

PRO
TICA PRO



INSTALLATION & OPERATION MANUAL

Air to water heat pump
- split series



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I. Check List

Inspect the following items against the list after unpacking the product, and make sure that the IDU and ODU comply with the information on the nameplates. For any queries, consult your local distributor or call TICA hotline.

No.	Name	Qty	Instruction for Use	Applicable model	Remarks
1	ODU	1 set	/	/	/
2	IDU	1 set	/	/	
3	Connecting copper pipe	1	Connected to check valve of refrigerant gas pipe for ODU	All models	For ODU
4	Qualification certificate	1	/	All models	
5	Warranty card	1	For unit warranty	All models	
6	Installation & Operation Manual	1	To guide unit installation and use	All models	For IDU
7	Qualification certificate	1	/	All models	
8	Drainage pipe	1	Connected to condensate water drainage outlet of IDU	Wall-mounted units	
9	Pipe clamp	2	To fix the drainage pipe of IDU		
10	Mounting panel	1	To facilitate IDU installation		
11	Heat insulation pipe	1	For insulating discharge valve of IDU	Ceiling-mounted units	
12	Nut	2	To connect refrigerant gas/liquid pipe of IDU		
13	Terminal block	6	To connect to the power cords of IDU and ODU		
14	Air discharge valve	1	For indoor heat exchanger discharge		
15	Hose	1	To connect discharge valve of IDU		
16	Wired controller	1	For powering on/off the unit		
17	Communication line	1	For connecting IDU and wired controller		
18	Safety valve	1	To facilitate IDU external pipeline installation		

Note: Models involved

Wall-mounted IDUs	TSCI120/140/160FHL TSCI120/140/160FHLN
Ceiling-mounted IDUs	TSCI120/140/160/180/200FHLN TSCI120/140/160/180/200FHLN
ODUs	TSCA120/140/160/180/200FHL

II. Must-read for Users

Read the Installation & Operation Manual thoroughly before installing and using the equipment and keep it for future reference.

- Only TICA authorized personnel can install TICA inverter type household air source heat pump chiller (heat pump). The installation must comply with the requirements of the company. TICA assumes no liabilities for losses arising from improper operations, including but not limited to pipe leakage, electric leakage and adverse effect or damages on the equipment.
- Reserve enough space for equipment installation strictly in accordance with the Manual. Otherwise, the heat exchange effect may be compromised.
- Install a residual current device between the power supply and the equipment.
- When the equipment is available for commissioning upon installation, call TICA's hotline to request equipment commissioning service. The equipment is usable only after a commissioning test is done. TICA assumes no liabilities for any losses arising from unauthorized access to the equipment.
- The equipment shall undergo regular maintenance and servicing after it is installed. In case of an abnormality, stop using it immediately and call TICA's hotline to report such event.
- Do not put your finger or other objects into a running equipment as it may cause personal injuries.
- If any parts are soaked in water, contact TICA's personnel to check or repair it before use again.
- Never drink or use the water in the unit for daily lives.
- All the circuits must be dedicated. The IDU and ODU must be reliably grounded.
- Contact a qualified electrician to check electricity meter, circuit breaker and wire diameter to make sure that they meet the maximum operating current requirement.
- If the ambient temperature is lower than 5°C and a power failure occurs, be sure to thoroughly drain water from the unit and pipeline. If the ambient temperature is lower than 5°C and the water system is fully filled with water, ensure that the unit is in the power-up state, and the chilled water circulating pump of the air conditioner is interlocked with the modular chiller. In this way, the modular unit can automatically control the water pump operation or heating operation, thereby implementing automatic anti-freezing protection of the air conditioning water system. The purpose is to protect facilities such as the unit and water pipeline against damage caused by freezing of water in the pipeline of the air conditioning water system. When the unit is energized, the unit may consume a certain amount of electricity to prevent it from freezing.
- If the ambient temperature is higher than 5°C, especially in summer, do not drain water to prevent air from flowing into the pipeline and causing internal rust and corrosion, and ensure normal water pressure of the system. Check the water quality before you turn on the unit next time. If the water quality is bad, replace the water and clean the filter.
- TICA assumes no liabilities for any losses arising from commissioning, maintenance or servicing by unauthorized personnel or from using the equipment other than the purposes contained within this

Manual.

- If the power cord is damaged, to avoid dangers, make sure to ask a professional from the manufacturer or its maintenance department or similar department to replace it.
- Nanjing TICA Climate Solutions Co., Ltd. reserves the right to interpret this Manual.

Caution: Failure to observe this Manual may cause fire, losses, personal injury or even be fatal.

Warning: The power supply of this equipment must be reliably grounded before use. Within close proximity of the inverter type household air source heat pump chiller (heat pump), there must be a well-functioning floor drain. In addition, water leakage of the unit or from the joints in the unit installation area shall not do any harm to adjacent items or the bottom floor of the building.

Warning: Never use refrigerant to discharge the gas in the IDU and within the pipe connecting the IDU and ODU. Use the vacuum pump for vacuumizing instead.

III. Product Overview

1. Overview

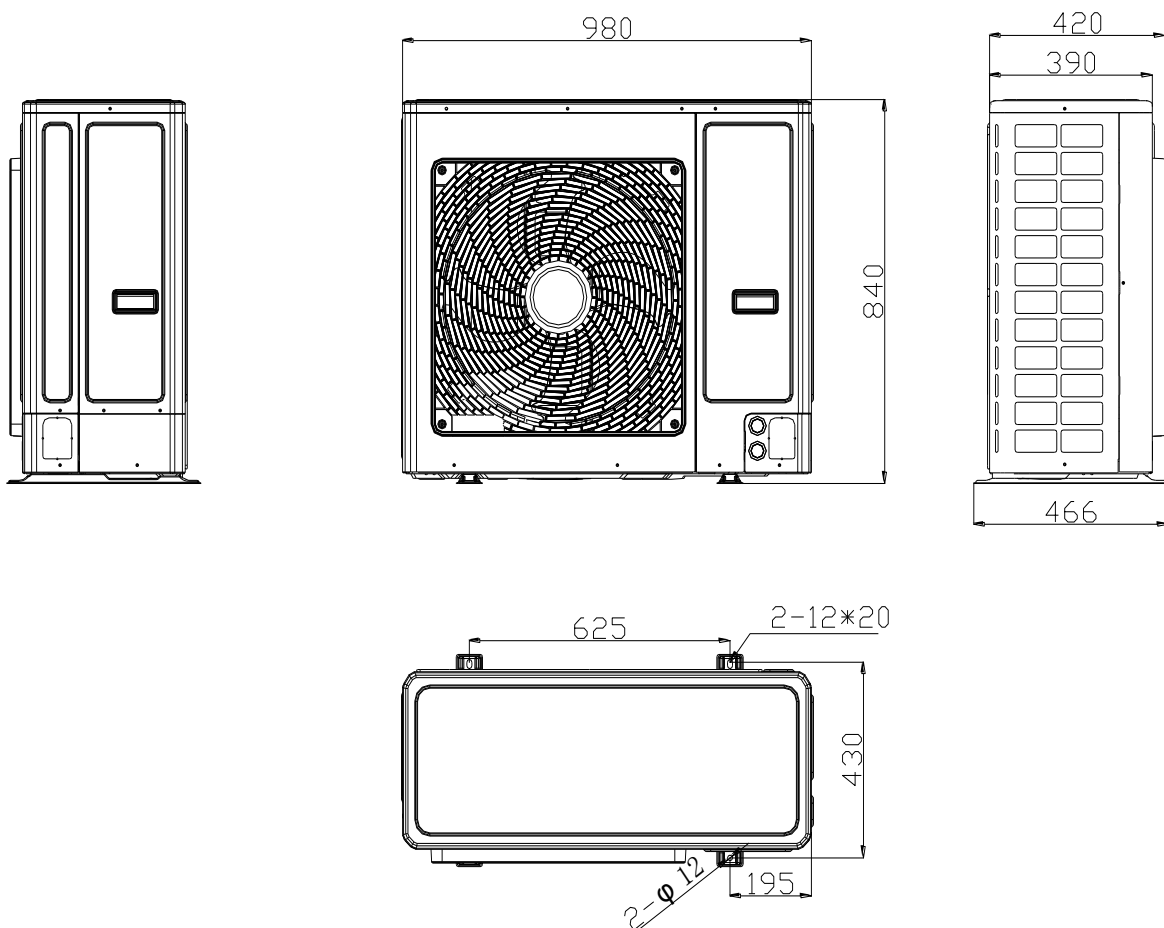
The inverter type household air source heat pump chiller (heat pump) consists of IDUs and ODUs. The IDUs and ODUs are connected through refrigerant pipelines. The inlet and outlet of IDU water pipes are connected to the air side products. In this way, the unit is able to offer hot/cold water to each air side product, which could facilitate heat exchange in the room and therefore heat/cool the room. It generally uses FCU for cooling and FCU, floor heating or radiator for heating. It is not recommended to use two different types of air side products for heating in the same system, considering the different water temperatures and resistances used at different air side products.

2. Outside View and Structure

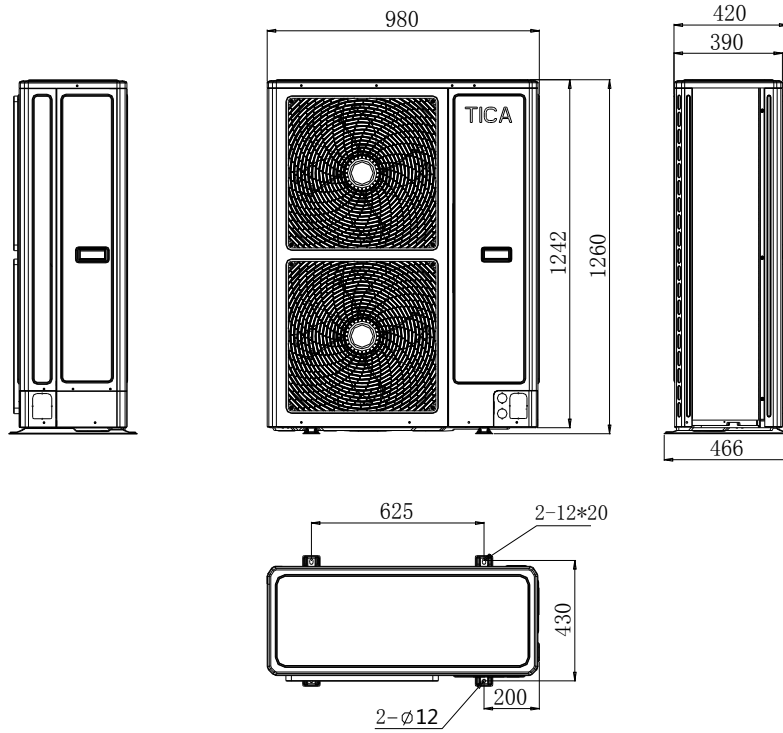
(1) Outside view

1) ODU Outline Drawing

(1) TSCA120FHL/TSCA140FHL/TSCA160FHL

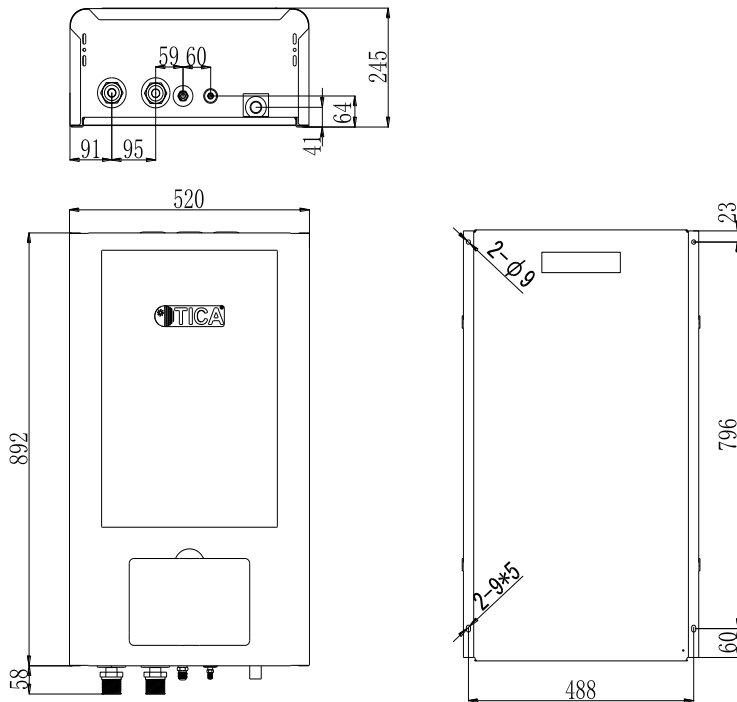


(2) TSCA180FHL/TSCA200FHL

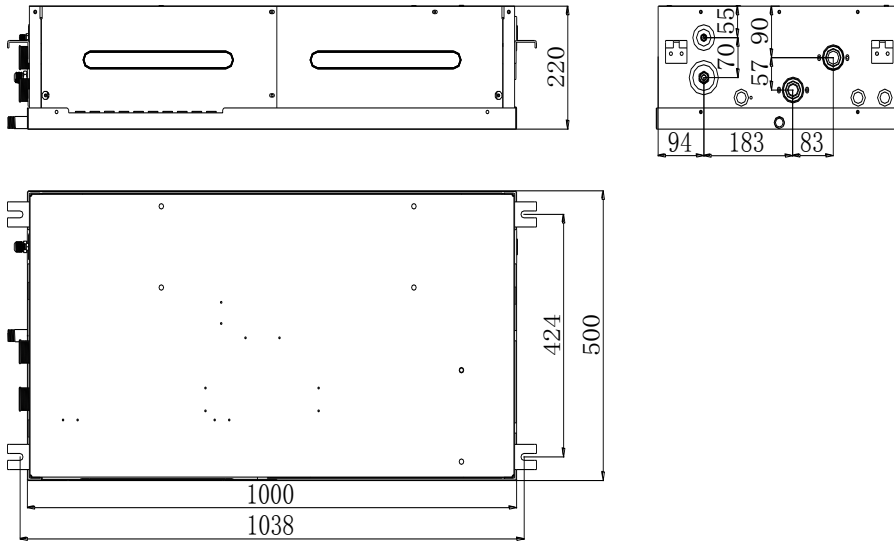


2) IDU Outline Drawing

(1) TSCI120FHL/TSCI140FHL/TSCI160FHL/TSCI120FHLN/TSCI140FHLN/TSCI160FHLN

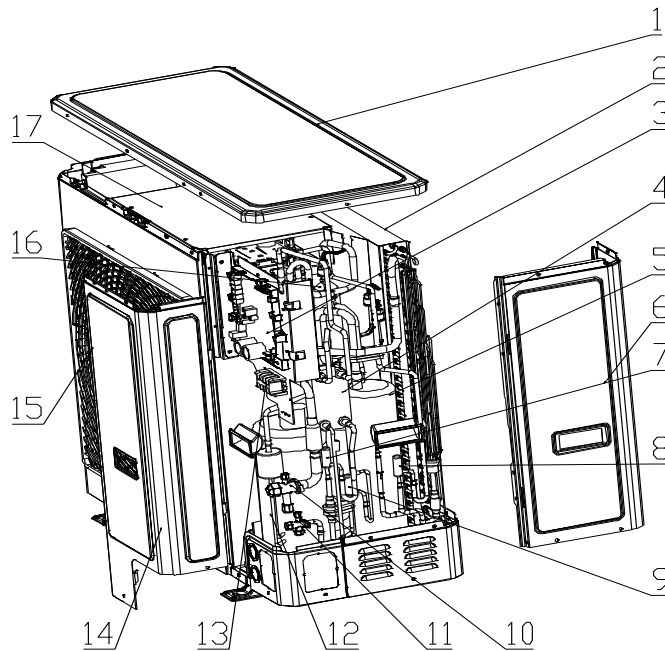


(2) TSCI120FHLD/TSCI140FHLD/TSCI160FHLD/TSCI180FHLD/TSCI200FHLD
TSCI120FHLDN/TSCI140FHLDN/TSCI160FHLDN/TSCI180FHLDN/TSCI200FHLDN



