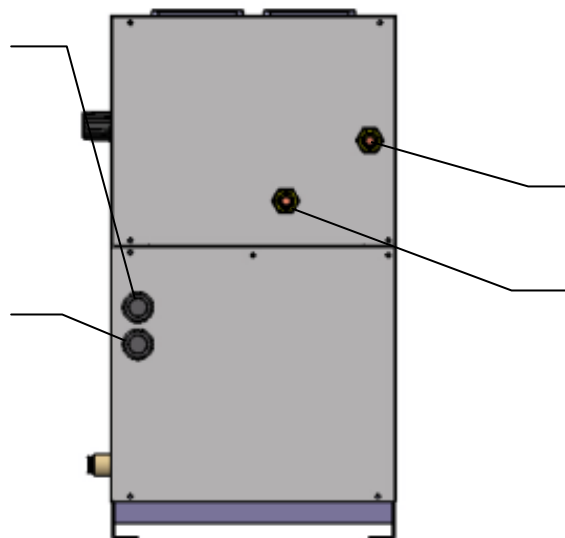
Filter inspection window
 The state of the filter can be checked.

Pressure adjustment handle
 To set outlet air pressure.

Drain outlet
 Discharges drainage. Please connect with tube of external diameter 10mm.

Signal cord entry
 Cable entry for operation and failure signals. Wire of max outer diameter 17mm can be plugged in.
 (Panel hole diameter Ø22mm)

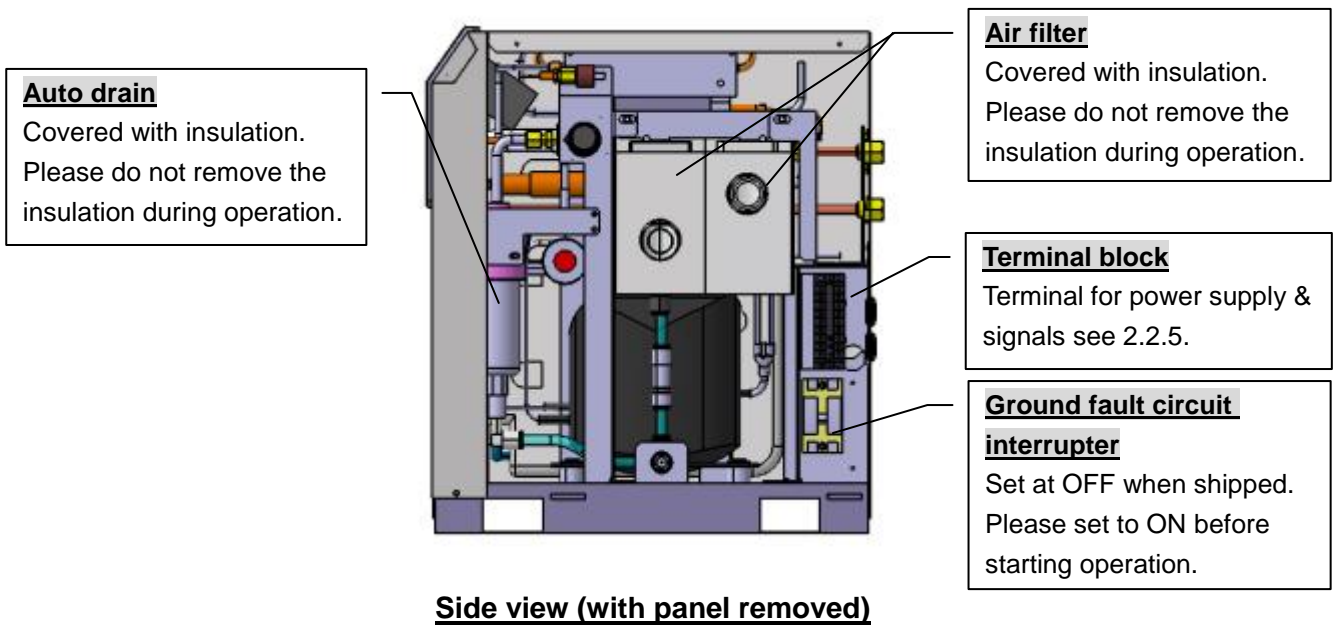
Power cord entry
 Cable entry for power supply and earth wire. Wire of max outer diameter 17mm can be plugged in.
 (Panel hole diameter Ø22mm)



Back view

Air inlet connection
 This is the air supply inlet.

Air outlet connection
 This is the air outlet.
 * Please insulate piping after this device.



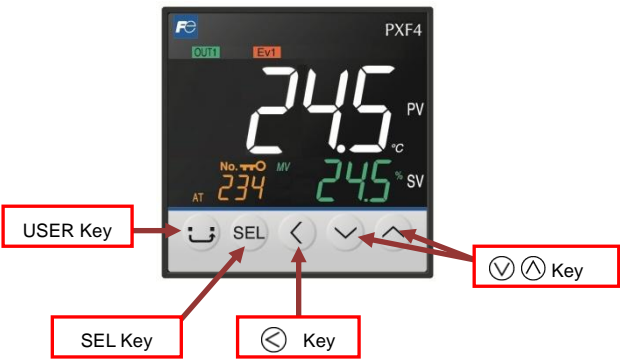
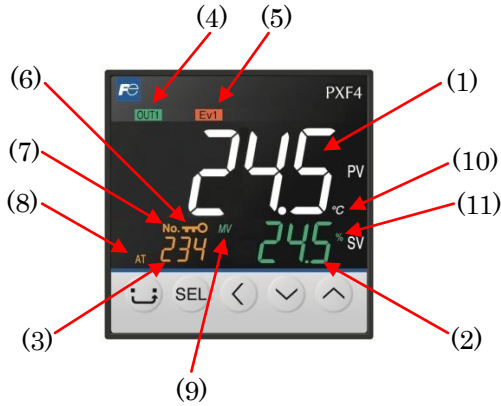
Accessories

The items below are included in the package.

- Operation Manual
- Drain tube (1m)
- Dedicated hexagon wrench (for the replacement of the filter element: only for the built-in filter type)

Temperature controller

Temperature setting is performed with the temperature controller.
Refer to 3.10.2 for button operation.

Operation parts	Display
 <p>USER Key</p> <ul style="list-style-type: none"> Press this key once in PV/SV display to switch between SV display and MV display. Press this key once in operation control mode, channel-selection mode, or setup mode to return to PV/SV display. ※ Pressing the USER button returns any screen to the initial display (PV/SV). <p>SEL Key</p> <ul style="list-style-type: none"> Press this key once in operation mode to move operation control mode. Press and hold this key in operation mode to move to channel selection mode. Press this key once in channel selection mode to move to setup mode. Press and hold this key in setup mode to move to channel selection mode. Press this key once in parameter selection submode of setup mode to enter parameter editing submode. Press this key once in parameter editing submode to save the change and return to parameter selection submode. <p>< Key</p> <ul style="list-style-type: none"> Use this key to select the digit when changing values. <p><math>\updownarrow</math> Key</p> <ul style="list-style-type: none"> Use this key to change SV value when in PV/SV screen. Change the displayed parameter or parameter setting. 	 <p>(1) Process value (PV) Air temperature at the outlet.</p> <p>(2) Set point (SV) The outlet air temperature set value.</p> <p>(3) Screen No. Shows screen No. when in parameter setting.</p> <p>(4) OUT 1 indicator Light / flashes when temperature adjustment heater operates.</p> <p>(5) EV 1 indicator Light when the alarm is generated</p> <p>(6) Lock indicator Lights during key lock.</p> <p>(7) No. indicator Lights during indicating screen No.</p> <p>(8) AT indicator Lights during auto tuning.</p> <p>(9) MV indicator Lights during MV is indicated on SV display.</p> <p>(10) °C indicator Shows the temperature unit under use.</p> <p>(11) % indicator % is shown to indicate the output condition of the heater.</p>

2 Transportation and Installation

Warning
<p>- Use the product in the right way. Pay attention to personal safety during installation, operation, maintenance, and inspection.</p>

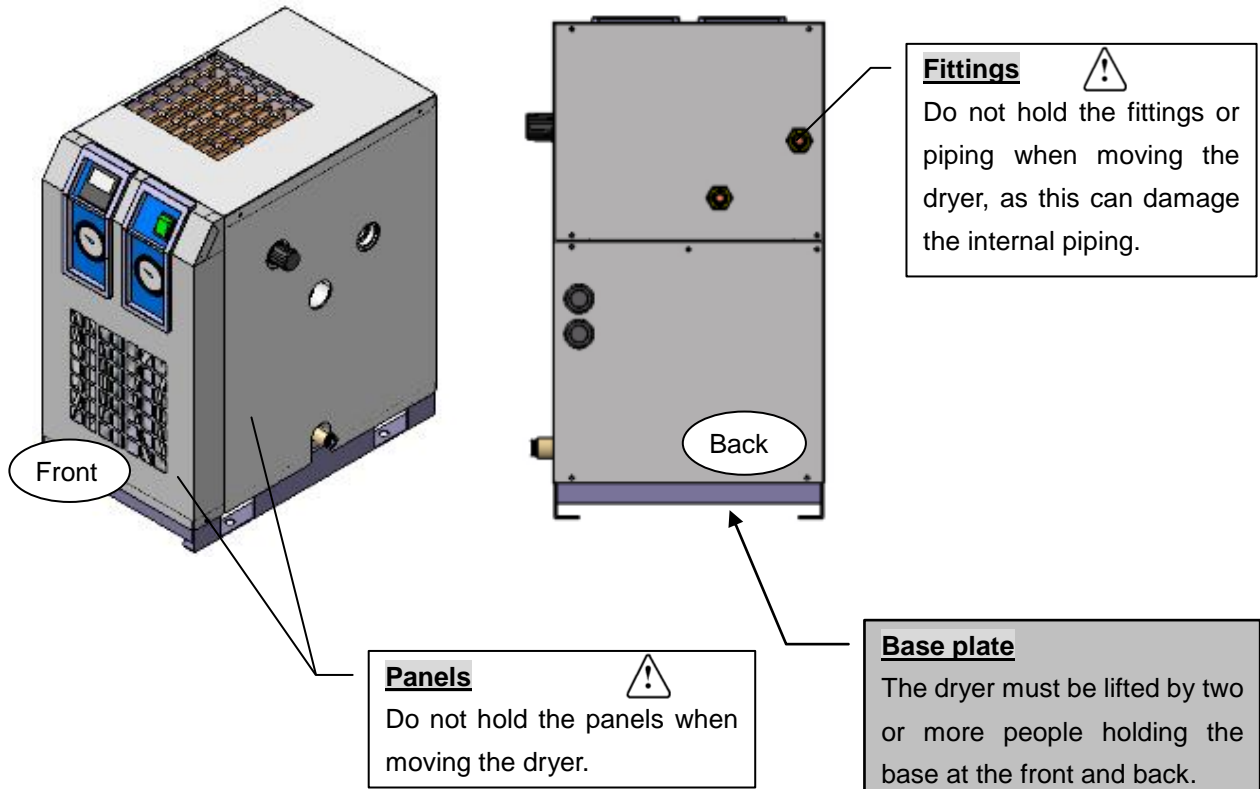
Caution
<p>- Transportation, installation, and maintenance including dangerous work must be done by trained personnel with sufficient knowledge and experience of the equipment and the system.</p>

2.1 Transportation

When transporting the dryer, always follow the instructions below.

- When lifting the dryer, lift carefully from the base to prevent dropping or tipping over.
- Do not lift by the panels, fittings or piping.
- Never lay this equipment on its side to move it. Pushing it over onto its side will damage the dryer.

