# **Service Manual**

# -- 4-pipe heat recovery mini VRF



2023.07

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# **Part 1 General Information**

### 1. Indoor and outdoor unit

#### 1.1 Outdoor unit

Capacity	Model	Power supply
8kW	HCHV-VH080R1-(BR)D-F01	220-240V/1PH/50Hz
10kW	HCHV-VH100R1-(BR)D-F02	220-240V/1PH/50Hz
12.5kW	HCHV-VH125R1-(BR)D-F03	220-240V/1PH/50Hz
14kW	HCHV-VH140R1-(BR)D-F04	220-240V/1PH/50Hz

### 1.2 Indoor unit

Сар	acity	IDU							
kW	index	Q4	QR	FA	G	UA	TA	ТВ	TH
2.2	22	22			22		22		
2.8	28	28			28	_	28		
3.6	36	36			36	36	36		_
4.5	45	45			45	45	45		
5.6	56	—	56	_	56	56	56	—	—
7.1	71		71		71	71	71	71	71
8.0	80	_	80	80		80	_	80	80
9.0	90	—	90	—	—	90	—	90	90
10.0	100	_	100	100		_	_	100	100
11.2	112		112			112			
12.0	120							120	120

12.5	125	_	125	_	 	_		_
14.0	140	_	140	140	 140		_	_
15.0	150		_		 		150	150
16.0	160		160	160	 160			

Q4	Compact cassette unit	UA	Floor ceiling unit
QR	Round flow cassette unit	TA	Short ducted unit
FA	Floor standing unit	ТВ	Medium ESP ducted unit
G	Wall mounted unit	ТН	High ESP ducted unit

### 1.3 Hydronic module

Model	Capacity	Matched ODU	
CE-SLMK-100N-DS-001	10kW	8&10kW ODU	
CE-SLMK-160N-DS-003	16kW	12.5&14kW ODU	

### 2. External appearance

### 2.1Outdoor unit

10~14kW



### 2.2 Indoor unit



#### 1.3 Hydronic module

10&16kW



### 3. Features

- Heat Recovery Mini VRF system, combined with ATA & ATW applications to obtain the solution for a home.
- It can connect to regular VRF IDU to cool down the air, as well as the hydro kit to produce the hot water for floor heating/Radiator, etc., or DHW for shower.
- It can connect to regular VRF IDU to cool down the air, as well as the hydro kit to produce the hot water for floor heating/Radiator, etc., or DHW for shower.
- It can cool down the room temperature and produce hot water together.



# Part 2 Outdoor unit information

### 1. Specification

### 1.1 Outdoor unit

OUTDOOR UNIT			HCHV-	HCHV-	HCHV-	HCHV-
			VH080R1-	VH100R1-	VH125R1-	VH140R1-
			(BR)D-F01	(BR)D-F01	(BR)D-F01	(BR)D-F01
Power	\//Dh/Hz		220~240/1/50	220~240/1/50	220~240/1/50	220~240/1/50
supply			220*240/1/30	220*240/1/30	220*240/1/30	220*240/1/30
Max. power input		W	6500	6500	6500	6500
Max. curre	nt	Α	30	30	30	30
ATA capacity	Cooling capacity	kW	8 10		12.5	14
	Power input	kW	2.6	3.64	4.04	4.6
	EER	W/W	3.07	2.78	3.09	3.02
	heating capacity	kW	8	10	12.5	14
	Power input	kW	2.05	3	4.04	4.61
	COP	W/W	4.08	3.47	3.09	3.04
	SEER		6.74	6.36	6.17	6.14
	SCOP		4.05	4.05	4.62	4.62
ATW	A7W45	kW	10.51	12.58	14.32	16.59
capacity	COP	W/W	4.02	3.61	3.21	2.98
	Capacity @A2W35	kW	12.26	14.78	12.2	14.4
	COP @A2W35	W/W	3.21	3.02	3.52	3.42
	Capacity @A7W35	kW	14.61	15.71	14.2	16.4
	COP @A7W35	W/W	3.65	3.55	3.62	3.58
	Capacity @A-7W35	kW	8.42	9.92	10.5	11.8
	COP @A- 7W35	W/W	2.42	2.39	3.32	3.31
	SCOP @W35 (average clima	/W55 ate)	3.48/2.73	3.61/2.73	3.35/2.86	3.35/2.86
	Energy efficien ηs@W35/W55	ncy 5	136%/106%	141%/106%	139%/111%	131%/111%

