PRO
TICA PRO

TICA®

Standard Air Handling Unit – Ceiling Type Installation and Maintenance Manual



TFD-B/C/D/S

Contents

I Characteristics of the Unit

• Elimination of cold bridge

All the metals in the cabinet of TICA's AHU are isolated from outside metals using polyurethane foam and specially designed rubber sealing strips, putting an end to the thermal insulation strips attached here and there inside the common AHU. Therefore, TICA's AHU can avoid cold bridge in a simple way.

• No air leakage

Adopting TICA's patented labyrinth design, the aluminum profile and panel form a whole through high-pressure polyurethane foam, and the aluminum profile is designed with a concave groove and a convex groove. A tenon is formed when the concave groove and convex groove are joined. Thus, it implements strict labyrinth sealing together with fastening of bolts and nuts.

• Polyurethane for thermal insulation

The panel consists of the polyurethane foam plastics with an extremely low thermal conductivity and the inner layer and outer layer of color steel plates. The standard panel thickness is 25 mm.

• Heat exchanger

Mechanical expansion tubes are adopted in the manufacturing process to ensure good contact between the copper pipe and the copper pipe and aluminum foil fixing parts. Besides, multiple options are provided, including hydrophilic aluminum foil, tinned copper foil, steel sheet of steel pipe, aluminum sheet of steel pipe, and stainless steel coil. The cooling coil, hot water coil and steam coil of TICA's air conditioning cabinet are all selected using special model selection software, which is compiled strictly according to the law of thermal engineering. Moreover, the software has been corrected in consideration of actual use conditions of coils to make it more reliable.

• Low noise

TICA's AHU is characterized by the high safety coefficient of motor and low noises. All the adopted low noise fans have undergone a strict static and dynamic balance test and have been selected using special fan application software to achieve the optimal fan operating point, fan efficiency and noise level. The fan and motor components are all provided with unique vibration damping devices, and flexible connection is adopted between the air outlet of fan and the panel, minimizing the unit vibration and noises. The unique sealing structure further prevents noises coming out of the unit. Therefore, a unit operating quietly is offered to you to meet the application requirements of respective industries in different scenarios.

• Filter:

The nylon filter is adopted, and the filter screen can be pulled out for washing and replaced conveniently.

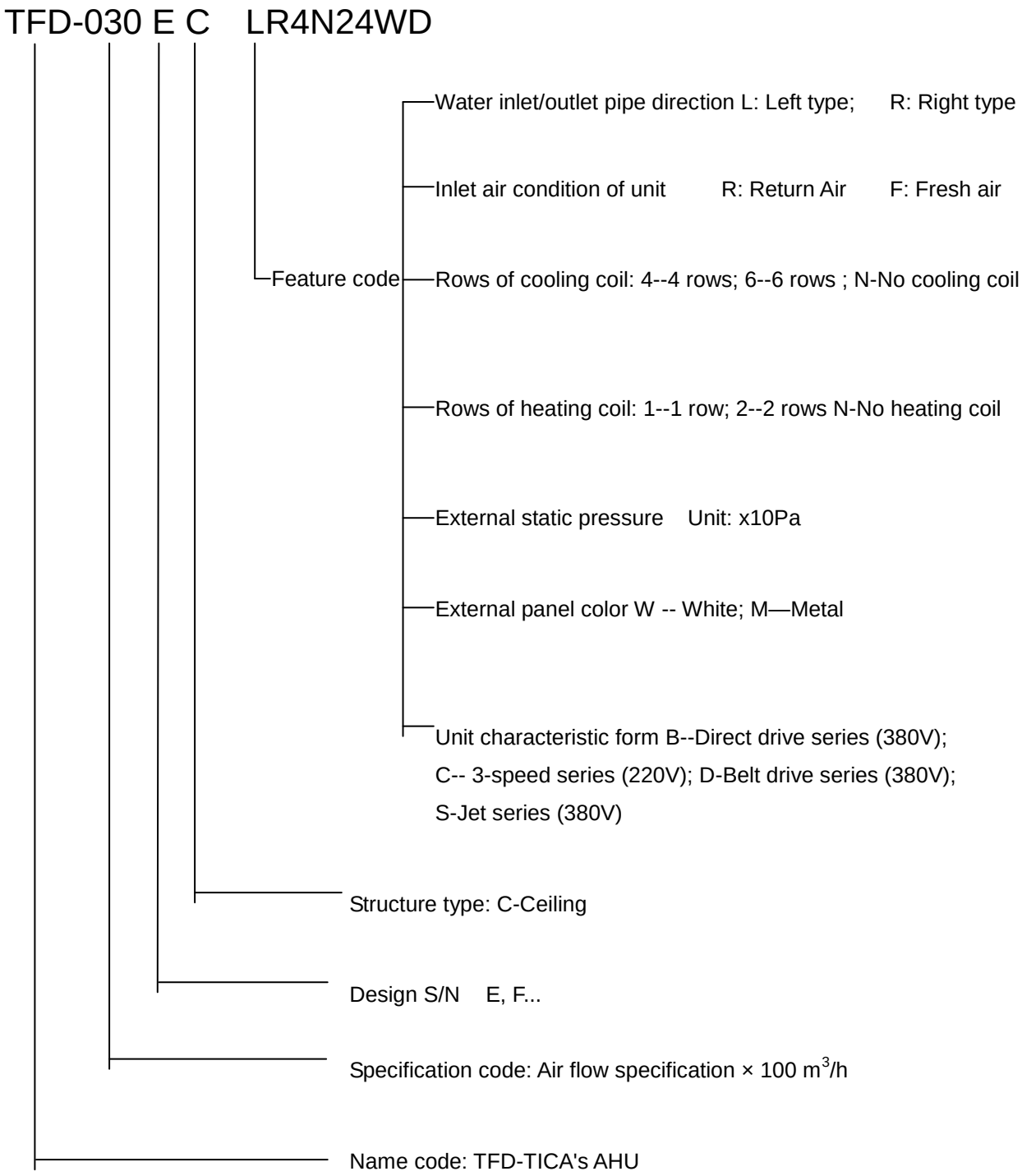
• Far air supply distance (jet type unit):

① The jet type unit adopts the ball type air outlet with excellent jet performance as an air supply outlet to send cold/hot air to a distance far enough.

② Horizontal air supply or vertical downward air supply can be selected for the air outlet direction of ball type air outlet. It especially applies to a tall space, particularly downward warm air supply of large workshops.

③ The air supply angle can be adjusted upward/downward manually in the range of 60°, sending cold/hot air to the desired position.

