



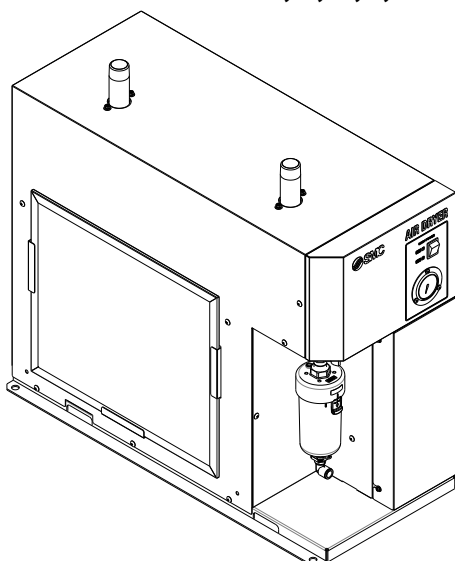
Operation Manual

PRODUCT NAME

Refrigerated Air Dryer

MODEL / Series

IDFC60-23-C,L,R,T,V
IDFC70-23-C,L,R,T,V
IDFC80-23-C,L,R,T,V
IDFC90-23-C,L,R,T,V



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 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 the Refrigerated Air Dryer, 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 B 8370:Pneumatic fluid power - General rules relating to systems

- 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 partially or in its entirety for the use by a third party without prior permission from SMC.
- The Operation Manual can be downloaded from the SMC URL below. URL:<http://www.smcworld.com/>


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

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Chapter 1 Safety Instructions






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

1.1 Before Using 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 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 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 the work place 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. In this case, turn off the switch of the product and reset the protection circuit referring to 6.2 Reset the Thermal relay and High Pressure Switch. It is possible that the product 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

The instructions given in this manual aim to ensure that the product is operated in a safe and correct way. This will prevent injury to operators and damage to the product. These instructions are grouped into three categories, "Danger", "Warning" and "Caution", which indicate the level of hazard, damage and also the degree of emergency. Contents with these signs are important instructions concerning safety. Confirm where those signs are, and read and comprehend notices and cautionary notices fully before handling. "**DANGER**", "**WARNING**" and "**CAUTION**" signs are in order according to severity (DANGER> WARNING> CAUTION). The meanings of these signs are as follows.


 DANGER
<p>"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.</p>
 WARNING
<p>"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.</p>
 CAUTION
<p>"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.</p>

1.2 Hazard classifications/ 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 incidental device.- 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 person who has sufficient knowledge and experience about the product and its incidental device.


1.2.1 Hazard of Electricity

 WARNING
<p>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.</p>

1.2.2 Hazard of Hot Surface

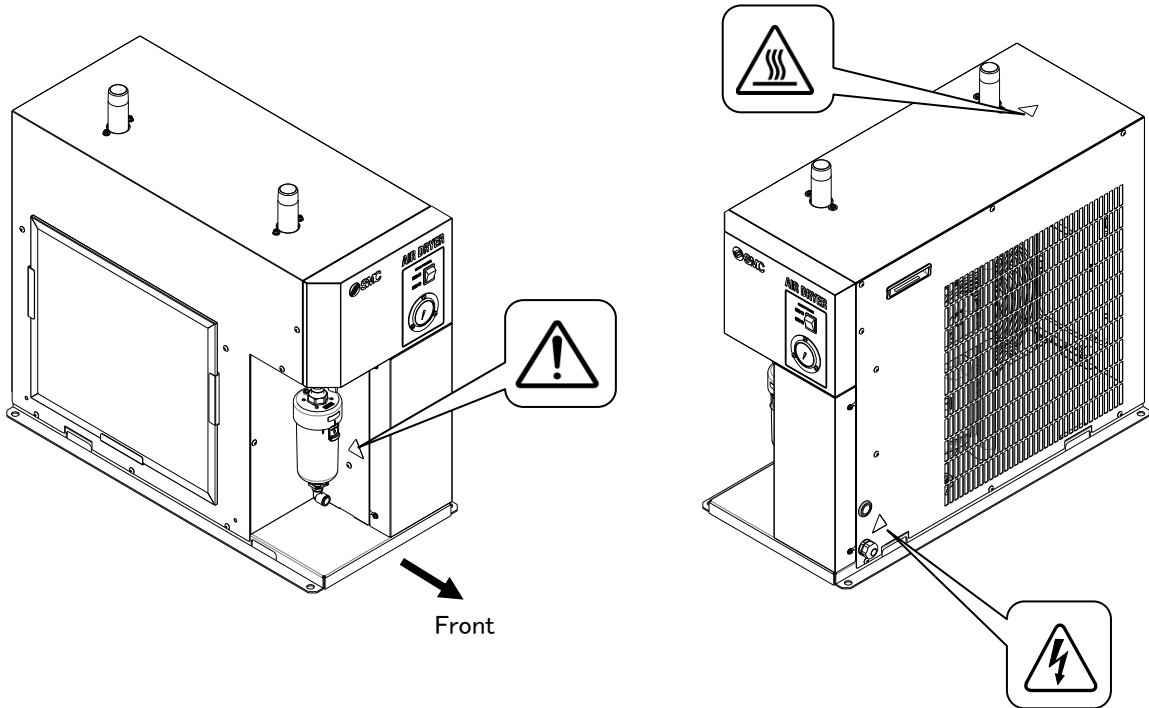
 WARNING
<p>The product has surfaces that can reach high temperatures during operation. What is more, there is also the danger of burn injury due to remaining heat after the power supply is cut. Therefore, wait until the temperature of hot parts become 50°C and below.</p>

1.2.3 Danger of Compressed Air Circuit

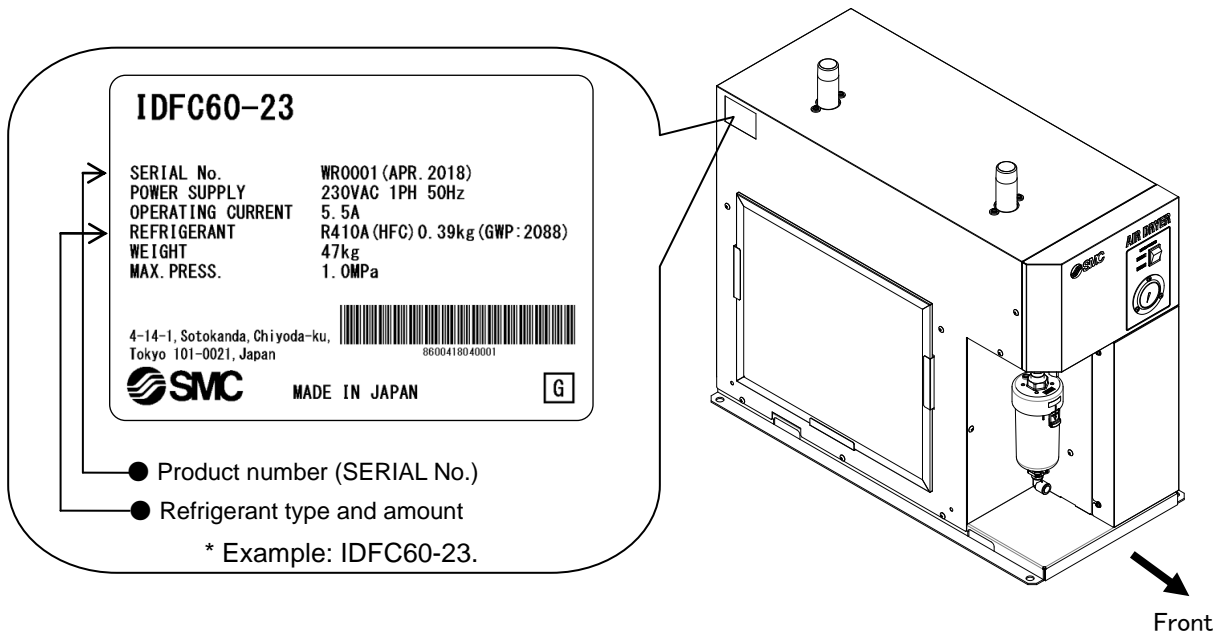
 WARNING
<p>Before replacing or cleaning parts, be sure to bleed compressed air remaining inside of the product until the gauge indicates "0". If there is no relief to the pressure, high pressure can propel objects at high velocity when unscrewing parts and cause injury.</p>

1.2.4 Positions of Hazard Warning labels

 WARNING
- Confirm the positions of the hazard warning labels.



1.2.5 Product label



Structure of the product number **W R 0001 (2018 April)**

W			R			0001
Year	Symbol	Note	Month	Symbol	Note	Serial No.
2018	W	Repeated from A to Z in alphabetical order	1	o	Repeated from A to Z in alphabetical order, with o assigned for January and Z for December.	-
2019	X		2	P		
2020	y		3	Q		
2021	Z		4	R		
↓	↓		↓	↓		

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

- This product uses Fluorocarbon (HFC) as a refrigerant.
- This product is specified by "Class 1 Act on Rational Use and Proper Management of Fluorocarbons 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 qualified recycle agency to dispose of collected refrigerant. Only personnel that have the required knowledge and experience about the equipment and incidental device should do the handle 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 explained on page 1-4.



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 devices should perform the collection of the refrigerant oil.
- Only maintenance personnel or qualified people 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 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 SMC's 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 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 considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.

If anything is unclear, contact your nearest sales branch.