	(average clima	ate)					
	Energy class		<u>\</u> +\\+	<u>\</u> +\\+	Λ±/Λ±	Δ±/Δ±	
	@W35/W55						
Capacity	W55	k\M	27	27.2	28.1	28.6	
with heat	ATA+ATW		21	21.2	20.1	20.0	
recovery	Power input	kW	4.2	4.11	4.37	4.58	
	Energy efficiency	W/W	6.47	6.61	6.43	6.24	
Outdoor	Cooling	°C	-15~55	-15~55	-15~55	-15~55	
temperat	heating	°C	-20~30	-20~30	-20~30	-20~30	
ure range	DHW	°C	-20~40	-20~40	-20~40	-20~40	
	Cooling +		7.40	7 40	7 40	7.40	
	hot water	Ľ	7~43	7~43	7~43	7~43	
Water	Heating	°C	25~58	25~58	25~58	25~58	
outlet temperat	DHW	Ŷ	35~55	35~55	35~55	35~55	
ure		C					
Compres	Brand		Mitsubishi	Mitsubishi	Mitsubishi	Mitsubishi	
sor	Туре		DC inverter	DC inverter	DC inverter	DC inverter	
	Model		MNB40FEQMC	MNB40FEQMC	MNB40FEQMC	MNB40FEQMC	
Refrigera	type/quantity		$P_{100/2} 0 ka$	$P_{100/2} 0 ka$	D/100/2.9kg	D/101/2 9kg	
nt			R410A/3.0Kg	R410A/3.0Kg	R410A/3.0Kg	R410A/3.0Kg	
Fan	Туре		DC	DC	DC	DC	
motor	Model		DR-310-180-8	DR-310-180-8	DR-310-180-8	DR-310-180-8	
	Quantity		1	1	1	1	
	Fan Airflow	0/1		5500	FEOO		
		m3/n	5500	5500	5500	5500	
Heat	Fin type	m3/n	5500 Hydrophilic	5500 Hydrophilic	Hydrophilic	5500 Hydrophilic	
Heat exchange	Fin type	m3/n	5500 Hydrophilic Aluminum	5500 Hydrophilic Aluminum	Hydrophilic Aluminum	5500 Hydrophilic Aluminum	
Heat exchange r	Fin type Tube	m3/n mm	5500 Hydrophilic Aluminum 7	5500 Hydrophilic Aluminum 7	Hydrophilic Aluminum 7	5500 Hydrophilic Aluminum 7	
Heat exchange r	Fin type Tube diameter	m3/n mm	5500 Hydrophilic Aluminum 7	5500 Hydrophilic Aluminum 7	Hydrophilic Aluminum 7	5500 Hydrophilic Aluminum 7	
Heat exchange r	Fin type Tube diameter Number of rov	m3/n mm vs	5500 Hydrophilic Aluminum 7 2	5500 Hydrophilic Aluminum 7 2	Hydrophilic Aluminum 7 3	5500 Hydrophilic Aluminum 7 3	
Heat exchange r	Fin type Tube diameter Number of rov Coil length × height ×	m3/n mm vs	5500 Hydrophilic Aluminum 7 2 1145*798*38 8	5500 Hydrophilic Aluminum 7 2 1145*798*38 8	Hydrophilic Aluminum 7 3 1145*798*58 2	5500 Hydrophilic Aluminum 7 3 1145*798*58 2	
Heat exchange r	Fin type Tube diameter Number of rov Coil length × height × width	m3/n mm vs mm	5500 Hydrophilic Aluminum 7 2 1145*798*38.8	5500 Hydrophilic Aluminum 7 2 1145*798*38.8	Hydrophilic Aluminum 7 3 1145*798*58.2	5500 Hydrophilic Aluminum 7 3 1145*798*58.2	
Heat exchange r Dimensio	Fin type Tube diameter Number of rov Coil length × height × width Net	m3/n mm vs mm mm	5500 Hydrophilic Aluminum 7 2 1145*798*38.8 1100*528*870	5500 Hydrophilic Aluminum 7 2 1145*798*38.8 1100*528*870	3       1145*798*58.2       1100*528*870	5500 Hydrophilic Aluminum 7 3 1145*798*58.2 1100*528*870	
Heat exchange r Dimensio ns	Fin type Tube diameter Number of rov Coil length × height × width Net Packing	m3/n mm vs mm mm mm	5500 Hydrophilic Aluminum 7 2 1145*798*38.8 1100*528*870 1140*540*965	5500 Hydrophilic Aluminum 7 2 1145*798*38.8 1100*528*870 1140*540*965	3       1145*798*58.2       1100*528*870       1140*540*965	5500 Hydrophilic Aluminum 7 3 1145*798*58.2 1100*528*870 1140*540*965	
Heat exchange r Dimensio ns Weight	Fin type Tube diameter Number of row Coil length × height × width Net Packing Net	m3/n mm vs mm mm kg	5500 Hydrophilic Aluminum 7 2 1145*798*38.8 1100*528*870 1140*540*965 85	5500 Hydrophilic Aluminum 7 2 1145*798*38.8 1100*528*870 1140*540*965 85	3       1145*798*58.2       1100*528*870       1140*540*965       91	5500 Hydrophilic Aluminum 7 3 1145*798*58.2 1100*528*870 1140*540*965 91	
Heat exchange r Dimensio ns Weight	Fin type Tube diameter Number of rov Coil length × height × width Net Packing Net Packing	m3/n mm vs mm mm kg kg	5500 Hydrophilic Aluminum 7 2 1145*798*38.8 1100*528*870 1140*540*965 85 97	5500 Hydrophilic Aluminum 7 2 1145*798*38.8 1100*528*870 1140*540*965 85 97	3       1145*798*58.2       1100*528*870       1140*540*965       91       104	5500 Hydrophilic Aluminum 7 3 1145*798*58.2 1100*528*870 1140*540*965 91 104	
Heat exchange r Dimensio ns Weight Sound	Fin type Tube diameter Number of row Coil length × height × width Net Packing Net Packing Sound	m3/n mm vs mm mm kg kg	5500 Hydrophilic Aluminum 7 2 1145*798*38.8 1100*528*870 1140*540*965 85 97	5500 Hydrophilic Aluminum 7 2 1145*798*38.8 1100*528*870 1140*540*965 85 97	3       1145*798*58.2       1100*528*870       1140*540*965       91       104	5500 Hydrophilic Aluminum 7 3 1145*798*58.2 1100*528*870 1140*540*965 91 104	
Heat exchange r Dimensio ns Weight Sound level	Fin type Tube diameter Number of rov Coil length × height × width Net Packing Net Packing Sound pressure	m3/n mm vs mm mm kg kg dB	5500 Hydrophilic Aluminum 7 2 1145*798*38.8 1100*528*870 1140*540*965 85 97 57	5500 Hydrophilic Aluminum 7 2 1145*798*38.8 1100*528*870 1140*540*965 85 97 57	3       1145*798*58.2       1100*528*870       1140*540*965       91       104       59	5500 Hydrophilic Aluminum 7 3 1145*798*58.2 1100*528*870 1140*540*965 91 104 59	
Heat exchange r Dimensio ns Weight Sound level	Fin type Tube diameter Number of rov Coil length × height × width Net Packing Net Packing Sound pressure Level	m3/n mm vs mm mm kg kg dB	5500 Hydrophilic Aluminum 7 2 1145*798*38.8 1100*528*870 1140*540*965 85 97 57	5500 Hydrophilic Aluminum 7 2 1145*798*38.8 1100*528*870 1140*540*965 85 97 57	Hydrophilic       Aluminum       7       3       1145*798*58.2       1100*528*870       1140*540*965       91       104       59	5500 Hydrophilic Aluminum 7 3 1145*798*58.2 1100*528*870 1140*540*965 91 104 59	
Heat exchange r Dimensio ns Weight Sound level	Fin type Tube diameter Number of row Coil length × height × width Net Packing Net Packing Sound pressure Level Sound	m3/n mm vs mm mm kg kg dB	5500 Hydrophilic Aluminum 7 2 1145*798*38.8 1100*528*870 1140*540*965 85 97 57 67	5500 Hydrophilic Aluminum 7 2 1145*798*38.8 1100*528*870 1140*540*965 85 97 57 57	5500       Hydrophilic       Aluminum       7       3       1145*798*58.2       1100*528*870       1140*540*965       91       104       59       69	5500 Hydrophilic Aluminum 7 3 1145*798*58.2 1100*528*870 1140*540*965 91 104 59 69	
Heat exchange r Dimensio ns Weight Sound level	Fin type Tube diameter Number of rov Coil length × height × width Net Packing Net Packing Sound pressure Level Sound power Level	m3/n mm vs mm mm kg kg dB dB	5500 Hydrophilic Aluminum 7 2 1145*798*38.8 1100*528*870 1140*540*965 85 97 57 57	5500 Hydrophilic Aluminum 7 2 1145*798*38.8 1100*528*870 1140*540*965 85 97 57 57 67	5500       Hydrophilic       Aluminum       7       3       1145*798*58.2       1100*528*870       1140*540*965       91       104       59       69	5500 Hydrophilic Aluminum 7 3 1145*798*58.2 1100*528*870 1140*540*965 91 104 59 69	

dimensio	for VRF IDU					
ns	max height for VRF IDU	m	<30	<30	<30	<30
	max length for hydro kit	m	<30	<30	<30	<30
	max height		< 20	< 20	< 20	< 20
	hydro kit	m	< 30	< 30	<30	<30
	Max height between IDUs	m	8	8	8	8
Connecti on pipe (liquid/ga	Air conditioner side	mm	9.52/15.88	9.52/15.88	9.52/15.88	9.52/15.88
s)	Hydronic module side	mm	9.52/15.88	9.52/15.88	9.52/15.88	9.52/15.88
Water primary circuit	waterflow	L/mi n	26.2	32.7	40.1	45.8
Max indoor	r units n	num ber	5	6	7	8
Max simultaneity % Max 130% of outdoor unit capacity						

### 1.2 Hydronic module

Hudronia hov				CE-SLMK-100N-	CE-SLMK-160N-
Hydronic box				DS-001	DS-003
Power supply			V/Ph/Hz	220~240/1/50	220~240/1/50
Leaving	Space he	eating	°C	25~60	25~60
water temperature	Domestic hot water		°C	40~60	40~60
Max. power in	iput		kW	3.6	3.6
Max. current input		А	17	17	
Sound power level			dB(A)	45	40
Dimension (W	/×H×D)		mm	490*910*340	490*910*340
Packing (W×H	H×D)		mm	620*1105*425	620*1105*425
Net/gross weig	ght		kg	47/55	48/56
	Piping	Outlet	mm	DN32	DN32
XX - 4 - H	connection Dia.	Inlet	mm	DN32	DN32
Water	Safety valve		kPa	600	600
circuit	Drainage pipe Dia	•	mm	DN20	DN20
	Expansion tank	Volume	L	2	2

		Max. water pressure	kPa	800	800
		Pre pressure	kPa	150	150
	Water side heat	Туре		Plate type	Plate type
	exchanger	Volume	L	0.658	1.22
	Water pump	Туре		DC	DC
	water pump	Pump head	m	9	9
Refrigerant	Liquid side Dia.		mm	Φ9.52	Ф9.52
circuit	Gas side Dia.		mm	Φ15.88	Ф15.88
	Power supply		V/Ph/Hz	230V/1Ph/50Hz	230V/1Ph/50Hz
Do als un E	Capacity		kW	3kW	3kW
Back-up E- heater	Step			1	1
	Max. power input		kW	3kW	3kW
	Max. current input	t	А	13.6A	13.6A

### 2. Dimensions

### 2.1 Outdoor unit





### 2.2 Hydronic module





### 3. Piping diagrams

### 3.1 System piping



No.	Part name	Specification
1	DC rotary compressor	Compressor frequency range: 10~120rps
2	Crankcase heater	27W
3	Oil separator	
4	High pressure switch	Disconnected: 4.5MPa Connected: 3.5MPa
5	Low pressure switch	Disconnected: 0.05MPa Connected: 0.15MPa
6	Gas-liquid separator	Volume: 3.5L
7	Condenser	
8	DC fan motor	Power output: 180W
9	Fan blade	
10	Refrigerant cooling pipe	
11	Cut-off valve of gas pipe of water side	15.88mm
12	Cut-off valve of liquid pipe of water side	9.52mm
13	Cut-off valve of liquid pipe of refrigerant side	9.52mm
14	Cut-off valve of gas pipe of refrigerant side	15.88mm
15	Plate heat exchanger	
16	Electrical heater	3kW
17	Water flow switch	
18	Safety valve	Open pressure: 6bar
19	Air purge	
20	Inverter water pump	Water head: 9m
21	Expansion tank	Pre pressure: 0.15MPa
22	Capillary	2m
23	capillary	2m
SV2	Liquid spray cooling solenoid valve	
SV3	Bypass solenoid valve	
STF1	4-way valve 1	
STF2	4-way valve 2	
EXV1	Electrical expansion valve (outdoor side)	
EXV2	Electrical expansion valve (hydronic	

	module side)	
Т3	Condenser temperature sensor	<b>25</b> ℃→5kΩ
T3C	Refrigerant temperature sensor of liquid pipe of water side	25°C→5kΩ
T4	Ambient temperature sensor	25°C→5kΩ
T5/TP	Discharge temperature sensor	25℃→50kΩ
Т7	Refrigerant cooling pipe outlet temperature sensor	25°C→5kΩ
TW-out	Water outlet temperature sensor of plate heat exchanger	25℃→5kΩ
TW-in	Water inlet temperature sensor of plate heat exchanger	25℃→5kΩ
T1	Water outlet temperature sensor of hydronic module	25°C→5kΩ

#### 3.2 Key components

1. Oil separator

Separates oil from gas refrigerant pumped out of the compressor and quickly returns it to the compressor. Separation efficiency is up to 99%.

