

INSTALLATION & OPERATION MANUAL

Installation & Operation Manual

Inverter Type Air Source Heat Pump For Residential

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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	/	All models	/
2	IDU	1	/	All models	
3	Copper bending tube	1	Connected to check valve of refrigerant gas pipe for ODU	All models	For ODU
4	Cable-through rubber ring	2	Installed on the cable-through hole of ODU	All models	
5	Installation & Commissioning Request Form	1	For clients	All models	For IDU
6	Installation & Operation Manual	1	To guide unit installation and use	All models	
7	Water filter	1	Installed on the water return pipe of IDU and close to IDU	All models	
8	Condensate drainage pipe	1	Connected to drainage outlet of IDU	TSCI120/140/160/ 180/200DHL D excluded	
9	Pipe clamp	2	To fix the drainage pipe of IDU		
10	Mounting panel	1	To facilitate IDU installation		
11	Nut	1	To connect refrigerant gas pipe of IDU	All models	
12	Nut	1	To connect refrigerant liquid pipe of IDU	All models	
13	Terminal block	6	To connect to the power cords of IDU and ODU	All models	
14	Air discharge valve	1	For indoor heat exchanger discharge	All models	
15	Protection sponge	1	For insulating discharge valve of IDU	All models	
16	Wired controller	1	For powering on/off the unit	All models	
17	Wired controller communication wire	1	For connecting IDU and wired controller	All models	

Note: Models involved

Wall-mounted unit	TSCA/I120/140/160DHL TSCA/I120/140/160EHL
Ceiling type unit	TSCA/I120/140/160/180/200DHL (communication cables of wired controller must be connected externally)

II Read Before Use

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 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 device 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 equipment is disused for a long period of time, cut off the power and let the water drain out from the equipment and pipes to prevent freezing. Otherwise, keep the unit energized. When the unit is energized, the unit may consume a certain amount of electricity to prevent it from freezing.
- 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 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 Introduction

1. Overview

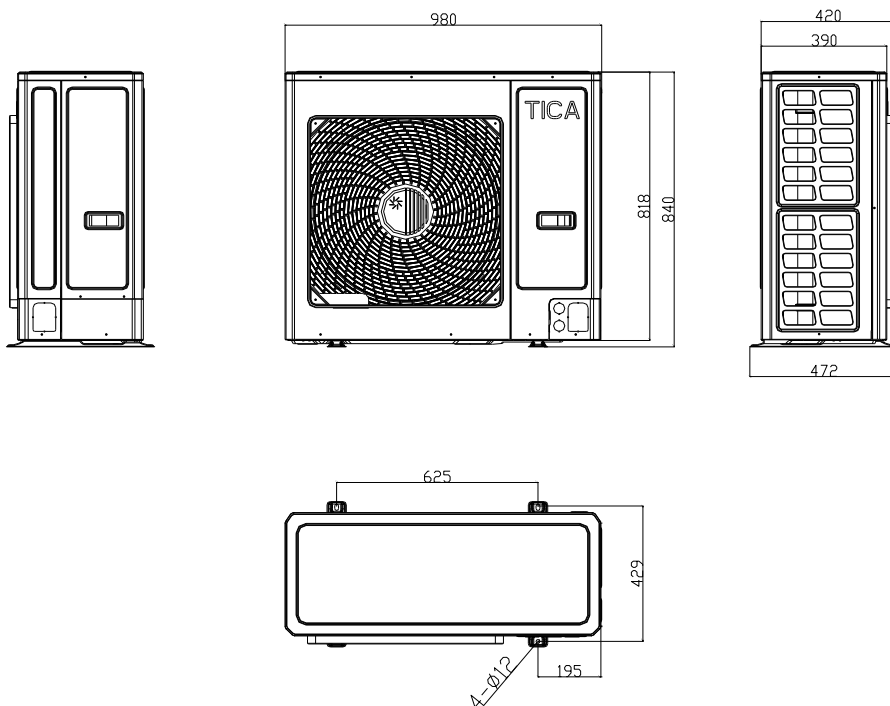
The inverter type household air source chiller (heat pump) consists of IDUs and ODUs. The IDUs and ODUs are connected through refrigerant pipelines. The inlet and outlet of IDU water pipes are connected to the air side products. In this way, the unit is able to offer hot/cold water to each air side product, 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 of the Unit

