

Standard Air Handling Unit – Ceiling Type



Installation and Maintenance Manual

TFD-J

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Note: Due to ordering difference, your unit may not have some functions contained in this manual. You should inform TICA of the specific performance parameters before placing the order.

Description of signs:



Warning: The instructions must be observed; otherwise, it may cause personal injury due to improper operations of the user.



Electric shock prevention: This sign applies to electrical installation, maintenance and related operations. Only experienced and qualified electricians can undertake the wiring work for this unit.



Note: The instructions must be observed; otherwise, it may cause damage to the air conditioning unit due to improper operations of the user.



Note: Installation and maintenance must be performed by qualified personnel who are familiar with relevant local laws and regulations and have experience in this type of equipment.



Warning: Avoid direct contact with sharp edges and coil surface.



Warning: The operating machine and power supply are dangerous. They may lead to serious casualties. Before maintenance, make sure to disconnect the power supply and confirm that all the moving parts have stopped.

TICA fully considers your safety in the design and manufacturing process. However, this cannot prevent damages caused by accidents arising from unauthorized operations or improper maintenance. The best way to ensure your safety is to conduct correct installation, proper operations and regular maintenance.

I. Features

Without any cooling or heating sources, heat recovery fresh air handling unit is composed of fan, static heat exchanger, cooling coil, filter and cabinet. The humidifier and electric heater are optional.

- **Elimination of Cold Bridge:**

All the metals in the cabinet of TICA's labyrinth 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 labyrinth 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.

- **Anti-rust Cabinet:**

Aluminum profile frames are set around four sides of all the panels, so all the sheet metal edges and corners are isolated from wet air, avoiding rust spots on the panels.

- **Low Noise:**

The low noise and highly efficient fans have undergone a strict static and dynamic balance test against standards of China. The ultra-low noise bearings require no oiling and therefore the unit can work reliably over a long time.

- **Static heat exchanger:**

With a heat recovery efficiency of over 70%, this kind of heat exchanger is able to substantially reduce energy required to handle fresh air, thus lowering power consumption.

- **Heat exchanger:**

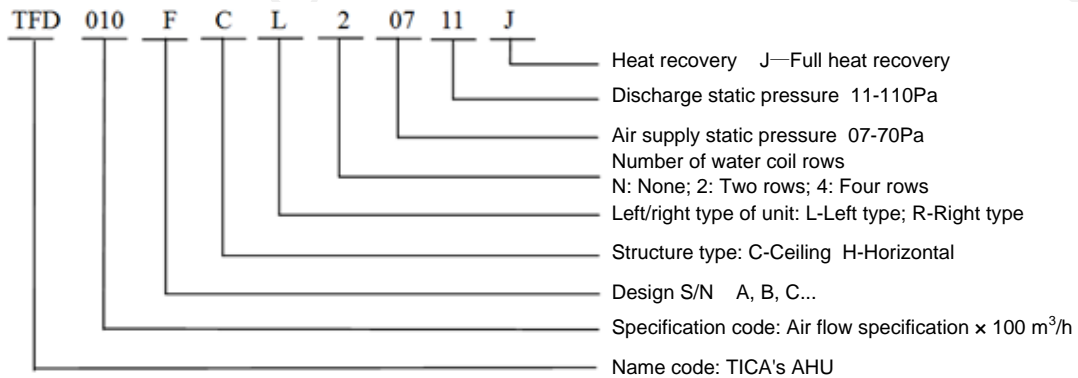
The copper tubes with aluminum fins are used in the heat exchanger. The copper tubes are expanded mechanically and as a result can closely touch the fins, greatly increasing the heat exchange efficiency. Using straight corrugated fins, the heat exchanger could be highly efficient and easy to maintain and clean as well. Though the aid of computer, the heat exchanger's pitch of fins is able to achieve its optimal value; its water flow process ensures that water velocity and inlet/outlet water temperature differences for heat exchangers at different sizes are within a reasonable range, and the problems of accumulated water and gas would be permanently resolved, making the unit safe and efficient to use.