Warning
<p>- The instructions above must be followed because the equipment is heavy and potentially dangerous to transport.</p> <p>- The dryer must be transported by more than one person, or using a forklift.</p>



2.2 Installation

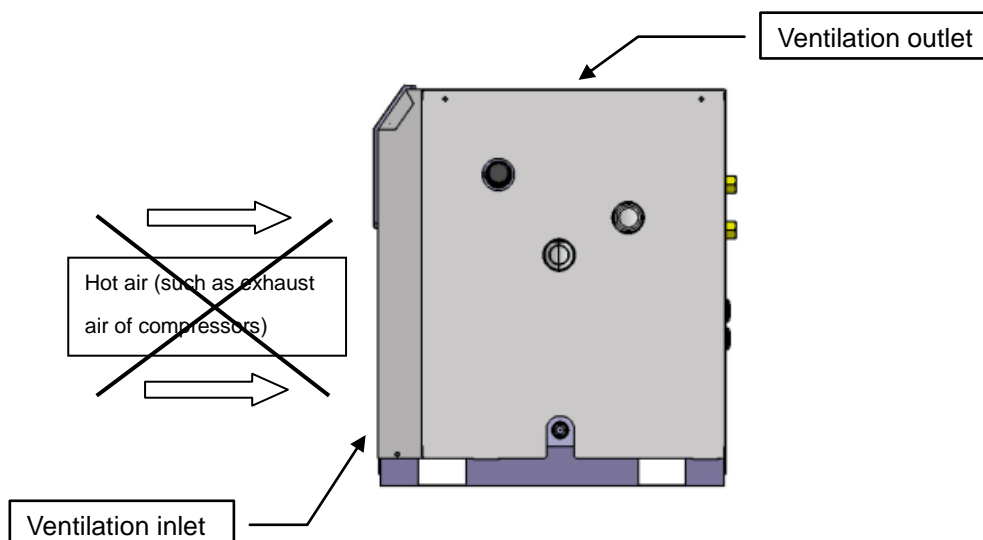
2.2.1 Location

The product should not be used or stored in the following environments.

- Environment where the product is exposed to rainwater, moisture vapor, salt water, oil etc.
- Locations exposed to excessive dust or particles.
- Locations exposed to flammable or explosive gas.
- Locations exposed to corrosive gas, solvent, or flammable gas.
- Locations exposed to direct sunlight or radiant heat.
- Locations where ambient temperature is outside of the following range:
 During operation: 2 to 30°C
 Storage: 0 to 50°C (when there is no drain water inside of the piping)
- Locations subjected to sudden changes in temperature.
- Locations where strong electromagnetic noise is generated (locations where electromagnetic field, strong magnetic field, surge is generated)
- Locations where static electricity is produced or discharged through the body of the equipment.
- Locations where strong high frequency wave is generated.
- Locations where there is a risk of lightning.
- Mounted on vehicles, marine vessels, etc.
- Locations at altitude of 2,000 meters or higher.
- Location where the product is affected by strong vibrations or impacts.
- Condition that applies external force or weight causing the product to be damaged.
- Locations where the ventilation grille of the equipment can be blocked.
- Locations where it could draw in hot air discharged from an air compressor or other dryers.
- Condition which has sudden pressure/flow rate change

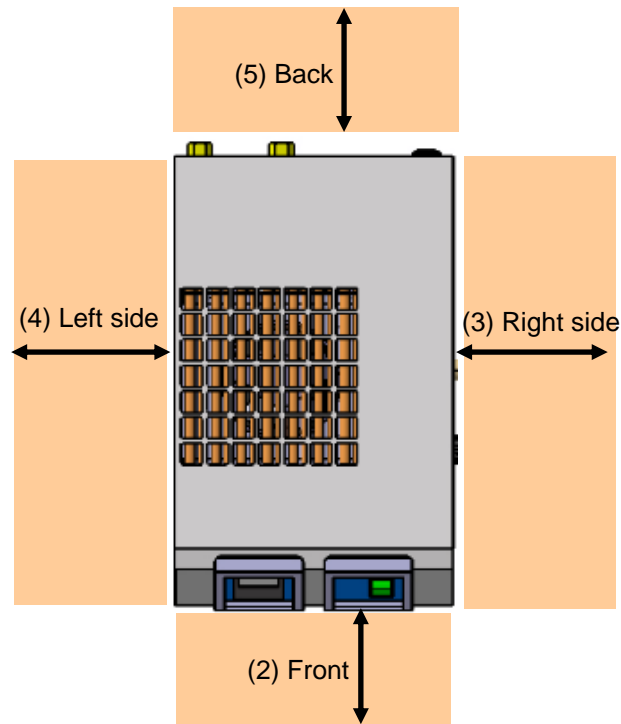
(2) If using the dryer in the following conditions or environments, please pay attention to safety measures and confirm with SMC before usage.

- Conditions or environments beyond the stated specifications; outdoors or directly exposed to sunlight.
- In equipment with atomic energy, railway, air navigation, vehicles, medical equipment, equipment that comes into contact with food or beverages, recreation equipment, emergency stop circuits, clutch/ brake circuits for press, or safety equipment.
- Uses which may affect people or property, particularly applications in which safety is required.
- If using in an interlock circuit, please use a double interlock by providing a mechanical protection function in case of breakdown. Carry out regular checks to confirm that it is working as required.



2.2.2 Anchorage

- The product should be installed on a vibration-free, stable, horizontal flat surface.
- Refer to “Chapter 6 6-2 Dimensions” for the unit dimensions.
- We recommend using the anchor bolt set sold separately as accessories.
- If insufficient space is provided for ventilation, the performance will decrease and may cause breakdown. Please install in the conditions illustrated below.



	Necessary installation space *1	Necessary maintenance space *2
(1) Top	600mm or more	600mm or more
(2) Front	600mm or more	600mm or more
(3) Right side	600mm or more	600mm or more
(4) Left side	-	600mm or more
(5) Back	-	600mm or more

*1 “Necessary installation space” is the space required to ensure performance and to be able to perform daily checks.

*2 “Necessary maintenance space” is the space required to check and repair the dryer if it breaks down. Please install so that there is sufficient space for servicing.

2.2.3 Air piping

- Connection to the inlet and outlet of compressed air should be made removable by using union etc.
- Hold the hexagonal fitting with a spanner, and connect the air piping fittings to the unit.
- Prevent the weight of the piping or unreasonable pressure that is caused in the process of piping from acting on the product.
- Be careful not to let the vibration of the air compressor transmit.
- If the temperature of compressed air at the inlet side is higher than 50°C, place an after-cooler after the air compressor outlet line.
- Use a material with low moisture absorption and dust generation, stainless steel, copper, fluoropolymer, etc. for piping of the compressed air inlet and outlet. Be sure to insulate to the outlet the piping. If piping is not insulated the controlled outlet air may be affected by piping outside temperature.
- If the air supplied to the dryer contains a lot of oil or foreign matter, this can cause deterioration in performance. Please install a main line filter or mist separator in the compressed air supply line to this dryer.
- Use pipes and fittings that are compatible with the operating pressure and temperature. Connect piping and fittings firmly to prevent air leakage.
- Provide bypass-piping to make it possible to do maintenance without stopping the air compressor.

*** Be sure to install Valve 1 and Valve 2 as shown in “3.2 Operation”.**
Recommend installing a silencer for the discharge of valve 1.

2.2.4 Drain Tube

- A polyurethane tube of 10mm external diameter is attached as a drain tube. The outlet end of the tube is released to atmosphere.
- Condensate fluid will be drained regularly using compressed air pressure. Fix the draining end of the tube firmly to prevent it from vibrating during draining.
- Do not use the drain tube in an upward direction.
- Do not bend or crush the drain tube.



Warning

During drainage work, follow your own procedure to ensure the safety of operators (e.g. wear protective goggles, apron and gloves).

If the drained fluid contains oil, waste liquid treatment is necessary according to local laws or regulations.

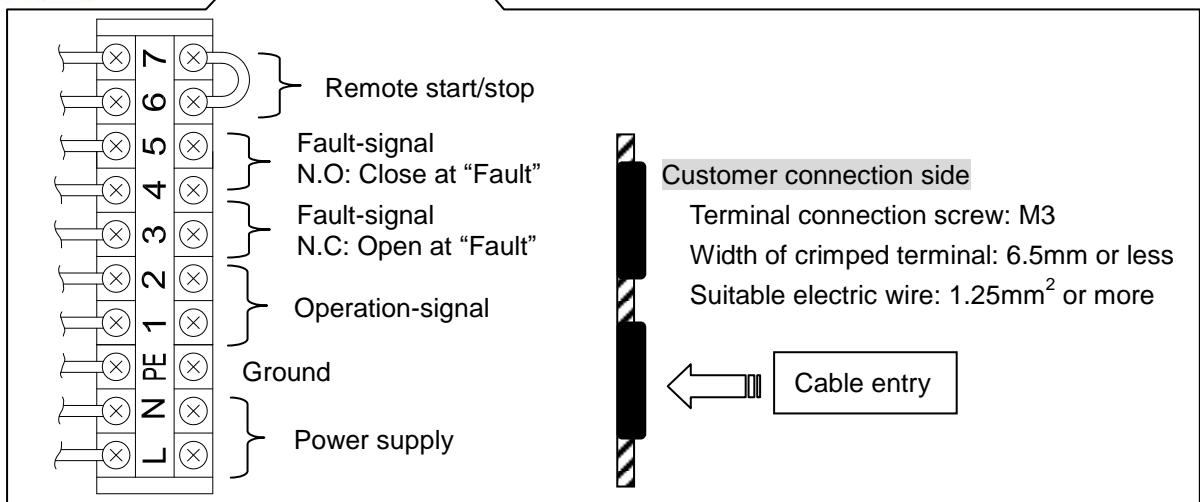
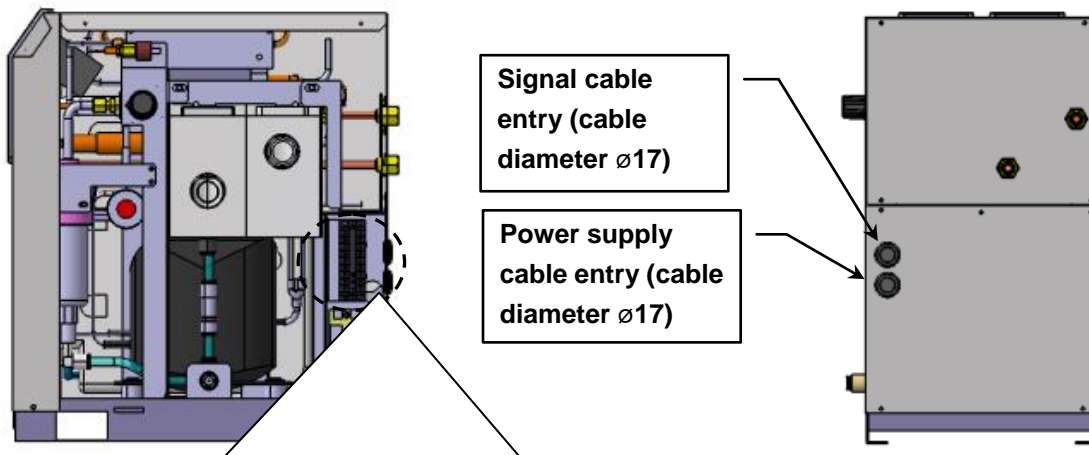
2.2.5 Electrical Wiring

Warning

Wiring must be done by qualified personnel.
 Before wiring, cut off the power supply for safety. Never work under energized conditions.
 Ensure a stable power supply with no voltage surges.
 Referring to “6-1 Specifications,” make sure to install an electric leakage breaker that has the correct short circuit capacity and load capacity to prevent electric shock or burnout of the motor of the refrigerator.
 Use a power supply suitable for the specifications of the product.
 The equipment should be grounded for safety.
 Do not connect the earth to a water pipe, a gas pipe, or a lightning rod.
 Do not plug too many leads into a single socket. This may cause exothermic heat or fire.
 Do not convert the wiring to use.
 In European countries, a ground fault circuit interrupter that meets the IEC standard should be used for the supply power.

Wiring procedure * The power cable should be supplied by others.

1. Remove the panel from the right-hand side of the dryer and lead the power cable from the power cable entry on the back panel.
2. Lead the signal cable from the signal cable entry in the same way as the power cable.
3. Connect the power cable, earth wire and signal cable to the terminal block. (Tightening torque: 0.6 to 1Nm)
4. Turn the ground fault circuit interrupter on.
5. Mount the cover on the terminal block and mount the panel on the right-hand side.