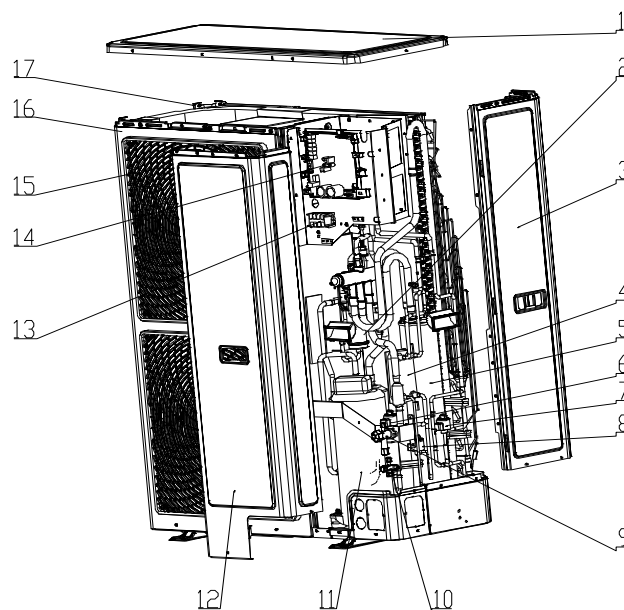
(2) Structure of ODU

1) TSCA120FHL/TSCA140FHL/TSCA160FHL



- 1) Upper cover 2) Heat exchanger 3) Main control board 4) Economizer
- 5) Gas-liquid separator 6) Right rear panel 7) Electronic expansion valve for cooling
- 8) Electronic expansion valve for heating 9) Air suction electronic expansion valve
- 10) Gas check valve 11) Liquid check valve 12) Compressor
- 13) Power cord terminal block 14) Front panel 15) Grille 16) Oil separator
- 17) Electric control box assembly

2) TSCA180FHL/TSCA200FHL

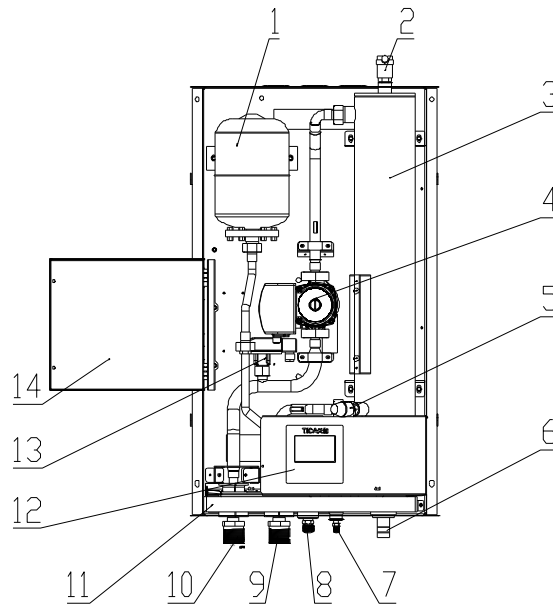


- 1) Upper cover 2) Oil separator 3) Rear panel 4) Plate heat exchanger 5) Gas-liquid separator

- 6) Electronic expansion valve for cooling 7) Electronic expansion valve for heating
- 8) Air suction electronic expansion valve 9) Gas check valve 10) Liquid check valve
- 11) Compressor 12) Front panel 13) Power cord terminal block
- 14) Electric control box assembly 15) Grille 16) Panel 17) Rear column

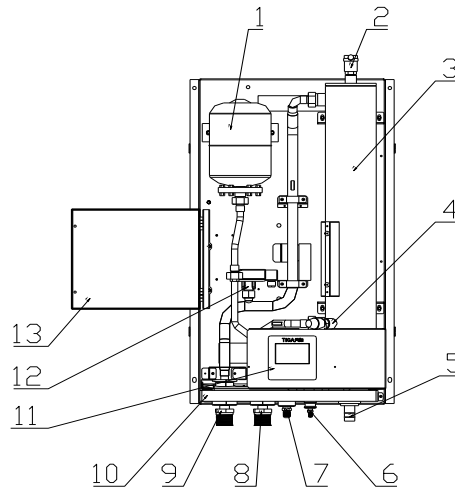
(3) Structure of IDU

- 1) TSCI120FHL/TSCI140FHL/TSCI160FHL



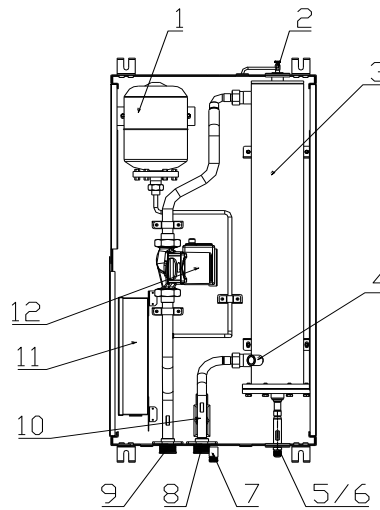
- 1) Expansion tank 2) Automatic air discharge valve
- 3) Shell-and-tube heat exchanger 4) Water pump 5) Safety valve
- 6) Drain pipe adapter 7) Refrigerant liquid pipe connector
- 8) Refrigerant gas pipe connector 9) Inlet water pipe connector
- 10) Outlet water pipe connector 11) Drainage pan 12) Wired controller
- 13) Water flow switch 14) Electric control box assembly

2) TSCI120FHLN/TSCI140FHLN/TSCI160FHLN



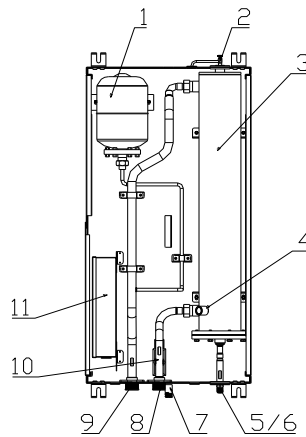
- 1) Expansion tank 2) Automatic air discharge valve
- 3) Shell-and-tube heat exchanger 4) Safety valve 5) Drain pipe adapter
- 6) Refrigerant liquid pipe connector 7) Refrigerant gas pipe connector
- 8) Inlet water pipe connector 9) Outlet water pipe connector 10) Drainage pan
- 11) Wired controller 12) Water flow switch 13) Electric control box assembly

3) TSCI120FHLD/TSCI140FHLD/TSCI160FHLD/TSCI180FHLD/TSCI200FHLD



- 1) Expansion tank 2) Manual air discharge valve
- 3) Shell-and-tube heat exchanger 4) Safety valve
- 5) Refrigerant liquid pipe connector 6) Refrigerant gas pipe connector
- 7) Drain pipe adapter 8) Inlet water pipe connector 9) Outlet water pipe connector
- 10) Water flow switch 11) Electric control box assembly 12) Water pump

4) TSCI120FHLDN/TSCI140FHLDN/TSCI160FHLDN/TSCI180FHLDN/TSCI200FHLDN



- 1) Expansion tank 2) Manual air discharge valve
- 3) Shell-and-tube heat exchanger 4) Electric control box assembly
- 5) Safety valve 6) Drain pipe adapter 7) Refrigerant liquid pipe joint
- 8) Refrigerant gas pipe joint 9) Water inlet pipe joint 10) Water outlet pipe joint
- 11) Water flow switch

3. Specifications

Wall-mounted	Entire unit	TSCA/I120FHL	TSCA/I140FHL	TSCA/I160FHL
	ODU	TSCA120FHL	TSCA140FHL	TSCA160FHL
	IDU	TSCI120FHL	TSCI140FHL	TSCI160FHL
Heating capacity 1	Nominal heating capacity (kW)	12.50	14.20	16.00
	Rated power input (kW)	3.20	3.74	4.26
	COP _h (kW/kW)	3.91	3.80	3.76
Heating capacity 2	Nominal heating capacity (kW)	11.50	14.00	15.80
	Rated power input (kW)	3.32	4.36	5.02
	COP _h (kW/kW)	3.46	3.21	3.15
Cooling capacity 1	Nominal cooling capacity (kW)	12.00	13.50	14.50
	Rated power input (kW)	4.24	5.01	5.56
	EER	2.83	2.69	2.61
Cooling capacity 2	Nominal cooling capacity (kW)	12.00	13.50	14.50
	Rated power input (kW)	2.80	3.35	3.82
	EER	4.29	4.03	3.80
Seasonal space heating energy efficiency class	LWT at 35°C	A+++	A+++	A+++
	LWT at 55°C	A++	A++	A++
SCOP	LWT at 35°C	4.65	4.60	4.52
	LWT at 55°C	3.45	3.40	3.31
Circulating water flow (m ³ /h)		2.06	2.41	2.75
Pump type		Variable frequency canned pump (Optional)		
Power supply		220-240V ~50Hz	220-240V ~50Hz	220-240V ~50Hz
Maximum total power (kW)	ODU	7.00	7.00	7.00
	IDU	0.30	0.30	0.30
Maximum operating current (A)	ODU	35.0	35.0	35.0
	IDU	1.36	1.36	1.36
Applicable ambient temperature (°C)	Cooling	-15~55	-15~55	-15~55
	Heating	-25~48	-25~48	-25~48

Maximum permissible pressure on high pressure side (MPa)		4.2	4.2	4.2
Maximum permissible pressure on low pressure side (MPa)		3.0	3.0	3.0
Maximum operating pressure of water system (MPa)		0.5	0.5	0.5
Refrigerant/Charge quantity		R410A/3.05kg	R410A/3.05kg	R410A/3.05kg
Sound power level (dB(A)) ODU		67	69	70
Sound power level (dB(A)) IDU		45	45	45
Unit external lift (mH ₂ O)		9.5	8.0	6.5
IP rating	ODU	IPX4, and applies to outdoor applications	IPX4, and applies to outdoor applications	IPX4, and applies to outdoor applications
Refrigerant pipeline connection	Gas/liquid pipe diameter (mm)	φ19.05/φ9.52	φ19.05/φ9.52	φ19.05/φ9.52
	Connection mode	Pipe socket		
Circulating water pipe connection	Water inlet/outlet pipe diameter	DN32	DN32	DN32
	Connection mode	External thread (R 1-1/4')		
Net weight (kg)	ODU	96	96	96
	IDU	53	53	53

Wall-mounted Without water pump	Entire unit	TSCA/I120FHLN	TSCA/I140FHLN	TSCA/I160FHLN
	ODU	TSCA120FHL	TSCA140FHL	TSCA160FHL
	IDU	TSCI120FHLN	TSCI140FHLN	TSCI160FHLN
Heating capacity 1	Nominal heating capacity (kW)	12.50	14.20	16.00
	Rated power input (kW)	3.20	3.74	4.26
	COP _h (kW/kW)	3.91	3.80	3.76
Heating capacity 2	Nominal heating capacity (kW)	11.50	14.00	15.80
	Rated power input (kW)	3.32	4.36	5.02
	COP _h (kW/kW)	3.46	3.21	3.15
Cooling capacity 1	Nominal cooling capacity (kW)	12.00	13.50	14.50
	Rated power input (kW)	4.24	5.01	5.56
	EER	2.83	2.69	2.61

Cooling capacity 2	Nominal cooling capacity (kW)	12.00	13.50	14.50
	Rated power input (kW)	2.80	3.35	3.82
	EER	4.29	4.03	3.80
Seasonal space heating energy efficiency class	LWT at 35°C	A+++	A+++	A+++
	LWT at 55°C	A++	A++	A++
SCOP	LWT at 35°C	4.65	4.60	4.52
	LWT at 55°C	3.45	3.40	3.31
Circulating water flow (m ³ /h)		2.06	2.41	2.75
Pump type		Variable frequency canned pump(Optional)		
Power supply		220-240V ~50Hz	220-240V ~50Hz	220-240V ~50Hz
Maximum total power (kW)	ODU	7.00	7.00	7.00
	IDU	0.30	0.30	0.30
Maximum operating current (A)	ODU	35.0	35.0	35.0
	IDU	1.36	1.36	1.36
Applicable ambient temperature (°C)	Cooling	-15~55	-15~55	-15~55
	Heating	-25~48	-25~48	-25~48
Maximum permissible pressure on high pressure side (MPa)		4.2	4.2	4.2
Maximum permissible pressure on low pressure side (MPa)		3.0	3.0	3.0
Maximum operating pressure of water system (MPa)		0.5	0.5	0.5
Refrigerant/Charge quantity		R410A/3.05kg	R410A/3.05kg	R410A/3.05kg
Sound power level (dB(A)) ODU		67	69	70
Sound power level (dB(A)) IDU		45	45	45
Unit external lift (mH ₂ O)		9.7	8.5	7.5
IP rating	ODU	IPX4, and applies to outdoor applications	IPX4, and applies to outdoor applications	IPX4, and applies to outdoor applications
Refrigerant pipeline connection	Gas/liquid pipe diameter (mm)	φ19.05/φ9.52	φ19.05/φ9.52	φ19.05/φ9.52
	Connection mode	Pipe socket		
Circulating water pipe connection	Water inlet/outlet pipe diameter	DN32	DN32	DN32
	Connection mode	External thread (R 1-1/4')		
Net weight (kg)	ODU	96	96	96

	IDU	53	53	53
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Ceiling	Entire unit	TSCA/I120 FHL	TSCA/I140 FHL	TSCA/I160 FHL	TSCA/I180 FHL	TSCA/I200 FHL
	ODU	TSCA120 FHL	TSCA140 FHL	TSCA160 FHL	TSCA180 FHL	TSCA200 FHL
	IDU	TSC1120 FHL	TSC1140 FHL	TSC1160 FHL	TSC1180 FHL	TSC1200F HLD
Heating capacity 1	Nominal heating capacity (kW)	12.5	14.2	16	18.5	21
	Rated power input (kW)	3.2	3.74	4.26	4.31	5.07
	COP _h (kW/kW)	3.91	3.8	3.76	4.29	4.14
Heating capacity 2	Nominal heating capacity (kW)	11.5	14	15.8	19	21.0
	Rated power input (kW)	3.32	4.36	5.02	6.07	6.82
	COP _h (kW/kW)	3.46	3.21	3.15	3.13	3.08
Cooling capacity 1	Nominal cooling capacity (kW)	12	13.5	14.5	17.5	19.5
	Rated power input (kW)	4.24	5.01	5.56	6.22	7.29
	EER	2.83	2.69	2.61	2.81	2.67
Cooling capacity 2	Nominal cooling capacity (kW)	12	13.5	14.5	18.5	22.0
	Rated power input (kW)	2.8	3.35	3.82	4.86	5.94
	EER	4.29	4.03	3.80	3.81	3.70
Seasonal space heating energy efficiency class	LWT at 35°C	A+++	A+++	A+++	-	-
	LWT at 55°C	A++	A++	A++	-	-
SCOP	LWT at 35°C	4.65	4.6	4.52	4.71	4.66
	LWT at 55°C	3.45	3.4	3.31	3.58	3.53
Circulating water flow (m ³ /h)		2.06	2.41	2.75	3.10	3.44
Pump type		Variable frequency canned pump (Optional)				
Power supply	ODU	220-240V ~50Hz	220-240V ~50Hz	220-240V ~50Hz	380-415V ~50Hz	380-415V ~50Hz
	IDU	220-240V ~50Hz	220-240V ~50Hz	220-240V ~50Hz	220-240V ~50Hz	220-240V ~50Hz
Maximum total	ODU	7	7	7	8	8

power (kW)	IDU	0.3	0.3	0.3	0.3	0.3
Maximum operating current (A)	ODU	35	35	35	15	15
	IDU	1.36	1.36	1.36	1.36	1.36
Applicable ambient temperature (°C)	Cooling	-15~55	-15~55	-15~55	-15~55	-15~55
	Heating	-25~48	-25~48	-25~48	-25~48	-25~48
Maximum permissible pressure on high pressure side (MPa)		4.2	4.2	4.2	4.2	4.2
Maximum permissible pressure on low pressure side (MPa)		3.0	3.0	3.0	3.0	3.0
Maximum operating pressure of water system (MPa)		0.5	0.5	0.5	0.5	0.5
Refrigerant/Charge quantity		R410A/3.0 5kg	R410A/3.0 5kg	R410A/3.0 5kg	R410A/4.4 0kg	R410A/4.4 0kg
Sound power level (dB(A)) ODU		67	69	70	71	71
Sound power level (dB(A)) IDU		45	45	45	45	45
Unit external lift (mH ₂ O)		9.7	8.5	7.5	5.5	4
IP rating	ODU	IPX4, and applies to outdoor applications	IPX4, and applies to outdoor applications	IPX4, and applies to outdoor applications	IPX4, and applies to outdoor applications	IPX4, and applies to outdoor applications
Refrigerant pipeline connection	Gas/liquid pipe diameter (mm)	φ19.05/φ9.52	φ19.05/φ9.52	φ19.05/φ9.52	φ19.05/φ9.52	φ19.05/φ9.52
	Connection mode	Pipe socket				
Circulating water pipe connection	Water inlet/outlet pipe diameter	DN32	DN32	DN32	DN32	
	Connection mode	External thread (R 1-1/4')				
Net weight (kg)	ODU	96	96	96	115	115
	IDU	53	53	53	53	53

Notes: 1) Heating capacity 1: Outdoor air temperature 7°C DB, 85% R.H.; EWT 30°C, LWT 35°C

Heating capacity 2: Outdoor air temperature 7°C DB, 85% R.H.; EWT 40°C, LWT 45°C.

