



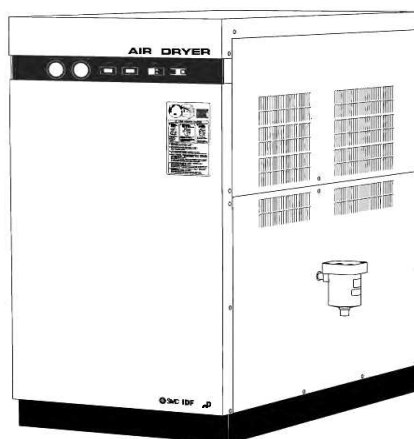
Operation Manual

PRODUCT NAME

Refrigerated Air Dryer

MODEL / Series

IDF190D-3-(C,M,R)W
IDF240D-3-(C,M,R)W



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.

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

SMC Corporation

Foreword

Thank you for purchasing SMC's refrigerated type air dryer (hereinafter referred to as the "product").

For safety and long life of the product, be sure to read this Operation Manual (hereinafter referred to as the "manual") and clearly understand the contents.

- For safe operation of SMC THERMODRYER, thoroughly read and follow the safety instructions, as well as regulations stated within ISO 4414*1 & JIS B 8370*2.
 - *1) ISO4414: Pneumatic fluid power - Recommendations for the application of equipment to transmission and control systems.
 - *2) JIS B8370: General rules for pneumatic equipment
- This manual is intended to explain the installation and operation of the product. Only people who understand the basic operation of the product through this manual or who install and operate industrial machinery and have basic knowledge and ability to handle such equipment, are allowed to work on the product.
- This manual and other documents attached to the product do not constitute a contract, and will not affect any existing agreements or commitments.
- It is strictly prohibited to copy this manual entirely or partially for the 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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Chapter 1 Safety



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

1.1 Before Using the Air Dryer

- This chapter is intended to specifically describe the safety related issues for handling the product. Read this before handling the product.
- This product is for dehumidification of compressed air. We, as the manufacturer, cannot take any responsibility if used for any other purpose.
- The product operates with high voltage and has some parts that get hot or rotates during operation. 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 service manual is not a general safety manual.
- People who handle this product or work around it need to take training to understand the inherent risks and master safety measures.
- 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 representatives should take the safety of all personnel in the work environment into account.
- It is necessary to think of the safety of working place and work environment for each task.
- If the product is subjected to a short power outage (including voltage sag), it may take a long time to resume normal operation or be unable to restart normally due to the protective equipment triggered after the power is recovered. Should this happen, turn the product off using the switch with light and reset the protection circuits referring to 6.2 - Reset the Thermal relay and High Pressure Switch. It is possible that the product starts suddenly after the power is recovered. Turn off the switch with light when removing the cover panel.
- This manual must be kept available to operators whenever necessary.

1.1.1 Danger, Warning and Caution in This Manual

The instructions given in this manual aim to ensure that the product is operate in a safe and correct way. These instructions are grouped into three categories, “Danger”, “Warning”, and “Caution”, which indicate the level of hazard, damage and also the degree of emergency. Read these statements carefully and thoroughly understand them and location of the instruction before operating or performing maintenance on the unit. “**DANGER**”, “**WARNING**” and “**CAUTION**” signs are in order according to severity (DANGER> WARNING> CAUTION). The meanings of these signs are as follows.



DANGER

“**DANGER**”: Hazard that will cause serious personal injury or death during operation, maintenance or inspection due to incorrect handling or negligence of compliance to avoid the danger.



WARNING

“**WARNING**”: Hazard that may cause serious personal injury or death during operation, maintenance or inspection due to the negligence of required procedure or warning to avoid the danger.




CAUTION


“**CAUTION**”: Hazard that Will cause minor personal injury or damage to the device or equipment during operation, maintenance or inspection due to the negligence of required procedure or warning to avoid the danger.

1.2 Hazard Classifications & Position of Hazard warning Labels


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

 WARNING
<ul style="list-style-type: none">- 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.- If there is abnormality, take actions below according to the operation manual.- Read carefully the Chapter 6 Troubleshooting before taking actions.- Do not start the product in any trouble. If failure occurs, immediately stop the product, and contact maintenance personnel or a qualified person.


1.2.1 Hazard of Electricity

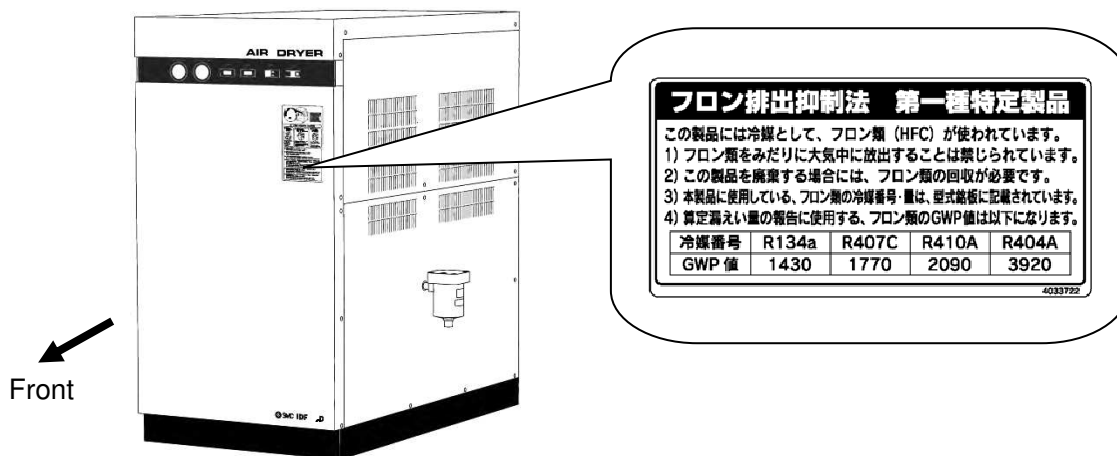
 WARNING
Inside of this product, there is a power-supplying section with high voltage separated by the cover panel. Do not operate the product without the cover panel.

1.2.2 Hazard of Hot Surface

 WARNING
The product has surfaces that can reach high temperatures during operation. 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.

1.2.3 Hazard of Compressed Air Circuit

 WARNING
Before replacing or cleaning parts, be sure to bleed compressed air remaining inside of the product until the gauge indicates "0". If there is no relief to the pressure, high pressure can propel objects at high velocity when unscrewing parts and cause injury.



1.3 Waste Disposal

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



CAUTION

- The product uses hydro fluorocarbon type refrigerant (HFC).
- This product is a Class 1 specified products of the Act on Rational Use and Proper Management of Fluorocarbon in Japan.
It is strictly forbidden 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. Only personnel with required knowledge and experience about the equipment and incidental device should perform the collection of the refrigerant.
- Only maintenance personnel or qualified personnel are allowed to open the cover panels of the product.
- The type and quantity of HFC can be found on the product label.



CAUTION

- Dispose of the refrigerant and refrigerant oil according to the bylaw or regulation of local government.
- Only personnel with required knowledge and experience about the product and incidental device should perform the collection of the refrigerant.
- Only maintenance personnel or qualified personnel are allowed to open the cover panels of the product.
- If there is something not clear, please contact our service office.

1.4 Limited Warranty and Disclaimer/ Compliance Requirements

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



CAUTION

The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries.

If the product is being considered for use in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.

If anything is unclear, contact your nearest sales branch.



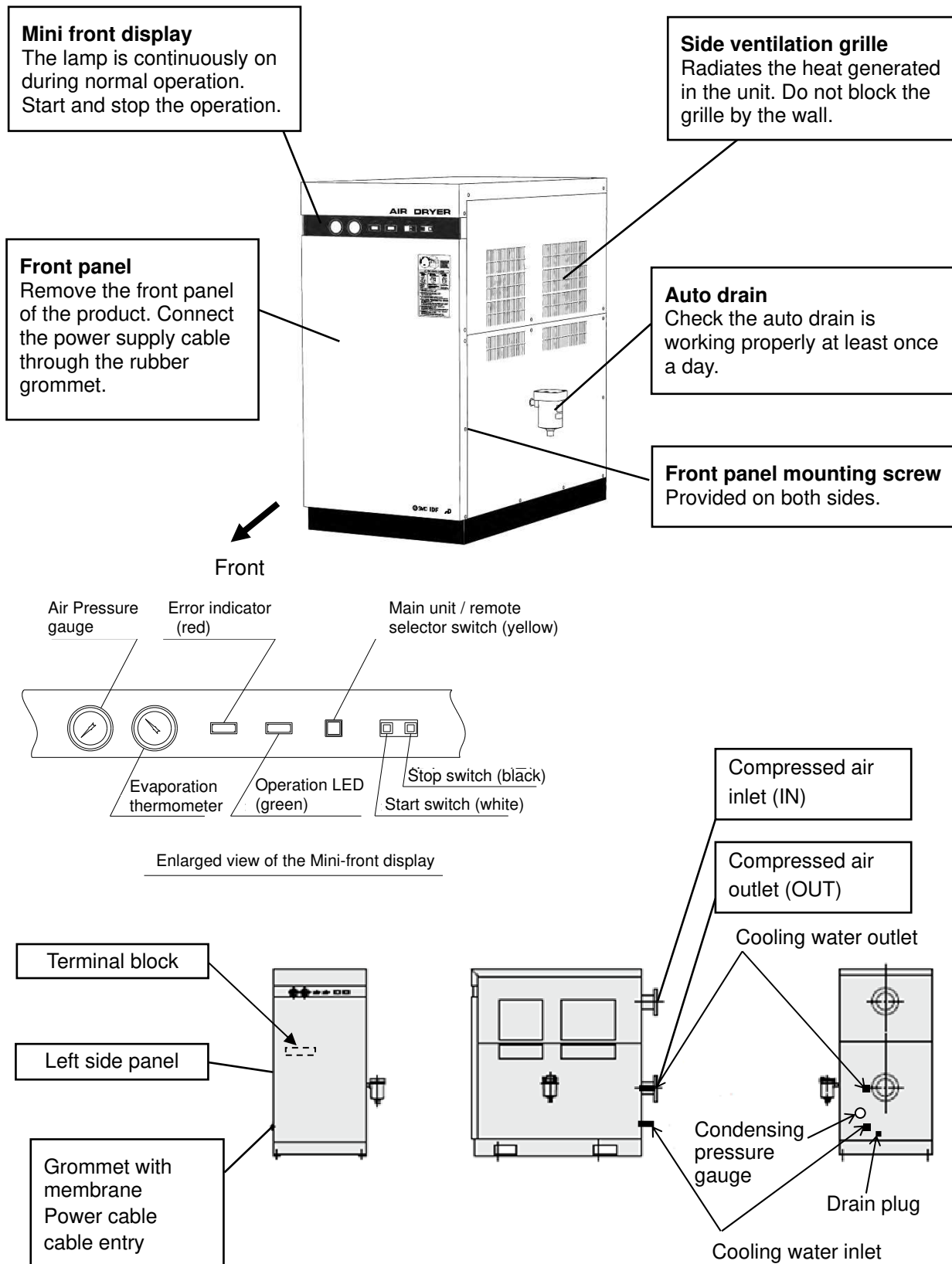
CAUTION

SMC products are not intended for use as instruments for legal metrology.

Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country. Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

Chapter 2 Name and Function of Parts

2.1 Name and Function of Parts



Chapter 3 Transportation and installation



WARNING

- Use the product in an appropriate manner, and pay attention to safety, particularly physical safety of operators, during the installation, operation, maintenance and checks of the product.
- When the product is used for a critical facility or equipment, prepare a spare product or alternative machine in case of failure or stoppage of the product due to the operation of the protective equipment.



CAUTION

Transportation, installation, and maintenance including dangerous work must be done by personnel who have require knowledge and experience about the product and system.

3.1 Transportation

Follow the instructions below when transporting the product.

- For moving the product, lift it with care so that the product is not laid down on its side or dropped.
- Do not transport the product lying down on its side, or the product will be damaged.
- Do not suspend the product.



WARNING

This product is heavy. Follow above cautions to avoid risk during transportation. This product weighs more than 450kg, only move the product using a forklift. Moving by forklift should be done by personnel who have the applicable licenses.

3.2 Installation

3.2.1 Environment

The product must not be operated or stored in the following conditions. Potential malfunction or damage to the product may occur if these instructions are disregarded.

- Place where the product is exposed to rain or wind. Humid place (more than 85% of relative humidity).
- Avoid locations where water, water vapor, salt water, or oil may splash on the product.
- Avoid locations where dust or other particles are present.
- Avoid locations where flammable or explosive gases are present.
- Avoid locations where corrosive gases, solvents or combustible gases present.
- Avoid locations which receive direct sunlight or radiated heat.
- Avoid locations where the ambient temperature exceeds the limits as mentioned below.
 During operation: 2 to 45°C
 During storage: 0 to 50°C (when there is no drain water inside of the piping)
- Avoid locations where temperature substantially changes.
- Avoid locations where strong magnetic noise occurs. (Avoid locations where strong electric field, strong magnetic fields, or surge voltage occur).
- Avoid locations where static electricity occurs or conditions which make the product discharge static electricity.
- Avoid locations where high frequencies occur.
- Avoid locations where damage is likely to occur due to lightening.
- Avoid installation on machines used for transporting, such as vehicles, ships, etc.
- Avoid locations at altitudes of 2000 meters or higher.
- Avoid locations where strong impacts or vibrations occur.
- Avoid locations where a massive force strong enough to deform the product is applied or the weight from a heavy object is applied.
- Avoid locations with insufficient space for maintenance.
 Necessary maintenance space
 Front face: 1.0 m
 Rear: 1.0 m
 Top: 1.0 m
 Right side: 1.0 m
 Left side: 1.0 m
- Avoid locations where the ventilation grille is obstructed.
- Avoid locations where the air dryer will draw in high-temperature air discharged from an air compressor or other dryer.
- Avoid pneumatic circuits where rapid pressure fluctuations or flow speed changes are generated.



WARNING

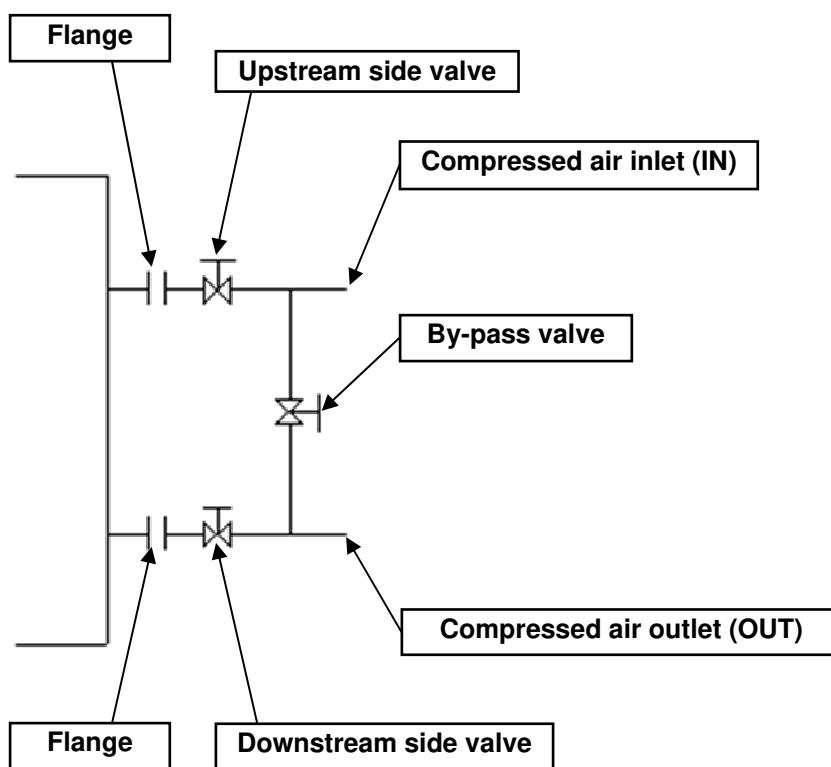
Do not use or store the product in conditions of compressed air or an environment containing substances below. Otherwise, malfunction or parts damage may occur.
- Corrosive gas, organic solvents or chemicals.

3.2.2 Installation

- The product should be installed on a vibration-free, stable, horizontal flat surface.
- Refer to the 7.3 Dimensions of the Chapter 7.
- We recommend the anchor bolt sets.

3.2.3 Air piping


- Connect compressed air inlet and outlet using a JIS10K flange specified in Chapter 7- 7.1 Specifications
- It is recommended to install a main line filter in the air inlet piping. Main line filter prevents the auto drain from malfunctioning by stopping rust and particles.
- Be careful not to let the vibration of the air compressor transmit.
- When the pressure of the air source fluctuates a lot, install an air tank.
- Before piping, flush the inside of piping to eliminate foreign matter such as particles, seal tape or liquid gasket. Entry of the foreign matter may cause cooling failure or drain discharge failure.
- 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.
- If rapid pressure fluctuation or flow change occurs, install a filter on the dryer outlet to prevent drain from splashing.




By-pass piping

3.2.4 Replacement of auto drain

- Mount the nipple to the auto drain (included in the same package). Then connect it to the drain inlet of the dryer.
- Connect the drain piping to the auto drain outlet. The drain piping should have an internal diameter of 8mm or more and be 5m or less in length. Make sure that it does not go upwards and it is not bent. The outlet end of the tube is released to atmosphere, and lets the drain flow through the tube.
- Ensure that the ball valve is opened. Refer to 7.3 Dimensions of the Chapter 7.
- Using the pressure of the compressed air, the drain will be discharged periodically. Fix the outlet end of the tube so as not to swing during discharge.

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

3.2.5 Electrical wiring

 WARNING
<p>All electrical work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.</p> <ul style="list-style-type: none"> - Be sure to shut off the user’s power supply. Wiring with the product energized is strictly prohibited. - Ensure a stable power supply with no surge. - Install the correct electric earth leakage breaker of the specified leakage capacity and load capacity referring to 7.1 Specifications to prevent electric shock and burning of the compressor motor. - Use a power supply suitable for the specifications of the product. 3 phase power supply type cannot be operated by single phase power supply. - Be sure to connect the ground connection. - Never connect the ground to water line, gas pipe or lightning conductor. - Do not plug too many leads into a single socket. That causes exothermic heat or fire. - Do not modify the internal electrical wiring of the product. - For use in Europe, install a breaker compliant with applicable IEC standards to the power supply of the product.

3.2.5.1. Wiring of the power supply cable

- Remove the front panel of the product and connect the power cable to the terminal block.
- Install the earth leakage breaker on the power supply side. It needs to be prepared by the user.
- Allowable power supply fluctuation:
3 phase 200 VAC +/-10% (50Hz); 3 phase 200 VAC to 220V +/-10% (60Hz)

Power supply cable specification

Prepare the power supply cables below.

Power supply cable: 10AWG (5.5mm² or greater), cable O.D. Approx. 16mm, 4 cores (including the ground)

Approx. 1.5m of cable is necessary for wiring in the product.

Power supply cable length

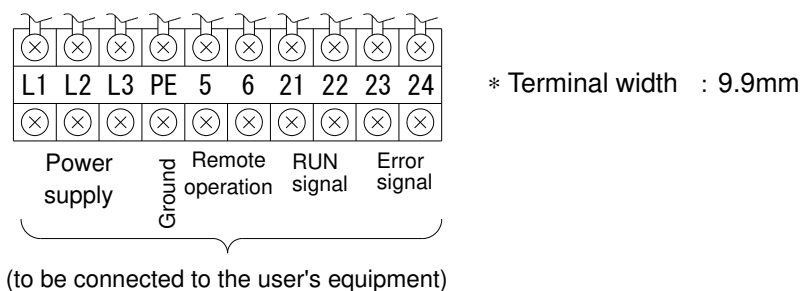
Power cable length for the product shall be less than 30m.

Power supply

Connect the power cable and grounding cable to the terminal block.

Wiring procedure

- 1) Remove the front panel.
- 2) Introduce the cable through the grommet with membrane to connect to the terminal block. (refer to the label on the terminal block)
Do not touch any equipment other than the terminal block during wiring. (Refer to the layout of the terminal box).
- 3) Loosen the M4 screw of the terminal block using a screwdriver. Attach the round crimp terminal (R5.5-4) attached to the power cable and tighten it to the terminal block with the previously loosened screw. 【Tightening torque:1.0N·m】
- 4) Mount the front panel back.



3.2.5.2. Wiring of signal cable (operation / error / remote operation)

- Remove the front panel of the product and connect the signal cable to the terminal block.

Signal cable specification

Prepare the following signal cables:

Signal cable: 20AWG (0.5mm² or greater), cable O.D. Approx. 9mm, 6 cores

Approx. 1.5m of cable is necessary for wiring in the product.

Signal cable length

Signal cable length shall be less than 30m.

Signal cable Connection

Connect the signal cable to the terminal block.

Wiring procedure

- 1) Remove the front panel.
- 2) Introduce the cable through the grommet with membrane to connect to the terminal block. (refer to the label on the terminal block)
Do not touch any equipment other than the terminal block during wiring. (Refer to the layout of the terminal box)
- 3) Loosen the M4 screw of the terminal block using a screwdriver. Attach the round crimp terminal (R1.25-4) attached to the signal cable and tighten it to the terminal block with the previously loosened screw. (Tightening torque: 1.0 N·m)

4) Mount the front panel back.


[Remote control]

- Voltage of AC200V is present on the terminal block. The black switch (stop) must be turned on while wiring. When wiring, shut off the supply breaker.
 - 1) Connect the external switch terminals to the terminal blocks No.5 and No.6.
Use a single pole type (non-voltage) external switch for remote operation.
 - 2) To enable remote operation, the yellow switch (main unit /remote selector switch) must be turned ON.
Then, for remote operation, the product is turned on/off using the external switch.