2.3 Cautions for reinstallation

 Caution
<p>The product can only be reinstalled in a new location by someone with sufficient knowledge and experience about the product and its accessories. The following instructions must be followed.</p>


If the product is moved and reinstalled in a new location after being operated (including trial assessment), the instructions below must be followed in addition to the instructions in Chapter 2.

Disassembly of the power cable

Cut off the power source when you disassemble the power cable.

 Warning
<p>Wiring must be done by qualified personnel. Before wiring, cut off the power supply for safety. Never work under energized conditions.</p>

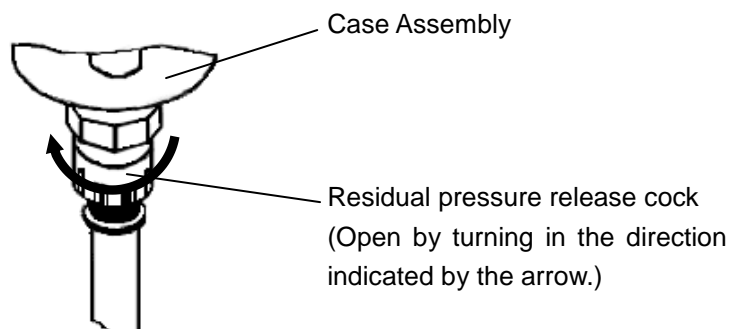
Disassembly of the air piping

 Warning
<p>Air piping must be done by qualified personnel. Separate the compressor from the product for safety before removing the piping. Do not remove any piping when there is remaining compressed air pressure inside of it.</p>

Remove the seal tape completely after detaching the piping. If any tape is left, it may get inside the equipment, causing cooling failure.

Compressed air residual pressure release procedure

1. Even while the dryer is removed, only open the bypass piping valve when compressed air is needed.
2. Close the compressed air inlet and outlet valve.
3. Remove the right side panel.
4. Open the residual pressure release cock of auto drain tube, and release compressed air pressure left inside of the equipment. Refer to the method to clean the auto drain strainer in "Chapter 4 Periodical maintenance" for detail.



3 Operation/ Shutdown

Caution

Only personnel with sufficient knowledge and experience about the product and its accessories should operate or shut down the equipment.

3.1 Check points before operation

Before trial assement, check the following points.

- Installation Condition

By visual inspection check that the equipment is installed in the upright position.
Make sure the product is fixed sufficiently with anchor bolts.
Do not place heavy items on the equipment or apply excessive load to piping etc.

- Wiring Connections

Power cord and earth wire should be connected firmly.

- Drain Tube

Drain tube should be connected correctly.

- Air piping

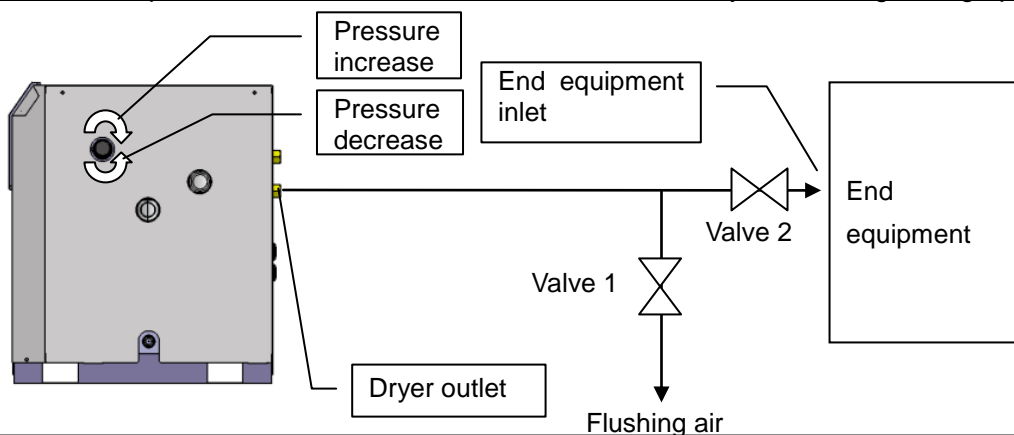
Check that the compressed air piping is connected correctly and flushing can be done as described in 3.2. Check that the compressed air inlet and outlet of the dryer, and bypass piping valves, are completely closed. Also, check that the compressed air inlet and outlet piping is insulated.

3.2 Operation

Start operation according to the procedure below.

- (1) With Valve 2 (below) closed, open Valve 1 to perform flushing of the outlet piping.
- (2) Turn on the main power supply breaker, then, turn on the ON/OFF switch.
- (3) The operation lamp and temperature control PV value and SV value light up. After a moment, the cooling fan will rotate, and hot air will be exhausted from the upper ventilation outlet.
- (4) Set the outlet air temperature of the dryer. (See 3.3 for setting method.)
*If the difference between the set temperature and the ambient temperature is bigger than 5deg.C, the outlet air temperature stability might exceed the specified value.
Depending on the operating conditions, the outlet air temperature and air cleanliness will stabilize in approximately 10 minutes.

If the outlet air temperature does not stabilize, set the PID value by auto tuning during operation.



- (5) Open Valve 2 and close Valve 1 to start using the compressed air.
- (6) Slowly turn the pressure adjustment handle to set the pressure supplied to the end equipment. The pressure is increased by turning clockwise, or decreased by turning anti-clockwise. The supply pressure can be adjusted from around 0.15MPa lower than the dryer inlet air pressure.
*The pressure adjustment handle has a lock function. Initially it is in the locked state.
Before adjustment, pull the handle towards you to release the lock. After adjustment, push it gently inwards to re-lock.
- (7) Depending on the condition of compressed air or ambient temperature, the cooling fan may alternate between start and stop. The operation of the chiller becomes continuous and the pointer of the evaporating thermometer will indicate the green zone.
- (8) Please use as it is in a continuously operating state.

Caution
<ul style="list-style-type: none"> - Avoid frequently switching the dryer on and off, as this may cause problems. - The auto drain on this dryer has a Normally Open structure in which the valve closes when the air pressure is 0.15MPa or above, so until the pressure increases, air will come out of the drain discharge outlet. Note that the pressure may not increase if the compressor has low air discharge. - If the amount of compressed air used varies, the outlet air temperature of the dryer may fluctuate. - <u>If the flow rate of the compressed air is less than the specified minimum flow rate, the temperature sensor may not operate correctly, causing the heater of the product to overheat, resulting in a halt in the operation with the protective device activating. Either keep supplying compressed air at the flow rate higher than the minimum specified by using a valve for flushing, or turn the product OFF.</u> - The performance display of this device shows the value at the outlet of this device, and is not guaranteed to be the value at the customer's end equipment inlet. Please control pressure and the temperature in the end equipment.

3.3 Outlet air temperature setting

Set the display SV to the desired temperature by pressing the \odot key or the $\text{\textcircled{A}}$ key on the temperature controller.

[Example] Change the SV temperature from 25.0°C to 30.0°C.

Display	Operation procedure				
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; padding: 5px;">20.0</td> <td style="text-align: center; padding: 5px;">PV</td> </tr> <tr> <td style="text-align: center; padding: 5px;">25.0</td> <td style="text-align: center; padding: 5px;">SV</td> </tr> </table>	20.0	PV	25.0	SV	<ol style="list-style-type: none"> 1. Make sure that the screen is PV/SV display. 2. Press the $\text{\textcircled{A}}$ key to change the SV value to 30.0. <p>When the SV value is changed to 30.0 by pressing the $\text{\textcircled{A}}$ key, press the SEL key to register the set value. (Even if SEL key is not pressed, the value is automatically registered 3 seconds later)</p>
20.0	PV				
25.0	SV				
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; padding: 5px;">20.0</td> <td style="text-align: center; padding: 5px;">PV</td> </tr> <tr> <td style="text-align: center; padding: 5px;">30.0</td> <td style="text-align: center; padding: 5px;">SV</td> </tr> </table>	20.0	PV	30.0	SV	
20.0	PV				
30.0	SV				

* Specified temperature range for the outlet air is 15 to 30°C.

3.4 Shutdown

- (1) Turn off the ON/OFF switch.
- (2) The operation light and temperature controller display will go out, and operation will stop.

3.5 Cautions for restart

- Wait at least 3 minutes before starting the Thermo-dryer after it has been shut down. Restarting within 3 minutes may activate the protective circuit so the lights will go out and operation is not possible.
- When operation is restarted, the temperature controller will retain the set values from the time when it was stopped immediately before restarting.

3.6 Check points before restart

Check the following points before starting operation. If any abnormality occurs, stop operation immediately. Turn off the ON/OFF switch and then turn off the breaker of the main power supply.

- There is no leakage of compressed air.
- The SV value of the temperature controller is set correctly.
- The PV value of the temperature controller is not displaying an error, and is not an abnormal value.
- The air pressure, temperature, flow rate and ambient temperature are within the specifications.
- Moisture is discharged from the drain tube.
- The pointer of the evaporating thermometer indicates the green zone.
- The dryer is not generating any abnormal sound, vibration or smell.

3.7 Cautions for abnormal stop

The heater has the following protective devices built in.


Protection device	Purpose
Thermostat, Temperature fuse	To prevent heater from overheating
Overload relay	Over current protection and overheat protection of the refrigerating compressor

When the protective devices are activated, the operation of the dryer will stop. If it stops, read chapter 5, and remove the cause of the stoppage before restarting.

When the protective device operates, it is possible to find which protective device became activated by checking whether the product itself is operating or if either of the "Temperature controller " LED or the "Running" LED is turned ON as shown in the table below.

Protection device	Operating status of the product when a failure occurs		
	Operating status of the product	Temperature controller	Operation LED
Overload relay	Stop	Turned ON	LED is OFF
Temperature fuse	Operation	Turned ON	Turned ON
Thermostat	Stop	Turned ON	Turned ON

* When emergency stop due to Overload relay is generated 5 times in an hour or the heater protection equipment (thermo-stat) is operated, the emergency stop status will be held.
If the temperature fuse operates, it will fail to control temperature, but the product operation will not stop.

	Caution
<p>• The protection devices are automatic return type. Please wait at least 3 minutes after operation stops. If restarted within 3 minutes, the dryer may not operate, or may stop again.</p>	

3.8 Specifications of signals

- Operation signal and fault signals contact type are non-voltage contacts. (Please refer to fig.3.8)

Signals	Specifications of the signal mode
Operation-signal (N.O.)	The contact turns on 10 minutes after starting
Fault-signal (N.C.)	<ul style="list-style-type: none"> - Switch on when alarm is generated by temperature controller - Switch on when stopping operation or the protective device operates
Fault-signal (N.O.)	<ul style="list-style-type: none"> - Switch off when alarm is generated by temperature controller - Switch off when stopping operation or the protective device operates