- **Filter:**

The nylon filter is adopted, and the filter screen can be pulled out for washing and replaced conveniently. The chemical fiber or glass fiber filter is optional.

II. Model Description

Set out below is the model designation of TICA's heat recovery AHUs:



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

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

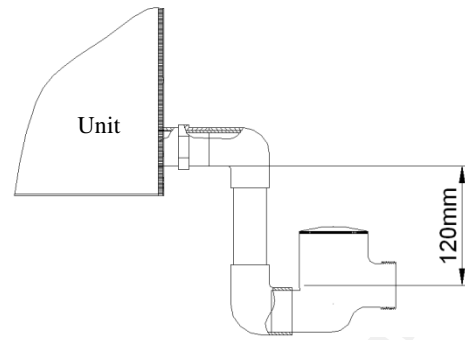
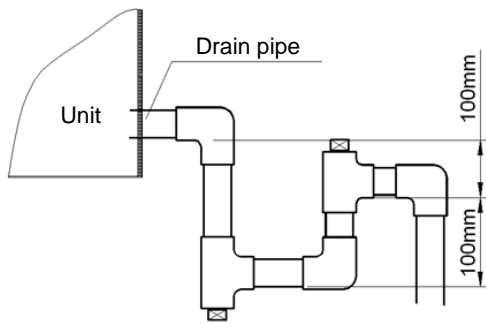
III. Installation

1. Installation

- (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 into 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 unit weight 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 discharge valve are set on the heat exchanger manifold of unit. The discharge 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.

2. 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. Please see the following figure.



U-shaped water seal installation diagram

Ball-type water seal installation diagram

- (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.

3. Installation of the Air System

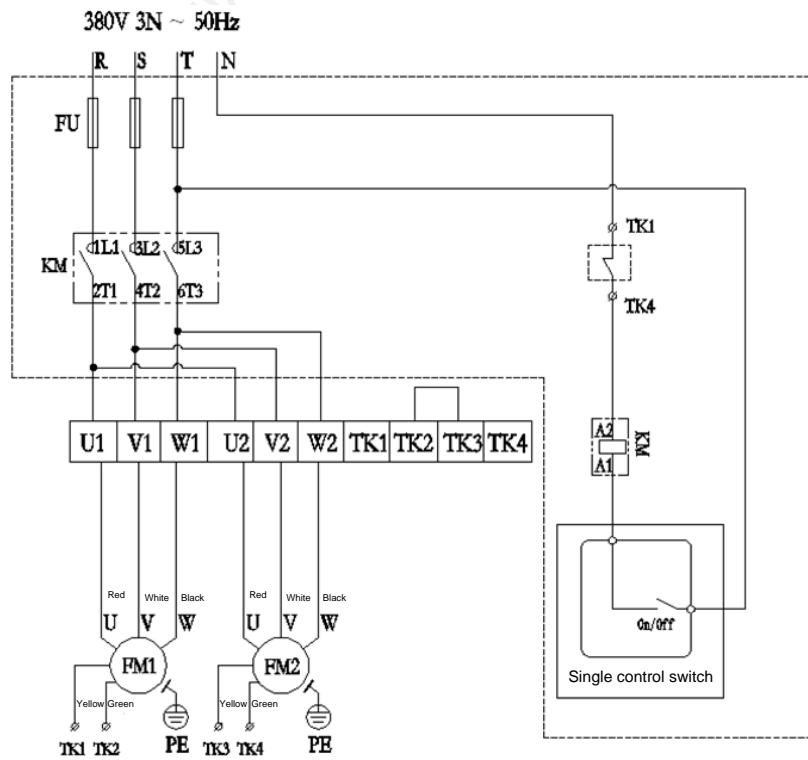
- (1) It is advised to put fresh air valve at fresh air inlet to adjust air flow.
- (2) The air inlet pipe and outlet pipe for the unit should be sealed to prevent air leakage.
- (3) Flexible connectors are used to connect the air inlet/outlet to the air duct of the unit. The unit cannot bear the air duct and other extra loads.