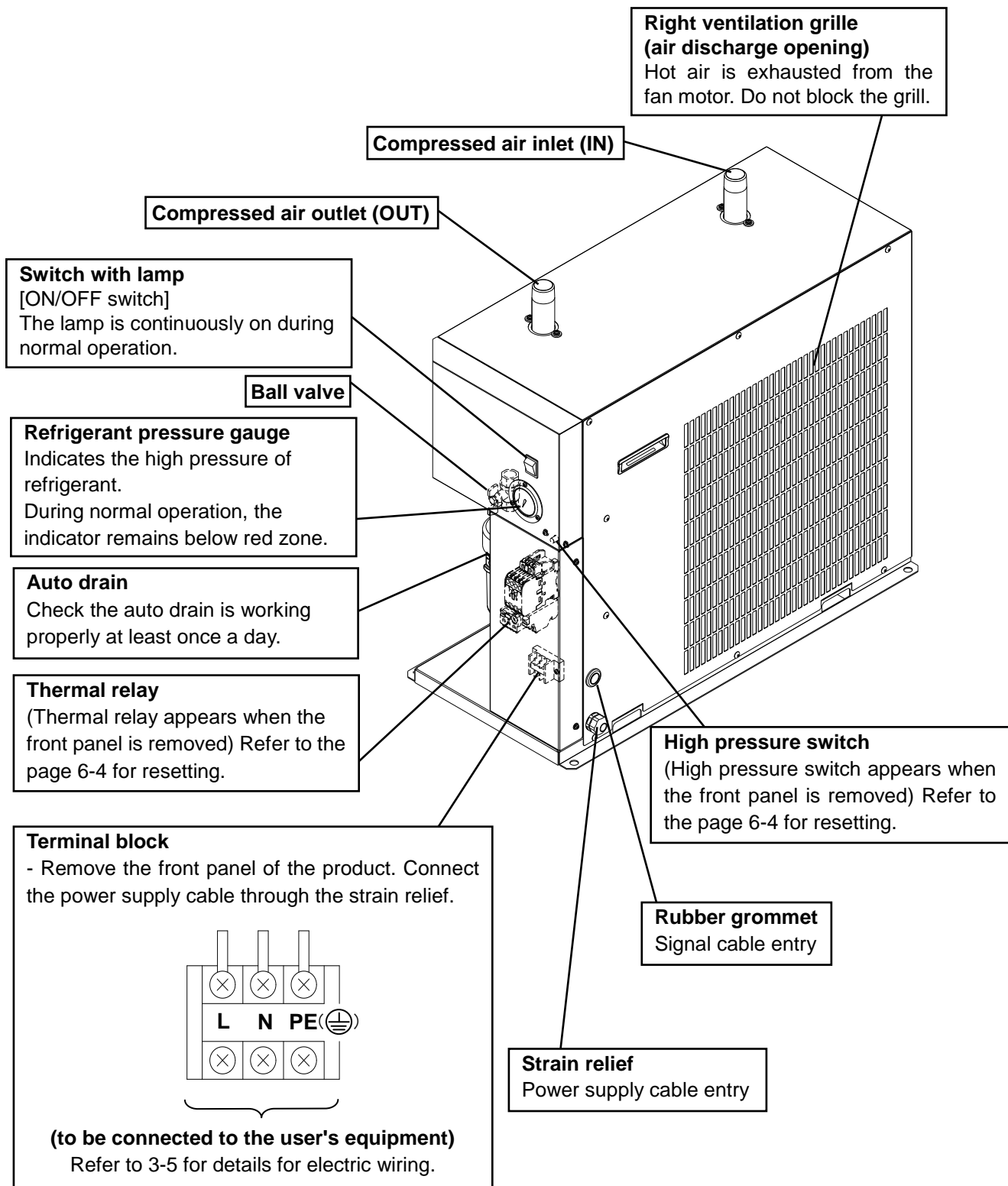
CAUTION

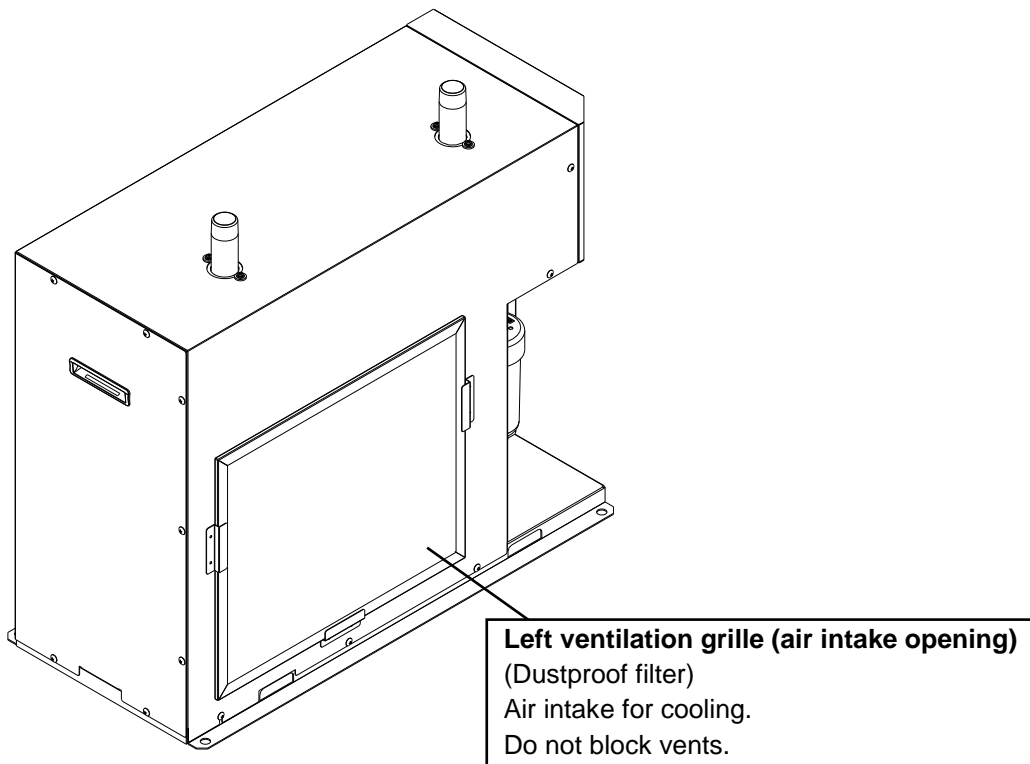
SMC products are not intended for use as instruments for legal metrology.

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.



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.

- When moving the product, lift with care from the base so that the product is not on its side with careful attention to tipping.
- Do not transport the product lying down on its side, or the product will be damaged.
- Do not suspend the product.
- Do not mount the air filter, etc. to the fitting for air inlet and outlet when transporting. If they have to be mounted, support the part with a bracket to avoid vibration during transportation.



WARNING


This product is heavy. Follow above cautions to avoid risk during transportation. As the product weighs more than 50kg incl package, move the product by a forklift. Moving by forklift should be done by personnel who have the licenses.

3.2 Installation

3.2.1 Environment

Do not use in the following environments, as it may lead to a breakdown. Potential malfunction or damage to the product may occur if these instructions are disregarded.

- Avoid locations where the air dryer will be in direct contact with wind or rain. (Avoid locations where relative humidity is 85% or more)
- 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: 20 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: 600 mm
 - Back: 600 mm
 - Top: 600 mm
 - Right side: 600 mm
 - Left side: 600 mm
- 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.**

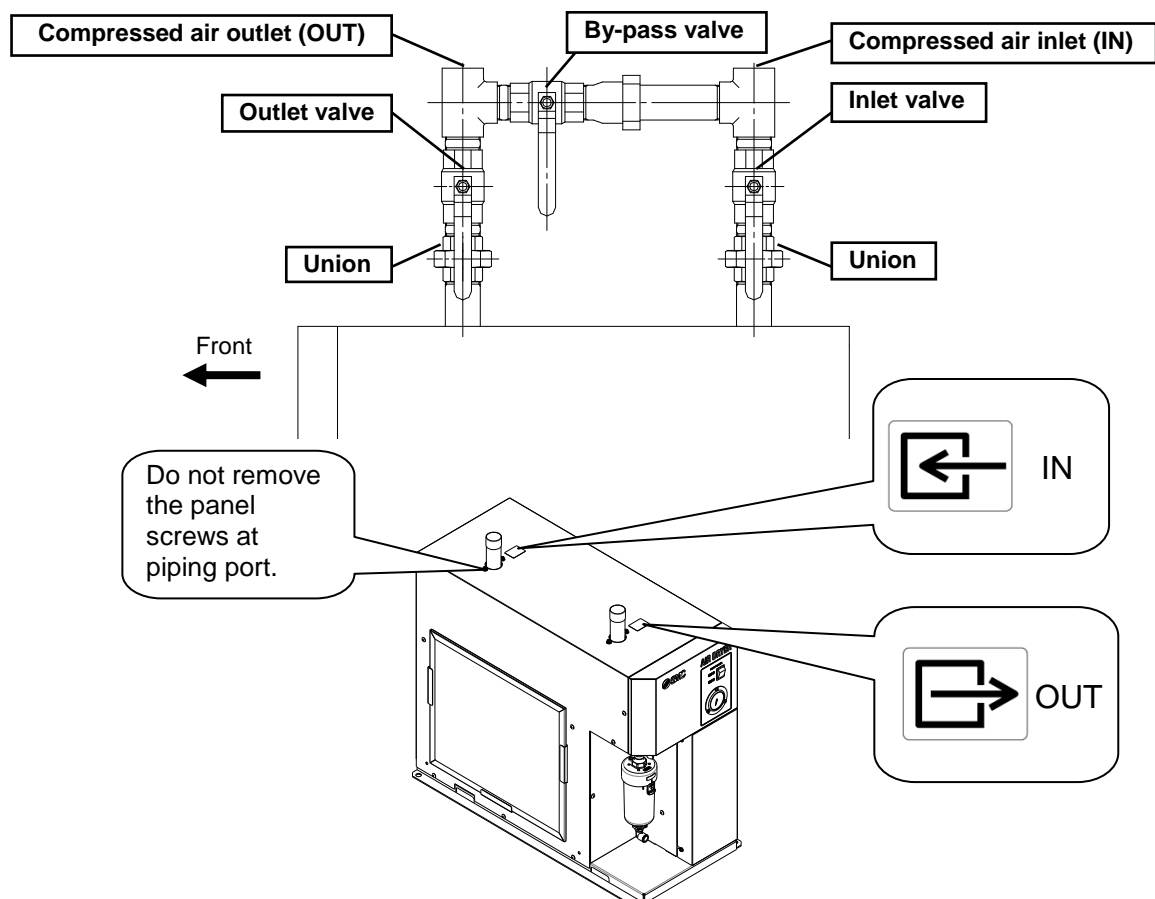
3.2.2 Anchorage

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

Product No.	Product name	QTY.
IDF-AB500	Set of foundation bolts	1 (4pcs./ set)


3.2.3 Air piping


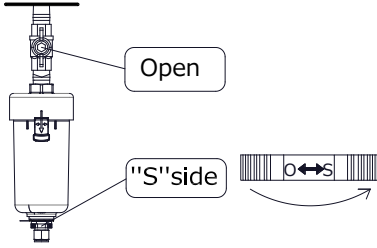
- Connection of the inlet and outlet of compressed air should be made removable by using union and so on.
- When an air fitting is connected with the body of the product, hold the pneumatic piping at the body with a pipe wrench and tighten.
- Avoid applying the piping weight directly to the dryer. When parts including air filter are mounted to the fitting of the inlet and outlet for compressed air, support the parts with the bracket to prevent force being applied to the product.
- Be careful not to let the vibration of the air compressor transmit.
- The piping surface temperature will be the same as the inlet temperature of the compressed air. Wrap the piping with insulator when the surface temperature exceeds 60°C.
- When the inlet temperature of the compressed air exceeds 65°C, install the aftercooler after the air compressor or decrease the temperature of the place to install the air compressor to keep the temperature at 65°C or lower.
- 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 made it possible to do maintenance without stopping the air compressor.
- Metal flexible tube for air inlet and outlet piping may make noise. Please change the piping to steel tube.
- If rapid pressure fluctuation or flow change occurs, install a filter on the dryer outlet to prevent drain from splashing.
- Depending on the operating conditions, condensation might occur around the outlet piping surface. Wrap insulator around the piping to avoid condensation.