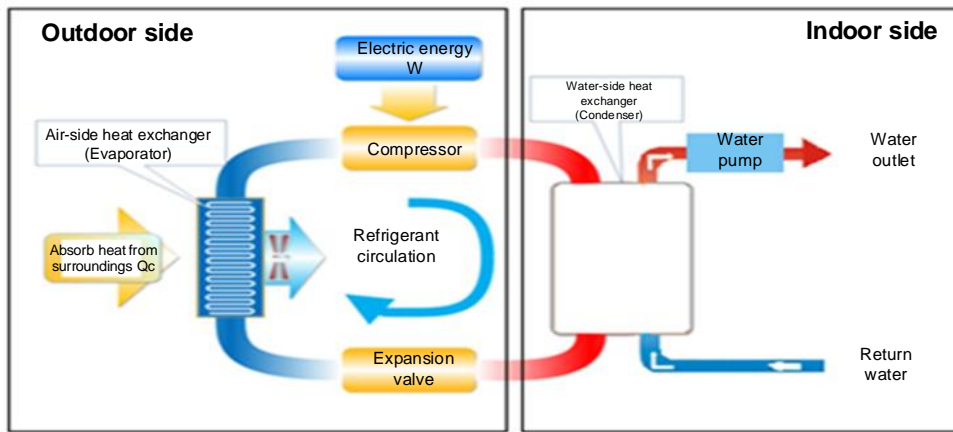
cooling capacity1: Outdoor air temperature 35°C DB; EWT 12°C, LWT 7°C.

cooling capacity2: Outdoor air temperature 35°C DB; EWT 23°C, LWT 18°C.

- 2) Due to the continuous improvement and innovation of TICA products, the product models, parameters and performance in this document are subject to changes without prior notice. The parameters indicated on the nameplate should prevail.
- 3) Please refer to the maximum total power and maximum operating current during power distribution.
- 4) The ODU has been charged with refrigerant.

4. System Scheme

The system scheme for this unit is provided below:



5. Features

(1) Powerful cooling/heating

By utilizing the EVI (Enhanced Vapour Injection) compressor, the unit is able to cool/heat the room via three electronic expansion valves and overcome the problems of great attenuation for traditional air source heat pump units at a low/high ambient temperature, thus greatly improving the heating/cooling capacity under extreme temperatures.

(2) Power failure memory function

The wired controller can automatically store the unit status (ON/OFF) each time before the inverter type household air source heat pump chiller (heat pump) is powered off. When the unit is powered on again, the wired controller sends power-on/off signal to the unit according to the stored status before power-off, to ensure that the unit could operate as previously set.

(3) Multi-grade anti-freezing protection

At low ambient temperatures, in particular, when the ambient temperature is below 0°C, the water system of the inverter type household air source heat pump chiller (heat pump) will most likely fail to work properly due to frozen water pipes. By utilizing TICA's unique multi-grade anti-freezing technology, our inverter type household air source heat pump chiller (heat pump) could determine when to enter or exit anti-freezing protection depending on the ambient conditions, and therefore guarantee steady operation of the unit to the greatest extent.

(4) Intelligent defrosting

In conditions with low ambient temperature and high relative humidity, the heating capability of the unit will decrease with the accumulation of frost on the surface of the fin. To address this issue, the unit adopts a control system to implement fast auto defrosting.

(5) Auxiliary heat source

In places where the ambient temperature is very low, an auxiliary heat source that could provide certain heating capacity should be equipped to improve the heating capacity of the system and ensure normal and reliable heating.

Regardless of the auxiliary heat source used, the unit provides one control signal that tells the peripheral equipment to turn the auxiliary heat source on or off. The auxiliary heat source requires additional independent control and separate configuration of the corresponding safety protection functions.

IV. Unit Installation

Notes:* Upon receiving the unit, check whether the unit model is correct, accessories complete and the appearances of the unit intact. If you find any damages or you have other problems, please immediately call TICA's hotline 4008-601-601.

- * Before installation, make sure that the unit power is consistent with its electricity meter capacity and power cords.

1. Use instructions for air side products

The unit consists of IDU, ODU and air side products (selected based on actual conditions). The air side product for cooling can be a FCU; The air side product for heating can be a floor heating, FCU or radiator. It is recommended to use floor heating as it requires lower water temperature while running with higher efficiency. If using radiator as the air side product for heating, use steel radiator. Steel radiator is also a good fit for the inverter type household air source heat pump chiller (heat pump) as it features abundant volume of water capacity and reduced heat losses at a low water temperature.

When selecting the model of an air side product, note to calculate the load of it in light of local design standard. If the model is inappropriate, the inverter type household air source heat pump chiller (heat pump) may be faulty or fail to provide adequate cooling/heating capacity.

If floor heating is used, observe relevant national standard or local standard on floor heating layout.

If FCU is used as an air side products for cooling/heating, consult your manufacturer on selecting appropriate models and on installation.

If radiator is used as an air side product for heating, consult your manufacturer on selecting appropriate models and on installation.

Taking into consideration of the unit features and to ensure reliable operation of the unit, the water outlet temperature of the unit is lower than that of the boiler when the unit operates in winter. Therefore, if radiator is used, add enough number of radiators to maintain the temperature in an acceptable range. The number of radiators to be added depends on the attenuation coefficient of radiator. The user can also consult the radiator manufacturer on the number to be added.

The air side products of this unit should meet the system cool/heat load, water pressure, water resistance and water quality among other requirements.

Installation of the air side product shall comply with relevant standard or requirement of the manufacturer.

2. Unit Installation and Connection Diagram

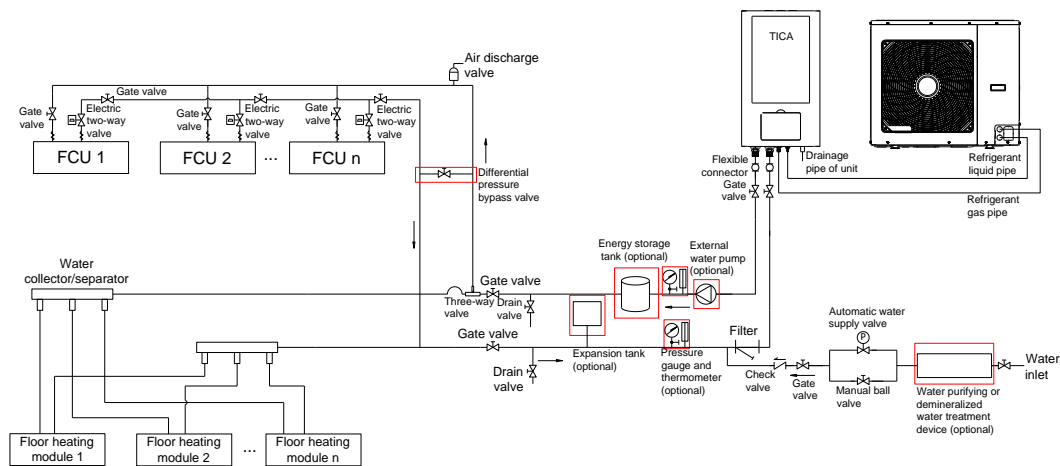


Diagram of combined FCU and floor heating

- Note: 1) In FCU cooling mode, the FCU should be connected for cooling; while in FCU heating mode, floor heating mode and floor heating preservation mode, the FCU, floor heating and radiators should be connected for heating. It is not recommended to use two different types of air side products for heating in the same system, considering the different water temperature and resistance used at different air side products.
- 2) Except the chillers (IDU and ODU), the user needs to prepare the air side products, connecting pipes and pipe fittings.
- 3) Decide whether the external water pump, energy storage tank, expansion tank, water purifying or demineralized water treatment device, pressure gauge, thermometer, and differential pressure bypass valve shown in the figures are needed according to the actual use conditions of the water system. If the model does not have internal water pump, be sure to provide an external water pump to ensure normal operation of the system. Provide other components based on the circumstances.
- 4) The air discharge valve needs to be installed at the highest position of the water system; the water drain valve needs to be installed at the lowest position of the water system. The air discharge valve should be installed where air discharge is unobstructed. It should avoid furniture and interior decoration, lest water leakage of air discharge valve damage the furniture or interior decoration.
- 5) After the air side product system is debugged, do not adjust the pipeline system valve without permission; otherwise the unit may fail to operate normally or be damaged.
- 6) The unit provides three-way valve control signal to realize water system switching between cooling and heating.

Note: For an air side product, an electric two-way valve is recommended together with a differential pressure bypass valve. The differential pressure bypass valve must ensure the minimum water flow in the unit when only few FCUs are opened or all FCUs are closed. The purpose is to prevent an excessive number of closed 2-way valves under partial load operating conditions. Otherwise, the water resistance is too large, the pump is overloaded and damaged, the water flow fails, and the unit cannot work properly.

3. Pre-check

(1) Water quality check

- The water pumped into the unit must comply with the existing Sanitary Standard for Drinking Water. It is recommended to use water with low hardness, preferably the softened water. Never use water from seas, rivers or lakes or water directly from underground without treatment as it may damage the precision parts of the unit.
- If the water does not comply with the quality standard, it is necessary to install water purifying or softening devices at the water inlet.
- Do not use the scale inhibitor or preservatives until they are confirmed to be non-corrosive to stainless steel or copper products and to be unharmed to the unit's heat exchanging ability.

(2) Water volume check

Model	Minimum water volume (V_{min})
TSCA/I120FHL /FHLD/ FHLN /FHLDN	100L
TSCA/I140FHL /FHLD/ FHLN /FHLDN	120L
TSCA/I160FHL /FHLD/ FHLN /FHLDN	140L
TSCA/I180FHLD/FHLDN	160L
TSCA/I200FHLD/FHLDN	180L

The water volume of the cooling/heating water system should be checked separately, and both should meet the requirement of the minimum water volume mentioned above.

Water system volume (V) check: a. When $V \geq V_{min}$, no energy storage tank is required.
 b. When $V < V_{min}$, add an energy storage tank
 (tank volume: $V_n \geq V_{min} - V$)

Notes:

- 1) The energy storage tank must be a closed pressurized tank.
- 2) The energy storage tank must be insulated well.
- 3) The pressure bearing capacity of the tank must comply with the system requirement.
- 4) The diameter of inlet and outlet pipe of the energy storage tank shall not be less than that of the main pipe of the water system.
- 5) Installation of the tank must comply with the requirements of its manufacturer.

(3) Expansion tank selection and check

1) Expansion tank check

(Applicable to TSCA/I120/140/160FHL and TSCA/I120/140/160/180/200FHLD units)

The unit has a built-in expansion tank (5 L) with initial pressure of 0.15 MPa and allowable water storage capacity of 220 L.

If the actually required water volume is greater than 200 L, add expansion tanks.

When adding an expansion tank, use the following formulas to calculate the needed volume:

$$V_b = 0.023 * (V - 220)$$

V— actual water system volume (unit: L)

V_b— active volume of expansion tank (unit: L)

(4) Water pump model selection and determination of water resistance

1) The water system resistance under the least favorable conditions is calculated by the following formula:

$$H_{max} = \Delta P1 + \Delta P2 + \Delta P3$$

Notes: $\Delta P1$ —Water pressure drop within the unit

$\Delta P2$ —Water pressure drop (unit: m) of the water pump (or some water pumps) with greatest water pressure losses among all the parallel air side products within the least favorable loop

$\Delta P3$ —Resistance losses of main pipe within the least favorable loop (unit: m)

Please refer to relevant manuals and parameters of air side products when calculating the above resistances.

The water pressure drop within the unit is described as follows:

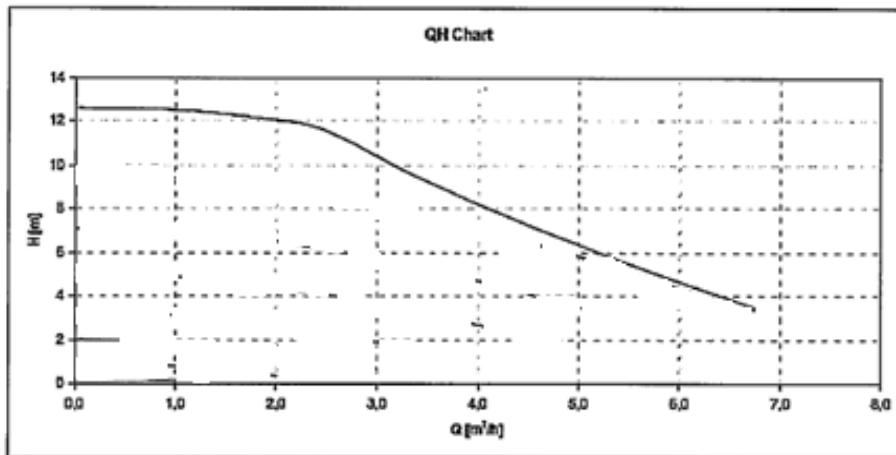
Model	Circulating water flow (m ³ /h)	Internal pressure drop (m)	Unit external lift (m)	Remarks
TSCA/I120FHL	2.06	/	9.5	Provided with water pump
TSCA/I140FHL	2.41	/	8.0	Provided with water pump
TSCA/I160FHL	2.75	/	6.5	Provided with water pump
TSCA/I120FHLD	2.06	/	9.7	Provided with water pump
TSCA/I140FHLD	2.41	/	8.5	Provided with water pump
TSCA/I160FHLD	2.75	/	7.5	Provided with water pump
TSCA/I180FHLD	3.10	/	5.5	Provided with water pump
TSCA/I200FHLD	3.44	/	4.0	Provided with water pump
TSCA/I120FHLN	2.06	2.5	/	Not provided with water pump
TSCA/I140FHLN	2.41	3.5	/	Not provided with water pump
TSCA/I160FHLN	2.75	4.5	/	Not provided with water pump
TSCA/I120FHLDN	2.06	2.3	/	Not provided with water pump
TSCA/I140FHLDN	2.41	3.0	/	Not provided with water pump
TSCA/I160FHLDN	2.75	3.5	/	Not provided with water pump
TSCA/I180FHLDN	3.10	4.5	/	Not provided with water pump
TSCA/I200FHLDN	3.44	5.5	/	Not provided with water pump

2) Water pump check

(Applicable to TSCA/I120/140/160FHL and TSCA/I120/140/160/180/200FHLD units)

The unit has a built-in circulating water pump, and the lift/flow curve is shown as below:

UPMXL GEO 25-125 130 PWM



Test the pump lift and flow against the water system resistance under the least favorable conditions. When the lift or flow of the built-in pump cannot meet the system requirements under the least favorable conditions, add external water pumps. To select and install an external water pump, please consult the water pump manufacturer.

Generally, keep the external water pump and built-in water pump running in series to increase the lift, but note that the selected external pump must match the built-in pump in terms of its characteristic flow curve.

3) Model selection of water pump

(Applicable to TSCA/I120/140/160FHLN, and TSCA/I120/140/160/180/200FHLDN units)

To select and install a water pump, please consult the water pump manufacturer.

The lift of the water pump must meet water system resistance calculated under the least favorable conditions. The water pump flow should meet the required water flow indicated on the unit nameplate.

4. Place of Installation

When installing, note that:

IDU and ODU installation site requirements:

- ODU is installed on the ground or on the roof or wall that is sturdy enough to support the unit. Sufficient installation and maintenance spaces must be reserved.
- Air outlet or inlet of ODU is unimpeded to ensure enough air flow for heat exchanging; in the meantime, prevent the cold air generated by the unit from affecting its surroundings.
- Avoid installation of ODU on a noise- or vibration-sensitive place, lest it may disturb the residents within its proximity.
- Shock absorbing device must be installed on ODU to prevent vibration from spreading over the building.
- Choose a well-drained place to install ODU, to make sure that no water accumulates.
- If installed in a place where people have easy access to the ODU, use safety measures, such as

fences, to avoid unit damages or personal injuries.

- To ensure normal operation of the unit, avoid the air outlet of ODU from the windward direction during the cooling or heating season.
- Do not install the ODU in a closed space (such as courtyard), lest the heat exchanging effect of the unit be dampened.
- Install the IDU indoors to ensure that its ambient temperature is above 0°C, lest it may be frozen. In addition, the relative humidity around IDU cannot exceed 80% as it may result in electric leakage. Install the IDU in a dedicated machine room, closed balcony, basement, corridor, equipment room, or other spacious and well-ventilated rooms (avoid very humid places such as toilet).
- Keep sufficient spaces for installation and maintenance. Avoid noise-sensitive places.
- Install the IDU on a flat, vertical and non-flammable wall surface with enough strength to bear the unit weight during operation. Wall-mounted IDU must be installed vertically while the ceiling IDU must be installed horizontally.
- Place the IDU at a place not exposed to direct sunlight or to direct radiation of a high temperature heat source.
- When installing the IDU and ODU, avoid places with acid or alkaline substance or corrosive gas.
- When installing the IDU and ODU, avoid places where plenty of oil, fiber, dust, and volatile flammable gases (such as gasoline and lacquer petroleum) exist.
- When installing the IDU and ODU, avoid the atmospheric environment containing oil sources (including engine oil), salt (marine area), or sulfide gas (the neighborhood of hot spring or oil refinery), or other corrosive gases, because these substances may easily cause unit failures.
- When installing the IDU and ODU, avoid strong power and strong magnetic field.
- Install the IDU in a place with easy access to water supply and drainage.
- The length of the pipe between IDU and ODU shall not exceed 25m.
- Maximum height difference of IDU and ODU must not exceed 6m.

