

Service Manual

Air-to-Water Heat pump

2022 06 03





IMPORTANT SAFETY NOTICE =

There are special components used in this equipment which are important for safety. These parts are marked by \triangle in the Schematic Diagrams, Circuit Board Diagrams, Exploded Views and Replacement Parts List. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire or other hazards. Do not modify the original design without permission of manufacturer.



- This service information is designed for experienced repair technicians only and is not designed for use by the general public.
- It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.
- Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the products dealt with in this service information by anyone else could result in serious injury or death.



In order to avoid frosting, be assured of no refrigerant leakage during the installation or repairing of refrigerant circuit.

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Safety Precautions

- Read the following "SAFETY PRECAUTIONS" carefully before installation.
- Electrical work must be installed by a licensed electrician. Be sure to use the correct rating and main circuit for the model to be installed.
- The caution items stated here must be followed because these important contents are related to safety. The meaning of each indication used is as below. Incorrect installation due to ignoring of the instruction will cause harm or damage, and the seriousness is classified by the following indications.
- Please leave this installation manual with the unit after installation.

⚠ WARNING	This indication shows the possibility of causing death or serious injury.
⚠ CAUTION	This indication shows the possibility of causing injury or damage to properties only.

• The items to be followed are classified by the symbols:

\Diamond	Symbol with white background denotes item that is PROHIBITED from doing.
0 0	Symbol with dark background denotes item that must be carried out.

• Carry out test run to confirm that no abnormality occurs after the installation.

Then, explain to user the operation, care and maintenance as stated in instructions.

Please remind the customer to keep the operating instructions for future reference.

	Trease remine the easterner to keep the operating instructions for father reference.	
	⚠ WARNING	
1.	Do not use unspecified cord, modified cord, joint cord or extension cord for power supply cord. Do not share the single outlet with	0
	other electrical appliances. Poor contact, poor insulation or over current will cause electrical shock or fire.	
2.	Do not tie up the power supply cord into a bundle by band. Abnormal temperature rise on power supply cord may happen.	\Diamond
3.	Keep plastic bag (packaging material) away from small children, it may cause suffocation.	\Diamond
4.	Do not use pipe wrench to install refrigerant piping. It might deform the piping and cause the unit to malfunction.	\Diamond
5.	Do not purchase unauthorized electrical parts for installation, service, maintenance and etc. They might cause electrical shock or fire.	\Diamond
6.	Do not modify the wiring of Indoor Unit for installation of other components (i.e. heater, etc). Overloaded wiring or wire connection	0
	points may cause electrical shock or fire.	
7.	Do not add or replace refrigerant other than specified type. It may cause product damage, burst and injury etc.	\Diamond
8. D	o not use joint cable for Indoor / Outdoor Unit connection cable. Use specified Indoor / Outdoor Unit connection cable, refer to instruction	n
CON	NECT THE CABLE TO THE INDOOR UNIT and connect tightly for Indoor / Outdoor Unit connection. Clamp the cable so that no externa	al 🚫
force	will be acted on the terminal. If connection or fixing is not perfect, it will cause heat up or fire at the connection.	
9. [Do not install outdoor unit near handrail of veranda. When installing outdoor unit at veranda of high rise building, child may climb up to	0
	outdoor unit and cross over the handrail and causing accident.	

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10.	Do not insert your fingers or other objects into the unit, high speed rotating fan may cause injury.	0
11.	Do not sit or step on the unit, you may fall down accidentally.	0
12.	For electrical work, follow local wiring standard, regulation and this installation instruction. An independent circuit and single outlet	0
	must be used. If electrical circuit capacity is not enough or defect found in electrical work, it will cause electrical shock or fire.	U
13.	For water circuit installation work, follow to relevant European and national regulations (including EN61770) and local plumbing and	0
	building regulation codes.	
14.	Engage dealer or specialist for installation. If installation done by the user is defective, it will cause water leakage, electrical shock or	0
	fire.	
	This is a R410A model, when connecting the piping, do not use any existing (R22) pipes and flare nuts. Using such same may	
	cause abnormally high pressure in the refrigeration cycle (piping), and possibly result in explosion and injury. Use only R410A	_
15.	Thickness or copper pipes used with R410A must be 0.8 mm or more. Never use copper pipes thinner than 0.8 mm.	O
16.	 It is desirable that the amount of residual oil is less than 40mg/10m. When install or relocate Indoor Unit / Outdoor Unit, do not let any substance other than the specified refrigerant, e.g. air etc. mix into 	0
10.	refrigerant cycle (piping). Mixing of air etc. will cause abnormal high pressure in refrigeration cycle and result in explosion, injury etc	U
17	Install apporation to this installation instruction attrictly. If installation is defeative, it will appear up to place and a serious about or fire	0
17.	Install according to this installation instruction strictly. If installation is defective, it will cause water leakage, electrical shock or fire.	
18.		0
	properly done, the set will drop and cause injury.	
19.	This equipment is strongly recommended to be installed with Residual Current Device (RCD) on-site according to the respective	0
	national wiring rules or country–specific safety measures in terms of residual current.	
20	During installation, install the refrigerant piping properly before run the compressor. Operation of compressor without fixing refrigeration piping and valves at opened condition will cause suck-in of air, abnormal high pressure in refrigeration cycle and result in	A
20.	explosion, injury etc.	•
	During pump down operation, stop the compressor before remove the refrigeration piping. Removal of refrigerant piping while	
21.	compressor is operating and valves are opened will cause suck-in of air, abnormal high pressure in refrigerant cycle and result in	0
	explosion, injury etc.	
22.	Tighten the flare nut with torque wrench according to specified method. If the flare nut is over tightened, after a long period, the flare	0
	may break and cause refrigerant gas leakage.	
23.	After completion of installation, confirm there is no leakage of refrigerant gas. It may generate toxic gas when the refrigerant contacts	0
	with fire.	
24.	Ventilate the room if there is refrigerant gas leakage during operation. Extinguish all fire sources if present. It may cause toxic gas	0
	when the refrigerant contacts with fire.	
25.	Only use the supplied or specified installation parts, else, it may cause unit vibrate loose, water leakage, electrical shock or fire.	0
26.	The unit is only for use in closed water system. Utilization in an open water circuit may lead to excessive corrosion of water piping and	0
20.	risk of incubating bacteria colonies, particularly Legionella, in water.	•
27.	If there is any doubt about the installation procedure or operation, always contact the authorized dealer for advice and information.	0
28.		0
	When installing electrical equipment at wooden building of metal lath or wire lath, in accordance with electrical facility standard, no	
29.		0

electrical contact between equipment and building is allowed. Insulator must be installed in between.

30. Any work carried out on the Indoor Unit / Outdoor Unit after removing any panels which is secured by screws, must be carried out under the supervision of authorized dealer and licensed installation contractor.

This unit must be properly earthed. The electrical earth must not be connected to a gas pipe, water pipe, the earth of lightening rod or a telephone. Otherwise there is a danger of electrical shock in the event of an insulation breakdown or electrical earth fault in the outdoor unit.

Do not use joint cable for outdoor connection cable. Use specified outdoor connection cable, refer to instruction CONNECT THE

32. CABLE TO THE OUTDOOR UNIT and connect tightly for outdoor connection. Clamp the cable so that no external force will be acted on the terminal. If connection or fixing is not perfect, it will cause heat up or fire at the connection.

\$\hfrac{\text{CABLION}}{\text{CAUTION}}\$

1. Do not install the Indoor Unit / Outdoor Unit at place where leakage of flammable gas may occur. In case gas leaks and accumulates at surrounding of the unit, it may cause fire.

2. Do not release refrigerant during piping work for installation, re-installation and during repairing a refrigeration parts. Take care of the liquid refrigerant, it may cause frostbite.

ZEZ CAUTION	
Do not install the Indoor Unit / Outdoor Unit at place where leakage of flammable gas may occur. In case gas leaks and accurate surrounding of the unit, it may cause fire.	mulates 🚫
2. Do not release refrigerant during piping work for installation, re-installation and during repairing a refrigeration parts. Take car liquid refrigerant, it may cause frostbite.	re of the
3. Do not install this appliance in a laundry room or other high humidity location. This condition will cause rust and damage to the	e unit.
4. Make sure the insulation of power supply cord does not contact hot part (i.e. refrigerant piping) to prevent from insulation failure	(melt).
5. Do not apply excessive force to water pipes that may damage the pipes. If water leakage occurs, it will cause flooding and da other properties.	mage to
6. Do not touch the sharp aluminum fin, sharp parts may cause injury.	\Diamond
7. Do not release refrigerant into the atmosphere. The product contains fluorinated greenhouse gases and that its functioning relies such gases.	s upon 🚫
8. Select an installation location which is easy for maintenance.	0
9. Carry out drainage piping as mentioned in installation instructions. If drainage is not perfect, water may enter the room and da the furniture.	amage 0
Power supply connection to Indoor Unit. Power supply point should be in easily accessible place for power disconnection in case of emergency. Must follow local national wiring standard, regulation and this installation instruction. Strongly recommended to make permanent connection to a circuit breaker. Power supply 1: Use approved 20A 4-poles circuit breaker with a minimum contact gap of 3.0 mm. Power supply 2: Use approved 15/16A 2-poles circuit breaker with a minimum contact gap of 3.0 mm. (Only applicate S*C09*3E8) or Use approved 20A 4-poles circuit breaker with a minimum contact gap of 3.0mm. (Only applicable f S*C12*9E8/S*C16*9E8)	
11. Ensure the correct polarity is maintained throughout all wiring. Otherwise, it will cause electrical shock or fire.	0
12. After installation, check the water leakage condition in connection area during test run. If leakage occurs, it will cause damage to properties.	o other
Installation work. 13. It may need two or more people to carry out the installation work. The weight of Indoor Unit / Outdoor Unit might cause injury if one person.	carried ()

1. General Information

1.1 Measurements

1.1.1 Outdoor units

Model	Dimension (W*H*D)	Net/Gross Weight (kg)	Power Supply
FHOF-WHS-080CE3	935×702×382	55/58	220~240V/1Ph/50Hz
FHOF-WHS-100CE3	1032×810×445	56.3/61	220~240V/1Ph/50Hz
FHOF-WHS-120CE3	1032×810×445	63.5/68	220~240V/1Ph/50Hz
FHOF-WHS-160CE3-3F	1014×1430×450	124/138	380~415V/3Ph/50Hz

1.1.2 Hydronic module

Model	Dimension (W*H*D)	Net/Gross Weight (kg)	Power Supply
FHIF-WHS-081CE3	490*910*340	47/55	220~240V/1Ph/50Hz
FHIF-WHS-121CE3	490×910×340	48/56	220~240V/1Ph/50Hz
FHIF-WHS-161CE3	490×910×340	48/56	220~240V/1Ph/50Hz

1.2 External outlook

1.2.1 Outdoor unit



6

1.2.2 Hydronic module

8/12/16kW



2. Specifications

2.1 FHOF-WHS-080CE3

			FHOF-WHS-080CE3
Power supply		V/Ph/H z	220~240/1/50
Performance data			
	Capacity	kW	8
Rated Heating*1	Power input	kW	1.9
	COP	kW/kW	4.2
	Capacity	kW	6.5
Rated Cooling*2	Power input	kW	2.32
	EER	kW/kW	2.8
	Capacity	kW	8
Heating*3	Power input	kW	2.5
	COP	kW/kW	3.2
	Capacity	kW	6.5
Cooling*4	Power input	kW	1.7
	EER	kW/kW	3.8
Seasonal space heating	water outlet @ 35°C		A++
energy eff. Class			
(average climate water outlet @ :		A++	A++
general)			
Max. power input		kW	4.2
Max. current input		A	19
Sound power level		dB(A)	66
Physical data			
Dimension (W×H×D)		mm	935×702×382
Packing (W×H×D)		mm	975×770×435
Net/gross weight		kg	55/58
	Brand		GMCC
	Type		Rotary DC Inverter
Compressor	Model		EKTF235D22UMT
	Poles		6
	Speed	rps	12~120
	Oil		POE/670mL
	Brand		Kaibang/Yongan
Outdoor fan	Motor type		Brushless DC motor
	Model		DRN-310-75-8

	Number of fans		1
	Air flow	m3/h	3200
	Number of rows		3
	Tube pitch(a)×row pitch(b)	mm	21×13.3
Air side heat	Tube dia. and type		Φ7 inner grooved copper
	Fin space	mm	1.4
exchanger	Fin type (code)		Hydrophilic aluminum
	Coil length×height× width	mm	784×651×40.11
	Number of circuits		7
Piping connections			
Liquid nino	Type		Flaring
Liquid pipe	Dia.(OD)	mm	Ф9.52
Consider	Type		Flaring
Gas pipe	Dia.(OD)	mm	Ф15.88
Max. piping length		m	20
Max. height difference	Outdoor unit upside	m	10
Wax. height difference	Outdoor unit downside	m	10
	Type		R32
Refrigerant	Quantity	kg	1.4
Kerrigerant	Throttle type		EXV
	Additional charge	g	(Total pipe length - 5)m *30g/m
Ambient temperature range	Cooling	$^{\circ}$	-5∼46°C
	Heating	$^{\circ}$	-28∼43℃
	Sanitary hot water	$^{\circ}$	-28∼43℃
Water temperature	Cooling	$^{\circ}$	5~25°C
Water temperature range	Heating	$^{\circ}$	25~60℃
Tange	Sanitary hot water	$^{\circ}$ C	40~60℃

Note:

- *: 1. The rated heating conditions: water flow 0.172m^3/(h kW), ambient temperature 7 $^{\circ}$ C DB, water inlet/outlet temperature 30/35 $^{\circ}$ C.
- 2. The rated cooling conditions: water flow 0.172m 3 /(h kW), ambient temperature 35 °C DB, water inlet/outlet temperature 12/7 °C.
- 3. Heating condition: water flow 0.172m^3/(h kW), ambient temperature 7 $^{\circ}$ C, water inlet/outlet temperature 40/45 $^{\circ}$ C.
- 4. Cooling condition: water flow 0.172m 3 /(h kW), ambient temperature 35 $^{\circ}$ C, water inlet/outlet temperature 23/18 $^{\circ}$ C.