- Contact capacity

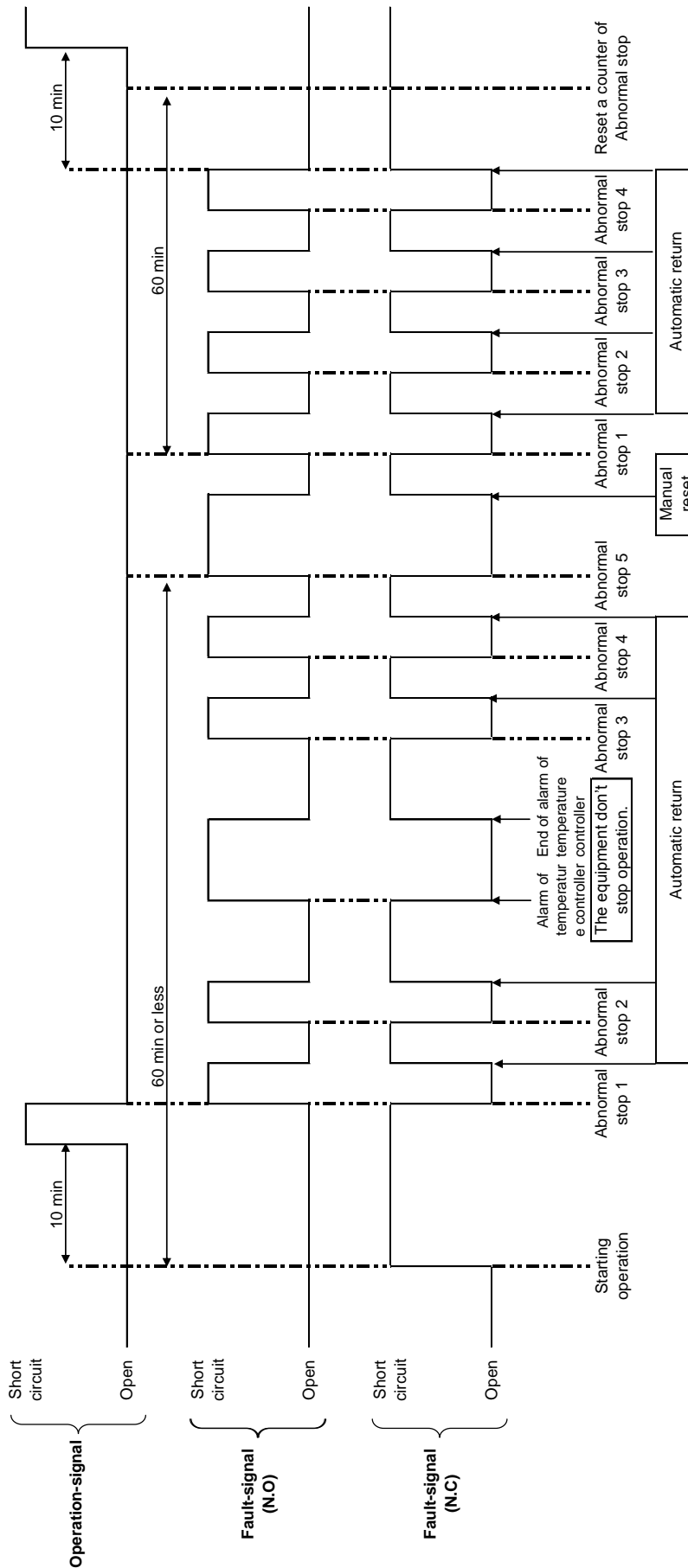
Resistance load: 2A Induction load: 80VA Lamp load: 100W
 Minimum current values: 5 VDC, 2mA

- Fault signal is generated when the protective device of the refrigerating compressor (overload relay) or the protective device of the heater (thermostat) or alarm of Temperature Controller operate. Be sure to remove the cause of the fault before restarting the dryer.

- 1) When the overload relay or thermostat is activated, the equipment stops operation.
- 2) When the alarm is generated by the temperature controller, the equipment does not stop operation.

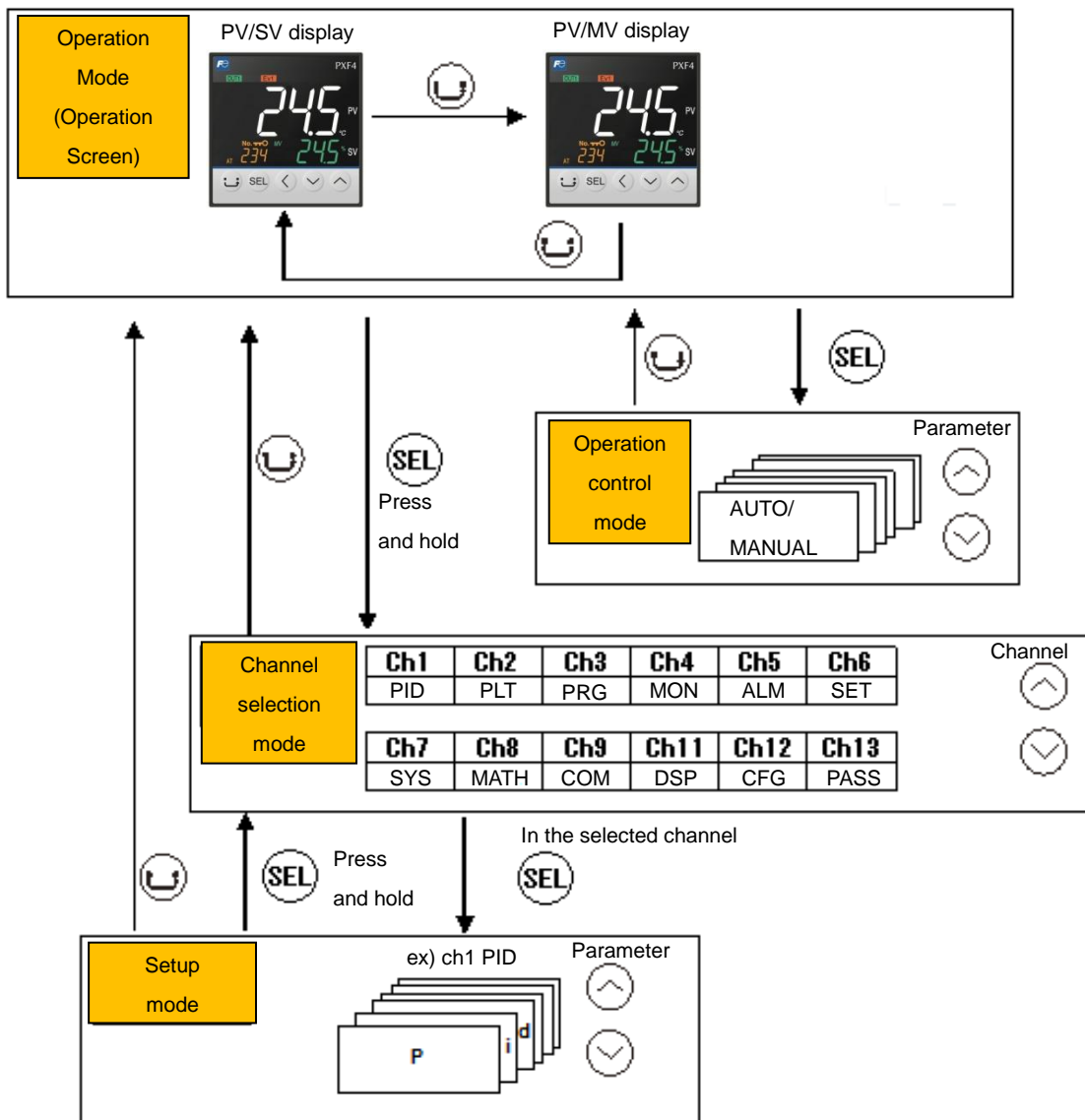
3.9 Remote control

- If remote controlling the dryer, remove the jump wire (#6 and #7) connected to the terminal block, and connect to the switch, etc.
- Even if remote controlling the dryer, wait 3 minutes before restarting after the dryer has stopped. If restarted within 3 minutes, it may not operate due to the protective device (overload relay) operating.
- To prevent breakdown of the motor, frequency of start and stop should be within 5 times an hour.

Fig 3.8 Timing chart of signals

【Notes】

- (1) The abnormal stop will be automatically reset until 4 times within 60 minutes, but the 5th time will not be automatically reset in this case, please turn off the power once in order to reset.
- (2) When the alarm is generated by the temperature controller, the equipment does not stop operation.

3.10.2 List of key operations



Operation mode

Mode for normal operation. Measured value (PV) or set value (SV) is displayed. Operation starts in this mode when power is supplied. Set value (SV) can be changed. The output of the heater (MV) is displayed by switching the screen.

Run mode

Alarm set values can be changed in Run mode.

Channel selection mode

Channel of desired parameters can be selected in the channel selection mode.

Setting mode

Parameters can be set in this mode. Mode can be switched between parameter selection and parameter setting by pressing the SEL key. In parameter selection, displayed parameters can be switched with ∇ and \blacktriangle keys. In parameter setting, set values can be changed with ∇ and \blacktriangle keys.

3.10 Functions and operation of temperature controller

3.10.1 List of Functions

- The following items can be set by the temperature controller.

<u>No.</u>	<u>Function</u>	<u>Outline</u>	<u>Reference page</u>
<u>1</u>	<u>Key-lock</u>	Keys can be locked to prevent the settings being changed by mistake.	3.10.4
<u>2</u>	<u>Auto-tuning failure</u>	When the outlet temperature is unstable, PID values are automatically adjusted to the optimum settings.	3.10.5
<u>3</u>	<u>Manual tuning of PID</u>	When the outlet temperature is unstable, PID values can be manually adjusted to the optimum settings.	3.10.6
<u>4</u>	<u>Switching of the temperature error alarm</u>	This function changes alarm type or threshold of temperature deviation, etc.	3.10.7

3.10.3 List of parameters

The temperature controller parameters are shown below.

[Initial values of the temperature controller]

Parameter symbol	Description of parameters	Set value		Remarks
		IDH*4-***	IDH*6-***	
SV	Set temperature	25.0	25.0	Unit [°C]
AT	Auto-tuning failure	oFF	oFF	“oFF ”: Auto tuning stop/ completed
P	Proportional band	5.0	9.0	Unit: %
I	Integral time	60	70	Unit: Second
D	Derivative time	11.5	13.5	Unit: Second
LoC	Key-lock	oFF	oFF	“oFF”: Keys are not locked
A1TP	Alarm type	10	10	Upper and lower deviation (with hold)
AL1	Temperature deviation	5	5	Unit: °C
A1HY	Alarm hysteresis	1	1	Unit: °C
DLY1	Alarm delay time	20	20	Unit: Second

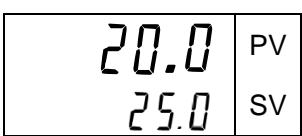
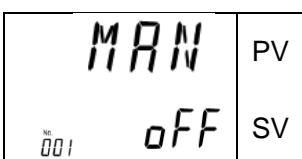


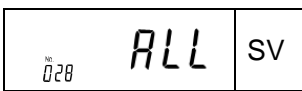


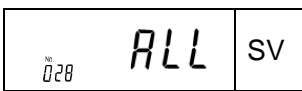
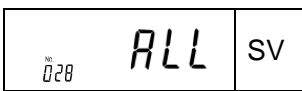

3.10.4 Key lock LoC (028)

Keys can be locked to prevent the settings being changed by mistake. There are 3 types of setting for key lock.

- oFF: Keys are not locked
- ALL: All buttons are locked
- PARA: Operations other than SV change are locked

Channel menu can be displayed.

[Setting example] Key lock setting

Display	Operation procedure
	1. Make sure that the screen shows PV/SV display.
	2. Press SEL key to return to the operation mode.
	3. Press  key to change from MAN to LoC.
	4. Press SEL key to enter the Loc mode. ("oFF" of the lower level flashes.)
	5. Press  key to change oFF to ALL.
	6. Press SEL key for setting. All keys are locked.
	7. Press  key to return to PV/SV display.

3.10.5 Auto tuning AT (005)

Optimum PID values are automatically set by auto tuning.

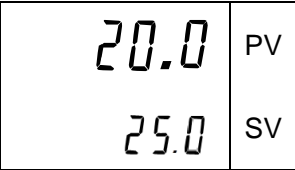




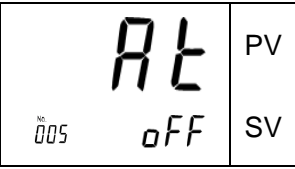

[Setting range]

- oFF: Stop/ completed
- oN: Auto tuning start (normal type)
- L-oN: Auto tuning (low PV type) start

Low PV type reduces the overshoot during tuning.

- After the auto tuning is completed successfully, the automatically set PID values are maintained after the power supply is cut. If the power supply is cut in the middle of auto tuning, the PID values are not changed and the user should perform auto tuning again.
 - The controller switches to ON-OFF operation (= 2-position operation) during auto tuning, so PV will vary greatly depending on the process. Do not use auto tuning during a process in which a wide variation of PV is not allowed.
 - If SV is changed greatly the PV input type is changed, or controllability is worse because the controlled item is changed, and the user should perform auto tuning again.
- Note) ON-OFF operation is performed during auto tuning. There will be an overshoot for SV.
To reduce the overshoot, choose a low PV type and perform auto tuning.