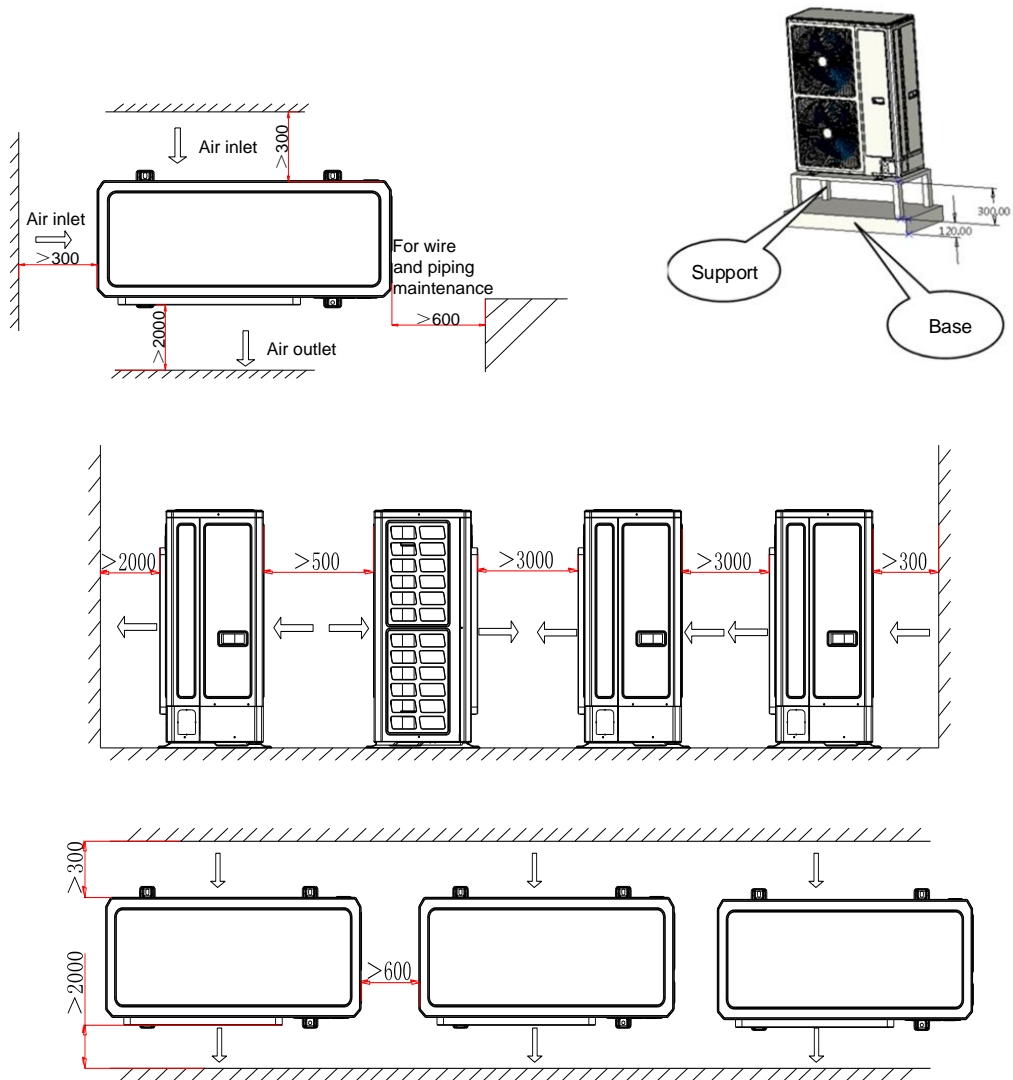
Danger: Never install the IDU in a flammable atmosphere. Keep the IDU away from fire and explosives.

Warning: Never install the IDU outdoors, as it may cause electric leakage and electric shock or freeze the unit.

Installation space diagrams are shown below:

1) ODU

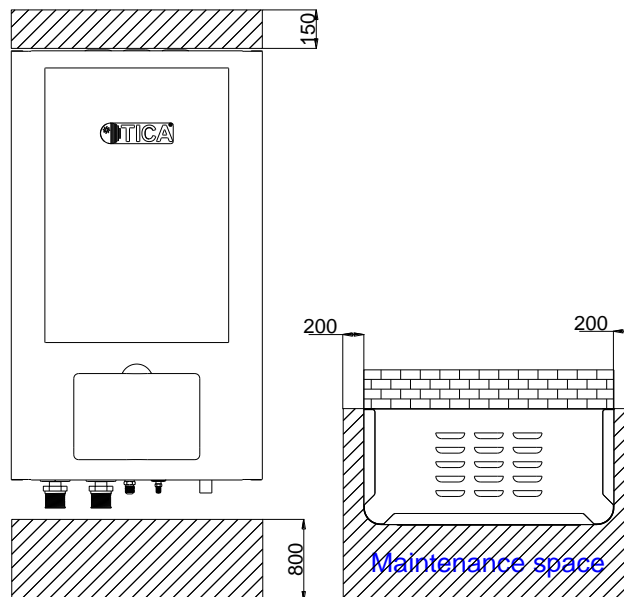
(1) TSCA120FHL/TSCA140FHL/TSCA160/ TSCA180/ TSCA200FHL



2) IDU

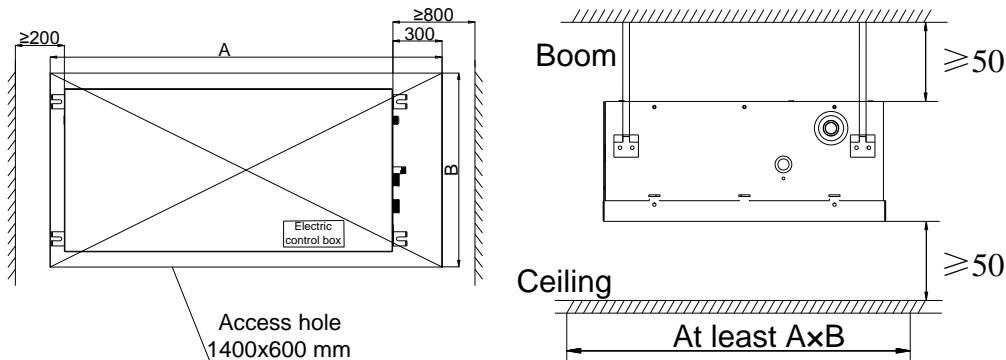
(1) TSCI120FHL/TSCI140FHL/TSCI160FHL

(Maintenance space view from front, unit: mm) (Maintenance space view from above, unit: mm)



(2) TSC1120FHLD/TSC1140FHLD/TSC1160//TSC1180//TSC1200FHLD

A sufficient maintenance space is required around the unit, as shown below (in the figure: A × B = Maintenance space length × Width; unit: mm).



5. ODU Installation

(1) Floor mounting

- The ODU must be installed on a durable foundation which is at least 120 mm high above the ground. Avoid wet or corrosive places lest the unit may be damaged. The foundation shall have a smooth surface.
- A metal bracket must be installed on the foundation as this may facilitate water drainage when defrosting. With a height not less than 300 mm and local maximum snow thickness, the bracket must be stable, anti-corrosive, and strong enough to bear the unit weight and to keep its shape after long period of use.
- The metal bracket is customized based on the unit's dimensions, weight and installing holes.
- The metal bracket should be securely fixed to the foundation through at least four sets of expansion bolts (M10 or larger size). In addition, flat gaskets and the spring gaskets must be arranged on the bolt. Installation of expansion bolts should comply with relevant standards and requirements.
- The bracket must be horizontal upon installation, and could bear the unit's weight whenever it is operating, installed or repaired.
- Four sets of M10 bolts are used to fix the ODU to the metal bracket. Arrange the bolts in a downward direction and with the matching flat gaskets and spring gaskets added.
- Install a shock absorbing device between the ODU and metal bracket to ensure that the ODU is securely fixed.
- Stainless steel bolts are desirable; otherwise, the bolts must undergo antiseptic treatment. Make sure that the bolts are not corroded after long-term use.

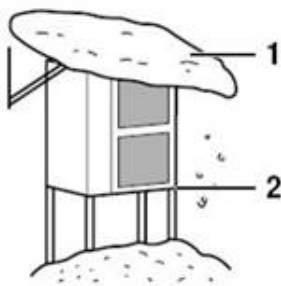
(2) External wall mounting

- Install the ODU on concrete or bearing structures. Never fix it on hollow brick wall, cob wall or similar structures which are unlikely to bear the unit's weight.
- The wall where the ODU is mounted shall be flat.

- The metal bracket for supporting the ODU is customized based on the unit's dimensions, weight and installing holes.
- The metal bracket must be anti-corrosive, and strong enough to bear the unit weight and to keep its shape after long-term use.
- The bracket shall be at least 300 mm high above the ground, and not lower than the local maximum snow thickness.
- The metal bracket should be fixed to the bearing wall through at least six sets of expansion bolts (M10 or larger size). Crossing bolts are required if the wall is thin or not strong enough. In addition, flat gaskets and the spring gaskets must be arranged on the bolt. Installation of bolts should comply with relevant standards and requirements.
- The bracket must be horizontal upon installation, and could bear the unit's weight whenever it is operating, installed or repaired.
- Four sets of M10 bolts are used to fix the ODU to the metal bracket. Arrange the bolts in a downward direction and with the matching flat gaskets and spring gaskets added.
- Install a shock absorbing device between the ODU and metal bracket to ensure that the ODU is securely fixed.
- Stainless steel bolts are desirable; otherwise, the bolts must undergo antiseptic treatment. Make sure that the bolts are not corroded after long-term use.

Notes:

- Handle the ODU with care as it is heavy and its center of gravity is not right at its center.
- Don't tilt the ODU exceeding 45°.
- Note to control the drainage of defrosted water in such a way that it may not cause excessive water accumulation or freezing, as it may cause foot slipping or other personal injuries.
- In snowy areas, the following measures should be taken to ensure the safe operation of the unit:
 1. Set up a canopy to avoid snow
 2. The unit should stay above the snow that might accumulate on the ground



- Wall mounting is not recommended for a noise- or vibration-sensitive place, as the noise and vibration may pass into the room.

6. IDU Installation

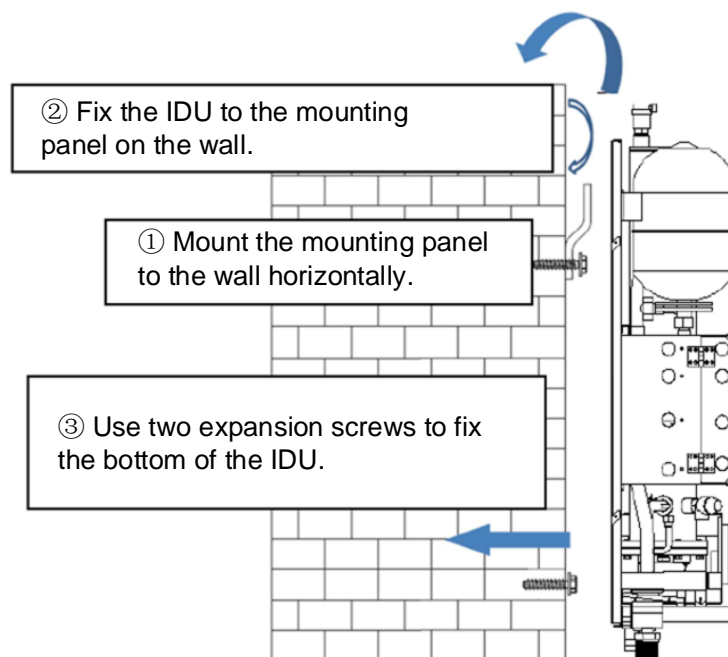
6.1 Wall-mounted IDU Installation

(1) Precautions

- 1) Install the IDU on a flat, vertical and non-flammable wall surface with enough strength to bear the unit weight during operation.
- 2) Install the IDU in an upward manner. Never install it in a horizontal or tilted way, as it may impede discharge of air from the water system, and result in water pump damages, degraded performance of the system, and water and electric leakage.
- 3) Cut off all the power supplies before the IDU is opened.
- 4) Keep away from the parts operating at high temperatures inside the unit.
- 5) To remove the electric box cover, first remove the front panel and then loosen the fixing screws of electric box cover.
- 6) For the ease of removing and rotating the electrical box, the space of 200 mm for the left and right sides is required.
- 7) To facilitate connection between the lower pipes and the water pipe, and between automatic water supply valve and filter, the space of 800 mm below the unit is required.
- 8) A space of 150mm is required on the top of the unit to facilitate installation and disassembly.

(2) Wall-mounted IDU Installation Diagram

- 1) Unscrew the left and right screws on the front panel, and lift the housing upward to remove it;
- 2) Fix the IDU following the steps below:
 - ① Use three expansion screws to fix the mounting panel to the wall. The mounting panel must be installed horizontally lest the unit may tilt.
 - ② Mount the IDU to the mounting panel.
 - ③ Use two expansion screws to fix the bottom of the IDU.



6.2 Ceiling Type IDU Installation

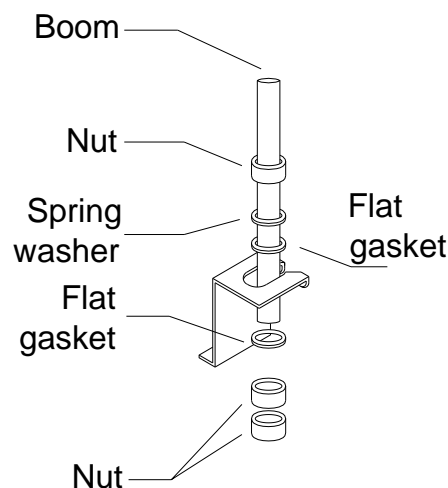
(1) Precautions

- 1) Install the IDU on a flat, vertical and non-flammable wall surface with enough strength to bear the unit weight during operation.
- 2) Install the IDU horizontally. Never install it in a vertical or tilted way, as it may impede discharge of air from the water system, and result in water pump damages, degraded performance of the system, and water and electric leakage.
- 3) Cut off all the power supplies before the IDU is opened.
- 4) Keep away from the parts operating at high temperatures inside the unit.
- 5) To remove the electric box cover, first remove the service panel and then loosen the fixing screws of electric box cover.

(2) Ceiling Type IDU Installation Diagram

(a) Hanging bolt

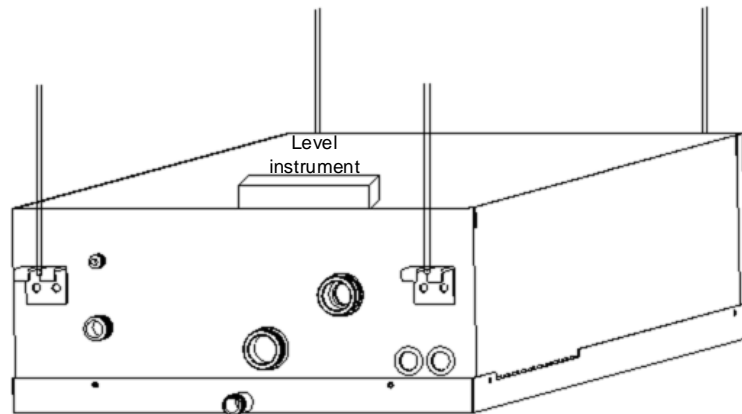
- Consider piping, wiring and maintenance carefully, and select the proper installation position and direction.
- The installed hanging bolt is shown below.



- ◆ Measure and mark the IDU suspension position and punch holes on the ceiling; Install the M10 boom and make sure that the boom is securely fixed;
- ◆ Determine the distance between booms according to the external dimensions of IDU;
- ◆ Hoist the IDU on the boom using nuts, flat gasket and spring gasket;
- ◆ Check to make sure that the installed unit is placed horizontally. Tighten the nut on the boom to prevent the IDU from falling and vibrating;
- ◆ Check and ensure that the unit body is at the center of the ceiling access panel.