2.2 FHOF-WHS-100CE3, FHOF-WHS-120CE3

Model			FHOF-WHS-100CE3	FHOF-WHS-120CE3				
Power supply		V/Ph/Hz	220~240/1/50	220~240/1/50				
Performance data								
	Capacity	kW	10	12				
Rated Heating*1	Power input	kW	2.22	2.9				
	COP	kW/kW	4.5	4.14				
	Capacity	kW	8.5	10				
Rated Cooling*2	Power input	kW	3.04	3.7				
	EER	kW/kW	2.8	2.7				
	Capacity	kW	10	12				
Heating*3	Power input	kW	2.94	3.53				
	СОР	kW/kW	3.4	3.4				
	Capacity	kW	8.5	10				
Cooling*4	Power input	kW	1.77	2.08				
	EER	kW/kW	4.8	4.8				
Seasonal space heating energy eff.	water outlet @ 35℃		A++	A++				
Class (average climate general)	water outlet @ 55°C		A++	A++				
Max. power input		kW	5	5				
Max. current input		A	22	22				
Sound power level		dB(A)	68	68				
Physical data	_							
Dimension (W×H×D)		mm	1032x810x445	1032x810x445				
Packing (W×H×D)		mm	1075×875×495	1075×875×495				
Net/gross weight		kg	56.3/61	63.5/68				
	Brand		GMCC	GMCC				
	Type		Rotary DC Inverter	Rotary DC Inverter				
C	Model		EKTF310D43UMT	EKTF310D43UMT				
Compressor	Poles		6	6				
	Speed	rps	12~120	12~120				
	Oil		POE/1000mL	POE/1000mL				
	Brand		Yongan	Yongan				
	Motor type		Brushless DC motor	Brushless DC motor				
Outdoor fan	Model		DRN-310-90-8	DRN-310-90-8				
	Number of fans		1	1				
_	Air flow	m3/h	4000	4000				
	Number of rows		2	2.5				

	Tube pitch(a)×row pitch(b)	mm	25×21.7	25×21.7					
	Tube die and true		Φ9.52 inner grooved	Φ9.52 inner grooved					
	Tube dia. and type		copper	copper					
Air side heat	Fin space	mm	1.6	1.6					
exchanger	Fin type (code)		Hydrophilic aluminum	Hydrophilic aluminum					
	Coil		1002 750 42.2	1003×750×43.3					
	length ×height ×width	mm	1003×750×43.3	+ 580×750×21.65					
	Number of circuits		4	5					
Piping connections									
Liquid nino	Type		Flaring	Flaring					
Liquid pipe	Dia.(OD)	mm	Ф9.52	Ф9.52					
Coanina	Type		Flaring	Flaring					
Gas pipe	Dia.(OD)	mm	Ф15.88	Ф15.88					
Max. piping length		m	20	50					
Max. height	Outdoor unit upside	m	10	20					
difference	Outdoor unit downside	m	10	20					
	Type		R32	R32					
Refrigerant	Quantity	kg	3	3.1					
Kenigerani	Throttle type		EXV	EXV					
	Additional charge	g	(Total pipe leng	gth - 5)m *30g/m					
Ambient	Cooling	$^{\circ}$	-5~	46℃					
	Heating	$^{\circ}$	-28~	~43°C					
temperature range	Sanitary hot water	$^{\circ}$	-28∼43°C						
Water temperature	Cooling	$^{\circ}$	5~25℃						
Water temperature range	Heating	$^{\circ}\!\mathbb{C}$	25~	60℃					
range	Sanitary hot water	$^{\circ}$	40~60℃						

Note:

- *: 1. The rated heating conditions: water flow 0.172m 3 /(h kW), ambient temperature 7 $^{\circ}$ C DB, water inlet/outlet temperature 30/35 $^{\circ}$ C.
- 2. The rated cooling conditions: water flow 0.172m 3 /(h kW), ambient temperature 35 °C DB, water inlet/outlet temperature 12/7 °C.
- 3. Heating condition: water flow 0.172m 3 /(h kW), ambient temperature 7 $^{\circ}$ C, water inlet/outlet temperature 40/45 $^{\circ}$ C.
- 4. Cooling condition: water flow 0.172m 3 /(h kW), ambient temperature 35 $^{\circ}$ C, water inlet/outlet temperature 23/18 $^{\circ}$ C.

2.3 FHOF-WHS-160CE3-3F

Model			FHOF-WHS-160CE3-3F
Power supply		V/Ph/Hz	380~415/3/50
Performance data			
	Capacity	kW	16
Rated Heating*1	Power input	kW	3.75
	COP	kW/kW	4.27
	Capacity	kW	15.2
Rated Cooling*2	Power input	kW	5.4
	EER	kW/kW	2.81
	Capacity	kW	16
Heating*3	Power input	kW	4.71
	COP	kW/kW	3.4
	Capacity	kW	15.2
Cooling*4	Power input	kW	3.17
_	EER	kW/kW	4.8
Seasonal space heating energy eff.	water outlet @ 35°C		A++
Class (average climate general)	water outlet @ 55°C		A++
Max. power input		kW	6.4
Max. current input		A	12.1
Sound power level		dB(A)	70
Physical data			
Dimension (W×H×D)		mm	1014×1430×450
Packing (W×H×D)		mm	1095×1545×485
Net/gross weight		kg	124/138
	Brand		GMCC
	Type		Rotary DC Inverter
	Model		EKTQ420D1UMU
Compressor	Poles		6
	Speed	rps	12~120
	Oil		POE/1400mL
	Brand		Yongan
	Motor type		Brushless DC motor
Outdoor fan	Model		DR-310-100-8-2
	Number of fans		2
	Air flow	m3/h	6100
	Number of rows		2

	Tube pitch(a)×row pitch(b)	mm	25×21.7				
	T 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		Φ9.52 inner grooved				
	Tube dia. and type		copper				
Air side heat	Fin space	mm	1.6				
exchanger	F: (1)		Hydrophilic				
	Fin type (code)		aluminum				
	Coil		005125042.2				
	length ×height ×width	mm	995×1350×43.3				
	Number of circuits		7				
Piping connections							
Timal Laine	Type		Flaring				
Liquid pipe	Dia.(OD)	mm	Ф9.52				
G :	Туре		Flaring				
Gas pipe	Dia.(OD)	mm	Ф15.88				
Max. piping length		m	50				
Mary balata	Outdoor unit upside	m	20				
Max. height difference	Outdoor unit downside	m	20				
	Туре		R32				
Defice	Quantity	kg	3.8				
Refrigerant	Throttle type		EXV				
	Additional charge	g	(Total pipe length - 5)m *30g/m				
A	Cooling	$^{\circ}$	-5~46℃				
Ambient temperature	Heating	$^{\circ}$	-28∼43°C				
range	Sanitary hot water	$^{\circ}$	-28∼43°C				
Water terminatura	Cooling	$^{\circ}$	5~25℃				
Water temperature	Heating	$^{\circ}$	25~60°C				
range	Sanitary hot water	℃ 40~60℃					

Note:

- *: 1. The rated heating conditions: water flow 0.172m^3/(h kW), ambient temperature 7 $^{\circ}$ C DB, water inlet/outlet temperature 30/35 $^{\circ}$ C.
- 2. The rated cooling conditions: water flow $0.172m^3/(h \text{ kW})$, ambient temperature 35 °C DB, water inlet/outlet temperature 12/7 °C.
- 3. Heating condition: water flow 0.172m^3/(h kW), ambient temperature 7 $^{\circ}$ C, water inlet/outlet temperature 40/45 $^{\circ}$ C.
- 4. Cooling condition: water flow 0.172m^3/(h kW), ambient temperature 35 $^{\circ}$ C, water inlet/outlet temperature 23/18 $^{\circ}$ C.

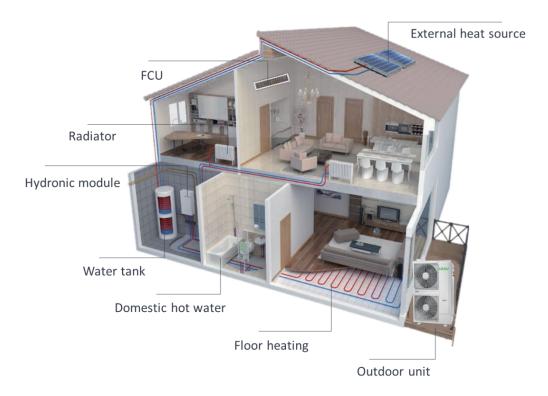
2.4 FHIF-WHS-081CE3, FHIF-WHS-121CE3, FHIF-WHS-161CE3,

Hydronic bo	οx			FHIF-WHS- 081CE3	FHIF-WHS- 121CE3	FHIF-WHS- 161CE3		
Power suppl	ly		V/Ph/ Hz	220~240/1/50	220~240/1/50	220~240/1/50		
Leaving	Spa	ace heating	C°	25~60	25~60	25~60		
water	Spa	ace cooling	C°	5~25	5~25	5~25		
temperatur e	Dome	stic hot water	C°	40~60	40~60	40~60		
Max. power	input		kW	3.6	3.6	3.6		
Max. curren	t input		A	17	17	17		
Sound powe	er level		dB(A)	45	45	45		
Dimension ($(W \times H \times D)$		mm	490*910*340	490*910*340	490*910*340		
Packing (W	$\times H \times D$)		mm	620*1105*425	620*1105*425	620*1105*425		
Net/gross w	eight		kg	47/55	48/56	48/56		
	Piping	Outlet	mm	DN32	DN32	DN32		
	connectio n Dia.	Inlet	mm	DN32	DN32	DN32		
	Safty valve		kPa	600	600	600		
	Drainage pi	pe Dia.	mm	DN20	DN20	DN20		
		Volume	L	2	2	2		
Water circuit	Expansion tank	Max. water pressure	kPa	800	800	800		
		Pre pressure	kPa	150	150	150		
	Water	Туре		Plate type	Plate type	Plate type		
	side heat exchanger	Volume	L	0.658	1.22	1.22		
	***	Brand		wilo	wilo	wilo		
	Water	Model		Para 25/8	Para 25/9	Para 25/9		
	pump	Pump head	m	8	9	9		
Refrigeran	Liquid side	Dia.	mm	Ф9.52	Ф9.52	Ф9.52		
t circuit	Gas side Di	a.	mm	Ф15.88	Ф15.88	Ф15.88		
	Power aver	157	V/Ph/	230V/1Ph/50H	230V/1Ph/50H	230V/1Ph/50H		
	Power supp		Hz	z	z	z		
Back-up	Capacity		kW	3kW	3kW	3kW		
E-heater	Step			1	1	1		
	Max. power	r input	kW	3kW	3kW	3kW		
	Max. currer	nt input	A	13.6A	13.6A			

3. Features

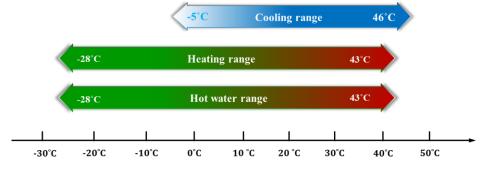
3.1 Outdoor unit

- Compact structure design, flexible installation.
- Long piping up to 30 meter with height difference 20 meter, no need extra refrigerant within 5m refrigerant pipe length.
- Heating, cooling & domestic hot water mode, total heat solution.

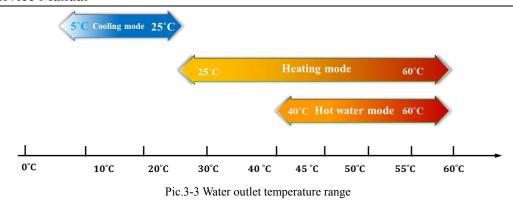


Pic.3-1 Total heat solution

• Wide operation ambient temperature range & Wide water outlet temperature range



Pic.3-2 Ambient temperature range

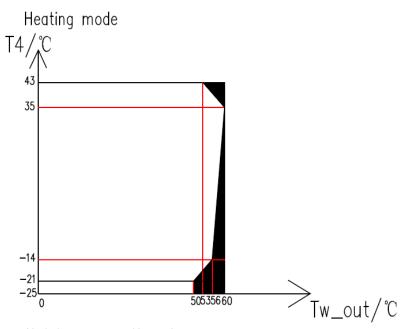


- DC inverter technology to guarantee optimal operational reliability and efficiency. Offers heating capacity of 85% at -15°C thanks to the large heat exchanger and large compressor.
- Seasonal space heating energy efficiency is up to A++ @35°C and @55°C.

3.2 Hydronic module

- All hydronic components are pre-assembled, easy for installation.
- Backup E-heater for additional heating during extremely cold outdoor temperatures. The capacity of E-heater is adjustable.
- Standard drain pan in the hydronic box, no worry about condensate water.
- Plate heat exchanger enhances the efficiency.
- Standard with water flow switch, inverter water pump, pressure gauge and expansion tank.