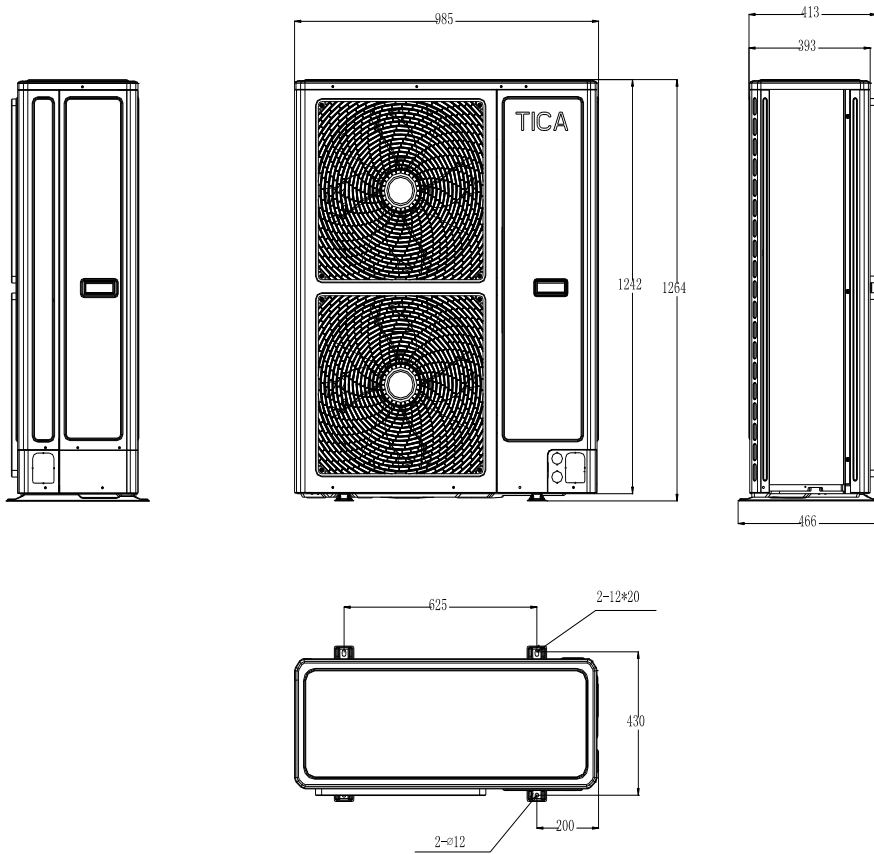
(1) Outside view

1) ODU Outline Drawing

(1) TSCA120DHL/TSCA140DHL/TSCA160DHL

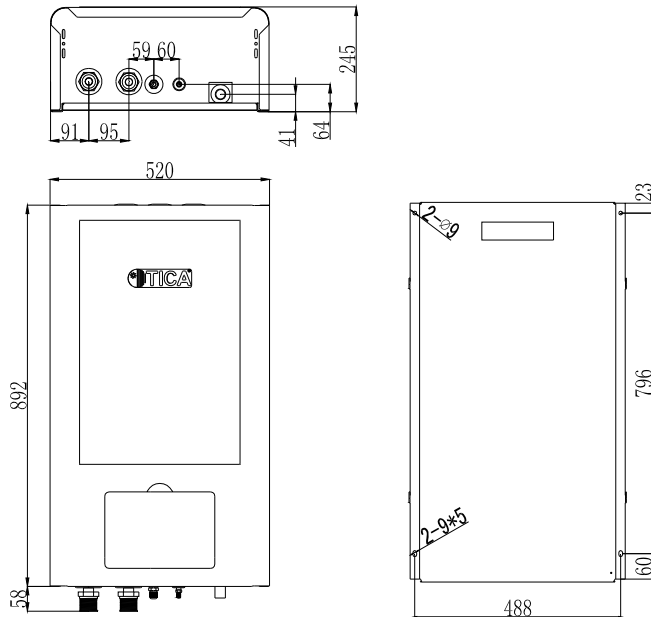


(2) TSCA180DHL/TSCA200DHL

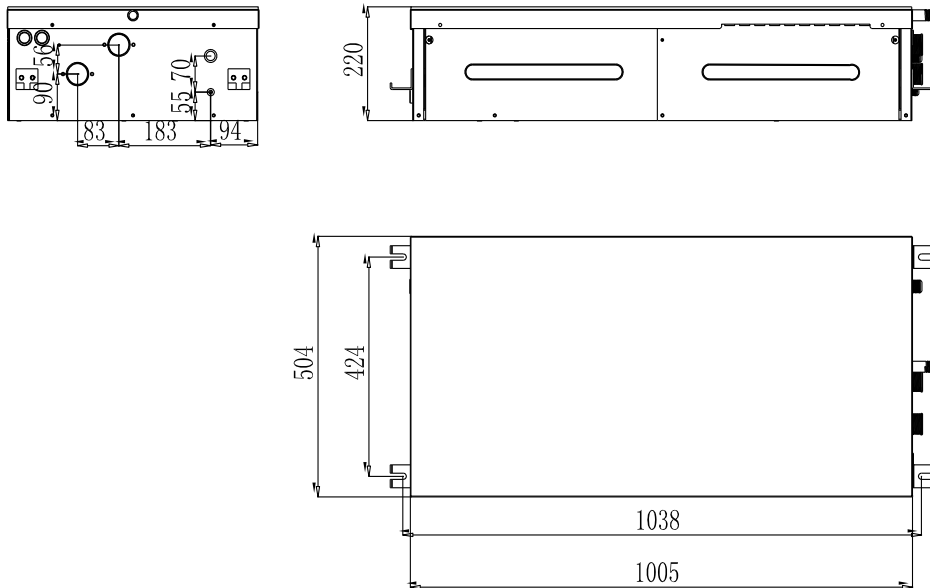


2) IDU Outline Drawing

(1) TSCI120DHL/TSCI140DHL/TSCI160DHL/TSCI120EHL/TSCI140EHL/TSCI160EHL

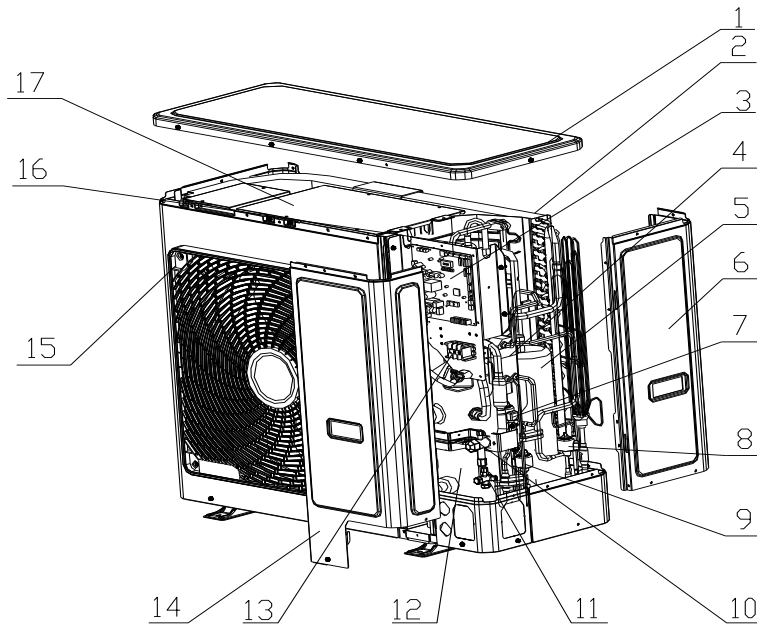


(2) TSCI120DHLD/TSCI140DHLD/TSCI160DHLD/TSCI180DHLD/TSCI200DHLD



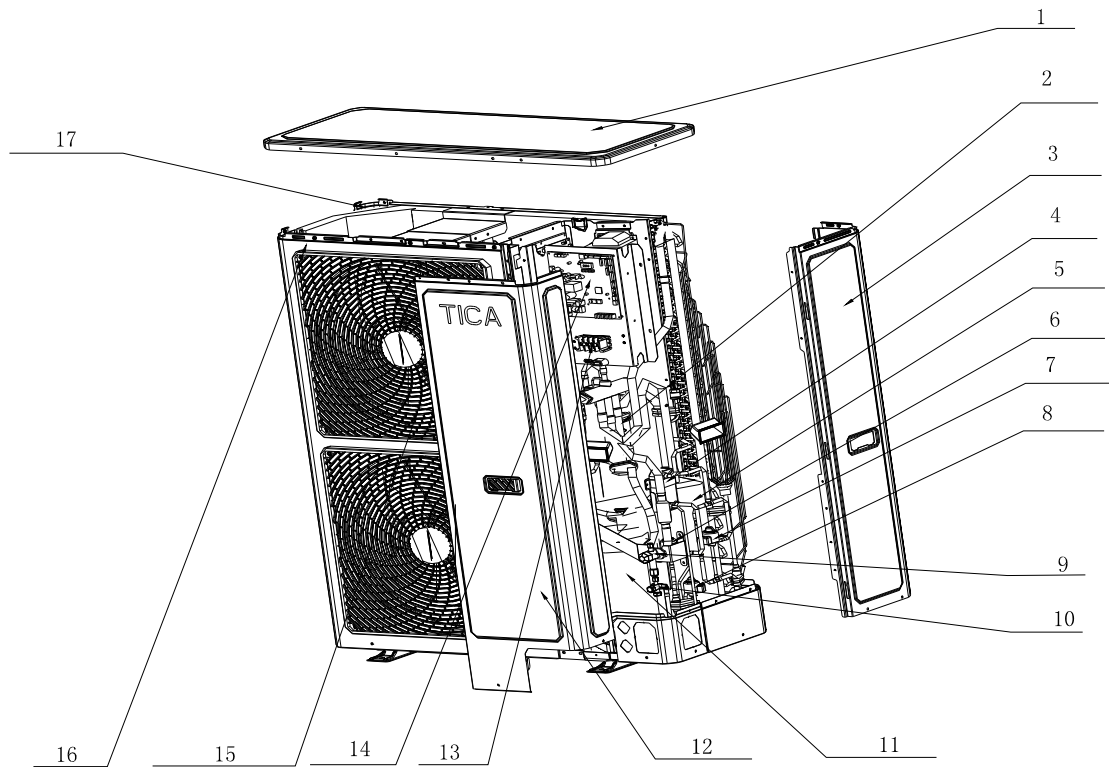
(2) Structure of ODU

1) TSCA120DHL/TSCA140DHL/TSCA160DHL



- 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

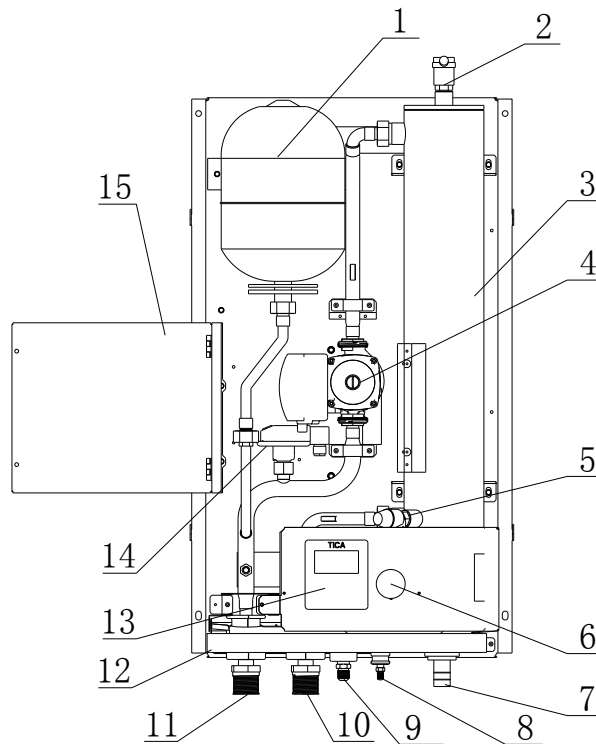
2) TSCA180DHL/TSCA200DHL



- 1) Upper cover
- 2) Oil separator
- 3) Rear side 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 side panel
- 13) Power cord terminal block
- 14) Electric control assembly
- 15) Grille
- 16) Panel
- 17) Rear column

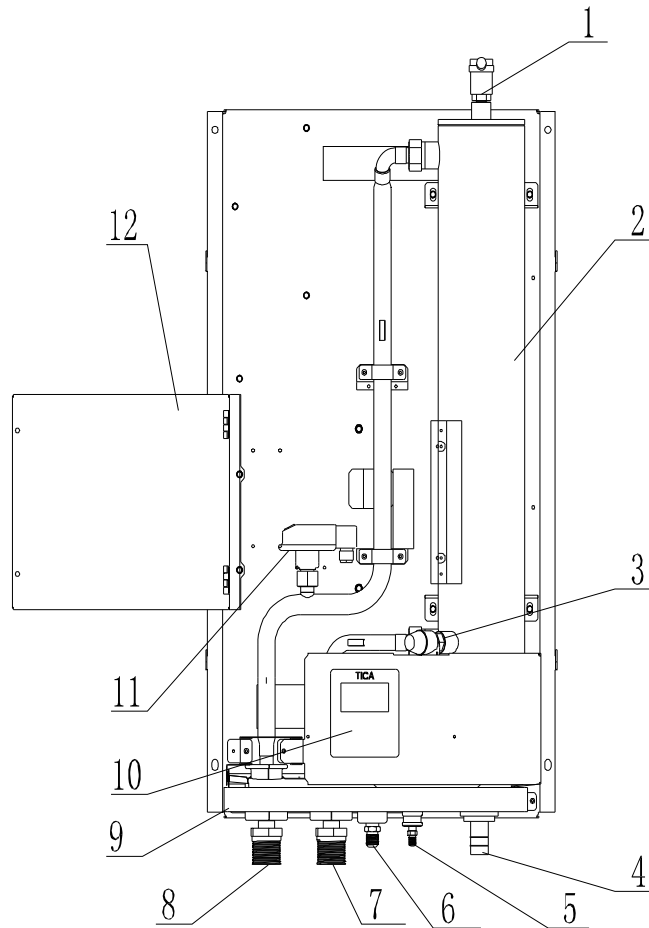
(3) Structure of IDU

1) TSCI120DHL/TSCI140DHL/TSCI160DHL



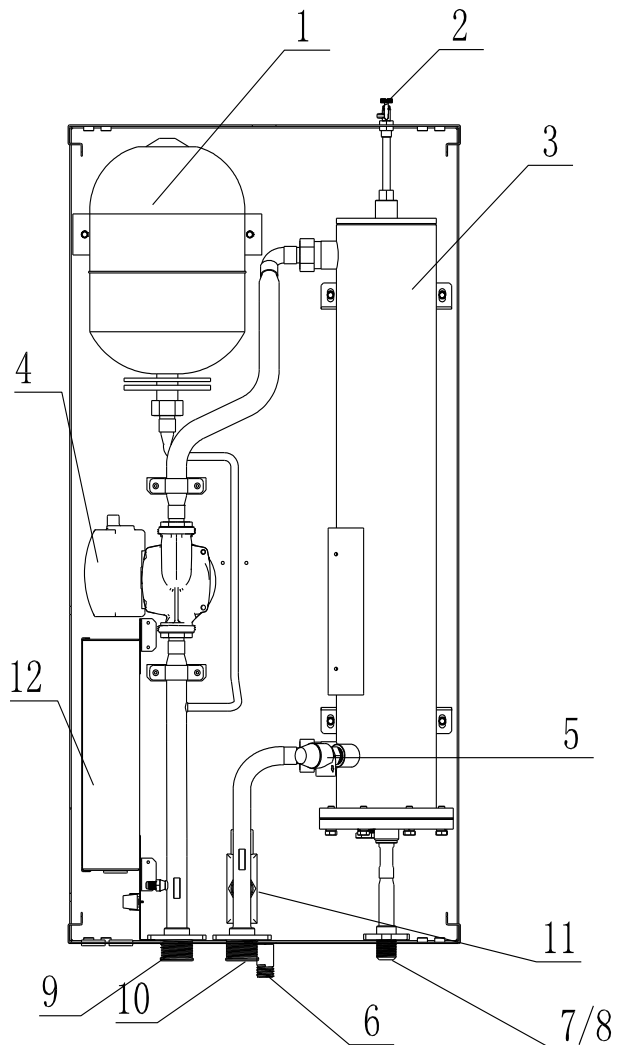
- 1) Expansion tank
- 2) Automatic air discharge valve
- 3) Shell-and-tube heat exchanger
- 4) Water pump
- 5) Safety valve
- 6) Pressure gauge
- 7) Drain pipe adapter
- 8) Refrigerant liquid pipe joint
- 9) Refrigerant gas pipe joint
- 10) Water inlet pipe joint
- 11) Water outlet pipe joint
- 12) Drainage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

2) TSCI120EHL/TSCI140EHL/TSCI160EHL



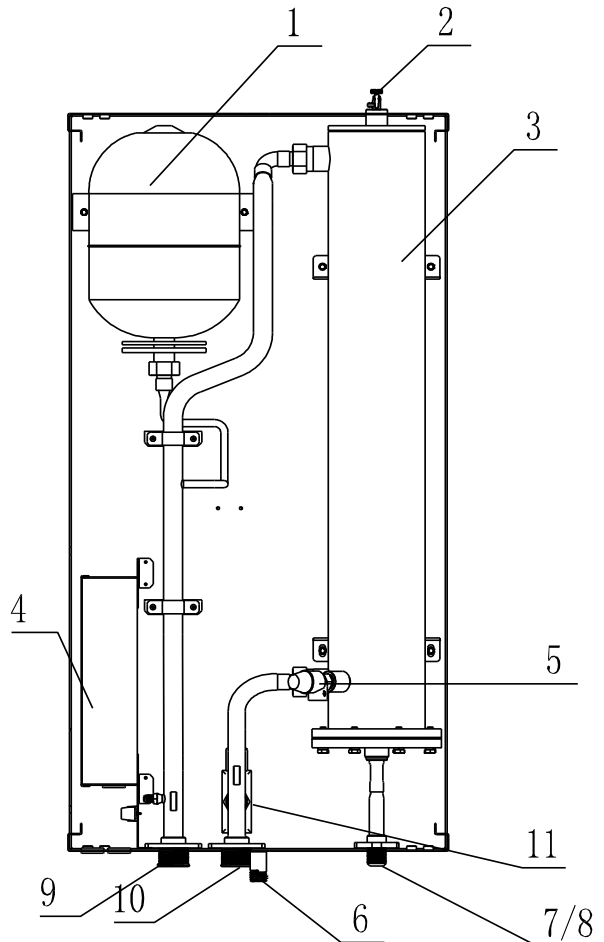
- 1) Automatic air discharge valve
- 2) Shell-and-tube heat exchanger
- 3) Safety valve
- 4) Drain pipe adapter
- 5) Refrigerant liquid pipe joint
- 6) Refrigerant gas pipe joint
- 7) Water inlet pipe joint
- 8) Water outlet pipe joint
- 9) Drainage pan
- 10) Wired controller
- 11) Water flow switch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

3) TSCI120DHLD/TSCI140DHLD/TSCI160DHLD



- 1) Expansion tank 2) Manual air discharge valve 3) Shell-and-tube heat exchanger 4) Water pump 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 12) Electric control box assembly

4) TSCI180DHLD/TSCI200DHLD



- 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

Standard: GB/T 18430.2 GB/T 25127.2

Wall-mounted	Entire unit	TSCA/I120DHL	TSCA/I140DHL	TSCA/I160DHL
	ODU	TSCA120DHL	TSCA140DHL	TSCA160DHL
	IDU	TSCI120DHL	TSCI140DHL	TSCI160DHL
Nominal cooling capacity	Nominal cooling capacity (kW)	12.0	14.0	16.0
	Rated power input (kW)	3.8	4.7	5.4
	COP _C (kW/kW)	3.16	2.98	2.96
Heating capacity 1	Nominal heating capacity (kW)	14.0	16.0	18.0
	Rated power input (kW)	4.0	4.6	5.4
	COP (kW/kW)	3.50	3.48	3.33
Heating capacity 2	Nominal heating capacity (kW)	8.60	10.50	12.50
	Rated power input (kW)	3.58	4.46	5.38
	COP _h (kW/kW)	2.40	2.35	2.32
IPLV (C)		4.30	4.30	4.30
IPLV (H)		2.80	2.80	2.80
Circulating water flow (m ³ /h)		2.06	2.41	2.75
Pump type		Variable frequency canned pump		
Power supply		220V -/ 50Hz	220V -/ 50Hz	220V -/ 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	16 - 48	16 - 48	16 - 48
	Heating	-25 - 25	-25 - 25	-25 - 25
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/2.70kg	R410A/2.70kg	R410A/2.70kg
Noise (ODU/IDU) (dB(A))		56/37	56/37	56/37
Lift	Water resistance (mH ₂ O)	/	/	/
	Unit external lift (mH ₂ O)	7.0	7.0	7.0
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	50