(b) IDU lifting

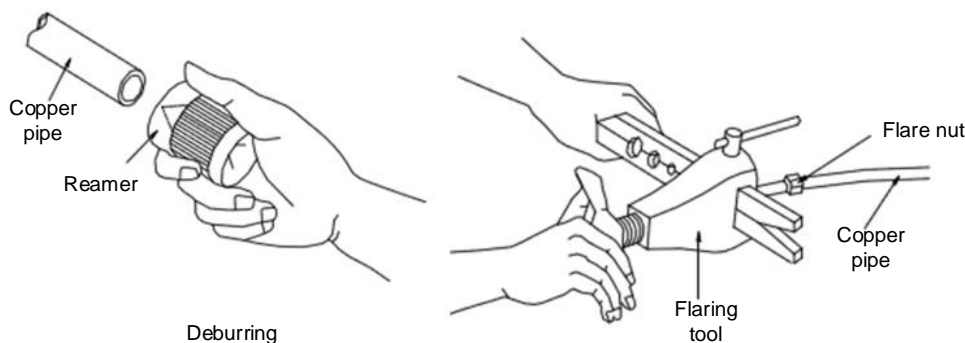
- Install the hoisting bolt in the U-shaped groove of the unit, hoist the unit, and use a level instrument to confirm levelness of the unit.
- Make sure that the IDU has a tilt to the drainage direction and a slope of about 1-2% along the drainage direction, and tighten the nut on the hanger rod.



7. Refrigerant Pipeline Connection

(1) Prepare pipes

- Prepare the copper pipes at the installation site. Use the copper pipe dedicated for cooling that has been dried and cleaned.
- Pipe specifications: $\phi 19.05$, thickness ≥ 1.0 mm (for gas pipe; $\phi 9.52$, thickness ≥ 0.8 mm (for liquid pipe).
- Make sure that the copper pipe is sealed on both ends lest the dust or water may enter the pipe.
- Use a pipe cutter to cut the connection pipe. It is recommended that the connection pipe be 20 cm to 30 cm longer than the required copper pipe.
- Use a reamer or file to remove burr at the end of the copper pipe. When finishing holes, keep the end of copper pipe downwards so that no copper borings drop to the copper pipe.
- Before installation, use nitrogen or air to blow away dust and foreign matters inside the pipes.
- Remove the flared nut from the unit and put it on the copper pipe. Use a flaring tool to flare the end of the copper pipe, to ensure the flare smooth and length of the cone side even.



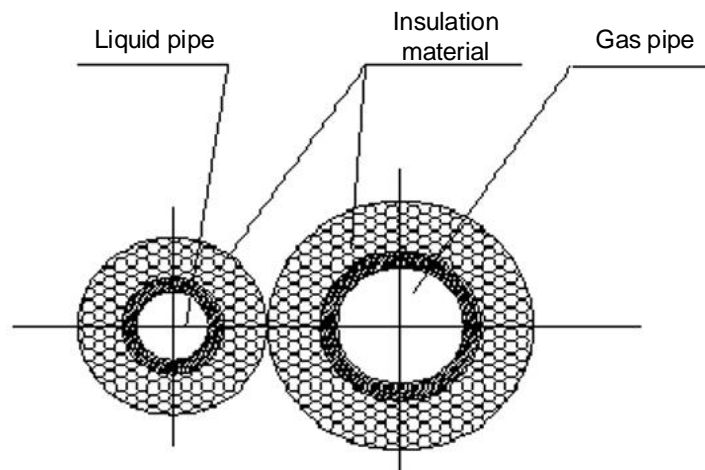
(2) Insulate copper pipe

- 1) Requirements for insulation material
 - Use rubber foam insulation pipe
 - Operating temperature: -25°C to 120°C

- Fireproof grade: fire retardant B1
- Insulation pipe specifications: liquid pipe inner diameter $\phi 9.52$ with the thickness not smaller than 20 mm; gas pipe inner diameter $\phi 19.05$ with the thickness not smaller than 20 mm.

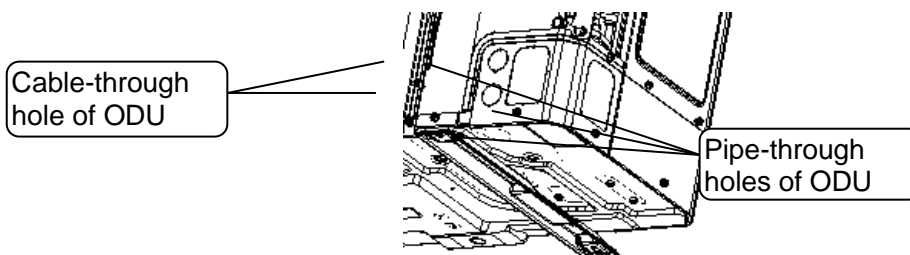
2) Precautions

- Protect the mouth of cooper pipe when passing it through heat insulation pipe.
- Liquid and gas pipes must be insulated separately as below.

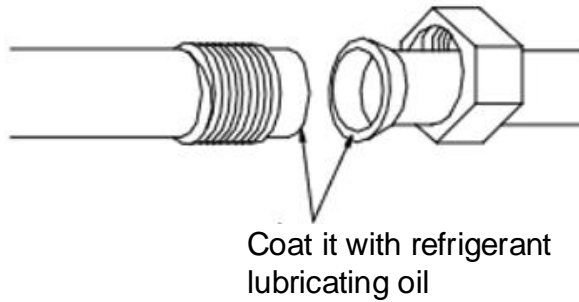


(3) Refrigerant pipeline connection

- Remove the upper right panel of ODU.
- Make sure that the check valve is closed.
- Knock off the covers of pipe-through holes of ODU according to the piping direction on site. The connection cooper pipes of ODU can be passed from the front, right or bottom of the unit. The covers of the holes where no copper pipes or cables pass through shall be reserved, lest the rodents may enter the unit and damage the cables.



- Before connection, apply refrigerant lubricating oil to the place where the pipes meet, to prevent gas leakage.



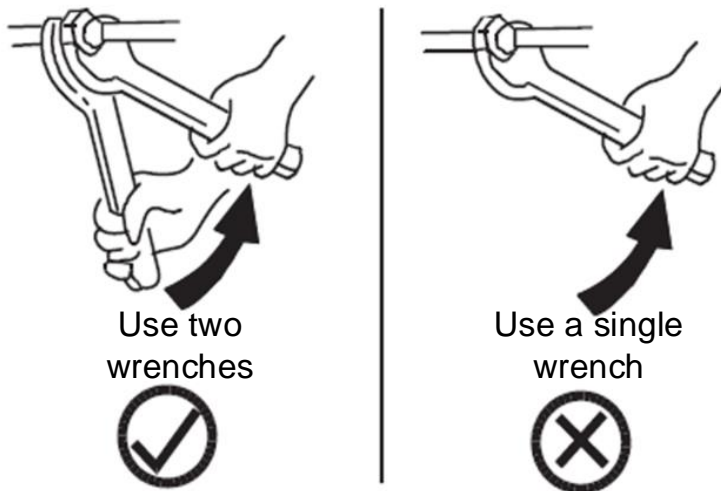
Note

The refrigerant lubricating oil should be POE (polyester) which is applicable to R410A refrigerant.

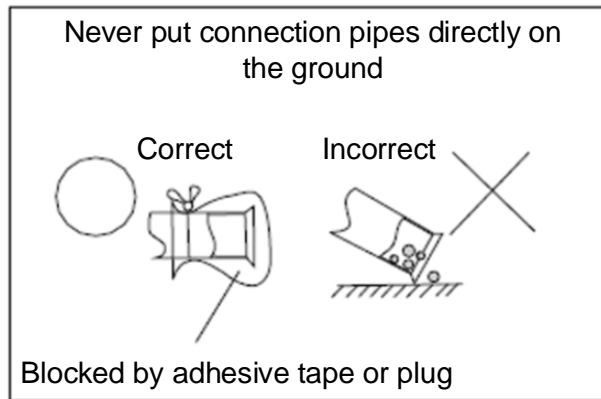
- Align the pipe socket of connection pipe with check valve pipe connecting point, and gently screw the tapered nuts to make a smooth fit. Use a torque wrench to tighten the nuts.
- Piping work shall be carried out step by step. Never tug the pipes with great force.
- Use bends with larger radius.
- Use a wrench to tighten the nuts at an acceptable torque.

Diameter (mm)	Torque (N·m)
φ9.52	40
φ19.05	100

- Use two wrenches to connect pipes, shown as below.



- When the connection pipe passes through a hole, use a seal cap to plug the end of the pipe.



Note

The holes to pass the refrigerant connection pipe of IDU and ODU shall have a diameter no less than 75 mm. Use PVC casing (at least DN75) based on the diameter of the holes, which could help protect connection copper pipes and IDU and ODU communication cables. Length of the PVC casing must be slightly longer than the wall thickness.

(4) Leakage detection

A leakage detection test shall be carried out after IDU and ODU refrigerant pipelines are connected. Increase pressure of the unit to 4.2 MPa by charging dry nitrogen via the charge valve. Use lather or other methods to ensure that air does not leak at the joints on the field. If air leaks, release the nitrogen. Repair the leak, and then detect leakage again.

Danger

While doing leakage detection and air tightness tests, do not let in oxygen, acetylene and flammable and toxic gases as they are very dangerous and could cause explosions. It is recommended to use dry nitrogen to do the tests.

(5) Vacuumizing

- Never use refrigerant to discharge the gas in the IDU and within the pipe connecting the IDU and ODU. Use the vacuum pump for vacuumizing.
- As shown in the figure, use refrigerant connection hose to connect the unit's gas check valve, low pressure gauge and vacuum pump.
- Open pressure gauge valve to start the vacuum pump for vacuumizing.
- Before loosening the valve core, use a tool to prop up a little the core of charge mouth of the liquid check valve to ensure that air enters the pipe.
- When the unit is vacuumized to 20Pa, fasten tightly the low pressure valve of pressure gauge, stop the vacuum pump and keep the pressure for over 30 minutes. At this time, observe whether the pointer rebounds. If yes, it is necessary to detect and repair the leaks. After that, repeat the vacuumizing and pressure keeping process.
- Remove the vacuumizing hose right after vacuumizing and opening the valve to supplement refrigerant.

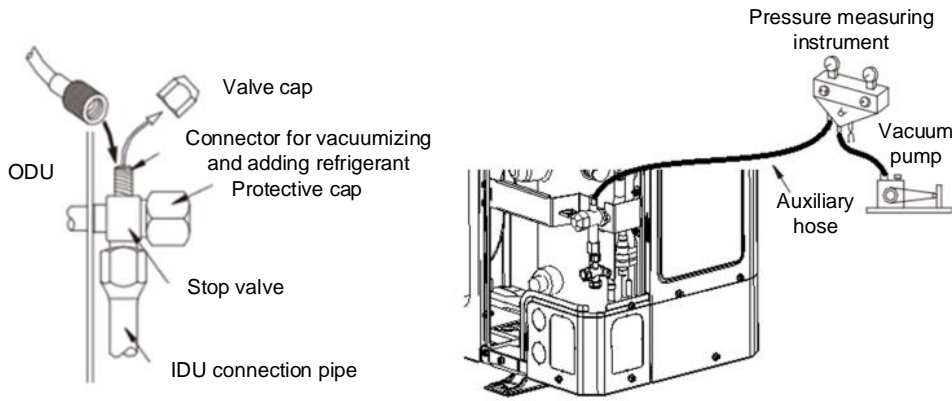


Diagram of ODU check valve Diagram of vacuumizing

(6) Opening the valve to supplement refrigerant

- After vacuumizing, use an Allen wrench to unscrew anticlockwise the cores of gas and liquid check valves so that the refrigerant could flow from the ODU to IDU.
- Screw the caps of gas and liquid valves and of their charge mouths.
- About the quantity of supplemented refrigerant:

Unit type (ODU)	Refrigerant type	Standard charge amount (kg)	Diameter (gas/liquid) mm
TSCA120FHL	R410A	3.05	φ19.05/φ9.52
TSCA140FHL	R410A	3.05	φ19.05/φ9.52
TSCA160FHL	R410A	3.05	φ19.05/φ9.52
TSCA180FHL	R410A	4.40	φ 19.05/ φ 9.52
TSCA200FHL	R410A	4.40	φ 19.05/ φ 9.52

The amount of refrigerant by default includes the amount for a 5.0 m pipe. Hence it is unnecessary to supplement refrigerant if the pipe has a length less than 5.0 m. If the pipe length is greater than 5.0 m, add refrigerant for the excess portion according to the requirement below. Supplemented charge quantity

$$W1 \text{ (kg)} = (\text{Actual liquid pipe length (m)} - 5.0 \text{ (m)}) * 0.054 \text{ (kg/m)}$$

Note

- Ensure liquid inhalation of refrigerant in the refrigerant charging process.
- To ensure the unit energy efficiency and reliability, only the correct refrigerant quantity can be charged.
- Discharge air from the connection pipe in the charging process.

(7) Insulating layer

- Apply glue to and wrap the joints of heat insulation pipes with thin adhesive tape (one side adhesive).
- Use a knife to cut the tape. Do not use your hands to tear it apart.
- Leave no gaps at the joints of heat insulation pipes.
- Properly wrap around the insulating layers of copper pipes with PVC adhesive tape. If applied too loosely, the pipes would not be insulated; if too tightly, it will reduce the heat-insulating performance of insulating material.
- Wrap tightly the joints of insulating materials with PVC adhesive tape.
- Never use ribbon to wrap the insulating layer, lest the insulation effect may be affected.
- After IDU and ODU communication cables are connected, wrap the connection copper pipes and communication cables into a bundle with adhesive tape.
- Then, use a fixing clip to fix the bundle.
- After that, seal the pass-through holes lest the unit may be affected by wind and rain.

8. Installation of the Water System

Notes:

- Only after the unit is fixed can it be connected to inlet/outlet pipes.
- To ensure water resistance balance, install the water system of the unit in reverse return manner.
- A water filter shall be installed at the water inlet pipe of this system in a manner that is convenient and easy for removal and cleaning. In addition, the installation direction and filter screen direction should be considered.
- To ensure the effectiveness of the use and normal operation of the unit, the inlet and outlet pipes of the unit must be properly insulated.

(1) Water system pipeline connection

1) Requirements for water system pipeline connection

- Do the waterway connection according to the above water system connection diagram.
- The pipes and accessories selected for the water system shall comply with relevant standard.
- The main water supply and return pipes that connect each air side product shall have a diameter

not less than that of inlet/outlet pipes. Steel pipes (DN32 or above) or PPR pipes (DN40 or above) are preferable.

- The connection pipes shall be resistant to corrosion.
- The connection pipes have to withstand pressure of not less than 1 MPa.
- The connection pipes have to withstand temperature of not less than 70°C.
- Be sure that the water pipes and accessories are free from cracks outside and foreign matters inside.
- The piping connection must be carried out in a way that facilitates maintenance and servicing.
- Pipes and pipe joints must be supported independently and reliably.
- Try to avoid electrical parts, cables when carrying out piping connection, as the water may leak and hence cause safety accidents.
- IDU pipes and pipe joints shall be easily removable for ease of operation and cleaning.
- The water filter must be installed as required (18-20 meshes are recommended). Make sure that the fluid flow and the arrow indicated on the filter are in the same direction. Install the filter where it is easy for maintenance.
- Gate valves must be installed on the inlet/outlet pipes of the unit, as they could cut off IDU water flow when repairing.
- Flexible joints should be used between the IDU interface and the field pipeline to reduce vibration propagation and hence to protect the pipeline.
- A drainage outlet should be set at the low positions of the water system so that the water can be completely discharged from the heat exchanger and the system; an air discharge valve should be set at the high positions to eliminate air from the pipeline. The drainage outlet and air discharge valve must be set where it is easy for maintenance.
- After the piping connection of water system is completed, use a dedicated water pump to flush the pipelines. Disconnect the IDU from the water system when flushing.
- After that, connect the water system to IDU for a pressure test to see whether the system leaks.
- After the pressure test, insulate the inlet and outlet pipes properly, lest heat losses, condensation or freezing may occur.

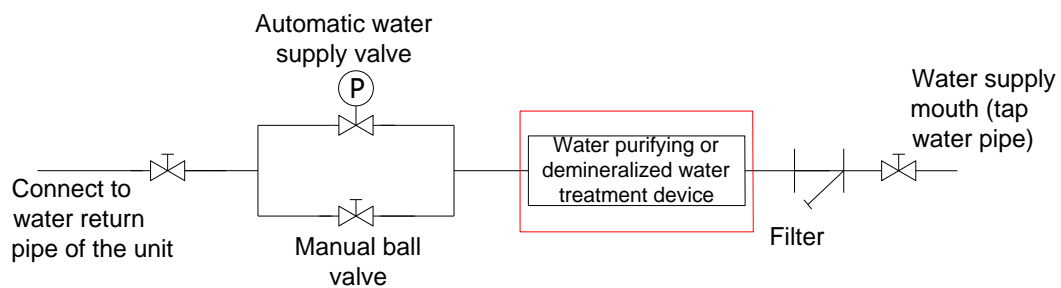
2) Precautions

- Decide whether or not to install the energy storage tank, external water pump, expansion tank, water purifying or demineralized water treatment device, pressure gauge and thermometer according to the on-site conditions.
- After piping connection, rinse the water system before it can be connected to the IDU.
- Piping design may vary with the actual conditions. For details, refer to the relevant design standard.
- Connect the inlet and outlet pipes in the correct direction.
- Make sure that the water filter is installed on the water inlet pipe of the unit.