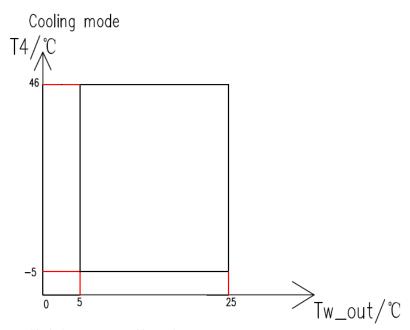
4. Operation range



T4: Ambient temperature Tw_out:: leaving water temperature

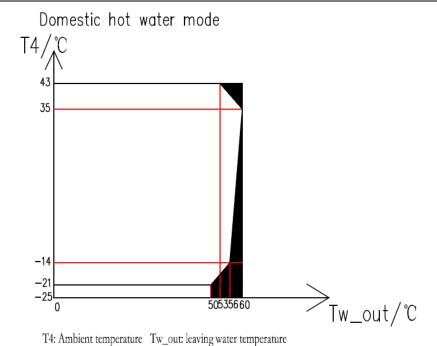
: No heat pump operation, backup E-heater or boiler only

Pic.4-1 Heating mode operation range



T4: Ambient temperature Tw_out: leaving water temperature

Pic.4-2 Cooling mode operation range

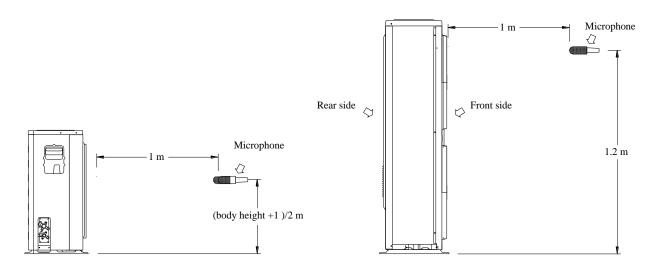


Pic.4-3 Domestic hot water mode operation range

: No heat pump operation, backup E-heater or boiler only

5. Sound pressure level

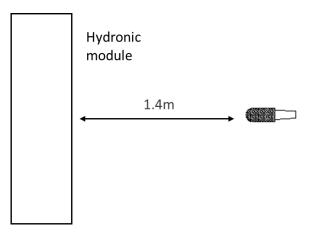
Outdoor unit:



Pic.5-1 Outdoor unit sound test diagram

Model	Sound pressure level (dB(A))
FHOF-WHS-080CE3	51
FHOF-WHS-100CE3	57
FHOF-WHS-120CE3	57
FHOF-WHS-160CE3-3F	59

Hydronic module:



Pic.5-2 Hydronic module sound test diagram

Model	Sound pressure level (dB(A))
FHIF-WHS-081CE3	30
FHIF-WHS-121CE3	32
FHIF-WHS-161CE3	32

6. Accessories

Accessories for hydronic module

Name	Pic.	QTY	Notes							
Wired controller communication wire		1	25m 5-core communication wire							
Y-type filter		1	Connected in water inlet pipe							
Wall mounted board		1								
Temperature sensor	0	1	5kΩ, for DHW tank							
Cable ties		3								
Wired controller cover		1								
Outdoor unit installation & owner's manual		1								
Hydronic module installation & owner's manual		1								
Wired controller installation & owner's manual		1								

7. Performance data

7.1 Heating capacity

R32 ATW Service Manual

- FHOF-WHS-080CE3 / FHIF-WHS-081CE3

LWE		30			35			40			45			50			55		60		
Tamb	НС	PI	COP	HC	PI	COP															
-25/-	3.29	1.93	1.70	3.10	2.06	1.50	3.03	2.12	1.43	2.80	2.16	1.30	2.29	1.84	1.24						
-20/-	4.35	2.12	2.06	4.15	2.16	1.92	3.69	2.11	1.75	3.53	2.27	1.55	3.23	2.35	1.37	3.02	2.46	1.23			
-15/-	6.72	2.72	2.47	6.83	2.90	2.36	6.67	3.04	2.19	6.58	3.13	2.10	6.11	3.05	2.00	4.49	2.55	1.76	2.98	1.83	1.63
-7/-8	7.69	2.24	3.44	8.04	2.45	3.29	7.53	2.62	2.87	7.50	3.06	2.45	7.06	2.97	2.38	6.20	2.91	2.13	3.53	1.98	1.79
2/1	7.98	2.34	3.40	8.15	2.53	3.23	7.76	2.79	2.78	7.76	2.99	2.59	7.63	3.15	2.42	6.34	2.84	2.23	3.61	2.06	1.75
7/6	8.50	2.21	3.84	8.26	2.29	3.61	8.07	2.38	3.39	7.79	2.53	3.08	7.65	2.62	2.92	6.14	2.53	2.42	4.23	1.96	2.16
15/12	8.66	1.87	4.63	8.36	1.76	4.75	8.21	1.88	4.36	7.70	2.07	3.71	7.27	2.29	3.18	6.06	2.24	2.70	3.84	1.94	1.98
20/15	9.00	1.41	6.38	8.01	1.45	5.54	7.10	1.38	5.15	6.72	1.55	4.32	6.29	1.74	3.62	5.85	1.93	3.04	5.09	1.91	2.66
25/18	8.78	1.30	6.77	8.19	1.34	6.10	7.46	1.28	5.83	7.09	1.46	4.87	6.94	1.65	4.22	5.95	1.77	3.37	5.42	1.93	2.80
35/24	9.07	1.20	7.55	8.38	1.29	6.52	7.78	1.23	6.33	7.39	1.38	5.37	7.03	1.57	4.48	6.03	1.66	3.63	5.46	1.70	3.22
43/28	8.55	1.11	7.71	8.38	1.17	7.19	7.62	1.22	6.26	7.25	1.25	5.82	6.78	1.31	5.16	5.92	1.46	4.05			

Integrated value takes into consideration the capacity drop during frosting and defrosting periods. The capacity is tested in free frequency situation.

Remark:

LWE: Leaving water temperature (\mathcal{C});

Tamb: Ambient temperature(\mathcal{C});

HC: Heating capacity (kW);

PI: Power input (kW)

FHOF-WHS-100CE3 / FHIF-WHS-121CE3

LWE		30			35			40			45			50			55			60	
Tamb	НС	PI	COP	НС	PI	СОР															
-25/-	5.43	3.12	1.74	5.40	3.39	1.59	5.04	3.55	1.42	4.70	3.51	1.34	2.86	2.25	1.27						
-20/-	7.28	3.01	2.41	7.20	3.19	2.26	6.08	3.02	2.01	5.64	3.09	1.82	5.10	3.54	1.44	3.78	2.98	1.27			
-15/-	8.63	3.36	2.57	8.50	3.52	2.41	7.79	3.62	2.15	7.52	3.83	1.96	7.10	4.00	1.77	6.75	4.14	1.63			
-7/-8	10.40	3.39	3.07	10.20	3.54	2.88	8.65	3.64	2.37	8.27	3.99	2.07	7.55	4.00	1.89	7.11	4.12	1.73	4.95	3.26	1.52
2/1	10.80	2.89	3.73	10.60	3.00	3.53	10.19	3.04	3.36	9.60	3.14	3.06	9.31	3.27	2.84	9.20	3.68	2.50	6.00	2.78	2.16
7/6	11.00	2.71	4.06	10.80	2.82	3.84	10.49	2.91	3.61	10.19	3.04	3.35	9.79	3.17	3.08	9.60	3.50	2.74	6.80	2.83	2.40
15/12	11.50	2.35	4.89	11.30	2.37	4.76	10.78	2.41	4.48	10.48	2.78	3.77	9.98	3.16	3.16	9.80	3.46	2.83	7.00	3.38	2.07
20/15	11.70	1.74	6.74	11.60	1.97	5.88	10.98	2.08	5.29	10.67	2.43	4.39	10.17	2.82	3.60	10.00	2.94	3.40	7.30	2.62	2.78
25/18	11.90	1.66	7.15	11.80	1.82	6.48	11.27	1.88	5.98	10.86	2.20	4.94	10.36	2.47	4.19	10.20	2.70	3.77	7.50	2.56	2.94
35/24	10.80	1.35	7.98	10.50	1.52	6.92	10.00	1.54	6.50	9.22	1.69	5.45	8.74	1.96	4.45	9.00	2.27	3.97	6.80	2.02	3.37
43/28	10.60	1.30	8.15	10.30	1.35	7.63	9.80	1.53	6.42	8.92	1.51	5.91	8.36	1.63	5.13	8.60	1.99	4.31			

Integrated value takes into consideration the capacity drop during frosting and defrosting periods. The capacity is tested in free frequency situation. Remark:

LWE: Leaving water temperature (C°);

Tamb: Ambient temperature(C°);

HC: Heating capacity (kW);

PI: Power input (kW)

R32 ATW Service Manual

FHOF-WHS-120CE3 / FHIF-WHS-121CE3

LWE		30			35			40			45			50			55			60	
Tamb	НС	PI	COP	НС	PI	COP															
-25/-	6.40	3.74	1.71	6.30	4.07	1.55	5.93	4.25	1.39	5.47	4.22	1.30	3.21	2.72	1.18						
-20/-	8.61	3.62	2.38	8.43	3.83	2.20	7.18	3.62	1.98	6.58	3.71	1.77	5.94	4.25	1.40	4.48	3.58	1,25			
-15/-	10.24	4.04	2.54	10.20	4.23	2.41	9.23	4.34	2.13	8.82	4.60	1.92	8.32	4.80	1.73	7.99	4.96	1.61			
-7/-8	12.36	4.07	3.04	12.12	4.25	2.85	10.26	4.37	2.35	9.71	4.79	2.03	8.86	4.80	1.85	8.42	4.94	1.70	5.83	3.91	1.49
2/1	12.84	3.47	3.70	12.60	3.60	3.50	12.11	3.64	3.32	11.41	3.77	3.03	11.06	3.93	2.81	10.92	4.42	2.47	7.08	3.33	2.12
7/6	13.08	3.25	4.02	12.84	3.38	3.80	12.47	3.49	3.57	12.11	3.64	3.32	11.63	3.81	3.05	11.40	4.20	2.71	8.04	3.40	2.37
15/12	13.68	2.82	4.85	13.44	2.85	4.72	12.82	2.89	4.44	12.45	3.34	3.73	11.86	3.79	3.13	11.64	4.16	2.80	8.28	4.06	2.04
20/15	13.92	2.08	6.68	13.80	2.37	5.83	13.05	2.49	5.24	12.69	2.92	4.35	12.08	3.38	3.57	11.88	3.53	3.37	8.64	3.15	2.75
25/18	14.16	2.00	7.09	14.04	2.19	6.42	13.41	2.26	5.93	12.92	2.64	4.90	12.31	2.96	4.16	12.12	3.24	3.74	8.88	3.07	2.90
35/24	12.84	1.62	7.91	12.48	1.82	6.85	11.88	1.85	6.43	10.94	2.03	5.39	10.37	2.36	4.40	10.68	2.72	3.92	8.04	2.42	3.32
43/28	12.60	1.56	8.07	12.24	1.62	7.56	11.64	1.83	6.35	10.59	1.81	5.85	9.92	1.96	5.07	10.20	2.39	4.26			

Integrated value takes into consideration the capacity drop during frosting and defrosting periods. The capacity is tested in free frequency situation. Remark:

LWE: Leaving water temperature (C°); Tamb: Ambient temperature(C°);

HC: Heating capacity (kW); PI: Power input (kW)

R32 ATW Service Manual

FHOF-WHS-160CE3-3F / FHIF-WHS-161CE3

LWE		30			35			40			45			50			55			60	
Tamb	НС	PI	COP																		
-25/-	8.96	5.26	1.70	8.64	5.71	1.51	8.48	5.98	1.42	8.00	5.93	1.35	4.84	3.87	1.25						
-20/-	12.00	5.08	2.36	11.52	5.38	2.14	10.24	5.09	2.01	9.60	5.22	1.84	8.96	5.97	1.50	6.57	4.94	1.33			
-15/-	14.24	5.67	2.51	13.60	5.94	2.29	13.12	6.10	2.15	12.80	6.46	1.98	12.48	6.75	1.85	12.00	6.98	1.72			
-7/-8	16.64	5.72	2.91	16.32	5.98	2.73	14.56	6.14	2.37	14.08	6.74	2.09	13.28	6.74	1.97	12.64	6.95	1.82	8.80	5.50	1.60
2/1	17.28	4.88	3.54	16.96	5.06	3.35	16.64	5.12	3.25	15.84	5.30	2.99	15.68	5.52	2.84	14.72	6.21	2.37	9.60	4.68	2.05
7/6	17.60	4.57	3.85	17.28	4.75	3.64	17.12	4.91	3.49	16.80	5.12	3.28	16.48	5.35	3.08	15.36	5.91	2.60	10.88	4.77	2.28
15/12	18.40	3.96	4.64	18.08	4.00	4.52	17.60	4.06	4.33	17.28	4.69	3.68	16.80	5.32	3.16	15.68	5.84	2.68	11.20	5.71	1.96
20/15	18.72	2.93	6.40	18.56	3.33	5.58	17.92	3.50	5.12	17.60	4.10	4.29	17.12	4.76	3.60	16.00	4.96	3.22	11.68	4.42	2.64
25/18	19.04	2.81	6.78	18.88	3.07	6.15	18.40	3.18	5.79	17.92	3.71	4.83	17.44	4.16	4.19	16.32	4.56	3.58	12.00	4.31	2.78
35/24	17.28	2.28	7.58	16.80	2.56	6.56	16.32	2.59	6.29	15.20	2.85	5.33	14.72	3.31	4.44	14.40	3.82	3.77	10.88	3.40	3.20
43/28	16.96	2.19	7.73	16.48	2.28	7.24	16.00	2.58	6.21	14.72	2.55	5.78	14.08	2.75	5.12	13.76	3.36	4.09			

 $Integrated\ value\ takes\ into\ consideration\ the\ capacity\ drop\ during\ frosting\ and\ defrosting\ periods.\ The\ capacity\ is\ tested\ in\ free\ frequency\ situation.$

Remark:

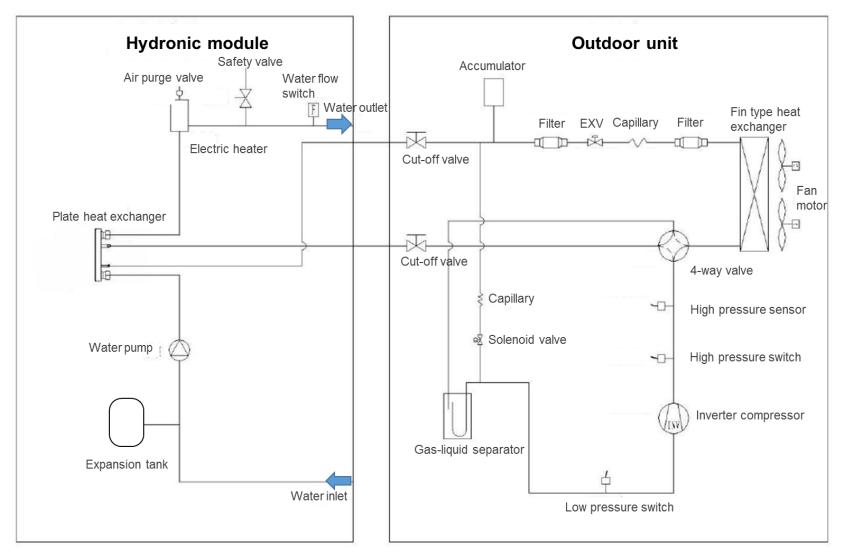
LWE: Leaving water temperature (C°);

Tamb: Ambient temperature(C°);

HC: Heating capacity (kW);

PI: Power input (kW)