II Model Description

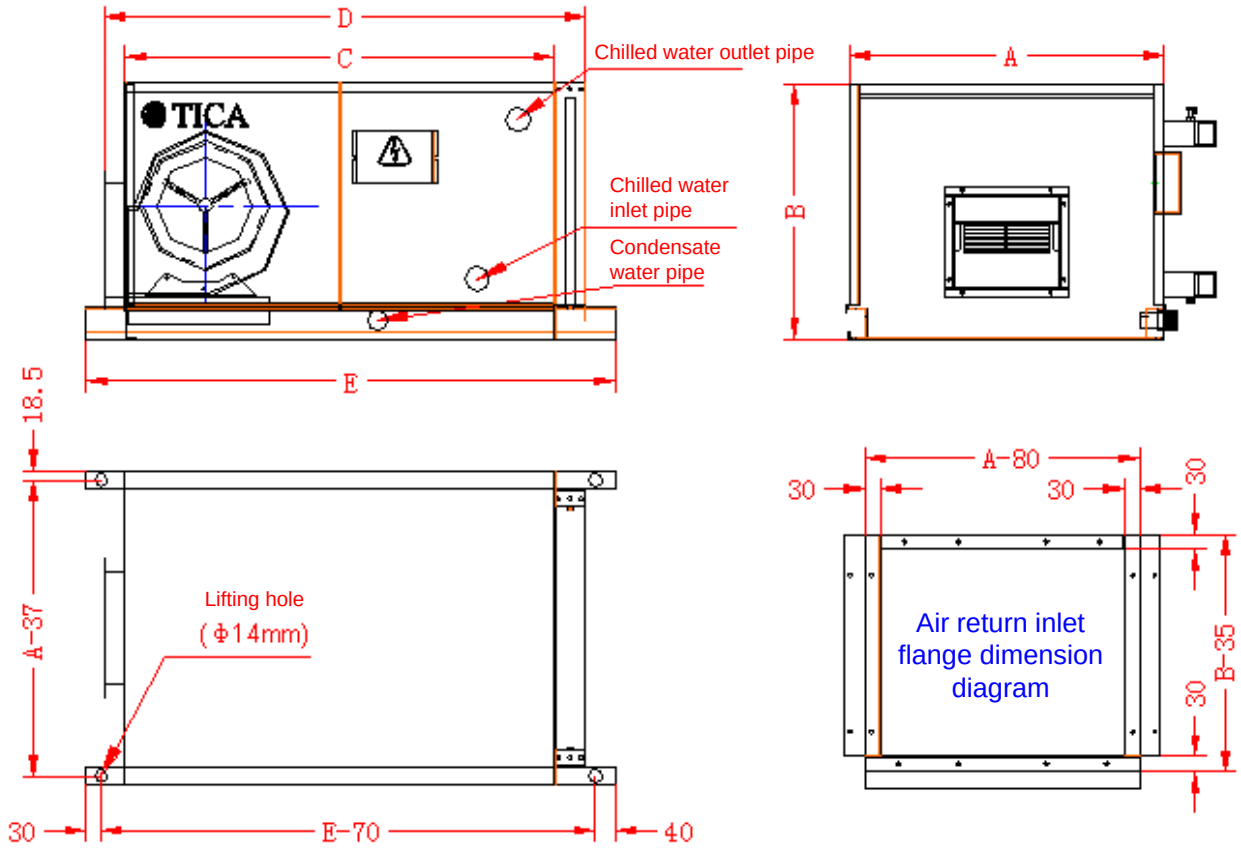


Optional accessories: The following devices can be configured according to the customer's requirements:

- Control cabinet
- Humidifier
- Two-/Three-way valve
- Air valve
- Electric heater

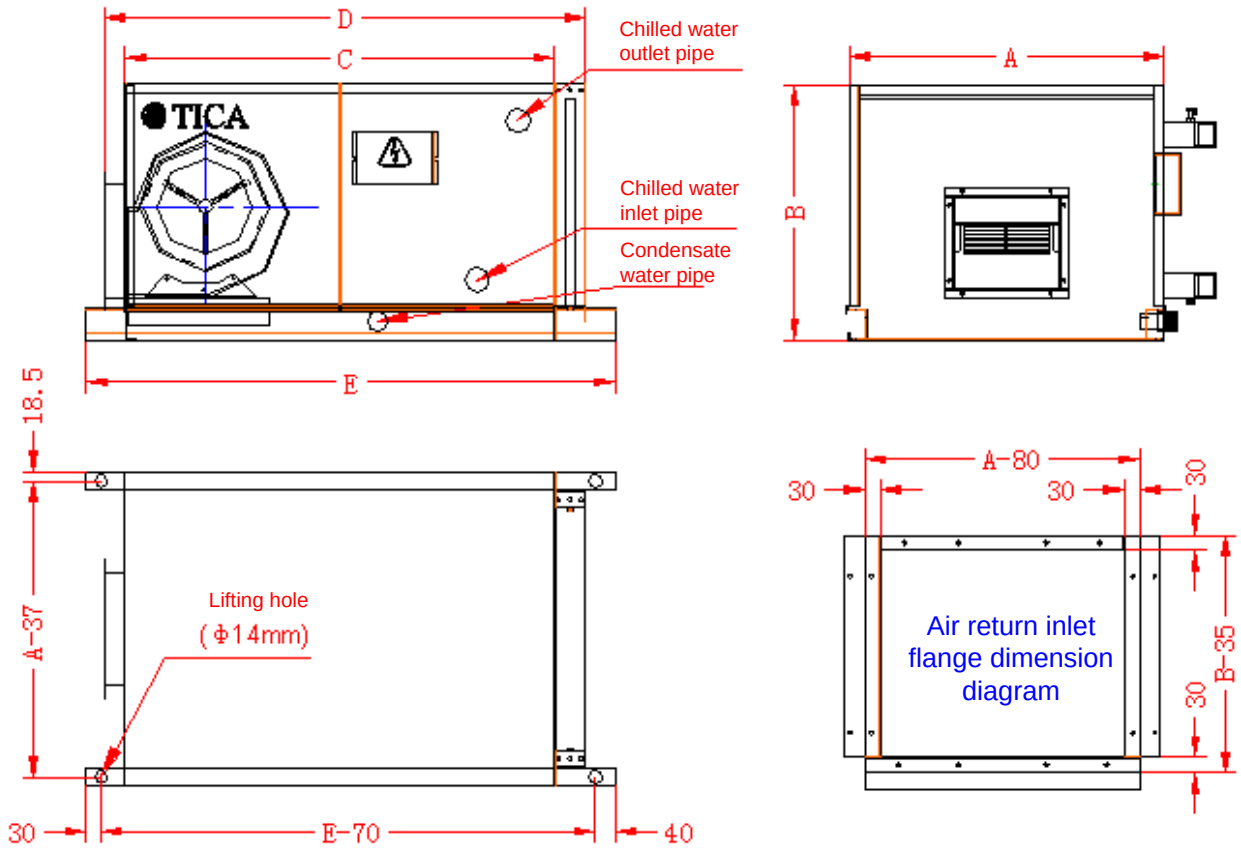
III Outline Dimensions and Specifications

