IDX-OM-O025E
Initial issue December, 2010

Operation Manual

Original Instructions

PRODUCT NAME

THERMODRYER

MODEL / Series

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

CE

Please read this manual prior of using the air dryer. Keep the manual readily available for reference.

SMC Corporation

Dear Customers

Thank you for selecting SMC THERMODRYER.

This opertion manual must be read and understood throughoutly before handling this product. It provides all essential information for maximizing product operating efficiency, as well as, for safe and longer life span operation.

For safety operation of SMC THERMODRYER, read thoroughly and follow stated safety instructions, as well as regulation stated within ISO 4414[*1] & JIS B 8370[*2].

*1) ISO4414: Pneumatic fluid power – Recommendations for the application of product to transmission and control systems.

*2) JIS B8370: Pneumatic fluid power – General rules relating to systems

This manual explains about 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 product for the installation and operation of the product are qualified to perform installation and operation.

The contents of the operation manual and the other documents attached to the product cannot become a part of the contract clause or cannot change and modify existing agreements, promises, and relationship.

Any statements contained in this operation manual cannot be newly guaranteed and modify existing guarantee certificate.

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

Table of Contents

To customers

Chapter i. Safety Instructions

i.1 Warning: Before using air dryer i-1

i.1.1 Hazards, warnings and Cautions used in this Manual i-1

i.2 Danger classifications/ Position of hazard warning label i-2

i.2.1 Danger Classification i-3

i.2.2 Electrical Hazards i-3

i.2.3 Hazards relating to high temperature i-3

i.2.4 Hazards relating to rotating motor i-3

i.2.5 Hazards relating to compressed air circuit i-4

i.2.6 Positions of hazard warning labels i-4

i.2.7 Hazards relating to refrigerant i-4

i.2.8 Cautions for usage i-5

i.3 Disposal i-6

i.4 Limited warranty and Disclaimer / Compliance Requirements i-7

Chapter 1. Names and Functions of Parts

1.1 Names and functions of parts 1-1

Chapter 2. Transportation and Installation

2.1 Transportation 2-1

2.2 Installation 2-2

2.2.1 Location 2-2

2.2.2 Anchorage 2-3

2.2.3 Air piping 2-4

2.2.4 Drain tube 2-4

2.2.5 Electrical wiring 2-5

2.3 Cautions for re-installation 2-6

Chapter 3. Operation/ Shutdown

3.1 Check points before operation 3-1

3.2 Operation 3-1

3.3 Functions and operation of temperature controller 3-3

3.3.1 Functions of temperature controller 3-3

3.3.2 Operation of temperature controller 3-3

3.4 Shutdown 3-8

3.5 Cautions for re-start 3-8

3.6 Check points before re-start 3-8

3.7 Cautions for abnormal stop 3-8

3.8 Specifications of operation/ failure signals 3-9

3.9 Remote control 3-9
Fig 3.8 Timing chart of signals 3-10
Chapter 4. Checks and Maintenance
4.1 Daily inspection 4-1
4.2 Parts which require regular maintenance 4-1
4.2.1 Maintenance of auto drain 4-1
4.2.2 Maintenance of filter 4-4
Chapter 5. Troubleshooting
5.1 Troubleshooting 5-1
Chapter 6. Reference Data
6.1 Specifications 6-1
6.2 Dimensions 6-2
6.3 Electrical wiring diagrams 6-4
6.4 Air and refrigerant circuits & Function explanation 6-5

i Safety Instructions

Before use, read and comprehend important cautionary notification well on this operattion manual.

i . 1 Warning: Before Useing THERMODRYER

In this chapter, the stated contents are especially about safety way to use THERMODRYER for customer.
THERMODRYER is installed on the downstream of the compressed-air to remove moisture and foreign material , regulate pressure of air,and control temperature of compressed-air. We, manufacturer, cannot take any responsibility if you use it for any other purpose.
THERMODRYER works with high voltage and has some parts that gets hot or rotates during operation. Ask seller if you need component replacement and servicing.
Not only people handle the THERMODRYER but every people who perform maintenance on or do works related to it should read safety instructions on this operation manual before handling.
This operation manual is not a general safety manual which is practiced by safety training representatives.
People who handle this product or work around it need to take training to comprehand inherent risks of it and master measures for safety.
It is usually responsible for supervisor to follow the safety instructions, but each operator or maintemance representative should do daily operations on their own hand.
Operators and maintemance representatives should take the safety of working place and work environment into account.
It is necessary to think of the safety of working place and work environment for each task.
Take enough safety training before the operation training. It is very dangerous to do operation training without any safety training. Operation training must be paid attention to its safety.
Keep this operation manual handy for workers related to above contents to refer to anytime.

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

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

“Caution”, “Warning” or **“Danger”** is the order of importance (Danger>Warning>Caution). Followings are the meanings of those signs.

Danger

Statements with the “Danger” sign explain about conditions in which there is a possible result of serious injury or loss of life if someone handles wrongly during operation or maintenance and did not follow the procedure to avoid danger.

⚠ Warning
Statements with the "Warning" sign explain about possibilities that can result in serious injury or loss of life if someone handle wrongly during operation or maintenance and did not follow the procedure to avoid warnig.

⚠ Caution
Statements with the "Caution" sign explain about possibilities that can result in injury or product damage if someone handles wrongly during operation or maintenance and did not follow the procedure to avoid caution.

i .2 Danger Classifications / Position of Danger Warning Label

To protect operator's sefety, we group danger into some types uniquely and attached labels indicating those types. Comfirm the contents of the danger types and positions of the labels before operation.

⚠ Warning
No one but professionals should operate THERMODRYER. **Transportation, installation, and maintenance involve risks. These should be done by someone who have enough knowledge and experience about this product and incidental devices.** **No one but our service personnel or qualified person should open the cover panel of this product.**

⚠ Warning
Should any problem occur, address it according to statements on this manual. • **Identify problems according to "Chapter 5 Troubleshooting."** • **Ask repair and maintenance.**

⚠ Warning
The product should not be operated in the event of any problems. **When the product gets out of order, shutdown it immediatery, and contact our service person or qualified person.**

i.2.1 Danger Classifications

Specific danger classification of this product is as follows.

Danger of Electricity

Since this product runs at hign voltage, there is the danger of electric shock. So, we display a symbol with indications, **"Caution", "Warning"** or **"Danger,"** on the equipment and this manual.

Danger of Heat

Since this product becomes hot while driving, there is the danger of burn injury. So, we display a symbol with indications, **"Caution", "Warning"** or **"Danger,"** on the product and this manual.

Danger of Rotor

Since this product has parts that rotate while driving, there is the danger of catching your fingers in or injury. So, we display a symbol with indications, **"Caution", "Warning"** or **"Danger,"** on the product and this manual.

i.2.2 Danger of 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.

No one but trained qualified person should operate or inspect in the power transmission sections.

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

i.2.3 Danger of High Heat

Warning
Since this product has parts that become hot during operation, there is the danger of burn injury resulting from contact with them. What is more, there is also the danger of burn injury due to remaining heat after the power supply is cut. Therefore, wait until the temperature of hot parts become 50°C and below.

i.2.4 Danger of Rotor

Warning
Since this product has parts that rotate during operation, there is the danger of burn injury resulting from contact with them. Though sometimes those parts can temporarily stop the rotation, they will rotate again, and so do not work with them while running mode.

i.2.5 Danger of Compressed Air Circuit

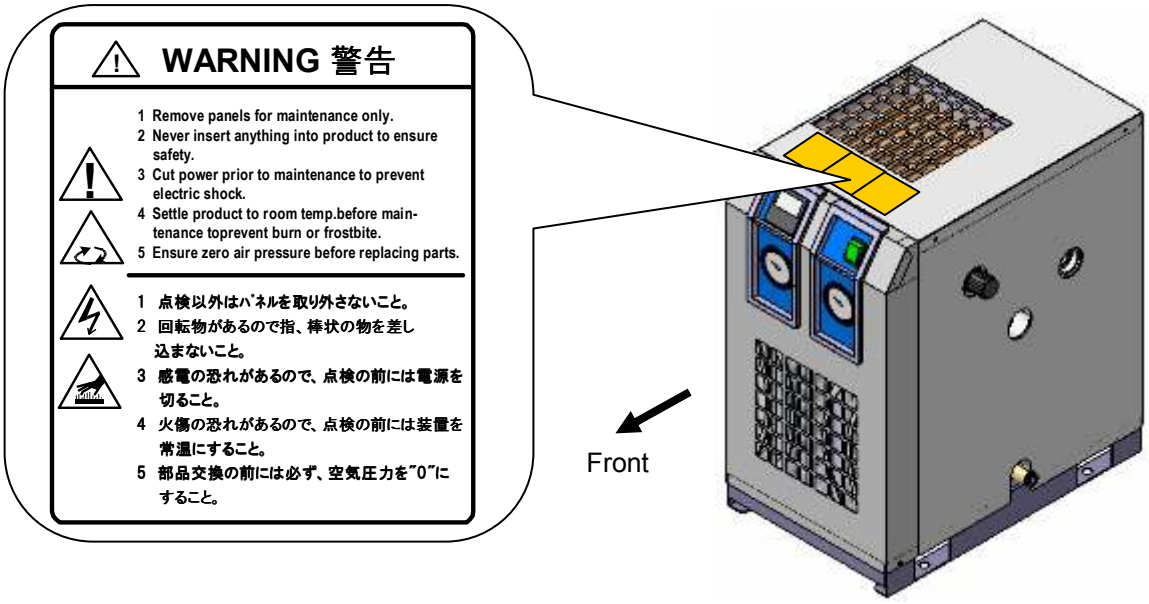
Warning

Before replacing or cleaning parts, be sure to bleed compressed air remain inside of the product untill the gauge indicates "0". If you do not do this air-bleeding, there would be the great danger of unexpected accident, such as shooting out of parts when they are being unscrewed.