4. Electrical Installation

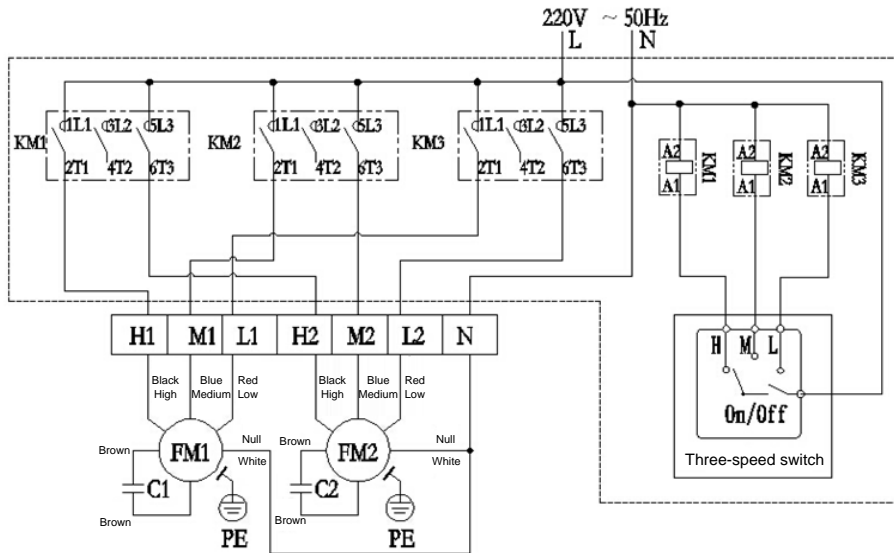
- (1) Circuit diagram

The figure below shows the general wiring diagram. Standard model does not contain what is in the dashed line box, which is for reference only.