1. Metal ceiling type – TFD- B



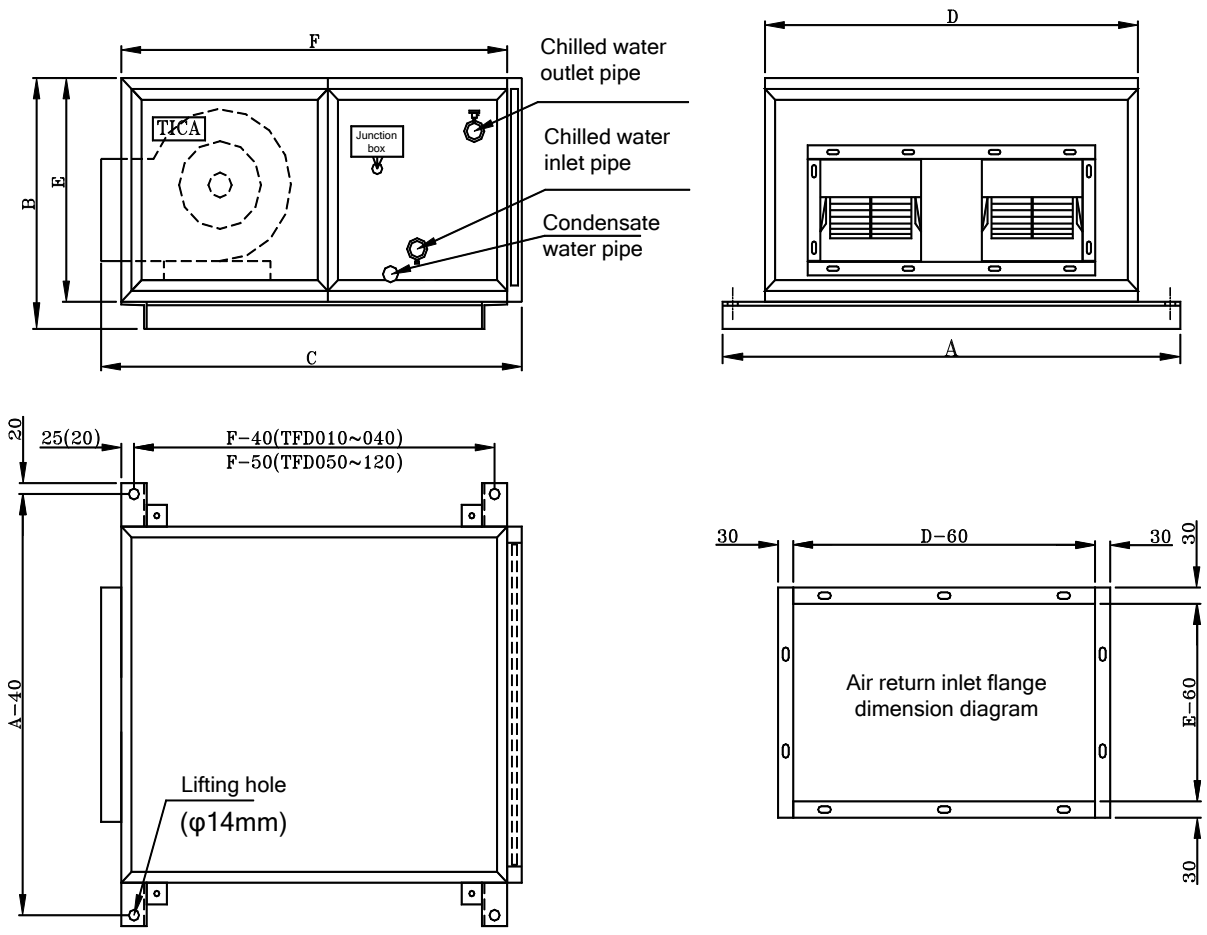
Model TFD	Dimensions (mm)					Chilled water pipe diameter (air return/fresh air)				Condensate water pipe diameter DN	Unit weight (4/6-row coils) (Kg)
	A	B	C	D	E	R4	F4	R6	F6	25	
010	623	505	850	950	1050	32	32	32	32	25	50/57
015	748	505	850	950	1050	32	32	32	32	25	57/63
020	828	580	850	950	1050	32	32	32	40	25	71/81
025	894	580	850	950	1050	32	32	32	40	25	76/86

2. Metal ceiling type – TFD- D



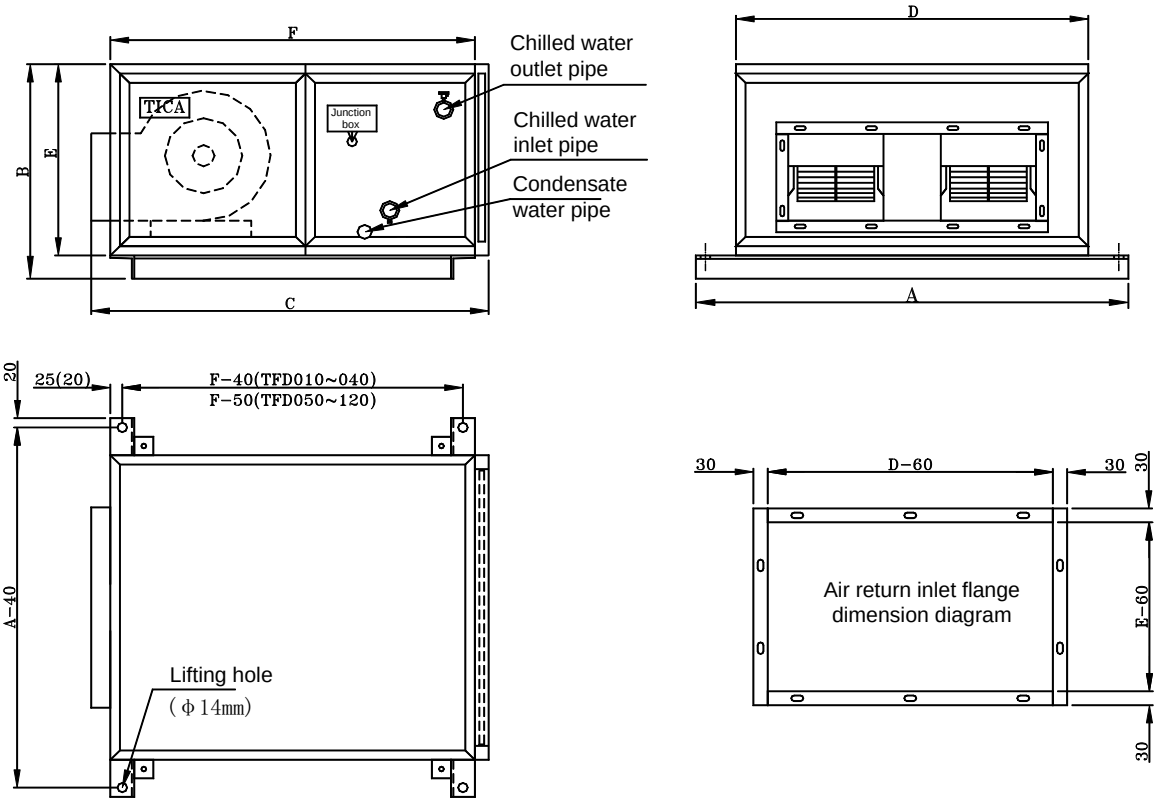
Model TFD	Dimensions (mm)					Chilled water pipe diameter (air return/fresh air)				Condensate water pipe diameter DN	Unit weight (4/6-row coils) (Kg)
	A	B	C	D	E	R4	F4	R6	F6	25	
030	1043	580	900	1000	1100	32	40	32	40	25	90/121
040	1241	580	900	1000	1100	40	40	40	50	25	99/129
050	1493	580	900	1000	1100	40	50	40	50	25	128/158
060	1570	640	900	1000	1100	40	50	40	50	25	139/180
070	1695	640	900	1000	1100	40	50	50	65	25	192/222
080	1695	730	900	1000	1100	40	50	50	65	25	231/271
090	1824	730	1000	1100	1200	40	65	50	65	25	270/305
105	2084	730	1000	1100	1200	50	65	50	65	25	279/309