i.2.6 Positions of Danger Warning Label

Warning

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



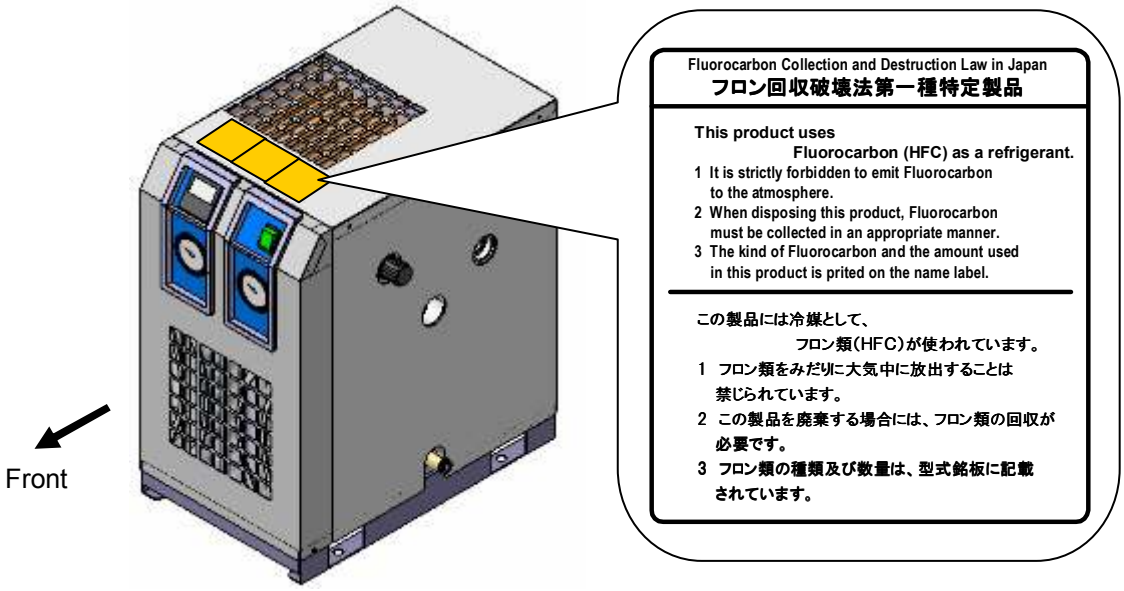
i.2.7 Danger of Refrigerant

Caution

This product uses Fluorocarbon (HFC) as a refrigerant.

This product is specified by "Class 1 Fluorocarbon Collection and Destruction Law in Japan."
It is strictly forbitten to emit Fluorocarbon to the atmosphere. Before you repair this product, you should collect the refrigerant with "Refrigerant collector." Then, ask a destruction agency to dispose of collected refrigerant. No one but someone have enough knowledge and experience about the equipment and incidental device should do the collection of the refrigerant.
No one but service person or qualified person should remove the cover panel of the product.

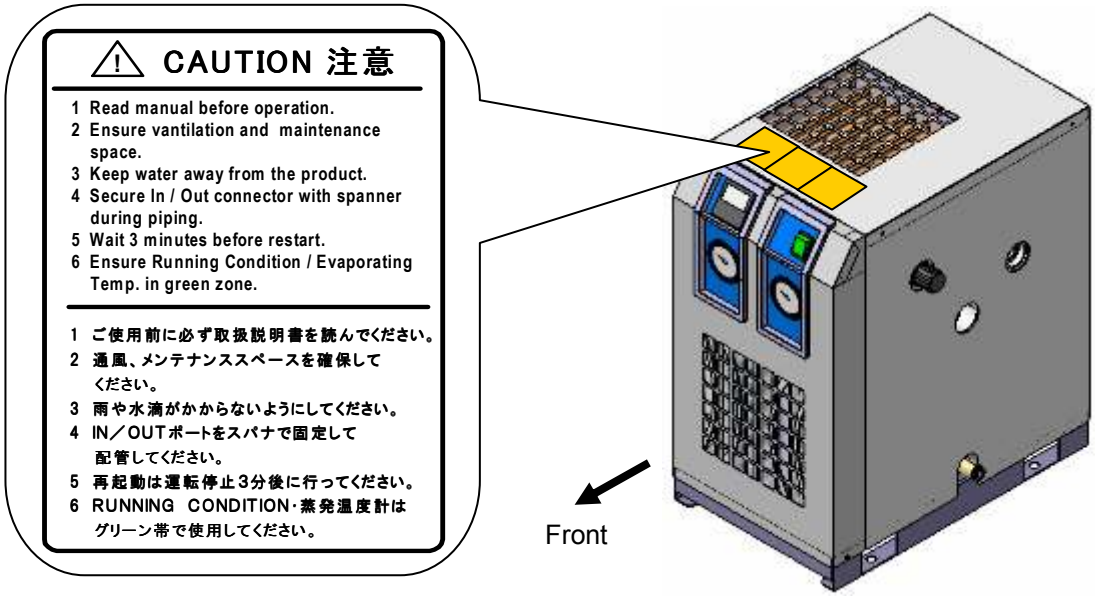
The quantity and the sort of the Fluorocarbon are mentioned on the specification label.



i.2.8 Cautions about Usage

⚠ Warning

Read with caution and pay attention to the notations on the danger warning labels.
Do not remove or rub the danger warning labels.
Cimfirm the positions of the danger warning labels.



i . 3 Disposal

When you dispose of the product, you shoud collect the refrigerant and the refrigerat oil enclosed in the refrigerant circuit.

⚠ Caution

Dispose of the refrigerant and refrigerant oil according to the bylaw or regulation of local government.

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

No one but someone have enough knowledge and experience about the product and incidental devices should do the collection of the refrigerant oil.
No one but service person or qualified person shoud remove the cover panel of the product.

If there are something not clear, please contact our service office.

i . 4 Limited warranty and Disclaimer / Compliance Requirements

The product 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. 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 with production product for the manufacture of weapons of mass destruction (WMD) or other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are govemed by the relevant security laws and regulation of the countries involved in the transaction. Prior to the shipment of a SMC product of a SMC product to another country, assure that all local rules goveming that export are known and followed.

⚠ Caution

The Product is provided use in 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 contact if necessary.
If anything is unclear, contact your nearest sales branch.

1 Names and Functions of Parts

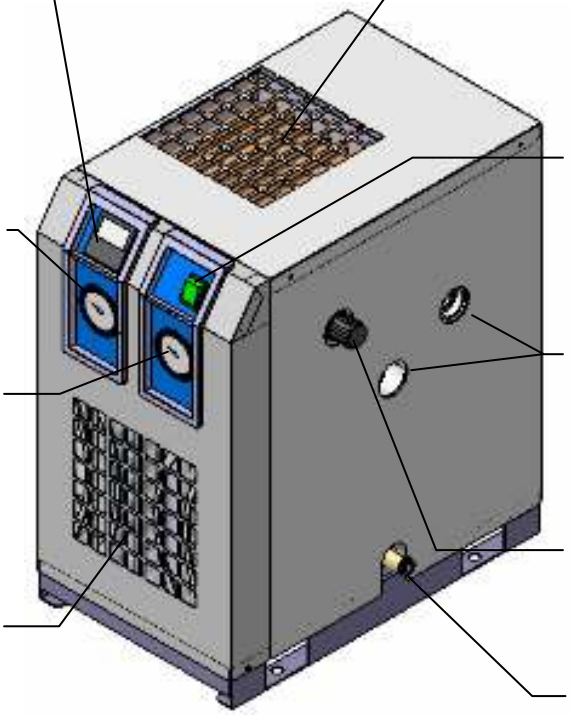
1.1 Names and Functions of Parts

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.

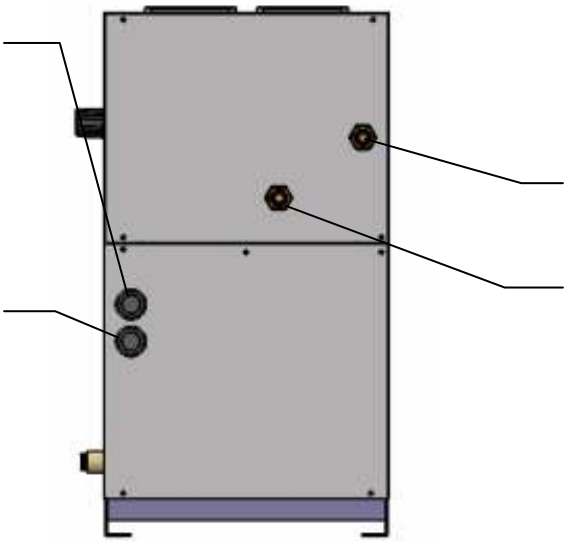
Filter inspection window
The state of the filter can be checked.

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)

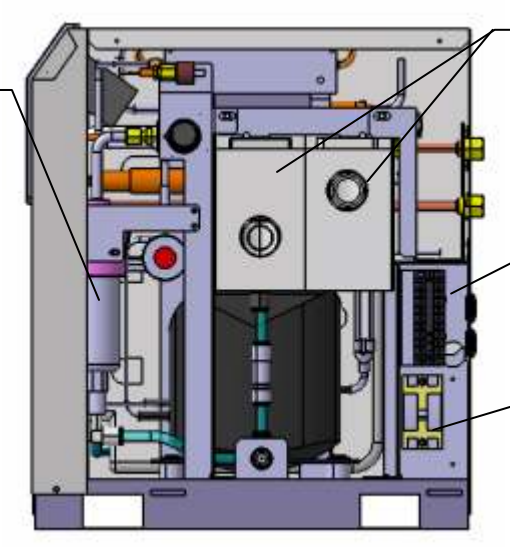


Back view

Air inlet connection
This is the air supply inlet.

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

Auto drain
Covered with insulation.
Please do not remove the insulation while operation.



Air filter
Covered with insulation.
Please do not remove the insulation while operation.

Terminal block
Terminal for power supply & signals see 2.2.4.

Circuit Interrupter
Set at OFF when shipped.
Please let to ON when before operation starts.