3.2.6 Cooling water piping

- Strainer (60 mesh or finer) is recommended on the inlet of the cooling water.
When the strainer is not used, impurities in the cooling water may adhere the water cooling condenser, decreasing the cooling performance.
- Do not remove the water release plug other than during maintenance or repair.
- When there is a possibility of freezing or the dryer is not used for a long period of time, discharge the water in the piping from the water release plug.
- Control the cooling water quality and amount. (Refer to the Chapter 5.2.1 Maintenance for water-cooled condenser for details.)


3.3 Cautions about Reinstallation

 CAUTION
Only someone who has enough knowledge about the equipment and incidental devices should reinstall it in another place.


If you move the product and reinstall it into another place after some operations (including trial running), all installation instructions in chapter 3 should be followed as well as the following instructions.

Disassembly of the power cable

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

 WARNING
<ul style="list-style-type: none"> - All electrical work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations. - Cut off the power supply for safety before the wiring. Wiring with the product energized is strictly prohibited.

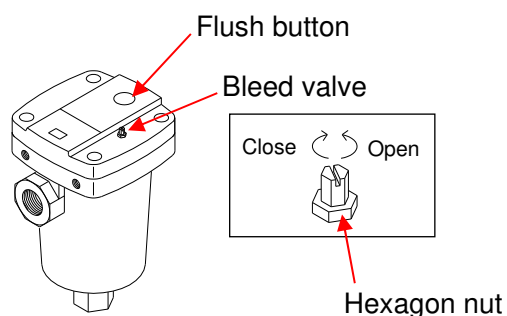
Removal of air piping

 WARNING
<ul style="list-style-type: none"> - All electrical work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations. - Separate the compressed air source 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. Remaining tape could cause imperfect cooling or failure by entering into the product.

Procedure to release residual compressed air

- 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) Ensure that the ball valve of the auto drain is opened.
- 4) Open the bleed valve of the auto drain. When compressed air stops coming out, press the flush button to confirm that there is no compressed air left inside. Refer to the figure shown below



Chapter 4 Operation/ Shutdown



CAUTION

Only someone who has enough knowledge and experience about the product and incidental devices should operate or shut down the product.

4.1 Check points before operation

Before trial operation, check following points.

Installation state

- By visual inspection check that the product is installed horizontally.
- Make sure the product is fixed properly with anchor bolts.
- Do not place heavy obstacles on the product and add unreasonable loading by piping and so on.

Connection of cables

- Check that the power cable and grounding cable are connected correctly.

Drain tube

- Drain tube should be connected correctly.

Air piping

- Confirm that the piping to the compressed air is correctly connected. Check that the IN and OUT side of the product and bypass piping valves are completely closed.

Ball valve

- Ensure that the ball valve of the auto drain is opened.

Cooling water piping

- Make sure that the cooling water pipes are correctly connected. Ensure that the valves on the water pipe are open and the cooling water flows.

4.2 Operation

Start operation according to the procedure below.

- 1) Turn on the main power supply breaker. Then turn on the white switch (operation switch).
- 2) Operation LED (green) is ON.
- 3) Open the IN and OUT side valves slowly. Ensure the bypass valve is completely closed. Confirm that there is no air leakage.
- 4) The compressor may continuously operate depending on the compressed air status. The evaporation thermometer indicates green band. When the evaporation thermometer is over the green area, refer to Chapter 6 - Troubleshooting.
- 5) After supplying compressed air for a while, the drain will be discharged from the drain tube automatically.
- 6) Continue the operation.



CAUTION

- Frequent switching ON and OFF leads to malfunction.
- The auto drain is normally open and the valve closes when the air pressure is 0.15MPa or more. When the IN side valve starts to open, air bleeds from the drain outlet until the pressure reaches 0.15MPa. The pressure may not reach 0.1MPa when the air compressor discharge flow rate is small.
- Dehumidified drain may flow into the secondary piping if there is sudden change of pressure or flow speed. Do not use the product where those condition is present.

- 7) For remote operation, the product is turned on/off using the external switch while the yellow switch (main unit / remote selector switch) is turned ON. Allow at least 3 minutes before restarting remote operation. If restart is attempted within 3 minutes, the protective equipment may trip and restart will not be possible. Start-stop frequency: 5 times/ hour or less. This is to protect the motor.

4.3 Stop

- 1) Turn on the black switch (stop).
- 2) For remote operation, use the external switch.
- 3) Green LED (operation) turns off and operation stops.

4.4 Cautions for re-start

Allow at least 3 minutes before restarting the product. If the product is restarted within 3 minutes after being stopped, the protection circuit will be activated, and the dryer will not start. When operation does not start, restart it referring to the Chapter 6 Troubleshooting.

4.5 Check points before restart

When starting operation, check the following points. Immediately stop operation if any abnormalities occur. Turn on the black switch (stop) and then shut off the power supply breaker.

- There should be no leakage of compressed air.
- Compressed air pressure, temperature, flow rate and ambient temperature are within the specifications of the product.
- Confirm that drain comes out of the drain tube.
- The evaporation thermometer is in the green area.
- Drain should not be exhausted from the compressed air outlet of the air dryer.
- There should be no abnormality with noise or vibration or odor from the product.
- Cooling water flows.

4.6 Cautions when the product is shut down for an extended period of time

- When the product is not used for a period longer than 24 hours, turn on the black switch (stop) or turn off the power supply. It is recommended to discharge the residual pressure and drain from the compressed air piping.
- The residual drainage in the air dryer may splash over the outlet when the operation is re-started, so it is recommended to install a filter on the outlet of the air dryer.
- Stop feeding water to the cooling water pipes and discharge the water from the water release plug.

4.7 Signal output

- Operation and error signals are non-voltage contact outputs.

	Signal Contact output
1) Operation signal	- During Operation: Closed - While stopped: Open (Including emergency stop): Open
2) Emergency stop signal	- Protective equipment in operation: Closed - Protective equipment not operated: Open

* Error signals are not output when the product stops operation due to an operation of the built-in overload relay.

- Contact capacity
AC220V/ 2A、 DC24V/ 2A (Minimum applicable load: 5 VDC, 1mA)

Chapter 5 Checks, Maintenance and Adjustment



WARNING

- Only people who have sufficient knowledge and experience about the product and its accessories are allowed to perform maintenance.
- Before maintenance, read and understand the important cautionary notifications in this operation manual.



DANGER

- Cut off the power supply for upstream when removing the panel.
- Before replacing or cleaning parts, be sure to bleed compressed air remain inside of the product until the gauge indicates "0".
Do not remove the auto drain case assembly with any air pressure remaining internally. If there is residual pressure in the product, there would be great danger of an unexpected accident, such as shooting out of parts when they are being unscrewed.
- Power supply parts become hot and will be applied with high voltage during operation. Heat may cause burns, or electric shock can result due to high voltage. Even if the switch with lamp is turned off and operation is stopped, electricity will be applied to the primary line. During the work for charging line, turn OFF the electrical leakage breaker of the user's equipment.
- Even if the device operation stops, there is a danger of burns due to residual heat. Do NOT start working on the parts inside the product until the temperature has decreased to 50°C or less. It may take 10 to 15 minutes.
- There is the possibility of contacting the condensate during the auto drain maintenance work. Follow enduser procedures ensure safety of operator.
(example. Put on protective glass, apron, and gloves).
- Use an aqueous solution of neutral detergent for cleaning of the auto drain and do not use solvents.
- When removing the panels and auto drain case assembly, wear protective gloves to prevent injuries from sharp edges.

5.1 Daily inspection

Before daily operation, check the following points. When any abnormality is found, stop operation immediately and refer to the Chapter 6 Troubleshooting.

- There should be no leakage of compressed air.
- The green LED is ON during operation.
- Confirm that condensate comes out of the drain tube.
- The evaporation thermometer is in the green area when the product is operated with compressed air.
- The indicated value of the evaporation thermometer is about 5 to 10°C lower than ambient temperature in a state where the product is stopped and compressed air is not applied.
- There should be no abnormality with noise or vibration from the product.
- There should be no smell or smoke from the product.

5.2 Regular maintenance

5.2.1 Maintenance for water-cooled condenser

When a water-cooled air dryer is used for a certain amount of time, the compression performance decreases due to the contamination of the cooling water side of the water-cooled condenser.

Because of this, compression pressure abnormally increases, starting the protection equipment installed in the air dryer, stopping the air dryer operation.

When the air dryer is operated, perform maintenance for the water-cooled condenser after reading 8-1 and 8-2 below carefully.

(1) Cooling water

Ground water or tap water may be used for cooling water for water-cooled condenser. There are 2 types of method for cooling; once-through water cooling and circulated water cooling.

With once-through type, ground water or tap water is continuously supplied to the water-cooled condenser, discharging warmed water to the outside. This method is used where cooling water source is abundant.

With circulated type, heat is absorbed by water-cooled condenser and warmed water is cooled down in the cooling tower for reuse.

In most cases, cooling performance of the water-cooled condenser is deteriorated by the contamination of the cooling water of adhesion of scales.

(2) Cooling Water Quality Standard

1) Water quality standard

As a guideline for cooling water quality which does not cause abnormal level of contamination or scale, JRA-GL-02-1994 Guideline of Water Quality for Refrigeration and Air Conditioning Equipment shall be referred. Table 4 -1 shows the values.

Table 4-1

Items		Cooling water system		
		Circulating type		Non circulating type
		Circulating fluid	Make-up water	Non circulating water
Standard items	pH [25°C]	6.5~8.2	6.5~8.0	6.8~8.0
	Conductivity (mS/m) [25°C]	80 or less	30 or less	40 or less
	Chloride ion (mg/L)	200 or less	50 or less	50 or less
	Sulphate ion (mg/L)	200 or less	50 or less	50 or less
	Acid consumption [pH4.8](mgCaCO ₃ /L)	100 or less	50 or less	50 or less
	Total hardness (mgCaCO ₃ /L)	200 or less	70 or less	70 or less
	Calcium hardness (mgCaCO ₃ /L)	150 or less	50 or less	50 or less
	Ion state silica (mgSiO ₂ /L)	50 or less	30 or less	30 or less
Reference items	Iron(mg/L)	1.0 or less	0.3 or less	1.0 or less
	Copper (mg/L)	0.3 or less	0.1 or less	1.0 or less
	Sulfide ion (mg/L)	Should not be inspected.	Should not be inspected.	Should not be inspected.
	Ammonium ion (mg/L)	1.0 or less	0.1 or less	1.0 or less
	Residual choride (mg/L)	0.3 or less	0.3 or less	0.3 or less
	Free carbon dioxide (mg/L)	4.0 or less	4.0 or less	4.0 or less
	Stability index	6.0~7.0 or less	—	—

* The water that passes through the water-cooled condenser is referred to as cooling water. This applies to both once-through and circulating type condensers.

2) Water quality check (monthly)

When tap water (well) or ground water is used as cooling water for water-cooled condenser, test the water quality based on (Testing Methods for industrial Water) or methods compliant with JISK0101 for items in Table -1.

When the value is outside of the standard value, take actions below.

- a) Change the source of water supply. For example, change the well water to tap water.
- b) Ask water treatment consultant about appropriate method.
- c) Change the cooling method. Change once-through water cooling method to circulated-water cooling.