3. Ceiling type – TFD- B



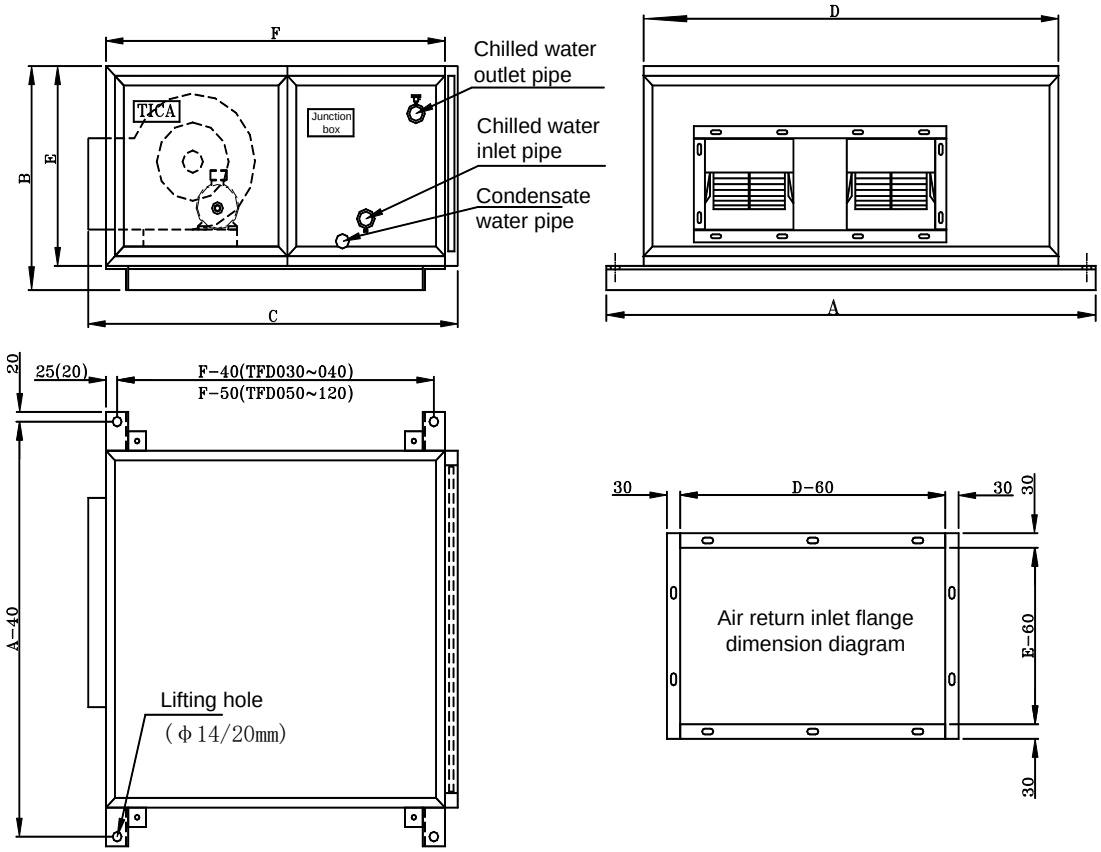
Model TFD	Dimensions (mm)						Chilled water pipe diameter (air return/fresh air) DN				Condensate water pipe diameter DN	Unit weight (4/6-row coils) (Kg)
	A	B	C	D	E	F	R4	F4	R6	F6		
010	787	545	950	623	505	850	32	32	32	32	25	50/57
015	912	545	950	748	505	850	32	32	32	32	25	57/63
020	992	620	950	828	580	850	32	32	32	40	25	71/81
025	1058	620	950	894	580	850	32	32	32	40	25	76/86

4. Ceiling type – TFD- C



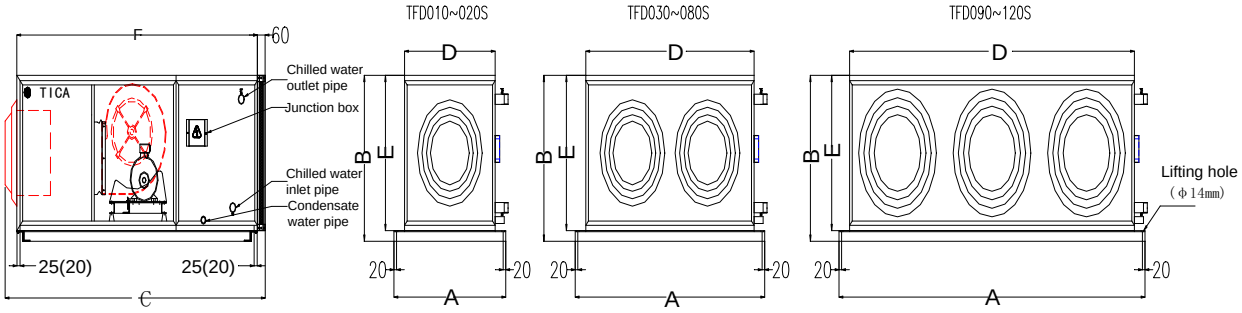
Model TFD	Dimensions (mm)						Chilled water pipe diameter DN				Condensate water pipe diameter DN	Unit weight (4/6-row coils) (Kg)
	A	B	C	D	E	F	R4	F4	R6	F6		
010	787	545	950	623	505	850	32	32	32	32	25	48/50
015	912	545	950	748	505	850	32	32	32	32	25	52/55
020	992	620	950	828	580	850	32	32	32	40	25	72/77
025	1058	620	950	894	580	850	32	32	32	40	25	74/79
030	1207	620	1000	1043	580	900	32	40	32	40	25	85/90
040	1405	620	1000	1241	580	900	40	40	40	50	25	95/98
050	1657	630	1000	1493	580	900	40	50	40	50	25	124/128
060	1734	690	1000	1570	640	900	40	50	40	50	25	140/143
070	1859	690	1000	1695	640	900	40	50	40	65	25	146/151

5. Ceiling type – TFD- D



Model TFD	Dimensions (mm)						Chilled water pipe diameter DN				Condensate water pipe diameter DN	Unit weight (4/6/8-row coils) (Kg)
	A	B	C	D	E	F	R4	F4	R6	F6		
030	1207	620	1000	1043	580	900	32	40	32	40	25	90/121
040	1405	620	1000	1241	580	900	40	40	40	50	25	99/129
050	1657	630	1000	1493	580	900	40	50	40	50	25	128/158
060	1734	690	1000	1570	640	900	40	50	40	50	25	139/180
070	1859	690	1000	1695	640	900	40	50	50	65	25	192/222
080	1859	780	1000	1695	730	900	40	50	50	65	25	231/271
090	1988	780	1100	1824	730	1000	40	65	50	65	25	270/305
105	2248	780	1100	2084	730	1000	50	65	50	65	25	279/309
120	2298	820	1100	2134	770	1000	50	65	50	65	25	287/311
135	2241	1027	1300	2041	947	1200	50	65	65	80	32	368/398
150	2241	1155	1300	2041	1075	1200	50	65	65	80	32	372/414