[Example] Auto tuning setting

Display	Operation procedure
	<ol style="list-style-type: none"> 1. Make sure that the screen shows PV/SV display. 2. Press SEL key to return to the operation mode. 3. Press  key to return to MAN mode. 4. oFF on the lower level flashes after pressing the SEL key. 5. Press  key to change from oFF to oN. 6. Press SEL key. Auto-tuning is performed. (AT indicator at the bottom of the left side flashes) 7. Press  key to return to PV/SV display.
	
	
	

3.10.6 PID manual setting

CH1 PID (control parameter)

- P** Proportion band (050)
- I** Integral time (051)
- d** Derivative time (052)

PID(proportion band / integral time / derivative time) is manually set.

[Setting range]

- P: 0.1 to 999.9%
- I: 0 to 3200 sec.
- D: • 0.0 to 999.9 sec.

- PID values are automatically set by auto tuning.
- PID values set by auto tuning are considered to be the optimum. To change the response, adjust the PID values manually.
- PID values are set in advance. Use manual tuning only when auto tuning is not stable.
- Generally, control becomes unstable if P is too small. Response becomes slow if P is too large.

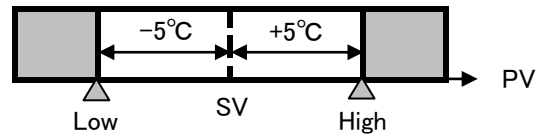
[Example] For setting P=10.0%, I=100sec., D=20sec.

Display	Operation procedure				
<table border="1"> <tr><td>20.0</td><td>PV</td></tr> <tr><td>25.0</td><td>SV</td></tr> </table>	20.0	PV	25.0	SV	1. Make sure that the screen shows PV/SV display.
20.0	PV				
25.0	SV				
<table border="1"> <tr><td>CH1</td><td>PV</td></tr> <tr><td>" 1 PId</td><td>SV</td></tr> </table>	CH1	PV	" 1 PId	SV	2. Press and hold the SEL key to switch to CH1 (PID control parameters).
CH1	PV				
" 1 PId	SV				
<table border="1"> <tr><td>P</td><td>PV</td></tr> <tr><td>050 5.0</td><td>SV</td></tr> </table>	P	PV	050 5.0	SV	3. Press and hold the SEL key. P (Proportion band) is displayed.
P	PV				
050 5.0	SV				
<table border="1"> <tr><td>050 10.0</td><td>SV</td></tr> </table>	050 10.0	SV	4. Press the [SEL] key. (The first digit of the lower level will start flashing.)		
050 10.0	SV				
<table border="1"> <tr><td>050 10.0</td><td>SV</td></tr> </table>	050 10.0	SV	5. Press Δ key change 5.0 to 10.0.		
050 10.0	SV				
<table border="1"> <tr><td>050 10.0</td><td>SV</td></tr> </table>	050 10.0	SV	6. Press SEL key to set the value.		
050 10.0	SV				
<table border="1"> <tr><td>I</td><td>PV</td></tr> <tr><td>051 60</td><td>SV</td></tr> </table>	I	PV	051 60	SV	7. Press ∇ key to display i(integral time).
I	PV				
051 60	SV				
<table border="1"> <tr><td>051 100</td><td>SV</td></tr> </table>	051 100	SV	8. Press the [SEL] key. (The first digit of the lower level will start flashing.)		
051 100	SV				
<table border="1"> <tr><td>051 100</td><td>SV</td></tr> </table>	051 100	SV	9. Press Δ key change 60 to 100.		
051 100	SV				
<table border="1"> <tr><td>051 100</td><td>SV</td></tr> </table>	051 100	SV	10. Press SEL key to set the value.		
051 100	SV				
<table border="1"> <tr><td>d</td><td>PV</td></tr> <tr><td>052 11.5</td><td>SV</td></tr> </table>	d	PV	052 11.5	SV	11. Press ∇ key to display d (derivative time).
d	PV				
052 11.5	SV				
<table border="1"> <tr><td>052 11.5</td><td>SV</td></tr> </table>	052 11.5	SV	12. Press the [SEL] key. (The first digit of the lower level will start flashing.)		
052 11.5	SV				
<table border="1"> <tr><td>052 20.0</td><td>SV</td></tr> </table>	052 20.0	SV	13. Press Δ key change 11.5 to 20.0.		
052 20.0	SV				
<table border="1"> <tr><td>052 20.0</td><td>SV</td></tr> </table>	052 20.0	SV	14. Press SEL key to set the value.		
052 20.0	SV				
	15. Press U key to return to PV/SV display.				

3.10.7 Switching of the temperature error alarm

1) Change the alarm type and temperature deviation

Set the temperature alarm for SV value.
The figure on the right shows the default value.



- Alarm type **A1TP** (470): Upper and lower limit deviation
- Temperature deviation **AL1** (009): +/- 5°C
- After the change of the alarm type, turn the power off and then on again.

* After changing the temperature alarm the error signal output specifications are changed. (Page 3-4).

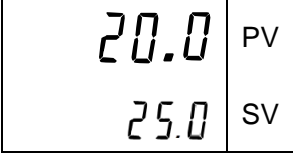

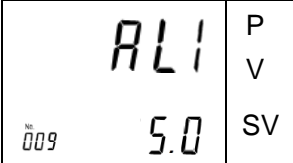


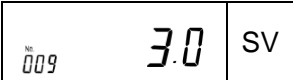


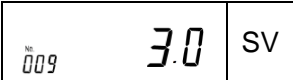
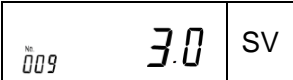

Set value	Alarm type	Operation profile
0	No alarm	-
3	Upper limit of the absolute value	
4	Lower limit of the absolute value	
8	Upper limit deviation	
9	Lower limit deviation	
10	Upper and lower limit deviation	

* Even if PV is in the alarm triggering range when power is supplied, the alarms above do not generate an alarm immediately. An alarm is generated if the PV value moves out of the alarm triggering range once and back into the range again.

[Example] Set the alarm type to upper limit deviation hold.

Display	Operation procedure
	<ol style="list-style-type: none"> 1. Make sure that the screen shows PV/SV display. 2. Press and hold the SEL key to switch to CH1 (PID control parameters). 3. Press \odot key to display CH5 (alarm parameters). 4. Press the SEL key to enter CH5 (alarm parameters). A1TP (setting of alarm type) is displayed. 5. Press the [SEL] key. (The first digit of the lower level will start flashing.) 6. Press \odot key to change 10 to 8 (upper limit deviation hold). 7. Press SEL key to set the value. 8. Press \odot key to return to PV/SV display.

[Example] Setting the temperature deviation within $\pm 3^{\circ}\text{C}$.

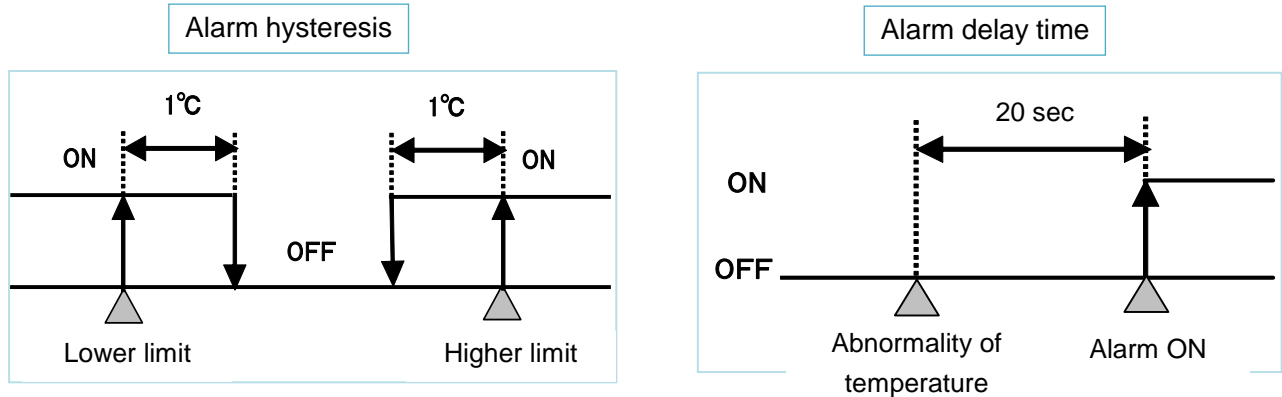
Display	Operation procedure
	1. Make sure that the screen shows PV/SV display.
	2. Press SEL key to return to the operation mode.
	3. Press   key to change MAN to AL1. 4. Press SEL key to enter the AL1 mode. (The first digit of the lower level will start flashing.)
	5. Press   key to change 5.0 to 3.0.
	6. Press SEL key to set the value.
	7. Press  key to return to PV/SV display.

1) Alarm hysteresis and alarm delay time

Change the temperature hysteresis for stopping the alarm and the time to turn on the alarm.

Alarm hysteresis **A1HY**(471): 1°C

Alarm delay time **DLY1**(472): 20sec.



[Example] For setting the alarm hysteresis to 2°C and delay time to 30sec.

Display	Operation procedure				
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><td style="font-size: 24px; font-weight: bold;">20.0</td><td style="font-size: 12px;">PV</td></tr> <tr><td style="font-size: 24px; font-weight: bold;">25.0</td><td style="font-size: 12px;">SV</td></tr> </table>	20.0	PV	25.0	SV	<ol style="list-style-type: none"> 1. Make sure that the screen shows PV/SV display. 2. Press and hold the SEL key to switch to CH1 (PID control parameters). 3. Press \odot key to display CH5 (alarm parameters). 4. Press the SEL key to enter CH5 (alarm parameters). A1TP (alarm type) is displayed. 5. Press \odot key to change A1TP to A1HY(alarm hysteresis). 6. Press the [SEL] key. (The first digit of the lower level will start flashing.) 7. Press \ominus key to change 1 to 2. 8. Press SEL key to set the value. 9. Press \odot key to change A1HY to DLY1 (delay time). 10. Press the [SEL] key. (The first digit of the lower level will start flashing.) 11. Press \ominus key change 20 to 30. 12. Press SEL key to set the value. 13. Press \odot key to return to PV/SV display.
20.0	PV				
25.0	SV				
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><td style="font-size: 24px; font-weight: bold;">CH 5</td><td style="font-size: 12px;">PV</td></tr> <tr><td style="font-size: 24px; font-weight: bold;">ALM</td><td style="font-size: 12px;">SV</td></tr> </table>	CH 5	PV	ALM	SV	
CH 5	PV				
ALM	SV				
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A1TP	PV				
1	SV				
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A1HY	PV				
1.0	SV				
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2.0	SV				
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><td style="font-size: 24px; font-weight: bold;">dLY1</td><td style="font-size: 12px;">PV</td></tr> <tr><td style="font-size: 24px; font-weight: bold;">20</td><td style="font-size: 12px;">SV</td></tr> </table>	dLY1	PV	20	SV	
dLY1	PV				
20	SV				
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30	SV				

4

Checks and Maintenance

4.1 Daily Check Points

Check the following points during normal operation. If you find any problems, immediately stop the operation and refer to “Chapter 5 Troubleshooting”.

- There is no air leakage.
- The running lamp is on during operation.
- Moisture (condensate fluid) is being discharged from the drain tube.
- The pointer of the evaporation thermometer indicates in the green zone when it is running with pressurized air supply.
- The pointer of the evaporation thermometer indicates about 3 to 10°C lower than the ambient temperature when the equipment is suspended with no pressurized air supply.
- There is no abnormal sound or vibration coming from the equipment.
- There are no abnormal smell or smoke coming from the equipment.

4.2 Periodical Maintenance

4.2.1 Cleaning of filter at ventilation port (suction port)

To eliminate dust at the ventilation port (suction port), apply an electrical vacuum or air blow once every month. Wear protective goggles and a mask to prevent dust from entering the eyes or throat during air blow.

Part number

Part no.	Description	Model	Qty.
IDF-S1249	Dust Protecting Filter	IDH*4	1
IDF-S1747	Dust Protecting Filter	IDH*6	1

4.2.2 Cleaning the auto drain strainer

Remove dust from the auto drain strainer once a month. Use a neutral detergent for cleaning. Also, if the auto drain becomes heavily polluted replace it with a new one and shorten the next cleaning interval.