Side view (with panel removed)

2 Transportation and Installation

⚠ Warning

- **Use the product in the right way. During Installation, operation, maintenance, and check, you should be careful in keeping the safety of human body.**

⚠ Caution

- **Transportation, installation, and maintenance including dangerous work must be done by a personnel who has enough knowledge and experience about the equipment and the sysytem.**

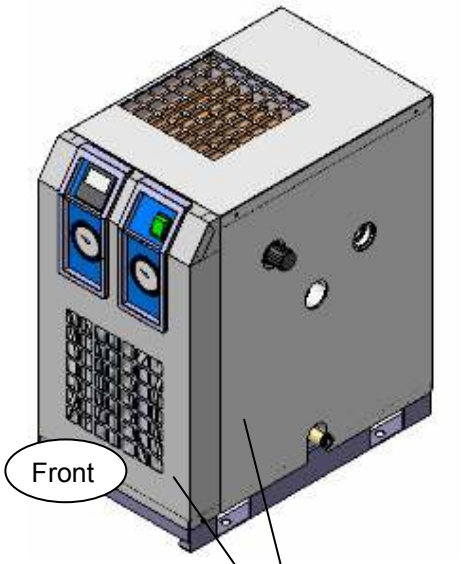
2.1 Transportation

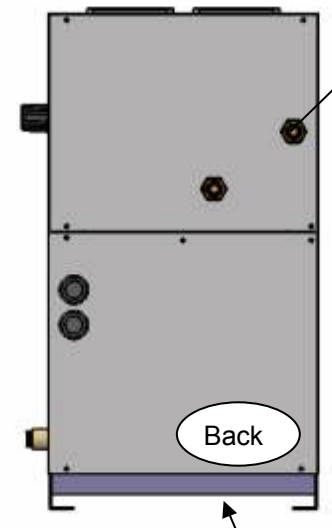
When transporting the dryer, always follow the instructions below.

- When lifting the dryer, lift carefully by 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

- **Those instructions above must be followed because the equipment is so heavy that it carries a great risk to transport.**
- **The dryer must be transported by more than one person, or using a forklift.**





Fittings ⚠
Do not hold the fittings or piping when moving the dryer, as this can damage the internal piping.

Panels ⚠
Do not hold the panels when moving the dryer.

Base plate
The dryer must be lifted by two or more people holding the base at the front and back.

2.2 Installation

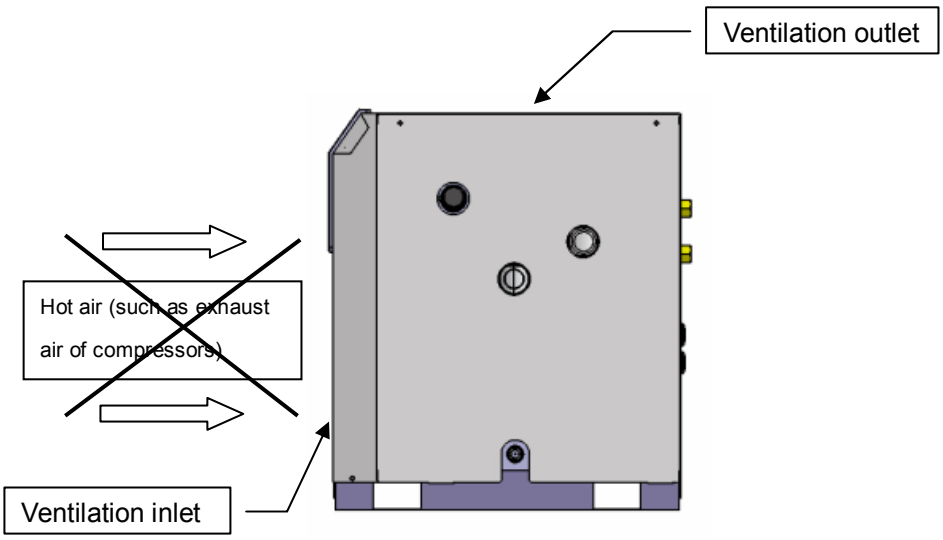
2.2.1 Location

The product should not be used or stored in the circumstances as follows. Those circumstances will cause not only malfunction but also failures.

- Environment where the product is exposed to rainwater, moisture vapor, salty water, oil and so on.
- Locations where excessive dust or particles exist.
- Locations where inflammable or explosive gas are.
- Locations where corrosive gas, solvent, combustible gas are.
- Locations that receive direct sunlight or where radiant heat is generated.
- Locations where ambient temperature is beyond following range:
  On-stream: 2 ~ 30°C
  Storage: 0 ~ 50°C (when there is no drain water inside of the piping)
- Locations where temperature changes rapidly.
- Locations where strong electromagnetic noise is generated (locations where electromagnetic field, strong magnetic field, surge is generated)
- Circumstances where static electricity is produced or discharged through the body of the equipment.
- Locations where strong high frequency wave is generated.
- Locations where danger of thunder is apparent.
- Locations by loading on vehicles, marine vessels, and so on.
- Locations whose altitude is higher than 2,000 meters.
- Circumstances where strong vibration or impact are transmitted.
- Circumstances where too much force and weight are put on the body of the equipment that causes it to deform.
- Locations the ventilation grille of the equipment can be blocked.
- Place where rejection style air of air compressor or other driers (hot wind) is inhaled.

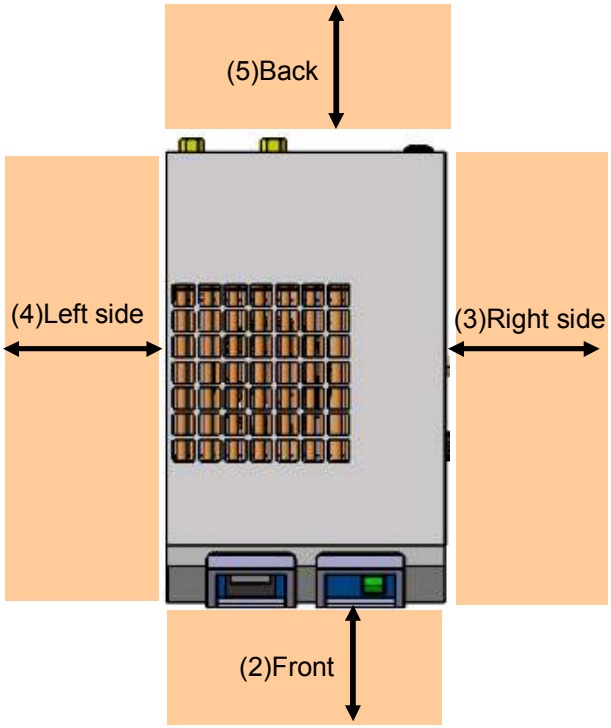
(2) If using the dryer in the following conditions or environments, please pay attention to safety measures and confirm with SMC before usage.

- 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 “Chapter6 6-2 Dimensions” for the unit dimensions.
- We recommend the anchor bolt sets that we are selling 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 and so on.
- Hold the hexagonal fitting with spanner and so on, 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 loading 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, Teflon® 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 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 have enough endurance against the operating pressure and temperature. And connect it 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". We recommend installing a silencer for the discharge of valve 1.**

2.2.3 Drain Tube

- A polyurethane tube of 10mm external diameter is attached to the drain tube. The outlet end of the tube is released to atmosphere. And let drain flow through the tube into a scupper and so on.
- Using the pressure of the compressed air, drain will be discharged periodically. Fix the outlet end of the tube so as not to swing during discharge.
- Prevent the drain tube from riser piping.
- Prevent the drain tube from being folded or flatted. Since the drain tube is coming from the bottom of the unit, be careful to avoid the body from stomping over the tube during installation.

⚠ Warning

During drain work, follow the procedure that you define to keep the safety of worker (ex. Put on protective glass, apron, and gloves).

In case that oil gets mixed in the wasted water that is discharged from the auto drain, the waste liquid treatment is necessary. Handle it following the bylaw or regulation of local government.