2. Gas-liquid separator

Separates liquid refrigerant from gas refrigerant and stores liquid refrigerant and oil to protect compressor from liquid hammering.

3. Refrigerant cooling pipe

Use refrigerant to cool down the PCB temperature.

4. SV2 liquid spray cooling solenoid valve

Open when discharge temperature exceeds the limit. Allow liquid refrigerant to inject directly to compressor, to cool down the discharge temperature.

- 5. SV3 bypass solenoid valve
- 6. 4-way valve 1

Near the electrical box. Change the refrigerant flow direction.

7. 4-way valve 2

Near the condenser. Change the refrigerant flow direction.

#### 8. EXV1 and EXV2

Control the refrigerant flow. Opening degree is controlled by discharge temperature, evaporator temperature, or water tank temperature.

9. Electrical heater

Provide additional heating capacity. Open when outdoor temperature is low and water outlet temperature is lower than setting temperature, or when switch on the auxiliary heater manually in wired controller.

10. Water flow switch

When water flow is insufficient, water flow switch will disconnect to stop and protect the hydronic module.

11. Safety valve

Prevents excessive water pressure by opening at 6bar and discharging water from the water circuit.

12. Air purge

Remove air from the water circuit.

13. Expansion tank

Balances water system pressure.

14. Water pump

Circulates water in the water circuit.

### 4. Refrigerant flow diagrams

### 4.1 Cooling mode



#### 4.2 Heating mode



#### 4.3 Hot water mode



Running mode	SIFI	SIFZ	EAVI			
DHW	OFF	ON	Controlled by TP	480P		
he FXV/ of normal V/DF indeen unit is closed						

The EXV of normal VRF indoor unit is closed.

### 4.4 Cooling and hot water (main cooling)



Running mode	STF1	STF2	EXV1	EXV2
Main cooling	OFF	OFF	Controlled by	Controlled by water tank
+DHW		UFF	TP	temp.

#### 4.5 Cooling and hot water (main hot water)



### 5. Wiring diagram

### 5.1 Outdoor unit



Reserved

Forced

silent mode

Standard mode

(factory default)

Mode

Night

silent mode

Night

time

6/10

(factory default)

6/12

8/10

8/12

_	· · · · · · · · · · · · · · · · · · ·							
	S1 Description——Outdoor unit							
			Code	Power				
		Dial to the company of the	1	8KW				
		Dial to the corresponding number to indicate the capacity of selecting outdoor unit	2	10KW				
			3	12.5KW				
			4	14KW				
			5	1				
			6	1				

### 5.2 Hydronic module



Power Supply 220V AC/50Hz

SW1	1-OFF: Heating and cooling; 2-ON: Heating only
	2&3 switch: Tolerance selection
1 2 3 4	2-OFF 3-OFF: 3°C; 2-ON 3-OFF: 2°C; 2-OFF 3-ON: 4°C; 2-ON 3-ON: 5°C
	4-OFF: 16kW unit; 4-ON: 10kW unit



1-OFF: With power-down memory; 1-ON: Without power-down memory 2-OFF: No room thermostat; 2-ON: With room thermostat 3-OFF 4-OFF: Normal control

### 6. Capacity table

### 7. Accessories

### 7.1 Accessories bag in outdoor unit

Name	Pic.	QTY	Notes
Remote controller		1	Used to set indoor unit
			address
Battery		2	1.5V
Drain joint		1	
Cable tie		3	
Branch installation manual		1	
Indoor unit manual		1	
Outdoor unit installation manual		1	

### 7.2 Accessories bag in hydronic module

Name	Pic.	QTY	Notes
Wired controller communication	1	1	25m 5-core
wire			communication wire
Y-type filter		1	Connected in water inlet
			pipe, DN32
Wall mounted board	8-1-7	1	
Temperature sensor	0	1	$5k\Omega$ , for DHW tank

Cable ties	3	
Wired controller cover	1	
Hydronic module installation & owner's manual	1	
Wired controller installation & owner's manual	1	
Connection nut	1	9.52mm
Connection nut	1	15.88mm

# Part 3 Installation

### 1. Outdoor unit placement and installation

#### 1.1 Select the location

- Provide sufficient space for installation and maintenance.
- The place shall ensure that the air inlet and outlet are unobstructed and not influenced by the strong wind.
- Dry and ventilated place.
- The supporting surface shall be flat and withstand the weight of the outdoor unit and can be installed horizontally without bringing more noise and vibration.
- Operation noise and exhaust air shall not affect neighbors.
- No flammable gas leaks.
- Easy to install the connecting pipe and electrical connection.
- Avoid installations in areas where the ambient temperature may drop below -20°C for outdoor unit.
- If an awning is built over the unit to prevent direct sunlight or rain, be careful that heat radiation from the condenser is not obstructed.
- If outdoor unit installed near sea, in areas with high sulfur content or in places with oil (such as machine oil, etc.), its lifespan maybe shortened.
- Keep indoor unit, outdoor unit, power supply wiring and transmission
- Wiring at least 1 meter away from televisions and radios. This is to prevent image interference and noise in those electrical appliances. (Noise may be generated depending on the conditions under which the electric wave is generated, even if 1 meter is kept.)

#### 1.2 Hoisting of outdoor unit

- Don't remove any package upon hoisting. Two ropes (more than 8cm) shall be used to hoist the well-packaged machine stably and safely. If there is no package or the packaging material is broken, use some backing plates or packaging materials to protect the machine.
- 2) The outdoor unit shall be carried and hoisted vertically, within an inclination of less than 15 degrees. Care should be taken to safety during carrying and hoisting the machine.
- 3) The gravity of the machine is not in the center, so be careful to hoist the machine.
- 4) Don't hold the suction inlet of the housing, or it will be deformed.

### 1.3 Installation space

Fix the outdoor unit with 4pcs M10 explosive bolts.

1) Outdoor unit dimension





2) Single unit installation



Fixed by 4 M10 explosive bolts

- >2000 -500 3000 > 3000 >300  $\triangleleft$  $\langle \neg \neg \rangle$ 5
- 3) More than one unit installation



### 2. Hydronic module placement and installation

#### 2.1 Select the location

- There should not be any heat source or steam near the unit.
- A place where air circulation in the room is good.
- A place where drainage can be easily done.
- A place where noise prevention is taken into consideration.
- Do not install the unit near the doorway.
- Ensure the spaces indicated by arrows from the wall, ceiling, fence or other obstacles.
- Recommended installation height for indoor unit shall be at least 800 mm.
- Must install on a vertical wall.
- When install electrical equipment at wooden building of metal lath or wire lath, according to electrical facility technical standard, no electrical contact between equipment and building is allowed. Insulator must be installed in between.
- Do not install the unit at outdoor. This is designed for indoor installation only.

### 2.2 Installation dimension

- 1) Wall mounted panel dimension
- The mounting wall is strong and solid enough to prevent it from vibration.
- Always mount the installation plate horizontally plate by aligning the marking thread and using a level gauge.
- Mount the installation plate on the wall with 8 sets of plug, bolt and washer (all nonsupply) with different size.



2) Hydronic module dimension



3) Space requirement for installation and maintenance





### 2.3 Install the hydronic module

- 1) Fix wall mounted panel
  - Choose a wall or support that is fully reliable and safe to withstand twice the weight of the unit.
  - The mounting wall panel is strong and solid enough to prevent it from vibration.
  - Always mount the installation plate horizontally plate by aligning the marking thread and using a level gauge.
  - Mount the installation plate on the wall with 8 expansion bolts. (all non-supply) (the minimum mounting hole diameter is 8.5 mm)
  - In order to ensure the reliability of the load-bearing, the wall drilling hole needs to reach a depth of 45~50 mm.
- 2) Engage the hooks on the indoor unit to the slots of installation plate. Ensure the hooks are properly seated on the installation plate by moving it left and right.
- 3) Keep the unit is vertical and keep a certain away from the wall. Otherwise, the air in the water circulation system will not be easily discharged, causing the unit malfunction.
- 4) Attention
  - As the hydraulic module is heavy, it needs at least two people for installation.
  - Do not lift the indoor unit by holding the refrigerant and water pipes to prevent damage of the pipes.