- This unit applies only to a closed water system. If applied to an open water system, the water pipes may be corroded.
- Make sure that the safety valve could discharge water smoothly.
- Never test or run the water system beyond the designed pressure of 0.5 MPa. During idle time, maximum water pressure of the system cannot exceed 0.5 MPa.

3) Installation of automatic water supply valve (prepared by user)

- When installing automatic water supply valve, please refer to the requirements of its manufacturer.
- Automatic water supply valve should be installed on the system's return water side.
- Replace or clean the valve core when it becomes dirty.
- Diagram of installing automatic water supply valve is shown below.



Notes: The manual water supply valve in the above diagram is used to accelerate water supply process. After charge is finished, close the manual ball valve and open the automatic water supply valve (for details, please refer to manual of automatic water supply valve).

4) Connection of drainage pipes

(a) Installation of drain pipe of wall-mounted unit

- Use uPVC pipes (Outer diameter 25 mm).
- Connect the drainage hose (attached to the unit) to the drainage outlet of the unit and use a clip to fix it.
- Connect the drainage pipe mouth to the outlet end of the drainage hose (attached to the unit) and use a clip to fix it.
- The drainage pipe shall be as short as possible and be tilted downwards (the degree of inclination shall be at least 1:100) to facilitate water drainage.
- Make sure the drainage pipes are connected reliably and firmly.

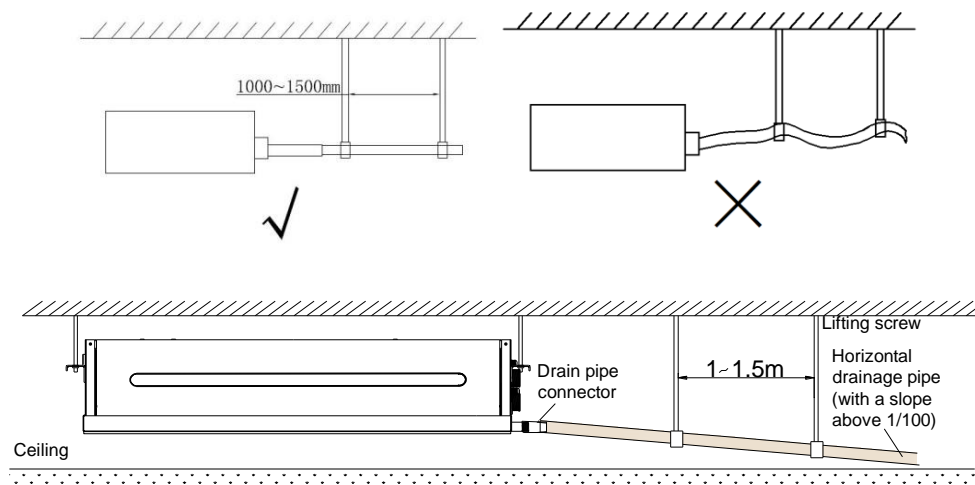


Note

- The IDU drainage outlet and drainage pipe shall be properly insulated to prevent condensation. Insulation treatment should be applied until it reaches the drainage pipe connecting to the IDU.
- Do not connect the pipe to the sewer line as the odor of the latter may enter indoors through the pipe.
- After the drainage connection pipe is installed, feed 1 liter of water into drainage pipe from drainage pan to check whether water is drained smoothly.
- Install water trap to facilitate water drainage if necessary.

(b) Installation of drain pipe of ceiling type IDU

- After the unit is installed, adjust the unit to tilt down by 1% to 2% to the drainage direction; otherwise excessive water will be accumulated in the unit and affect the performance of the unit.
- The installed drain pipe should tilt downward by 1%~2%; otherwise the condensate water will flow back and leak into the room when the IDU is turned off.
- The drain pipe cannot connect to the sewage pipe or other drain pipes.
- When the main drain pipe is connected to the IDU, the IDU must be higher than the main drain pipe. Select a drain pipe of sufficient size according to the IDU model.
- The transverse pulling length of the drain pipe should be within 20 m, and set a support point every 1 to 1.5 m, lest the drain pipe would be bent (see the figure below).



5) Installation precautions of expansion tank

- The purpose of expansion tank is to maintain the pressure balance of the water system. When installing the expansion tank, please refer to the requirements of the manufacturer.
- The expansion tank is usually installed at the highest point at the suction end of the system circulating water pump.
- The expansion tank should be installed indoors to ensure that the ambient temperature is not less than 0 °C in winter to prevent frost damage.
- Maintenance space must be reserved for the expansion tank.
- Water pressure and air tightness test should be carried out according to relevant standards and

manufacturer's requirements after installation of expansion tank.

6) Automatic air discharge valve

Automatic air discharge valves are used to discharge air out of the water system so that the unit works properly. An air discharge valve is installed at the highest position of the system and air discharge valves also need to be installed at high positions of some sections. Air discharge valves aims at discharging air in the system if any.

7) Installation of water pumps

- The purpose of water pump is to drive the system circulation. When installing the water pump, please refer to the requirements of the manufacturer.
- The installation of water pumps should comply with the relevant national standards.
- When installing indoors, install the pump in a dry and well-ventilated room where the ambient temperature is not too low. Otherwise, the pump may be frozen and damaged.
- When installing outdoors, provide a separate equipment box to prevent the pump from rain or moisture. The ambient temperature cannot be too low. Otherwise, the pump may be frozen and damaged.
- Avoid direct sunlight.
- Before installation, make sure that the piping is cleaned fully and is free from any rust or impurities.
- Two flat gaskets are used for installation. When tightening the union joint of the pipeline, hold the motor by hand to keep it in the correct position. After installation, check whether the threaded pipe leaks.
- When the unit is running, do not allow condensate water or water leakage in the junction box. Otherwise, the junction box may be shorted.

(2) Water system pipeline pressure test

- After the water pipes are connected (not connected to IDU), run a pressure test before rinsing and insulating them to make sure that the pipes are connected well.
- If pipes are connected by hot melt, run the test 24h after hot melt.
- Never run the pressure test with water system connected to IDU.
- Note to close the check valve at the port (connecting water inlet and outlet of IDU) of the water system.
- Perform a thorough check before running the pressure test, in order to make sure that all the joints and junctions of the system are air tight, and all the supports and hangers are properly installed.
- Some precautions against water leakage must be made before pressure test, as the leak may damage floor, furniture and home appliance.
- Feed water into the system and open the air discharge valve of the system as well. When the air discharge valve discharges water continually, it indicates the system is filled with water. Then

close the air discharge valve.

- When running the pressure test, check all valves to ensure that they are in a correct state.
- Use manual pressure testing pump or electric pump to raise the pressure slowly, lest sudden, excessive pressure may break the pipes.
- The test pressure shall comply with the relevant standard and shall be no less than 0.5MPa. Keep the test pressure for 1h and the pressure drop shall be no more than 0.05MPa. In the meantime, check to make sure that all pipes and their joints are free from leakage.
- Reduce the test pressure to 0.3MPa and keep the pressure for 2h. In this case, the pressure drop shall be no more than 0.03MPa. In the meantime, check to make sure that all pipes and their joints are free from leakage.
- If finding any leaks during this process, repair them immediately and repeat the pressure test.

(3) Water system pipeline rinsing

- After the water system (not connected to IDU) passes the pressure test, flush it repeatedly until dirt inside is completely drained off. Use a dedicated water pump to flush the pipelines. Disconnect the IDU from the water system when flushing.
- Flush the water system repeatedly until the outlet water is as clear as the inlet water. After that rinse off the impurities in the filter.
- Then connect the IDU to the water system.

(4) Insulating the water pipes

It is recommended that all the water pipelines adopt rubber insulation. The insulating layer thickness should not be less than 20 mm (if other materials are used for thermal insulation, the thermal insulation effect cannot be poor than that of the recommended material). The thermal insulation material of outdoor water tubes should be wrapped with a protective coat, which should be made of galvanized sheet iron or galvanized sheet aluminum. The joints between the IDU and water pipes should be properly insulated to prevent cold bridge and condensation on heat insulation pipe.

See the following form for the recommended thickness of rubber and plastic insulating layer:

Diameter of water supply and return pipes (mm)	15~20	25~50	65~100	>100
Insulating layer thickness (mm)	20	30	40	50

(5) Water supply

- Open the valve of water supply pipe and use the automatic water supply valve to inject water. When necessary, open the manual valve to accelerate the process.
- Keep open the automatic air discharge valve.
- Stop supplying water until air is discharged completely from the water system. The allowable water supply pressure must not exceed 0.4MPa.
- Open the safety valve manually and check whether it is functional.
- If needing to interrupt automatic water supply, close the check valve of automatic water supply

valve manually.

- After water supply is completed, make sure the automatic water supply valve is open and close manual water supply valve.

Note

- During water supply process, when water is released from air discharge valve, it is considered that air discharge is done and it is time to close air discharge valve. While this could never fully discharge the air in the system, the remaining air could be discharged from automatic air discharge valve after the system operates for some time. Extra water supply may be required.
- The water pressure indicated on the pressure gauge may vary based on the temperature (the pressure rises as the temperature rises). Always keep the water pressure above 0.1MPa to prevent air entering water system.
- The unit could automatically discharge excessive water through safety valve.
- After confirming that the air is exhausted from water system, close automatic air discharge valve to prevent water dripping.

9. Electrical Installation

(1) Instructions on electrical wiring

Notes:

- The unit must use the special power supply, and the supply voltage must comply with the rated voltage. The minimum starting voltage of the unit must be kept above 90% of the rated voltage, the voltage must be within $\pm 10\%$ of the rated voltage range during operation, and the voltage difference between the phases should be within the range of $\pm 2\%$.
- The power supply circuit of the unit must have a grounding wire, and the power supply earth line must be connected to the external earth line reliably and effectively. Types of cables, layout and protective methods shall comply with electrical standard and requirements.
- Install the unit according to the national standard on wiring.
- Wiring construction must be carried out by professionals in accordance with the circuit diagram.
- Set an electric leakage protection device according to requirements of the related national technical standard of electrical equipment.
- The power cord and signal cable should be laid neatly and reasonably without interfering with each other, and cannot come into contact with the connection pipe and valve body.
- Power cord is not attached to this unit when delivered. Note to select the proper power cord. Power cord conversion is prohibited.
- When the power cord is parallel with control signal cable, put them into separate conduits with proper spacing reserved.
- For maintenance, disconnect the circuit breakers of the IDU and ODU at the same time.
* After all the lines are connected, check them carefully for any errors before connecting the power supply.

Warning:

- For safety considerations, a circuit breaker and residual current device must be installed.
- The unit must be grounded permanently and solidly. Otherwise, it may result in electric shock and serious personal injuries.

1) Power cord

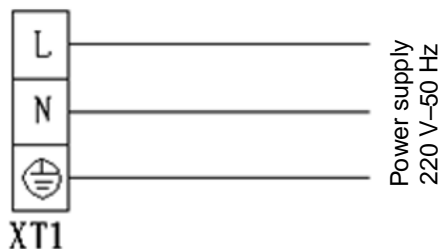
For the specifications of power cord, please refer to the following form.

Model		Power supply	Cable diameter (mm ²) (Plastic insulation and sheathed wire)			Circuit breaker capacity (A)
			Phase line	Neutral line	Earth line	
ODU	TSCA120/140/160FHL	220V~50Hz	6.0	6.0	6.0	40A
ODU	TSCA180/200FHL	380V 3N~50Hz	2.5	2.5	2.5	20A
IDU	TSCI120/140/160FHL	220V~50Hz	1.0	1.0	1.0	6A
IDU	TSCI120/140/160FHLN	220V~50Hz	1.0	1.0	1.0	6A
IDU	TSCI120/140/160/180/200FHLD	220V~50Hz	1.0	1.0	1.0	6A
IDU	TSCI120/140/160FHLDN	220V~50Hz	1.0	1.0	1.0	6A

Notes:

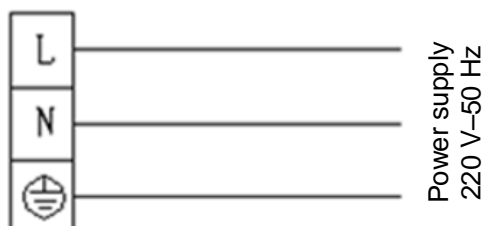
- ⊕ The above circuit breaker and power supply is based on the unit's maximum power (maximum current);
- ⊗ The power cord specifications indicated in the form are those of the multi-core copper core cable (like YJV copper core cross-linked PVC insulated cable and PVC sheathed power cable) which are installed in the trunking in an exposed way (GB/T16895.15) at the ambient temperature of 40°C (cable working temperature is 90°C). If use conditions vary, recalculate the specifications in accordance with national standard.

1) IDU wiring diagram

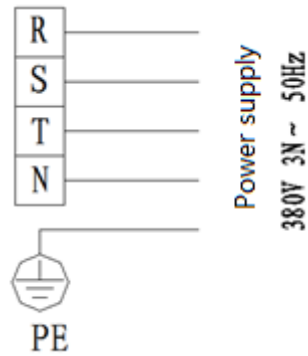


2) ODU wiring diagram

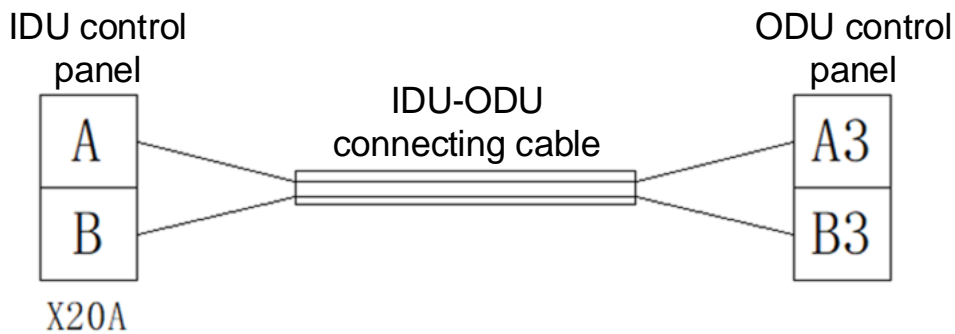
ODU type: TSCA120/140/160FHL (single-phase) power cable wiring diagram



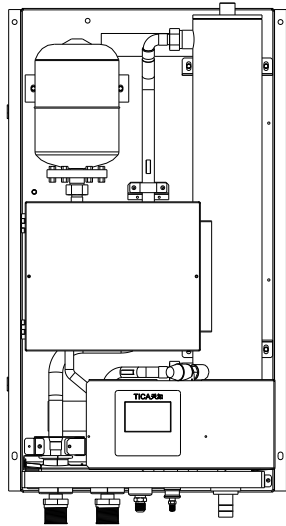
ODU type: TSCA120/140/160FHL (single-phase) power cable wiring diagram



3) Diagram of communication cable

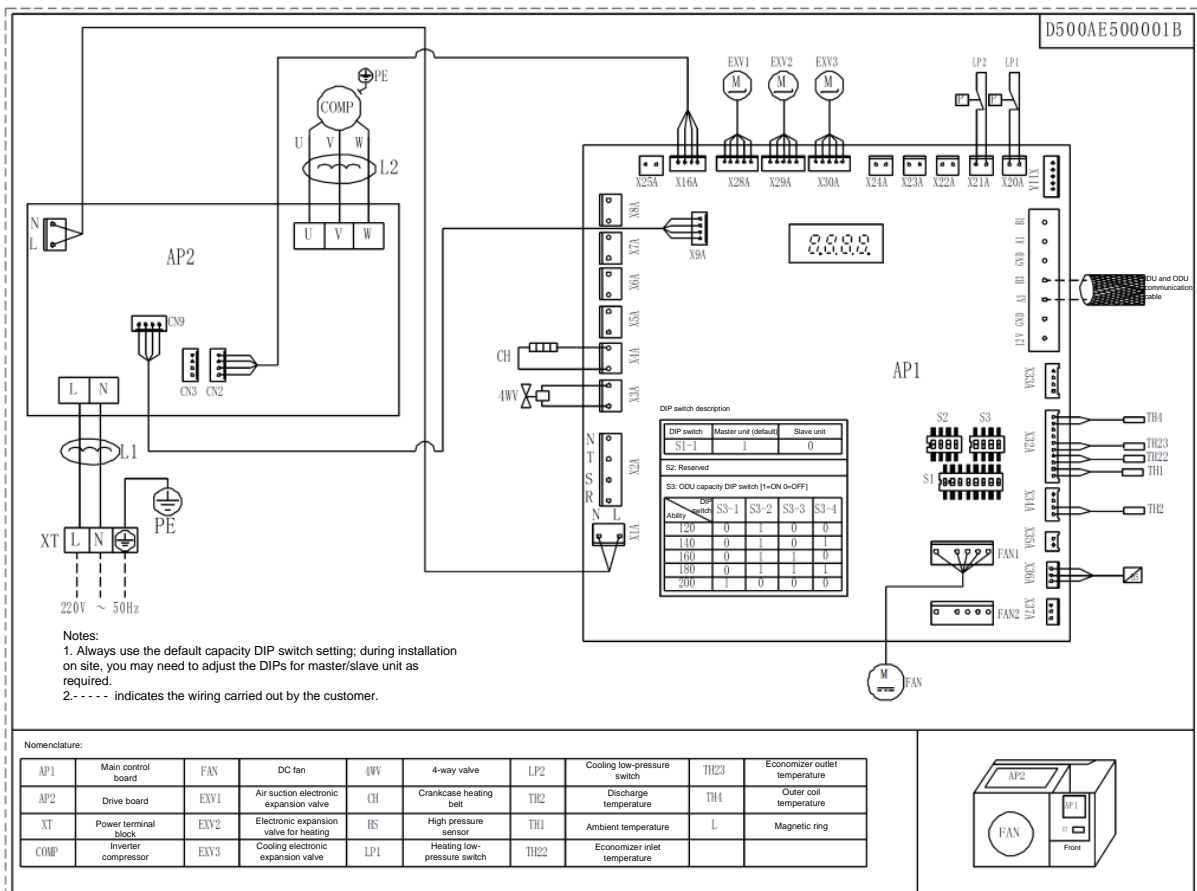


- 4) Use dedicated conduits to protect the IDU and ODU cables. Communication cable and power cord shall be arranged separately to avoid interference.
- 5) The outdoor power cables and cables connecting IDU and ODU must not be lighter than the chloroprene rubber armored cord (wire No.57 provided in IEC 60245); the indoor power cables must not be lighter than average polyvinyl chloride sheathed flexible cord (wire No. 53 provided in GB5023.1).
- 6) It is necessary to set PVC protective sleeve when passing cables through wall, lest the cable be damaged.
- 7) Pass the cables of IDU and ODU into the unit through dedicated cable-through holes, which are wrapped with cable-through rubber rings.
- 8) IDU cables of a wall-mounted IDU will enter the unit from above the fixing sheet metal of the lower right wired controller, and then connect to the electric control box through cable-through hole at the left of the electric control box. Dedicated cable ties must be arranged for cables.