4.2.3 Replacement of case assembly

Replace the case assembly with a new one if the auto drain failure continues after cleaning it.



Warning

- Maintenance of the air dryer should only be carried out by someone with sufficient knowledge and experience of air dryers and related equipment.
- Before carrying out maintenance, the important warnings in this manual must be thoroughly read and understood.



Danger

- When replacing or cleaning parts of the air dryer, be sure to remove the compressed air pressure inside the air dryer to "0". Never remove the case assembly when the air dryer is operated or air pressure remains inside. It is extremely dangerous if compressed air pressure remains inside the air dryer, as parts may come flying off at speed when loosened, or other unexpected accidents.
- This product has parts that become hot during operation and a power supply with high voltage applied. There is a risk of burns due to heat or electrification by high voltage. Even when operation is shut down after switching off the air dryer's illuminated light, there are also charging lines. When working on the charged sections, be sure to switch off the earth leakage breaker installed before starting work.
- As some parts of the air dryer will remain hot, there is a risk of burns due to residual heat after the power is switched off. Do not carry out replacement work until the temperature of these parts has fallen to 50°C or less. Wait approximately 10 to 15 minutes as a guide.
- When carrying out maintenance work on the auto drain strainer and auto drain, there is a risk of touching the drain fluid during work. Please follow the safety procedure for operators specified by customer. (Example: carry out work wearing safety glasses, apron and gloves to prevent discharged fluid from touching the human body.)
- Use neutral detergent solution to clean parts such as the auto drain strainer and auto drain. Never use solvent such as thinner.
- When removing the outer casing panel or case assembly of the auto drain, wear gloves to prevent injuries.

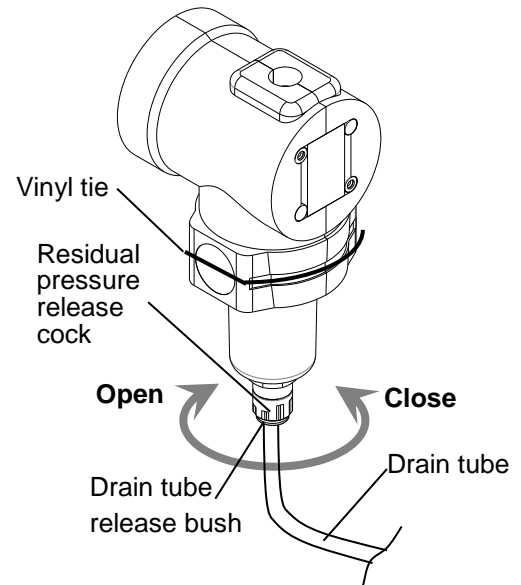
[How to clean and replace the auto drain/strainer]

When carrying out maintenance work on the auto drain and auto drain strainer, please follow the steps below.

(1) Removal of the bowl assembly

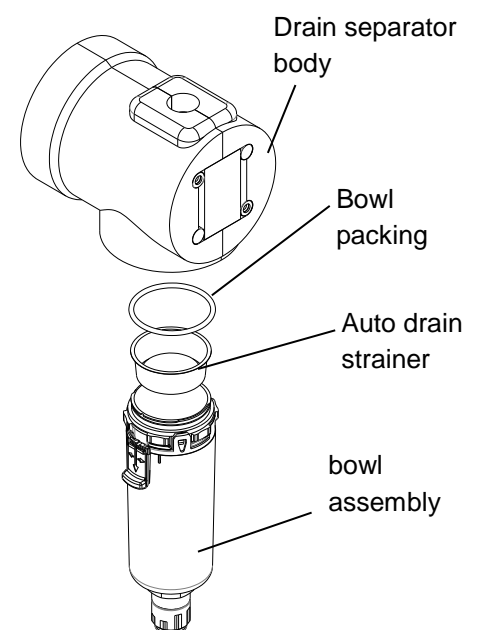
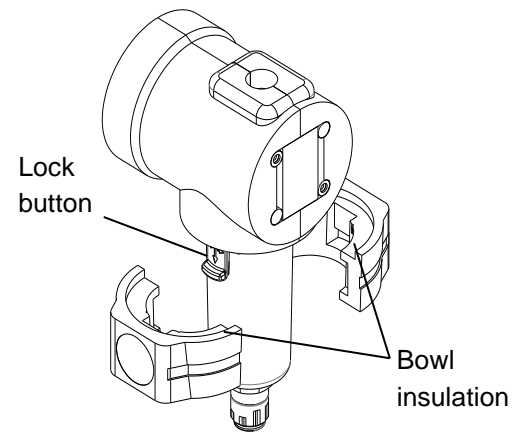
- 1) Turn off the illuminated ON/OFF switch.
- 2) Disconnect the earth leakage breaker at the power supply or unplug the power plug from the socket.
- 3) Fully close the inlet and outlet valves. Only open the bypass when compressed air is required during work.
- 4) Only remove the outer panels when necessary for work.
- 5) Open the residual pressure release cock at the drain tube connection port to release air and drain fluid left in the product. (Leave the drain tube connected and hold it so that it does not get twisted.)
- 6) Take care because condensate fluid may spurt out due to residual air pressure in the product.
- 7) Remove the drain tube.
- 8) Pull out the tube while pushing up the drain tube release bush.

- 9) Loosen the vinyl tie fixing the bowl insulation and remove the bowl insulation.
- 10) Hold the bowl assembly lightly and pull down the lock button with thumb. Then, turn the bowl assembly to the left (or right) to 30° to align the marks. Release your thumb from the lock button and slowly pull down the bowl assembly (vertically) to remove it.
- 11) Remove the auto drain strainer and clean it. Take care not to cut your hand with the sharp edges of the strainer.
- 12) Pour solution of neutral detergent into the assembly and shake it well to clean.



(2) Mounting of the bowl assembly

- 1) Check the bowl packing for damage such as scratches, twisting or foreign particles attached to it. Then, apply grease thinly and fit it in the groove in the bowl assembly.
- 2) Fit the auto drain strainer to the case assembly and fit it into the drain separator body. Turn it until the lock button clicks.
- 3) Try to turn the bowl assembly gently and check that it does not turn. If it turns, start again from fitting the bowl assembly to the body.
- 4) Attach the bowl insulation to the bowl assembly and fix the bowl assembly with the vinyl tie.
- 5) Close the residual pressure release cock and mount the drain tube and front panel as they were.
- 6) When reapplying compressed air to the air dryer, first open the valve on the inlet side slowly. Check for compressed air leakage and if everything is all right, open the valve on the outlet side.
- 7) If the auto drain strainer or case assembly is damaged or very dirty, replace it with a new one.



Replacement part of Auto drain

Part no.	Description	Qty.	Applicable model	Remarks
AD38-A	Bowl assembly	1	IDH*4, IDH*6	With bowl packing
AD37-A		1	IDH*4, IDH*6 (Specification for Option E)	

Note) The drain separator body can not be replaced.

This bowl assembly product number only applies for products manufactured after March 2019.

Old and new product numbers are not interchangeable.

The product number of the bowl assembly manufactured before February 2019 (dryer SERIAL No.XP or before), is "AD38", "AD37".

See SMC WEB catalog for details.

Replacement part of Auto drain strainer and Bowl packing

Part no.	Description	Qty.
IDF-S0001	Auto drain strainer	1
C32FP-260S	Bowl packing	1

Bowl insulation

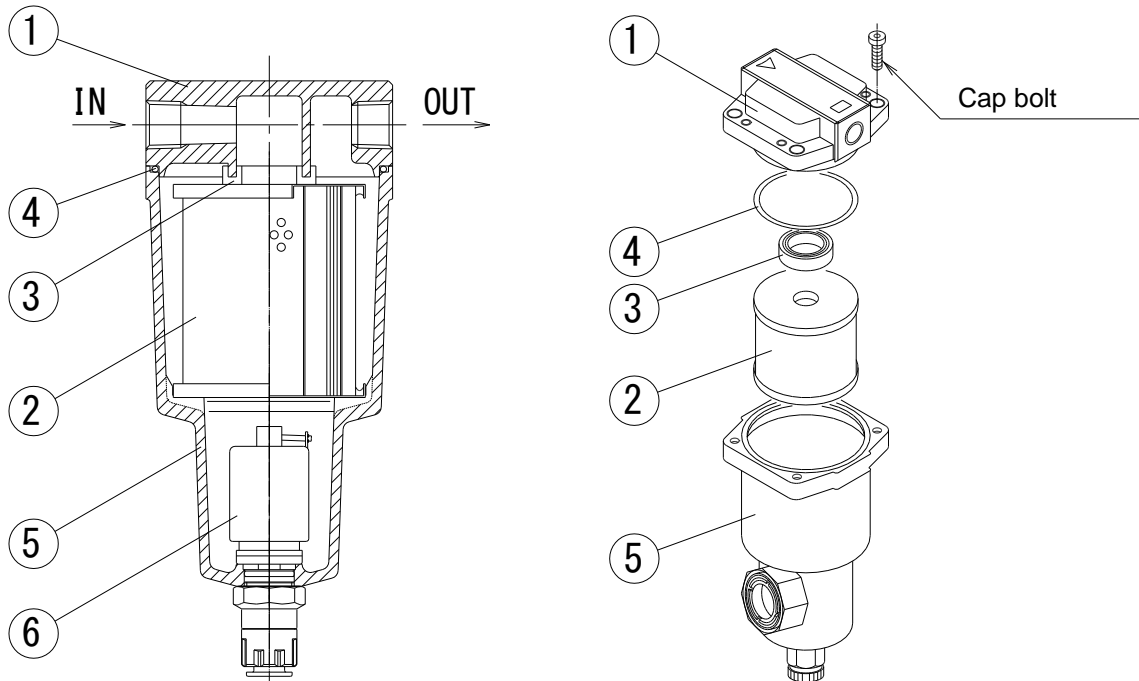
Part no.	Description	Qty.	Remarks
IDF-S1932	Bowl insulation	1	2 pieces per model

4.2.4 Maintenance of filter

For any product with a built in filter, the filter element should be replaced every 2 years. For replacement, use the special hexagon wrench (width across flats 4 x 40 x 72) included with this manual.

(1) Micro mist separator with pre-filter element replacement procedure

1. Unscrew the 4 cap bolts and remove the housing. Cap bolts should be removed with a hexagonal spanner of nominal size 5. (Do not remove anything apart from the insulation of the body (1).)
2. Remove the element from the housing, and the O ring and gasket from the body.
3. Mount a new O ring onto the body.
4. Mount a new gasket onto the body.
5. Insert a new element into the body with the holes upwards.
6. Firmly attach the housing with 4 cap bolts.
7. Carry out checks to confirm there is no air leakage.