#### 2.4 Wired controller of hydronic module

The hydronic module is standard with a touch screen wired controller. The wired controller could be taken away from hydronic module and installed in room, which is convenient for using and detecting room temperature. A 25m communication wire is inside the accessory bag, also with an additional wired controller cover plate which is used placed the original cover in hydronic module.



### 3. Refrigerant piping installation

#### 3.1 Cut-off valve introduction

- 1) It is closed when leaving the factory.
- 2) Open the valve counterclockwise or close the valve clockwise with a 6mm socket head wrench.
- 3) After completing the operation, tighten the valve cover
- 4) R410A special tool shall be used to vacuumize the valve and fill the refrigerant at the



service entrance. Fill the refrigerant at the service entrance at the gas side, and vacuumize the valve at the service entrance at the liquid side and the gas side simultaneously.



5) The outdoor unit has two sets of cut-off valves. One set is only for hydronic module connection and the other is only for VRF IDU connection.

#### Please note that two sets of valves are not allowed to be mixed.



### 3.2 Pipe dimensions

1) Cut-off valve dimension

Hydronic mod	ule connection	VRF IDU o	connection
Gas side	Liquid side	Gas side	Liquid side
Ф 15.88	Ф9.52	Ф 15.88	Ф9.52

2) Pipe connection diagram



3) Determination of main pipe (L1) diameter

	Diameter of main pipe				
ODU capacity (kW)	L1<30m		L1≥30m		First distributor
	Gas pipe	Liquid pipe	Gas pipe	Liquid pipe	
8/10	Ф 15.88	Φ9.52	Ф 19.05	Φ9.52	SP-FQG-N01D
12.5/14	Ф 15.88	Φ9.52	Ф 19.05	Φ9.52	SP-FQG-N01D

#### 4) Determination of main pipe (L0, L2~L5) diameter

Capacity of downstream IDU	Diameter of main pipe of indoor units				
(kW)	Gas pipe Liquid pipe distribu				
W<6.5	Φ12.7	Ф9.52	SP-FQG-N01D		
$6.5 \leq W < 18$ , or hydronic module	Ф 15.88	Ф9.52	SP-FQG-N01D		
18≪W<22	Ф 19.05	Ф9.52	SP-FQG-N01D		

5) Allowable length and height difference of refrigerant pipe



Pipe length requirements				
Total pipe length		≤100m	L1+L2+L3+L4+L5+a+b+c+d+e+f	
Length of farthest	Actual length	≪60m		
pipe	Equivalent length	<b>≪70m</b>		
Equivalent length between first		≤20m	L3+L4+c	
Equivalent length to the nearest distributor		≤15m	a, b, c, d, e, f	
Height difference	ODU upper	≪30m	-	
between ODU and IDU	ODU lower	≤20m	-	
Height difference between IDUs		≪8m	-	
Height difference between ODU and hydronic module		≼5m	-	
Equivalent length between ODU and hydronic module		≪20m	LO	

#### 3.3 Refrigerant pipe installation

1) Flaring

Use a pipe cutter to cut the refrigerant pipe and a pipe expander to flare.



	8	-	<b>v</b> 1
Outer	A(m	im)	00 <sup>°</sup> i 4
(mm)	Maximum	Minimum	1 46°
ф 6.35	8.7	8.3	
ф9.52	12.4	12.0	
¢ 12.7	15.8	15.4	R0.4~0.8
φ <b>1</b> 5.88	19.0	18.6	J.↓J.J.

#### 2) Fastening nut

Align the connecting pipe, tighten it by hand, and then by a wrench.

х

Burr



Pipe Dimension (mm)	Tightening Torque (Nm)
φ 6.35	14.2~17.2(144~176 kgf•cm)
φ 9.52	32.7~39.9(333~407 kgf•cm)
φ 12.7	49.5~60.3(504~616 kgf•cm)
φ <b>1</b> 5.88	61.8~75.4(630~770 kgf•cm)

#### Note:

- To prevent the copper pipe from internal oxidation upon welding, the copper pipe shall be filled with nitrogen. Otherwise, the oxide skin will block the refrigeration system!
- When fastening the nut, too strong force will damage the flared socket, but too weak force will result in leakage. Please refer to the tightening torque in the table above to fasten the nuts!
- 3) Distributor installation
- The distributor shall use U-type or Y-type, instead of T-type.
- The distributor shall be installed horizontally, with the deviation angle of no greater than ± 10°.
- The distributor cannot be turned directly, with the straight pipe of no less than 0.8 meter.



- 4) Remove foreign materials in the pipeline
- The foreign materials, which enter the refrigerant pipe during installation, shall be cleaned with high pressure nitrogen.
- Don't connect with the indoor unit upon cleaning.
- Use the nitrogen instead of refrigerant or flammable toxic gases like oxygen.
- 5) Air tightness test
- After the refrigerant pipe is installed and connected to the indoor unit, and before the connecting to the valves of the outdoor units, refill the nitrogen with the pressure

of 40kgf/cm<sup>2</sup> (4.0MPa) from the gas side and the fluid side simultaneously, mark the pressure value, and then perform 24-hour air tightness test.

- If the pressure drops, recheck the leakage of all interfaces and then maintain the pressure for 24 hours.
- Don't connect with the outdoor unit during maintaining the pressure.
- 6) Thermal insulation of pipes
- Apply thermal insulation to the pipes at the gas side and the liquid side respectively.
- Use closed-cell thermal insulation materials, with the flame retardant grade of B1 and high temperature resistance of 120°C.
- Outer diameter of copper pipe ≤ \$\u03c6 12.7\$ and thickness of thermal insulation cotton ≥15mm; outer diameter of copper pipe ≥ \$\u03c6 15.88\$ and thickness of thermal insulation cotton ≥20mm.
- The nut joints of the indoor unit shall be performed thermal insulation.

#### 3.4 Oil return bend setting

 Position of Oil Return Bend at the Height Direction When the vertical height is more than 10m, it is necessary to add oil return bend in the middle. Divide the vertical segments into sections not larger than 8m, as shown in picture below.



2) Position of Oil Return Bend at the Horizontal Direction

When the horizontal distance is more than 40m, it is necessary to add oil return bend in the middle. Divide the horizontal pipe into sections not larger than 30m, as shown in picture below.



### 3.5 Vacuumizing

- 3.5.1 Principles of system vacuumizing
- 1) The vacuum pump has the vacuum degree of less than -0.1MPa and the air displacement of more than 40L/min.
- 2) It is unnecessary to vacuumize the outdoor unit. Don't open the check valves at the gas side and the liquid side of the outdoor unit.
- 3) Make sure the vacuum pump can drop up to -0.1MPa within 2 hours; if it fails to drop up to -0.1MPa after 3 hours, check moisture or air leak.
- 4) The vacuum pump must have a check valve.
- 3.5.2 Method of system vacuumizing
- If the system is commissioned for the first time and the shut-off valve is closed.
  - If only connect air conditioner indoor units, it is only necessary to vacuum the system connected to the indoor unit according to the method of 3.5.1.
  - If connect air conditioner indoor units and hydronic module, the two systems should be vacuumed according to method of 3.5.1.
- If the system has been used and the shut-off valve is in open state.
  - If only connect air conditioner indoor units, please vacuum as followings.
    - a. Close shut-off valve corresponding to the hydronic module.
    - b. Air conditioner indoor units and outdoor unit should be in power-on state;
    - c. Press UP and DOWN button in outdoor unit display board together for 5 seconds, until it shows SE.
    - d. Then vacuum the system with air conditioner indoor units connected according to method 3.5.1.
  - If connect air conditioner indoor units and hydronic module, please vacuum as followings.
    - a. Air conditioner indoor units and outdoor unit should be in power-on state;
    - b. Press UP and DOWN button in outdoor unit display board together for 5 seconds, until it shows SE.
    - c. Then evacuate the system with air conditioner indoor units connected according to method 3.5.1.

#### 3.5.3 Vacuumizing mode

Press UP and DOWN button in outdoor unit display board together for 5 seconds until display board shows SE, to enter vacuumizing mode.

In vacuumizing mode, two 4-way valve will be OFF and two EXV will open to max, fan motor and compressor stops. When power supply is OFF, the unit exits vacuumizing mode.

#### Note:

- Don't use tools and measuring apparatus using for different refrigerants or directly contacting the refrigerant.
- Don't exhaust air with refrigerant gas.

• If the vacuum degree cannot reach -0.1MPa, recheck its leakage. If not, keep the vacuum pump on for 1-2h.

### 3.6 Additional refrigerant charge

The refilling volume of refrigerant (R410A) is calculated according to the diameter and length of the pipes at the liquid side between the indoor and outdoor units.

Diameters of pipe at the liquid side (mm)	Refilling volume of refrigerant equal to the length of 1m pipe (unit: kg)	
φ 6.35	0.023	
φ 9.52	0.040	

Note:

- The R410A refrigerant must be weighed by an electronic scale and filled in the liquid state.
- The additional refrigerant quantity is calculated only according to the equivalent length of the air conditioner indoor units liquid pipe, and the length of the hydronic module liquid pipe is not included in the calculation of the additional refrigerant quantity.