Wall-mounted	Entire unit	TSCA/I120EHL	TSCA/I140EHL	TSCA/I160EHL
	ODU	TSCA120DHL	TSCA140DHL	TSCA160DHL
	IDU	TSCI120EHL	TSCI140EHL	TSCI160EHL
Nominal cooling capacity	Nominal cooling capacity (kW)	12.0	14.0	16.0
	Rated power input (kW)	3.8	4.7	5.4
	COP _C (kW/kW)	3.16	2.98	2.96
Heating capacity 1	Nominal heating capacity (kW)	14.0	16.0	18.0
	Rated power input (kW)	4.0	4.6	5.4
	COP (kW/kW)	3.50	3.48	3.33
Heating capacity 2	Nominal heating capacity (kW)	8.60	10.50	12.50
	Rated power input	3.58	4.46	5.38

	(kW)			
	COP _h (kW/kW)	2.40	2.35	2.32
IPLV (C)		4.30	4.30	4.30
IPLV (H)		2.80	2.80	2.80
Circulating water flow (m ³ /h)		2.06	2.41	2.75
Pump type		No		
Power supply		220V -/ 50Hz	220V -/ 50Hz	220V -/ 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	16 - 48	16 - 48	16 - 48
	Heating	-25 - 25	-25 - 25	-25 - 25
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/2.70kg	R410A/2.70kg	R410A/2.70kg
Noise (ODU/IDU) (dB(A))		56/37	56/37	56/37
Lift	Water resistance (mH ₂ O)	3.5	4.0	4.5
	Unit external lift (mH ₂ O)	/	/	/
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	50

Ceiling type	Entire unit	TSCA/ I120DHL	TSCA /I140DHL	TSCA/ I160DHL	TSCA/ I180DHL	TSCA/ I200DHL
	ODU	TSCA120DHL	TSCA140DHL	TSCA160DHL	TSCA180DHL	TSCA200DHL
	IDU	TSCI120DHL	TSCI140DHL	TSCI160DHL	TSCI180DHL	TSCI200DHL
Nominal cooling capacity	Nominal cooling capacity (kW)	12.0	14.0	16.0	18.0	20.0
	Rated power input (kW)	3.8	4.7	5.4	6.1	7.0
	COP _c (kW/kW)	3.16	2.98	2.96	2.95	2.86
Heating capacity 1	Nominal heating capacity (kW)	14.0	16.0	18.0	20.0	22.0
	Rated power input (kW)	4.0	4.6	5.4	5.5	6.1
	COP (kW/kW)	3.50	3.48	3.33	3.64	3.61
Heating capacity 2	Nominal heating capacity (kW)	8.60	10.50	12.50	13.50	14.50
	Rated power input (kW)	3.58	4.46	5.38	5.67	5.83
	COP _h (kW/kW)	2.40	2.35	2.32	2.38	2.40
IPLV (C)		4.30	4.30	4.30	4.30	4.30
IPLV (H)		2.80	2.80	2.80	2.80	2.80
Circulating water flow (m ³ /h)		2.06	2.41	2.75	3.10	3.44
Pump type		Variable frequency canned pump			No	
Power supply	ODU	220V -/ 50Hz	220V -/ 50Hz	220V -/ 50Hz	380V 3N 50Hz	380V 3N 50Hz
	IDU				220V -/ 50Hz	220V -/ 50Hz
Maximum total power (kW)	ODU	7.00	7.00	7.00	8.00	8.00
	IDU	0.30	0.30	0.30	0.02	0.02
Maximum operating current (A)	ODU	35.0	35.0	35.0	15.0	15.0
	IDU	1.36	1.36	1.36	0.1	0.1
Applicable	Cooling	16 - 48	16 - 48	16 - 48	16 - 48	16 - 48

ambient temperature (°C)	Heating	-25 - 25	-25 - 25	-25 - 25	-25 - 25	-25 - 25
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/2.70kg	R410A/2.70kg	R410A/2.70kg	R410A/3.20kg	R410A/3.20kg
Noise (ODU/IDU) (dB(A))		56/37	56/37	56/37	59/33	59/33
Lift	Water resistance (mH ₂ O)	/	/	/	5.0	6.5
	Unit external lift (mH ₂ O)	7.0	7.0	7.0	/	/
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	DN32
	Connection mode	External thread (R 1-1/4')				
Net weight (kg)	ODU	96	96	96	102	102
	IDU	53	53	53	53	53

Notes: 1) Test conditions of the unit: heating capacity:

Nominal cooling capacity: tested at the rated water flow when ambient DB/WB temperature is 35/- °C and water outlet temperature is 7 °C;

Heating capacity 1: tested at the rated water flow when ambient DB/WB temperature is 7/6 °C and water outlet temperature is 45 °C;

Heating capacity 2: tested at the rated water flow when ambient DB/WB temperature is -12/-14 °C and water outlet temperature is 41 °C;

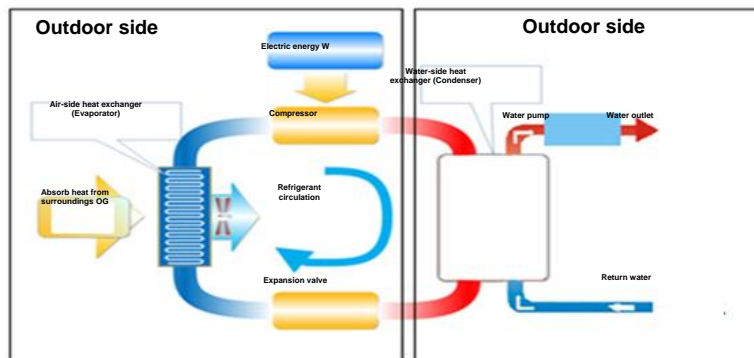
2) Due to the continuous improvement and innovation of TICA products, the product models, parameters and performance in this document are subject to changes without prior notice. The parameters indicated on the nameplate should prevail.

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. Unit 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

The wired controller can automatically store the unit status (ON/OFF) each time before the inverter type household air source 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) Grade V 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 chiller (heat pump) will most likely fail to work properly due to frozen water pipes. By utilizing TICA's unique grade V anti-freezing

technology, our inverter type household air source 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 in winter may be below $-20\text{ }^{\circ}\text{C}$, 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.

* The unit must be reliably grounded. Never connect the earth line to the neutral line or to the pipes.

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 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 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 product 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

1) Air side products using FCU to cool/heat

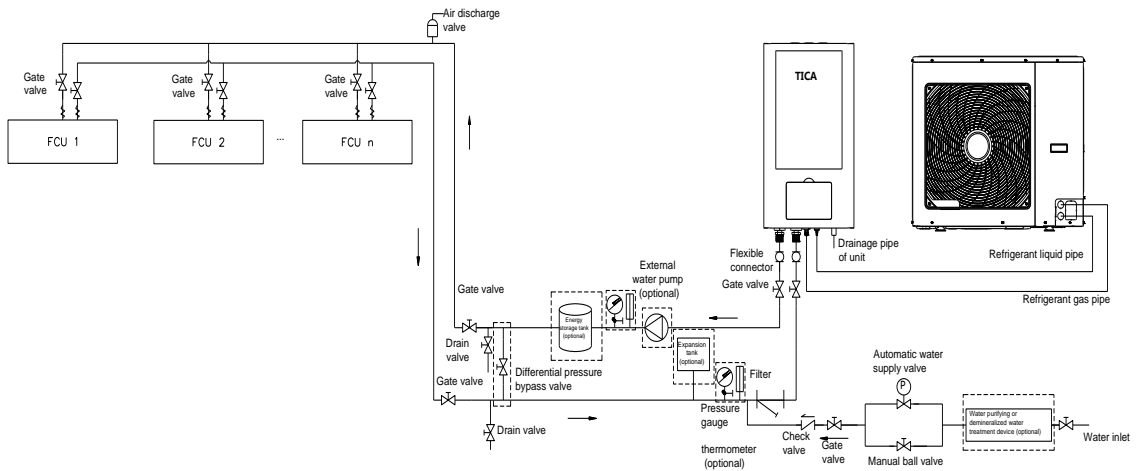


Diagram of FCU air side products

2) Air side products using FCU to cool and floor heating to heat

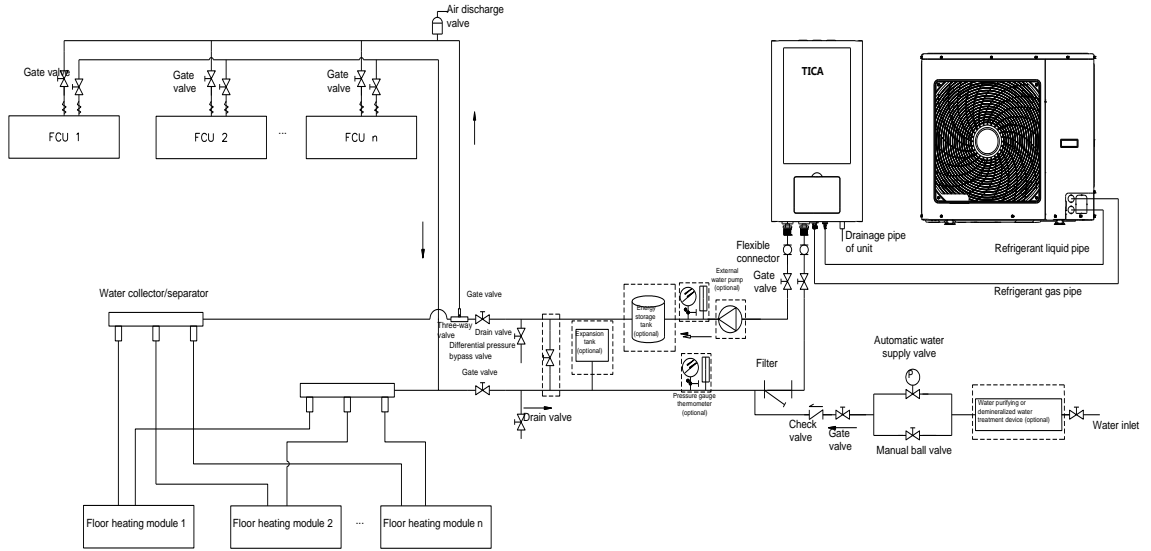


Diagram of combined FCU and floor heating

3) Air side products using FCU to cool and radiators to heat

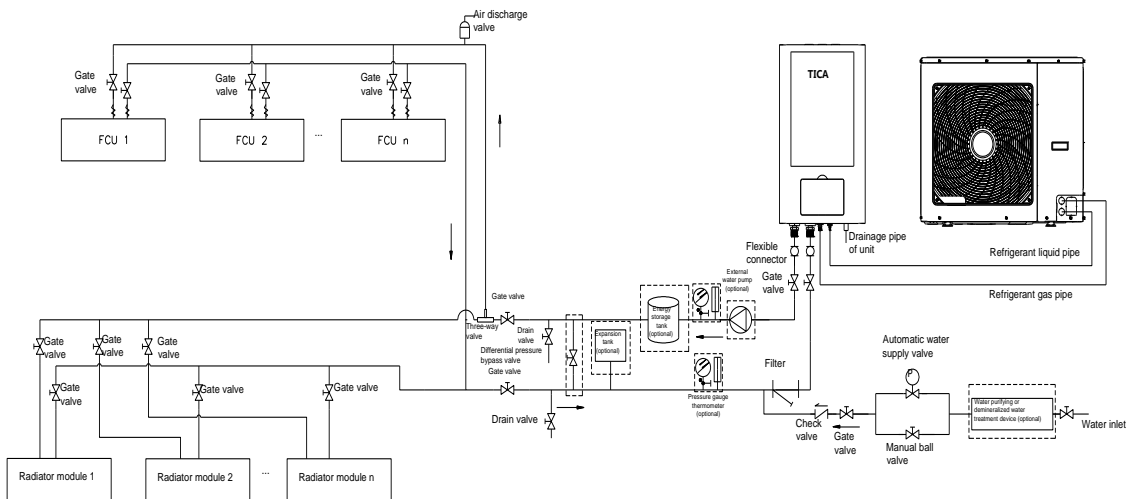


Diagram of combined FCU and radiators

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 for 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. Among them, TSCA/I120/140/160 EHL units have to be provided with water pump and expansion tank externally as they don't have them built in; TSCA/I180/200DHL units have to be provided with water pump externally because they don't have water pump built in. Other components are provided depending 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: When 2-way valves are installed for air side products but no bypass valve is installed, the number of installed 2-way valves cannot exceed 50% of the total number of air side products. 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, 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 not harmful to the unit's heat exchanging ability.