When cooling water passing through the cooling towers, initially it may satisfy with water quality standards. However, in places where contaminated air is present, sulfite gas in the air may dissolve into the facility water and become sulfuric acid, corroding the heating surface. Inspect the quality of the cooling water and replace the circulating water on a regular basis.

Fig. 1 shows the possible issues due to water quality

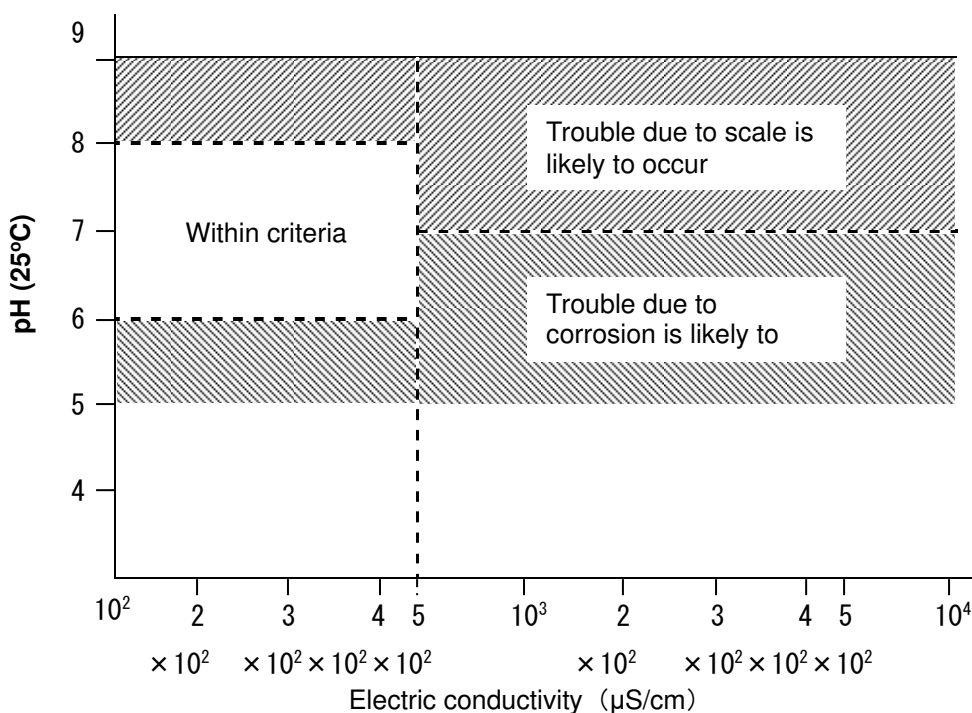




Fig. 1 Relation between pH conductivity and trouble

(3) Maintenance and inspection of the strainer (monthly)

	CAUTION
<p>If the mesh of the Y shaped air strainer becomes clogged with foreign matter such as algae, heat radiation performance declines. This will start the safety device and stop operation.</p>	

	WARNING
<p>Stop the cooling water system or stop the cooling water circuit to release the residual pressure.</p>	

Stop supplying the cooling water and remove the Y shaped strainer mesh for inspection. When foreign matter has accumulated, remove it using a brush or air gun so that the mesh is not deformed or damaged.

[Note]
 It is recommended to install valves and pressure gauges to clean the Y shaped strainer easily. By fully closing the valves, it is not necessary to stop the facility water system while cleaning the Y shaped strainer. With a pressure gauge, the pressure of the cooling water circuit can be checked and works can be performed safely.

- (4) Cleaning of cooling water system (every 3 months)
 Clean the user's cooling water system and replace the cooling water with new water. Cooling water quality must satisfy the criteria specified in "Table 4-1".

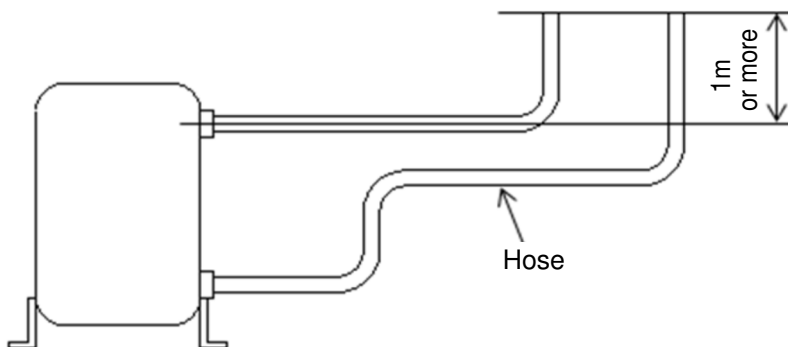
- (5) Cleaning of cooling water side of the water-cooled condenser
 Even if the water quality is properly controller, the cooling performance will be deteriorated by the scales in the cooling piping. Please clean the cooling piping periodically referring the procedure below.
 Cleaning is possible mechanically or chemically.
 Water-cooled condenser used for IDF190D-3-W, IDF240D-3-W cannot be cleaned mechanically because it is double pipe type. It should be cleaned chemically.

1) Chemical cleaning method

When the tank is cleaned, cleaning agent is poured in the tank and left for a specific period of time, or cleaned with circulating cleaning agent. The latter is more effective. It is necessary to carefully consider the generation of corrosive gas and corrosion caused by the cleaning agent.

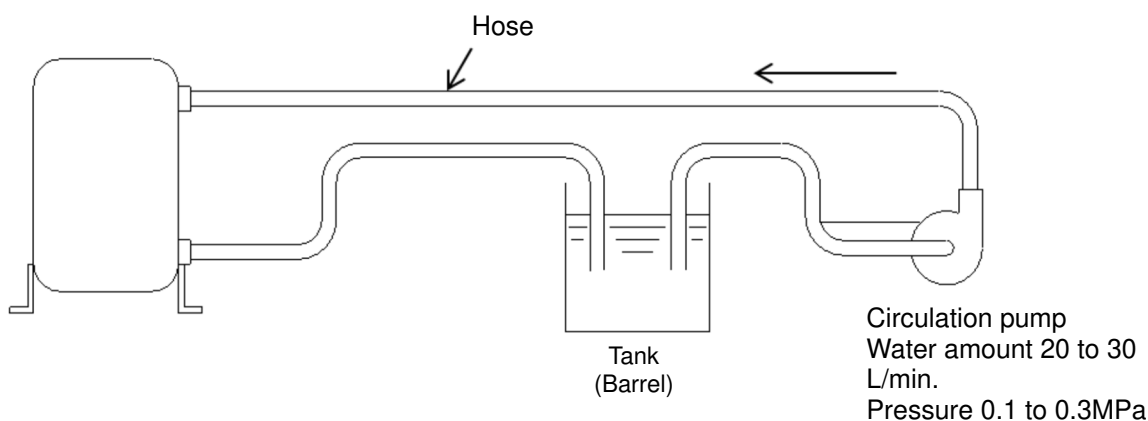
a) Cleaning procedure (static method)

1. Disconnect the inlet / outlet water tube for the heat exchanger, then connect the hose (rubber or vinyl).
2. Raise and secure the hose, fill the liquid so that the liquid level of the cleaning liquid is at least 1m above the top end of the water chamber cover, and leave it for a specified time.
3. Discharge the cleaning fluid and rinse the cooling tower with water for 20 minutes or longer to get rid of the cleaning agent.



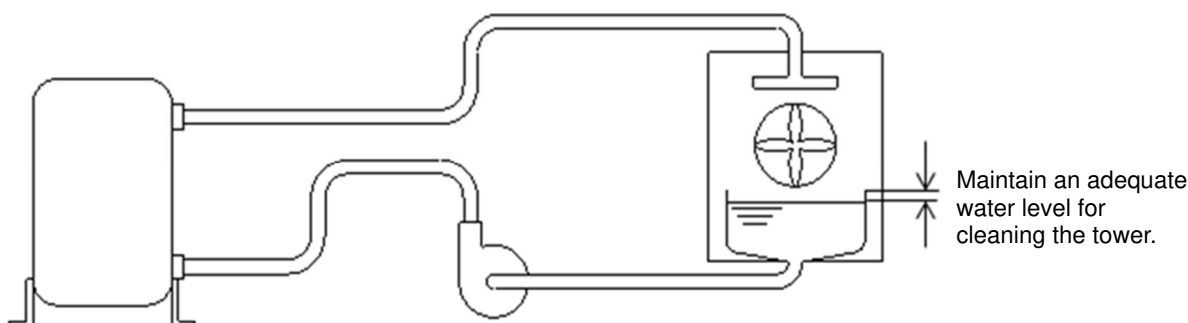
b) Cleaning procedure when cooling tower is used (circulating method)

1. Connect the cleaning circulation pump (if necessary, use an acid resistant pump) to the cooling water inlet and outlet of the tank heat exchanger with a hose.
2. Put the cleaning solution into the tank and circulate the fluid for specified period of time.
3. Discharge the cleaning fluid and rinse the cooling tower with water for 20 minutes or longer to get rid of the cleaning agent.



c) Procedure when the cooling tower is used.

1. Inject the detergent into the cooling tower and clean the tower for specified period of time.
2. Discharge the cleaning fluid and rinse the cooling tower with water (change water every 5 minutes for 3 to 4 times) to get rid of the detergent.



2) Precautions for chemical cleaning method

When the tank is cleaned, cleaning agent is poured in the tank and left for a specific period of time, or cleaned with circulating cleaning agent. The latter is more effective. It is necessary to carefully consider the generation of corrosive gas and corrosion caused by the cleaning agent.

1. Before starting cleaning with circulating agent, check water leakage and pump pressure to avoid the leakage of cleaning agent.
2. When chemical cleaning is performed, the amount, time and treatment vary depending on the type of cleaning liquid. Therefore, follow the operation manual of each type of cleaning liquid when cleaning. Especially pay attention during discharge of water.
3. Cleaning effect can be checked by following points.
 - Scale condition during cleaning.
 - Check the pressure change of the cooling water system with cooling pump discharge pressure.

5.2.2 Auto Drain Maintenance

Remove the dust accumulated in the auto drain every month. Use neutral detergent for cleaning. When cleaning does not improve the operation, replace the element and bowl assembly. From the next time on, clean them in intervals shorter than a month.



WARNING

- **Be sure to release the residual pressure of the auto drain before starting maintenance.**
- **When the bowl assembly is broken or very dirty, replace it with a new one.**

- (1) Follow the procedure below for the auto drain maintenance.
 - 1) Turn on the stop switch of the product and stop the operation.
 - 2) Shut off the power supply from the earth leakage breaker.
 - 3) Fully close the valve at the compressed air IN and OUT piping. (Open the bypass valve, only when compressed air is required during maintenance.)
 - 4) Remove the exterior panel where it is necessary for the work.

[Cleaning and replacement of the auto drain]

Follow the procedure below for the auto drain maintenance.

Note: Before maintenance

When disassembling the auto drain for cleaning, replacing parts, etc., **be sure to completely remove the air pressure as follows. Do not disassembly the auto drain while pressurized.**

- * Exhaust the compressed air from the auto drain < Fig. 1 >
- Close the inlet of the drain and open the bleed valve gradually.
- When compressed air stops coming out, press the flush button to confirm that compressed air is not left inside.