6. Ceiling type – TFD- S



Model TFD	A	B	C	D	E	F	Number of air outlets	Jet air outlet specification	Outer diameter	Inner diameter	Chilled water pipe diameter (air return/ fresh air) DN	Condensate water pipe diameter DN	Unit weight (4/6-row coils) (Kg)
010	787	545	1555	623	505	1450	1	315	384	190	The same as type B	25	69/76
020	972	620	1590	808	580	1450	1	400	467	230	The same as type B	25	93/103
030	1207	620	1605	1043	580	1500	2	315	384	190	The same as type D	25	108/138
040	1405	620	1640	1241	580	1500	2	400	467	230	The same as type D	25	121/152
050	1657	630	1640	1493	580	1500	2	400	467	230	The same as type D	25	151/181
060	1734	690	1650	1570	640	1500	2	500	600	275	The same as type D	25	162/204
070	1859	690	1650	1695	640	1500	2	500	600	275	The same as type D	25	218/249
080	1859	780	1650	1695	730	1500	2	500	600	275	The same as type D	25	260/300
090	1988	780	1740	1824	730	1600	3	400	467	230	The same as type D	25	300/335
100	2248	780	1750	2084	730	1600	3	500	600	275	The same as type D	25	320/350
120	2298	820	1750	2134	770	1600	3	500	600	275	The same as type D	25	330/358

IV Installation

Storage of the Unit

If the unit needs to be kept outdoors before being installed in the equipment room, prevent the unit from being affected by dirt, rain and snow or destroyed by animals, and do not damage the protective film on the surface of the unit. Do not expose the unit under direct sunshine in summer; otherwise, the thermal insulation board will be deformed. If the unit needs to be installed outdoors, specify this requirement when placing the order so that TICA can take special treatment measures. The units packaged as a whole cannot be piled up.

Installation of the Unit

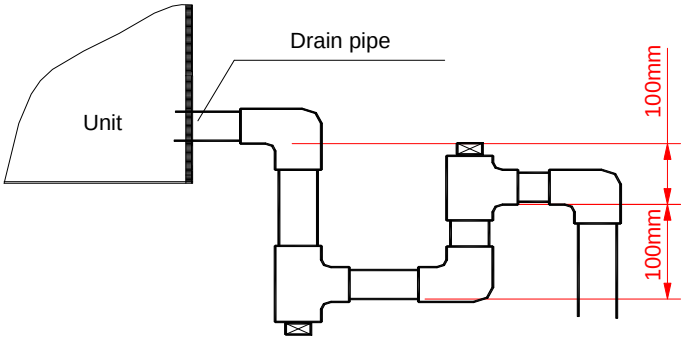
1. Carefully check whether the unit is damaged before unit installation. If any of the following cases occurs, contact the distributor as soon as possible for repairing or replacement:
   a. The unit is seriously bruised or deformed outside.
   b. Internal elements of the unit are damaged;
   c. The fan or motor gets loose.
2. Only professionals who are familiar with this product and understand related local regulations can install the unit. During installation, do not collide or scratch the cabinet.
3. For the sake of safe use, the lifting point of ceiling type unit must be firm and hard enough to bear the weight of the unit and the vibration during unit operation. Meanwhile, the unit must be kept horizontal to prevent overflow of condensate water from the drain pan. Rubber damping sheet or shock absorber should be added in the lifting process to reduce the vibration noises of the unit. The horizontal and vertical units should be installed on a firm and flat foundation. The recommended foundation height is 150 mm. The length and width dimensions should be determined by referring to the external unit dimensions, and a water tank should be set around the foundation.
4. A maintenance space of at least 700 - 800 mm should be reserved around the unit, especially at the side of the access door (plate) and external water pipe, the space at the taking direction of filter is above 600 mm, and a sufficient space should also be kept during installation of pipes.
5. The water drain valve and exhaust valve are set on the heat exchanger manifold of

unit. The exhaust valve is loosened to discharge air when water is supplied. The valve is tightened after air discharge. When the unit will be stopped for a long term, accumulated water in the heat exchanger pipe is drained through the water drain valve.

6. The series of products are installed at proper indoor positions according to their different forms.

Installation of the Water System

1. Before installation, clean the water pipe. A filter should be installed at the water inlet of the user's water pump.
2. The condensate water pipe of unit is located at the unit bottom. The condensate water discharge elbow should be installed according to the residual pressure value of unit, ensuring smooth discharge of condensate water and preventing external odor from entering the cabinet. (As shown in the following figure.)



When the internal negative pressure is greater than 800 Pa, H needs to be increased.

3. When connecting the water inlet pipe and water outlet pipe connected to the air conditioning unit, use a double tube clamp to exert even force to the opposite direction at the same time. The torque force cannot exceed 250.8 N.m (21 Kgf.m), lest the heat exchanger would crack due to twisting and lead to water leakage. The water supply/return pipe outside the unit must be set with a valve (excluding the condensate water drain pipe) and is used to regulate the flow and cut off the water source during unit overhauling. Thermal insulation measures must be taken for the external water pipes of unit.
4. For the heat exchanger using cold/hot water as medium, the lower pipe is the water inlet pipe, and the upper pipe is the water outlet pipe; if steam is used as medium, the upper pipe is the steam inlet pipe, and the lower pipe is the water outlet pipe, connected to the steam trap. Please connect the pipes by referring to the label on the unit.
5. All the water pipe joints must be sealed, preventing water leakage.

6. The unit cannot bear the extra weight other than the water inlet pipes, water outlet pipes and drain pipes.
7. The refrigerant water temperature of the standard model cannot be less than 5°C; the hot water temperature of heating cannot be greater than 80°C, and 60°C is recommended.

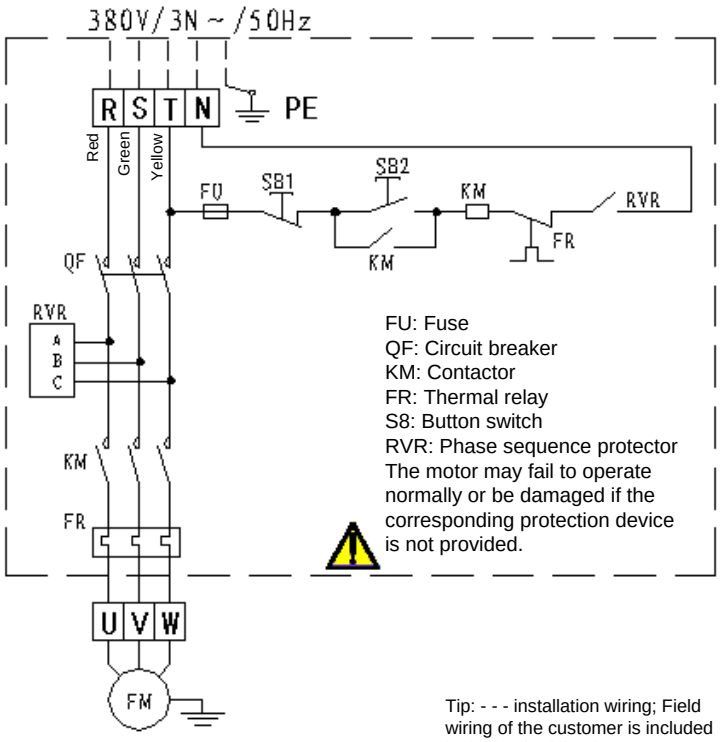
Installation of the Air System

1. The air inlet pipe and outlet pipes for the unit should be sealed to prevent air leakage. Thermal insulation measures must be taken at the joint of the air outlet flange and air supply duct for the unit.
2. Flexible connectors are used to connect the air inlet/outlet to the air duct of the unit. The unit cannot bear the air duct and other extra loads.