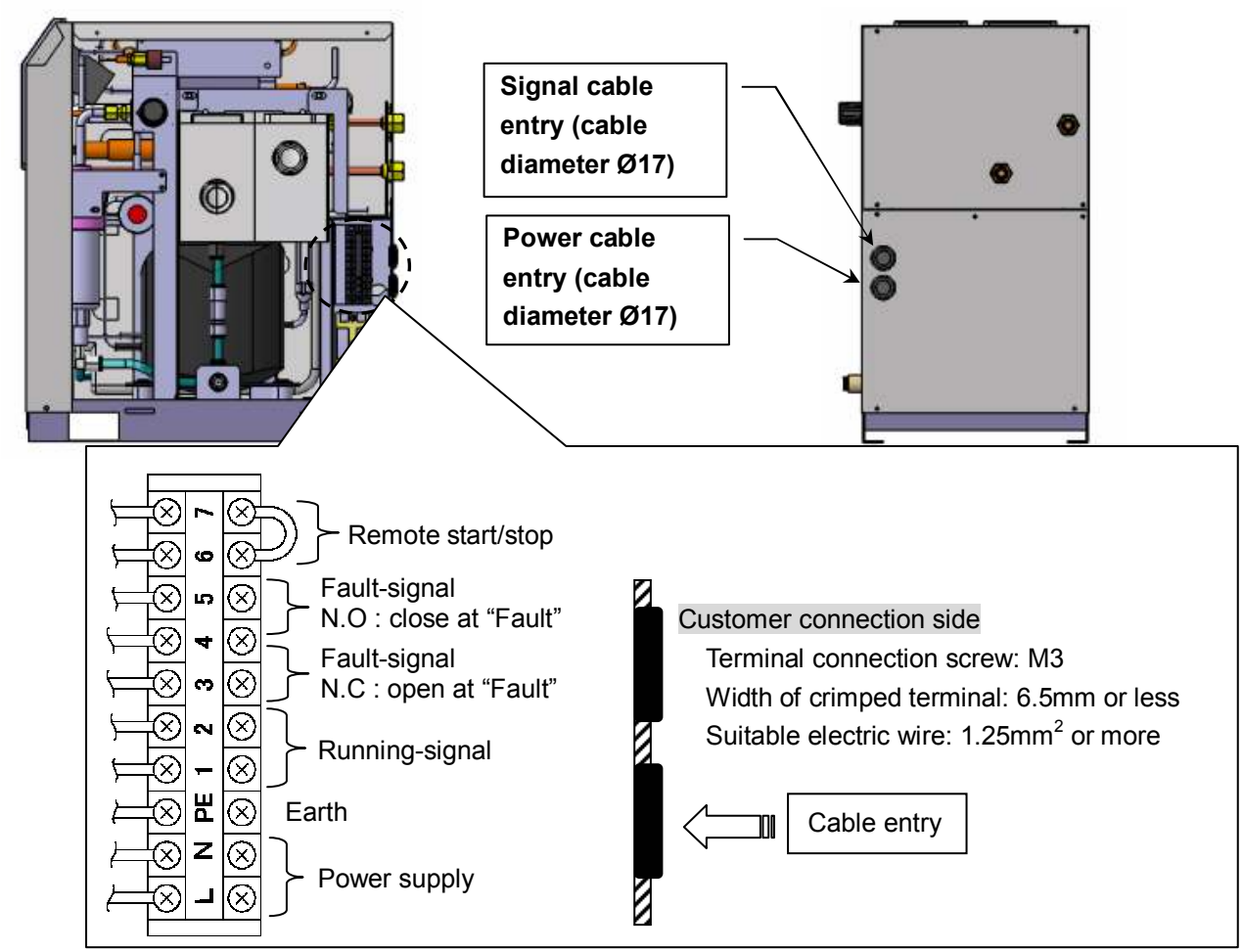
2.2.4 Electric Wiring

⚠ Warning

No one but qualified person should do the wiring work.
Before wiring, you must cut the power off for safety. Do not work under any energized conditions.
Supply power from a stable place, which is free from the effect of surge.
Refering to "6-1 Specifications," make sure to install a electric leakage breaker that has right short circuit capacity and load capacity to prevent electric shock or burnout of the motor of the refrigerator.
Supply power for the equipment should meet the specifications.
The equipment should be grounded for safety.
Do not connect the earth to a water pipe, a gas pipe, or a lightening rod.
Do not plug too many leads into a single socket. That causes exothermic heat or fire.
Do not convert the wiring to use.
In European countries, a circuit breaker that meets the IEC standard should be used for the supply power.

Wiring procedure * The power cable should be supplied by the customer.

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 leakage breaker on.
5. Mount the cover on the terminal block and mount the panel on the right-hand side.



2.2 Cautions about Reinstallation

⚠ Caution

No one but someone who has enough knowledge about the equipment and incidental devices should reinstall in another place. And following instructions must be executed.

If you move the product and reinstall it into another place after some operations (including trial running), instructions that are not only following ones but also all of those in the chapter 2 should be followed.

Disassembly of the power cable

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

⚠ Warning

No one but qualified personnel should do the electric wiring.
Cut off the power supply for safety before the wiring. Do not work under energized condition.

Disassembly of the air piping

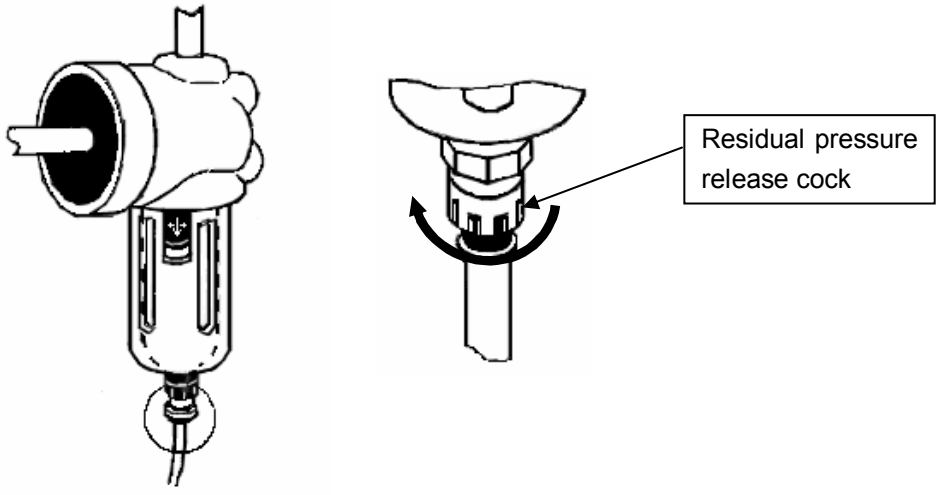
⚠ Warning

No one but qualified personnel should do the air piping.
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.

Remove the seal tape completely after detaching the piping. Remained tape will cause imperfect cooling and failure by entering into the body of the equipment.

Compressed air residual pressure release procedure

1. Even while the dryer is removed, only when compressed air is needed, open the bypass piping valve.
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

No one but someone who has enough knowledge and experience about the equipment and incidental devices should operate or shut down the equipment.

3.1 Check points before operation

Before a trial running, check following points.

- Installed Condition
  By visual inspection check that the equipment is installed horizontally.
  Make sure the product is fixed enough with anchor bolts.
  Do not place heavy obstacles on the equipment and add unreasonable loading by piping and so on.
- Wiring Connections
  Power cord, and the earth 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.

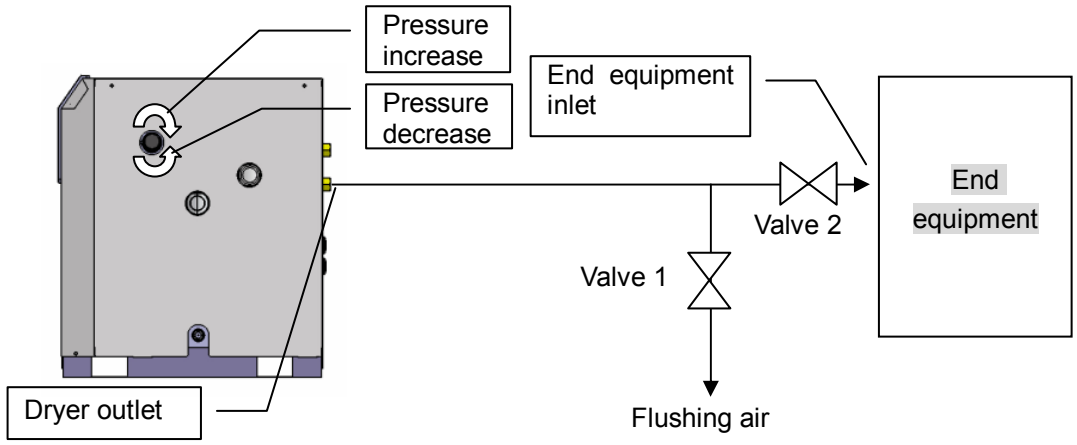
(2)Turn on the main power supply breaker, then turn on the ON/OFF switch.

(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 1.2 for setting method.)

* Depending on the operating conditions, the outlet air temperature and air cleanliness will stabilize in around 10 minutes.

If the outlet air temperature does not stabilize, set the PID value by auto tuning (See 1-3).



(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.

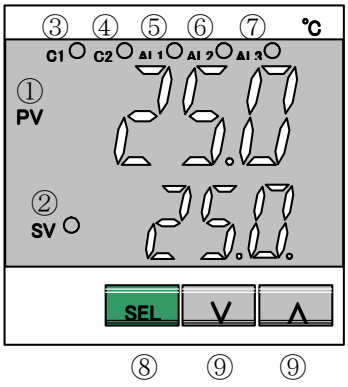
(8) Please use as it is in a continuously operating state.

⚠ Caution

- **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.**
- **If compressed air is supplied intermittently or stopped, the heater of the dryer may overheat, which will activate the protection devices, causing the dryer to stop. Flow compressed air using the flushing valve, or turn off the power.**
- **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 Functions and operation of temperature controller

3.3.1 Functions of temperature controller



Display	Function
①PV	Displays the air temperature at the outlet of the dryer.
②SV	Displays the set value for air temperature at the outlet of the dryer. (**Initial value = 25°C**)
③C1	Lights/ flashes when temperature adjustment heater operates.
④C2	Not used in this product.
⑤AL1	Not used in this product.
⑥AL2	Not used in this product.
⑦AL3	Not used in this product.
⑧SEL	Key used to change and select setting values.
⑨V, Λ	Keys used to select settings.

1.2.2 Operation of temperature controller

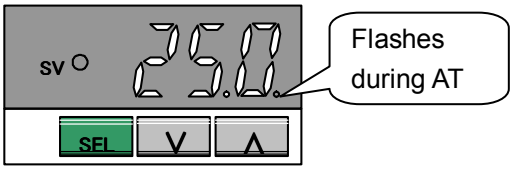
How to select auto-tuning operation

Explanation

●P.I.D value is set automatically.

●When it is automatically set by auto-tuning, the P.I.D value is stored so even if power is switched off, there is no need to set it again.

● During auto-tuning operation, the decimal point on the right of the display will flash.



①AT=1 (standard type) ②AT=2 (low PV type)
Low PV type reduces overshoot when tuning.
* The value of P.I.D is set beforehand.
Please use this function only when control is not optimum.

Sequence	Explanation	Display
Λ or V ⇩	Decide SV value (Example: 25°C)	SV 25.0 ⇩
SEL (for 1sec) ⇩		PV 5169
V ⇩	Press V once	SV oFF ⇩
SEL ⇩		PV AT
Λ ⇩	Select “1” by pressing Λ once or “2” by pressing Λ twice. *SV flashes when setting.	SV 0 ⇩
SEL (for 2sec)	Fix settings & return to normal screen.	PV AT SV 1

How to set SV (set value)

Explanation

●This is the control target value.