### 4. Water piping installation

- Water inlet and water outlet in indoor unit are used for connection to water circuit. Please request a licensed technician to install this water circuit.
- This water circuit must comply with all relevant European and national regulations, i.e. IEC/EN61770.
- Be careful not to deform the piping to excessive force when doing piping connection job.
- Use DN32 nut for both water inlet and outlet connection and clean all pipes with tap water before connecting to the indoor unit.
- Cover the pipe end to prevent dirt and dust when inserting it through a wall.
- Choose proper sealer which can withstand the pressures and temperatures of the system.
- If an existing tank is to be connected to this indoor unit, ensure the pipes are clean before water pipe installation is carried out.
- Be sure to use two spanners to tighten the connection. Tighten the nuts with torque wrench: 117.6N•m.
- If non-brass metallic piping is used for installation, make sure to insulate the pipes to prevent galvanic corrosion.
- Make sure to insulate the water circuit pipes to prevent reduction of heating capacity.
- After installation, check the water leakage condition in connection area during test run.
- Please check if the exhaust valve in the hydraulic module can normally release the air in the water circulation system.

- The refrigerant circuit of the hydronic module contains a small amount of Nitrogen, which is used to keep the pressure and detect leakage. When installing, unscrew the nut of the refrigerant pipe joint of the hydronic module. If there is no gas flowing out, check the refrigerant circuit of the unit for leakage. Install and operate only after confirming no leakage.
- When the ambient temperature is below 0° C, be sure to keep the unit energized when the unit is not running.
- If the unit cannot be energized, drain the water from the hydronic module, the water tank and each water line, so as to avoid freezing the equipment and piping.

	Water pipe connection
Water outlet pipe	DN32
Water inlet pipe	DN32

#### 4.1 System diagram of water system

1) Only connect DHW tank



2) Connect heating device and DHW tank



#### 4.2 Water quality requirement

- The temperature of supplied water in the tank shall not exceed 50 °C.
- The water quality shall meet the values specified in the following table. Otherwise, the scaling will appear in the heat exchanger and the floor heating system after a period of use, which will affect the heat exchange efficiency and cause failure.

PH value	Total hardness	Conductivity	Sulfur ion	Chloride ion	Ammonia ion
6.5~8.0	200 µ V/cm	<50ppm	No	<50ppm	No
Sulfate ion	Silicon	Iron content	Sodium ion	Calcium ion	
<50ppm	<30ppm	<0.3ppm	No	<50ppm	

#### 4.3 Water injection and air exhaust

- 1) The exhaust valve should be installed at the highest point of the water system piping, and the drain valve should be set at the lowest point.
- 2) After the outdoor unit and hydronic module are installed, turn off the power.
- 3) Open the water inlet valve, unscrew the exhaust valve on the hydronic module, and fill the water system of the hydronic module. The air in the system can be gradually discharged through the exhaust valve and the water outlet of the water tank.
- 4) Check the water circulation system for leakage.
- 5) If there is no leakage in the system pipeline, power on and start the unit. After the pump runs, exhaust the air in the system through the exhaust valve and the water outlet of the

hydronic module. After the sound of the air exhausting cannot be heard, close the exhaust valve on the hydronic module and the water outlet valve of the tank.

6) For the system without installing the water tank, exhaust air through the air exhaust valve on the hydronic module and water pipe system.

#### 4.4 Anti-freeze measurements

- 1) When the ambient temperature is below 0 °C, be sure to keep the unit energized.
- 2) If the unit cannot be energized, drain the water in the hydronic module, buffer tank and water lines to avoid freezing the equipment and pipelines.
- 3) Follow the steps below to drain the water from the tank.
  - a. Turn off the power
  - b. Close the water inlet of the water tank
  - c. Open the water tank outlet and drain valve
- 4) Follow the steps below to drain the water from the hydronic module.
  - a. Turn off the power
  - b. Close the water supply valve
  - c. Open the drain valves on the circulating water inlet and the outlet of the hydronic module.

### 5. Electrical wiring

Please select a dedicated power supply for indoor unit and outdoor unit respectively.

- The power supply has specified branch circuit with leakage protector and manual switch.
- Outdoor unit and indoor unit connect with required power supply which is 220-240V~ 50H.
- The external power supply circuit must be grounded, and the ground wire should be reliably connected to the external ground.
- Use 3-core or 2-core shielded cable as indoor and outdoor signal wire.
- Switch off the power supply before making any connections.
- Use only copper wires.
- The installation should comply with relevant national electric standard.
- Power wiring should be engaged by specialized electrician.
- The field wiring must be carried out in accordance with the wiring diagram supplied with the unit.
- The power cable and signal cable should be arranged neatly and reasonably, and should not interfere with each other, and should not be in contact with the connecting pipe and the valve body.
- Be sure to install the required fuses or circuit breakers
- After the wiring is completed, the power can be turned on after careful inspection.

### 5.1 Electrical characteristics

Units	Power supply	Min. volts	Max. volts	Max. current
8/10/12.5/14kW ODU	220-240V/1PH/50Hz	165V	265V	30A
10/16kW hydronic module	220-240V/1PH/50Hz	165V	265V	17A

#### 5.2 Wiring suggestion

Units	Power line (mm <sup>2</sup> )	Breaker (A)	Fuse (A)	Signal wire (mm <sup>2</sup> )	
8/10/12.5/14kW ODU	3×6.0	63	45	three-core	
10/16kW hydronic module	3×4.0	32	32	3×1.0	

### 5.3 Connection diagram

1) Power line connection



2) Communication line connection





Note:

- When the communication line uses a two-core shielded cable, the shielding net shall be connected to "E" of the terminal block. When the communication line uses a three-core shielded cable, the shielding net shall be connected to the ground.
- Never connect the power line (strong current) to the terminal block of the communication line (weak current). Otherwise, the power board will be burnt out.
- When the power line is parallel to the communication line, please put the electrical wires into their own wire pipes, with proper wire spacing (10A or below: 300mm, 50A or below: 500mm).
- The communication line (P Q E) should be connected one unit after another in a daisy chain from the outdoor unit to the final indoor unit

### 5.4 Water system accessories connection

1) Water system connection diagram



2)	Main component		
Α	Outdoor unit	Н	DHW temperature sensor
В	Hydronic module	-	Booster heater filed supply)
С	Wired controller	J	Electric 3-way valve (filed supply)
D	Contactor for circulation water pump (filed supply)	к	Circulation water pump (filed supply)
Е	Contactor for booster heater (filed supply)	L	Floor heating (filed supply)
F	Buffer tank	М	Power supply
G	DHW tank		

#### 3) Wires

No.	Description
1	Power supply cable for outdoor unit
2	Power supply cable for hydronic module
3	Communication wire between wired controller and hydronic module
4	Circulation water pump control cable
5	Booster cable control cable
6	Temperature sensor cable
7	Electric 3way valve control cable
8	Power supply cable for circulation water pump
9	Power supply cable for booster heater
10	Power supply cable between contactor and circulation water pump
11	Power supply cable between contactor and booster heater
12	Communication wire between ODU and hydronic module

Note: Equipment must be grounded. All high-voltage external loads if it is metal or a grounded port must be grounded. All external loads currents are needed less than 3A, if the load current is greater than 3A, the load must be controlled through AC contactor.

4) Connection of 3-way valve



- When the unit is in DHW mode, SV4 has 220V output. When the unit is in heating mode, SV4 has no output.
- Wiring of the 3-way valve is different for NC (normal close) and NO (normal open). Before wiring, read the installation manual for the 3-way valve carefully.
- SV3 has 220V output in heating mode and has no output in DHW mode. So it can also use 3-wire and 2-control type 3-way valve. The connection is shown in picture below.



- 5) Connection of circulation water pump
  - The hydronic module is standard with a 9m water head circulation mode. If the water pipe is long and it requires additional water pump, can connect to this port.
  - This port sends ON or OFF signal to the water pump. An additional contactor is needed, and a dedicated terminal is needed to supply power to the water pump.
  - Start in heating mode and stop in DHW mode.



6) Connection of booster heater

Connection of the booster heater cable depends on the application. Only when the domestic hot water tank is installed will this wiring be needed. The unit only sends ON or OFF signal to the booster heater. An additional contactor is needed and a dedicated terminal is needed to supply power to the booster heater.



7) Connection of room card function



The REMO\_CTRL is used to remotely start and stop the units. It is short-circuited at the factory, and units use wired controller to start and stop. If it is necessary to use the REMO\_CTRL, the short line should be removed and controlled by the opening and closing switch. When switch is closed, the unit could normally work and controlled by wired controller. When the switch is opened, the unit can't start.

### 6. Commissioning

#### 6.1 DIP switch setting

Before starting the system, check every switch in PCB is in right position.