Electrical Installation

1. Electrical principle diagram

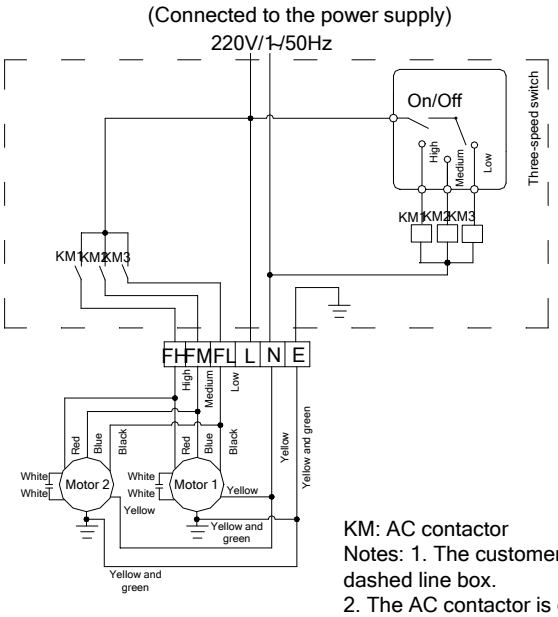
The figure below show the general wiring diagram of the TFD-B/D/S-type unit, which is used for reference only.



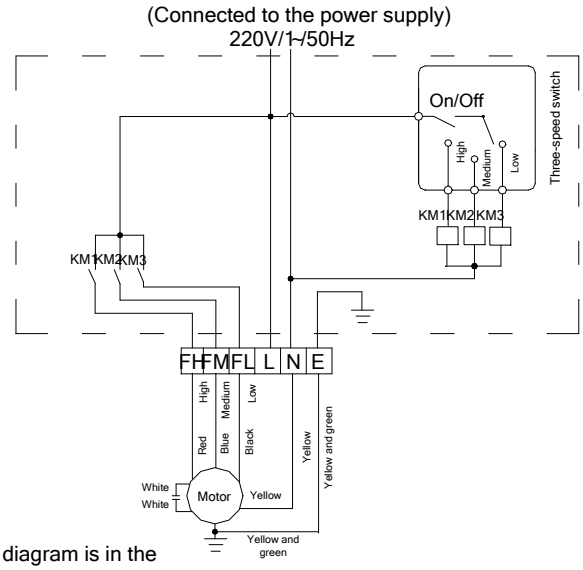
Tip: - - - installation wiring; Field wiring of the customer is included in the dashed line box.

The figure below show the general wiring diagram of the TFD-C standard unit, which is used for reference only.

Model: TFD050C/060C/070C



Model: TFD010C/015C/020C/025C/030C/040C



KM: AC contactor
Notes: 1. The customer's wiring diagram is in the dashed line box.
2. The AC contactor is optimal and can be customized by the factory according to the customer's requirements.

2. Table of Thermal Relay Protector Setting Currents and Recommended Models (TFD-B/D/S)

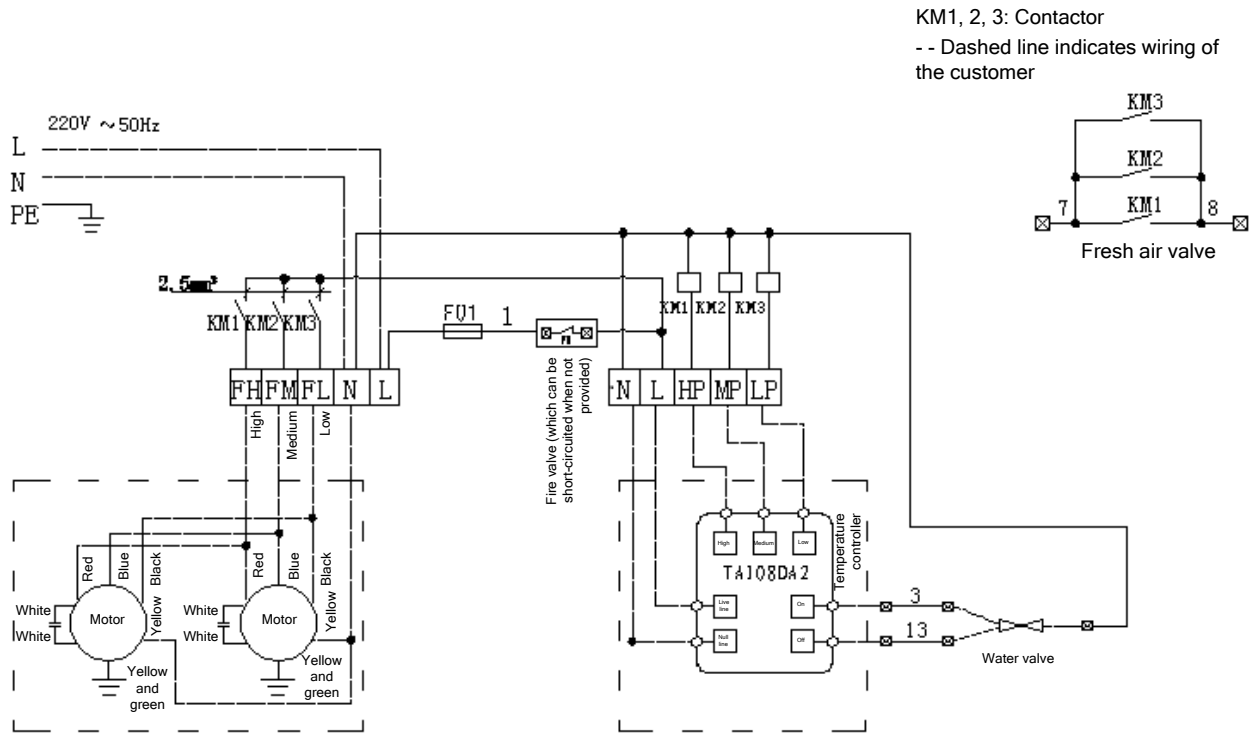
No.	Unit motor power (KW)	Setting current value (A)	Recommended thermal relay	
1	0.55	1.6	LRD07C (1.6-2.5A)	Schneider
2	0.75	2.0	LRD07C (1.6-2.5A)	Schneider
3	1.1	2.9	LRD08C (2.5-4A)	Schneider
4	1.5	3.7	LRD08C (2.5-4A)	Schneider
5	2.2	5.2	LRD12C (5.5-8A)	Schneider
6	3	6.8	LRD12C (5.5-8A)	Schneider
7	4	8.8	LRD14C (7-10A)	Schneider
8	5.5	11.8	LRD21C (12-18A)	Schneider
9	7.5	15.6	LRD21C (12-18A)	Schneider

3. Before wiring, check whether the power supply complies with the unit requirement, and whether the power voltage deviation exceeds ±10% of the rated voltage. The TFD- B/D/S unit adopts the three-phase voltage 380V/3~/50Hz AC power supply, and the TFD-C unit adopts the single-phase voltage 220V/1~/50Hz AC power supply.