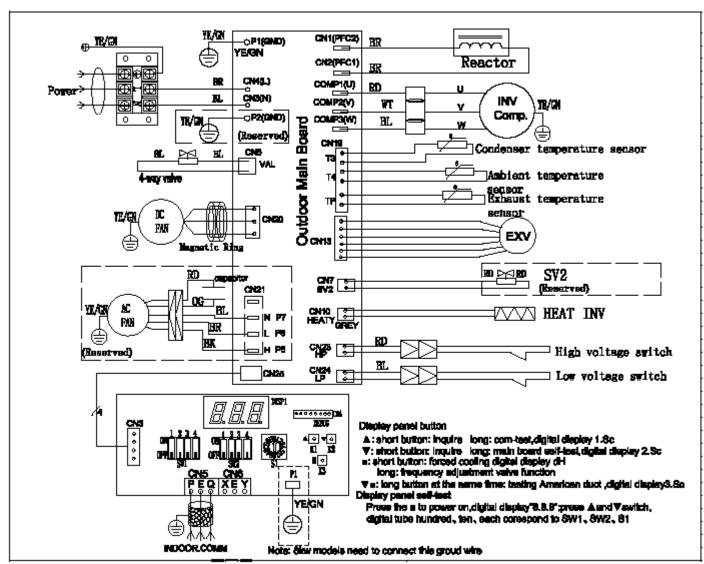
8. System diagram



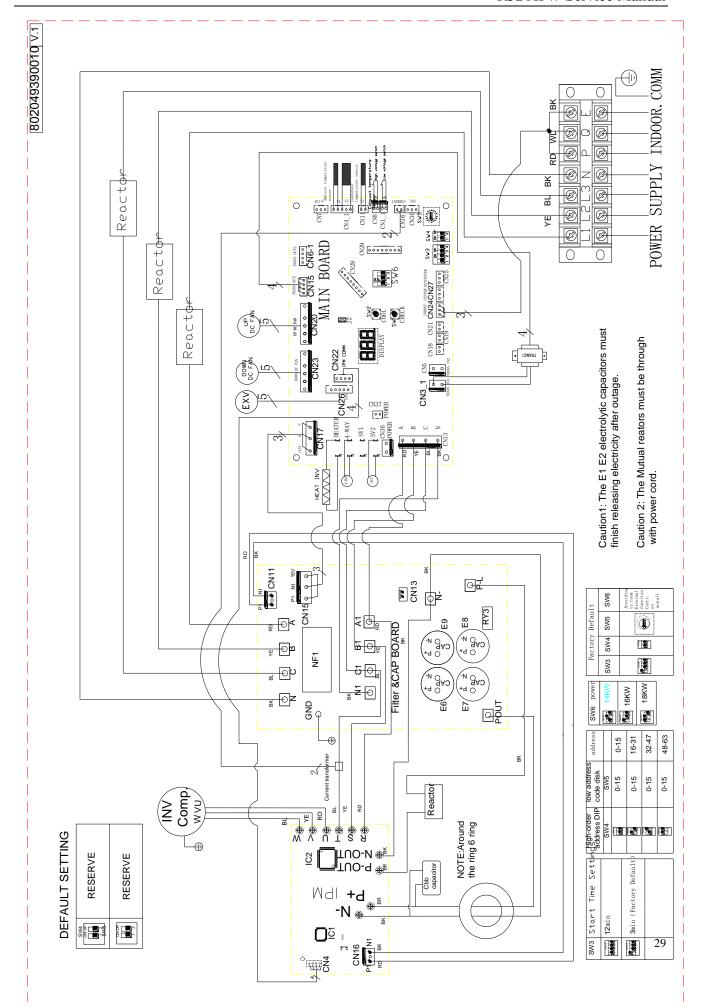
9. Wiring diagram

9.1 Outdoor unit

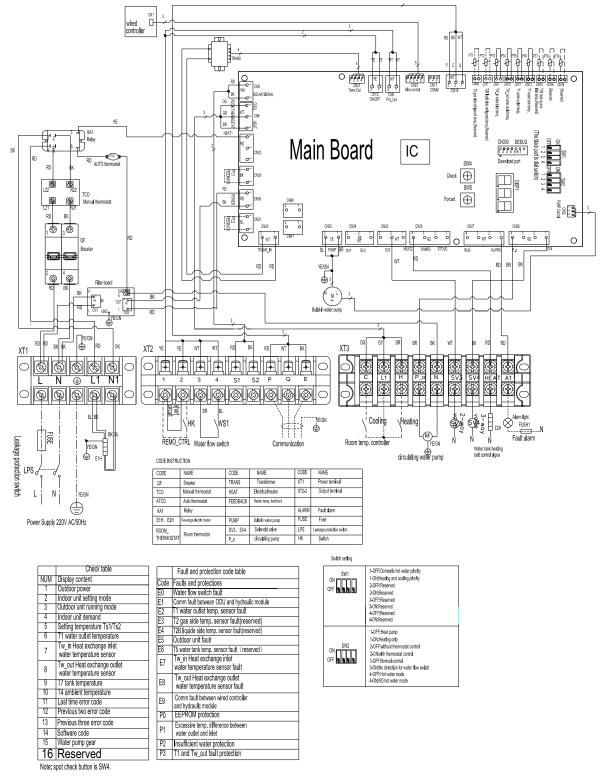
9.1.1 FHOF-WHS-080CE3 FHOF-WHS-100CE3 FHOF-WHS-120CE3



9.1.2 FHOF-WHS-160CE3-3F



9.2 Hydronic module



^{1.} The power supply is equipped with a leakage protection switch and a fuse to provide reliable protection; the power supply must be property wired and reliable; an external load greater than 1.5A must be controlled by an AC contactor; 2. Normally displayed content: 0—shutdown (standby); 2—cooling start; 3—heating start; antifreeze di); defrosting dif; display at fault—corresponding fault code;

^{3.} The indoor system chip sets the check button, and the operation status of the outdoor system can be observed through the spot check. Convenient for engineering and technical nel to maintain. For the specific check display sequence, please see the check code table;

^{4.} When servicing IDU and ODU, be sure to disconnect the power supply first, and check according to the corresponding classification faults. See the fault protection code table for specific protection faults;

^{5.} 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 should be removed and controlled by the opening and closing switch HK. Start and stop of the unit (when HK is closed, the unit is turned on; when HK is disconnected, the unit is stopped).

9.3 Printed circuit board

1. Single phase outdoor unit



Main integrated PCB



Display board

2. 3-phase outdoor unit



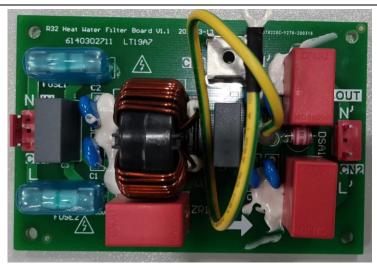


Main PCB

3. Hydronic module



Main PCB

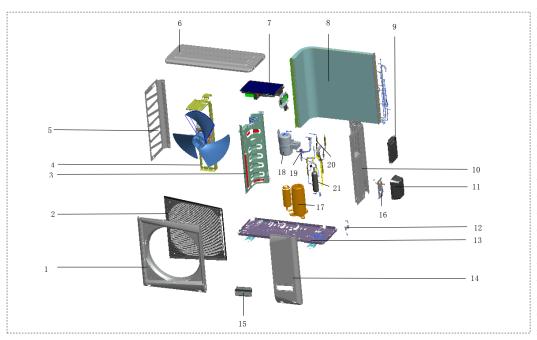


Filter board

10. Exploded view

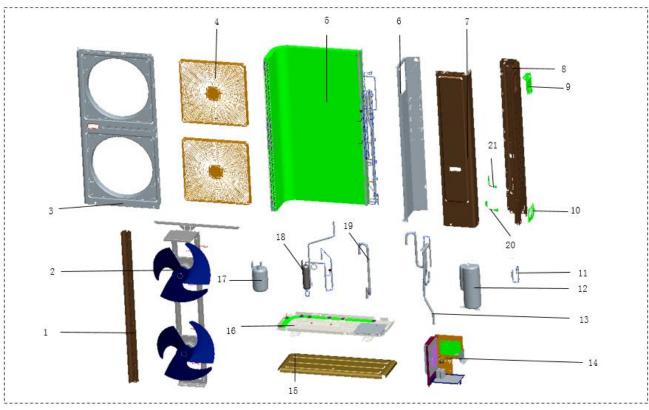
10.1 Outdoor unit

1. FHOF-WHS-080CE3 FHOF-WHS-100CE3 FHOF-WHS-120CE3



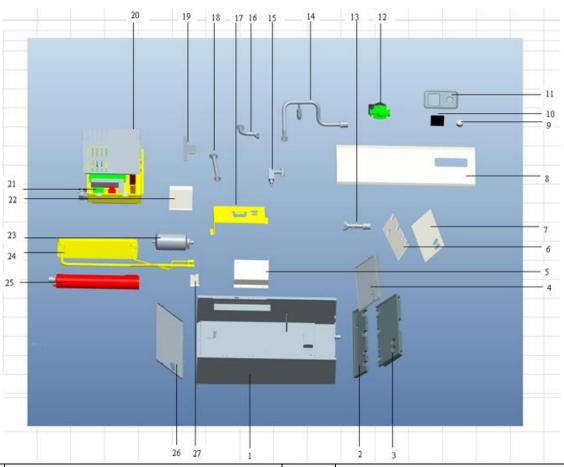
No.	Part name	No.	Part name
1	Front panel	12	EXV assy
2	Net	12.1	EXV body
3	Middle partition part	12.2	EXV coil
4	Fan motor support assy	13	Chassis assy
4.1	Fan motor	14	Right front panel
4.2	Fan blade	15	Small handler
5	Left side plate	16	Seat plate
6	Top cover plate assy	17	Inverter compressor
7	EC part	18	Gas-liquid separator
7.1	Integrated main PCB	19	Gas return pipe
7.2	Display board	20	4-way valve assy
8	Condenser part	20.1	4-way valve
9	Big handler	20.2	4-way valve coil
10	Right rear panel assy	21	Discharge pipe assy
11	Seat plate cover		

2. FHOF-WHS-160CE3-3F



No.	Part name	No.	Part name
1	Stand column	13.1	4-way valve
2	Fan motor support assy	13.2	4-way valve coil
2.1	DC fan motor	14	EC part
2.2	Fan blade	14.1	Current transformer
3	Front panel	14.2	Main PCB
4	Net	14.3	Transformer
5	Condenser part	14.4	Filter board
6	Middle partition part	14.5	IPM board
7	Maintenance panel	15	Top cover panel with cotton
8	Right side panel	16	Chassis
9	Big handler with cotton	17	Gas-liquid separator
10	Seat plate cover	18	Discharge pipe of compressor part
11	EXV part	18.1	High pressure switch
11.1	EXV body	18.2	Oil separator
11.2	EXV coil	19	Gas return pipe of compressor part
12	Compressor	20	Gas side stop valve
13	4-way valve assy	21	Liquid side stop valve

10.2 Hydronic module



No.	Part name	No.	Part name
1	Bottom plate assy	18	Heat exchanger water outlet pipe assy
2	Water pan foam 1	19	Middle beam
3	Water pan foam 2	20	EC box cover
4	Water pan assy	21	EC box
5	Expansion tank support	21.1	Transformer
6	Foam 1	21.2	Main PCB
7	Foam 2	21.3	Filter board
8	Front panel	21.4	Relay
9	Pressure gauge	21.5	Thermostat
10	Wired controller	21.6	Thermostat
11	Wired controller panel	22	Plate heat exchanger support
12	Water pump	23	Expansion tank
13	Water inlet connection pipe connection	24	Plate heat exchanger assy
14	Water outlet connection pipe connection	25	Electric heater
15	Water flow switch	26	Upper cover plate
16	Heat exchanger water inlet pipe assy	27	Electric heater support
17	Wired controller support		

11. Installation

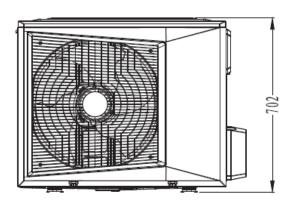
11.1 Installation for outdoor unit

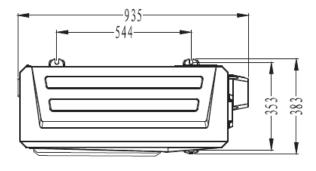
11.1.1 Select the best location

- 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 -28°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, region with high content of sulphur or oily location (e.g. machinary oil, etc.), it lifespan maybe shorten.
- 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.)

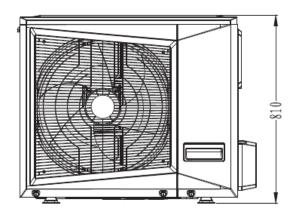
11.1.2 Installation dimension for outdoor unit

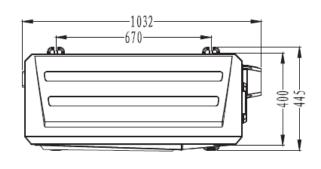
(1) FHOF-WHS-080CE3



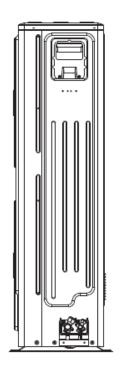


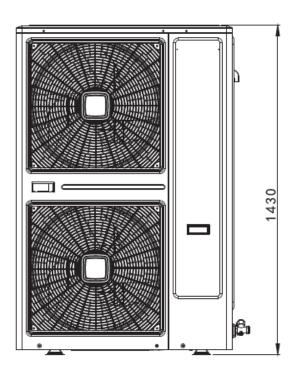
(2) FHOF-WHS-100CE3 FHOF-WHS-120CE3

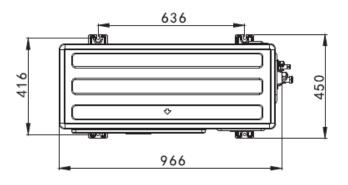




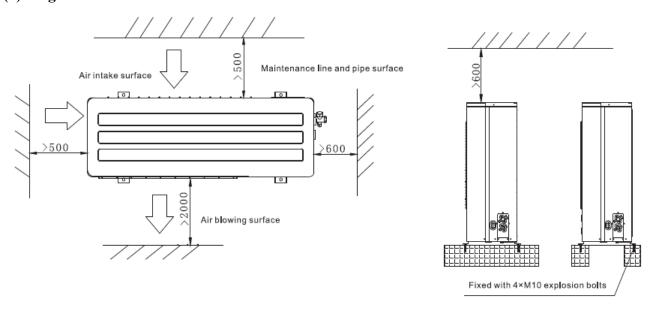
(3) FHOF-WHS-160CE3-3F





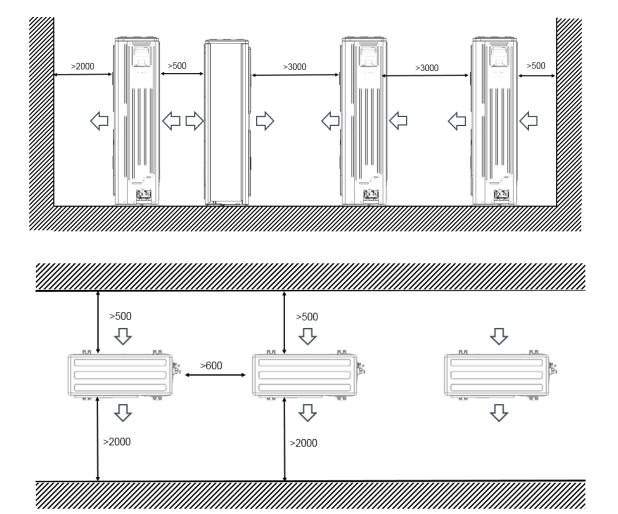


(3) Single unit installation



(4) More than one unit installation





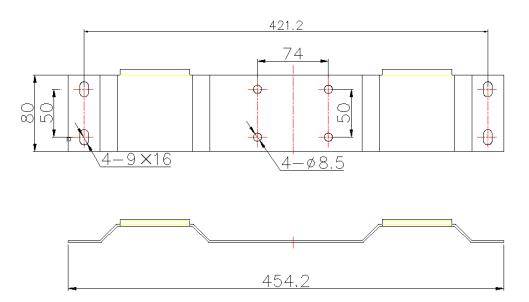
11.2 Installation for hydronic module

11.2.1 Select the best location

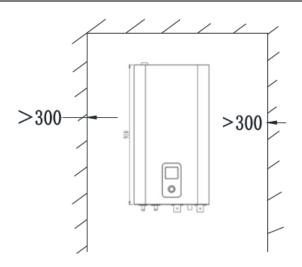
- There should not be any heat source or steam near the unit.
- A place where air circulation in the room is good.
- A place where drainage can be easily done.
- A place where noise prevention is taken into consideration.
- Do not install the unit near the door way.
- Ensure the spaces indicated by arrows 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.