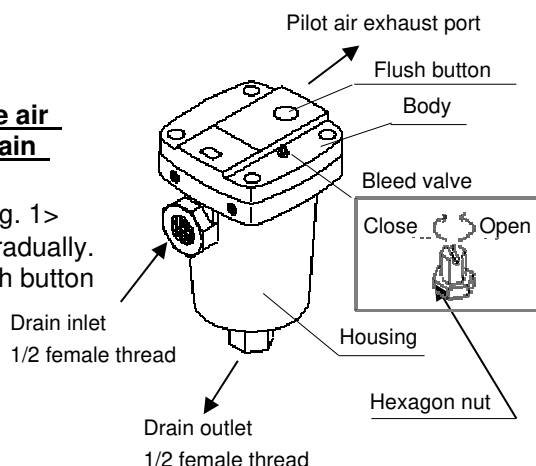


Fig.1 Name and Function of Parts

(A) Disassembly < Fig.2 >

Remove the 4 hexagon socket head cap screws using an allen key with nominal size 5, and lift up the body. The entire draining mechanism can be removed.

(B) Cleaning of the interior

- 1) Hold the body and rinse the lower half of the body (draining mechanism) with water or lukewarm water with neutral detergent.

Caution! Never use anything other than neutral detergent.

DO NOT disassemble the draining mechanism.

The mechanism cannot be reused when disassembled.

When scratches are seen on the main valve (discharge valve) or it is difficult to clean the dirt off, the main valve needs to be replaced.

Refer to (D) Replacement of the main valve.

- 2) Wipe the inner surface of the housing with a cloth.
If there is dust stuck to the inside of the housing, leakage can occur after reassembly.
- 3) When O-ring is dirty, clean the surface with a soft cloth and check for gouges and deformation.
Damage or deformation could cause leakage when the product is reassembled. Replace the O-ring with a new one.
O-ring number: G85 (B)

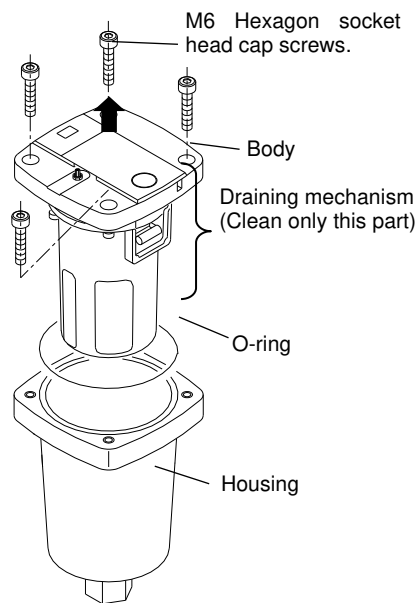


Fig. 2 Disassembly

(C) Reassembly

- 1) Place the O-ring onto the groove on top of the housing. **Make sure that the O-ring does not come out.**
- 2) Hold the body with the draining mechanism facing downwards. Place the mechanism into the housing so that the flush button comes to the opposite of the drain inlet. (If the body and housing are not completely engaged, there will be a gap of approx. 3mm between them. Rotate the body to the right or left)
- 3) Tighten the 4 hexagon socket head cap screws. (Appropriate tightening torque: 4.9Nm)
Caution! Ensure there is no gap between the body and the housing before tightening. If the bolt is tightened with a gap, the parts will be broken.
- 4) After reassembly, assemble the valve for the drain inlet slowly. Before use ensure that there is no leakage.

(D) Replacement of the main valve (discharge valve)

Purchase the replacement kit of the main valve and replace it referring to the attached Replacement Procedure. Replacement requires a specific tool. Replacement procedure must be followed to reuse the product and prevent the parts from being damaged. Replacement kit for exhaust valve mechanism.

5.3 Adjustment

5.3.1 Capacity Control Valve

The capacity control valve is set to the value in Table 5.2 at the time of shipment. Adjustment during operation is not necessary.

Table 5.2 Set value for capacity control valve

Description	Set value	Note
Capacity control valve	1 to 5°C (0.43 to 0.49)	Evaporation thermometer

However, if the evaporation temperature is not in the range of Table 5.2 during low-load operation, adjust the capacity adjustment valve to the value of the table. Make any adjustment based on the procedure of Table 5.3 while the load is not being applied.

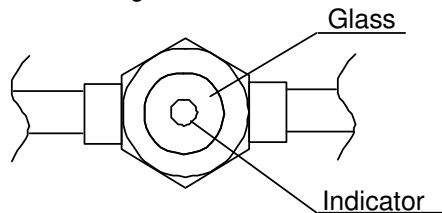
Table 5.3 Adjustment for the capacity control valve

Evaporation temperature °C	Adjustment method
1°C or less	Remove the capacity adjustment valve cover. Then rotate the 6mm hexagon socket head cap screw clockwise

Note) It may take time for pressure to be stabilized. Rotate the capacity adjustment valve by 1/2 revolution. After about 5 minutes, when the value is stabilized, read the evaporation thermometer.

5.3.2 Sight glass (for IDF240D-3-W only)

Check the refrigerant condition in the refrigerant circuit with the table below



(a) Check for refrigerant amount

Sight glass (Refrigerant in the glass)	Condition
Filled with liquid	Correct
Air leaking positions	Correct
Bubbles keep coming	Refrigerant is insufficient *1
Liquid level and gas level are separated	Refrigerant

*1) Air bubbles may be generated if the refrigerant circuit on the upstream of the sight glass is clogged and pressure drops occur even if the refrigerant amount is normal.

(b) Moisture in the refrigerant circuit (colour of the indicator)

- Green (DRY) ---- Good
- Yellow (WET) ---- Moisture is present in the refrigerant.
(Moisture in the circuit may deteriorate the compressor oil for refrigeration and cause malfunction of the control equipment and shorten the service life.)

Chapter 6 Troubleshooting

6.1 Troubleshooting

Refer to the table below if any abnormality is found. If there is something that is not clear, please turn off the power supply and contact our service office.

Problem	Possible causes	Action
Air dryer does not operate and the running lamp does not turn on, even when the switch is ON.	Power cable is loose or not connected.	- Connect the cable correctly.
	The earth leakage breaker is OFF.	- Please check the earth leakage breaker capacity. - Turn on the earth leakage breaker. If the earth leakage breaker keeps tripping, please shut off the power supply and contact our service office. Insulation failure is possible. [Option with earth leakage breaker is available (Option R)]
	Incorrect connection of 3-phase power supply.	- The earth leakage breaker is OFF at the time of shipment. Turn on before starting operation. - Be sure to solve the problem causing the breaker to trip before restarting. Restarting without solving the problem can cause serious incidents.
	External switch for remote operation has not been turned ON.	- Exchange the order of 2 wires out of the 3 wires (R phase and T phase) and reconnect them.
	Wiring for remote operation is loose or keeps coming out.	- Turn on the switch. - Connect the wiring correctly.
The lamp goes off and the compressor stops.	Water-cooled condenser is contaminated.	- Clean the air-cooled condenser.
	Facility water supply decreased because foreign matter has accumulated in the strainer.	- Inspect the strainer once a month. Remove foreign matter when it has accumulated.
	Facility water temperature is high.	- Decrease facility water temperature by increasing the cooling capacity of the facility water system.
	Compressed air temperature is too high.	- Improve the ventilation condition of the air compressor or lower the ambient temperature to decrease the discharge air temperature of the air compressor. - Install an aftercooler after the air compressor to reduce the temperature.
	Large voltage fluctuation.	- Install the power transformer or revise the power supply for correct voltage. (Temporarily allowable fluctuation of the power supply voltage is within +/-10% of rated voltage)

Problem	Possible causes	Action
Compressor stops with the operation LED ON with no cooling water flow.	Water-cooled condenser is contaminated.	- Clean the air-cooled condenser.
	Facility water supply decreased because foreign matter has accumulated in the strainer.	- Inspect the strainer once a month. Remove foreign matter when it has accumulated.
	Large voltage fluctuation.	- Install the power transformer or revise the power supply for correct voltage. - Ensure power supply voltage fluctuation is within +/-10% of the rated voltage.
	Overload relay of the compressor was activated.	- Check if the product was restarted within 3 minutes after stopping the operation. - Wait 3 minutes before restarting.
Compressor stops with the operation LED ON with cooling water flow.	Water-cooled condenser is contaminated.	- Clean the air-cooled condenser.
	Facility water temperature high.	- Decrease the facility water temperature. (Check and adjust the cooling tower)
	Facility water supply decreased because foreign matter has accumulated in the strainer.	- Inspect the strainer once a month. Remove foreign matter when it has accumulated.
Moisture is generated downstream of the compressed air line.	Compressed air temperature is too high.	- Improve the ventilation condition of the air compressor or lower the ambient temperature to decrease the discharge air temperature of the compressor. - Install an aftercooler after the air compressor to reduce the temperature.
	The bypass valve is open.	- Be sure to use the dryer with the bypass valve fully closed.
	Drain is not discharged from the auto drain.	- Check that the drain tube is not trapped or bent. - Check the auto drain. - Ensure that the ball valve is opened. - Use the product within the specified pressure range.
	Large fluctuation (pulsation) of compressed air	- Install an air tank. - Avoid intermittent operation.
	- Residual drainage in the air dryer splashes over when the unit is re-started.	- Install a filter on the outlet of the air dryer. - Blow the unit with air to eliminate the residual drain after stopping or re-starting the operation.
Large pressure drop	The piping converges downstream of the dryer with a different air line that does not have a dryer.	- Install a dryer in the line where this product is not installed. - Separate the two lines so they do not converge.
	The valve in the inlet/ outlet piping is not fully opened.	- Be sure to fully open the IN and OUT valves.
	- The air filter in the compressed air piping is blocked.	- Replace the filter element. (Refer to the operation manual for used equipment).

6.2 Reset the Thermal relay and High Pressure Switch

When the lamp goes off and the compressor stops during operation, the thermal relay or high voltage pressure switch has activated to protect the compressor for refrigeration. It is necessary to reset it manually. The position of the thermal relay and high pressure switch can be checked among the electrical parts by removing the front panel.

Refer to the Chapter 6.1 Troubleshooting to eliminate the cause of activation of the thermal relay or high voltage pressure switch.

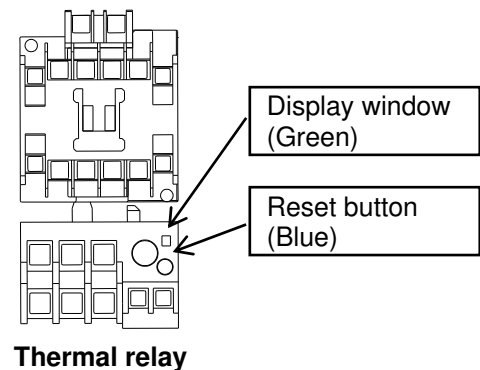


WARNING

Turn off the switch with lamp and shut off the power supply to the product before removing the panel.