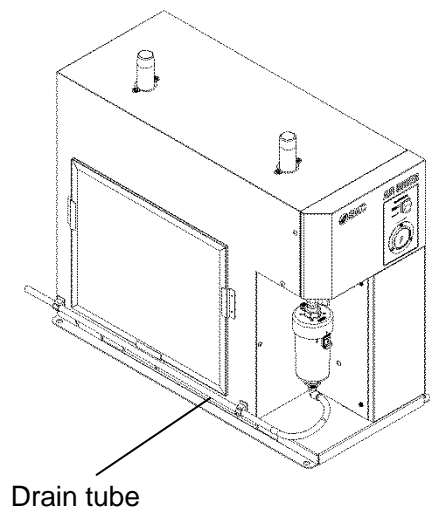
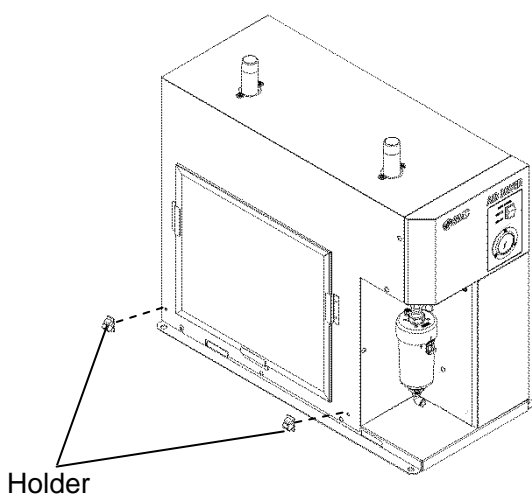


3.2.4 Drain tube


- A drain tube of 12mm O.D. is included as an accessory. The outlet end of the tube is released to atmosphere and lets the drain flow through the tube.
(When customers prepare the drain tube, keep its length at 5m or less and the I.D. at 8mm or larger for correct operation of the auto drain)
- 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.
- Prevent the drain tube from having a rise in its piping.
- Do not bend or crush the drain tube. When installing the product, take care not to place the product on the drain tube.
- For piping the drain tube to the back of the dryer, use the holder included as an accessory.

 WARNING
<ul style="list-style-type: none">- For handling the condensate drain, follow the safety guide line and wear protective goggles, apron and gloves.- When oil is contained in the condensate drain, dangerous substances may be present. Handle it following the bylaw or regulation of local government.

 CAUTION
<ul style="list-style-type: none">- During the dryer operation, keep the ball valve open at all times. When the ball valve is closed, the condensate drain cannot be discharged.- Keep the drain cock at "S" side. If the drain cock is at "O" side, compressed air continues to bleed.




3.2.5 Electrical wiring

 WARNING
<ul style="list-style-type: none"> - Only qualified personnel should do electrical wiring work. - Cut off the power supply for safety before the wiring. Wiring with the product energized is strictly prohibited. - Use a power supply suitable for the specifications of the product. - Supply power from a stable place, which is free from the effects of any surge. - Do not plug too many leads into a single socket. It can cause a fire. - Supply power from a system with an emergency stop equipped. - To avoid electric shock and burnout of the compressor motor, select the earth leakage breaker with the correct sensitivity of leakage current and load capacity and mount to the supply power side referring to the Chapter 7.1 Specifications. - Install the breaker correctly, so that all power can be shut off and easy access to the operation panel is realized. - Install a breaker compliant with applicable local safety regulations and standards. - The equipment should be grounded for safety. - Add an allowance to the length of the grounding cable so that external force is not applied to it. - Connect the grounding cable first before connecting other cables, and remove it last when removing cables. - Do not connect the earth to a water pipe, a gas pipe, or a lightning rod. - 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.

Power supply cable specification

- Prepare the power supply cables below.
- Approx. 0.2m of cable is necessary for wiring in the product.

IDFC60-23	IDFC70-23	IDFC80-23	IDFC90-23
16AWG (1.25mm ²)		14AWG (2.0mm ²)	
Cable O.D. Approx. 9 to 11mm.		Cable O.D. Approx. 18 to 23mm.	

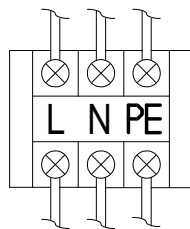
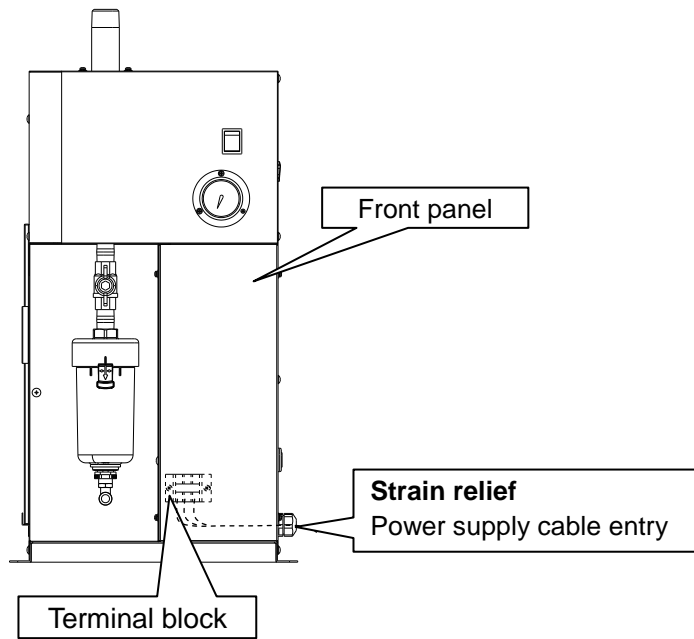
Power supply

- Connect the power cable and grounding cable to the terminal block. Use round crimp terminal for connection terminal.

	IDFC60-23	IDFC70-23	IDFC80-23	IDFC90-23
Terminal screws	M3.5		M4.0	
Applicable crimp terminal	1.25-3.5		2-4	
	(Terminal width 8.5mm or less)		(Terminal width 9.5mm or less)	


Wiring procedure

- (1) Remove the front panel.
- (2) Pass the cable through the strain relief to connect to the terminal block. (refer to the label on the terminal block)
 - M3.5 Screw tightening torque : 1.0 to 1.3N·m
 - M4.0 Screw tightening torque : 1.4 to 2.0N·m
 Do not touch any equipment other than the terminal block during wiring.
- (3) Mount the front panel back.



[Terminal block]


3.3 Cautions about Reinstallation

	CAUTION
<p>Only someone who has enough knowledge about the product and incidental devices should reinstall it in another place.</p>	


If you move the product and reinstall it into another place after some operations (including trial running), all installation instructions in chapter 2 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"> - Only qualified personnel should do the wiring work. - Cut off the power supply for safety before the wiring. Wiring with the product energized is strictly prohibited. 	

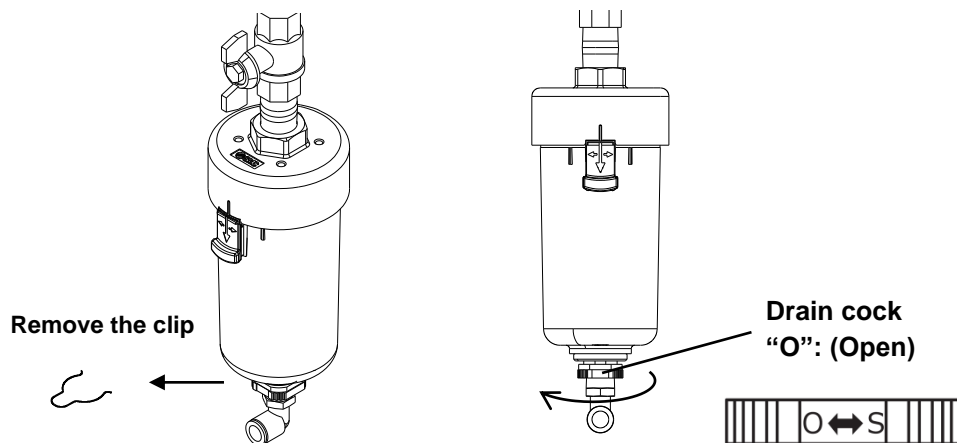
Removal of air piping

	WARNING
<ul style="list-style-type: none"> - Only qualified personnel should do the wiring work. - 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 open the bypass piping valve when compressed air is needed.
- 2) Close the compressed air inlet and outlet valves.
- 3) Ensure that the ball valve of the auto drain is opened.
- 4) Remove the drain cock holding clip.
- 5) Rotate the drain cock of the auto drain to "O" side, and exhaust the compressed air from the product.



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 on a level surface.
- Make sure the product is fixed properly with anchor bolts.
- Do not place heavy objects on the product or 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.

4.2 Operation

Start operation according to the procedure below.

- 1) Turn on the main power supply breaker. Turn on the switch with lamp.
- 2) The operation lamp turns on. After a moment, the cooling fan will rotate, and hot air will be exhausted from the ventilation outlet.
- 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 fan keeps starting and stopping depending on the compressed air and ambient temperature conditions, but the compressor keeps operating continuously, and the evaporation thermometer stays within the green area.
When the refrigerant pressure gauge indicator is in the area higher than 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

- Frequently switching ON and OFF leads to malfunction.
- The auto drain is normally open and the valve closes when the air pressure is 0.1MPa or more. When the IN side valve starts to open, air bleeds from the drain outlet until the pressure reaches 0.1MPa. 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 a sudden change of pressure or flow speed. Do not use the product where these conditions are present.

4.3 Stop

- 1) Turn off the switch with lamp.
- 2) The lamp 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 abnormality occurs. Turn off the switch with lamp and shut off the breaker of the power supply.

- 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 odour from the product.

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

- When the product is not used for longer than 24 hours, turn off the operation switch or power supply for safety and saving energy. It is recommended to discharge pressure 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.