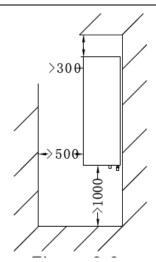
11.2.2 Installation dimensions

- (1) Wall mounted panel size. (mm)
 - 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 non-supply) with different size.

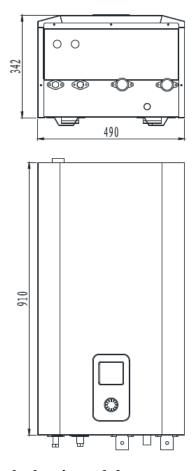


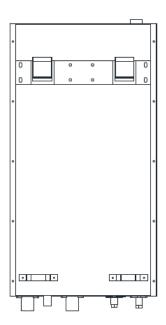
(2) Space required for installation and maintenance. (mm)





(3) Outline dimensions and installation dimension. (mm)





11.2.3 Install the hydronic module

(1) Fix wall mounted panel

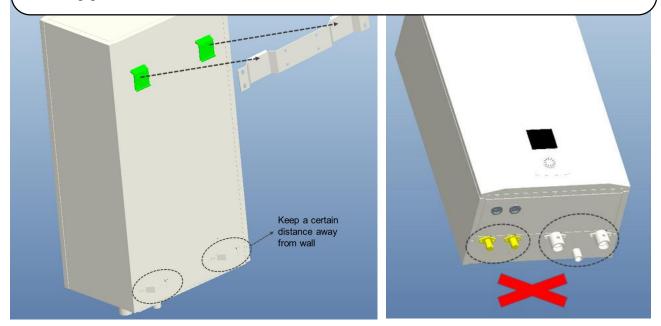
- Choose a wall or support that is fully reliable and safe to withstand twice the weight of the unit.
- The mounting wall panel is strong and solid enough to prevent it from vibration.
- Always mount the installation plate horizontally plate by aligning the marking thread and using a level gauge.
- Mount 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.

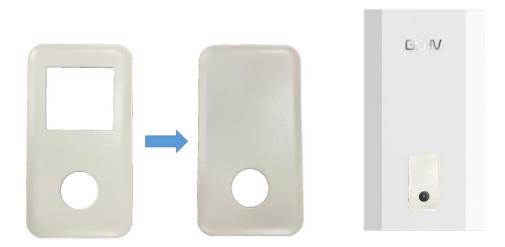
△ Attention

- 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.



11.2.4 Wired controller

The hydronic module is standard with a touch screen wired controller. The wired controller can 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.



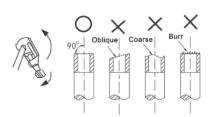
11.3 Refrigerant pipe work

11.3.1 Refrigerant piping

Decide piping length and then cut by using pipe cutter. Remove burrs from cut edge. Make flare after inserting the flare nut (locate at valve) onto the copper pipe. Align center of piping to valves and then tighten with torque wrench to the specified torque as stated in the table.

(1) Cutting and flaring

- Please cut using pipe cutter and then remove the burrs.
- Remove the burrs by using reamer. If burrs is not removed, gas leakage may be caused. Turn the piping end down to avoid the metal powder entering the pipe.
- Please make flare after inserting the flare nut onto the copper pipes.



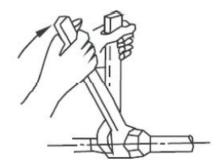
Outer diameter	A(m	m)	9	
	(mm)	MAX	MIN	
	Ф9.5	12.4	12.0	4
	Ф15.9	19.0	18.6	

Cutting the connection pipe

Flaring size of connection tube

(2) Fastening nut

Align the connecting tube, screw the nut you're your hand and then tighten with a wrench.



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	tening

 Piping size (mm)
 Tightening torque (N•m)

 Φ9.5
 32.7~39.9(333~407 kgf•cm)

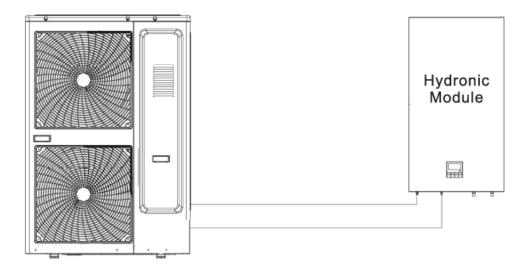
 Φ15.9
 61.8~75.4(630~770 kgf•cm)

Tightening torque

⚠ Attention

In order to prevent oxidation inside the copper tube during copper pipe welding, nitrogen filling must be taken. Otherwise the scale will block the refrigeration system!

11.3.2 Connection between outdoor unit and hydronic module



Note: The refrigerant circuit of the hydraulic 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 hydraulic 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.

11.3.3 Accessory pipe in pipeline

Because of different mounting positions of the air conditioning, the required accessory pipe can be long or short, to avoid affecting the capacity from too long cooling pipe, please select a reasonable tube length according to table below, try to select the location of the shorter lines for the installation.

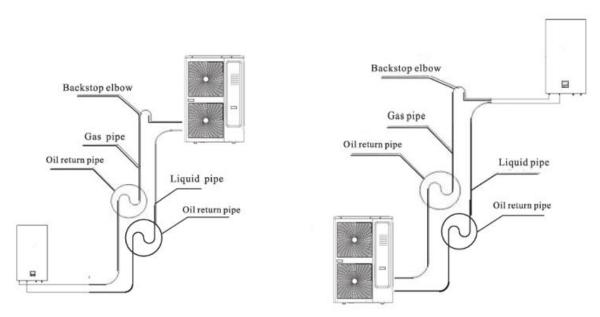
(1) The maximum allowable operating distance away from the pipe.

	1 0		
	<6.5kW	6.5~10.5kW	≥10.5kW
Pipe length	Max. length 15m	Max. length 20m	Max. length 50m
Height difference	Max. height 8m	Max. height 10m	Max. height 20m
Oil return bends quantity	Up to 10	Up to 10	Up to 15

Note: On condition that 80% of the cooling capacity is guaranteed in the above parameters, the cooling capacity loss and return oil has been fully considered.

(2) The use of oil return bend.

When the height difference between the indoor and outdoor unit is greater than 5 m, in order to facilitate oil return of the compressor, oil return bend must be used. Upon site operations, the following typical installation methods can be referred to.



Note: Oil return elbow radius R≤100mm, 10 oil return elbows must be located per 5m as shown above; when the height difference between indoor and outdoor unit exceeds five meters, oil reserve elbow and backstop elbow should be set according to the relative position of outdoor unit and indoor unit.

11.3.4 Main pipe diameter

	Main pipe diameter			
Model	Pipeline length (one-way)<30m	Pipeline length (one-way) ≥30m	
	Liquid pipe	Gas pipe	Liquid pipe	Gas pipe
FHOF-WHS-080CE3 FHOF-WHS-100CE3 FHOF-WHS-120CE3	φ9.52	φ15.88	φ9.52	φ15.88
FHOF-WHS-160CE3-3F	φ9.52	φ15.88	φ9.52	φ19.05

11.3.5 Remove the foreign matter inside the pipe

- When the refrigerant piping is installed, foreign matter inside the pipe must be removed with high pressure nitrogen.
- The hydronic module shall not be connected during cleaning.
- It is not possible to replace nitrogen with flammable and toxic gases such as refrigerant or oxygen.

11.3.6 Air tightness test

- 1) After the refrigerant piping is installed and connected to the hydronic module, the nitrogen with pressure of 40kgf/cm2 (4.00 MPa) should be injected from the gas side and the liquid side, before connecting the pipe to the outdoor unit valve. Mark the pressure value and perform 8-hour air tightness test.
- 2) If a pressure drop is found, re-examine the leakage of all interfaces and re-pressurize for 8 hours

after completion.

3) The outdoor unit cannot be connected when holding pressure.

11.3.7 Vacuum pumping

- 1) A vacuum pump with a vacuum degree of $-0.1\mu m$ or less and gas displacement of above 40L/min shall be used.
- 2) The outdoor unit does not need to be vacuumed. Do not open the shut-off valve on the gas side or liquid side of the outdoor unit.
- 3) Confirm that the vacuum pump can work below -0.1MPa after running for more than 1 hour. If it cannot work below -0.1MPa after running for more than 2 hours, it indicates that there is moisture or gas leakage inside and needs to be checked.
- 4) The vacuum pump must be equipped with a check valve.

Attention

- Do not mix tools and measuring instruments used for different refrigerants and in direct contact with the refrigerant.
- Never remove air with refrigerant gas.
- When the vacuum degree cannot reach -0.1MPa, please consider whether there is a possibility of leakage. Please confirm again if there is any leakage. If there is no leak, run the vacuum pump for one or two more hours.

11.3.8 Adding amount of refrigerant

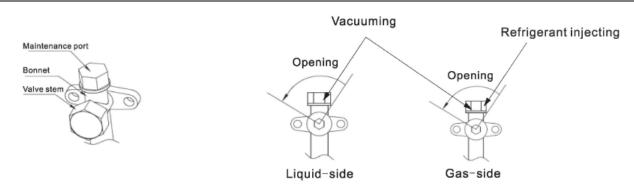
The calculation method of the adding amount of refrigerant is shown in the following table, based on the pipe diameter and length of connection liquid side piping between outdoor unit and the hydronic module.

Liquid pipe diameter (mm)	Pipe length (m)	Adding amount of refrigerant (kg)
φ9.52	€5	
φ9.52	>5	Add 0.03kg for each additional 1m

Note: R32 refrigerant must be charged in liquid form with fixed amount measured by electronic scale.

11.3.9 Instructions for use of the shut-off valve

- 1) It shall be in OFF state when delivery.
- 2) Open or close the valve with a 6 mm hex wrench, counterclockwise turning for opening and clockwise turning for closing.
- 3) The valve cover must be tightened after the operation.
- 4) The operation of vacuuming and refrigerant injection at the service port must be operated with the special tool R32. Inject the refrigerant at the gas side valve service port, and vacuum at the liquid side and the gas side valve service port.

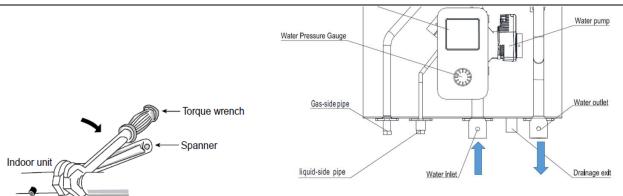


11.3.10 Pipe insulation treatment

- 1) Insulate the gas side and liquid side pipes separately.
- 2) Use closed-cell insulation material, with B1 flame retardant rating and 120'Chigh temperature resistance.
- 3) The outer diameter of the copper tube is φ 9.52, the thickness of the insulation cotton is not less than 15 mm; the outer diameter of the copper tube is φ 15.88, and the thickness of the insulation cotton is not less than 20 mm.
- 4) The nut joint of the hydronic module must also be insulated.

11.4 Water piping

- 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.



	Water pipe connection
Water outlet pipe	DN32
Water inlet pipe	DN32

11.4.1 Water quality

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	200µV/cm	<50ppm	No	<50ppm	No
Sulfate ion	Silicon	Iron content	Sodium ion	Calcium ion	
<50ppm	<30ppm	<0.3ppm	No	<50ppm	

11.4.2 Water injection and air exhaust

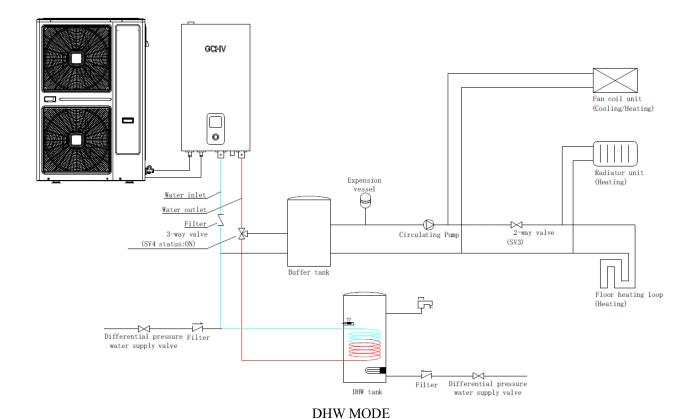
- 1) The exhaust valve should be installed at the highest point of the water system piping, and the drain valve should be set at the lowest point.
- 2) After the outdoor unit and hydronic module are installed, turn off the power.
- 3) Open the water inlet valve, unscrew the exhaust valve on the hydronic 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.