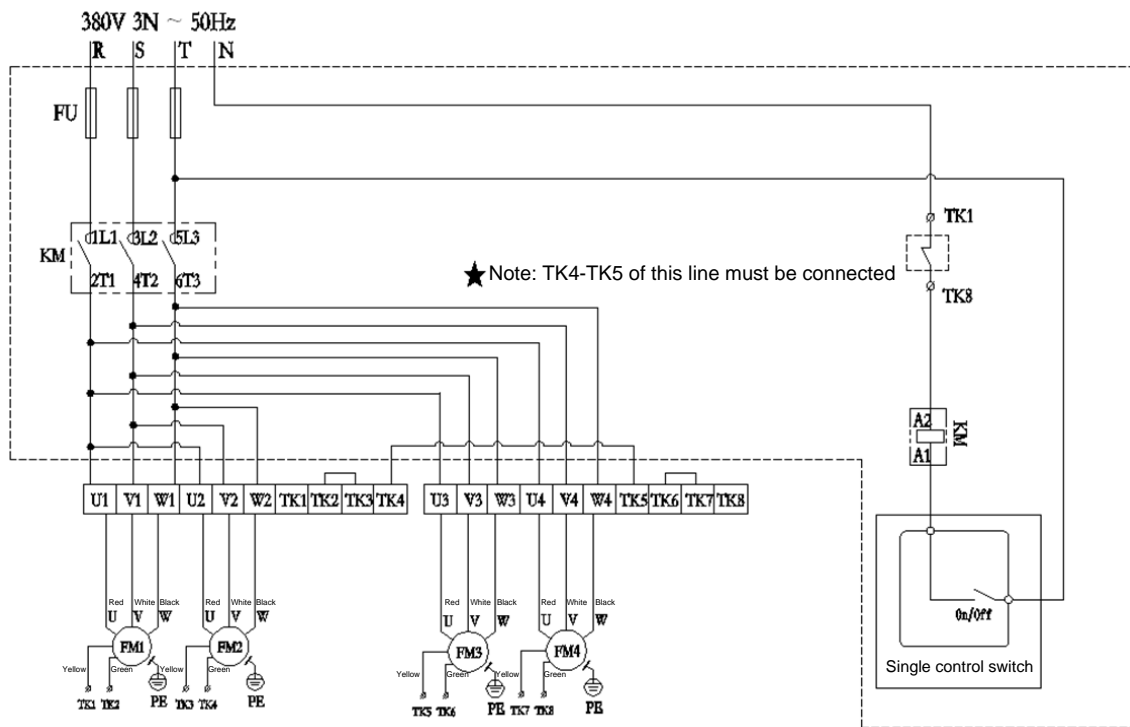
380V/3N- 50Hz



220V- 50Hz:



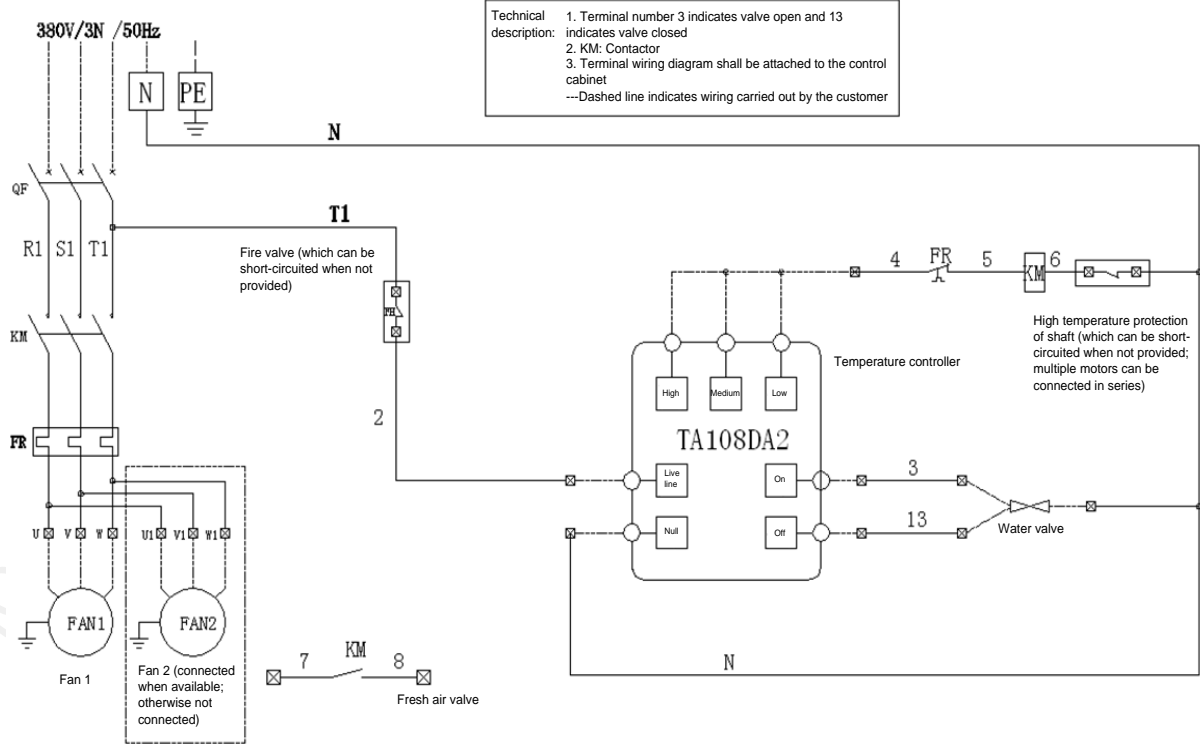
380V/3N- 50Hz: 4 fans



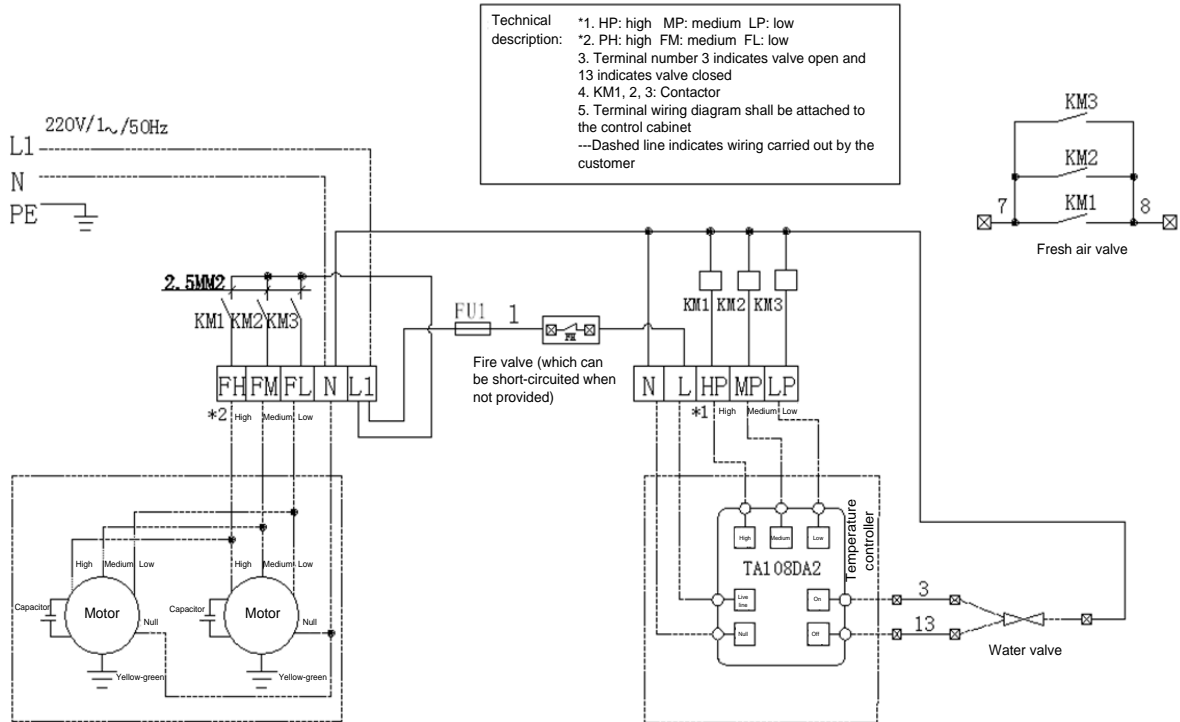
In the figure: KM indicates the contactor, and FU indicates fuse

- (2) Before wiring, check whether the power supply complies with the unit requirement, and whether the power voltage deviation exceeds $\pm 10\%$ of the rated voltage. The unit at $2500\text{m}^3/\text{h}$ air flow above adopts the three-phase voltage $380\text{V}/3\text{N}\sim/50\text{Hz}$ AC power supply, The unit at $1000\text{-}2000\text{m}^3/\text{h}$ air flow adopts $220\text{V} \sim 50\text{Hz}$ or $380\text{V}/3\text{N}\sim/50\text{Hz}$ power supply. Please make sure the unit is connected to the proper power supply.
- (3) 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.
- (4) When the unit motor power is less than 11kW , direct start connecting terminal is available for use; and when the unit motor power is greater than or equal to 11kW , star-delta start connecting terminal is available for use. During wiring, the customer needs to set overload, short circuit and overheat protection.
- (5) The circuit diagram for TICA's supporting control cabinet (optional) is show below:

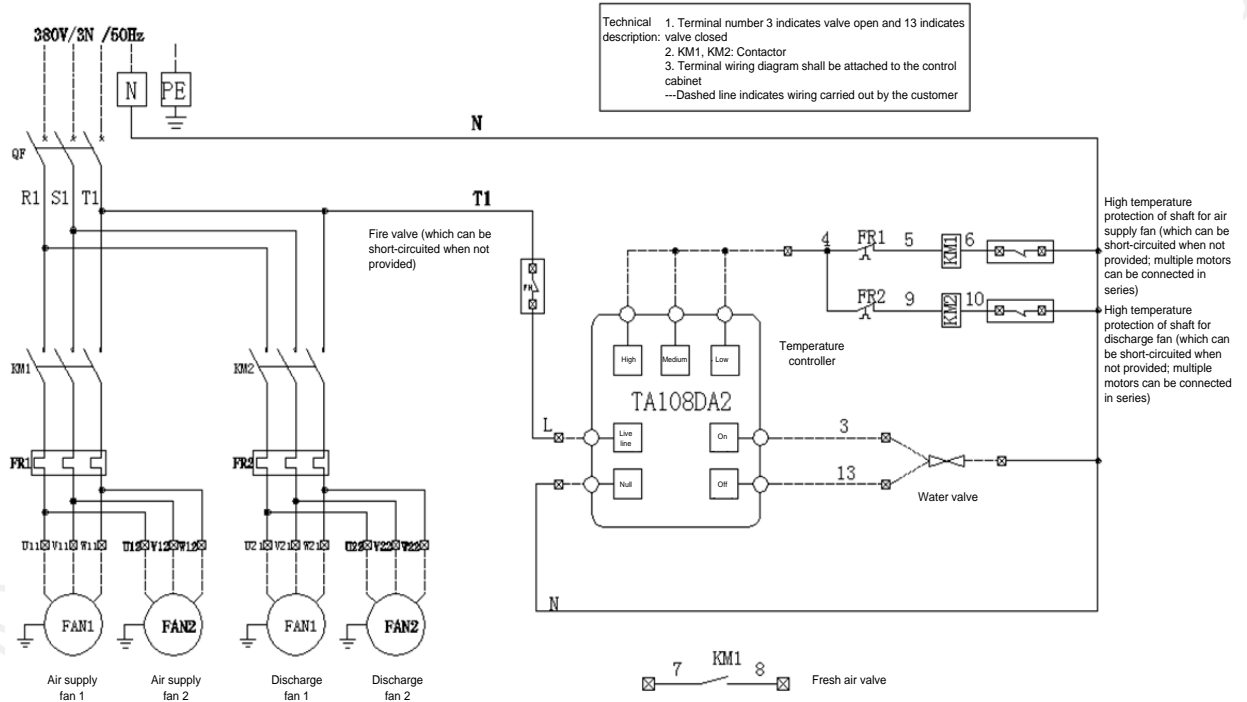
380V/3N- 50Hz:



220V- 50Hz:



380V/3N~/50Hz two blowers + two discharge fans:




IV. Debugging

1. Check

Before debugging and operation, the unit should be checked comprehensively. The check work should include the following aspects at least:

- Check whether the unit has been installed completely and whether foreign matters have been removed from the inside.
- Check whether the fan impeller of the rotating part rotates flexibly and whether it comes into contact with the shell, check the lubrication condition, and check whether all the regulating devices are flexible.
- Check whether all the air valves in the air system pipeline are opened according to the designed position, and whether the locking mechanism has been locked.
- Check whether the water system has been cleaned and air has been discharged from the system. The pipeline should be rinsed after the pipeline system has been installed. During cleaning, be sure to close the valve connected to the unit, lest foreign matters in the pipeline would be flushed into the coil and block the loop. Before filling water for use, open the discharge valve first to drain the air from the pipeline, and close it when water is discharged.
- Check whether the motor insulation is qualified. The winding may be damped when the motor stops operation for a long term. Before use, use a megohm meter to measure its insulation resistance.

The insulation resistance at 25°C should exceed 2 MΩ.