(2) Water volume check

Model	Minimum water volume (V_{min})
-------	------------------------------------

TSCA/I120DHL/EHL/DHLD	100L
TSCA/I140DHL/EHL/DHLD	120L
TSCA/I160DHL/EHL/DHLD	140L
TSCA/I180DHLD	160L
TSCA/I200DHLD	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/I120/140/160DHL and TSCA/I120/140/160/180/200DHLD)

The unit has a built-in expansion tank (8 L) with initial pressure of 0.15 MPa and allowable water storage capacity of 200 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:

$$V_b = 0.03 * (V - 200)$$

V – actual water system volume (unit: L)

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

2) Expansion tank selection

(Applicable to TSCA/I120/140/160EHL)

The unit is not equipped with expansion tank and therefore an expansion tank has to be selected and installed on site.

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

$$V_b = 0.03 * V$$

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:

$$H_{\max} = \Delta P_1 + \Delta P_2 + \Delta P_3$$

Notes: ΔP_1 ——Water pressure drop within the unit

ΔP_2 ——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

ΔP_3 —— 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:

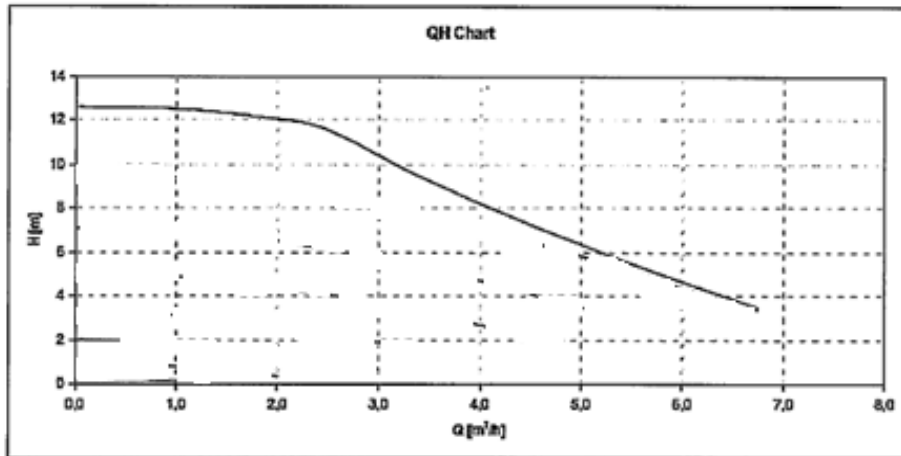
Model	Circulating water flow (m ³ /h)	Internal pressure drop (m)	Unit external lift (m)	Remarks
TSCA/I120DHL	2.06	/	7.0	Provided with water pump
TSCA/I140DHL	2.41	/	7.0	Provided with water pump
TSCA/I160DHL	2.75	/	7.0	Provided with water pump
TSCA/I120DHLD	2.06	/	7.0	Provided with water pump
TSCA/I140DHLD	2.41	/	7.0	Provided with water pump
TSCA/I160DHLD	2.75	/	7.0	Provided with water pump
TSCA/I120EHL	2.06	3.5	/	Not provided with water pump
TSCA/I140EHL	2.41	4.0	/	Not provided with water pump
TSCA/I160EHL	2.75	4.5		Not provided with water pump
TSCA/I180DHLD	3.10	5.0	/	Not provided with water pump
TSCA/I200DHLD	3.44	6.5	/	Not provided with water pump

2) Water pump check

(Applicable to TSCA/I120/140/160DHL and TSCA/I120/140/160DHLD)

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/I120/140/160EHL and TSCA/I180/200DHL)

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:

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 peace of 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.
- Never install the ODU in a closed space (such as courtyard), lest the heat exchanging effect of the unit be dampened.

IDU installation site requirements:

- 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.

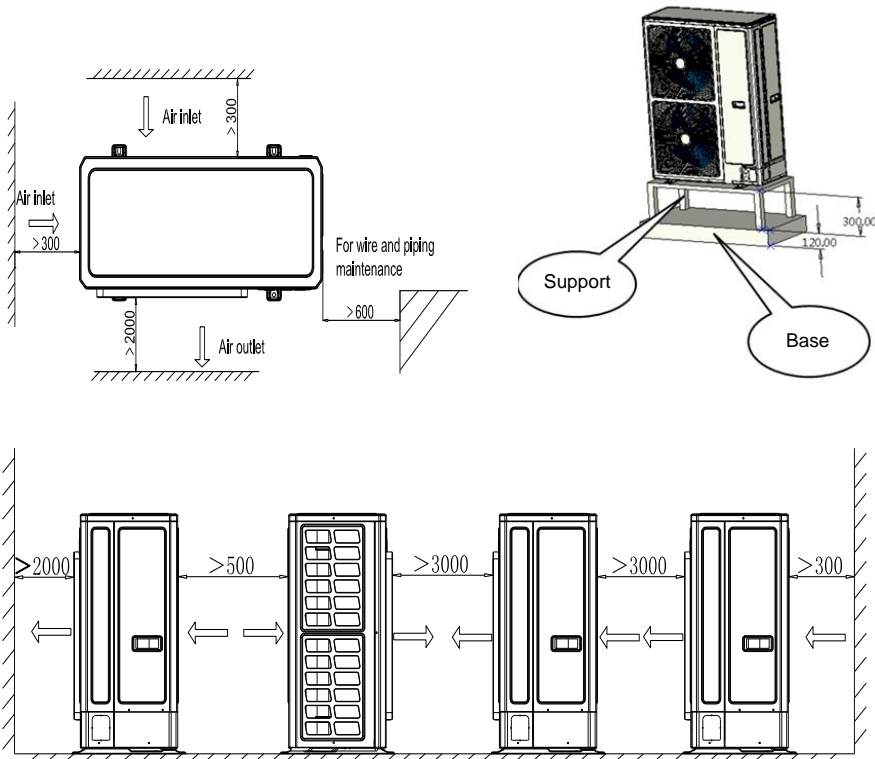
Danger Never install the IDU in a flammable atmosphere. Keep the IDU away from fire and explosives.

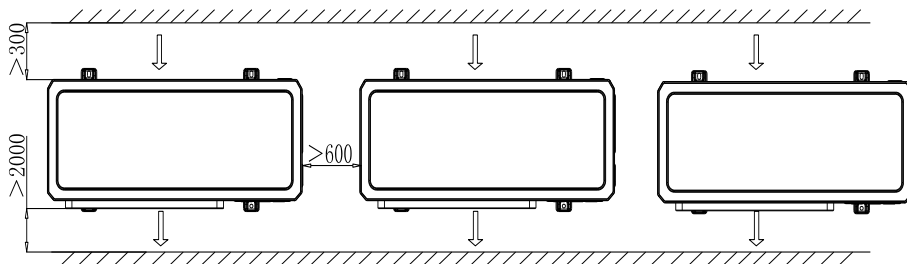
Warning Never install the IDU outdoors, as it may cause electric leakage and electric shock or freeze the unit.

Installation space diagrams are shown below:

1) ODU

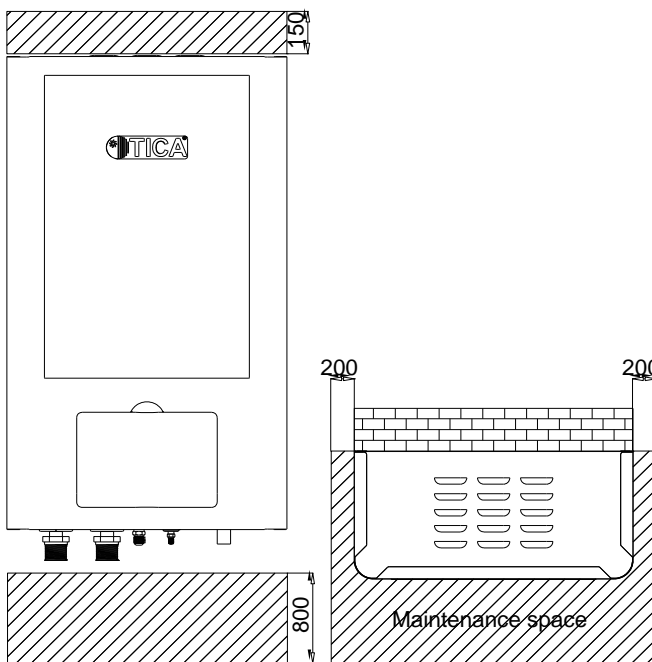
(1) TSCA120DHL/TSCA140DHL/TSCA160DHL/TSCA180DHL/TSCA200DHL





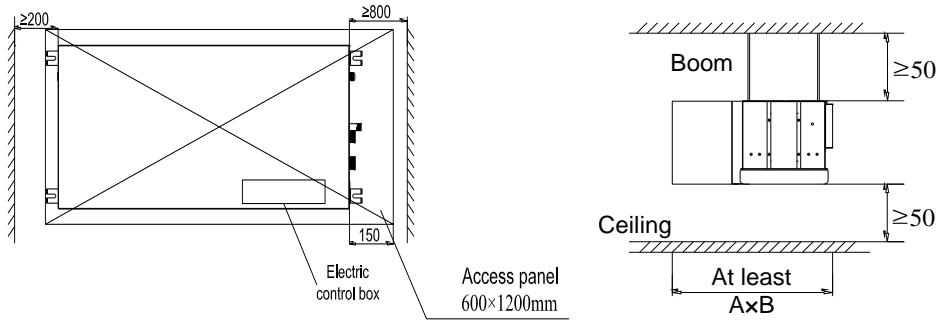
2) IDU

(1) TSCI120DHL/TSCI140DHL/TSCI160DHL/TSCI120EHL/TSCI140EHL/TSCI160EHL
 (Maintenance space view from front, unit: mm) (Maintenance space view from above, unit: mm)

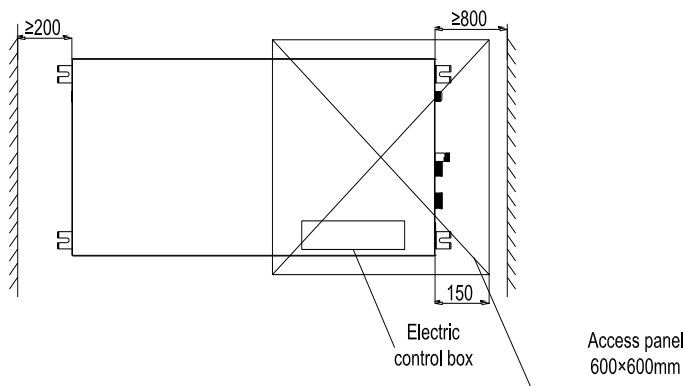


(2) TSCI120DHL/D/TSCI140DHL/D/TSCI160DHL/D/TSCI180DHL/D/TSCI200DHL/D

A sufficient maintenance space is required around the unit, as shown below (in the figure: $A \times B = \text{Unit length} \times \text{Width}$; unit: mm).



The maintenance space must meet the following minimum requirements, if it fails to meet the foregoing requirements:



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, 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.