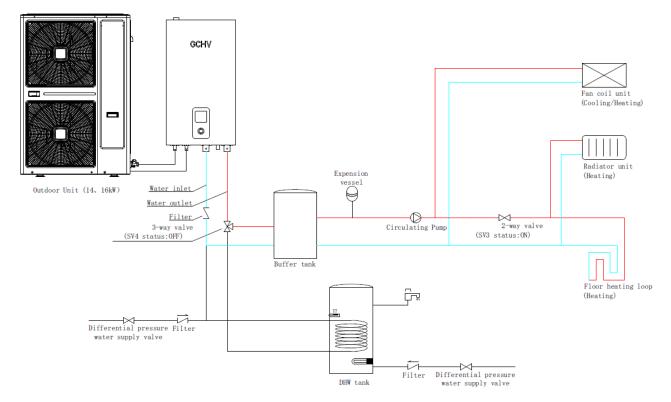
11.4.3 Anti-freeze measures

- 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.

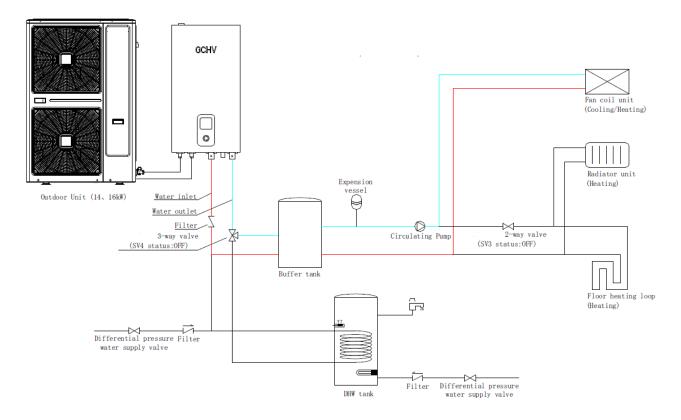
- a. Turn off the power;
- b. Close the water inlet of the water tank;
- c. Open the water tank outlet and drain valve;
- 4) Follow the steps below to drain the water from the hydronic module.
 - a. Turn off the power;
 - b. Close the water supply valve;
 - c. Open the drain valves on the circulating water inlet and the outlet of the hydronic module_o

11.4.4 Pipeline sketch

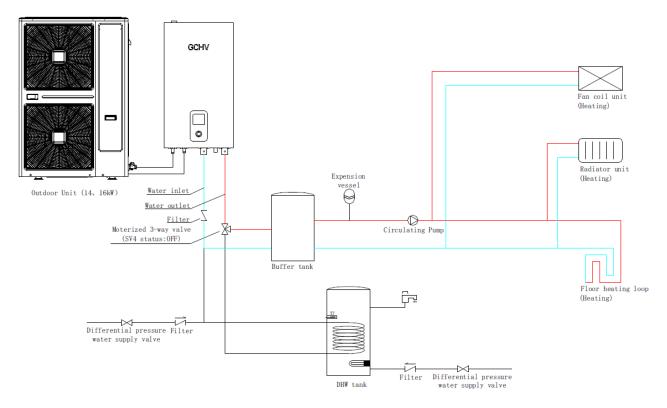




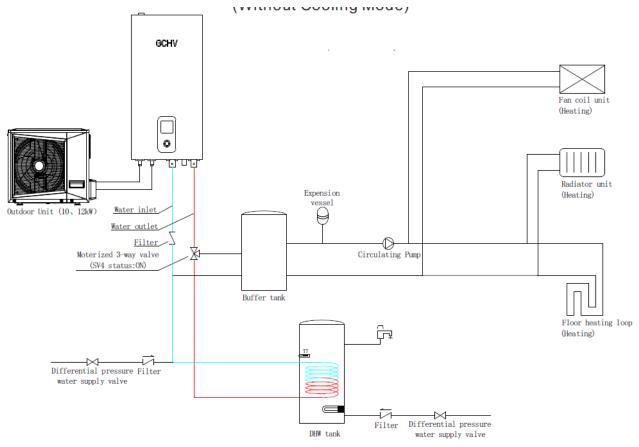
HEATING MODE



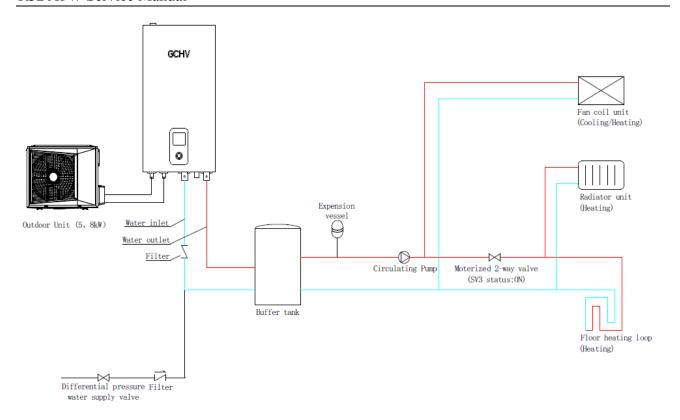
COOLING MODE



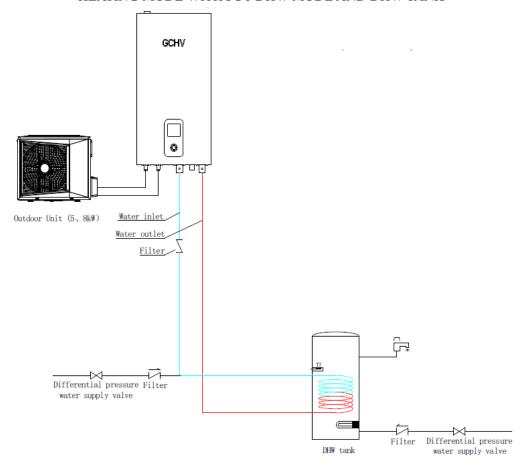
HEATING MODE WITHOUT COOLING MODE



DHW MODE WITHOUT COOLING MODE



HEATING MODE WITHOUT DHW MODE AND DHW TANK



ONLY DHW MODE

:--

11.5 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 $220-240V \sim 50Hz$ or 380-415V $3N \sim 50Hz$.
- The external power supply circuit must be grounded, and the ground wire should be reliably connected to the external ground.
- Use 3-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.

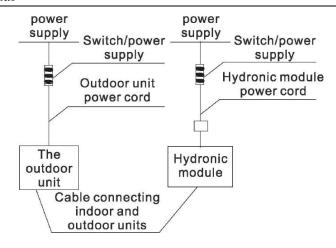
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- Be sure to install the required fuses or circuit breakers
- After the wiring is completed, the power can be turned on after careful inspection.

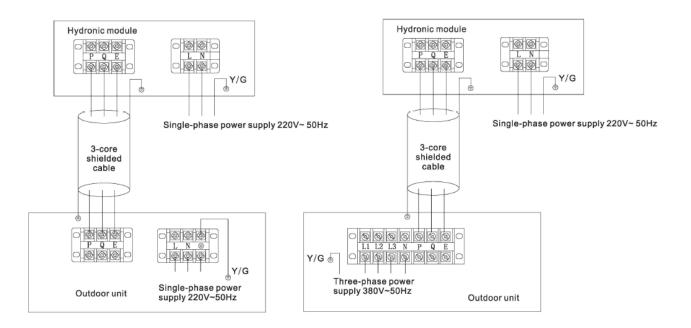
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11.5.1 Outdoor unit wiring		outdoor	outdoor	indoor
Model		FHOF- -WHS-080CE3 -WHS-100CE3 -WHS-120CE3	FHOF -WHS-160CE3-3F	FHIF- -WHS-081CE3 -WHS-121CE3 -WHS-161CE3
	Phase	1	3	1
Outdoor	Voltage	220~240V	380~415V	220~240V
unit power	Frequency	50Hz	50Hz	50Hz
	Power wiring(mm)	3*4.0	5*2,5	3*2,5
fuse		C 25A	3x C20A	C20A
Signal wiring(mm)			core shielded cable 3*0.7 core shielded cable 2* 0.7	

Please select the electrical wires and fuse according to the local rules. These are only suggested size till 10m lenght, openly installation wires



Wiring and control

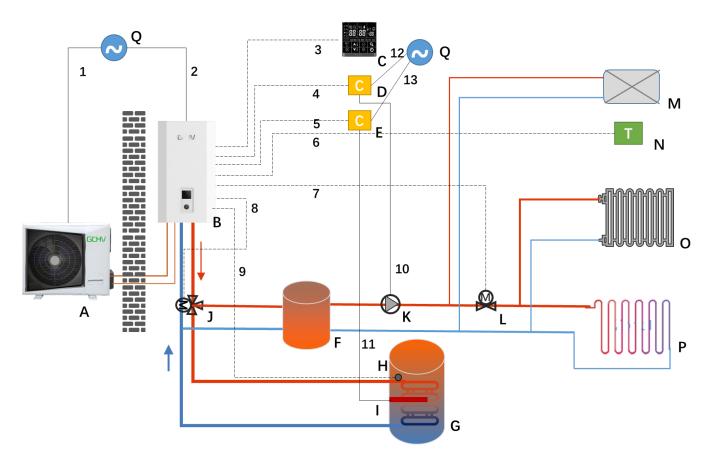


Electrical connection for single-phase and three-phase units

⚠ Attention

- When using the 2-core shielded cable as the signal cable, connect the shielded mesh to "E" of the terminal block. When using the 3-core shielded cable as the signal cable, the shielded mesh must be grounded.
- It is absolutely forbidden to connect the power line (strong power) to the signal line (weak power) terminal block, otherwise the electric control board will be burned out.

11.6 Field wiring



A	Outdoor unit	В	Hydronic module
С	Wired controller	D	Contactor for circulation water pump
			(filed supply)
Е	Contactor for booster heater	F	Buffer tank (filed supply)
	(filed supply)		
G	DHW tank (filed supply)	Н	T7 temperature sensor
I	Booster heater filed supply)	J	Electric 3-way valve (filed supply)
K	Circulation water pump (filed supply)	L	Electric 2-way valve (filed supply)
M	FCU	N	Room thermostat (filed supply)
О	Radiator (filed supply)	P	Floor heating (filed supply)
Q	Power supply		

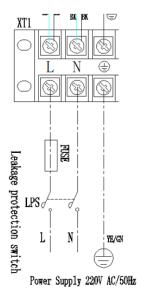
No.	Description
1	Power supply cable for outdoor unit
2	Power supply cable for hydronic module
3	Communication wire between wired controller and hydronic module
4	Circulation water pump control cable
5	Booster cable control cable

R32 ATW Service Manual

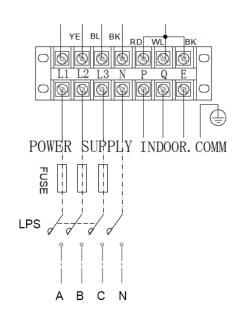
6	Room thermostat cable		
7	Electric 2-way valve control cable		
8	Electric 3way valve control cable		
9	Temperature sensor cable		
10	Power supply cable for circulation water pump		
11	Power supply cable for booster heater		
12	Power supply cable for circulation water pump		
13	Power supply cable for booster heater		
14	Communication wire between ODU and hydronic module		

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

1. Connection of power supply



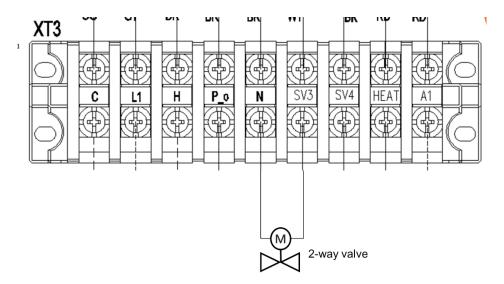
1-phase (1-phase outdoor unit, hydronic module)



3-phase outdoor unit

Model		FHOF- -WHS-080CE3 -WHS-100CE3 -WHS-120CE3	FHOF -WHS-160CE3-3F	FHIF- -WHS-081CE3 -WHS-121CE3 -WHS-161CE3
	Phase	1	3	1
Outdoor	Voltage	220~240V	380~415V	220~240V
unit power	Frequency	50Hz	50Hz	50Hz
	Power wiring(mm)	3*4.0	5*2,5	3*2,5

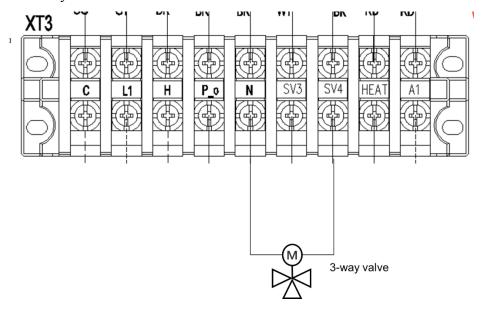
2. Connection of 2-way valve



When the unit is in cooling mode, SV3 has no output. When the unit is in heating mode, defrosting mode and anti-freezing mode, SV3 has a 220V AC output.

Please use a normal closing valve for this unit.

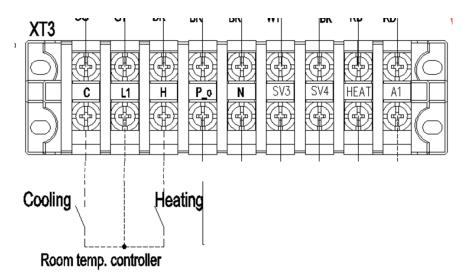
3. Connection of 3-way valve



When the unis is in DHW mode, SV4 has 220V output. When the unit is in cooling mode or 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.

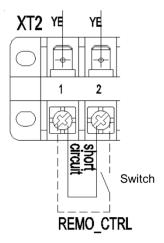
4. Connection of room thermostat



When hydronic module SW2-2 is in ON position, the unit is controlled by room thermostat. And the unit can't run DHW mode.

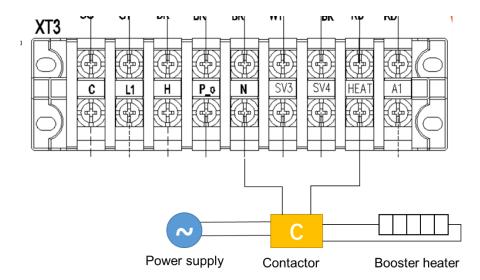
When "H" signal is connected, the unit will run heating mode, and the default setting temperature is 50° C. When "C" signal is connected, the unit will run cooling mode, and the default setting temperature is 7° C. If both signals are connected or disconnected, the unit is OFF.