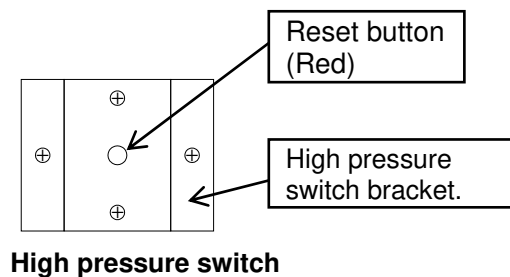
Reset the thermal relay (for IDF240D-3-W only)

- 1) Turn on the black (stop) switch of the product.
- 2) Remove the front panel.
There is a thermal relay (See Figure on the right)
- 3) Make sure that the green bar appears in the display window of the thermal relay.
- 4) Press the blue reset button. Confirm that green bar is shown in the display window.
- 5) Mount the front panel.
- 6) Operation restarts by turning on the white (operation) switch.



Reset the High Pressure Switch

- 1) Turn on the black (stop) switch of the product.
- 2) Remove the front panel.
There is pressure switch for high pressure (Figure on the right)
- 3) Press the red reset button.
- 4) Mount the front panel.
- 5) Operation restarts by turning on the white (operation) switch.



Chapter 7 Documents

7.1 Specifications

Item		Models	IDF190D-3-W	IDF240D-3-W
Air flow capacity m ³ / min	Standard condition (ANR) ^{Note 1)}	50Hz	32	43
		60Hz	38	50
	Compressor inlet condition ^{Note 2)}	50Hz	34	46
		60Hz	40	53
Rated value	Inlet air pressure MPa		0.7	
	Inlet air temperature °C		40	
	Cooling water pressure MPa		0.2~0.98	
	Cooling water temperature °C		32	
	Cooling water flow rate L/min		80	90
	Pressure drop at cooling water MPa		0.05	0.05
	Note 4)	Cooling tower performance ^{Note 9)}	kW(RT) 28.5 (6.3)	
Operating range	Fluid		Compressed air	
	Inlet air temperature °C		5 to 50	
	Inlet air pressure MPa		0.15 to 0.97	
	Note 3)	Ambient temperature (Humidity) °C	2 to 40 (Relative humidity 85% or less)	
Electrical specifications	Power supply ^{Note 5)}		3-Phase 200 VAC (50Hz), 200/ 220 VAC (60Hz)	
	Operation current ^{Note 6)} 50/60Hz 3-phase 200V	A	17.3	26.1
			17.9	26.4
	Power consumption 50/ 60Hz, 3 phase 200V	kW	4.6	6.0
			5.6	7.3
Earth leakage breaker capacity ^{Note 7)} (Sensitivity current 30mA)		A 50		
Cooling method of the condenser			Water-cooled type	
Air reheater / after cooler			Second class pressure vessel	
Refrigerant			R407C (HFC)	
Amount of refrigerant to be filled		kg	2.25	4.5
Auto drain			ADH4000-04	
Port size			80A (3B) JIS10KFF flange	100A (4B) JIS10K flange
Weight		kg	450	660
Coating color			Body panel: White Base: Black	
Applicable air compressor output (as a guideline) (for screw type)		kW	190	240

Note 1) Air flow capacity in the standard condition (ANR) (20 °C, atmospheric pressure, relative humidity of 65 %).

Note 2) Air flow capacity converted by the compressor intake condition [32°C, Atmospheric pressure, and 75% relative humidity]

Note 3) The operating range does not guarantee use with normal air flow capacity.

- Note 4) If the operating conditions are different from rated, select the product model according to the selection method specified in the catalogue.
- Note 5) For the power supply voltage, refer to 'How to Order' in the catalogue.
- Note 6) These values are reference values under rated conditions and are not guaranteed. - Do not use these values for the thermal setting values etc.
- Note 7) Products other than Option R are not equipped with an earth leakage breaker. Purchase an appropriate earth leakage breaker separately.
- Note 8) If the product is subjected to a short power outage (including voltage sag), it may take a long time to resume normal operation or be unable to restart normally due to the protective equipment triggered after the power is recovered.
- Note 9) 1RT=4.535kW

7.2 Refrigerant and GWP


Refrigerant name	Global Warming Potential (GWP)	
	Regulation (EU) No 517/2014 (IPCC AR4 standard)	Act for Rationalized Use and Proper Management of Fluorocarbons
R407C	1,774	1,770

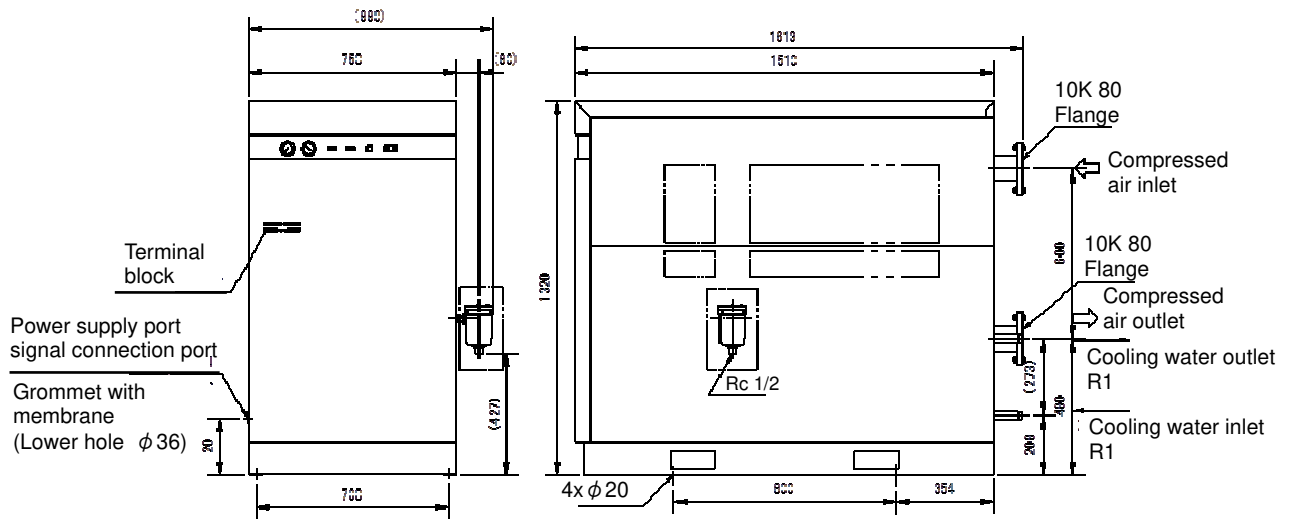
Note 1: The product contains greenhouse gas.

Note 2) For information on the enforcement of the Act on Rational Use and Proper Management of Fluorocarbons, please visit our website below. [SMC's website]: <https://www.smcworld.com/products/ja/freon/>

7.3 Dimensions


【IDF190D-3-W】

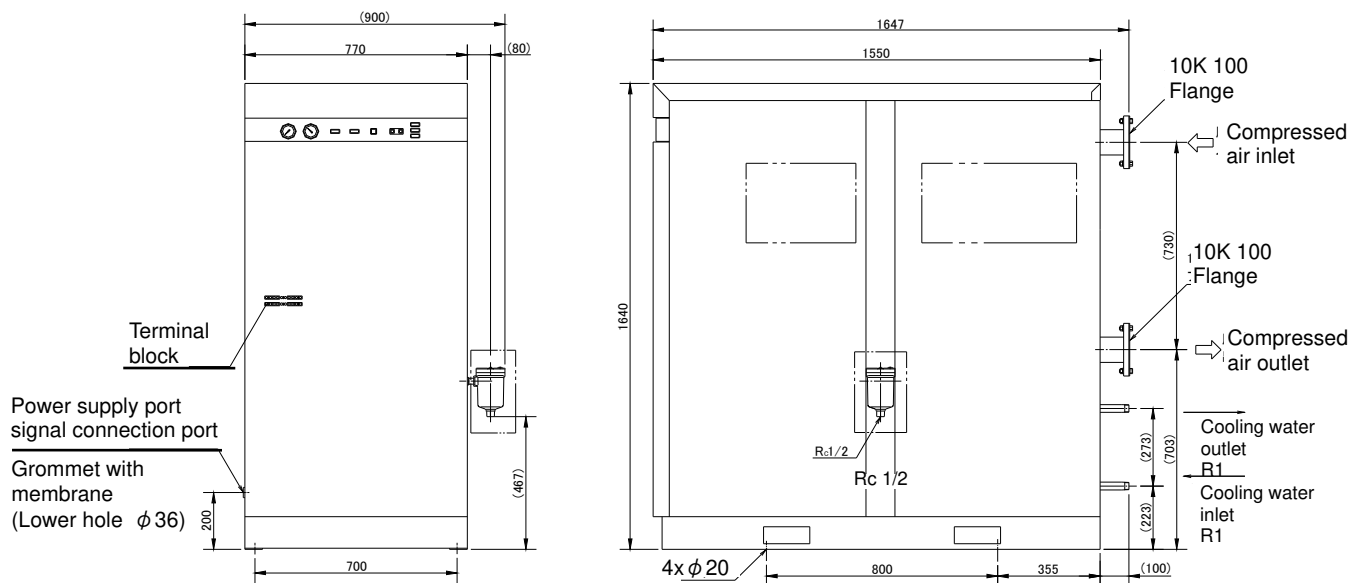
 Parts marked with square brackets are included in the package



* Auto drain is included in the package. It must be installed by the customer.