Chapter 5 Checks and Maintenance



WARNING

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



DANGER

- Cut off the power supply upstream when removing the panel.
- Before replacing or cleaning parts, be sure to bleed compressed air remaining 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 the operation is stopped, electricity will be applied to the primary line. During the work for primary 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. Guideline: 10 to 15 minutes
- There is the possibility of contacting the condensate during the auto drain maintenance work. Follow the procedure that you define to keep the worker safe.
(eg. Put on protective glasses, 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 lamp is on during operation.
- Confirm that condensate comes out of the drain tube.
- The evaporation thermometer is in the green area.
- 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 Clean the dustproof filter of the ventilation grille


Vacuum or air-blow the filter every month to remove dust and particles of the ventilation grille.

 CAUTION
Wear protective goggles or mask during air blow.

5.2.2 Auto drain maintenance

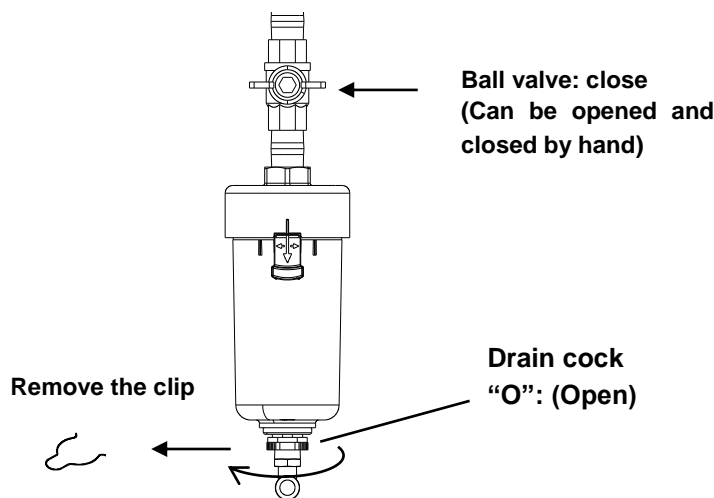
Remove the dust accumulated in the auto drain element and bowl assembly every month. Use neutral detergent for cleaning.

When cleaning does not improve the operation, replace the element and bowl assembly. From the next time, clean them with intervals shorter than a month.

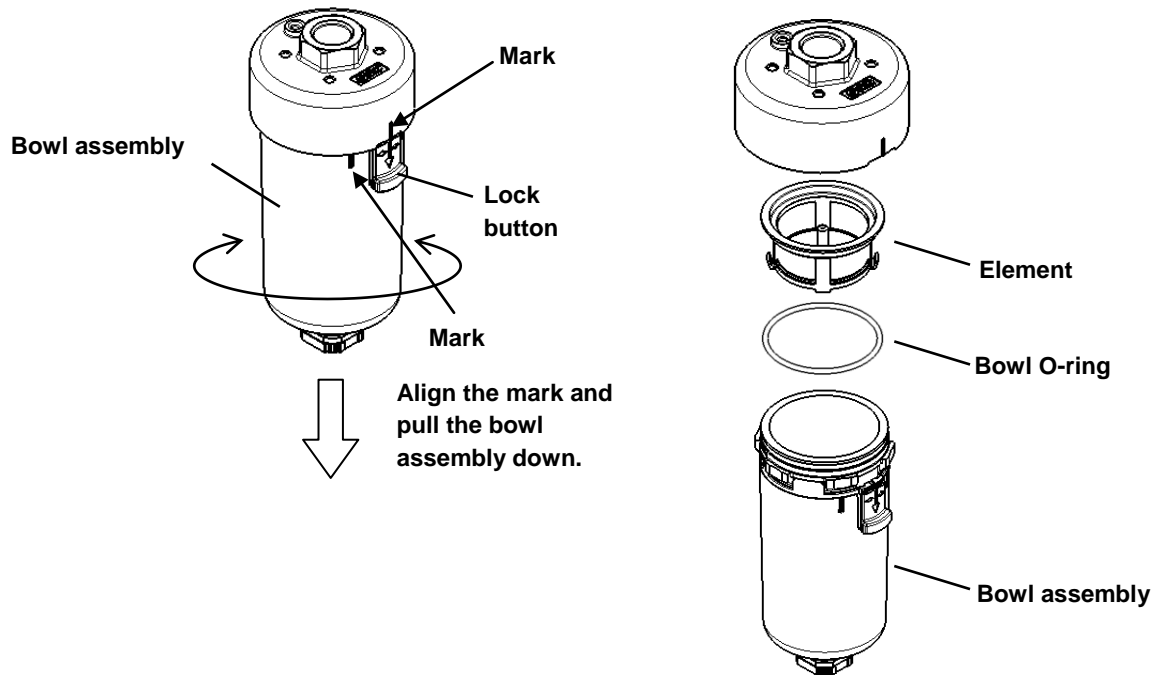
 WARNING
- Be sure to release the residual pressure of the auto drain before starting maintenance. - When the bowl assembly is broken or very dirty, replace it with a new one.

(1) Removal of the bowl assembly

- 1) Turn off the switch with lamp.
- 2) Shut off the earth leakage breaker of the power supply or remove the power supply plug from the socket.
- 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) Close the ball valve on the top of the auto drain.
- 5) Remove the drain tube.
- 6) Remove the clip and rotate the auto drain cock to the "O" side to release the residual air pressure in the auto drain.



- 7) Pull down the lock button of the bowl assembly with your thumb, and rotate the bowl assembly anticlockwise by 30 degrees to align the marks.
- 8) Remove the bowl assembly by pulling down on it.



(2) Mounting of the bowl assembly

- 1) Check that there are no scratches, twisting or adhesion of foreign matter on the bowl O-ring, then thinly apply grease and mount it to the groove of the bowl assembly.
(The grease used recommends Krytox GPL 207 of Du Pont.)
- 2) Return the cleaned element to the bowl assembly.
- 3) Mount the bowl assembly to the body of the auto drain. Rotate it until the lock button stops completely with a click. (Rotate the bowl assembly in the left and right direction lightly to ensure that it will not rotate. If it rotates, re-do this step.)
- 4) Rotate the drain cock to the "S" side and mount a clip.
(Check that the drain cock will not rotate to the "O" side.)
- 5) Mount the drain tube as it was.
- 6) Open the ball valve.

Auto drain product number for replacement

Product No.	Product name	QTY.
AD52-A	Bowl assembly	1
KA00463	Bowl O-ring	1
AD402P-040S	Element	1

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.

Problems	Possible causes	Action
Air dryer does not operate and the running lamp does not turn on, even when the switch is ON.	Power cord is loose or not connected.	- Connect the cord correctly.
	The earth leakage breaker is OFF.	- Please check the earth leakage breaker capacity. - Turn on the earth leakage breaker. If the breaker keeps turning off, please shut off the power supply and contact our service office. Air dryer insulation failure is possible.
	Remote operation signal is OFF. (For option T)	- Check the condition of remote operation signal.
The lamp goes off and the operation stops. (Protection circuit is activated. Reset the protection circuit referring to 6.2 Reset the Thermal relay and High Pressure Switch).	Poor ventilation in installation location. Ambient temperature is too high	- Keep the ambient temperature low by ventilation.
	Ventilation grille is obstructed by a wall or blocked with dust.	- Install so that the ventilation grill is 600mm or more away from the wall. - Clean the ventilation grille every month.
	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)
Operation stops after a while. Operation lamp is ON. (Overload relay of the compressor for refrigeration was activated. Turn of the switch with lamp and wait until the overload relay is automatically recovered).	Poor ventilation in installation location. Ambient temperature is too high.	- Keep the ambient temperature low by ventilation.
	Ventilation grille is obstructed by a wall or blocked with dust.	- Install so that the ventilation grill are 600mm or more away from the wall. - Clean the ventilation grille every month.
	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)
	Restarted operation within 3 minutes after operation stopped.	- Restart operation after 3 minutes passed.

Problem	Possible causes	Action
The refrigerant pressure gauge indicates red zone.	Poor ventilation in installation location. Ambient temperature is too high.	- Keep the ambient temperature low by ventilation.
	Ventilation grille is obstructed by a wall or blocked with dust.	- Install so that the ventilation grill are 600mm or more away from the wall. - Clean the ventilation grill every month.
	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.
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.
	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. - Keep the specified operating pressure range.
	Large pressure fluctuation.	- 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.
	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.
Large pressure drop	The valve in the inlet/ outlet of dryer piping is not fully opened.	- The valve in the inlet/ outlet of the dryer has to be fully opened.
	The air filter in the compressed air piping is blocked.	- Replace the filter element. - Refer to the operation manual for used equipment.
Drain is not discharged even when rotating the drain cock to "O" side of the manual knob.	The drain cock exhaust outlet is clogged.	- Remove the clogging by cleaning the bowl assembly and blowing it with air. Or replace the bowl assembly.


Problem		Possible causes	Countermeasures
Air leakage from the auto drain	Air leaks out from the gap between the bowl and body.	O-ring of the bowl is damaged.	- Replace the bowl O-ring with a new one. When assembling the bowl O-ring, add grease. (Note)
	Air is leaking out of the bowl.	Bowl is damaged.	- Replace the bowl assembly. Or replace with a metal bowl assembly.
	Air leaks out from the gap between the bowl and internal assembly.	Chamber O-ring is damaged.	- Replace the bowl assembly.
	Air leaks out from the gap between the internal assembly and drain cock.	Drain cock O-ring is damaged.	- Replace the bowl assembly.
	Drainage or air continues blowing out of the drain exhaust.	Drain piping length is long or piping I.D. is small and restricting. (Back pressure is applied.)	- When connecting the drain piping, use the piping with I.D of \varnothing 8 mm or more and the length should be within 5 m. Riser pipework should be avoided.
		Drain cock is loosened.	- Tighten the drain cock to "S" side of the manual knob.
Drain does not enter.		Element is clogged.	- Remove the clogging by cleaning the element and blowing it with air. Or, replace the element.

Note) The grease used recommends Krytox GPL 207 of Du Pont.

6.2 Reset the Thermal relay and High Pressure Switch

When the lamp goes off and the compressor for refrigeration 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. For the location of the thermal relay and high voltage pressure switch, refer to page 2-1.

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.

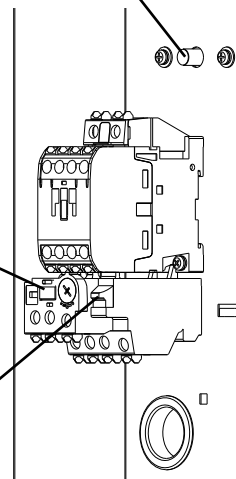
Reset the thermal relay

- (1) Turn off the switch with lamp and shut off the power supply to 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 when the power is supplied and the switch with lamp is turned on.