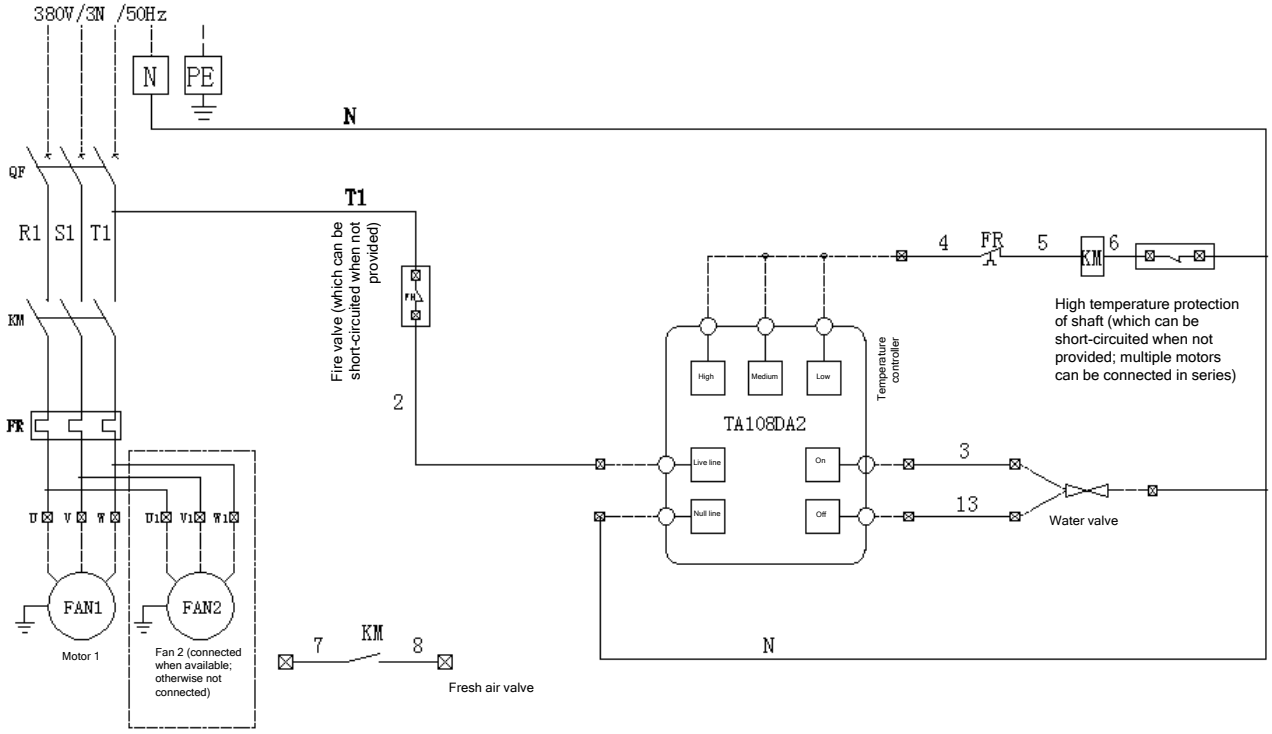
4. The motor should be connected to a power supply with a protection device, and the unit must be grounded reliably. Check whether the electrical circuit is in good conditions and meets electrical safety requirements.
5. When the unit is delivered together with the control cabinet, the temperature controller is shipped together with the unit. The temperature controller is installed on the wall of the indoor operation room to implement remote control operation. Field wiring includes the controlled power cord and the signal line between the temperature controller and the control cabinet.

The electrical principle diagram for the unit with a control cabinet, for reference only

C series unit



D/B/S series unit



V Debugging

1. Before operation, open the exhaust valve on the water return pipe. Close the exhaust valve after air is exhausted from the coil and pipeline.
2. Before operation, check whether the damping system of the system is installed with a temporary shock absorbing device. If yes, remove it first.
3. Before starting the fan, rotate the fan impeller manually to check whether there is any abnormal friction sound. If yes, eliminate the cause. After connecting the power supply, start the motor first, and check whether the fan rotation direction is correct. If it is incorrect, stop the motor and change the power phase sequence.
4. During unit debugging operation, measure whether the motor operating current exceeds the rated current, preventing burning of the motor due to fan overload.
5. If the unit needs to be stopped during operation in winter, the fresh air valve should be closed before the hot water circulation in the unit, lest the heat exchanger would be frozen.
6. Professionals need to manage the unit, check the unit operating status regularly, and eliminate all the found abnormalities in time before continuing operation.

VI Routine Maintenance

Note: Maintenance work can be carried out only after the unit has been stopped.

Check the unit operating status on an irregular basis, and implement long-term and effective maintenance for the unit so as to greatly improve the unit operation reliability and service life.

1. During the season when the unit is not used, fill water in the heat exchanger, reducing the possibility of pipe corrosion. However, to prevent frost crack of the heat exchanger pipe for the unit when the ambient temperature is less than 0°C in winter, water stored in the unit must be exhausted (a water drain valve is set at the lower part of the water inlet pipe for the heat exchanger of unit).
2. To ensure good ventilation and achieve high heat exchange efficiency, the air filter is usually cleaned on a monthly basis, and on a weekly basis in places where air environment is poor.
3. Rinse the heat exchanger of unit regularly to remove dust accumulated on the heat exchanger surface. After the unit has been used for 2-3 years, clear the water scale inside the pipe. If possible, use softened water to produce cold/hot water for the heat exchanger of unit.
4. Clean the drain pan and water seal elbow on an annual basis.
5. Check the flexible connector of air duct regularly. In case of air leakage, repair it in time.
6. For the TFD-D unit, adjust the belt tension on a regular basis. The proper belt tightness is very important to the service life. If the belt is too tight, an extra load will be generated on the belt and bearing, reducing their service life; if the belt is too loose, the belt will slip, generating heat and reducing their service life. The belt tightness can be judged using two methods. Firstly, use a belt tightness measuring tool to judge it. The measuring tool provides a scale, and the tension size can be determined according to the belt center distance and the belt model. If no belt tightness measuring tool is available, adjust the belt tightness till the belt does not give out a sharp sound when the fan starts. It is allowed if the belt gives out short sounds. After tightening the belt and before starting the fan, check the belt pulley alignment again. When necessary, readjust the belt pulley to ensure alignment. A new belt may be a little stretched when it is just used. Check the belt tightness again after operation for several days.

   After the unit has operated for one week, readjust tightness of the belt. After that, perform routine check every three months.

7. Fan bearing maintenance

(1) For the fan with an oil injection nozzle, lubricating grease should be filled for the bearing regularly: clean lithium based grease No. 2.

(2) If the user selects the grease of a brand for filling, the grease of this brand should be always used.

(3) The validity period of lubricating grease depends on the grease type, bearing rotating speed, shaft diameter and operating environment. Normally, the lubricating grease should be replaced after the fan has operated for about 1500 hours; if the fan operates continuously for 24 hours, replace the lubricating grease every 500 - 700 hours of operation.

How to fill lubricating grease: Keep the shaft rotating when filling lubricating grease, stop filling when seeing one layer of fresh grease overflowing, and use hand to rotate the wind wheel fast to discharge excess grease.