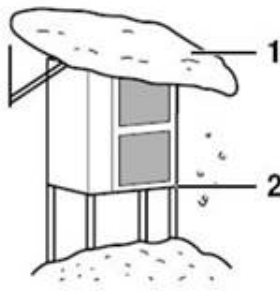
- The bracket must be horizontal upon installation, and could bear the unit's weight whenever it is operating, installed or repaired.
- Four sets of M10 bolts are used to fix the ODU to the metal bracket. Arrange the bolts in a downward direction and with the matching flat gaskets and spring gaskets 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 m high above the ground.
- 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

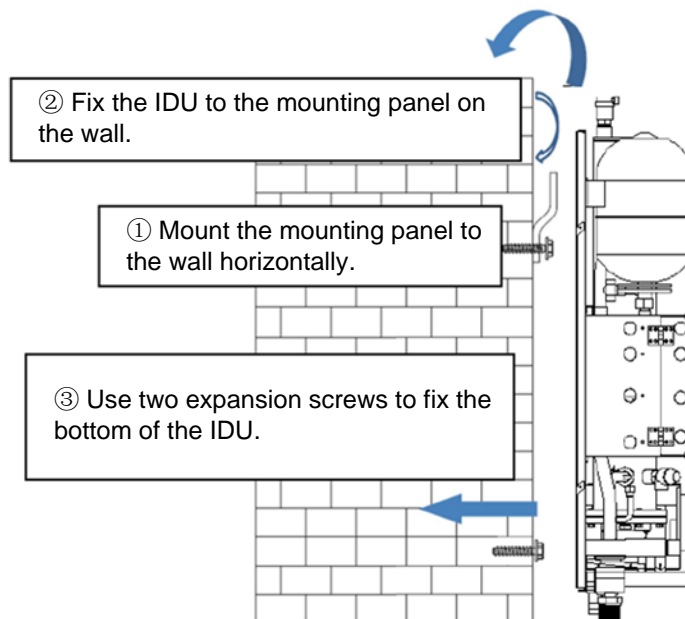
1) Unscrew the left and right screws on the front panel, and lift the housing upward to remove it;

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

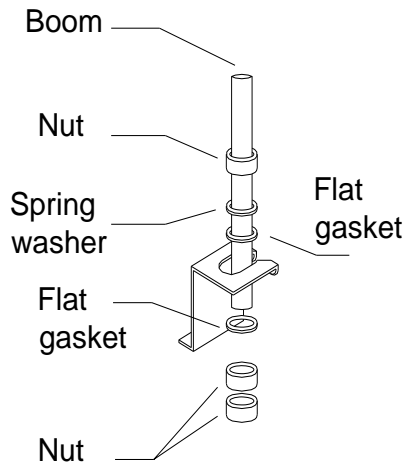
discharge of air from the water system, and result in water pump damages, degraded performance of the system, and water and electric leakage.

- 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.

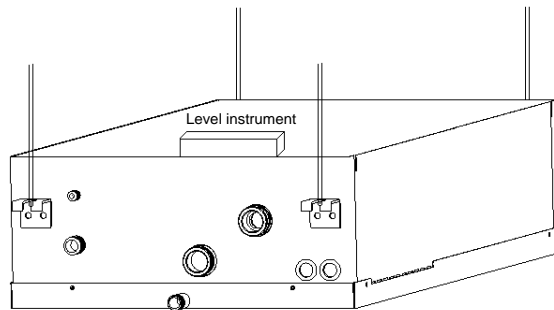


- ◆ Measure and mark the IDU suspension position and punch holes on the ceiling; Install the M10 boom and make sure that the boom is securely fixed;
- ◆ Determine the distance between booms according to the external dimensions of IDU;
- ◆ Hoist the IDU on the boom using nuts, flat gasket and spring gasket;
- ◆ 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.

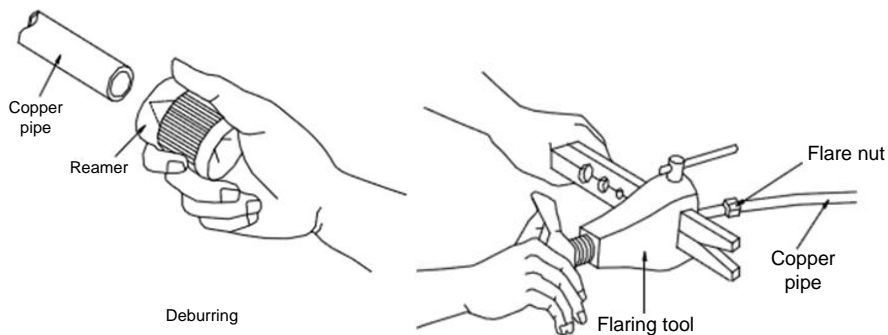
- Make sure that the IDU has a tilt to the drainage direction and a slope of about 1-2% along the drainage direction, and tighten the nut on the hanger rod.



7. Refrigerant Pipeline Connection

(1) Preparing 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 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.



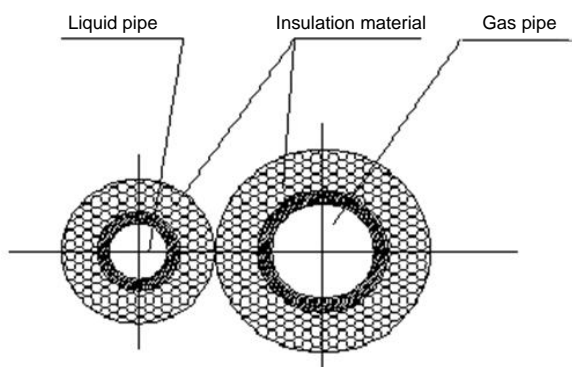
(2) Copper pipe insulation

1) Requirements for insulation material

- Use rubber foam insulation pipe
- Operating temperature: $-25\text{ }^{\circ}\text{C}$ to $120\text{ }^{\circ}\text{C}$
- 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

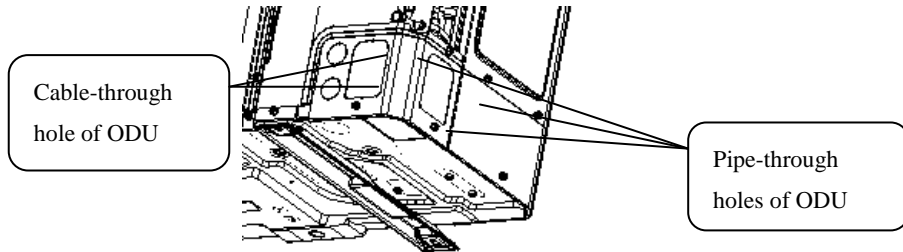
- Protect the mouth of copper pipe when passing it through heat insulation pipe.
- Liquid and gas pipes must be insulated separately as below.



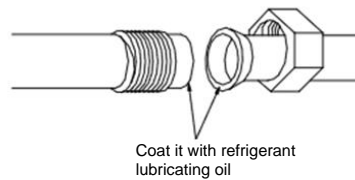
(3) Refrigerant pipeline connection

- 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.



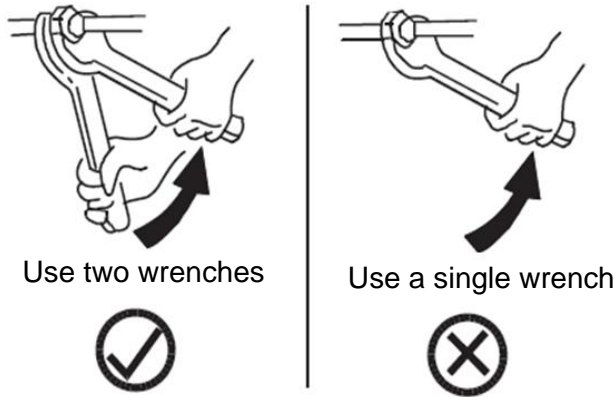
Note

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

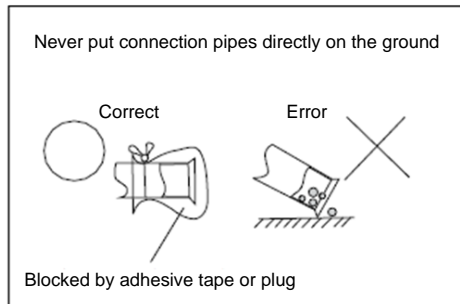
- Align the pipe socket of connection pipe with check valve pipe connecting point, and gently screw the tapered nuts to make a smooth fit. Use a torque wrench to tighten the nuts.
- Piping work shall be carried out step by step. Never tug the pipes with great force.
- Use bends with larger radius.
-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

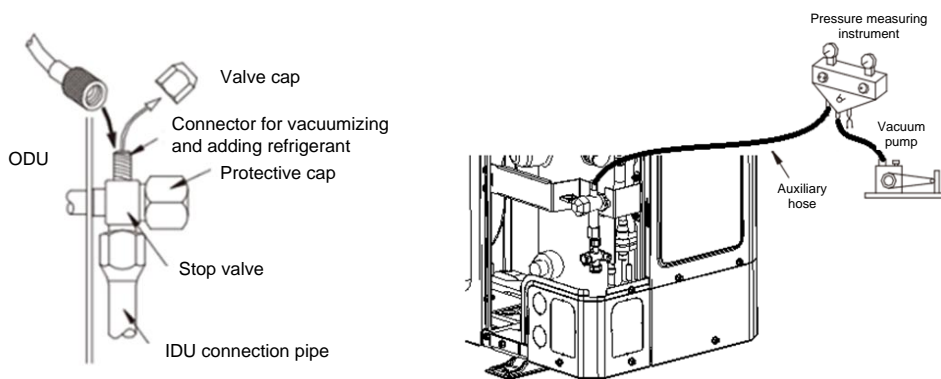


Diagram of ODU check valve Diagram of vacuumizing

(6) Opening valves 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
TSCA120DHL	R410A	2.70	φ19.05/φ9.52
TSCA140DHL	R410A	2.70	φ19.05/φ9.52
TSCA160DHL	R410A	2.70	φ19.05/φ9.52
TSCA180DHL	R410A	3.20	φ19.05/φ9.52
TSCA200DHL	R410A	3.20	φ19.05/φ9.52

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 $W1$ (kg) = (Actual liquid pipe length (m) - 5.0 (m)) * 0.054 (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. Water System Installation

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.
- Keep pipes of the system clean and away from pollutants to prevent dusts or other external matters from entering the pipe system during installation.

(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.

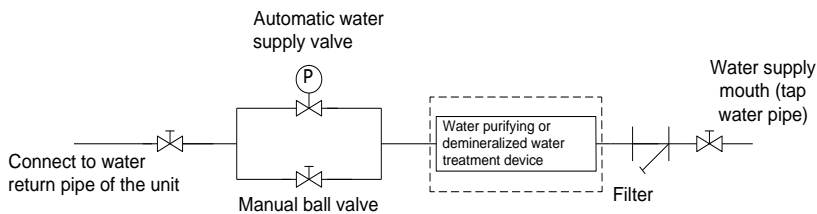
2) Precautions

- 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).

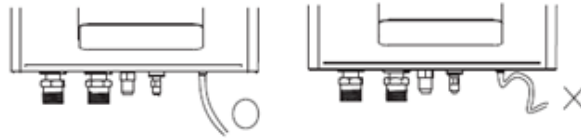
4) Connection of drainage pipes

(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.

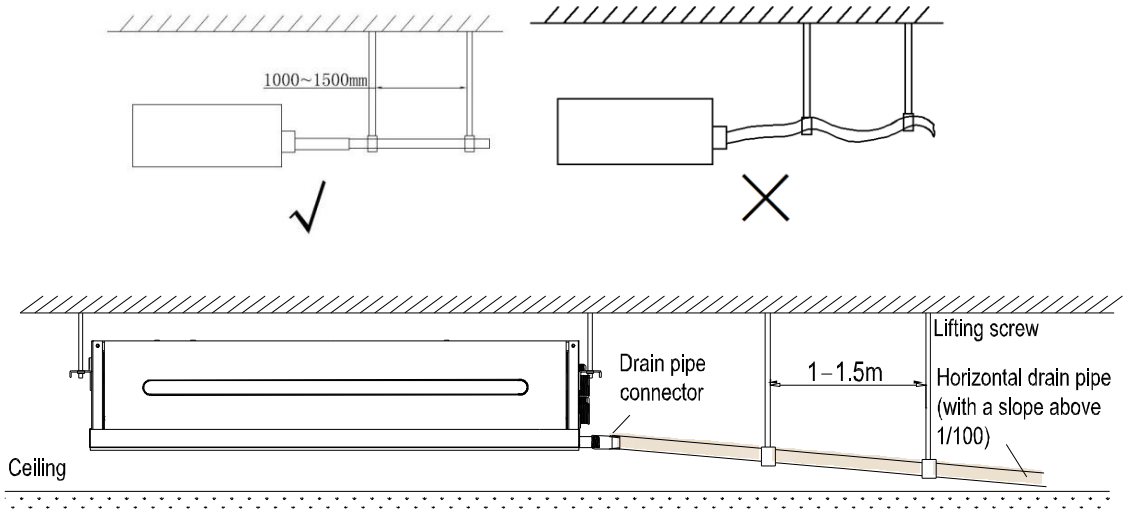


Note

- 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 in the room, install the pump in a dry and well-ventilated room with

ambient temperature not less than -20 °C.