Sequence	Explanation	Display
V	Reduces the set temp (e.g. 20°C → 25°C)	SV 30.0 ⇩
Λ	Increases the set temp (e.g. 25°C → 30°C)	SV 25.0 ⇩ SV 30.0

How to manually set P.I.D value

Explanation

●Manually sets P.I.D value.

●If value of P is too small, control will become unstable. If it is too large, response will become slow.

* The value of P.I.D is set beforehand. Please use this function only when temperature does not stabilize.

Sequence	Explanation	Display
SEL (for 3sec)		PV: P / SV: 5.0
∨	Press ∨once to set "I" or twice to set "D"	
SEL	Select the parameter you want to set.	PV: P / SV: 5.0
∧ or ∨	Change the set value (e.g. Change P from 5.0→ 25.0) * SV flashes during setting	PV: P / SV: 25.0
SEL (for 2sec)	Fix settings & return to normal screen.	

How to set key lock

Explanation

●This function means the set values cannot be changed inadvertently.

●There are three types of key lock. Please set if necessary.

LoC No.	All parameters Front key	SV value only Front key
0	○	○
1	×	×
2	×	○
3	Same as LoC 0	
4	Same as LoC 1	
5	Same as LoC 2	

○: setting possible ×: not possible

● **When releasing key lock, please set key lock number to "0".**

* It is not locked in initial state.

Sequence	Explanation	Display
SEL (for 1sec)		PV: Stby / SV: oFF
∨ **(twice)**	Press ∨once to go into key lock mode	
SEL		PV: LoC / SV: 0
∧	Select the key lock no. you want to set *SV flashes during setting	
SEL (for 2sec)	Fix settings & return to normal screen.	PV: LoC / SV: 1

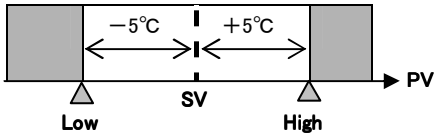
How to set Alarm Function

Explanation

・Set a Alarm for SV

・Initial set value(default value) is as follows.

1. Type of alarm : High/Low-Deviation
2. Deviation value : ±5℃



1.How to set type of alarm

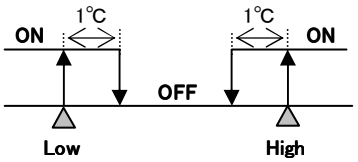
Sequence	Explanation	Display
SEL (for 3sec)		PV P SV 5.0
⇩		
∨	Press ∨ 12 times to set "ALN1"	
⇩		PV ALN1 SV 10
SEL		
⇩		
∧ or ∨	Change the set value (e.g. Change from 10→0) * SV flashes during setting	PV ALN1 SV 0
⇩		
SEL (for 2sec)	Fix settings & return to normal screen.	

Alarm No.	Type of Alarm	Alarm No.	Type of Alarm
0	None	8	High-Deviation
3	High-Absolute	9	Low-Deviation
4	Low-Absolute	10	High/Low-Deviation

②How to set Deviation value or Absolute value

Sequence	Explanation	Display
SEL (for 1sec)		PV SPby SV oFF
⇩		
∨	Press ∨ 4times to set "AL1"	
⇩		PV AL1 SV 5.0
SEL		
⇩		
∧ or ∨	Change the set value (e.g. Change P from 5.0→ 2.0) * SV flashes during setting	PV AL1 SV 2.0
⇩		
SEL (for 2sec)	Fix settings & return to normal screen.	

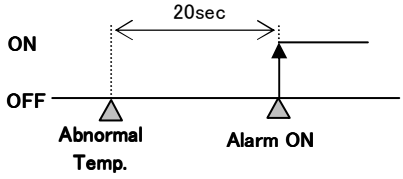
3. Hysteresis : 1℃



3.How to set Hysteresis value

Sequence	Explanation	Display
SEL **(for 5sec)**		PV P-n 1 / SV 0
⇩		
∨	Press ∨ once to set "Alhy"	PV A lhy / SV 1.0
⇩		
SEL		
⇩	Change the set value (e.g. Change P from 1.0→ 3.0) * SV flashes during setting	PV A lhy / SV 3.0
∧ or ∨		
⇩		
SEL **(for 2sec)**	Fix settings & return to normal screen.	

4.ON-delay : 20 sec



4.How to set ON-delay

Sequence	Explanation	Display
SEL **(for 5sec)**		PV P-n 1 / SV 0
⇩		
∨	Press ∨ 3times to set "Alhy"	PV dLy 1 / SV 20
⇩		
SEL		
⇩	Change the set value (e.g. Change P from 20→ 30) * SV flashes during setting	PV dLy 1 / SV 30
∧ or ∨		
⇩		
SEL **(for 2sec)**	Fix settings & return to normal screen.	

Supplement: How to set self tuning

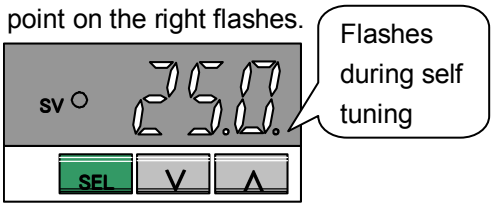
Explanation

●**We recommended PID control or fuzzy control for this device.** When setting of PID value is necessary, please use auto tuning.

● Please use when high control is unnecessary, and the condition of the controlled object changes frequently.

● Function to control PID parameters automatically to fit the controlled object and set temperature (SV value) conditions.

●During self tuning operation, the decimal point on the right flashes.



●Conditions for performing self tuning

(1) Temperature startup when the power supply is turned on

(2) Temperature startup when SV changed (Only performed when deemed necessary)

(3) When control becomes unstable and is judged to be continuous.

Sequence	Explanation	Display
∧ or ∨	Set SV value. (e.g. 25°C)	PV 25.0
⇩		
SEL (for 3 sec)	Display second block parameter	PV P SV 15.0
⇩		
∧ or ∨	Display parameter CTrL.	
⇩		
SEL	Select parameter CTrL	PV CTrL
⇩		
∧ or ∨	Select SELF	SV FUZY
⇩	* SV flashes during setting	
SEL (for 2 sec)	Fix settings & return to normal screen.	PV CTrL SV SELF
Shutdown	Turn off the power supply to this unit and wait 3 min.	
⇩		
Restart operation	When this device is operated again, self tuning begins.	

* Do not change the SV value while executing self tuning.

* Once the PID value has been decided, if the SV is not changed, the next time the power is switched on, self tuning will not be performed.

Initial set values (default values)

Parameter display symbol	Parameter	Set value	Display	
			IDH*4-***	IDH*6-***
SV	Set temperature	25℃	25.0	25.0
CTrL	Control system	Fuzzy control	FUZY	FUZY
LoC	Key lock	"O": No key lock	0	0
AT	Auto-tuning	"O": Pause	0	0
P	Proportional band	-	5.0	9.0
I	Integral time	-	60	70
d	Derivative time	-	11.5	13.5

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 THERMODRYER 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 abnormailty 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.

⚠ Caution

・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.

3.8 Specifications of signals

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

Signals	Specifications of the signal mode
Running-signal (N.O)	The contact turns on 10 minutes later after starting
Fault-signal (N.C)	●Switch on when alarm comes out of a temperature controller ●Switch on when stopping operation or the protective device operate
Fault-signal (N.O)	●Switch off when alarm comes out of a temperature controller ●Switch off when stopping operation or the protective device operate

・Contact capacity

Resistance load : 2A Induction load : 80VA Lamp load : 100W

Minimum current values : DC5V 2mA

・Fault signal comes out 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 worked, the equipment stops operation.

2) When the alarm comes out of a temperature controller, the equipment don't stop operation.

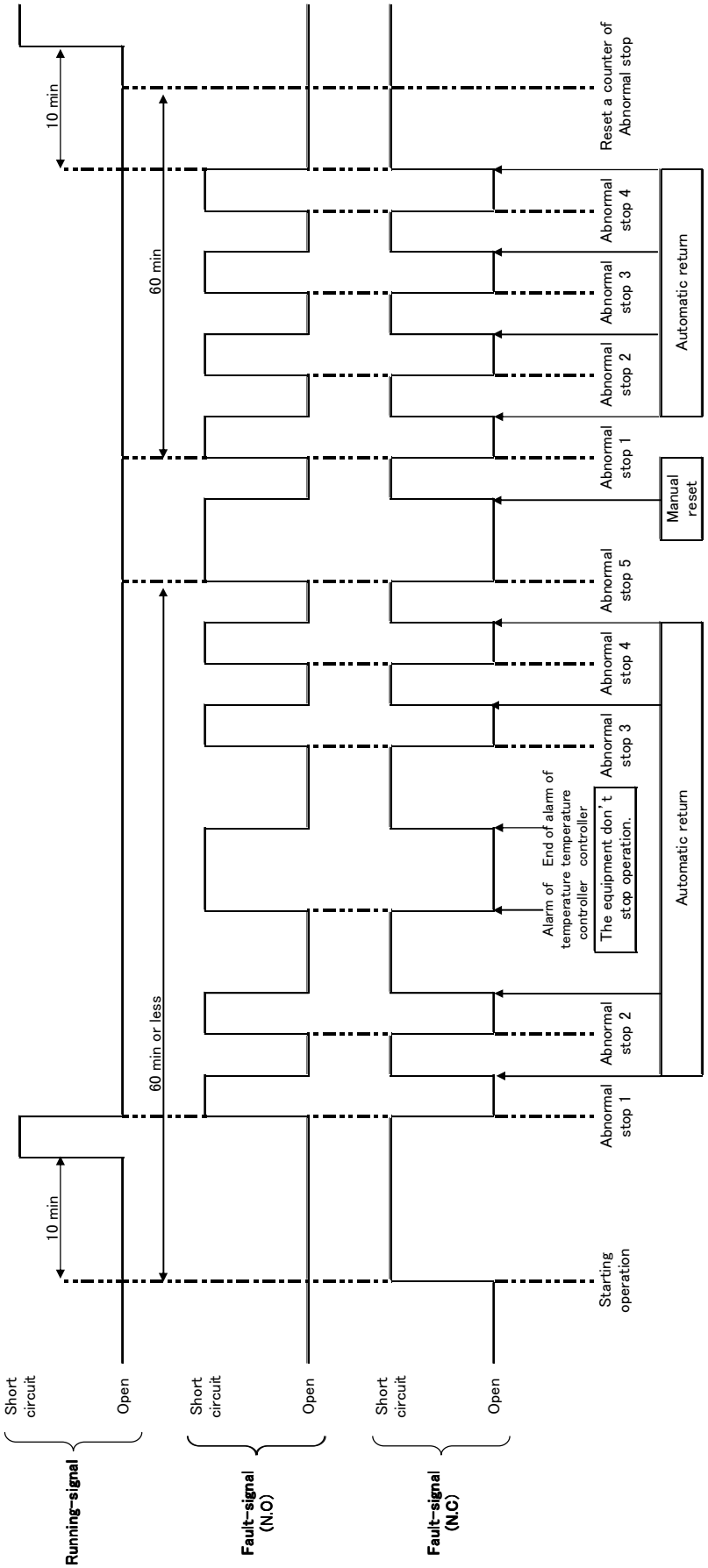
3.9 Remote control

・If remote controlling the dryer, remove the jump wire on #7 & #8 in the terminal and connects wires for power supply on and off with the dryer's illuminated switch ON.