High pressure switch
Reset button (red)

Thermal relay
Reset button (blue)

Display



Reset the High Pressure Switch

- (1) Turn off the switch with lamp and shut off the power supply to the product.
- (2) Remove the front panel.
There is a red high pressure switch reset button (See Figure on the right)
- (3) Press the red reset button.
- (4) Mount the front panel.
- (5) Operation restarts when the power is supplied to the product and the switch with lamp is turned on.

※Option T does not restart even if it is reset with the power supply ON.
Turn on the switch with lamp after turning it OFF.

Chapter 7 Documents

7.1 Specifications

Specifications		Model	IDFC60-23	IDFC70-23	IDFC80-23	IDFC90-23	
Operating range (Note1)	Fluid		Compressed Air				
	Inlet air temperature		20 to 65°C				
	Inlet air pressure		0.15 to 1.0MPa (Note7)				
	Ambient temperature (Humidity)		20 to 45°C (Relative humidity 85% or less)				
Rated conditions	Air Flow capacity (Note2)	At outlet pressure dew point of 20°C	4.7m ³ /min	7.8m ³ /min	10.9m ³ /min	15.4m ³ /min	
		At outlet pressure dew point of 10°C	2.8m ³ /min	4.7m ³ /min	6.5m ³ /min	9.2m ³ /min	
		At outlet pressure dew point of 3°C	0.9m ³ /min	1.6m ³ /min	2.2m ³ /min	3.1m ³ /min	
	Inlet air pressure		MPa	0.7			
	Inlet air temperature		°C	50			
	Ambient temperature		°C	35			
	Power supply voltage (frequency)		Single-phase 230 VAC (50Hz) Allowable voltage fluctuation +/-10% (Note5)				
Maximum Air Flow Capacity			Air flow calculated with correction factor (see the Chapter 7-2)				
Electric spec	Power consumption (Note4)	kW	1.0	1.6	2.4	2.8	
	Operating current (Note4)	A	5.5	8.0	13.0	14.0	
Applicable circuit breaker capacity (sensitivity current 30mA) (Note5)		A	10	15	20	30	
Cooling method			Air-cooled refrigeration				
Refrigerant			R410A (HFC) GWP:2088 (Note6)				
Amount of refrigerant to be filled		g	390±10	530±10	630±10	780±10	
Auto drain			Float type (Normally open: Min. operating pressure: 0.1MPa)				
Drain tube O.D.		mm	12				
Port size			R1	R1 1/2	R2		
Weight		kg	49	68	95	110	
Coating color			Panel: Urban white1 Base: Urban gray2				

Note 1: The operating range does not guarantee use with normal air flow capacity.

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

Note 3: Do not use this product with continuous voltage fluctuations.

Note 4: These values are reference values under rated conditions and are not guaranteed. Do not use these values for the thermal set values, etc.

Note 5: Products other than Option R are not equipped with an earth leakage breaker. Purchase an appropriate earth leakage breaker separately. Use an earth leakage breaker with a leak current sensitivity of 30mA.

Note 6: This is the value specified by IPCC4 AR4. The value specified by “Class 1 Act on Rational Use and Proper Management of Fluorocarbons JAPAN.” is R410A GWP: 2090.

Note 7: The maximum operating pressure is 1.0MPa as standard, but it is possible to achieve 1.6MP when selecting Option L or Option V.

Coefficient factors

Inlet air temperature (°C)

35	40	45	50	55	60	65
1.58	1.46	1.09	1.00	0.79	0.64	0.51

Inlet air pressure (MPa)

0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0 to 1.6
0.67	0.79	0.88	0.91	1.00	1.02	1.04	1.09

Ambient temperature (°C)

20	25	30	35	40	45
1.19	1.13	1.06	1.00	0.90	0.77

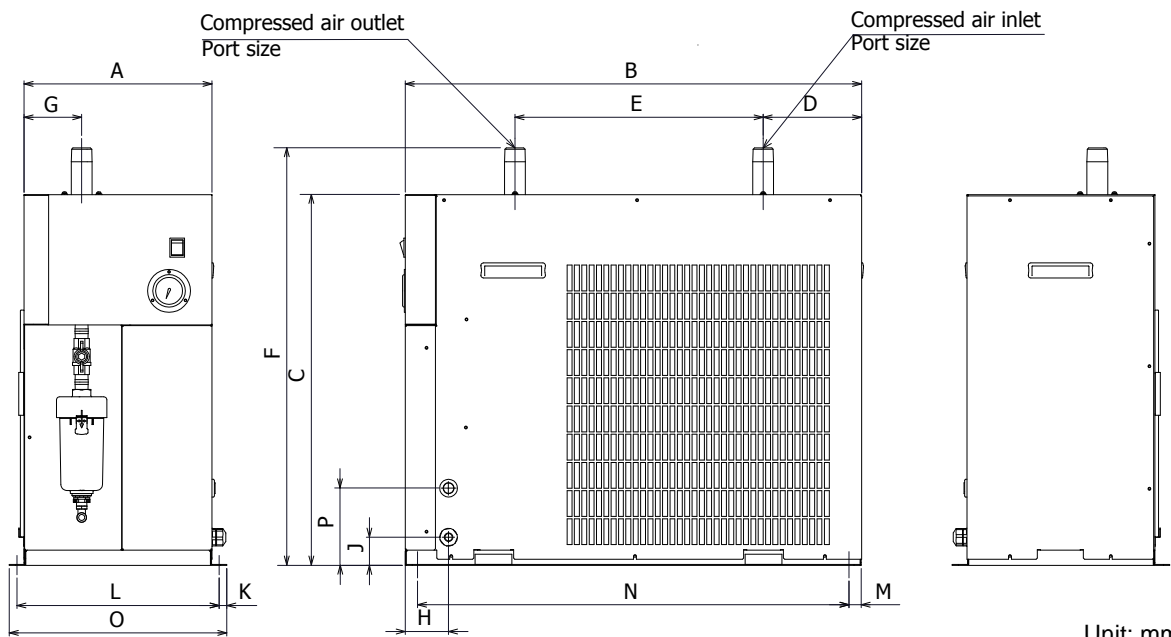
Calculation example: The air flow capacity when the dew point of IDFC60 is set to 10°C under the following conditions
 < Operating conditions: Inlet air temp: 45°C, Inlet air pressure: 0.8MPa, Ambient temp: 30°C >
 $2.8 \text{ m}^3/\text{min} \times 1.09 \times 1.02 \times 1.06 = 3.3 \text{ m}^3/\text{min}$

7.2 Refrigerant and GWP value

Refrigerant	Global Warming Potential (GWP)	
	Regulation (EU) No 517/2014 (Based on the IPCC AR4)	Revised Fluorocarbons Recovery and Destruction Law (Japanese law)
R410A	2,088	2,090

Note 1: This product is hermetically sealed and contains fluorinated greenhouse gases (HFC).

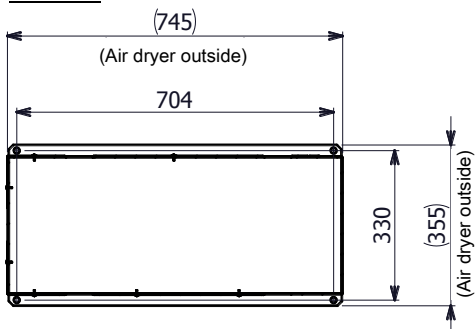
7.3 Dimensions



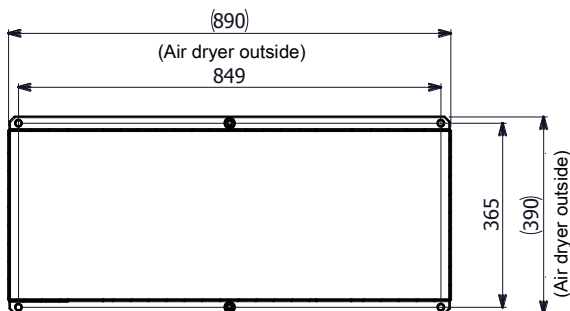
Model	Port Size	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P
IDFC60	R1	307	745	605	161	405	681	94	71	46	12.5	330	20	704	355	126
IDFC70	R1-1/2	342	890	825	176	480	905		68			365		849	390	81
IDFC80	R2	438	957	863	169	480	958	219	78	10	11.0	463	20	916	485	170
IDFC90																

Anchor bolt location (Hole diameter:Ø13)