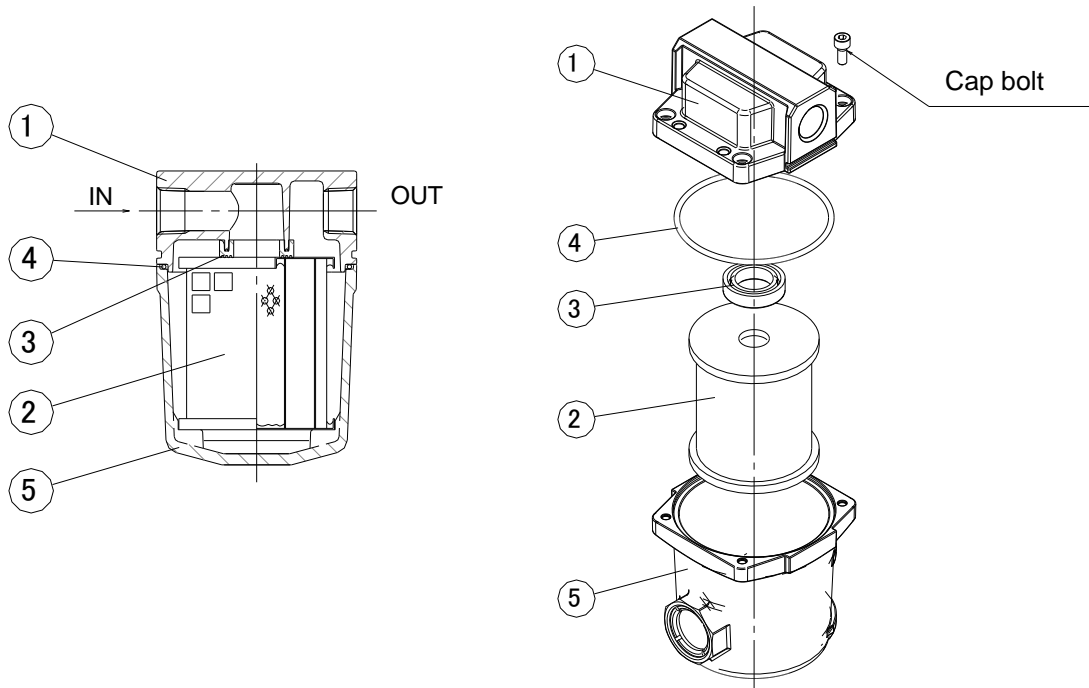


No	Part name	Part number	
		IDH*4	IDH*6
1	Body	-	-
2	Element		
3	Gasket	Element assembly AMH-EL250	Element assembly AMH- EL350
4	O ring		
5	Housing	Case assembly AM-CA250C-D	Case assembly AM-CA350C-D
6	Auto drain	[For Option E] AM-CA250C-C	[For Option E] AM-CA350C-C

(2) Super mist separator element replacement procedure

1. Unscrew the 4 cap bolts and remove the housing. Cap bolts should be removed with a hexagonal spanner of nominal size 5. ((Do not remove anything apart from the insulation of the body (1).)
2. Remove the element from the housing, and the O ring and gasket from the body.

3. Mount a new O ring onto the body.
4. Mount a new gasket onto the body.
5. Insert a new element into the body with the holes upwards.
6. Firmly attach the housing with 4 cap bolts.
7. Carry out checks to confirm there is no air leakage.





No.	Part name	Part number	
		IDH*4	IDH*6
1	Body	-	-
2	Element	Element assembly AME-EL250	Element assembly AME-EL350
3	Gasket		
4	O ring		
5	Housing	-	-

5 Troubleshooting

5.1 Troubleshooting

Should any problem occur, consult the following table, and if the problem cannot be solved, shut off the power supply and then contact your nearest sales office.

Problem	Probable causes	Action
Air dryer does not operate and running lamp does not come on, even when switch is ON.	Power cord or plug is loosened or has come out completely.	Connect the power cord and plug correctly.
	Ground fault circuit interrupter is OFF.	Confirm whether a circuit breaker of the correct capacity is used. It is not possible to restart the air dryer within 3 minutes after shutdown. Wait for 3 minutes before restarting. Resume the operation after resetting the circuit breaker to ON. If the circuit breaker still trips to OFF, failure of electrical insulation may have occurred. Remove the power supply and contact SMC.
During operation, the light goes out and the chiller stops.	- Poor ventilation in installation location. - Ventilation grille is obstructed by a wall or blocked with dust. - The dust filter is blocked	- Improve ventilation by installing ducts etc. - Install so that the front and the top ventilation ports are far enough from walls. Page 2-3 - We recommend frequent cleaning of the ventilation grilles. (Once a month as a guide)
	- Ambient temperature is too high	Reduce ambient temperature to within the specifications.
	- Compressed air flow rate is too low or not flowing, or is too high	- Use with flow rate of compressed air within the specifications. (If the flow rate is too low or not flowing, the heater may overheat, activating the thermostat.) - Adjust using the flushing valve. Pages 3-1 and 3-2
	- Inlet air temperature is too high	Improve the ventilation system around the air compressor, or reduce the ambient temperature around the air compressor to lower the temperature of discharge from the compressor.
	- Large fluctuation of power supply voltage.	Install a power supply transformer and review the power supply to keep the voltage within the allowable value. Allowable fluctuation of the power supply voltage is -5~+10% of the rated voltage.
Evaporation thermometer indicates higher than green zone.	- Poor ventilation in installation location. - Ventilation grille is obstructed by a wall or blocked with dust. - The dust filter is blocked with oil, foreign matter, dust etc.	- Improve ventilation by installing ducts etc. - Install so that front and back ventilation ports are at least 600mm from walls. Page 2-3 - We recommend frequent cleaning of the ventilation grilles. (Once a month as a guide) - Clean or replace the dust filter.
	- Ambient temperature is too high	Reduce ambient temperature to within the specifications.
	- Compressed air flow rate is too high.	Use with flow rate of compressed air within the specifications.
	- Inlet air temperature is too high	Improve the ventilation system around the air compressor, or reduce the ambient temperature around the air compressor to lower the temperature of discharge from the compressor.

Problem	Probable causes	Action
Large pressure drop.	- The valve in the inlet/ outlet piping is not fully opened.	- Be sure to use the dryer with the inlet/ outlet piping valve fully opened.
	- The air filter in the compressed air piping is blocked.	- Replace the element of the air filter on the inlet side or built-in to this product. Page 4-4
	- Compressed air flow rate is too high.	- Use with flow rate of compressed air within the specifications.
Moisture is generated downstream of the compressed air line.	- The bypass valve is open.	- Be sure to use the dryer with the bypass valve fully closed.
	- Drainage fluid is not discharged from the auto drain.	- Check that the drain tube is not trapped or bent. - Check the auto drain. - Check the auto drain strainer. Page 4-1
	- The piping converges with piping from a separate air line that does not have an air dryer.	- Install an air dryer in the line that does not have one. - Separate the two lines so they do not converge.
Compressed air does not flow.	- The set pressure is too low.	- Adjust the pressure with the pressure adjustment handle. Page 3-2
	- The inlet/ outlet valve is closed.	- Open the inlet/outlet valve.
The air pressure cannot be set.	- The pressure adjustment handle is locked.	- Release the lock of the pressure adjustment handle. Page 3-2
The outlet air temperature is higher than the set temperature	- Air flow rate is too low or not flowing	- Use with flow rate of compressed air within the specifications.
	- Set temperature is too low.	- Set the temperature within the setting range.
	- Compressed air flow rate is too high.	- Use with flow rate of compressed air within the specifications.
	- Inlet air temperature is too high.	- Reduce the inlet air temperature to within the specifications by reducing the ambient temperature or installing an after cooler.
The outlet air temperature is lower than the set temperature	- Set temperature is too high. - The air outlet piping is reverse to the air Inlet piping. - Temperature fuse is activated.	- Set the temperature within the setting range. - Perform proper connection of piping. Page 1-1
The outlet air temperature fluctuates.	- Inappropriate P.I.D setting value. - There is voltage fluctuation. - The difference between the outlet air temperature setting value and the ambient temperature is greater than +/-5 deg. C.	- Set P.I.D value manually or by auto-tuning. Page 3-9,3-10 - Connect to a power supply that can supply a steady voltage. - Please set the outlet air temperature in the range of ambient temperature +/-5 deg. C.
The temperature controller buttons do not work.	- The temperature controller key lock is on.	- Release the key lock. Page 3-8
The temperature controller display is:  	- The contact of the temperature sensor terminal is bad, or wiring has been disconnected.	- Please contact your nearest sales office.

6

Reference Data

6.1 Specifications

Item		Specification					
		IDH4-10*	IDH4-20*	IDHA4-23*	IDH6-10*	IDH6-20*	IDHA6-23*
Note 1) 2) Operating range	Fluid	Compressed air					
	Amount of air processed	100 to 500L/min (ANR)			200 to 800L/min (ANR)		
	Inlet air temperature	5 to 40°C					
	Inlet air pressure	0.3 to 1.0MPa					
	Ambient temperature	15 to 35°C (Relative humidity 85% or less)					
	Outlet air temperature adjustment range	15 to 30°C					
	Outlet air set pressure range	0.15 to 0.85MPa (The inlet air pressure should be at least 0.15MPa higher than the outlet air pressure.)					
Rated conditions	Air flow capacity	400 L/min ANR			600 L/min ANR		
	Inlet air pressure	0.7MPa					
	Inlet air temperature	35°C					
	Ambient temperature	30°C					
Note 3) Rated performance	Outlet air pressure dew point	10°C					
	Outlet air temperature stability <small>Note 4)</small>	±0.1°C					
	Outlet air temperature display accuracy	±0.5°C (including accuracy of the sensor)					
Note 5) Electrical specifications	Power supply	Single phase 100VAC (50/60Hz)	Single phase 200VAC (50/60Hz)	Single phase 230VAC (50/60Hz)	Single phase 100VAC (50/60Hz)	Single phase 200VAC (50/60Hz)	Single phase 230VAC (50/60Hz)
	Operating current	4.2A	2.1A	2.1A	9.4A	4.8A	4.8A
	Circuit Breaker	10A	5A	5A	15A	10A	10A
	Compressor input	180/200W 50/60Hz			385/440W 50/60Hz		
	Heater input	220W			420W		
Note 6) Built-in filter specifications	Nominal filtration rating	0.01 μm (99.9% filtration efficiency) <small>Note 6)</small>					
	Cleanliness of the filter outlet side	Particles of 0.3 μm or more: 3.5 particles/L(ANR)or less <small>Note 6)</small>					
Protective devices	Overcurrent protection	Overload relay					
	Heater overheat prevention	Thermostat, temperature fuse					
Temperature control method		Heater operation, PID control					
Refrigerant type/Refrigerant charge		R134a/0.14kg			R134a/0.26kg		
Noise level (reference value) <small>Note 7)</small>		52dB (A)			55dB (A)		
Weight		26kg			37kg		
Applicable drain tube O.D.		10mm					
Coating colour		Body panels:White 1 Base:Gray 2					
IP Class		IP2X					
Overvoltage Category		Category / IEC60664-1					
Pollution Degree		Degree 2					
Applicable directive		CE Marking					

Note 1: ANR refers to conditions of 20°C, atmospheric pressure, 65% relative humidity.

Note 2: The upper limit of the outlet air adjustment temperature depends on the operating conditions.

Note 3: Rated performance is performance at rated conditions, when power supply voltage is as shown in electrical specifications.

Note 4: In case, the outlet air temperature is set in the range of the ambient temperature +/-5 deg. C.

Note 5: Please use the running voltage within -5% to +10% of the rated value.

Note 6: Depends on inlet air cleanliness. Filter performance only applies to the type with built-in filter.

Note 7: Front:1m, height:1m, stable with no load

6.2 Refrigerant with GWP reference

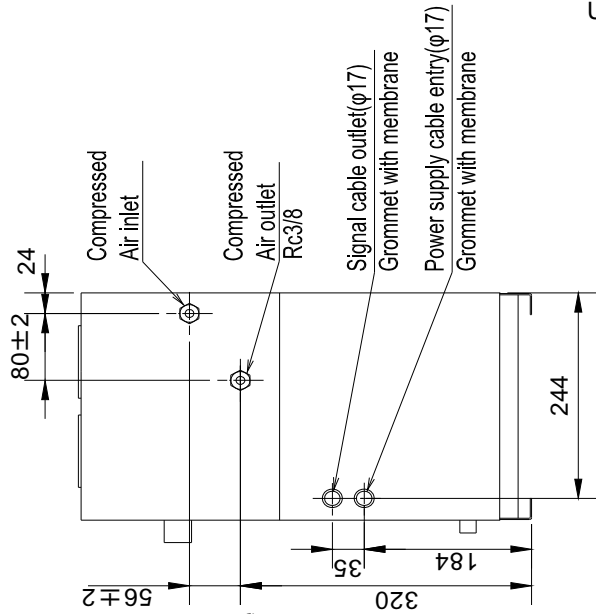
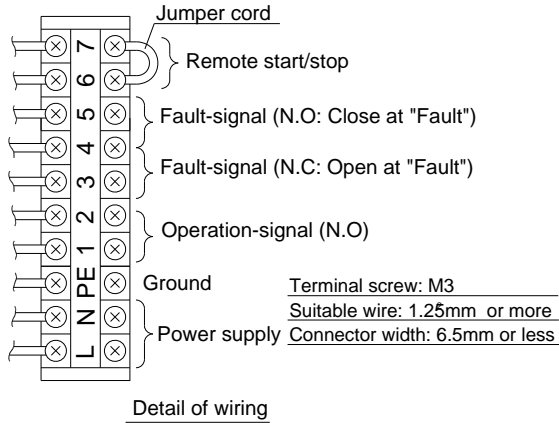
Refrigerant	Global Warming Potential (GWP)	
	Regulation (EU) No 517/2014 (Based on the IPCC AR4)	Revised Fluorocarbons Recovery and Destruction Law (Japanese law)
R134a	1,430	1,430
R404A	3,922	3,920
R407C	1,774	1,770
R410A	2,088	2,090

Note1: This product is hermetically sealed and contains fluorinated greenhouse gases.
 Note2: See specification table for refrigerant used in the product.