【IDF240D-3-W】

 Parts marked with square brackets are included in the package

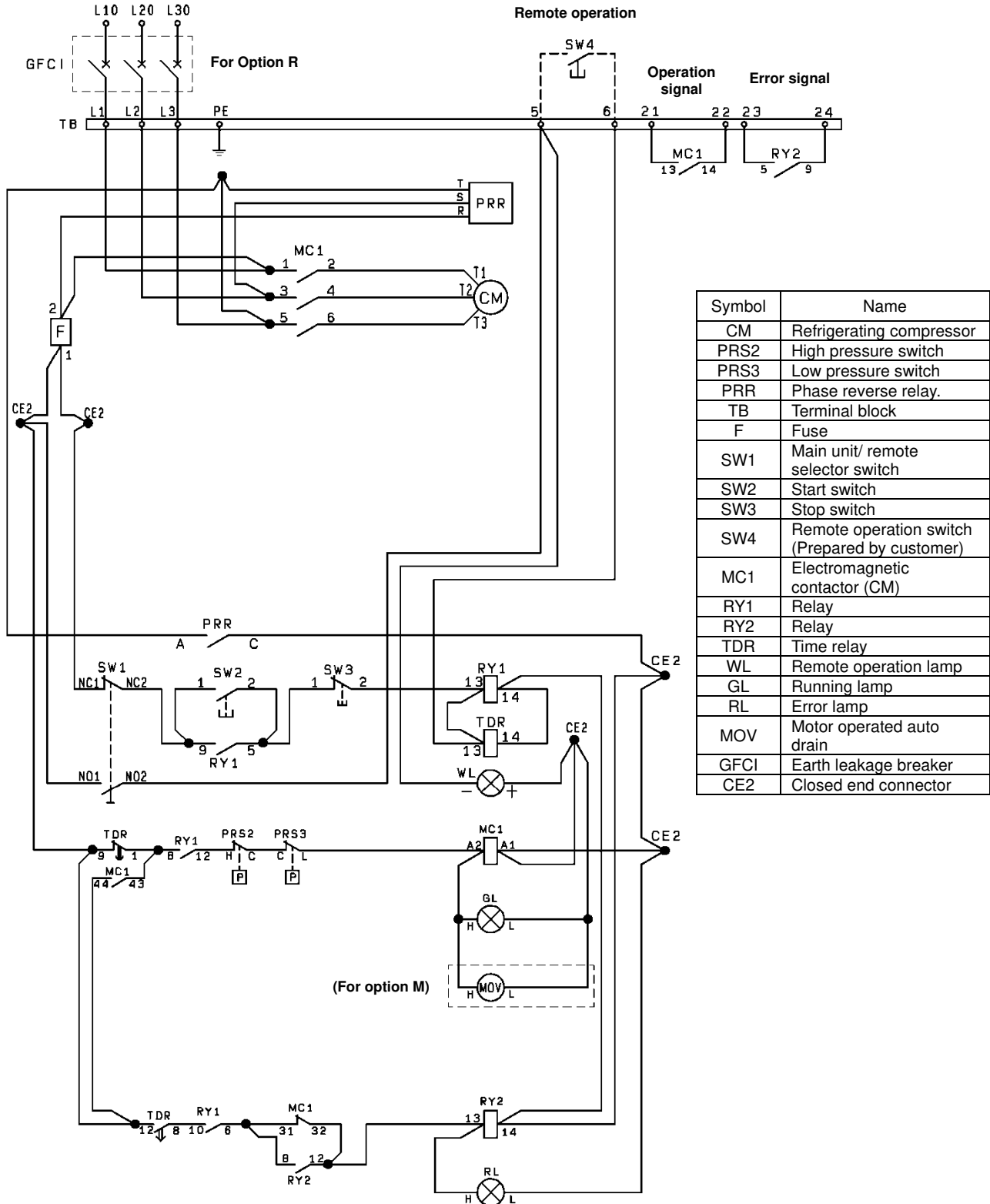


* Auto drain is included in the package. It must be installed by the customer.

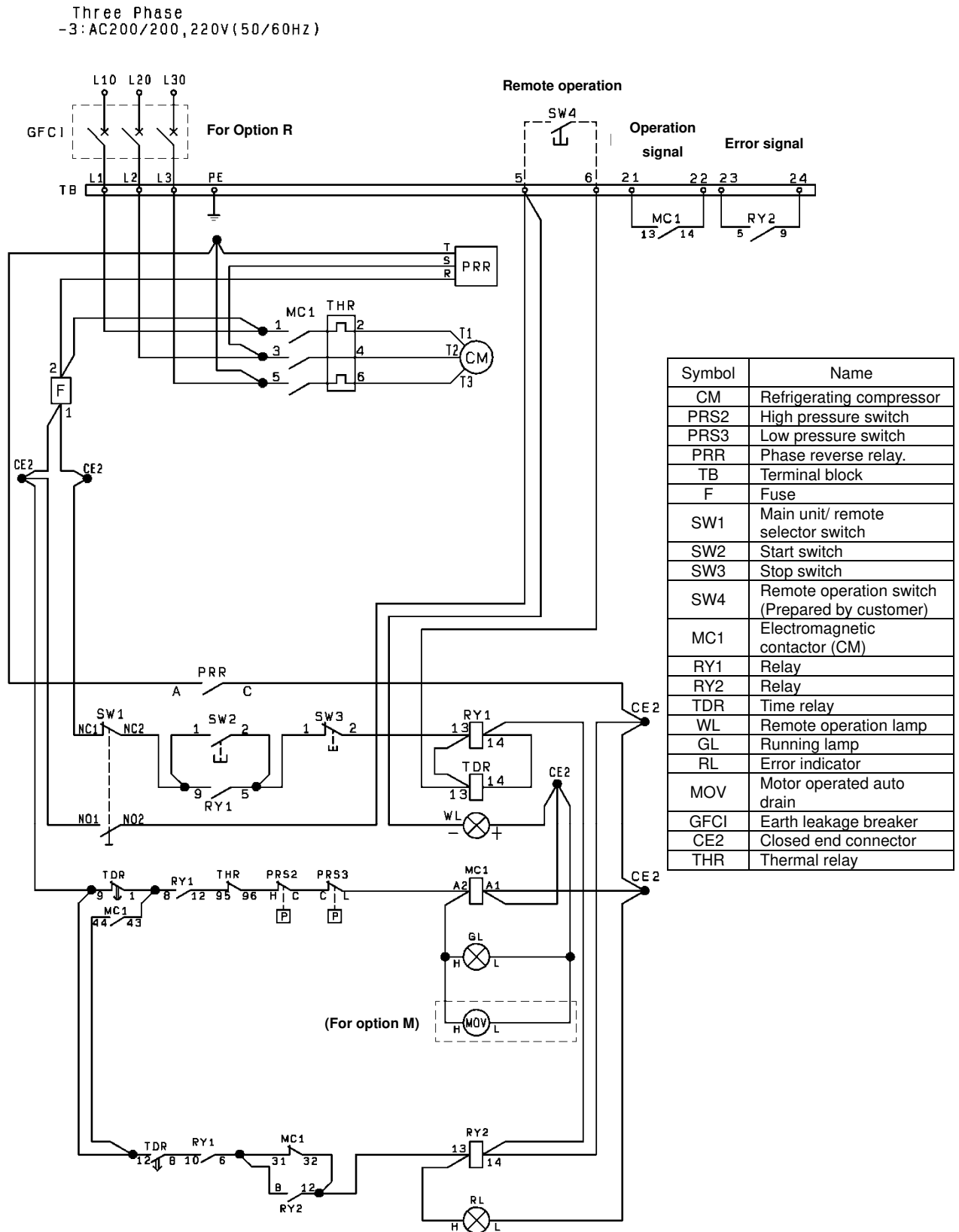
7.4 Electrical circuit diagram

■IDF190D-3-W

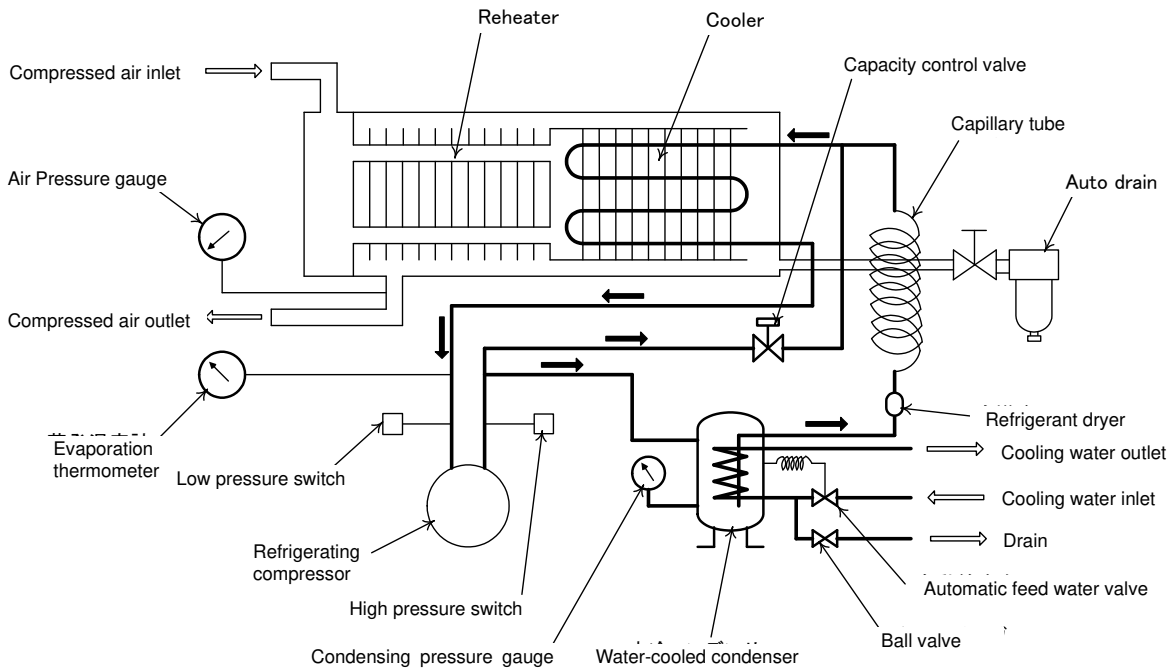
Three Phase
 -3: AC200/200, 220V (50/60Hz)



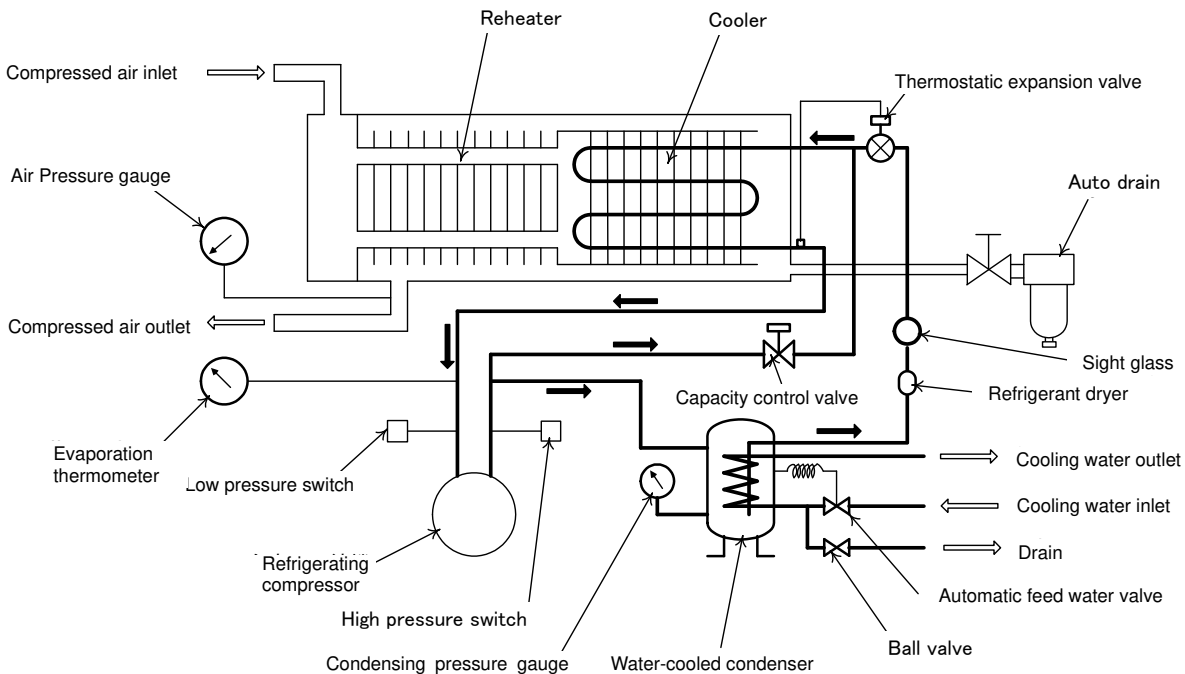
■IDF240D-3-W



7.5 Air and refrigerant circuits and functions



IDF190D-3-W Compressed Air and refrigerant circuits



IDF240D-3-W Compressed Air and refrigerant circuits

Air circuit

The humid hot air that enters the air dryer first goes into the reheater, and exchanges its heat with dehumidified cold air to pre-cool it. Then, the air enters the evaporator, where it releases its heat to a cold HFC, and is dehumidified and cooled further to let moisture separate. Finally, the air exchanges heat with the hot air coming to the air dryer and its temperature increases higher, and it leaves the air dryer as warm, dry air.