・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



4 Checks and Maintenance

4.1 Daily Check Points

Check following points during usual operations. If you find any problems, immediately stop the operation and refer to "Chapter 5 Troubleshooting" to maintain as soon as possible.

- There is no air leakage
- The running lamp is lighting during operation
- Drain is being discharged from 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 evaporated thermometer indicates about 3~10^{o}C lower than that of ambient temperature when the equipment is suspended with no pressurized air supply.
- There is no abnormal sound or vibration coming up from the equipment.
- There are no abnormal smell or smoke coming up from the equipment.

4.2 Periodical Maintenance

As a preventive maintenance, clean following parts periodically.

- Auto Drain Strainer Once a month; *Note
- Dust Protecting Filter Once a month; *Note

*Note: If they are too dirty, replace them and shorten the period of maintenance from next time.

Part No.	Name	Model	Quantity
IDF-S0001	Auto Drain Strainer	IDH*4, IDH*6	1
IDF-FL221	Dust Protecting Filter	IDH*4	1
IDF-FL222	Dust Protecting Filter	IDH*6	1

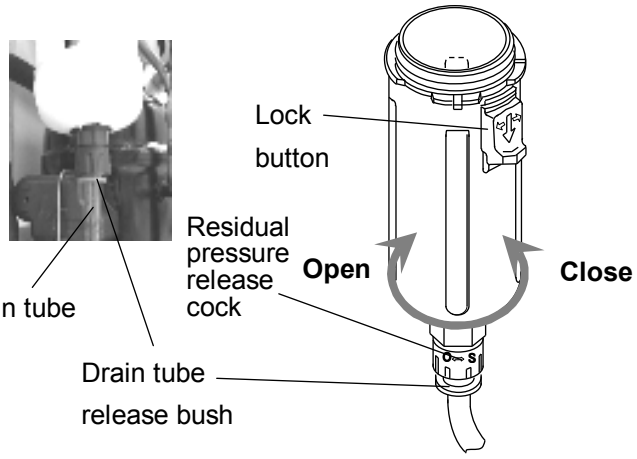
Clean dust and other foreign particles from the ventilation area with vacuum cleaner or air blow nozzle once a month. During air blowing, put on protective glass and mask to prevent dusts from coming into throat or eyes.

4.2.1 Maintenance for Auto-drain

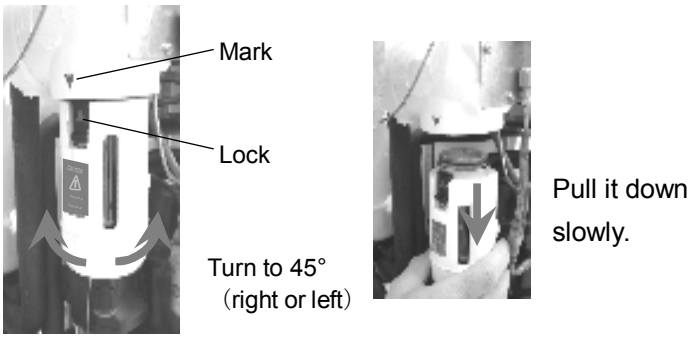
When carrying out maintenance work on the auto drain and auto drain strainer, please follow the steps below.

- Turn off the illuminated ON/OFF switch.
- Disconnect the earth leakage breaker at the power supply or unplug the power plug from the socket.
- Fully close the IN/OUT valves. Only open the bypass when compressed air is required during work.
- Only the point that is necessary for work please remove a decoration panel.

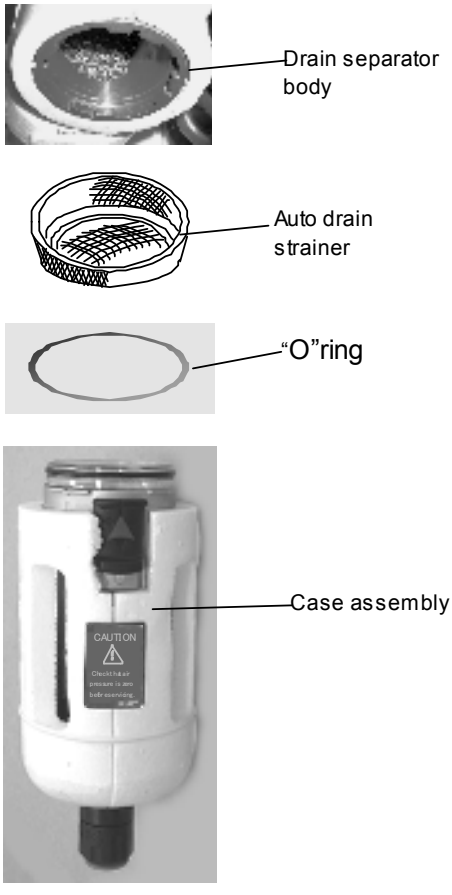
- Open the residual pressure release cock at the drain tube connection port to release air and drain fluid left in the product.
  (Leave the drain tube connected and hold it with hand so that it does not get twisted.)
- Because drain may be given by air pressure left in a product like a careful.



- Remove the drain tube.
  Pull out the tube while pushing up the drain tube release bush.
- Hold the case assembly lightly and pull down the lock button with thumb. Then, turn the case assembly to the left (or right) to 45°to align the marks.



- Release your thumb from the lock button and slowly pull down the case assembly (vertically) to remove it.
- Remove the auto drain strainer and clean it. Take care not to cut your hand with the sharp edges of the strainer.
- Pour solution of neutral detergent into the case assembly and shake it well to clean.
- Check the case O-ring for damage such as scratches, twisting or foreign particles attached to it. Then, apply grease thinly and fit it in the groove in the case assembly.
- Fit the auto drain strainer to the case assembly and fit it into the drain separator body. Turn it untill the lock button clicks.
- Try to turn the case assembly lightly and check that it does not turn. If it turns, start with fitting the case assembly to the body again..
- Close the residual pressure release cock and mount the drain tube and front panel as they were.
- When reapplying compressed air to the air dryer, first open the valve on the inlet side slowly. Check for compressed air leak and if everything is all right, open the valve on the outlet side.
- If the auto drain strainer or case assembly is damaged or very dirty, replace it with a new one.



⚠ Danger

Do not remove the case assembly when there is still air pressure left inside of the equipment. If there is remaining air pressure, there would be the great danger of unexpected accident such as shooting out of parts when they are being unscrewed.
Put on gloves to prevent injury when remove the case assembly.

⚠ Danger

Do not remove the auto drain strainer during operation. There is a power supply section that is high temperature and highly energized during operation. There would be the great danger of burn injury or electric shock.

⚠ Danger

Even after shutting down the equipment, there are still very hot parts inside of it because of afterheat. There would be the great danger of burn injury. Do not do any replacement untill the temperature of parts gets lower than 50°C. It takes reughly about 10~15 minutes.

⚠ Danger

There is the risk of touching discharged drain water during replacement. Follow the procedure that you define for the safety of worker (ex. Put on protective glass, apron, and gloves to prevent discharged water from touching their skin).

⚠ Danger

Use aqueous solution of neutral detergent to clean. Do not use solvent such as thinner.

⚠ Note

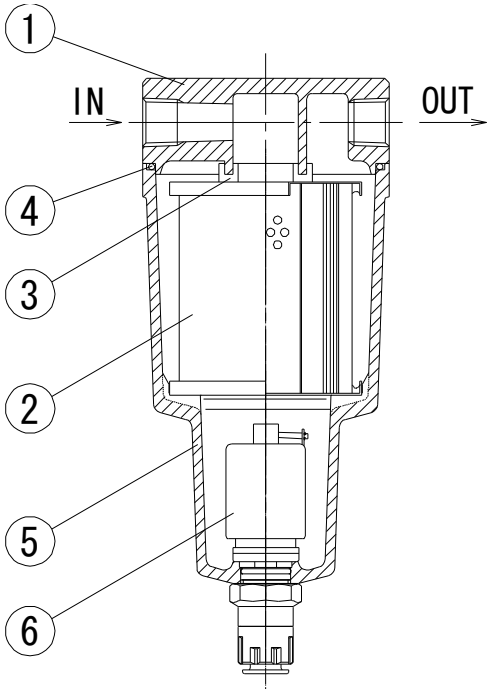
In case that oil get mixed in the wasted water dischargd from the auto drain, the waste liquid treatment is needed. Handle it following the byelaw or regulation of local government.