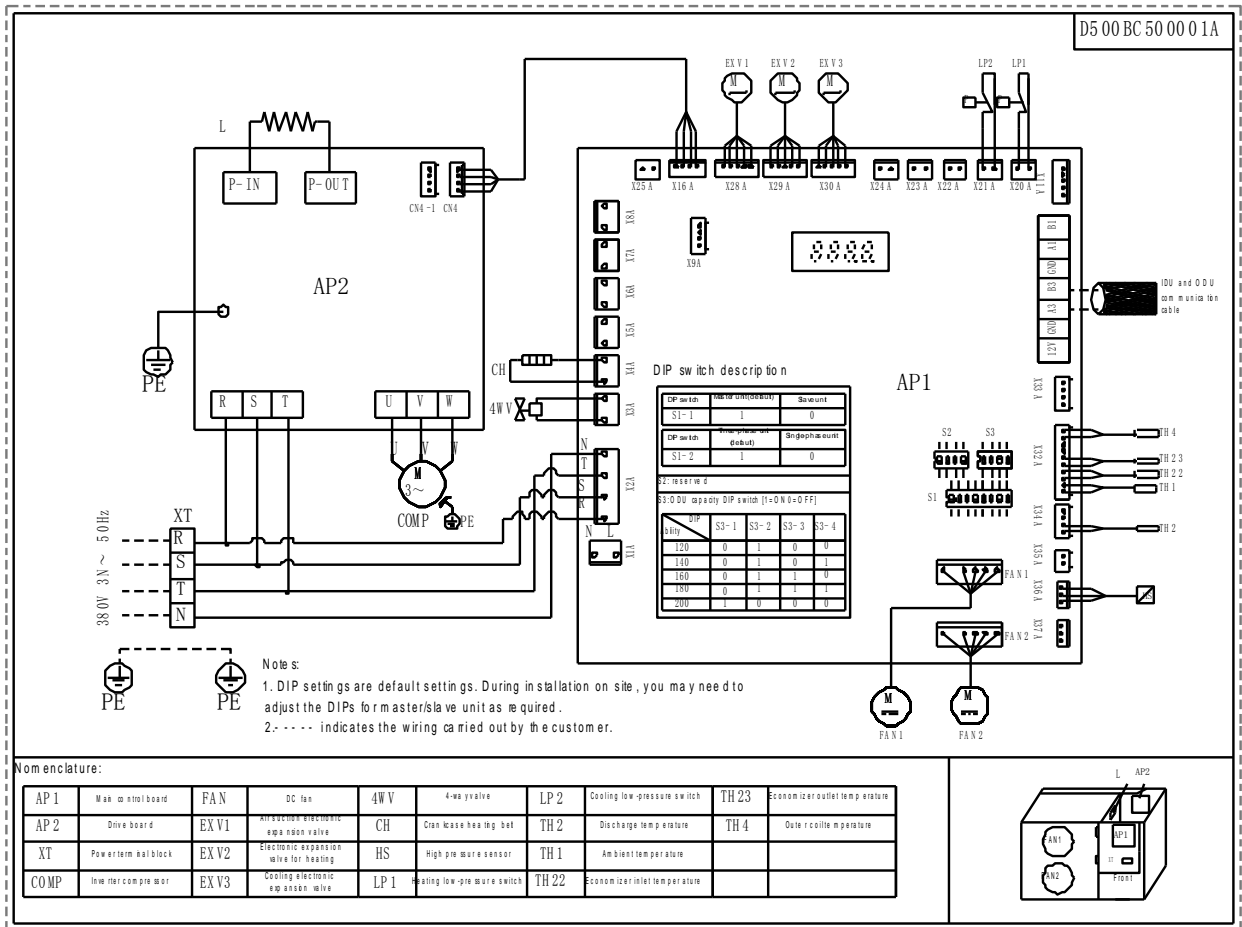


The cable will enter from the right side of the unit, and pass through this area and connect to the electric control box through the cable-through hole at the left of the electric control box.

- 9) ODU cable will enter the unit through the lower right cable-through hole, which is wrapped with cable-through rubber ring (attached to the unit).
- 10) Use a line seat to press the cables tightly of IDU and ODU, lest the forces may be exerted on terminal block.
- 11) ODU electrical principle diagram
- 1) TSCA120/140/160FHL

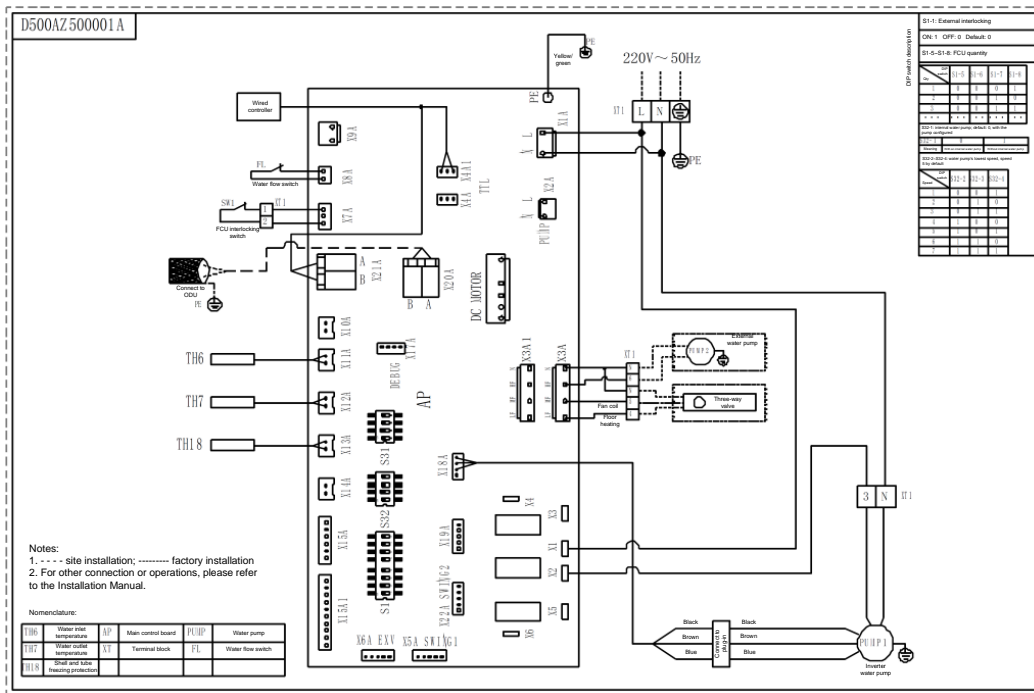


(2) TSCA180/200FHL



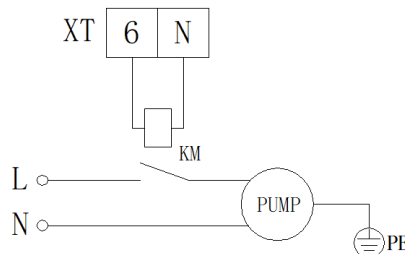
12) IDU electrical principle diagram

(1) TSCI120/140/160FHL /TSCI120/140/160FHLD/TSCI180/200FHLD
TSCI120/140/160FHLN /TSCI120/140/160FHLD/TSCI180/200FHLDN



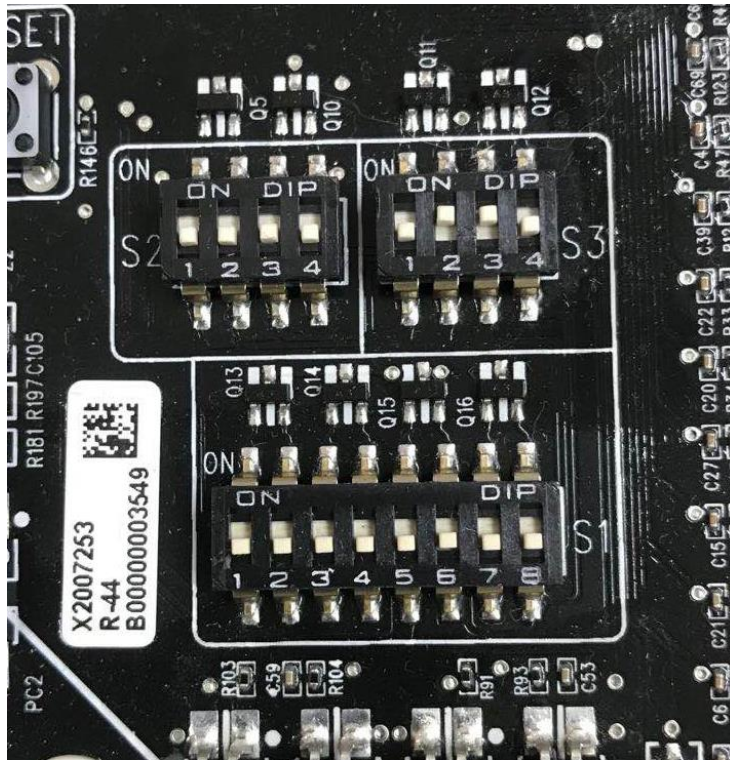
Note

- Port X7A (external interlocking switch SW1) on the main board of IDU could only receive passive switch quantity signal. Never connect the power supply directly to No.1 and No.2 of terminal block, as it may burn the control board and even cause a fire.
- If an external water pump is required, and the maximum operating current of this pump is less than 1A, connect it to the external water pump port of IDU in accordance with the IDU electrical principle diagram; if the maximum operating current of this pump is more than 1A, the external water pump port of IDU can only act as a signal control port and cannot connect to the water pump. The external water pump should be controlled by an AC contactor or a power relay. The wiring diagram is shown as below:



(2) DIP switch settings

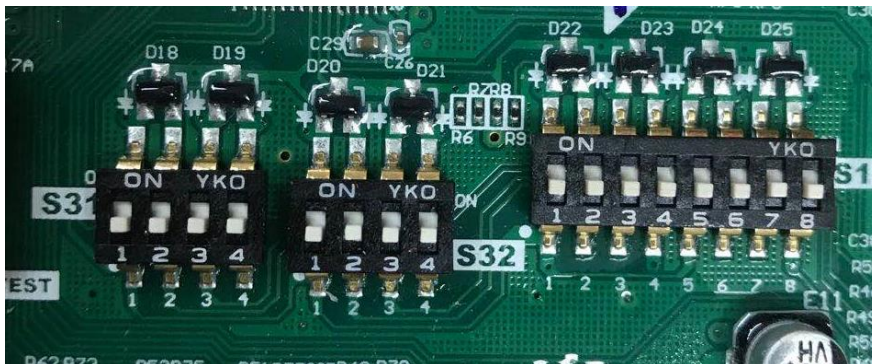
1) ODU DIP switch



S1: S1-1 indicates master/slave unit. It is ON by default. OFF indicates slave unit. ON of S1-2 indicates three-phase unit, and OFF indicates single-phase unit.
S2: Preserved
S3: DIP switch of unit capacity: from 1 to 4: 120 indicated by 0100, 140 indicated by 0101, 160 indicated by 0110, 180 indicated by 0111; 200 indicated by 1000

Notes: DIP switch of ON indicates 1; otherwise is 0

2) IDU DIP switch



S1: S1-1 indicates the external interlocking function. It is OFF by default. ON indicates external interlocking enabled. S1-5, 6, 7, 8 indicate the quantity of FCUs.
S31: Preserved
S32: S32-1 indicates the internal water pump. The default setting is OFF, indicating internal water pump

configured; S32-2, 3, 4 indicate the minimum speed of the water pump.

Notes: DIP switch of ON indicates 1; otherwise is 0

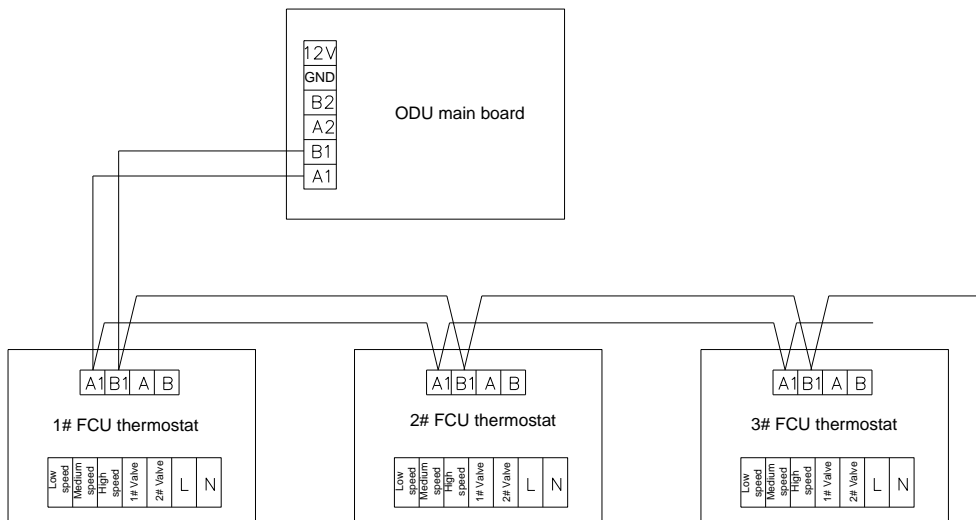
- Notes:
1. An external water pump does not need DIP switch.
 2. In standby mode, the external water pump is enabled, requiring no DIP switch.
 3. See the IDU electrical principle diagram for the water pump speed DIP switch.

(3) Interlock control function of air side products

A standard unit is equipped with a FCU interlock control interface at delivery. Interlock control is implemented depending on the way the terminals are interlocked. If wires are properly connected, interlocked control of indoor air side products and the IDU can be implemented.

The matching and dedicated FCU thermostat (optional) of TICA is recommended:

TICA's dedicated FCU thermostat can be used for RS485 communication with the main board. The figure below shows the wiring of indoor air side products and the ODU when TICA's dedicated FCU thermostat is used to implement the interlocked control of indoor air side products and the IDU.



In this case, reserved IDU DIP switch S1-5, 6, 7, 8 need to be set to realize the communication between the unit and FCUs. At most 15 FCU thermostats can be monitored.

S1-5, 6, 7, 8: reserved FCU DIP switch, from 5 to 8: 1 set indicated by 0001, 2 sets indicated by 0010, 3 sets indicated by 0011, 4 sets indicated by 0100, 5 sets indicated by 0101, 6 sets indicated by 0110 and so on, 15 sets at most.

10. Trial operation

(1) Check before trial operation

- Unit check. Check whether the unit is properly installed; whether enough spaces are reserved for installation and maintenance; whether all the fastening screws and machine screws are tight; whether the unit is vacuumized or needs to add refrigerant; whether refrigerant liquid and gas valves are completely open; and whether all DIP switches are correctly configured.
- Piping system check. Check whether the pipes of water system are all properly connected; whether the valves of the system are properly open; and whether all the pipes are properly

insulated.