- When installing outdoors, provide a separate equipment box to prevent the unit from rain or moisture. The ambient temperature of the unit outdoors should not be lower than -20 °C.
- 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) Water pipe insulation

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 0.4 MPa.
- 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 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.

* 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

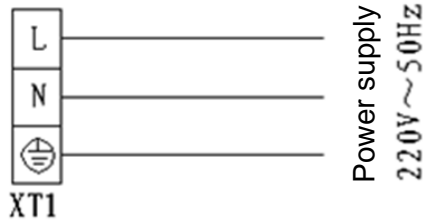
For the specifications of power cord, please refer to the following form.

Model		Power supply	Cable diameter (mm ²) (Plastic insulation and sheathed wire)			Circuit breaker capacity (A)
			Phase line	Neutral line	Earth line	
ODU	TSCA120/140/160DHL	220 V - 50 Hz	6.0	6.0	6.0	40A
ODU	TSCA180/200DHL	380V 3N 50Hz	2.5	2.5	2.5	20A
IDU	TSCI120/140/160DHL	220 V - 50 Hz	1.0	1.0	1.0	6A
IDU	TSCI120/140/160EHL	220 V - 50 Hz	1.0	1.0	1.0	6A
IDU	TSCI120/140/160DHL D	220 V - 50 Hz	1.0	1.0	1.0	6A
IDU	TSCI180/200DHL D	220 V - 50 Hz	1.0	1.0	1.0	6A

Notes:

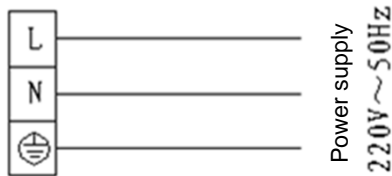
- ① The above circuit breaker and power supply is based on the unit's maximum power (maximum current);
- ② The power cord specifications indicated in the form are those of the multi-core copper core cable (like YJV copper core cross-linked PVC insulated cable and PVC sheathed power cable) which are installed 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

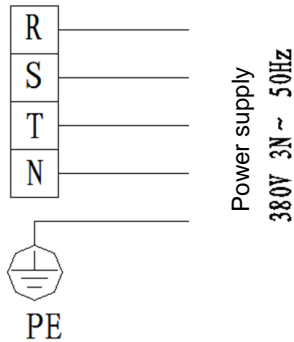


2) ODU wiring diagram

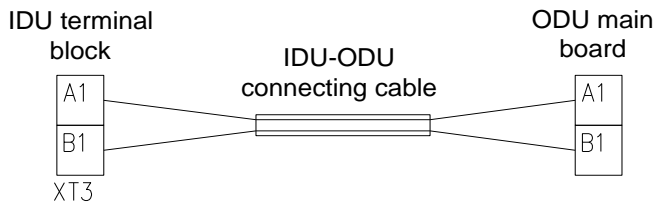
ODU type: TSCA 120/140/160 DHL (single-phase) power cable wiring diagram



ODU type: TSCA180/200DHL (three-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.

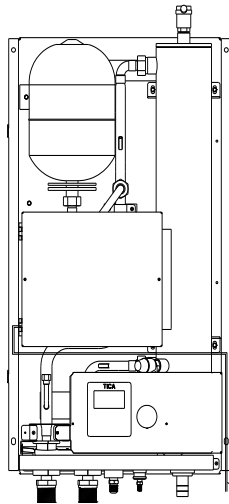
5) The outdoor power cables and cables connecting IDU and ODU must not be lighter than the chloroprene rubber armored cord (wire No.57 provided in IEC 60245); the indoor power

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.



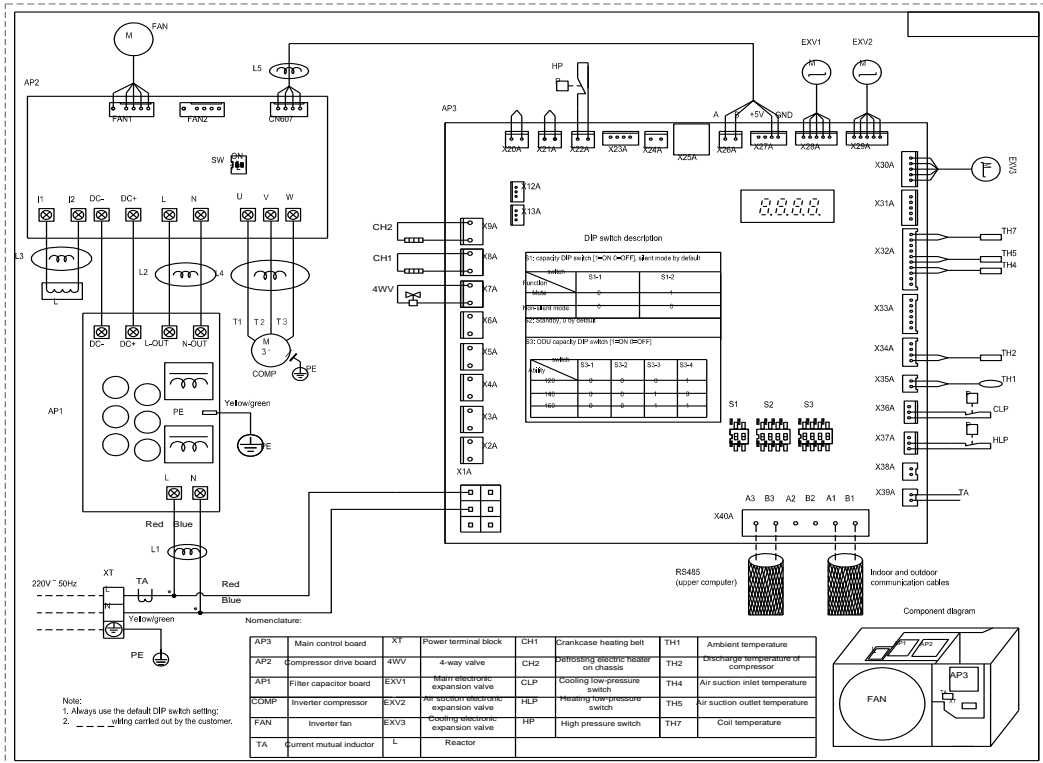
The cable will enter from the right side of the unit, and pass through this area and connect to the electric control box through the cable-through hole at the left of the electric control box.

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).

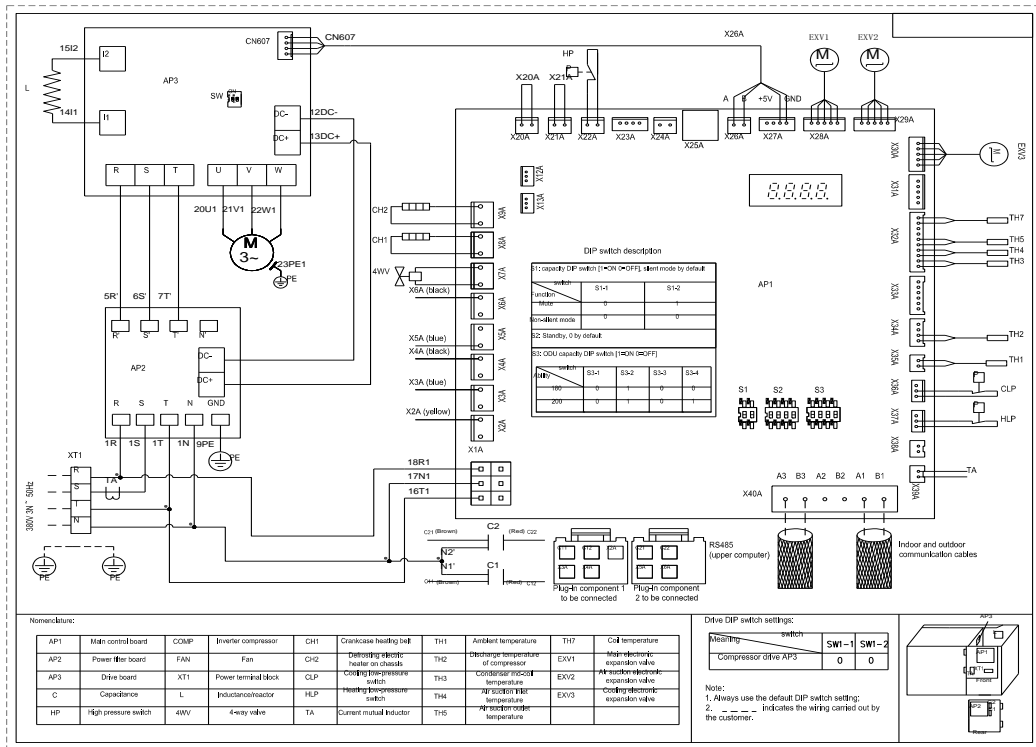
10) Use a line seat to press the cables tightly of IDU and ODU, lest the forces may be exerted on terminal block.