IDFC60

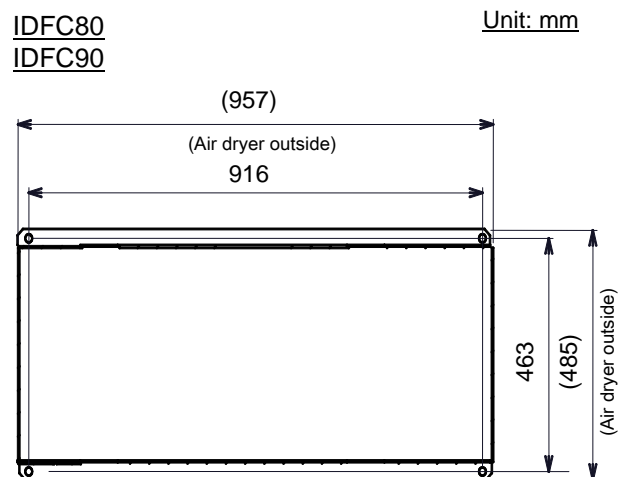


IDFC70



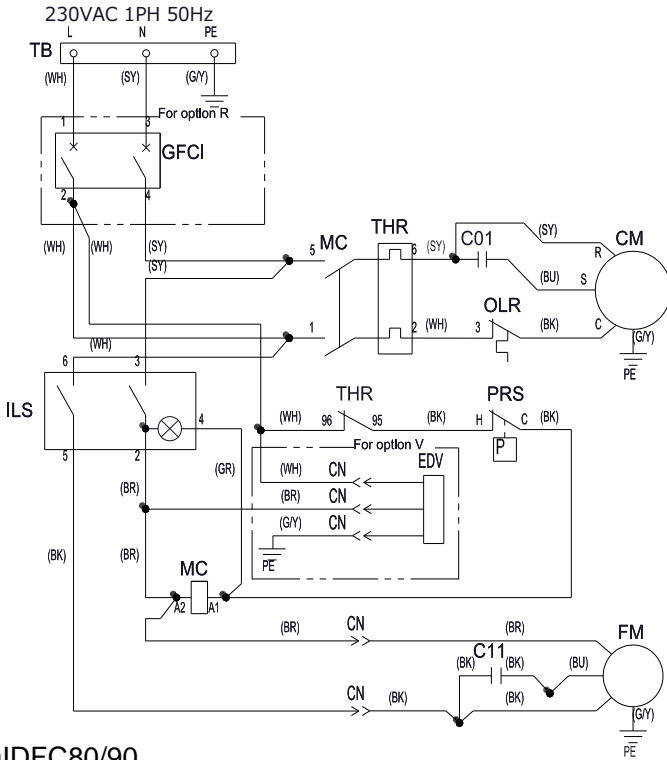
IDFC80

IDFC90



7.4 Electric circuit

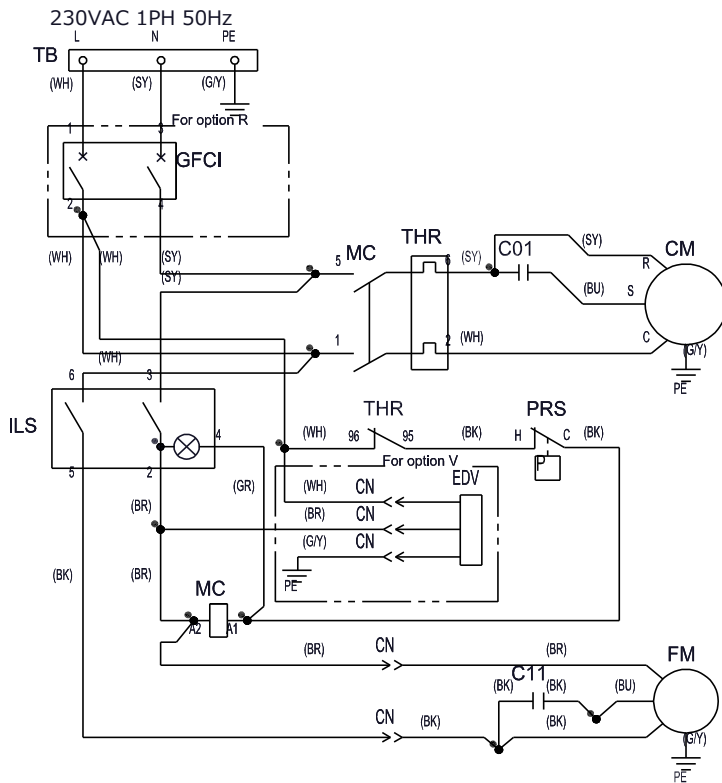
■IDFC60/70



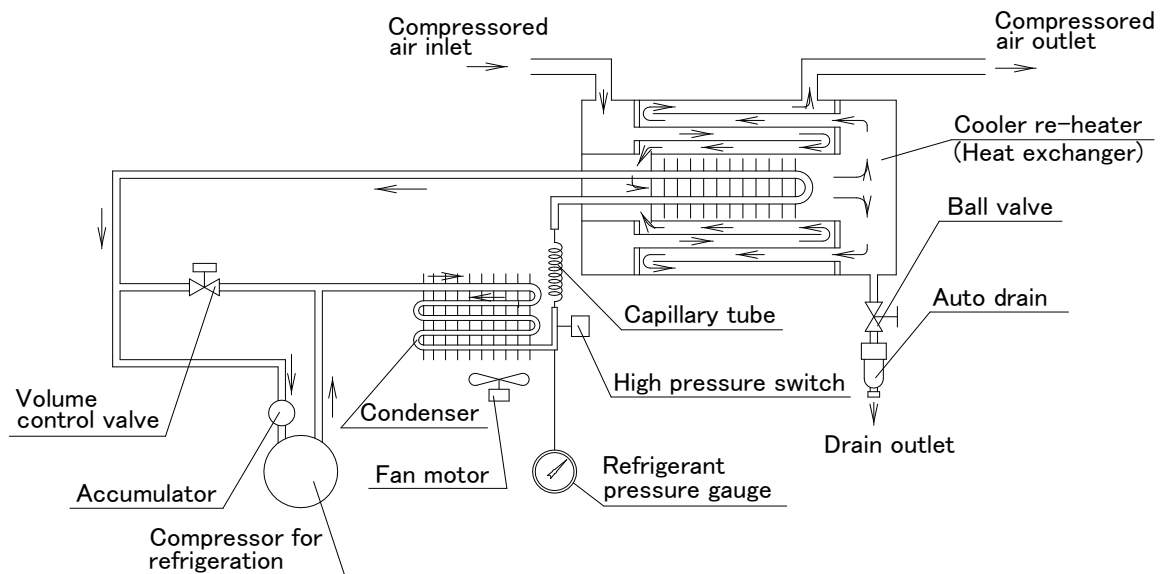
SYMBOL	DESCRIPTION
CM	Refrigerating compressor
OLR	Overload relay
FM	Fan motor
MC	Magnetic contactor
PRS	High pressure switch
ILS	Switch with lamp
THR	Thermal relay
C01	Capacitor for refrigerating compressor
C11	Capacitor for fan motor
TB	Terminal block
CN	Connector
GFCI	Ground fault circuit interrupter
EDV	Electronic drain valve
PE	Protective earth

SYMBOL	WIRE COLOR
(BK)	Black
(WH)	White
(GR)	Gray
(SY)	Sky blue
(BU)	Blue
(BR)	Brown
(G/Y)	Green/Yellow

■IDFC80/90



7.5 Air/ Refrigerant Circuit



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 (HFC) in the refrigerant circuit is compressed by the compressor and cooled by the condenser to become liquid. When passing through the capillary tube, 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.

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 L

Option L: Dryer with heavy duty auto drain.

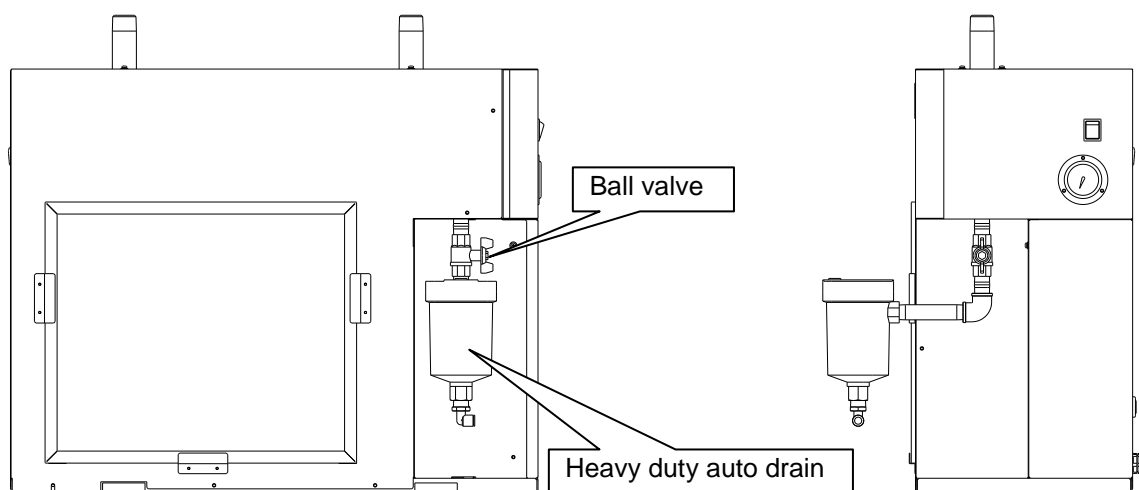
The heavy duty auto drain to be assembled by customer.

9.1 Safety instructions for use

Refer to the instructions below when handling the product.

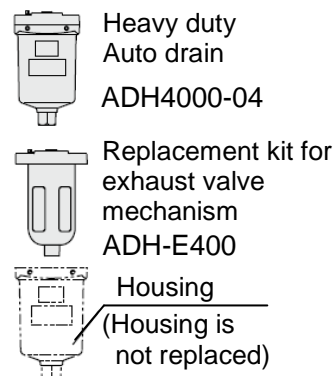
 WARNING
<ul style="list-style-type: none"> - Before replacing the auto drain on the compressed air side confirm that the pressure gauge indicates zero. Removing the auto drain with any air pressure remains could arise to unexpected accident, such as parts been expelled when being unscrewed. - There is the possibility of damaging the condenser during the auto drain maintenance. Follow enduser procedures ensure safety of operator. (example: Put on protective glass, apron, and gloves)

9.2 Specifications



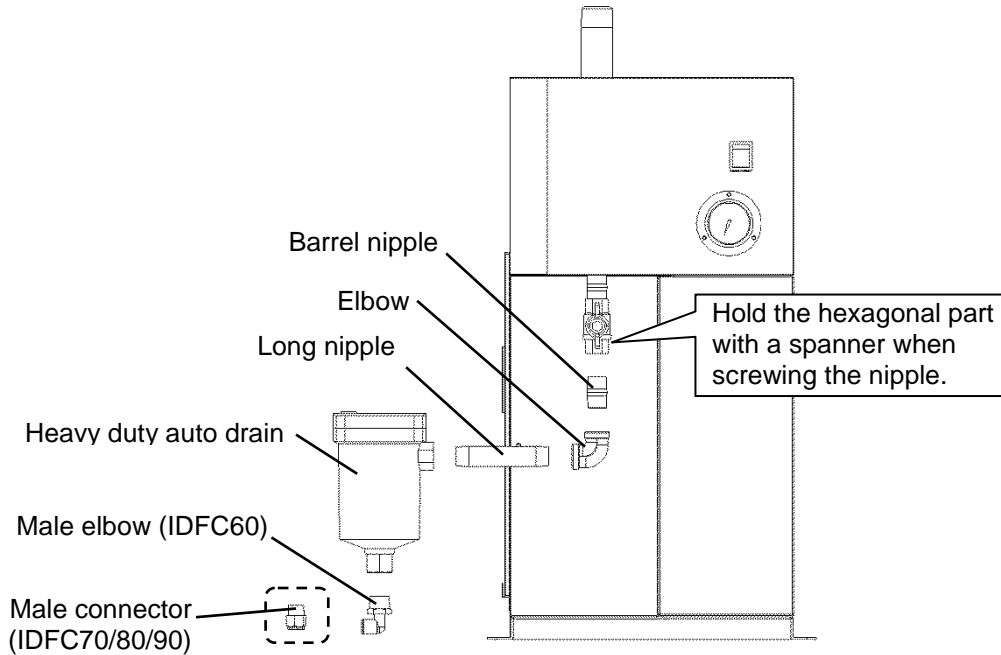
Heavy duty auto drain assembly

Part number (Service parts)	Heavy duty auto drain	ADH4000-04
	Replacement kit for exhaust valve mechanism	ADH-E400
Auto drain type	Float type	
Auto drain valve type	N.O. (Normally open)	
Maximum specification pressure	1.6MPa	
Operating pressure range	0.05 to 1.6 MPa	
Maximum condensate discharge	0.024m ³ /h (0.7 MPa, water)	



9.3 Mount the Heavy Duty Auto Drain

- 1) Hold the hexagonal part (width across flats: 25) at the connection port (ball valve Rc1/2) of the product with a spanner and screw-in the barrel nipple and elbow in order.
- 2) Screw-in the long nipple and heavy duty auto drain (width across flats of drain inlet port: 30) completely. Mount the heavy duty auto drain vertically while facing the drain port downwards. (Allowable inclination difference in the vertical direction is 5°)
- 3) For IDFC60, mount male elbow (width across flats: 22) to the drain outlet port (width across flats: 27). For IDFC70, IDFC80 and IDFC90, mount male connector (width across flats: 22) to the drain outlet port (width across flats: 22) and mount the drain tube.