- Power distribution system check. Check whether the power voltage is proper; whether all the screws of electrical parts are tightly fastened; check to make sure that the system's power cords and control cables are wired properly; and the unit is grounded reliably.
- Before trial operation, check again to make sure that the water system is installed properly and the water filter is at the return water side. The water system has undergone cleaning and pressure tests.
- Open water pump and air discharge valve to make sure that IDU and its pipelines are free from air. After confirming that the air is exhausted from water system, close air discharge valve to prevent water dripping.
- Check the data indicated on the pressure gauge to make sure that the pressure of water system is normal.
- Power on. Power on the unit to check whether its wired controller displays faults. If yes, please troubleshoot them by referring to the error code; if no, make sure power has been applied to the unit at least 24 hours before testing and commissioning. After the unit is initially powered on, the system clock needs to be reset.
- Check the water flow before operation: after the water pump starts, empty the air out of it. After water pump operates normally for some time, check whether the water flow meets requirements.

(2) Trial operation

- After power is applied to the unit for over 24 hours, press "ON/OFF" button on the wired controller to turn on the unit.
- The parameters of wired controller are preset by the manufacturer. Hence the users are not required to set them.
- After compressor starts, check whether the unit operates normally. For any abnormalities, power off the unit for a check.
- Check whether IDU water pump and ODU fan operate normally and without unusual noises.
- If the system functions well, record its operating parameters, water pressure, ambient temperature, water inlet and outlet temperatures and current, to make sure that they are within the acceptable range.
- After trial run, put back the upper right panel of ODU and panel of IDU.
- Clean the water filter after initial trial run.

V. Operation and Use of Wired Controller

1. Screen description



Icon	Name	Function
	Query	1) Query errors on the main interface.
	Menu	1) Tap Menu to enter the function menu on the default interface. 2) Tap Menu to return to the preceding level of menu on the setting interface or query interface.
	Directions	1) Tap the direction button on the menu interface to enter the next level of menu. 2) Tap the direction button on the setting interface to modify the parameter values or set functions.
	OK	1) Tap OK to enter the next level of menu on the menu interface. 2) Tap OK on the setting interface to confirm the parameter setting.
	ON/OFF	1) In power-on state, tap ON/OFF to shut down the unit. 2) In power-off state, tap ON/OFF to start up the unit.

Main interface

<p>Jan. 1, 2019, 12:00:00 Unit status: Cooling Air conditioner water outlet: 30.5°C/45 Air conditioner water inlet: 30.1°C/40 Ambient temperature: 15.6°C </p>
--

The display screen displays current time information in the first line, the current water inlet and outlet temperatures and set values of the unit in the second and third lines respectively, and the ambient temperature of the main module in the fourth line. The operating mode area displays the setting mode of the unit (cooling , heating , water pump , or anti-freezing) . When the heating symbol

blinks, the system is defrosting. In the remote control status area, ♀ is displayed if the unit is remotely controlled and the symbol is not displayed if the unit is controlled by a wired controller. In the operation status area, "Stop" is displayed if the unit is shut down. If the water pump is started, the water pump symbol () is displayed; if the water pump is not started, the symbol is not displayed. If the word

"Ambient" blinks, the ambient temperature for unit (including submodules) operation does not meet operating conditions.

Menu interface

Jan. 1, 2019, 12:00:00
Unit Operating Status
Unit Port Status
Modify User Parameters
Modify Maintenance Parameters

Menu interface: Tap the up or down button to switch between menus, tap **OK** to enter a selected menu interface, and tap **Menu** to go back to the home page.

Unit Operating Status page: tap **Menu** to go back to the menu page.

Unit Port Status page: tap **Menu** to go back to the menu page, tap left or right button to switch between unit models, and tap up or down to display unit port information.

Modify User Parameters page: tap **Menu** to go back to the menu page, tap up or down button to switch

Jan. 1, 2019, 12:00:00
Check Unit Error
Program Version

between menus, tap **OK** to enter the setting menu, tap left or right button to modify parameter value, tap **OK** to confirm the setting, and tap **Menu** to go back to the original page.

Modify Maintenance Parameters page: tap **Menu** to go back to the menu page, tap up or down button to switch between parameters, tap left or right button to change parameter value,

and tap **OK** to confirm the setting.

Check Unit Error page: tap **Menu** to go back to the menu page, tap left or right button to switch between unit models, and tap up or down to display unit error information.

Program Version page: tap **Menu** to go back to the menu page, and tap left or right button to switch between unit models.

2. Interface Function

Interface	Display
Main interface	<ol style="list-style-type: none"> 1) Operating mode 2) Real-time temperature and humidity, water temperature, etc. 3) Error icon, water pump icon, anti-freezing icon, etc. 4) Error message
Unit Operating Status	<ol style="list-style-type: none"> 1) Water pump status 2) Electric heater status 3) Number of systems loaded by the compressor
Unit Port Status	<ol style="list-style-type: none"> 1) Temperature sensor values, including ambient temperature, discharge temperature, suction temperature, coil temperature, water inlet/outlet temperature, and air return temperature 2) Humidity sensor value 3) Pressure sensor value 4) Operating current of unit 5) EXV steps
Modify User Parameters	<ol style="list-style-type: none"> 1) Operating mode settings, including mode, temperature and humidity 2) Configuration parameter settings, including centralized control parameter 3) Date and time settings

	4) Unit timing settings
Check Unit Error	1) Current errors 2) Historical errors
Program Version	1) Main controller program version 2) Wired controller program version

VI. Repair and Maintenance

Warning:

- This inverter type household air source heat pump chiller (heat pump) shall be repaired and maintained by professionals authorized by TICA, as improper operations may cause serious personal injuries or property losses.
- For any abnormalities or faults occurring during operation, note to call TICA's hotline or report them to your local service agency. Never attempt to repair them on your own.
- Before maintenance, make sure to disconnect the circuit breaker of the unit.

- Install the inlet and outlet pipes in the correct direction.
- A filter must be installed at the water inlet of the system, and the screen of the filter needs to be cleaned regularly to make sure that water flows smoothly and abundantly in the water system. Clean the screen based on the water quality in the earlier stage, and once every 2 to 3 months in the later stage. Otherwise, dirt may clog the filter and hence affect the operation of the system.
- When cleaning or replacing the screen of water filter, note to close the check valves at both ends of filter before the screen can be removed. After that, make sure to open check valves and confirm that water refill is completed.
- Allowable water inlet pressure shall not be greater than 0.4 Mpa, lest the internal parts may be damaged.
- When testing the water pump, note that it must meet the unit's requirements on water flow. Both excessive and insufficient water flow will affect the unit's use and service life.
- An energy storage tank with proper capacity shall be provided.
- Check periodically to make sure that water supply devices and air discharge devices function well, lest water supply cuts occur or air enters the system, hence affecting the unit's performance and reliability.
- Check the working conditions of each component of the unit regularly and check whether the work pressure of the cooling system of the unit is within the normal range. Check whether there are oil dirt on the pipeline joints and valves of the unit to ensure that no refrigerant leaks out.
- Check whether wiring of the unit power supply and electrical system is secure, and whether electrical components work well and have no smell. For any abnormalities, repair or replace the faulty parts in a timely manner.
- Do not open or close the water system valves at will during unit operation. Otherwise, the normal operation of the unit may be affected, and the unit may be damaged.
- Never connect the unit protective device in short circuit, as it may cause damages to the unit.

- It is forbidden to run the compressor of the unit in a reverse direction. Note to make sure that the power supply and electrical components of the unit work properly.
- Do not use sharp objects when operating the controller. Do not impose excessive force, lest the controller panel may be damaged.
- The minimum starting voltage of the unit must be kept above 90% of the rated voltage, and the voltage during operation must be within $\pm 10\%$ of the rated voltage range. An adverse impact will be caused to the unit when the voltage is too high or too low. Make sure the power supply is stable. Otherwise, when the unit starts, it may generate excessive current, thus making it impossible to start.
- Install the unit in a dry, clean and well ventilated place. To ensure normal performance of air-side fin heat exchanger, it is advised to clean it periodically, primarily depending on the local air quality and period of use.
- For efficiency and safety considerations, take care to clean water-side heat exchanger with detergent. Recommend once every 2 to 6 months, depending on the local water quality and usage time.
- Never run the unit where acid, alkali, salt spray and other corrosive gases are present, as it will damage the unit casing, pipeline or electrical components.
- Do not relocate the temperature probe. Otherwise, the unit's automatic control program will be affected, which may cause operation of the unit unlikely or unit damages.
- Do not use unqualified refrigerant, refrigerant substitute or refrigerant additive. Incorrect using method or using unqualified refrigerant, refrigerant substitute or refrigerant additive will lead to unit damage and various safety hazards. Please select qualified refrigerant or call TICA hotline to purchase qualified refrigerant. All the technicians operating refrigerant must have acquired qualification certificates, and know very well and strictly observe the technical requirements, laws and regulations related to refrigerant use, handling, recovery, and recycling. When charging or adding refrigerant to the unit, make sure that the charging amount and refrigerant type are consistent with the information on the unit nameplate. A refrigerant charging mistake may lead to a unit fault or other potential safety hazards.
- Check regularly to make sure water pressure is above 0.1 MPa. If necessary, please refill the water system.
- Safety valve
 Rotate the red spherical bulge on the valve counterclockwise, to check whether safety valve can function properly. If failing to discharge water normally, call TICA's hotline or contact local service agency.
 If water flows out of the unit continually, close ball valve on inlet and outlet pipes, and then call TICA's hotline or contact local service agency.
- Safety valve hose

Check whether water could flow through safety valve hose smoothly.

- Clean water filter routinely to prevent clogging.
- When the unit is left unused for a prolonged period in winter, drain the water out of the system completely before powering off the unit; otherwise, do not power off the unit lest any damages may be made.
- If left idle for too long, make sure to do a thorough check and cleaning of the unit and its water system before it can be started.
- This unit applies only to a closed water system. If applied to an open water system, the unit's heat exchanger and water pipes may be corroded.
- To drain water out of the system, remove the water inlet and outlet pipes or open water discharge valve and unscrew the drain hole bonnet on the heat exchanger (by removing the bonnet circled in the following figure), lest the unit be frozen.

Heat exchanger drainage methods: Remove the screws on the left and on the right of the panel (four in total) and then remove the panel. The drain hole bonnet is located at the lower right corner of the unit, as shown below.



VII. Common Faults

Code	Fault description	Cause	Handling Method
E001	Inadequate water flow	Water flow switch disconnected	Check the water flow switch wiring
E002	External interlocking	External interlocking K1 disconnected	Check external interlocking K1 wiring
E003	Communication failure between IDU and wired controller	Communication cable between IDU and wired controller disconnected	Check the communication cable, IDU panel, and wired controller communication port for damage
E004	Communication failure between IDU and ODU	1. Forget to power on IDU/ODU	1. Check whether power is applied to it
		2. Communication cable between IDU and ODU gets loose or wrongly connected	2. Check the communication cables between IDU and ODU and tighten them
		3. Control panel is damaged	3. Replace the control panel
E005	Ambient temperature fault	1. Temperature sensor gets loose wires	1. Check its wiring and tighten them
		2. Temperature sensor is damaged	2. Replace temperature sensor
E006	Anti-freezing temperature fault	1. Temperature sensor gets loose wires	1. Check its wiring and tighten them
		2. Temperature sensor is damaged	2. Replace temperature sensor
E007	Total water outlet temperature fault of the main module	1. Temperature sensor gets loose wires	1. Check its wiring and tighten them
		2. Temperature sensor is damaged	2. Replace temperature sensor
E009	Protection of too high discharge temperature	1. Refrigerant leaks	1. Add proper amount of refrigerant
		2. Non-condensable gas exists in the system	2. Vacuumize the system again and add some refrigerant
		3. Ambient temperature sensor is wrongly located	3. Check and relocate the ambient temperature sensor
E011	Discharge temperature sensor failure	1. Temperature sensor gets loose wires	1. Check its wiring and tighten them
		2. Temperature sensor is damaged	2. Replace temperature sensor
E013	Outer coil temperature sensor 1 failure	1. Temperature sensor gets loose wires	1. Check its wiring and tighten them
		2. Temperature sensor is damaged	2. Replace temperature sensor
E023	Too high system pressure	1. Low water flow	2. Check whether the valves are wide open, whether the cold water inlet pressure is too small and whether pump lift and flow meet requirements
		2. Water filter blocked by dirt	3. Clean or replace the filter
		3. Dirt deposits on the condenser	4. Clean condenser
		4. Refrigerant filter or throttle	5. Replace filter or throttle device

		device is blocked	
E025	Module water inlet temperature fault	1. Temperature sensor gets loose wires	1. Check its wiring and tighten them
		2. Temperature sensor is damaged	2. Replace temperature sensor
E026	Module water outlet temperature fault	1. Temperature sensor gets loose wires	1. Check its wiring and tighten them
		2. Temperature sensor is damaged	2. Replace temperature sensor
E027	Too low unit water outlet temperature	1. Too low water flow	1. Check whether the water filter is blocked by dirt
		2. Too much air in the water system	2. Check whether valve of water circulating pipeline is open
		3. Inaccurate testing of water outlet temperature sensor	3. Check whether air is completely pushed out of the system
			4. Check whether water outlet temperature sensor is damaged
E032	Input power exception	Too high or low input voltage	1. Check voltage input
E035	Misphase protection	Misphase of the unit's input power cord	Check the wiring of the unit's input power cord
E036	Open-phase protection	Open-phase of the unit's input power cord	Check the wiring of the unit's input power cord
E039	Excessive compressor current	1. The system's high voltage is too high	1. Refer to overvoltage protection of system
		2. Compressor is damaged	2. Replace the compressor
E041	Low pressure protection in cooling mode	1. Refrigerant leaks	1. Detect leaks and add refrigerant again
		2. Throttle device is blocked	2. Replace throttle device
		3. Poor performance of shell-and-tube heat exchanger	3. Check and clean evaporator
E043	Low pressure protection in heating mode	1. Refrigerant leaks	1. Detect leaks and add refrigerant again
		2. Throttle device is blocked	2. Replace throttle device
		3. Poor heat exchange	3. Clean the heat exchanger
E045	High pressure sensor fault	1. The pressure sensor wiring is loose	1. Check pressure sensor wiring and tighten them
		2. Pressure sensor damaged	2. Replace pressure sensor
E065	Compressor drive communication fault	1. Communication cable gets loose or wrongly connected	1. Check the communication cables and tighten them
		2. Control panel is damaged	2. Replace the control panel
		3. Drive board is not powered on	3. Check whether power cord of drive board is connected properly
E069	Air suction outlet fault	1. Temperature sensor gets loose wires	1. Check its wiring and tighten them
		2. Temperature sensor is damaged	2. Replace temperature sensor

E070	Air suction inlet fault	1. Temperature sensor gets loose wires	1. Check its wiring and tighten them
		2. Temperature sensor is damaged	2. Replace temperature sensor
E073	Compressor drive hardware fault	1. Too low or high input voltage 2. Compressor drive board damaged	1. Check the voltage 2. Replace compressor drive board
E074	Compressor bus voltage exception		
E075	Compressor out of step		
E076	Compressor zero speed protection		
E077	Compressor phase loss		
E078	Compressor overcurrent		
E080	Compressor drive fault		

VIII. After-sales Service

- If repair and maintenance service is needed, call the service hotline of TICA.

Notes:

Improper maintenance or repair may cause water leakage, electric shock or fire. When you need to move or reinstall the unit, call the service hotline of TICA for consultation.

- Warranty

The warranty period and detailed content of warranty are subject to the ordering contract.

Contact us

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IX. Names and Content of Hazardous Substances in Products

- 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 (Cr(VI))	Polybrominated biphenyl (PBB)	Polybrominated diphenyl ether (PBDE)
Compressor and its accessories	×	○	×	○	○	○
Refrigerant	○	○	○	○	○	○
Motor	×	○	○	○	○	○
Heat exchanger	×	○	○	○	○	○
Pipeline fittings	×	○	○	○	○	○
Valves	×	○	○	○	○	○
Screws, bolts, and other fasteners	○	○	○	×	○	○
Other metal parts	×	○	○	○	○	○
Controller and electrical components	×	○	○	○	○	○
Sponge	○	○	○	○	○	○
Foam	○	○	○	○	○	○
Other plastic parts	○	○	○	○	○	×
Rubber parts	○	○	○	○	○	○
Wires	○	○	○	○	○	○
Other printed matters	○	○	○	○	○	○
Accessories (remote controller, battery, etc.)*	○	○	○	○	○	○

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.

*: It indicates that the environmental protection service life of the battery matched with the product is 2 years.



The number in this identification indicates that the environmental protection service life of the product under the normal use status is 15 years. Some parts may also have the identification of environmental protection service life, and their environmental protection service life is subject to the number in the identification. The product configuration may be different due to different models or product improvements. The actual configuration of sold products should prevail.