1) Outdoor unit DIP switches



• In forced silent mode, the fan speed and compressor frequency will be limited

for lower noise.

• In night silent mode, the fan speed and compressor frequency will be limited in night time for lower noise at night. The night time is set by SW1-3&4.



• Starts timing from the detection of the highest ambient temperature. Take the factory default setting as an example. After 6 hours, the unit enters night time. And the night time last 10 hours.

_				
	S1	Description——Outdoor unit		
			Code	Power
		Diel to the component of the	1	8KW
	EEOZ2	Dial to the corresponding	2	10KW
		capacity of selecting	3	12.5KW
	6810	outdoor unit	4	14KW
			5	/
			6	/

- Check the right capacity switch according to the nameplate.
- 2) Hydronic module switches

SW1	1-OFF: Heating and cooling; 2-ON: Heating only
	2&3 switch: Tolerance selection
1 2 3 4	2-OFF 3-OFF: 3°C; 2-ON 3-OFF: 2°C; 2-OFF 3-ON: 4°C; 2-ON 3-ON: 5°C
Factory default	4-OFF: 16kW unit; 4-ON: 10kW unit
SW2	1-OFF: With power-down memory; 1-ON: Without power-down memory
	2-OFF: No room thermostat; 2-ON: With room thermostat
1 2 3 4	3-OFF 4-OFF: Normal control
Footon, dofoult	

Factory default

- SW1-1, the factory default setting is in ON position, heating only mode.
- SW1-2&3, set the start temperature difference. Take factory default setting as an example. When the DHW tank water temperature is 3°C lower than setting temperature in DHW mode, or water outlet temperature is 3°C lower than setting temperature in heating mode, the unit starts.
- SW1-4, set the hydronic module capacity. Set it according to nameplate.

#### 6.2 Indoor unit address

• All indoor units and hydronic module will have address automatically after first

powering on.

- The address of hydronic module is fixed to 63 and can't be changed.
- Can also set indoor units address manually by remote controller or wired controller. Please refer to controller manual.
- All indoor units and hydronic module address can't be repeated.

#### 6.3 Pre-operation check

After the installation of the unit, check the followings before powering on the units:



- Field wiring: Make sure that the field wiring between the switch box and unit, outdoor unit and indoor units, unit and domestic hot water tank, and unit and backup heater box have been connected according to the instructions, according to the wiring diagrams and to local laws and regulations.
- Fuses, circuit breakers, or protection devices: Check that the circuit breaker or the locally installed protection devices are of the size and type specified in the chapter 5 specifications. Make sure that no fuses or protection devices have been bypassed.
- Booster heater circuit breaker: Do not forget to turn on the booster heater circuit breaker (applies only to units with optional domestic hot water tank installed).
- Ground wiring: Make sure that the ground wires have been connected properly and that the ground terminals are tightened.

- Internal wiring: Visually check the EC box for loose connections or damaged electrical components.
- Mounting: Check that the unit is properly mounted, to avoid abnormal noises and vibrations when starting up the unit.
- Damaged equipment: Check the inside of the unit for damaged components or squeezed pipes.
- Calculate the additional volume of refrigerant according to the length of on-site liquid pipe.
- Refrigerant leak: Check the inside of the unit for refrigerant leakage. If there is a refrigerant leak, call your local dealer.
- Power supply voltage: The power supply voltage must correspond to the voltage on the identification label of the unit.
- Air purge valve: Make sure the air purge valve is open (at least 2 turns).
- Shut-off valves: Make sure that the shut-off valves are fully open
- Turn on the power supply switch of the outdoor unit in advance, and make sure it is power-on for more than 12 hours, so that the heater heats the compressor oil.

# Part 4 Troubleshooting

### 1. Error codes

#### 1.1 Error codes in outdoor unit

Code	Failure or protection definition
E2	Comm. failure between indoor/hydronic module and outdoor units
E4	Environment temperature sensor failure (T4)
E6	Condensate temperature sensor failure (T3)
E8	Exhaust temperature sensor failure (Tp)
E9	AC overvoltage/undervoltage protection
E10	EEPROM failure
Ec	Refrigerant cooling pipe temperature sensor failure (T7)
H0	Comm. failure between master chip and DSP
H1	Display board and main board communication failure
H4	The protection of three times P6 in 30 minutes
H5	The protection of three times P2 in 30 minutes
H6	The protection of three times P4 in 100 minutes
H7	The decrease in the number of indoor units
H9	The protection of two times P9 in 10 minutes
H10	The protection of three times P3 in 60 minutes
H11	The protection of two times P13 in 10 minutes
H12	The protection of three times Pb in 60 minutes
P1	High pressure protection
P2	Low pressure protection
P3	Over current protection
P4	Excessive exhaust temperature protection
P5	T3 condenser over temperature protection
P6	IPM modules protection
P8	T3C over temperature protection
P9	DC fan protection
P10	Protected against typhoons
P11	Heating T2 high temperature protection
P13	Abnormal current detection protection
Pb	Module over-high temperature protection

### 1.2 Error codes in hydronic module

Code	Failure or protection definition
E0	Water flow switch failure
E1	Communication failure between hydraulic module and outdoor unit
E2	Water outlet temperature sensor T1 failure
E3	Refrigerant gas side temperature sensor T2 fault (reserved)
E4	Refrigerant liquid side temperature sensor T2B fault (reserved)
E5	Outdoor unit fault
E6	Water tank T5/T7 temperature sensor failure (reserved)
E7	Heat exchanger inlet water temperature sensor Tw_in fault
E8	Heat exchanger outlet water temperature sensor Tw_out fault
E9	Communication failure between hydraulic module and wire controller
P0	EEPROM protection
P1	Excessive temperature difference between inlet and outlet water protection
P2	Insufficient water flow protection
P3	T1 and Tw_out temperature sensor fault protection (reserved)
d0	Antifreeze function
d1	Oil return function
df	Defrost function

### 2. Spot check

Before starting the troubleshooting procedure, carry out a thorough visual inspection of the unit and look for obvious defects such as loose connections or defective wiring.

### 2.1 Outdoor unit spot check list

No.	Display content	Note
0	Frequency/number of indoor units	
1	Outdoor capacity	80/100/125/140
2	Running mode	0: Power off/air supply; 2: Cooling; 3:
		Heating; 4: Forced cooling; 5: Forced
		heating; 7: Hot water; 8: Cooling and hot
		water (main cooling state); 9: Cooling
		and hot water (Main hot water state)
3	Total capacity demand	
4	After correction capacity demand	
5	Actual operation capacity demand	

6	Fan speed state	0-8
7	T2/T2B average temp.	Cooling is T2B and heating is T2
8	T3 condenser outlet temp.	
9	T3C	
10	T4 outdoor ambient temp.	
11	TP exhaust temp.	
12	T9 module temp.	
13	T7/TS refrigerant cooling inlet pipe	
	temp.	
14	Electronic expansion valve 1	Actual value = Show value * 4
	opening degree	
15	AC current	
16	DC current	
17	AC voltage	Actual value = Show value * 2
18	DC voltage	Actual value = Show value * 2
19	The number of indoor units	
20	The number of running indoor units	
21	Priority mode	0: automatic selection
22	Electronic expansion valve 2	Actual value = Show value * 4
	opening degree	
23	Hydronic module water outlet temp.	
24	T5 water tank temp.	
25	The cause of the P6	L0: IPM or IGBT overcurrent fault; L1:
		Phase loss fault; L2: Compressor stall
		fault; L3: Bus voltage too low fault; L4:
		fan motor overcurrent fault; L5: fan motor
		phase loss failure; L6: fan motor zero
		speed fault; L7: PFC fault; L8: Bus
		voltage is too high fault; L9: Compressor
		zero speed fault; LA: PWM sync failure;
		Lb: MCE failure; LC: compressor
		overcurrent protection; Ld: EEPROM
		error; LE: Compressor start failure; LF:
		Fan stall failure
26	Frequency limit display	0: unlimited frequency; 1: T3B/T3C
		frequency limits; 2: T4 frequency limits; 4:
		TP frequency limits; 8: Voltage limiting
		frequency; 16: current limiting frequency;
		32: IPM temperature frequency limits; 64:

		Mute frequency limit; 128: Outlet water
		temp. limiting frequency (If there are
		multiple frequency limits, the sum to be
		added will be displayed)
27	Last failure or protection code	
28	Soft version	
29	Memorizer version	
30	Hydronic module demand	
31	Indoor demand	
32	1	
33	1	
34	Press value of pressure sensor	MPa
35	Compressor drive command	Hz
	frequency	
36	Fan drive command speed	Actual value = Show value * 10, rpm
37		

### 2.2 Hydronic module spot check list

No.	Display content
1	Capacity of outdoor unit *10
2	Indoor unit running mode (0-off; 2-cooling; 3-heating)
3	Outdoor unit running mode
4	Indoor unit demand
5	Setting temperature Ts1/Ts2
6	T1 temperature
7	Tw_in temperature
8	Tw_out temperature
9	T4 ambient temperature
10	T5/T7 water tank temperature
11	Last failure
12	The second failure from the end
13	The third failure from the end
14	Software version
15	

### 3. Troubleshooting

#### 3.1 Outdoor unit

1) E2: Comm. failure between indoor/hydronic module and outdoor units

a. Check the communication wire PQE between outdoor unit and indoor units/hydronic module. Check whether they are loose.