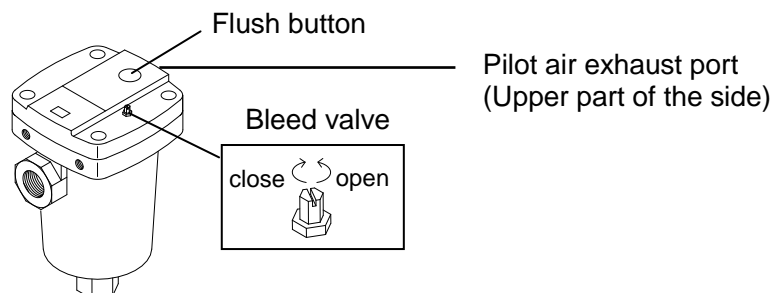
Note 1) Apply sealant tape or sealant to fit the nipple.

Tightening torque: 28 to 30N·m

Note 2) If the amount of drainage flowing into the heavy duty auto drain is small, open the bleed valve gradually to adjust so that the drainage can flow into the auto drain smoothly.

9.4 Maintenance

- 1) Check the auto drain condition at least once a day. Press the flush button to clean (flush) the exhaust valve.
- 2) The pilot air of the heavy duty auto drain is exhausted from the position in the drawing. Do not block the exhaust port. Do not obstruct the exhaust port with airborne particles, etc.
- 3) Before removing the heavy duty auto drain, close the ball valve, and open the bleed valve or press the flush button and confirm that there is no air pressure.




Chapter 10 Option R

Option R is equipped with an earth leakage breaker (GFCI). This is to shut off the power supply when over current or leakage current is applied to the air dryer.

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 style="padding-left: 20px;">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 Earth leakage breaker specification

Item \ Models	IDFC60-23-R	IDFC70-23-R	IDFC80-23-R	IDFC90-23-R
Rated current (A)	10	15	20	30
Sensitivity current (mA)	30			

10.3 Connection of power supply

Connect the power cable according to the procedure below.

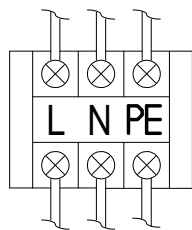
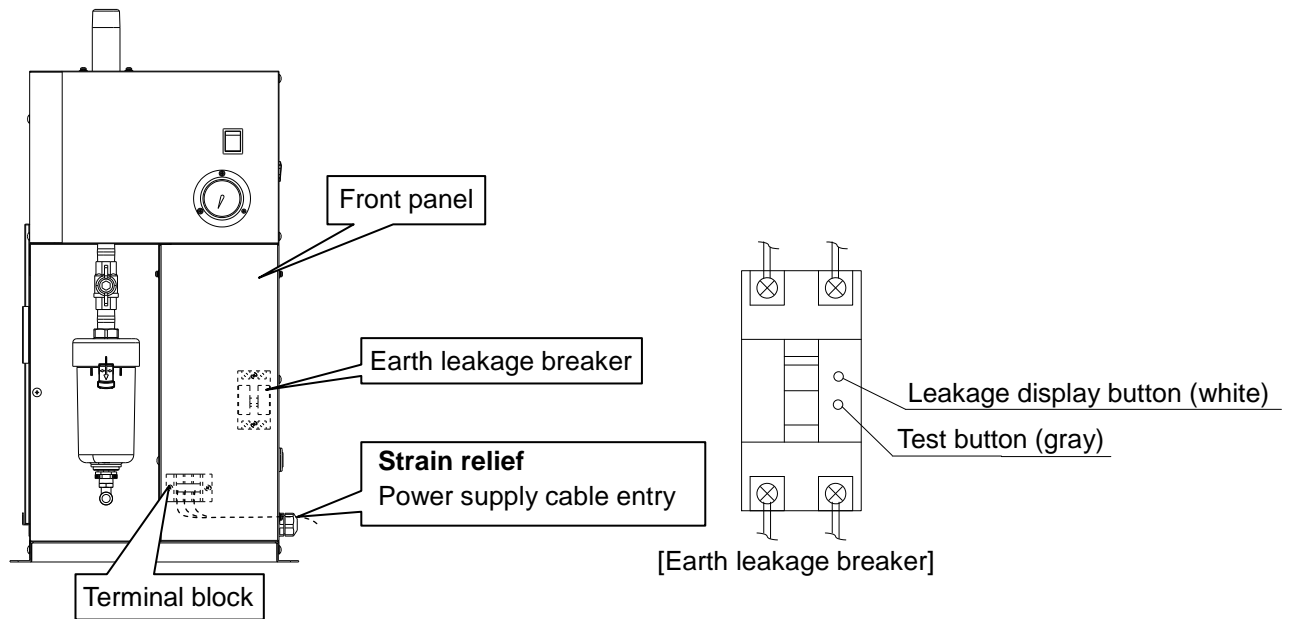
- 1) Remove the front panels.
- 2) Introduce the cable through the strain relief to connect to the terminal block. (refer to the label on the terminal block)

M3.5 Screw tightening torque : 1.0 to 1.3N·m

M4.0 Screw tightening torque : 1.4 to 2.0N·m

Do not touch any equipment other than the terminal block during wiring.

- 3) Mount the front panel back.



[Terminal block]

※Refer to the Chapter 3.2.5 Electrical wiring for power cable connection.

Chapter 11 Option T

Option T has terminal block for the output of operation and error signals and remote control.

11.1 Safety instructions for use

Refer to the instructions below when handling the product.



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.**
- **The equipment should be grounded for safety. Earth leakage breaker does not operate correctly without grounding.**
- **Do not modify the internal electrical wiring of the product.**

11.2 Operation / Error signal output

- Operation mode signal (Contact output)
 - Operation signal - - - During operation: contact "close"
 - Error signal - - - During error: contact "close"
- Contact capacity
 - Rated load voltage 240 VAC or less / 24 VDC or less
 - Maximum load current 5A (resistance load) / 2A (inductive load)
 - Minimum applicable load 20 VDC 3mA

11.3 Remote operation

230 VAC is applied to the terminal for remote operation. Select the appropriate switch.

- For remote operation, customer operates the switch which is connected by customer with the switch with lamp ON.

- Position holding switch (alternate type switch).

Keep the jumper wire (terminal No. 4-5) connected for the remote terminal A.

Disconnect the jumper wire from the remote terminal B (terminal number 6-7) and connect the switch.

- Automatic return switch (momentary switch).

Disconnect the jumper wire from the remote terminal A (terminal number 4-5) and connect the switch (A contact: operation signal), and then disconnect the jumper wire from the remote terminal B (terminal number 6-7) and connect the switch (B contact: stop signal).

- Allow at least 3 minutes before restarting the dryer. If the air dryer is restarted within 3 minutes after been stopped, the protection circuit will be activated.

In order to avoid motor failure, start-stop frequency of the product must be 5 times/ hour or less.

【Restart the operation】

- Error signal output is released by turning off the switch with lamp or giving an operation stop signal remotely. Eliminate the cause of error. Restart operation after 3 minutes passed.

- When the error signal is not released even by turning off the switch with lamp, the thermal relay or high pressure switch is activated. Reset the thermal relay or high pressure switch referring to 6.2 Reset the Thermal relay and High Pressure Switch.

11.4 Connect the power cable and signal cable

Connect the power cable and signal cable according to the procedure below.

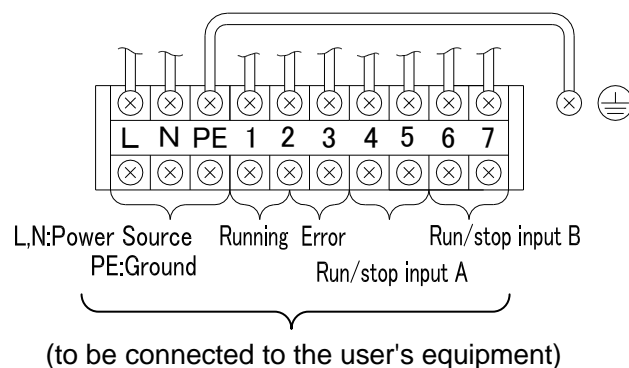
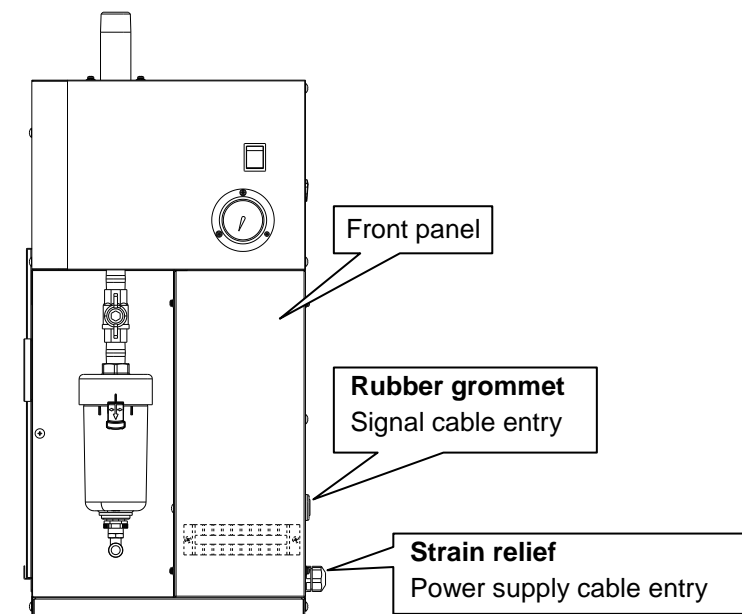
- 1) Remove the front panel.
- 2) Insert the power cable to the power cable entry and connect to the terminal block.
- 3) Insert the signal cable to the signal cable entry and connect to the terminal block.