-  Note: After measurement, the winding must be discharged immediately to avoid electric shock. If the insulation resistance does not reach the reference value, the winding must be dried.
- Check whether the power voltage meets the requirement, whether the three-phase voltage is balanced, and whether the circuit wiring is correct. Before formal startup, the motor switch can be pressed for a trial to check whether the fan rotation direction is correct.

2. Trial Operation

The unit can be started after the above check work is completed. After the unit starts, note to check whether the motor operating current is normal and whether the unit sends abnormal sound. Check whether the unit air flow and air pressure are normal.

The following situation should be regarded as normal:

Noises

Noises will be generated when air flows at a high speed or the fan motor operates. Noises can be regarded to be normal so long as they are not higher than the value specified for the product sample or in the nameplate

or other contract documents.

Vibration

Certain vibration is generated when the fan motor rotates at a high speed. Vibration should be regarded to be normal when it is not higher than the value specified by the national standard or other contract documents.

V. Use and Maintenance

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

Check the unit operating status on a regular 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 lower than 0 °C in winter, water stored in the unit must be discharged (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 the 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.

VI. 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 fan footing gets loose.	4. Lock the footing fixing plate tight.
	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 again.
	7. The bearing contains dirt due to poor quality of the lubricating oil.	7. Use quality lubricating oil and clean the bearing.
The air supply flow is insufficient.	1. The filter screen is too dirty.	1. Clean the filter screen.
	2. The air duct sealing is poor.	2. Check the pipe 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.
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. Insufficient air supply volume results in insufficient cooling capacity.	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 in the 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 is not fresh.	1. The fresh air volume is insufficient.	2. Increase the opening of the fresh air valve.
		3. Clean the fresh air filter screen.
		4. Increase the cross sectional area of fresh air duct.

VII. After-sales Service and Warranty

After-sales Service

- Ask your distributor to perform maintenance work; improper maintenance or repair may lead to water leakage, electric shock, or fire.
- When the equipment needs to be moved or reinstalled, ask your distributor to do it; improper maintenance or repair may lead to water leakage, electric shock or fire.

Provide the following information when you request repair:

- Air conditioner model;
- Factory number and installation date;
- Details of the fault;
- Your name, address and telephone number.

Repair after the warranty period

Please contact your distributor.

Warranty check

After operation for several seasons, performance of air conditioners will be reduced on account of internal dust accumulation.

You are advised to sign a maintenance check contract with us. For details of the special service, contact your distributor.

Inquiry

For the after-sales service, contact your distributor.

VIII. Hazardous Substances

- This product complies with the environmental protection requirements of the Measures for the Administration of the Restricted Use of the Hazardous Substances Contained in Electrical and Electronic Products.
- Environmental protection service life: In the environmental protection service life, the user's normal use of this product will not cause serious pollution to the environment or cause serious damages to persons and properties. The service life is specified by TICA. The environmental protection service life is not equivalent to the service life of safe use.
- Recycling: When this product is not needed or its service life ends, recycle it according to the related national regulations on recycling of waste electrical and electronic products. Do not discard it at will.

Names and content of hazardous substances in products

Part name	Hazardous substance					
	Plumbum (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent chromium (Cr(VI))	Polybrominated biphenyl (PBB)	Polybrominated diphenyl ether (PBDE)
Plate- and cross-type total heat exchanging core	○	○	○	○	○	○
Fan	×	○	○	○	○	○
Motor	×	○	○	○	○	○
Body and its components	○	○	○	×	○	○
Heat exchanger	○	○	○	○	○	○

This table is prepared according to the provisions of SJ/T 11364.

○: It indicates that the content of this hazardous substance in all homogeneous materials in this part is below the limit requirement defined in GB/T 26572.

×: It indicates that the content of this hazardous substance in at least one homogeneous material in this part exceeds the limit requirement defined in GB/T 26572. Moreover, substitution cannot be implemented at present due to technical reasons, and it will be improved gradually along with technical progress in the future.

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