8. Consumables and wearing parts:

The following accessories are consumables or wearing parts:

a. Air filter

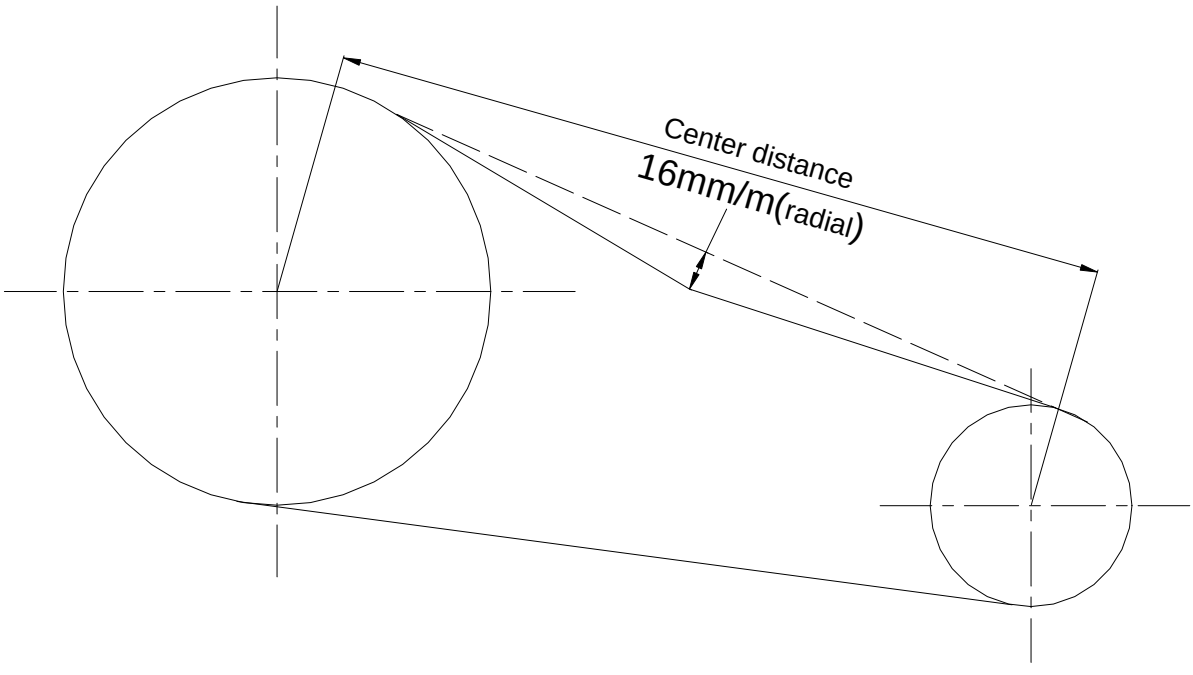
b. Belt

c. Steam tank of the electrode humidifier

d. Fan bearing

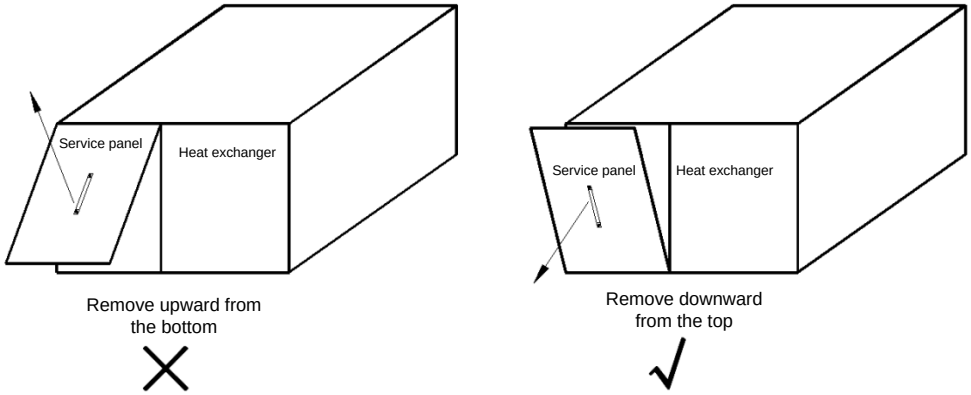
The user needs to replace them according to use conditions, lest an equipment fault may occur.

9. Indication diagram of belt tension related to the center distance:



Belt cross section	Force needed to make the belt move downward by the 16 mm radial distance of 1 m		
	Tensioning force (small belt pulley diameter) mm	Newton (N)	Kilogram force (Kgf)
SPZ	56-95	13-20	1.3-2.0
	100-140	20-25	2.0-2.5
SPA	80-132	25-35	2.5-3.6
	140-200	35-45	3.6-4.6
SPB	112-224	45-65	4.6-6.6
	236-315	65-85	6.6-8.7
SPC	224-335	85-115	8.7-11.7
	375-560	115-150	11.7-15.3

10. To remove the service panel, do not pull it forcedly from the bottom. Remove it slowly from the top, lest the lining board of service panel would be damaged by pulling.



11. Before installing the removed service panel, clear the dried glass glue from the side water tray of service panel, and then apply glass glue for sealing, preventing air and water leakage.

VII Troubleshooting

Common Fault	Cause	Solution
Abnormal sound	1. The impeller or fan bearing gets loose.	1. Lock the bearing seat.
	2. There is foreign matter in the impeller or volute.	2. Clear the foreign matter.
	3. The installed air duct and regulating valve get loose.	3. Fasten them.
	4. The two V pulleys are not at the same central line, and the V belt is too loose or too tight.	4. Readjust the V pulley or V belt.
	5. The flexible connector of fan outlet is too tight.	5. Replace it with a proper flexible connector.
	6. The fan rotation speed is too high, and the operating point is not proper.	6. Match the fan and the belt pulley of motor again.
	7. The bearing contains dirt due to poor quality of the lubricating oil.	7. Use quality lubricating oil and clean the bearing.
	8. The selected fan is too small.	8. Replace the fan.
	9. The motor, fan or motor seat bolt gets loose, leading to the loosening problem.	9. Fasten the bolt.
The air supply volume is insufficient.	1. The filter screen is too dirty.	1. Clean the filter screen.
	2. The air duct sealing is poor.	2. Check the air duct and plug the pipeline leakage.
	3. There is an obstacle in the air duct or the air valve is not opened.	3. Check the pipeline and make it smooth.
	4. The fan rotates inversely.	4. Change the power phase sequence of motor.
	5. The selected fan is improper.	5. Select the proper fan and air flow rate.
	6. The rotation speed is too low.	6. Change the belt pulley to increase the rotation speed.
The air supply volume is too large.	1. The selected fan is improper.	1. Select the proper fan and air flow rate.
	2. The rotation speed is too high.	2. Change the belt pulley to reduce the rotation speed.
The unit leaks water.	1. The wind speed is too high, making water splash.	1. Reduce the unit air flow.
	2. Condensate water cannot be discharged smoothly, and water overflows from the drain pan.	2. Check whether the prepared drainage water seal is proper, and clear the dirt from the drainage pipe.
	3. Condensate water is generated due to air leakage of the unit.	3. Seal the position with air leakage.
The cooling capacity is insufficient.	1. The inlet water temperature of the heat exchanger for unit is too high.	1. Adjust the inlet water temperature of the unit.
	2. The surface of the heat exchanger for unit is blocked by dirt, affecting heat exchange.	2. Clean the heat exchanger.
	3. The problem is caused by insufficient air supply volume.	3. Eliminate the cause of insufficient air supply volume and increase the air supply volume.
	4. The selected unit model is too small.	4. Reselect a model.
The air flow rate in the air conditioning room air conditioning room is too large.	1. The wind speed of the air outlet is too high.	1. Increase the air supply outlet area.
	2. The air flow organization is not reasonable.	2. Check the air duct design to make the air flow organization reasonable.
The air in the air conditioning room the air conditioning room is not fresh.	1. The fresh air volume is insufficient.	1. Increase the fresh air valve.
		2. Clean the fresh air filter screen.
		3. Increase the cross sectional area of fresh air duct.

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