Refrigerant circuit

The fluorocarbon gas in the refrigerant circuit is compressed by the compressor and cooled by the water-cooled type condenser to become liquid. When passing through the capillary tube or the thermostatic expansion valve, the HFC gas is regulated and its temperature decreases. While passing through the cooler part, it evaporates rapidly, taking the heat from the compressed air, and is sucked in by the compressor. The volume control valve opens when the compressed air has been cooled sufficiently, and prevents condensed water from being frozen by excessive cooling.

Coolant water circuit

Automatic water supply valves are installed in the cooling water inlet side of the water-cooled condenser. The valve is appropriately controlled the cooling water in response to variations in load, and serves to maintain the condensing pressure constant. At the time of product shipment, it is set as the condensing pressure in the no-load operation state becomes a value in the table below. In addition, it is normal if the range is operating during the condensing pressure in the table below.

Models	Condensing pressure set point	Range of driving of normal condensing pressure
IDF190D-3-W IDF240D-3-W	1.7 +/- 0.1 MPa	1.5 to 1.9 MPa

Chapter 8 Option C

8.1 Specifications

Special epoxy resin is coated on the copper tube surface to improve the corrosion resistance. The special epoxy resin is only applied where the copper tubes are not protected or insulated.

8.2 Precautions for installation and handling

- 1) The epoxy resin minimizes the corrosion of the coated copper tubes against corrosive gas. The corrosive cannot be completely prevented. Therefore, avoid using the product in environment where corrosive gases are present as much as possible.
- 2) Do not scratch the coated surface of the copper tube when removing the panels for maintenance. As the corrosion resistance can be deteriorated from the scratch position.

Chapter 9 Option M

9.1 Safety instructions for use

Refer to the instructions below when handling the product



WARNING

- Before replacing the auto drain, on the compressed air side confirm that the pressure gauge indicates zero.
Do not remove the auto drain with any air pressure remaining internally. If there is residual pressure in the product, there would be great danger of an unexpected accident, such as shooting out of parts when they are being unscrewed.
- When removing the panels, wear protective gloves to prevent injuries.
- There is the possibility of contacting the condensate during the auto drain maintenance work. Follow enduser procedures ensure safety of operator. (example. 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.



WARNING

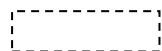
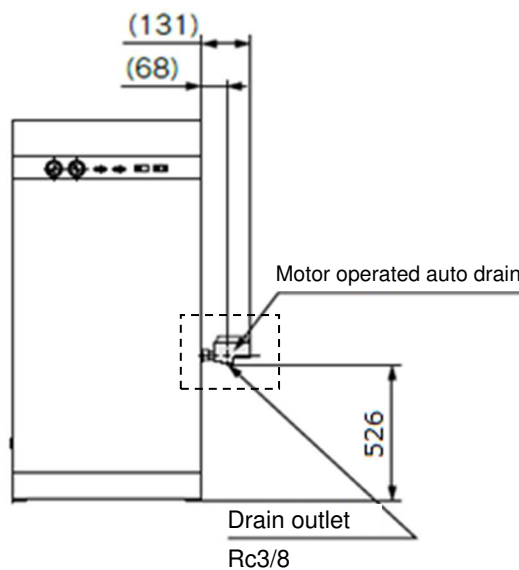
- All electrical work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.
- Be sure to shut off the user's power supply. Wiring with the product energized is strictly prohibited.
 - Ensure a stable power supply with no surge.
 - Mount the correct electric leakage breaker of the specified leakage capacity and load capacity to prevent electric shock and burning of the compressor motor.
 - Use a power supply suitable for the specifications of the product.
 - Be sure to connect the ground connection.
 - NEVER connect the ground to water line, gas pipe or lightning conductor.
 - Do not plug too many leads into a single socket. That causes exothermic heat or fire.
 - Do not modify the internal electrical wiring of the product.
 - For use in Europe, install a breaker compliant with applicable IEC standards to the power supply of the product.

9.2 Specifications

Motor type auto drain (ADM200) is installed instead of the float type auto drain (standard).

Table 1.

Item	Models
	IDF190/ 240D-3-MW
Product number	IDF-S0511
Maximum operating pressure	1.0MPa
Fluid	Compressed air
Operation cycle	4 cycles per minute
Operating time	2 sec/ cycle
Power supply	AC200V (50/ 60Hz)
Power consumption	4W



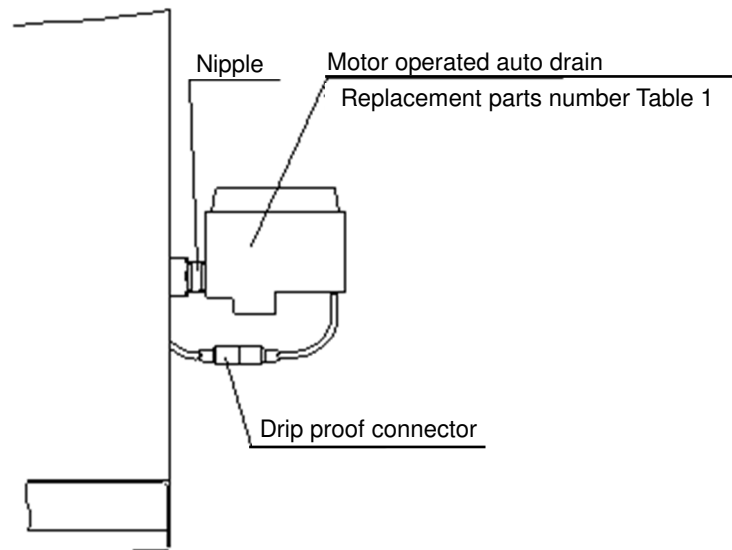
Parts in the square of dashed lines are included as accessories.

9.3 Installation of Motor type Auto Drain

- 1) Screw the nipple and the motor type auto drain (drain inlet port hex size: 30mm) into the connection port of this product in order. Mount the auto drain vertically while facing the drain port downwards. (Allowable inclination difference in the vertical direction is 5°)

Note 1) Apply sealant tape or sealant to fit the barrel nipple and long nipple. Tightening torque: 28 to 30N·m

- 2) Screw-in an elbow union (size: 17mm) to the drain outlet port and mount the drain tube.
- 3) Connect the two wires from the auto-drain to the two wires from the product. Drip proof connectors are used, which can be connected by hand. Ensure they are firmly connected.




9.4 Electrical circuit diagram

Refer to 7.4 Electrical circuit diagram (page 7-4 and 7-5) for electric circuit.

Chapter 10 Option R

10.1 Safety instructions for use

Refer to the instructions below when handling the product.

 WARNING
<p>All electrical work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.</p> <ul style="list-style-type: none"> - Be sure to shut off the user's power supply. Wiring with the product energized is strictly prohibited. - Ensure a stable power supply with no surge. - Use a power supply suitable for the specifications of the product. - The equipment should be grounded for safety. <p>Earth leakage breaker does not operate correctly without grounding.</p> <ul style="list-style-type: none"> - 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. That causes exothermic heat or fire. - Do not modify the internal electrical wiring of the product.

10.2 Specifications

An earth leakage breaker is installed in the product. The customer's power supply is connected to the primary side of the earth leakage breaker, and not directly to the terminal block of the standard product. The earth leakage breaker is located in the front panel.

Product No.	Earth leakage breaker specification
IDF190/ 240D-3-RW	Breaker capacity: 50A, Sensitivity current 30mA

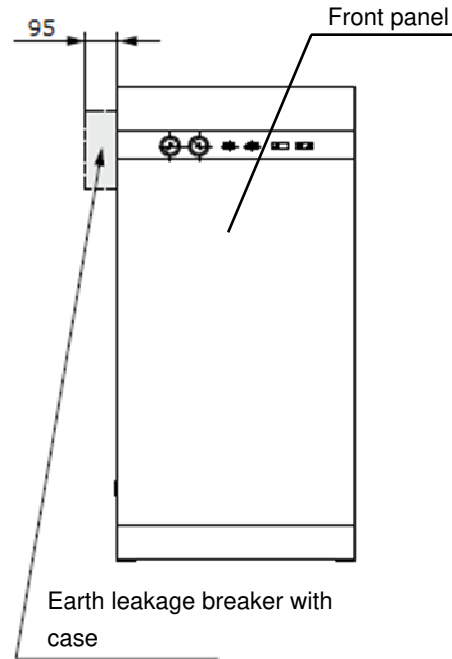
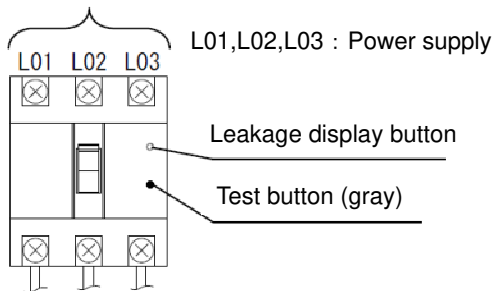
10.3 Connection of power supply

Connect the power cable according to the procedure below.

- 1) Remove the case of the earth leakage breaker.
- 2) Insert the power supply cable prepared by customer into the rubber grommet and draw the power supply cable close to the earth leakage breaker through the base hole.
- 3) Connect the power cable to the earth leakage breaker terminal.

Terminal connection screw: M5 (tightening torque: 2.6Nm)
Crimp terminal width: 9.5mm or less
Applicable wire: 1.25mm² or greater

(to be connected to the user's equipment)



- 4) Connect the ground line.
Connect to the M4 screw on the right of the earth leakage breaker (specified by ground label)
Applicable crimp terminal → 1.25-4
- 5) Reinstall the case of the earth leakage breaker.

10.4 Handling Precautions of the Earth Leakage Breaker

- 1) When the breaker is tripped, please turn off the power supply and contact our service office.
 - White button (indicates earth leakage) has popped up → Earth leakage
 - White button (indicates earth leakage) has not popped up → Over current
- 2) Perform an operation check of the earth leakage breaker every month by pushing the gray button (test button) with the breaker and the black switch (stop switch) ON. The earth leakage breaker should trip when the test button is pressed. When the earth leakage breaker malfunctions, it does not trip.

10.5 Electrical circuit diagram

Refer to 7.4 Electrical circuit diagram (page 7-4 and 7-5) for electric circuit.

Chapter 11 Inspection record

11.1 Inspection record

We recommend keeping the inspection record for maintenance or service.

Product No.	Description	Contents of check	Date

Revision
Rev A : Apr,2023

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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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