11) ODU electrical principle diagram

(1) TSCA120/140/160DHL

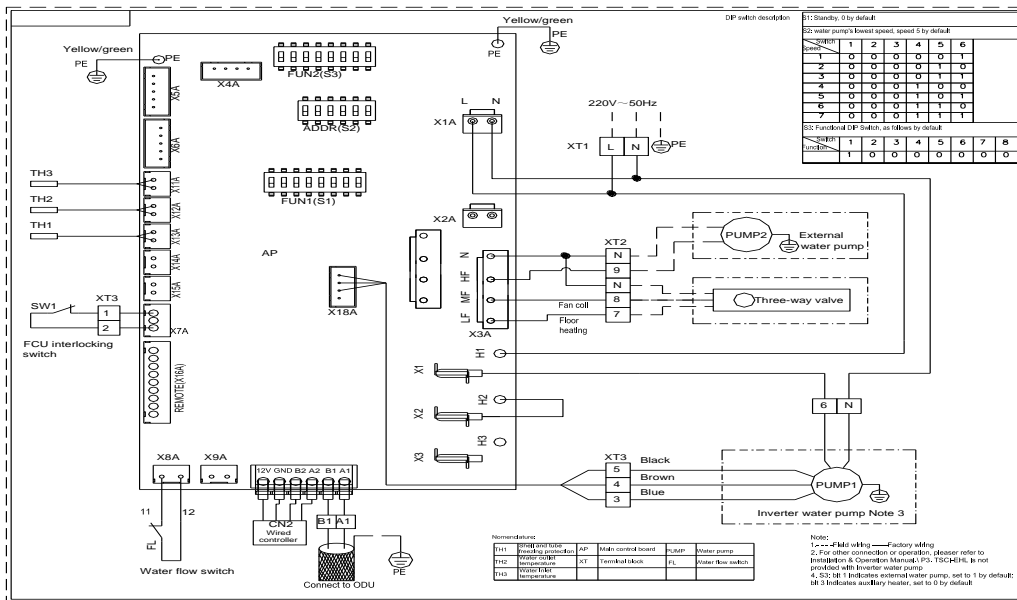


(2) TSCA180/200DHL

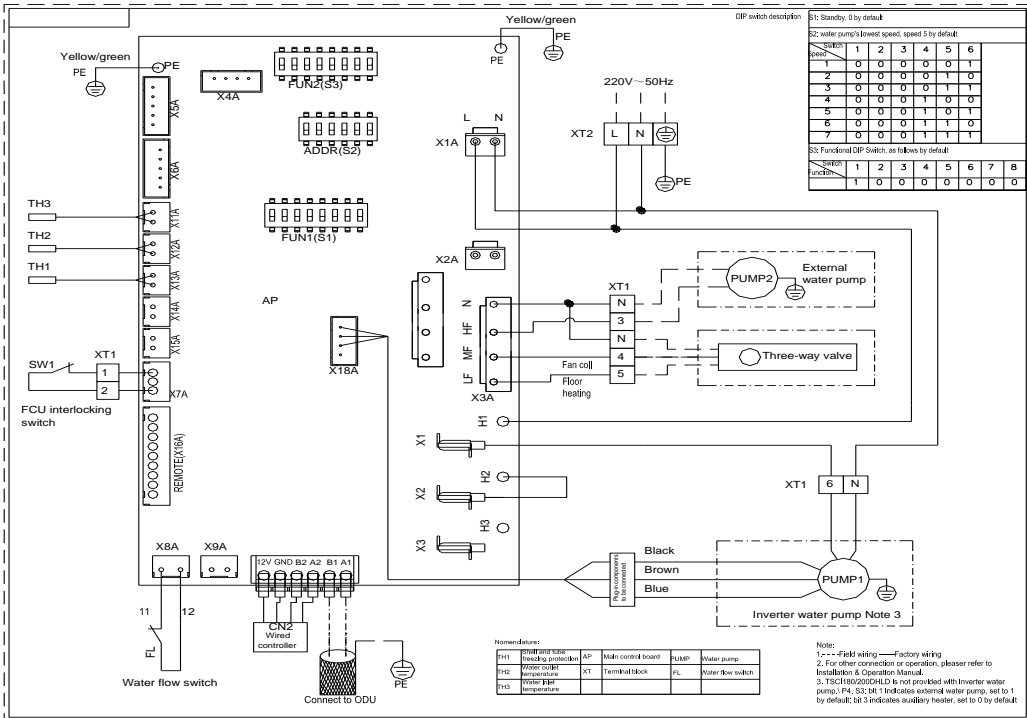


12) IDU electrical principle diagram

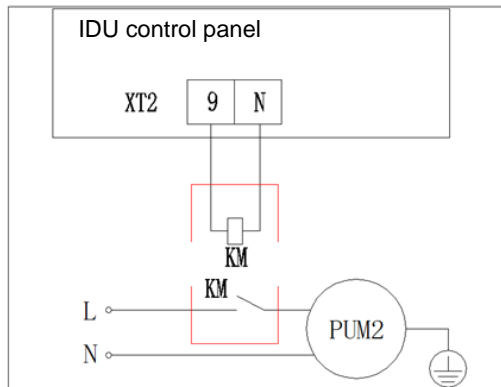
(1) TSC1120/140/160DHL/TSC1120/140/160EHL



(2) TSCI120/140/160DHL/D/TSCI180/200DHL/D

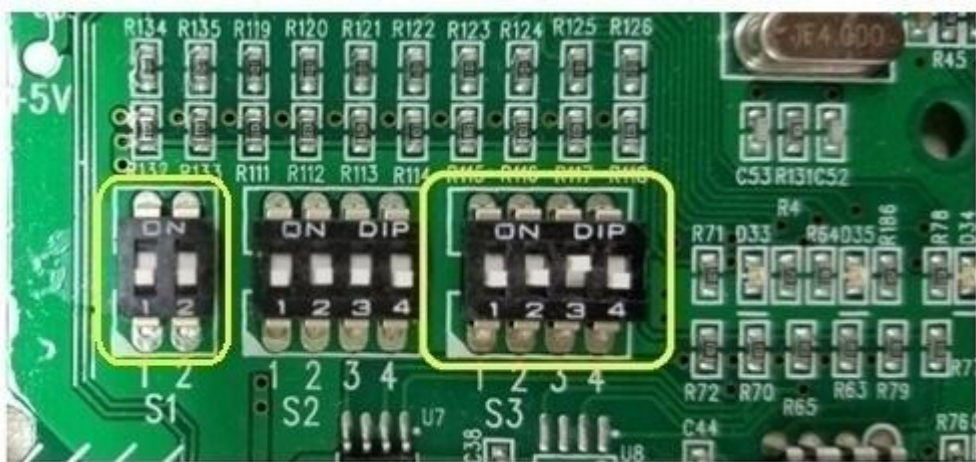

Note

- 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: Position 1 reserved, set to OFF; Position 2 - silent mode at night, set to On to enable or OFF to disable the mode. Set to ON by default

S2: FCU DIP switch reserved, all set to OFF; configured based on interlocking of air side products.

S3: DIP switch of unit capacity: from 1 to 4: 120 indicated by 0001, 140 indicated by 0010, 160 indicated by 0011, 180 indicated by 0100, 200 indicated by 0101

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

2) IDU DIP switch



S1 reserved, all set to OFF

S2: No. 1 - No. 3 reserved, set to OFF;

No. 4 - No. 6 indicate water pump's lowest speed, 001-111 indicates speed 1 to speed 7, set to speed 5 by default.

S3: Position 1 indicates external water pump standby mode, dialed ON to enable and OFF to disable the mode;

Position 3 indicates auxiliary electric heater, dialed ON to enable and OFF to disable it;

Other positions are reserved and set to OFF.

Instructions of No. 7 - No. 8 temperature control of auxiliary electric heater: -5 °C indicated by 00; -10 °C indicated by 01; -15 °C indicated by 10; -20 °C indicated by 11 (effective with auxiliary electric heater enabled).

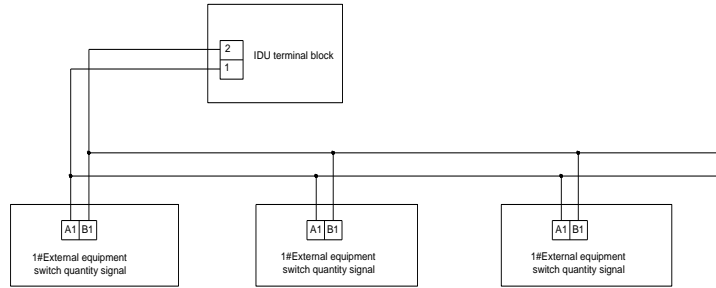
Notes: DIP switch of ON indicates 1; otherwise is 0

(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. There are several ways to implement interlocked control over the unit:

1) Direct access of the ON/OFF passive switch signal to FCU peripherals

When user selects an external device with passive switch signal, please connect the switch signal to the IDU terminal blocks 1 # and 2 # to realize the interlocked control of indoor air side products and the IDU. The wiring diagram of indoor air side products and the IDU is as follows:

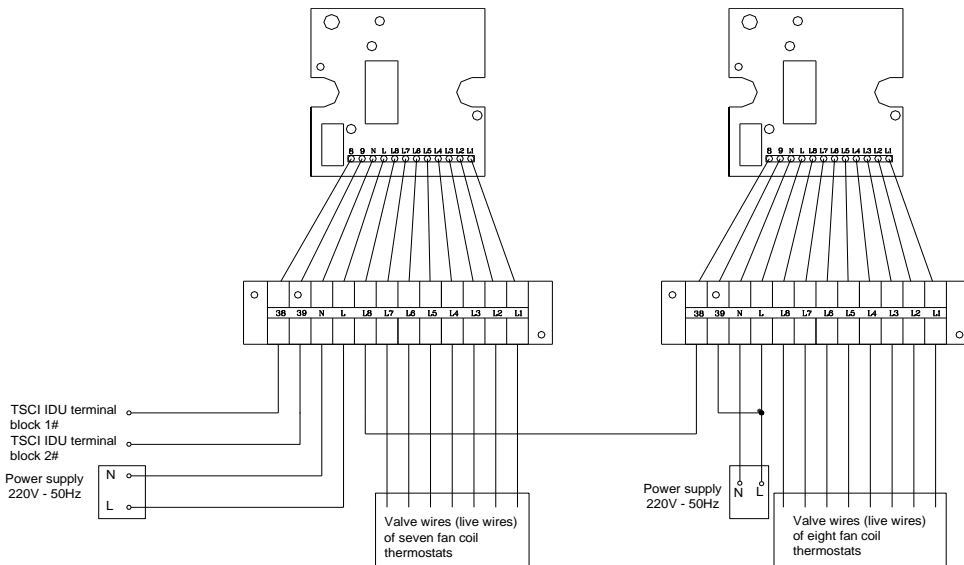


2) Interlock controller

When user selects an interlock controller, interlocked control of indoor air side products and the IDU can be implemented after wires are properly connected. A single interlock controller can control 8 air side products in an interlocked manner, two interlock controllers can accommodate 15 air side products, and so on.

If an interlock controller needs to be used, a temperature controller must be used for the air side products.

The figure below shows the wiring of indoor air side products and the IDU when an interlock controller is used to implement such control.



The figure above is the wiring diagram of two interlock controllers, and the wiring of multiple interlock controllers is similar to the wiring in the figure above.

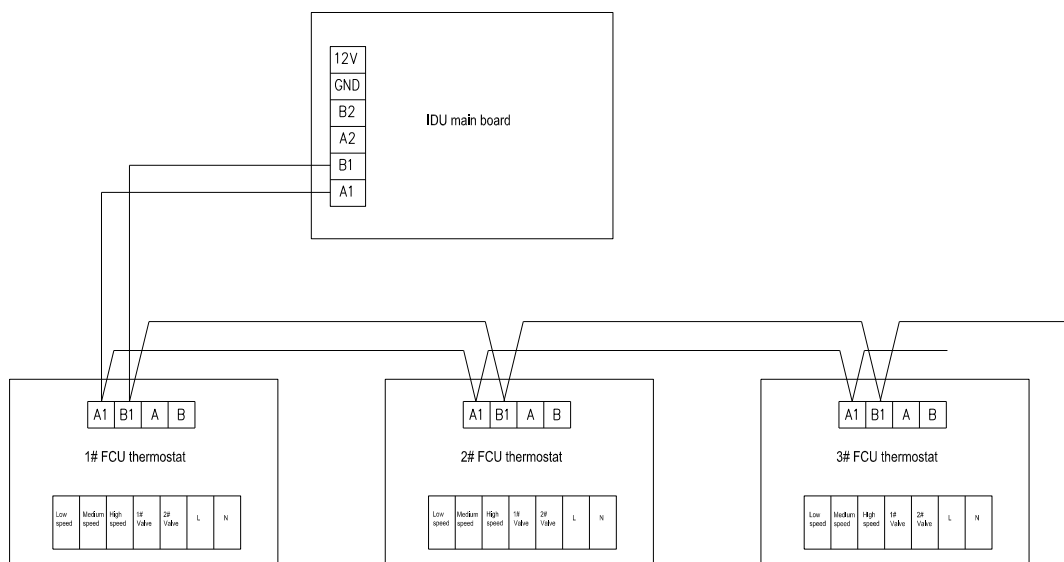
Note

Interlock controllers are not equipped for standard models at delivery. The wired control switch is short-connected to the common line. If an interlock

controller needs to be connected, remove the short connection wire and connect wires as per the circuit diagram above.

3) Matching TICA's dedicated FCU thermostat (optional)

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 IDU when TICA's dedicated FCU thermostat is used to implement the interlocked control.



In this case, it is necessary to realize the communication between the IDU and the fan coil by setting S2 FCU DIP switch. At most 15 FCU thermostats can be monitored.

S2: (FCU DIP switch reserved, from 1 to 4) 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 of IDU 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

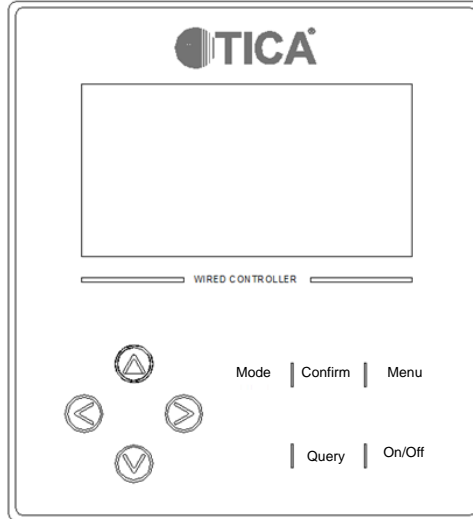
- After power is applied to the unit for over 24 hours, press "ON/OFF" button on the wired controller to turn on the unit.
- The parameters of wired controller are preset by the manufacturer. Hence the users are not required to set them.
- After compressor starts, check whether the unit operates normally. 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.