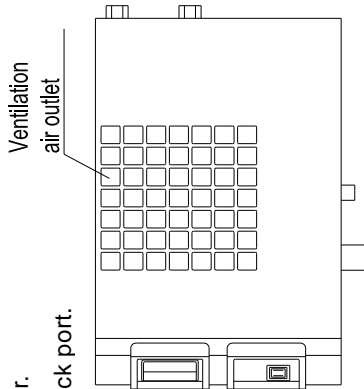
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6.3 Dimensions

IDH#4

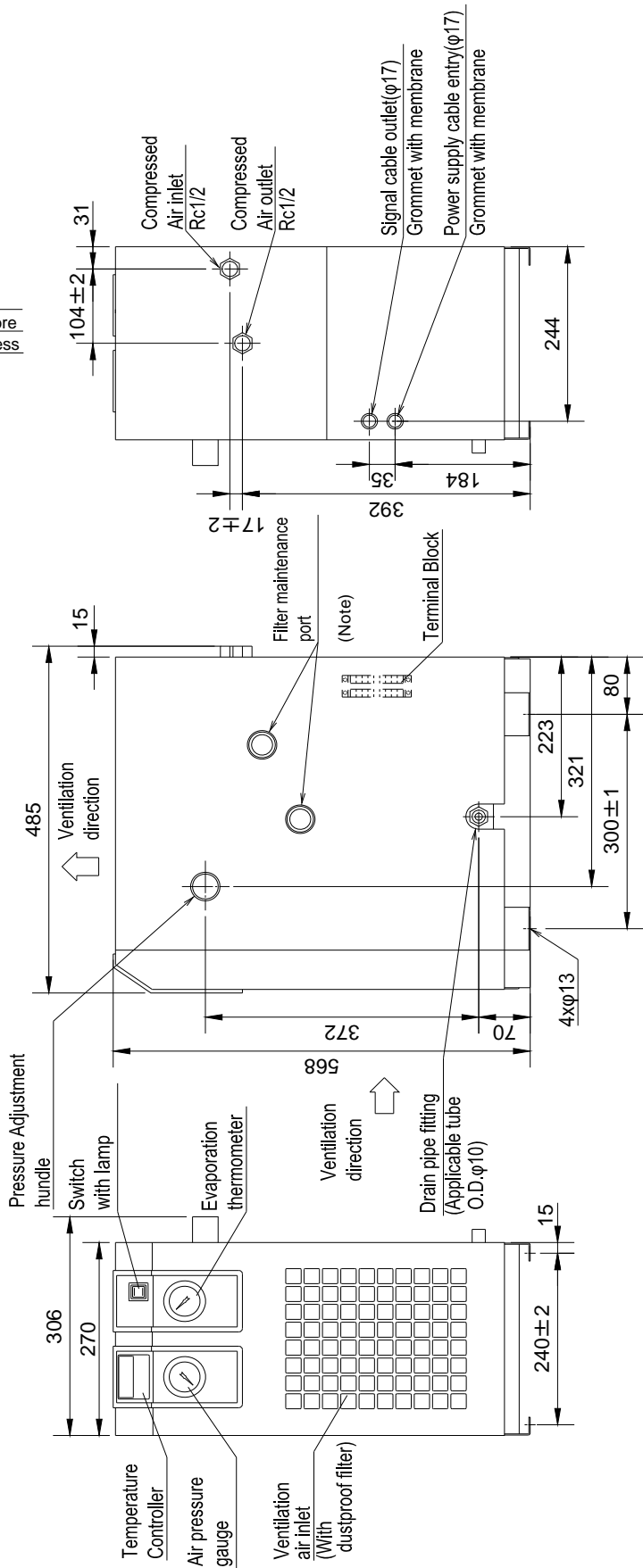
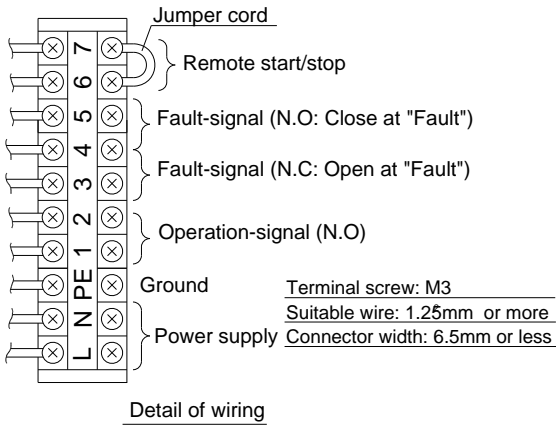


Note : The filter check port applies to the type built-in filter.
The type without built-in filter does not have a check port.



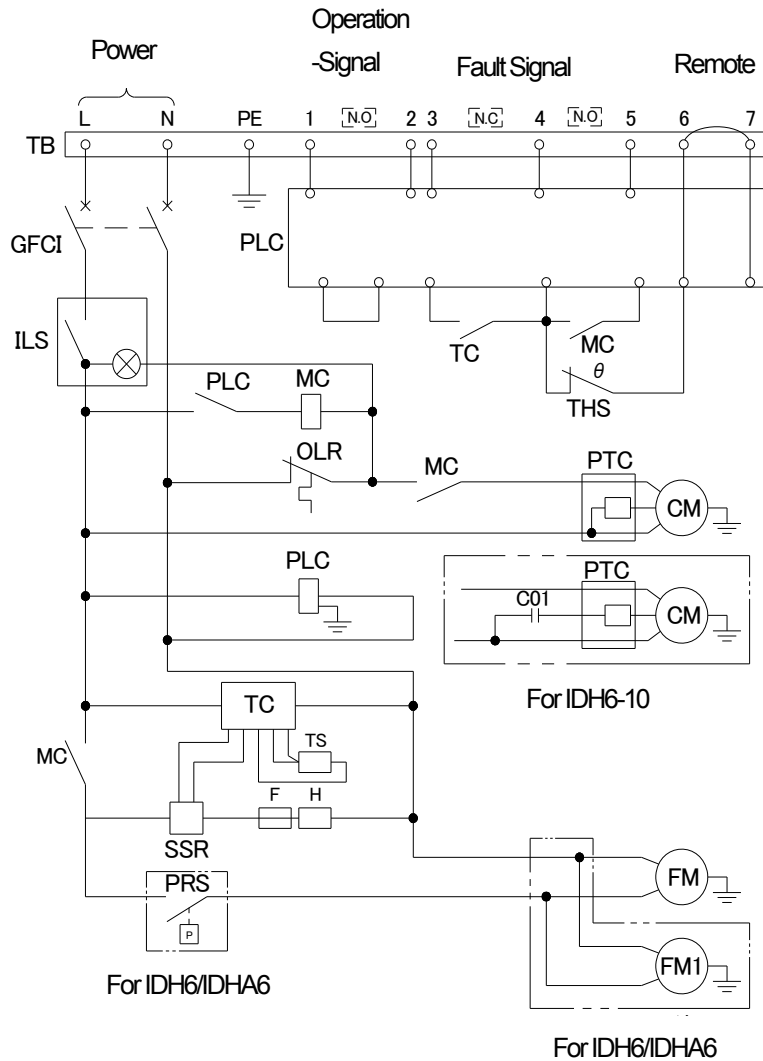
IDH*6

Units: mm



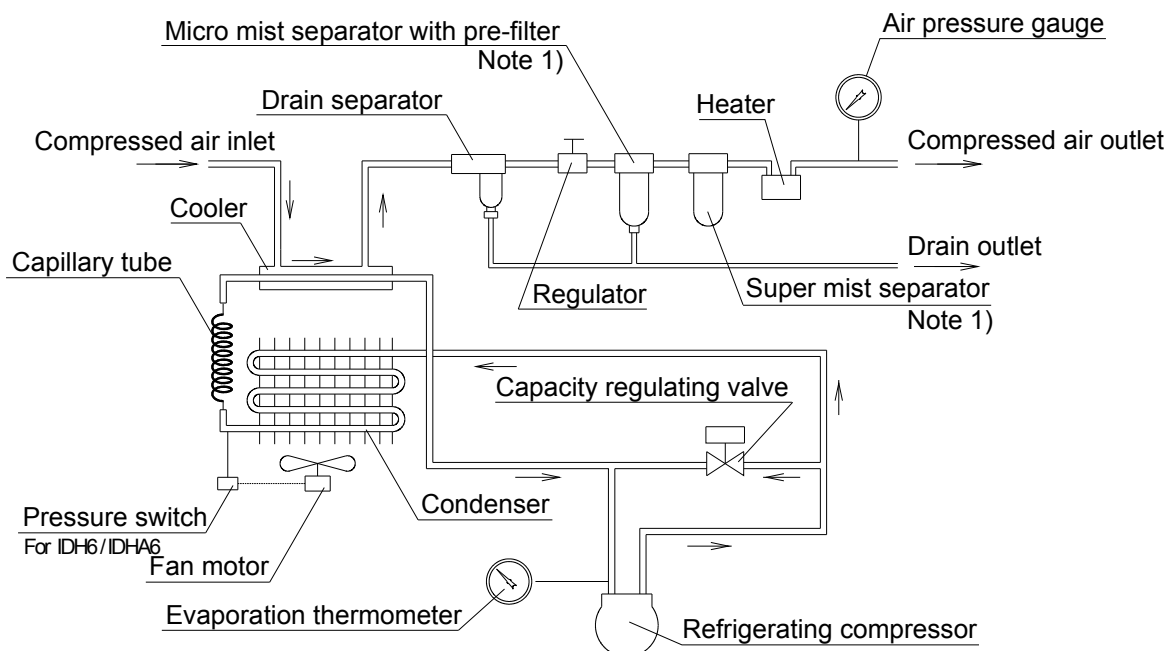
Note : The filter check port applies to the type with built-in filter.
The type without built-in filter does not have a check port.

6.4 Electrical Wiring Diagrams



SYMBOL	DEVICE NAME
CM	Refrigerating Compressor
FM	Fan Motor for Condenser
OLR	Overload Relay
ILS	Switch with Lamp
PTC	PTC Starter(Start Relay)
MC	Magnetic Contactor
THS	Thermostat
TB	Terminal Block
TC	Temperature Controller
TS	Temperature Sensor
SSR	Solid State Relay
H	Heater
F	Fuse
GFCI	Ground Fault Circuit Interrupter
PLC	Programable Logic Controller

6.5 Air and refrigerant circuits & function explanation



Air circuit

Warm, humid air that enters the dryer is cooled by the cooling compressor. At this time, condensate is separated from the air by the drain separator and automatically discharged. The pressure of the dry air is adjusted by the regulator, and oil mist and minute particles are removed by the micro mist separator with pre-filter and super mist separator ^{Note 1)}. The dry and highly pure air ^{Note 1)} is temperature adjusted by the heater and supplied to the secondary side.

Note 1: Does not apply to type without built-in filter

Refrigerant circuit

The fluorocarbon gas in the refrigerant circuit is compressed by the compressor and cooled by the condenser to become liquid. Then, as it goes through the capillary tube, the refrigerant pressure and temperature decrease. As it goes through the cooler, it draws heat from the compressed air, evaporates rapidly and is sucked into the cooler. The capacity adjustment valve opens if the compressed air is sufficiently cooled, and prevents freezing of the condensate due to over-cooling.

7 Service Record

7.1 Service Record

It is recommended to keep a maintenance/service record.

Parts No.	Description	Maintenance/Service Work Description	Date

[Revision]

Revision D : July.2022

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Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.
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