5. Connection of REMO CTRL



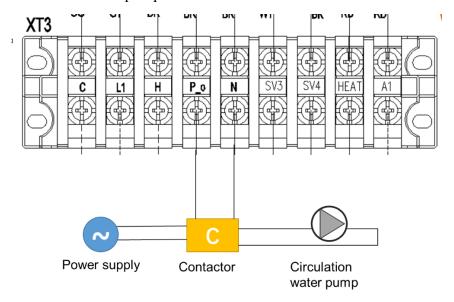
The REMO_CTRL is used to remotely start and stop the units. It is short-circuited at the factory, and units use wired controller to start and stop. If it is necessary to use the REMO_CTRL, the short line should be removed and controlled by the opening and closing switch. Start and stop of the unit (when switch is closed, the unit is turned on; when switch is disconnected, the unit is stopped).

6. Connection of booster heater



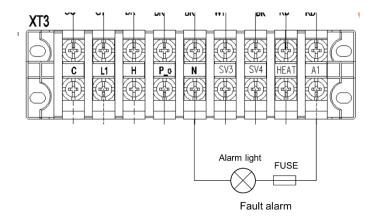
Connection of the booster heater cable depends on the application. Only when the domestic hot water tank is installed will this wiring be needed. The unit only sends ON or OFF signal to the booster heater. An additional contactor is needed and a dedicated terminal is needed to supply power to the booster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

7. Connection of circulation water pump



Connection of the circulation depends on the length of water pipes. The unit only 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.

8. Connection of alarm signal



When the unit has error code, alarm port has a 220V output.

12. Start-up and configuration

The unit should be configured by the installer to match the installation environment (outdoor climate, installed options, etc.) and user expertise.

12.1 DIP switch settings

1. Single phase outdoor unit

	S1	0	Reserved
		1	FHOF-WHS-080CE3
Composites actting		2	FHOF-WHS-100CE3
Capacity setting		3	FHOF-WHS-120CE3
		4	Reserved

2. 3-phase outdoor unit

r - r - r - r - r - r - r - r - r - r -						
Start time getting	me setting SW3	1 2 3 4	Start time 12 min			
Start time setting		1 2 3 4	Start time 3 min (Factory default)			
	SW6	ON DP	Reserved			
Capacity setting		ON DP	FHOF-WHS-160CE3-3F			

3. Hydronic module

1 0 9 4	SW2-1	OFF	Heating and cooling
1 2 3 4	3 W 2-1	ON	Heating only
ON	SW2-2	OFF	Without thermostat control
OFF SW2		ON	With thermostat control
	SW2-4	OFF	With DHW mode
(factory default)		ON	Without DHW mode

12.2 Pre-operation checks

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 and valves (when applicable), unit and room thermostat (when applicable), 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 11 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.
- 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

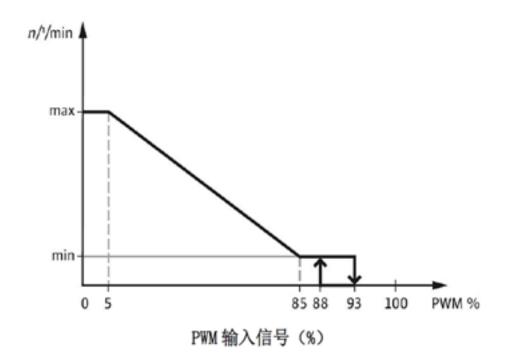
12.3 Water pump

The water pump in hydronic module is DC inverter type, and the water head is 9m. It will adjust running speed automatically according to the temperature difference between water inlet and outlet temperature of plate heat exchanger.

SHIMGE



Input signal

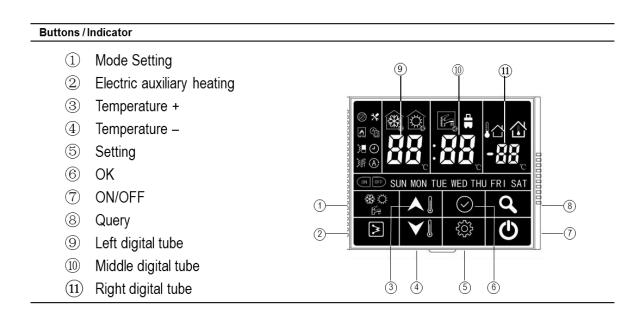


13. Operation and control

This wired controller is used for communicating with the system main board, controlling the operating status of the system through touch keys, and displaying the working status of the whole system through its LCD screen.