- b. It should be 2-core shielded wire or 3-core shielded wire.
- c. P to P, Q to Q, E to E.

#### 2) E4/E6/E8/Ec: temperature sensor fault

- a. Check the sensor connection
- b. Measure the resistance of sensor. Except for the exhaust temperature sensor that is 50kohms, all other temperature sensors are 5kohms.

#### 3) E9: AC overvoltage/undervoltage protection

- a. When voltage is higher than 265V or lower than 165V, unit will show this error code.
- b. Measure the input power voltage. If the voltage exceeds range, improve the power supply. If the voltage is within the specified range, replace the main PCB.

#### 4) E10: EEPROM failure

Check whether the capacity switch is same as the capacity in nameplate. If the capacity switch is right, replace the main PCB.

#### 5) H0: Comm. failure between master chip and DSP

Check whether the capacity switch is same as the capacity in nameplate. If the capacity switch is right, replace the main PCB.

### 6) H1: Display board and main board communication failure

Check the connection wire. It should be in CN25 port in main PCB.

#### 7) H7: The decrease in the number of indoor units

Part of indoor unit communication is lost.

- a. Do spot check in outdoor unit to check how many indoor units are still online.
- b. Check the communication wire connection of indoor unit showing E1.
- c. Confirm that whether all indoor units get power from same distribution box.

#### 8) P1: High pressure protection

When the pressure is higher than 4.5MPa, the unit will show P1 error.

- a. If P1 happens before compressor runs, check the high pressure switch connection and check whether the switch can be closed normally.
- b. If P1 happens after compressor runs, connect the unit with a pressure gauge. If the pressure is really high, check whether the condenser has poor ventilation or any part is blocked. If pressure is normal, measure the high pressure switch. If the resistance is infinite, replace the pressure switch; if the pressure switch resistance is 0, replace the main board.

#### 9) P2/H5: Low pressure protection

When the pressure is lower than 0.05MPa, unit will show P2 error.

- a. Check the low pressure switch connection and resistance.
- b. Connect the unit with a pressure gauge. If the pressure is really low, check whether any part is blocked or refrigerant is insufficient.
- c. Check whether evaporator has poor ventilation.

#### 10)P3/H10: Over current protection

When the current is higher than 30A, unit will show P3 error.

- a. Check whether the compressor and fan motor wire connections are tight.
- b. Check whether the system is overloaded, too big capacity of indoor units.
- c. Check whether the refrigerant is too much.
- d. Check whether the condenser has poor ventilation.
- e. Do spot check in outdoor unit to read AC current and compare it with current measured by clamp meter. If the difference is big, replace the main PCB.

#### 11)P4/H6: Excessive exhaust temperature protection

When exhaust temperature is higher than 115°C, the unit will show P4 error.

- a. Check whether the exhausted temperature sensor is firmly connected.
- b. Measure the resistance. It should be 50kohm at 25°C.
- c. If the temperature sensor reading is accurate, check the exhaust temperature of item 11 and compare it. If the temperature read by main PCB is unreasonable, replace the main PCB.
- d. Check whether the system is overloaded, too big capacity of indoor units.
- e. Check whether the condenser has poor ventilation.
- f. Check whether the refrigerant is insufficient or any part is leaked.
- g. Check whether the low-pressure side pipelines of the system are blocked, such as flat pipes, valve bodies, filters.
- h. Check whether SV2 on main PCB outputs 220V before failure.

#### 12)P5: T3 condenser over temperature protection

When condenser temperature is too high.

- a. Check whether the condenser temperature sensor is firmly connected.
- b. Measure the resistance. It should be 5kohm at 25°C.
- c. If the temperature sensor reading is accurate, check the exhaust temperature of item 8 and compare it. If the temperature read by main PCB is unreasonable, replace the main PCB.
- d. Check whether the condenser has poor ventilation.

#### 13)P6/H4: IPM modules protection

- a. Check the power supply. It should be 220~240V.
- b. Check whether the heat dissipation of the condenser is normal, to ensure that there is no dirty blockage, poor return air, etc.
- c. Check whether the module heat dissipation silicone grease is applied evenly.

- d. Measure the resistance between compressor UWV (normally within  $20\Omega$ ) and UVW resistance to ground (normally infinite, M $\Omega$  level), if the compressor resistance is abnormal, replace the compressor.
- e. Run the unit and observe whether the compressor is abnormal, such as abnormal noise, excessive current, etc.
- f. Do spot check in outdoor unit display board, item 25, to read the reason of P6.

#### 14)P8: T3C over temperature protection

- a. Check whether the condenser temperature sensor is firmly connected.
- b. Measure the resistance. It should be 5kohm at 25°C.
- c. If the temperature sensor reading is accurate, check the exhaust temperature of item 9 and compare it. If the temperature read by main PCB is unreasonable, replace the main PCB.

#### 15)P9/H9: DC fan protection

a. Check whether the power supply is normal and check whether the fan motor is connected well with PCB.

No.	Color	Port	Remark				
1	RED	Vm	DC380V/310V, if not, replace the PCB.				
2	BLACK	GND	Ground				
3	WHITE	Vcc	DC 15V, if not, replace the PCB.				
4	YELLOW	Ven	DC 0-6.5V. If there is no voltage fluctuation				
		vsp	when the fan is turned on, replace the PCB.				
5	BLUE	FG	12/r. If there is no DC voltage fluctuation when				
5	DLUL		the fan is turned on, replace the fan motor.				

b. Measure the voltage according to table below.

#### 16)P10: Protected against typhoons

The fan is rotated by external force. Ensure the installation distance between two outdoor units is enough.

#### 17)P11: Heating T2 high temperature protection

Evaporator temperature is too high in heating mode.

- a. Check whether the indoor unit has good ventilation, the return air is short-circuited, and the return air is blocked. Make sure that the evaporator is not dirty, and the return air problem, then proceed to the next step.
- b. Check the capacity switch of the indoor, check whether there is a small-capacity unit that has been dialed to a large capacity, correct the dialing code.
- c. Replace outdoor unit PCB.

#### 18)P13/H11: Abnormal current detection protection

5 minutes after the compressor starts, the transformer detects the current <1A.

- a. Check the wire connection between terminal and PCB.
- b. Measure the current by clamp meter. If the clamp meter current is normal, replace

the main PCB.

#### 19)Pb/H12: Module over-high temperature protection

- a. Check whether the module heat dissipation silicone grease is applied evenly.
- b. Check whether the refrigerant could flow through the cooling pipe in PCB.

#### 3.2 Hydronic module

#### 1) E0: Water flow switch failure

Water flow switch is closed when water pump doesn't run.

- a. It is not allowed to connect the short circuit wire in water flow switch port.
- b. Check the water flow switch, whether it could be closed or opened normally when toggle the block of water flow switch.
- c. Water flow is too small, so water flow switch can't close.

#### 2) E1: Communication failure between hydraulic module and outdoor unit

- a. Check the PQE communication wire connection.
- b. Whether there is a high magnetic field or high power interfere, such as lifts, large power transformers, etc. To add a barrier to protect the unit or to move the unit to the other place.

# 3) E2&E7&E8: Water outlet temperature sensor T1 failure/ Heat exchanger inlet water temperature sensor Tw\_in/Tw\_out fault

- a. Check the sensor connection
- b. Measure the resistance of sensor. The resistance of all temperature sensors are 5kohms.

#### 4) E5: Outdoor unit fault

Check the error code in outdoor unit display board.

#### 5) E6: Water tank T5/T7 temperature sensor failure

- a. The DHW water temperature sensor should be connected on site. There is a temperature sensor in accessory bag.
- b. Check whether the sensor is connected well.
- 6) E9: Communication failure between hydraulic module and wire controller Reconnect the wired controller again.

#### 7) P0: EEPROM protection

- a. Check the capacity switch in hydronic module PCB, whether the capacity is same as the capacity in nameplate.
- b. Replace the PCB.
- 8) P1: Excessive temperature difference between inlet and outlet water protection When the temperature difference between water inlet and outlet temperature of plate heat exchanger is higher than 20°C, the unit will show this error.
  - a. Check the sensors connection firstly. Then take out the sensor, then use multi-meter to measure the resistance of the sensor, if it is open-circuit/short-circuit, replace the sensor, otherwise go to next step;

- b. Check the water flow rate, if it is too low, please check water loop is jammed or not as below steps
- c. Check the water pump is enough or not, if not, need to add bigger pump
- d. Check all the water loop valves are open correct or not, if not, open them
- e. Check the filter is jammed or not, if jammed, please clean it, as well as water loop system
- f. If all above steps are done, still P1 error, replace the IDU PCB.