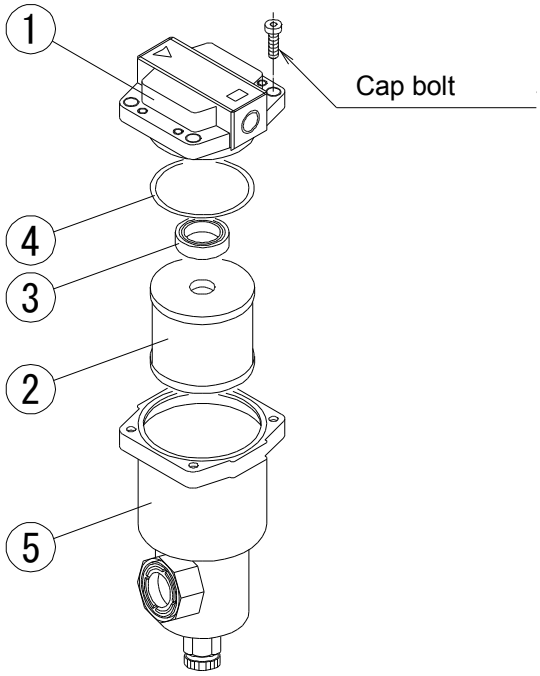
4.2.2 Maintenance of filter

For any product with a built in filter, the filter element should be replaced once a year.

(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. ((1) Do not remove apart from the insulation of the body.)
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.

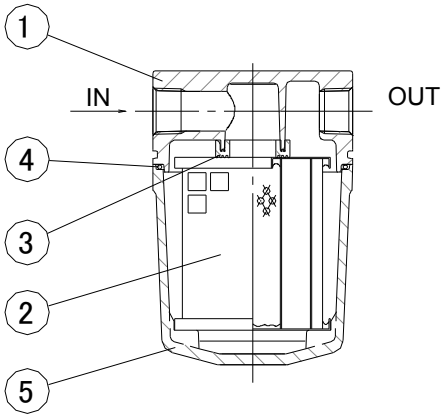


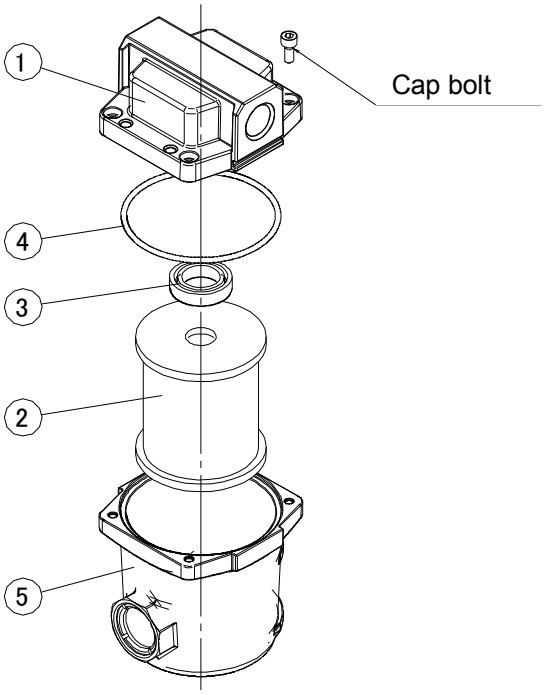


No	Part name	Part number	
		IDH*4	IDH*6
1	Body	-	-
2	Element	Element assembly AMH-EL250	Element assembly AMH- EL350
3	Gasket		
4	O ring		
5	Housing	Case assembly AM-CA250C-D	Case assembly AM-CA350C-D
6	Auto drain		

(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. ((1) Do not remove apart from the insulation of the body.)
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.





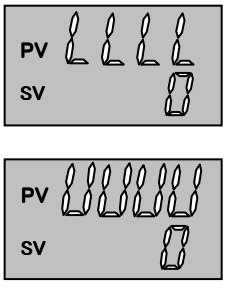
No.	Part name	Part number	
		IDH*4	IDH*6
1	Body	-	-
2	Element	Element assembly AME-EL250	Element assembly AME-EL350
3	Gasket		
4	O ring		
5	Housing	-	-

5 Troubleshooting

5.1 Troubleshooting

Should any problem occur, inspect the following table, and if the problem cannot be solved, shut off the power supply and then contact one of our sales offices for further instructions.

Problem	Probable causes	Action
Air dryer does not operate and running lamp does not light on, even switch is ON.	Power cord or plug is in loosening state or completely pulling out.	Perform proper connection on the power cord and plug.
	Circuit breaker is OFF.	Confirm whether the proper capacity of the circuit breaker 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 one of our agents for further instructions.
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 front and back 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 air compressor or make ambient temperature around air compressor low to lower the temperature of discharge from compressor.
	・The power supply voltage changes largely.	・Install a power supply transformer and review the power supply to keep the voltage adequate value. Allowable fluctuation of the power supply voltage is +-/10% at max. 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 40cm 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 air compressor or make ambient temperature around air compressor low to lower the temperature of discharge from 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 3-1
	・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.	・P.I.D setting value is not proper. ・There is voltage fluctuation.	・Set P.I.D value manually or by auto-tuning. Page 3-3 ・Connect to a power supply that can supply a steady voltage.
The temperature controller buttons do not work.	・The temperature controller key lock is on.	・Release the key lock. Page 3-4
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

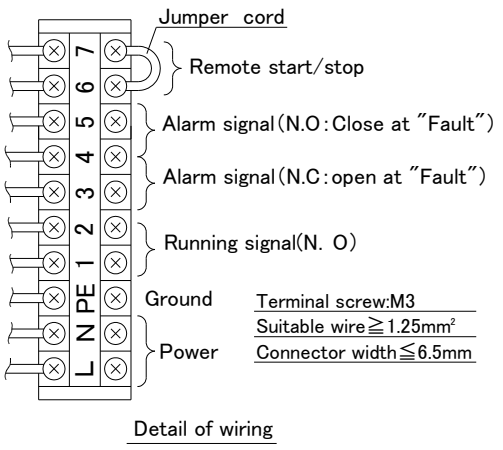
Item		Specification					
		IDH4-10*	IDH4-20*	IDHA4-23*	IDH6-10*	IDH6-20*	IDHA6-23*
Note 1) 2) Operating conditions	Fluid used	Compressed air					
	Amount of air processed	100 to 400L/min (ANR) : 6 to 24m³/h			200 to 600L/min (ANR) : 24 to 36m³/h		
	Inlet air temperature	5 to 40℃					
	Inlet air pressure	0.3 to 1.0MPa					
	Ambient temperature	15 to 35℃(85% RH or less)					
	Outlet air temperature Adjustment range	15 to 30℃(Ambient air temperature ±5℃) Note6)					
	Outlet air pressure Adjustment range	0.15 to 0.85MPa (Inlet air pressure must be at least 0.15MPa higher than outlet air pressure)					
Rated conditions	Amount of air processed Note1)	400 L/min ANR:24 m³/h			600 L/min ANR: 36 m³/h		
	Inlet air pressure	0.7MPa					
	Inlet airtemperature	35℃					
	Ambient temperature	30℃					
Note 3) Rated performance	Outlet air pressure dew point	10℃					
	Outlet air temp stabillity	±0.1℃					
	Outlet air temp display accuracy	±0.5℃ (including sensor accuracy)					
Note 4) Electrical specification	Power supply	Single phase AC100V 50/60Hz	Single phase AC200V 50/60Hz	Single phase AC230V 50/60Hz	Single phase AC100V 50/60Hz	Single phase AC200V 50/60Hz	Single phase AC230V 50/60Hz
	Operating current(nominal value)	4.2A	2.1A	2.1A	9.4A	4.8A	4.8A
	Circuit Breaker	10A	5A	5A	15A	10A	10A
	Compressor power consumption	180/200W 50/60Hz			385/440W 50/60Hz		
	Heater output	220W (nominal value)			440W (nominal value)		
Note 5) Filter	Filtration rating	0.01μm (99.9% collection particle efficiency) Note5)					
	Secondary side cleanliness	Particles of 0.3μm or over:3.5 particles/L(ANR)or less Note5)					
Protective devices	Overcurrent protection	Overload relay					
	Heater overheat prevention	Thermostat, temperature fuse					
Temperature control method		Heater heating/PID control					
Type and quantity of refrigerant		R134a/0.14kg			R134a/0.26kg		
Air inlet/outlet port size		Rc3/8			Rc1/2		
Sound Level(nominal value) Note 6)		52dB (A)			55dB (A)		
Product weight		26kg			37kg		
Drain tube diameter		10mm					
Colour		Body panels:Urban white 1;Base:Urban gray 2					
IP Class		IP2X					
Overvoltage Category		Category Ⅱ/IEC60664-1					
Pollution Degree		Degree 2					
EC Directive (For IDHA series)		Machinery Directive:2006/42/EC Low Voltage Directive:2006/95/EC EMC Directive : 2004/108/EC					

Note 1: ANR refers to conditions of 20℃, atmospheric pressure, 65% relative humidity.
Note 2: The upper limit of the outlet air adjustment temperature is different by use condition.
Note 3: Rated performance is performance at rated conditions, when power supply voltage is as shown in electrical specifications.
Note 4: Please use the running voltage within the range of -5% to +10% of ratings.
Note 5: Depends on inlet air cleanliness. Filter performance only applies to the type with built-in filter.
Note 6: Front:1m, height:1m, stable with no load