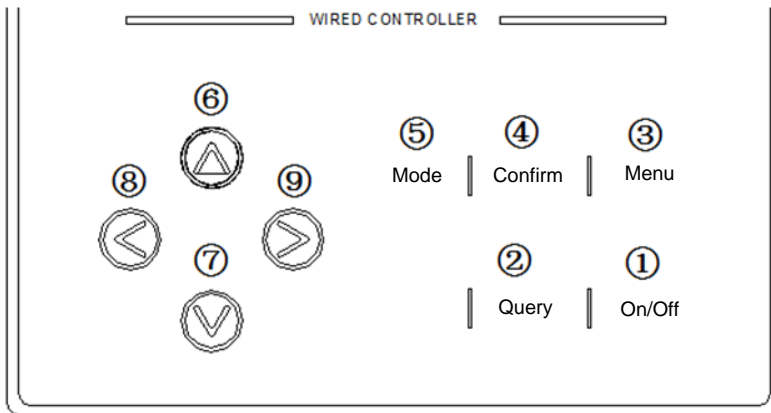
- After trial run, put back the upper right panel of ODU and panel of IDU.
- Clean the water filter after initial trial run.

V. Operation and Use of Wired Controller

1. Screen Description



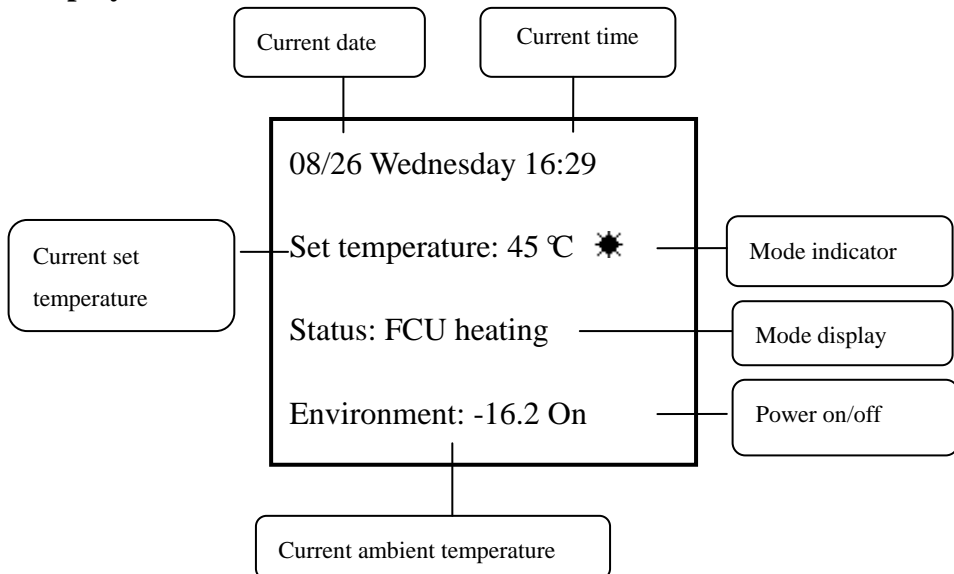
(1) Buttons



Button ①	On/Off: press and hold this button for 3s to turn on/off the unit.
Button ②	Query: press Query to check the unit's current faults.
Button ③	Menu: press Menu to enter/exit from it.
Button ④	OK: press OK to enter the desired screen or to confirm a parameter setting or a timer.

Button ⑤	Mode button: FCU cooling, FCU heating, floor heating and floor heating preservation are available.
Buttons ⑥ and ⑦	Up/Down: press it to select the menu or parameters; when on the main screen, press it to adjust set temperature.
Buttons ⑧ and ⑨	Left/Right: press it to select a desired item when setting parameters or functions; or to set values when setting dates or timers.

(2) Main display screen



From the top down the information displayed on the screen is: current date and time; user's set temperature; unit mode (to prompt the unit faults (if any) for 3s in a roll polling manner); and ambient temperature, and ON/OFF status of wired controller.

2. Function Description

(1) On/Off

On the main screen, press and hold ON/OFF for 3s to power on/off the unit.

(2) Shortcut settings

On the main screen, press Menu to enter main menu interface. Then select Unit Operation Settings, and then press OK to select Mode Temperature Settings and then Shortcut Settings. Press Left/Right to enable/disable the function and press OK to confirm your choice. When shortcuts are activated, user could press Up/Down to set temperatures; and could press Mode to set operating modes quickly.

(3) Temperature settings

- a) On the main screen, press Up/Down to set temperatures (enabled when activating shortcuts).
- b) On the main screen, press Menu to enter main menu interface. Then select Unit Operation Settings, and then press OK to select Mode Temperature Settings and then Set Temperatures. Press Left/Right to set temperatures and press OK to confirm your choice.

(4) Mode selecting

- a) On the main screen, press Mode to select FCU cooling, FCU heating, floor heating and floor heating preservation (enabled when activating shortcuts).
- b) On the main screen, press Menu to enter main menu interface. Then select Unit Operation Settings, and then Mode Temperature Settings and then Mode. Press Left/Right to set operating mode and press OK to confirm your choice.

(5) Error check

- a) On the main screen, press Query to check the unit's current faults.
- b) On the main screen, press Menu to enter main menu interface. Then select Historical Warnings Query. Press OK, and then Up/Down to check the unit's status.

(6) Unit status query

On the main screen, press Menu to enter main menu interface. Then select Unit Status Query. Press OK, and then Up/Down to check the unit's status.

(7) Time/timer settings

On the main screen, press Menu to enter main menu interface. Then select Date and Timer. Press OK, and then Up/Down to select Date and Clock to enter system time settings. Select Weekday Timer or Holiday Timer to enter corresponding timer settings. Then press Up/Down to set month, date, weekday and hour, etc. Then press Left/Right to adjust values and then press OK to confirm your choice.

(8) Compulsory e-heater function

On the main screen, press Menu to enter main menu interface. Press Up/Down to make Unit Operating Settings, and then press OK, and then Up/Down to select Compulsory e-heater. Press Left/Right to enable or disable this function, and then OK to confirm your choice. This function is for one time only. Reset it when necessary.

(9) Silent mode

On the main screen, press Menu to enter main menu interface. Press Up/Down to make Unit Operating Settings, and then press OK, and then Up/Down to select Silent Mode. Press Left/Right to select Grade 1/2/3/4 Silent Mode, and then OK to confirm your choice.

(10) Testing water pump function

On the main screen, press Menu to enter main menu interface. Press Up/Down to make Unit Operating Settings, and then press OK, and then Up/Down to select Test Water Pump. Press Left/Right to enable or disable this function, and then OK to confirm your choice.

(11) Password settings

On the main screen, press Menu to enter main menu interface. Press Up/Down to make Unit Operating Settings, and then press OK. Then Up/Down to select User Password and then OK. On this interface, user can activate the password, and set or change the password. Press OK to confirm your choice.

(12) Manual reset

On the main screen, press Menu to enter main menu interface. Press Up/Down to make Unit Operating Settings, and then press OK, and then Up/Down to select Manual Reset. Press Left/Right to select Yes or No, and then OK to confirm your choice. Select Yes to clear all current fault resets.

Notes:

- On all interfaces, user can press Menu to return to main screen.
- In the silent mode, the unit automatically operates with reduced capacity.
- User's initial password on the Unit Operating Settings is: 0000.

V. Repair and Maintenance

Warning:

- This inverter type household air source 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, 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.
- On the water inlet pipes, water filters should be installed. In addition, these filters need to be cleaned periodically, lest water-side heat exchanger may be clogged, hence causing damages to the unit.
- Note to clean the screen of water filters regularly (clean the screen based on the water quality in the earlier stage, and once every 2 to 3 months in the later stage) to make sure water flows smoothly and abundantly, lest 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.
- When ambient temperature is below 0 °C, do not turn off the power even if the unit is idle. If power off is required, note to drain water out of the system. Otherwise, the unit will be damaged, for which TICA will not assume any liabilities.
- 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 and Troubleshooting

Code	Fault description	Cause	Handling Method
E00	Communication failure between IDU and wired controller	1. Communication cable gets loose or wrongly connected	1. Check the communication cables between wired controller and IDU and tighten them
		2. IDU control panel is damaged	2. Replace the control panel
E01	Communication failure of 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
E02	Water inlet temperature sensor failure	1. Temperature sensor gets loose wires 2. Temperature sensor is damaged	1. Check its wiring and tighten them 2. Replace temperature sensor
E03	Water outlet temperature sensor failure		
E04	Ambient temperature sensor failure		
E05	Discharge temperature sensor failure		
E06	Coil temperature sensor failure		
E07	Reserved		
E08	Air supply inlet temperature sensor failure	1. Temperature sensor gets loose wires 2. Temperature sensor is damaged	1. Check its wiring and tighten them 2. Replace temperature sensor
E09	Air supply inlet temperature sensor failure		
E10	Reserved		
E11	Water flow protection	1. Water differential pressure switch gets loose wires	1. Check its wiring and tighten them
		2. Lack of water or valve not wide open	2. Check whether the valve of water circulation pipelines is open and whether the water inlet pressure is too small
		3. Water filter blocked by dirt	3. Clean water filter

		4. Incorrect testing	4. Test the pump lift and flow again
		5. A large amount of air is present in the water system	5. Open the air discharge valve above the IDU to discharge air. After confirming that the air is exhausted from water system, close the air discharge valve.
E12	Water Outlet Temperature Low		1. Check whether the water filter is blocked by dirt
E13	Shell and tube freezing protection	1. Low water flow	2. Check whether valve of water circulating pipeline is open
E14	Water Outlet Temperature High	2. Too much air inside the water system	3. Check whether air is completely pushed out of the system
E15	Excessive temperature difference between water inlet and outlet	3. Inaccurate testing of water outlet temperature sensor	4. Check water outlet temperature sensor is damaged
E16	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
E17	Low pressure protection in heating mode	1. Low pressure switch gets loose wires	1. Check its wiring and tighten them
		2. Refrigerant leaks	2. Detect leaks and add refrigerant again
		3. Throttle device is blocked	3. Replace throttle device
		4. Evaporator fails to exchange heat well	4. Check and clean evaporator
		5. Low pressure switch is damaged	5. Replace low pressure switch
E18	High pressure protection of system	1. High pressure switch gets loose wires	1. Check its wiring and tighten them
		2. 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
		3. Water filter blocked by dirt	3. Clean or replace the filter
		4. Dirt deposits on the condenser	4. Clean the condenser
		5. Refrigerant filter or throttle	5. Replace filter or throttle device

		device is blocked	
		6. High pressure switch is damaged	6. Replace high pressure switch
E19	Compressor overcurrent protection	1. The system's high voltage is too high	1. Refer to overvoltage protection of system
		2. Current mutual inductor is damaged	2. Replace current mutual inductor
		3. Compressor is damaged	3. Replace the compressor
E20	High temperature protection of inverter modules	1. Inverter modules have high temperature	1. Check whether running power of the unit is normal
E21	Wrong model	1. Wrong DIP switch	1. Set DIP switches according to the instructions
E22	Compressor drive failure	1. Drive board is damaged	1. Replace the damaged board
		2. Low voltage input	2. Check voltage input
E23	Failure of freezing protection temperature sensor of shell and tube	1. Temperature sensor gets loose wires	1. Check its wiring and tighten them
		2. Temperature sensor is damaged	2. Replace temperature sensor
E24	External interlocking failure	1. External interlocking disconnected	1. Check external interlocking wires
E25	Communication failure of ODU main board and drive	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
E26	Low pressure protection in cooling mode	1. Low pressure switch gets loose wires	1. Check its wiring and tighten them
		2. Refrigerant leaks	2. Detect leaks and add refrigerant again
		3. Throttle device is blocked	3. Replace throttle device
		4. Evaporator fails to exchange heat well	4. Check and clean evaporator
		5. Low pressure switch is damaged	5. Replace low pressure switch

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

Address: No.6, Hengye Road, Nanjing Economic and Technological Development Zone
Postal code: 210046

Tel: 4008-601-601 Fax: 86-25-85323095

<http://www.ticachina.com> E-mail: tica@ticachina.com

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

O: 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 configuration may be different due to different models or product improvements. The actual configuration of sold products should prevail.