#### 9) P2: Insufficient water flow protection

The water flow switch is still opened after water pump runs more than 100 seconds.

- a. Check the water flow switch connection, whether it is firmly.
- b. Check the water flow switch, whether it could be closed or opened normally when toggle the block of water flow switch.
- c. Check whether the water flow is insufficient.

### Appendix: resistance table of temperature sensor

5K: Applicable to all sensors except exhausted temperature sensor

Temp.	Resistance (kΩ)				Temp.	Temp. Res		esistance (kΩ)	
(°C)	Min	Mid	Max		(°C)	Min	Mid	Max	
-30	51.159	52.84	54.521		26	4.771	4.821	4.871	
-29	48.659	50.232	51.805		27	4.599	4.649	4.699	
-28	46.299	47.772	49.248		28	4.434	4.485	4.535	
-27	44.071	45.452	46.832	1	29	4.277	4.327	4.377	
-26	41.968	43.261	44.554	1	30	4.126	4.176	4.226	
-25	39.981	41.193	42.405	1	31	3.981	4.031	4.081	
-24	38.102	39.238	40.375	1	32	3.842	3.892	3.942	
-23	36.326	37.391	38.457	1	33	3.709	3.759	3.808	
-22	34.646	35.645	36.645	1	34	3.581	3.631	3.68	
-21	33.055	33.993	34.931		35	3.495	3.508	3.557	
-20	31.55	32.43	33.31		36	3.34	3.389	3.438	
-19	30.097	30.923	31.748		37	3.226	3.275	3.323	
-18	28.722	29.497	30.271		38	3.117	3.165	3.213	
-17	27.42	28.147	28.873	1	39	3.012	3.06	3.107	
-16	26.186	26.868	27.55		40	2.912	2.959	3.006	
-15	25.017	25.657	26.297		41	2.815	2.861	2.908	
-14	23.908	24.509	25.11		42	2.722	2.768	2.814	
-13	22.857	23.421	23.985		43	2.633	2.678	2.724	
-12	21.859	22.389	22.918		44	2.547	2.592	2.637	
-11	20.912	21.409	21.907		45	2.464	2.509	2.553	

-10	20.013	20.48	20.917		46	2.385	2.429	2.473
-9	19.116	19.584	20.023		47	2.308	2.352	2.395
-8	18.322	18.734	19.146		48	2.235	2.278	2.231
-7	17.54	17.927	18.314		49	2.164	2.207	2.249
-6	16.797	17.16	17.524		50	2.096	2.138	2.18
-5	16.09	16.431	16.733		51	2.03	2.071	2.112
-4	15.418	15.739	16.06		52	1.966	2.006	2.047
-3	14.779	15.08	15.382		53	1.904	1.944	1.984
-2	14.17	14.454	14.737		54	1.844	1.884	1.923
-1	13.591	13.857	14.124		55	1.787	1.826	1.865
0	13.04	13.29	13.54		56	1.732	1.77	1.809
1	12.505	12.739	12.974		57	1.679	1.717	1.754
2	11.995	12.215	12.436		58	1.628	1.665	1.702
3	11.509	11.717	11.924		59	1.579	1.615	1.652
4	11.047	11.241	11.436	-	60	1.531	1.567	1.603
5	10.606	10.789	10.971		61	1.485	1.521	1.556
6	10.186	10.357	10.529		62	1.441	1.476	1.511
7	9.785	9.945	10.107		63	1.399	1.433	1.467
8	9.403	9.554	9.705		64	1.357	1.391	1.425
9	9.038	9.18	9.322	1	65	1.318	1.351	1.384
10	8.69	8.823	8.956		66	1.279	1.312	1.344
11	8.357	8.482	8.607		67	1.242	1.274	1.306
12	8.04	8.157	8.274		68	1.206	1.237	1.269
13	7.736	7.816	7.957		69	1.171	1.202	1.233
14	7.446	7.55	7.653		70	1.137	1.168	1.199
15	7.169	7.266	7.363		71	1.105	1.135	1.165
16	6.9	6.991	7.082		72	1.074	1.103	1.133
17	6.644	6.729	6.814		73	1.043	1.072	1.101
18	6.398	6.478	6.558		74	1.014	1.043	1.071
19	6.163	6.238	6.313		75	0.986	1.014	1.042
20	5.938	6.008	6.078		76	0.959	0.986	1.014
21	5.723	5.789	5.854		77	0.932	0.959	0.986
22	5.517	5.578	5.64		78	0.907	0.933	0.96
23	5.32	5.377	5.484		79	0.882	0.908	0.934
24	5.131	5.185	5.238		80	0.858	0.884	0.91
25	4.95	5	5.05					

50K: Applicable to all sensors except exhausted temperature sensor

T (°C)	Rmin (kΩ)	Rnom (kΩ)	Rmax (kΩ)		T (°C)	Rmin (kΩ)	Rnom (kΩ)	Rmax (kΩ)
0	157.7	161.2	164.7		56	14.16	14.48	14.81
1	150.2	153.4	156.7		57	13.65	13.96	14.28
2	142.9	145.9	148.9		58	13.15	13.46	13.77
3	136.1	138.9	141.7		59	12.69	12.99	13.3
4	129.7	132.3	134.9		60	12.23	12.53	12.83
5	123.6	126	128.4		61	11.8	12.09	12.39
6	117.8	120	122.3		62	11.39	11.67	11.96
7	112.2	114.3	116.4		63	10.98	11.26	11.54
8	107.1	109	111		64	10.6	10.87	11.15
9	102.1	103.9	105.7		65	10.23	10.5	10.77
10	97.42	99.08	100.8		66	9.88	10.14	10.41
11	92.97	94.51	96.06		67	9.537	9.792	10.05
12	88.74	90.17	91.61		68	9.211	9.46	9.715
13	84.73	86.05	87.38		69	8.897	9.141	9.391
14	80.92	82.14	83.37		70	8.595	8.834	9.078
15	77.29	78.42	79.56		71	8.306	8.539	8.778
16	73.84	74.89	75.95		72	8.028	8.256	8.49
17	70.57	71.54	72.51		73	7.759	7.983	8.212
18	67.46	68.35	69.25		74	7.501	7.72	7.944
19	64.49	65.32	66.15		75	7.254	7.468	7.687
20	61.68	62.44	63.2		76	7.016	7.225	7.44
21	59	59.7	60.4		77	6.786	6.991	7.201
22	56.44	57.09	57.74		78	6.565	6.765	6.971
23	54.02	54.61	55.2		79	6.352	6.548	6.749
24	51.7	52.25	52.8		80	6.147	6.339	6.536
25	49.5	50	50.5		81	5.95	6.138	6.331
26	47.37	47.87	48.37		82	5.761	5.944	6.133
27	45.34	45.84	46.34		83	5.578	5.757	5.942
28	43.41	43.91	44.41		84	5.401	5.577	5.758
29	41.59	42.08	42.57		85	5.231	5.403	5.58
30	39.84	40.33	40.82		86	5.069	5.237	5.41
31	38.18	38.66	39.15		87	4.912	5.076	5.245
32	36.59	37.07	37.55		88	4.76	4.921	5.087
33	35.07	35.55	36.03		89	4.615	4.772	4.934
34	33.64	34.11	34.58		90	4.474	4.628	4.787
35	32.27	32.73	33.2		91	4.338	4.489	4.645

36	30.95	31.41	31.87	92	4.207	4.354	4.506
37	29.7	30.15	30.61	93	4.081	4.225	4.374
38	28.5	28.95	29.4	94	3.958	4.099	4.245
39	27.37	27.81	28.25	95	3.84	3.978	4.121
40	26.29	26.72	27.16	96	3.726	3.861	4.001
41	25.24	25.67	26.1	97	3.616	3.748	3.885
42	24.25	24.67	25.09	98	3.509	3.639	3.773
43	23.31	23.72	24.14	99	3.407	3.534	3.665
44	22.41	22.81	23.22	100	3.308	3.432	3.56
45	21.53	21.93	22.33	101	3.212	3.333	3.459
46	20.71	21.1	21.5	102	3.119	3.238	3.361
47	19.92	20.3	20.69	103	3.03	3.146	3.267
48	19.16	19.54	19.92	104	2.942	3.056	3.174
49	18.44	18.81	19.18	105	2.858	2.97	3.086
50	17.75	18.11	18.48	106	2.778	2.887	3
51	17.08	17.44	17.8	107	2.699	2.806	2.917
52	16.44	16.79	17.14	108	2.623	2.728	2.837
53	15.84	16.18	16.53	109	2.549	2.652	2.758
54	15.26	15.59	15.93	110	2.479	2.579	2.683
55	14.69	15.02	15.35				