Units: mm

6.2 Dimensions

IDH*4

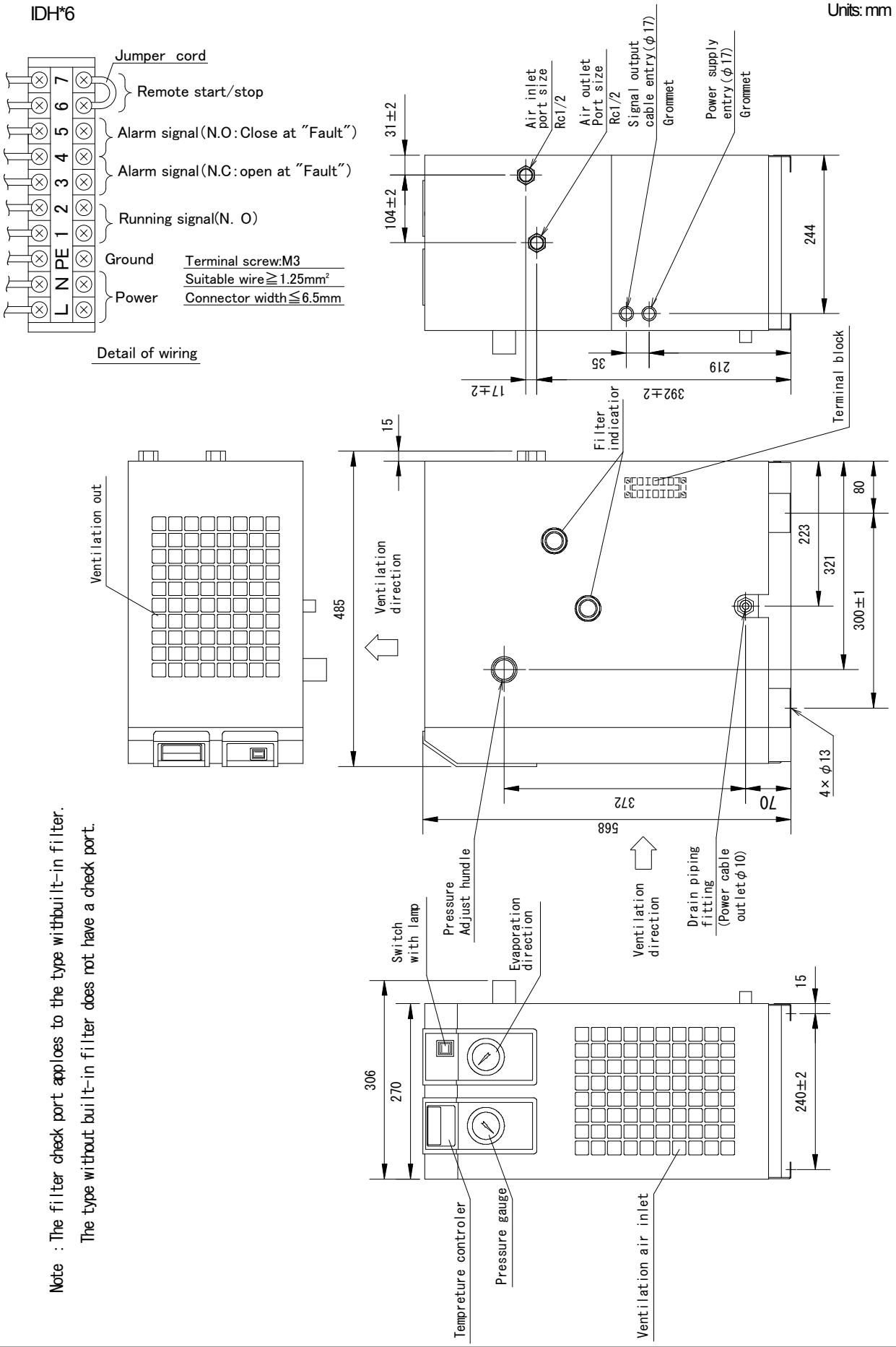


Detail of wiring

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

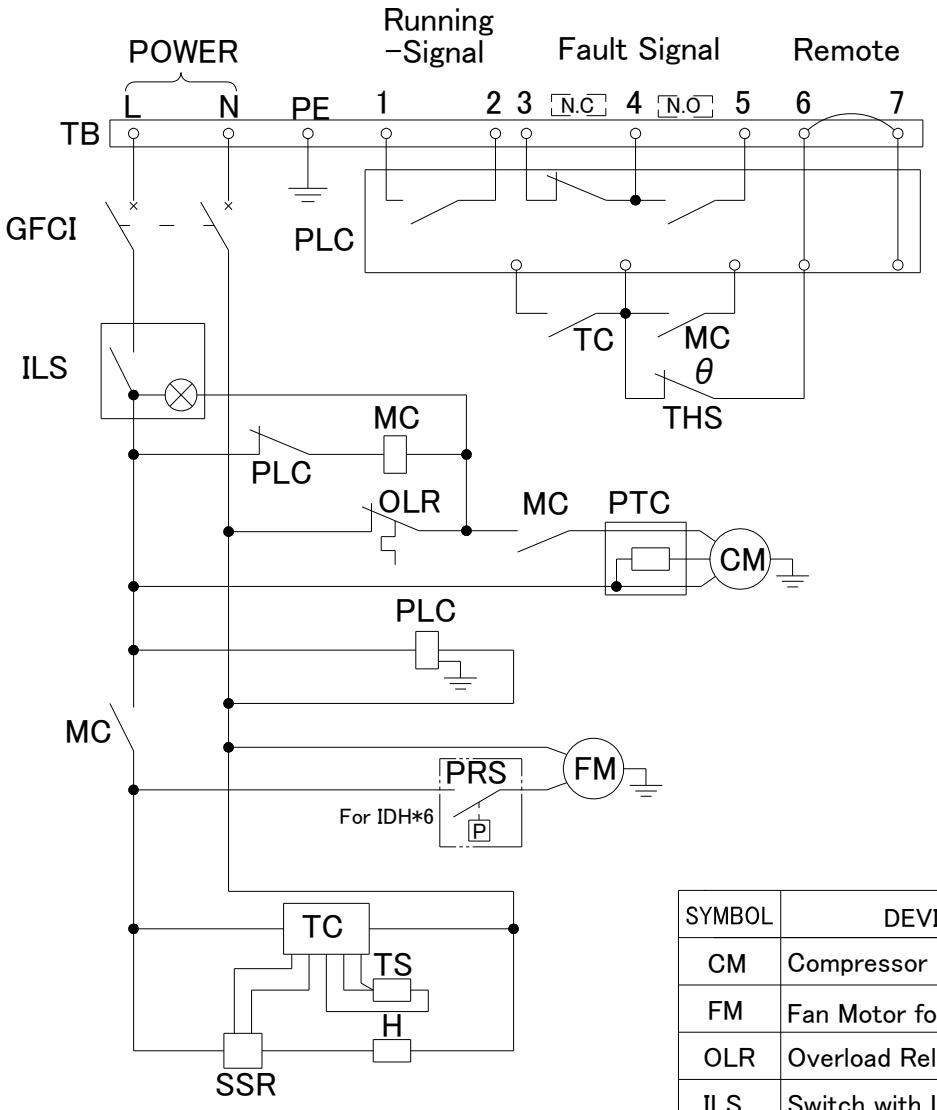
IDH*6

Units: mm



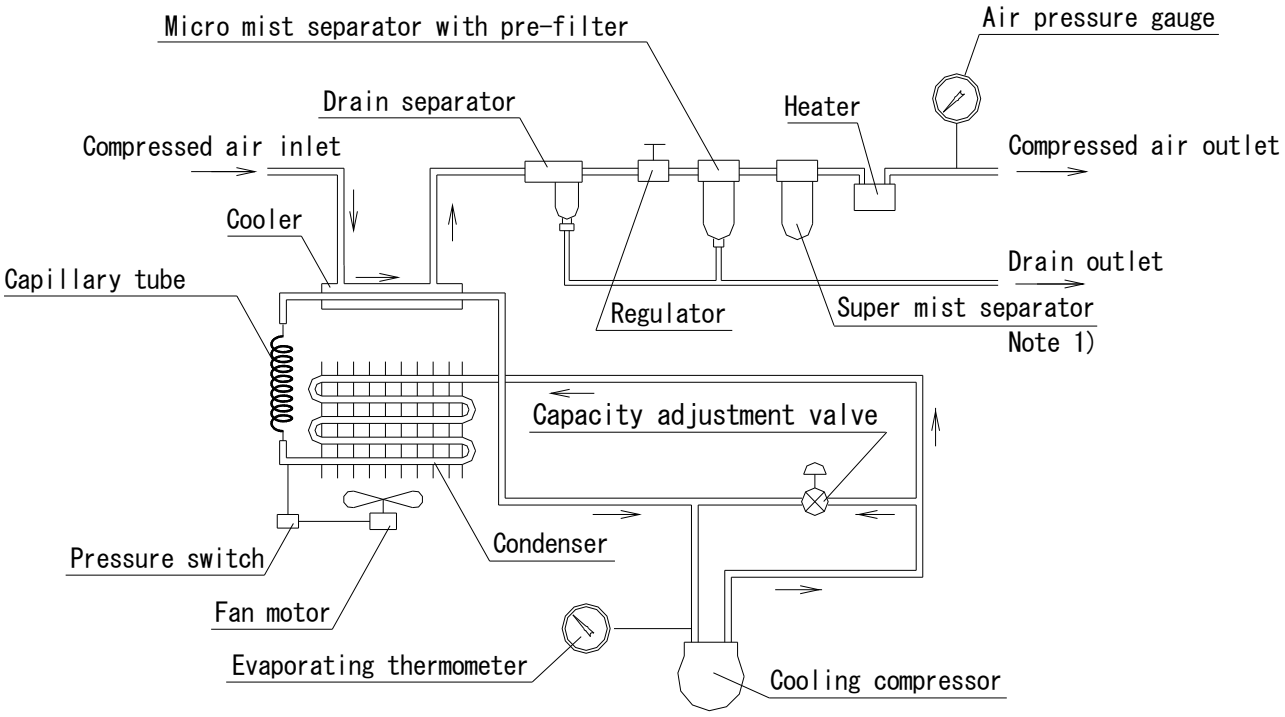
Note : The filter check port apploes to the type withbuilt-in filter.
The type without built-in filter does not have a check port.

6.3 Electrical Wiring Diagrams



SYMBOL	DEVICE NAME
CM	Compressor Motor
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
GFCI	Ground Fault Circuit Interrupter
PLC	Programable Logic Controller

6.4 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.

SMC Corporation

Akihabara UDX 15F,
4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021, JAPAN
Tel: +81 3 5207 8249 Fax: +81 3 5298 5362
URL: http://www.smcworld.com