M3.5 Screw tightening torque: 1.0 to 1.3N·m

M4.0 Screw tightening torque: 1.4 to 2.0N·m

Do not touch any equipment other than the terminal block during wiring.

- 4) Mount the front panel back.



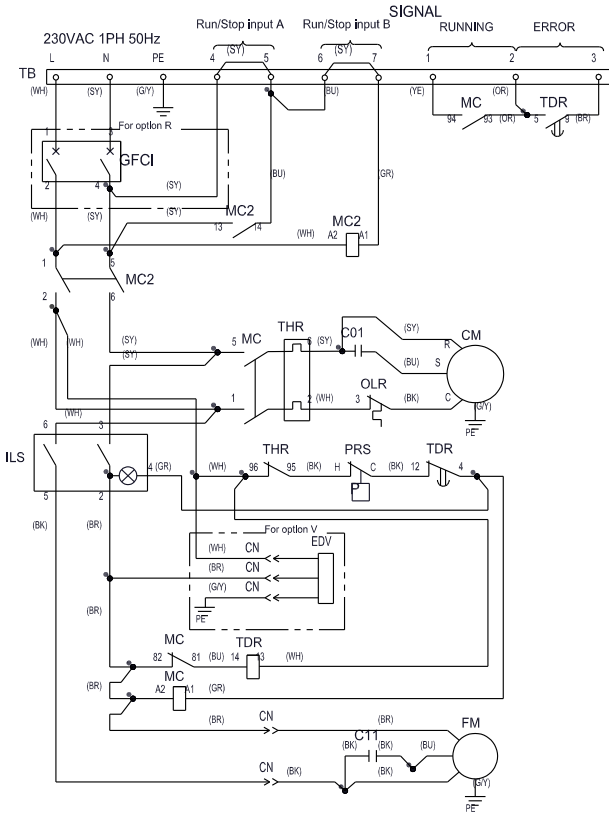
Signal cable terminal

IDFC60-23-T, IDFC70-23-T	IDFC80-23-T, IDFC90-23-T
Screws for connecting terminal block: M3.5	Screws for connecting terminal block: M4.0
Crimp terminal width: 8.5mm or less Applicable wire: 1.25mm ²	Crimp terminal width: 9.5mm or less Applicable wire: 2.0mm ²

※Refer to the Chapter 3.2.5 Electrical wiring for power cable connection.

11.5 Electric circuit

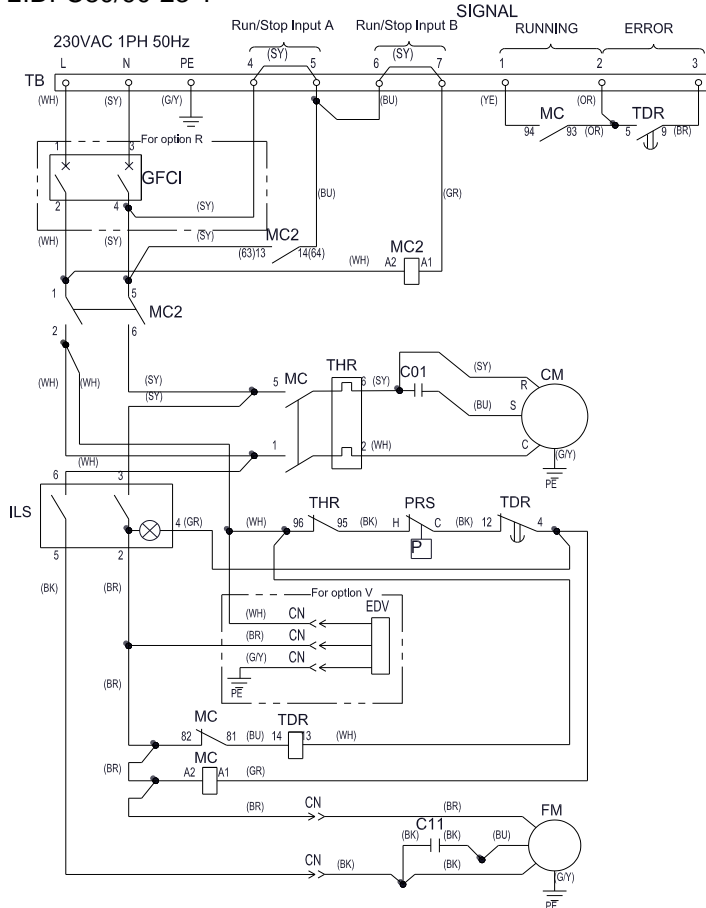
■IDFC60/70-23-T



SYMBOL	DESCRIPTION
CM	Refrigerating compressor
OLR	Overload relay
FM	Fan motor
MC	Magnetic contactor
MC2	Magnetic contactor for remote switch
PRS	High pressure switch
ILS	Switch with lamp
THR	Thermal relay
C01	Capacitor for refrigerating compressor
C11	Capacitor for fan motor
TB	Terminal block
CN	Connector
TDR	Time delay relay
GFCI	Ground fault circuit interrupter
EDV	Electronic drain valve
PE	Protective earth

SYMBOL	WIRE COLOR
(BK)	Black
(WH)	White
(GR)	Gray
(SY)	Sky blue
(BU)	Blue
(BR)	Brown
(YE)	Yellow
(OR)	Orange
(G/Y)	Green/Yellow

■IDFC80/90-23-T




Chapter 12 Option V

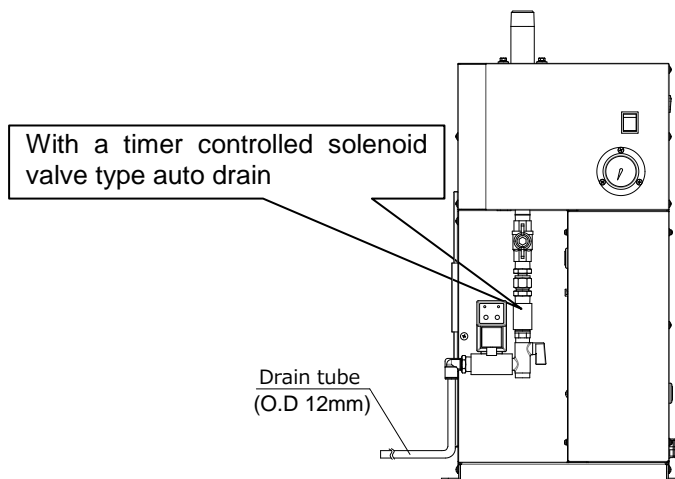
Option V is a dryer with a timer controlled solenoid valve type auto drain. The timer is adjusted by customer according to the operating conditions.

12.1 Safety instructions for use

Refer to the instructions below when handling the product.

 WARNING
<ul style="list-style-type: none"> - Before replacing the auto drain on the compressed air side confirm that the pressure gauge indicates zero ”. Removing the auto drain with any air pressure remains could arise to unexpected accident, such as parts been expelled when being unscrewed. - There is the possibility of damaging the condenser during the auto drain maintenance. - Follow end-user procedures to ensure safety of operator. (example: Put on protective glass, apron, and gloves).

12.2 Specifications

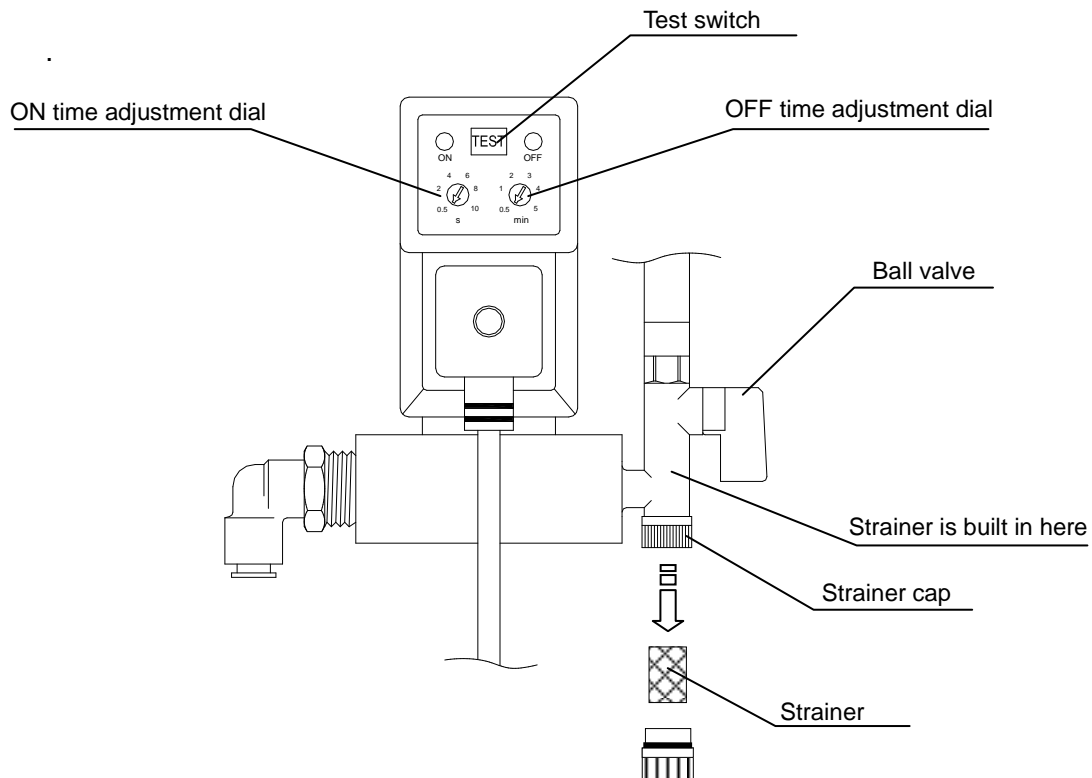


Part number (Service parts)		IDF-S0534
Max. operating pressure		1.6MPa
ON time	Setting range	Approx. 0.5 to 10sec.
OFF time	Setting range	Approx. 0.5 to 5 min.

12.3 Maintenance

Be sure to perform regular maintenance of the strainer.
Follow the following steps to perform maintenance.

- 1) Close the ball valve.
- 2) Press the test switch to release the residual pressure.
- 3) Remove the strainer and clean it.
- 4) Mount the strainer and open the ball valve.



Chapter 13 Inspection record

13.1 Inspection record

We recommend keeping the inspection record for maintenance or service.

Product No.	Description	Contents of check	Date

Revision
Rev G : Oct,2019

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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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