13.1 Icon introduction



	Anti-freezing	X	Error	Cooling mode ON
12	Reserved		Weekly	Heating mode
	Reserved	7	timer	ON
```	Hydronic		Clock	DHW mode
<b>≸</b> ■	module heater		Clock	ON
	Water tank		Dagamyad	Outdoor
	heater	Reserved	temp.	

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	Timer	<b>OFF</b>	Timer		Indoor
	ON		OFF	Ĭ.	Temp.
*	Cooling	2746	Heating		DHW
<b>725</b>	mode		mode		mode
SÜN	Day	aa _.	Time / temp.		Reserved

- The wired controller and the main board will check whether the communication is successful within 1 minute after power-on. If the communication is not successful, the main control board (30 seconds) and the wired controller will alarm the communication fault. If the communication is successful later, the alarm fault is restored and normal operation control is restored.
- ON/OFF button : Press this button to turn the unit ON or OFF.
- OK button: Press this button to confirm the settings, exit all interfaces of setting or query and return to the main interface.

# 13.2 Setting the clock

- ① Short press setting button ②, the clock icon ② flashes.
- ② Long press OK button ③, to enter time setting interface.
- 3 When the day icon, hour icon (left digital tube) or minute icon (middle digital tube) flash, scroll
- and 🗡 to select. Press OK button 🛇 to confirm the selection each time. (24h format)

#### Check the time

Short press button, the clock icon flashes. When the clock icon flashes, short press button, the current time will be displayed, the clock icon becomes constantly on. And it automatically exits after 10 seconds. Press button will also exit.

Note: when first power on or repower on the controller, the default time is 18:00, Monday.



# 13.3 Running mode and temperature setting

### 13.3.1 Running mode setting

Short press MODE button to select running mode.

- 1. When the unit is without DHW mode
- Heating only model: the wired controller can only select heating mode.
- Heat pump model: it will be selected heating  $\longrightarrow$  cooling  $\Longrightarrow$   $\longrightarrow$  heating  $\Longrightarrow$ .
- 2. When the unit is with DHW mode
- Only heating model: the wired controller can only select heating → DHW and heating +
   DHW combination mode
- Heat pump model: it will be selected heating  $\rightarrow$  DHW  $\rightarrow$  cooling + DHW  $\rightarrow$  cooling + DHW  $\rightarrow$  heating  $\rightarrow$  heating  $\rightarrow$  heating  $\rightarrow$ .

Note: 1. Whether the unit is with DHW mode depends on SW2-4 in hydronic module PCB.

SW2-4: OFF—with DHW mode

ON—without DHW mode

2. SW2-1: OFF—heating and cooling

ON—heating only

#### 13.3.2 Temperature setting

- 1. When the unit is with DHW mode
- When the unit is set in only heating mode or only cooling mode
  - a) In main interface and when the unit is ON, short press  $\triangle$  or  $\bigvee$  , to enter heating/cooling water temperature  $T_{S1}$  setting interface, left digital tube flashes.
  - b) Press All or Valueton to choose the target temperature. Press button once to increase the setting temperature by 1°C. When the setting temperature reaches the highest or lowest value, press the button again that the setting temperature won't change.
  - c) Press button or no operation for 5 seconds, it will save the setting and exit the temperature setting interface.
- When the unit is set in only DHW mode
  - a) In main interface and when the unit is ON, short press  $\triangle \mathbb{I}$  or  $\mathbb{I}$  , to enter DHW water temperature  $T_{S2}$  setting interface, middle digital tube flashes.
  - b) Press or button to choose the target temperature. Press button once to increase the setting temperature by 1°C. When the setting temperature reaches the highest or lowest value, press the button again that the setting temperature won't change.
  - c) Press button or no operation for 5 seconds, it will save the setting and exit the temperature setting interface.

- When the unit is set combination mode and the unit is running one mode
  - a) In main interface, short press or or or to enter current running mode temperature setting interface, one digital tube flashes. (no operation for 5 seconds to exit setting)
  - b) Press or button to choose the target temperature. Press button once to increase the setting temperature by 1°C. When the setting temperature reaches the highest or lowest value, press the button again that the setting temperature won't change.
  - c) Short press button, to enter the other mode temperature setting interface.
  - d) After finishing the setting, Press  $\bigcirc$  button or no operation for 5 seconds, it will save the setting and exit the temperature setting interface.

### 2. When the unit is without DHW mode

- a) In main interface, short press  $\triangle \mathbb{I}$  or  $\mathbb{V} \mathbb{I}$ , to enter heating/cooling water temperature  $T_{S1}$  setting interface, middle digital tube flashes.
- b) Press or button to choose the target temperature. Press button once to increase the setting temperature by 1°C. When the setting temperature reaches the highest or lowest value, press the button again that the setting temperature won't change.
- c) Press button or no operation for 5 seconds, it will save the setting and exit the temperature setting interface.

Notes: 1. The default temperature is 7  $^{\circ}$ C for cooling mode, 45  $^{\circ}$ C for heating mode, 50  $^{\circ}$ C for DHW mode.

2. The setting temperature range is  $5\sim25~C$  for cooling mode,  $25\sim60~C$  for heating mode and  $40\sim60~C$  for DHW mode.

# 13.4 Display shows

#### 13.4.1 Digital display

		DHW mode is OFF*			
Status	Standby	Standby Running		Setting	All modes
	mode heating/cooling mode		mode	temperature	All modes
Left digital	T1	T1	T1	$T_{S1}$	T1
Middle digital	Т7	Т7	Т7	$T_{S2}$	$T_{S1}$

#### Note:

T1: water outlet temperature of hydronic module

*T7: DHW water tank temperature* 

 $T_{S1}$ : heating or cooling mode setting temperature

 $T_{S2}$ : DHW mode setting temperature

*: When SW2_4 is in OFF position, DHW mode is ON; when SW2_4 is in ON position, DHW mode is OFF.

#### 13.4.2 Icon display

When there is a box outside the mode icon, it means the unit is running in this mode.

## 13.5 Electric auxiliary heating

1. When the unit is in heating mode or timer heating mode is ON, in the main interface, press electric auxiliary heating button , the hydronic module electric heater icon is displayed to open electric heater.

When water outlet temperature  $T_1 \le$  (setting temperature  $T_s - 6^{\circ}C$ ), the electric heater will work and the icon will still show. If not, this icon will disappear.

When  $T_1 \ge T_S$  or T4 temperature sensor is fault, the electric heater will stop working.

When the electric heater is working, if press the button  $\bigcirc$ , the electric heater will not stop working until  $T_1 \ge T_{S_1}$ 

# 13.6 Forced defrosting

Long press electric auxiliary heating button , "dF" will be displayed. If the unit is in heating mode or DHW mode and T3 (outdoor unit heat exchanger temperature) is lower than 15°C, the unit will enter forced defrosting mode.

### 13.7 Sterilization mode

Long press mode setting button , the water tank electric heater icon flashes 5s, and the high-temperature sterilization mode is manually activated (only available when DHW mode or cooling(heating) + DHW combination mode).

After flashing 5s, if the hydronic module is running sterilization mode, the icon will still flash until it exit sterilization mode.

Exit condition: 1. Water tank temperature  $T7 \ge 70^{\circ}C$  and last 30 minutes;

2. Run sterilization mode more than 3 hours.

# 13.8 Weekly timer setting

When it reaches to setting time, the unit will start to work according setting mode and temperature or shutdown the unit.

### 13.8.1 Weekly timer setting

Press setting button twice, the weekly timer icon flashes, long press button to enter the

**R32 ATW Service Manual** weekly timer setting interface. After entering the weekly timer setting mode, icon flashes, press or button to select or or , and press button, when icon is always on, enter the start time 2. **Days setting:** Long press  $\triangle$  or  $\bigvee$  button to switch setting items. When the  $\bigcirc$  icon is always on, SUN icon starts to flash (flashing indicates that the setting is adjustable), short press or button to switch from **SUN-SAT**. After selecting a day, press button and the day icon will be on. Press button again to cancel the selection, the icon flashes, and you can reset it. After finishing days setting, the selected day's icon is always on (if no day is selected, the currently flashing day will be selected). "Hour" setting: Long press button, at this time "Hour" flashes (left digital tube, initial value is 08, if it has been set, the last set value is displayed, the temperature unit is not displayed), short press All or Value button to select the time (00-23), short press O button, the number is always on. Press button again to cancel the selection, the icon flashes, and you can reset it. "Minute" setting: After "Hour" setting is completed, long press button. At this time, "Minute" flashes (middle digital tube, initial value is 00, if it has been set, the last set value is displayed, temperature unit is not displayed), short press  $\triangle$  or  $\forall$  to select the time (00-59). Short press  $\bigcirc$  button, the number is always on. Press  $\bigcirc$  button again to cancel the selection, the icon flashes, and you can reset it. **Mode setting:** After finishing minutes setting, long press  $\vee$  to enter the timer mode setting. Short press to choose mode. The operations are like chapter 13.3.1. **Temperature setting:** After finishing mode setting, long press to enter temperature setting. When the digital tube flashes, short press or to set the target temperature. Press button to select the setting temperature value, and the value is always on. Press button again to cancel the selection, the icon flashes, and you can reset it. Press button once to increase the setting temperature by 1°C. When the setting temperature reaches the highest or lowest value, press the button again that the setting temperature won't change. If setting mode is combination mode, after finishing first temperature setting, long press button to switch to the other temperature setting. After finishing temperature setting, long press mode setting button to back timer setting interface. When icon flashes, press button to enter shutdown timer setting interface. **Shutdown time setting:** When is always on, long press button to select timer shutdown days. Short press or button to switch from SUN-SAT. After selecting a

"Minutes" setting. 9. **Exit:** After finishing all setting, long press  $\bigcirc$  button to exit timer setting. Notes: 1. After finishing every setting, please remember short press button to save the set,

day, press button and the day icon will be on. Press button again to cancel the selection. When the days icon flashes, and you can reset it. Long press button to enter "Hour" and

otherwise, the weekly timer setting will fail.

2. Long press Al button, it will come back to last setting interface.

### 13.8.2 Weekly timer setting query

Press setting button twice, the weekly timer icon flashes, short press button to enter the weekly timer setting interface.

In weekly timer viewing interface, press  $\triangle$  or  $\forall$  button to check:

- 1. Timer on: the digital tube displays the timer on time;
- 2. Timer off: the digital tube displays the timer off time.
- 3. Timer on: the digital tube displays the timer setting temperature, and setting mode;

### 13.8.3 Clear weekly timer setting

In main interface, press setting button three times, and middle digital tube displays 1 or 0. At this time, long press button, the controller will clear weekly settings.

# 13.9 Power-down memory setting

In main interface, press setting button three times, and middle digital tube displays 1, meaning the controller with power-down memory (default). Press or button, when it displays 0, meaning the controller without power-down memory.

# 13.10 Spot check

Press button to enter the query status, press button or no operation for 5 seconds to exit the query interface and return to the main interface. Press or button in query interface, it will show these data in turn:

No.	Description	Notes
1	AC side setting water temperature Ts1	
2	Domestic hot water setting temperature Ts2	When hydronic module is without DHW function, it will show 0.
3	Water inlet temperature of heat exchanger Tw_in	
4	Water outlet temperature of heat exchanger Tw_out	
5	Water outlet temperature of hydronic module T1	
6	Water tank temperature T7	When hydronic module is without DHW function, it will show 0.
7	Temperature detected by temperature probe of wired controller T6	211 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

8	Ambient temperature T4	
9	Capacity of hydronic module	Capacity (HP) = value * 0.1
10	Operating capacity demand of hydronic module	Capacity (HP) = value * 0.1
11	Water pump gear	

# 13.11 Error code display

When the unit has error, the icon and error code will appear in the screen. Only when the error is solved, it will disappear.

Error code	Description	Error code	Description
Е0	Water flow switch failure	E8	Heat exchanger water outlet temperature sensor Tw_out malfunction
E1	Communication failure between hydronic module and outdoor unit	E9	Communication failure between hydronic module and wired controller
E2	Water outlet temperature sensor T1 malfunction	EF	Mode conflict
E5	Outdoor unit failure	Р0	EEPROM protection
Е6	Water tank temperature Sensor T7 malfunction	P1	Excessive temperature difference between water inlet and outlet protection
E7	Heat exchanger water inlet temperature sensor Tw_in malfunction	P2	Water shortage protection

# 13.12 Anti-freezing function

When ambient temperature or water temperature is too low, in order to protect water pipe from freezing, the unit will enter anti-freezing mode. "d0" and icon will show in wired controller.

# 14. Troubleshooting

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.

# 14.1 Spot check

### 14.1.1 Spot check in outdoor unit

For single phase outdoor unit, press up button to enter spot check.



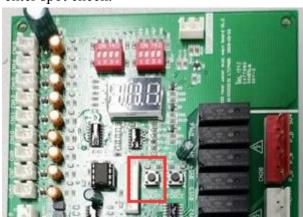
For three-phase outdoor unit,

No.	Display content	Remarks
0	Current frequency / quantity of indoor unit	
1	Capacity of outdoor unit	50/80/100/120/140/160
2	Total capacity of indoor units	
3	Total required capacity after correction of outdoor unit	
4	On anotice made	0: Standby; 2: Cooling; 3: Heating; 4:
4	Operation mode	Forced cooling
5	Actual operating capacity of outdoor unit	
6	Fan speed	0~8
7	Tw_in water inlet temperature of heat exchanger	
8	Tw_out water outlet temperature of heat exchanger	
9	T1 water outlet temperature of hydronic module	
10	T3 condenser temperature of outdoor unit	
11	T4 ambient temperature	
12	T5 exhaust temperature	
		1-phase ODU: Actual value = Check
13	Opening degree of electronic expansion valve	display value ×4; 3-phase ODU: Actual
		value = Check display value $\times$ 8
14	High pressure	

15	Primary current	
16	Secondary current	
17	Primary voltage	
18	Secondary voltage	
19	Last failure or protection code	No protection or fault display
20	Control parameter	For dev elopers only
21	Control parameter	For dev elopers only
22		End of check

# 14.1.2 Spot check in hydronic module

Press SW4 check button to enter spot check.



No.	Display content	Remarks
1	Capacity of outdoor unit	
2	Set mode of indoor unit	
3	Operating mode of outdoor unit	0: Standby; 2:Cooling; 3: Heating; 4: Forced cooling
4	Operating capacity demand for indoor unit	
5	Setting temperature	
6	T1 water outlet temperature	
7	Tw_in water inlet temperature of PHE	
8	Tw_out water outlet temperature of PHE	
9	T7 DHW Tank Temperature	
10	T4 ambient temperature	
11	Previous fault	
12	Previous second fault	
13	Previous third fault	
14	Software version	
15	Pump output level	
16		

# 14.1.3 Spot check in wired controller

Press query button to enter spot check. Press up and down button to turn pages.



No.	Display content	Remarks
1	AC side setting water temperature Ts1	
2	Domestic hot water setting temperature Ts2	When hydronic module is without DHW function, it will show 0.
3	Water inlet temperature of heat exchanger Tw_in	
4	Water outlet temperature of heat exchanger Tw_out	
5	Water outlet temperature of hydronic module T1	
6	Water tank temperature T7	When hydronic module is without DHW function, it will show 0.
7	Temperature detected by temperature probe of wired controller T6	
8	Ambient temperature T4	
9	Capacity of hydronic module	Capacity (HP) = value * 0.1
10	Operating capacity demand of hydronic module	Capacity (HP) = value * 0.1
11	Water pump gear	

# 14.2 Error code and troubleshooting

## 14.2.1 Outdoor unit

Code	Failure or protection	Failure cause and corrective action
E1	Three-phase supply phase-sequence	1. Check the power supply cables to avoid phase loss
	fault	2. Check the power supply cables sequence; change any two
	(only for 3Ph unit)	cables sequence of the three power supply.
E2	Communication failure between	Cause: Communication interrupted f or 2mins or more
	indoor unit and outdoor unit	between ODU and IDU
		1. Wire doesn't connect between IDU and ODU. Connect the
		wire.

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	2. Communication wire sequence is not right. Reconnect the
	wire in the right sequence.
	3. 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.
Ambient temperature sensor failure	1. The T4 sensor connector is loosening. Reconnect it.
	2. The T4 sensor connector is wet or there is water in. Remove
	the water, make the connector dry. Add waterproof adhesive
	3. The T4 sensor failure, change a new sensor.
Condenser temperature sensor failure	The same with E4.
T5 exhaust temperature sensor failure	The same with E4.
AC over voltage/ under voltage	
protection	
EEPROM failure	1. The EEPROM parameter is error, rewrite the EEPROM
	data.
	2. EEPROM chip part is broken. Change a new EEPROM
	chip part.
	3. Main PCB is broken, change a new PCB.
Communication failure between the	
main control chip and the module	
board	
Display P6 protection f or 3 times	It can only be restored by repowering on the unit.
within 30 minutes	The same with P6.
Display P2 protection f or 3 times	It can only be restored by repowering on the unit.
within 30 minutes	The same with P2.
Display P4 protection f or 3 times	It can only be restored by repowering on the unit.
within 100 minutes	The same with P4.
Display P9 protection f or 2 times	It can only be restored by repowering on the unit.
within 10 minutes	The same with P9.
High pressure sensor failure	Cause: Exhaust pressure Pc<0.3MPa
Display P3 protection f or 3 times	It can only be restored by repowering on the unit.
within 60 minutes	The same with P3 and P14.
High pressure protection (high	Heating mode, DHW mode:
voltage switch)	1. The water flow is low; water temp is high, whether there
	is air in the water system. Release the air.
	2. Water pressure is lower than 0.1Mpa, charge the water to
	let the pressure in the range of 0.15~0.2Mpa.
	3. Over charge the refrigerant volume. Recharge the
	refrigerant in right volume.
	refrigerant in right volume.  4. EXV locked or coil connector is loosening. Tap-tap the
	Condenser temperature sensor failure T5 exhaust temperature sensor failure AC over voltage/ under voltage protection EEPROM failure  Communication failure between the main control chip and the module poard  Display P6 protection f or 3 times within 30 minutes  Display P2 protection f or 3 times within 30 minutes  Display P4 protection f or 3 times within 100 minutes  Display P9 protection f or 2 times within 10 minutes  High pressure sensor failure  Display P3 protection f or 3 times within 60 minutes  High pressure protection (high

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		install the EXV coil in the right location
		DHW mode:
		Water tank heat exchanger is smaller than the required
		1.7m2 (10-16kW unit) or 1.4m2 (5-7kW unit)
		Cooling mode:
		1. Heat exchanger cover is not removed. Remove it.
		2. Heat exchanger is dirty or something is block on the
		surface. Clean the heat exchanger or remove the obstruction
P2	Low pressure protection	3 times P2 protection appears within 30 minutes and then
		reported H5.
		1. System is lack of refrigerant. Charge refrigerant in right volume.
		2. When at heating mode or DHW mode, heat exchanger is
		dirty or something is block on the surface. Clean the heat
		exchanger or remove the obstruction.
		3. The water flow is low in cooling mode.
		4. EXV locked or coil connector loose. Tap-tap the valve
		body and plug in/ plug off the connector for several times to
		make sure the valve is working correctly. And install the
		EXV coil in the right location
P3	Primary current overcurrent	
	protection	
P4	Exhaust temperature is too high	3 times P4 protection appears within 100 minutes and then
	protection	reported H6.
	Freezensin	1. The same reason to P1.
		2. System is lack of refrigerant. Charge the refrigerant in
		right volume.
		3. Tw_out temp sensor connector loosens. Reconnect it.
		4. T1 temp sensor connector loosens. Reconnect it.
		5. T5 temp sensor connector loosens. Reconnect it.
P5	T3 high temperature protection	Outdoor unit heat exchanger is not good.
	is inglitemperature protection	2. Temperature sensor is in wrong place or broken.
P6	Module protection	3 times P6 protection appears within 30 minutes and then
10	Module protection	reported H4.
		1. Power supply voltage of the unit is low, increase the
		power voltage to the required range.
		2. The space between the units is too narrow for heat
		exchange. Increase the space between the units.
		3. Heat exchanger is dirty or something is block on the
		surface. Clean the heat exchanger or remove the obstruction.
		4. Fan is not running. Fan motor or fan is broken. Change a
		new fan or fan motor.
		new ian of ian motor.

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		5. Over charge the refrigerant volume. Recharge the
		refrigerant in right volume.
		6. Water flow rate is low, there is air in system, or pump
		head is not enough. Release the air and reselect the pump.
		7. Water outlet temp sensor is loosening or broken,
		reconnect it or change a new one.
		8. Water tank heat exchanger is smaller than the required
		1.7m ² (10-16kW unit) or 1.4m ² (5-7kW unit)
		9. Module wires or screws are loosening. Reconnect wires
		and screws.
		The Thermal Conductive Adhesive is dry or drop. Add
		some thermal conductive adhesive.
		10. The wire connection is loose or drop. Reconnect wire.
		11. IPM board is defective, replace a new one.
		12. If already confirm the control system has no problem,
		then compressor is defective, replace a new compressor
P9	DC fan failure	2 times P9 protection appears within 10 minutes and then
		reported H9
L0	DC compressor module failure	
L1	DC bus low voltage protection	
L2	DC bus high voltage protection	
L4	MCE fault / synchronization /	
	closed loop	
L5	Zero speed protection	
L7	Phase sequence error protection	
L8	Speed change > 15Hz at the	
	previous and last moments	
L9	set speed and actual running	
	speed difference >15 Hz	

## 14.2.2 Hydronic module

Code	Failure or protection	Failure cause and corrective action
E0	Water flow switch fault	1. The wire circuit is short connected or open. Reconnect the
		wire to assure effective connection.
		2. Water flow rate is too low
		3. Water flow switch failed, switch is opened or closed
		continuously. Change water the flow switch.
E1	Communication fault between	1. Wire doesn't connect between IDU and ODU. Connect
	hydronic module and outdoor unit	the wire.
		2. Communication wire sequence is not right. Reconnect the
		wire in the right sequence.
		3. Whether there is a high magnetic field or high power

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		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.
E2	T1 fault of water outlet temperature	1. The T1 sensor connector is loosening. Reconnect it.
	sensor	2. The T1 sensor connector is wet or there is water in.
		Remove the water, make the connector dry. Add waterproof
		adhesive.
		3. The T1 sensor failure, change a new sensor.
E5	Outdoor unit fault	Please see the error code in outdoor unit.
Е6	T7 fault of DHW tank water	1. The T7 sensor connector is loosening. Reconnect it.
	temperature sensor	2. The T7 sensor connector is wet or there is water in.
		Remove the water, make the connector dry. Add waterproof
		adhesive.
		3. The T7 sensor failure, change a new sensor.
E7	Tw_in fault of heat exchanger inlet	1. The sensor connector is loosening. Reconnect it.
	water temperature sensor	2. The sensor connector is wet or there is water in. Remove
		the water, make the connector dry. Add waterproof adhesive.
		3. The sensor failure, change a new sensor.
E8	Tw_out fault of heat exchanger outlet	1. The sensor connector is loosening. Reconnect it.
	water temperature	2. The sensor connector is wet or there is water in. Remove
		the water, make the connector dry. Add waterproof adhesive.
		3. The sensor failure, change a new sensor.
E9	Communication fault between	1. Wire doesn't connect between controller and unit.
	hydronic module and wired controller	Connect the wire.
		2. Communication wire sequence is not right. Reconnect the
		wire in the right sequence.
		3. 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.
P0	EEPROM protection	1. The EEPROM parameter is error, rewrite the EEPROM
		data.
		2. EEPROM chip part is broken. Change a new EEPROM
		chip part.
		3. Main PCB is broken, change a new PCB.
P1	Protection for large temperature	1. Check that all shut off valves of the water circuit are
	difference of inlet and outlet	completely open.
		2. Check if the water filters need cleaning.
		3. Charging water
		4. Make sure there is no air in the system (Purge air).
		5. Check on the manometer that there is sufficient water
		pressure. The water pressure must be >1 bar (water is cold).

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		6. Check that the pump speed setting is on the highest speed.
		7. Make sure that the expansion tank is not broken.
		8. Check that the resistance in the water circuit is not too
		high for the pump
P2	Protection for insufficient water flow	
Р3	T1 and Tw_out simultaneous fault	The same to E2 and E8.
	protection	