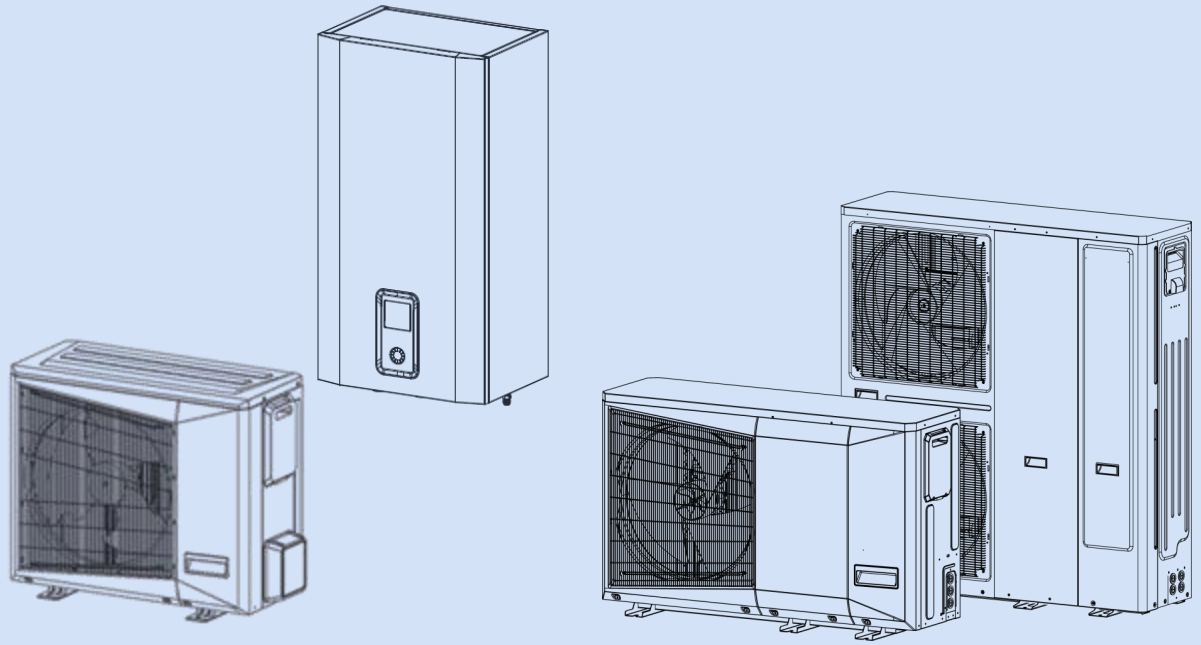
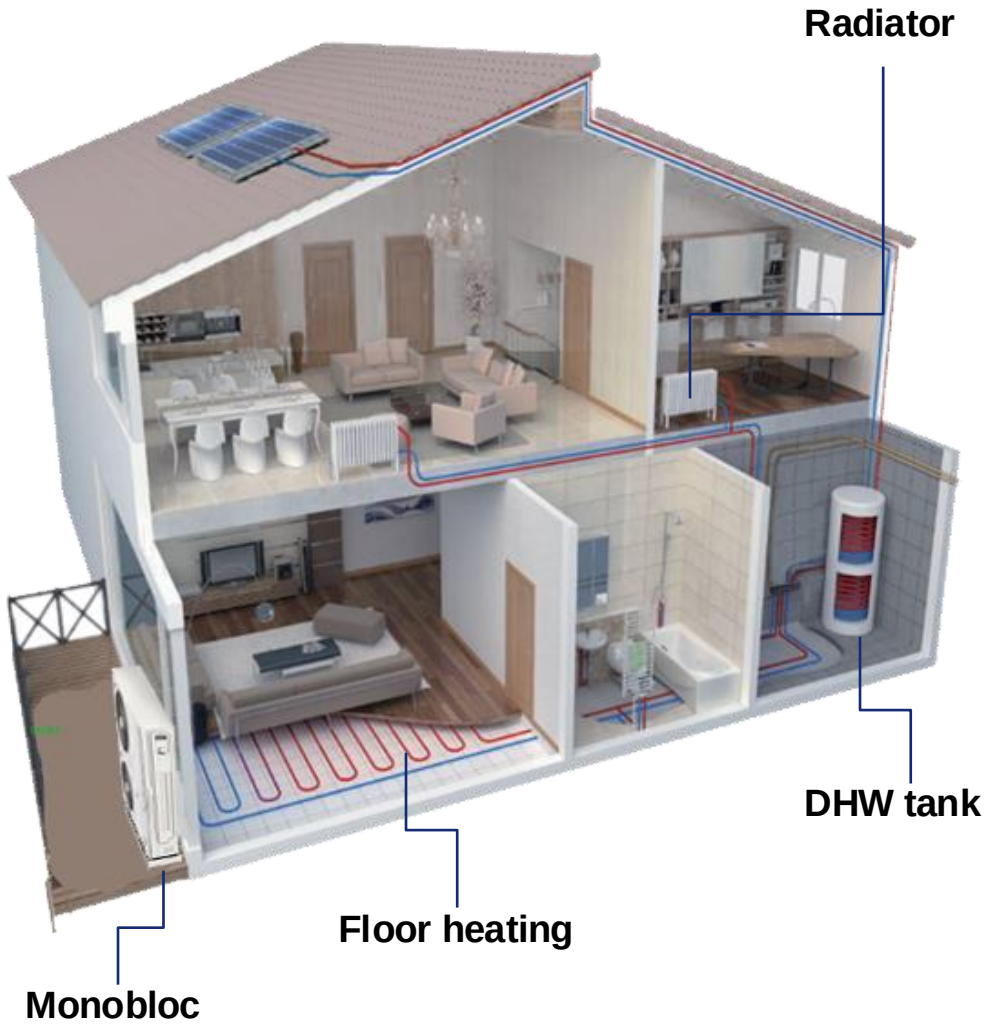
R32
AIR-TO WATER
HEAT PUMP



2023.11

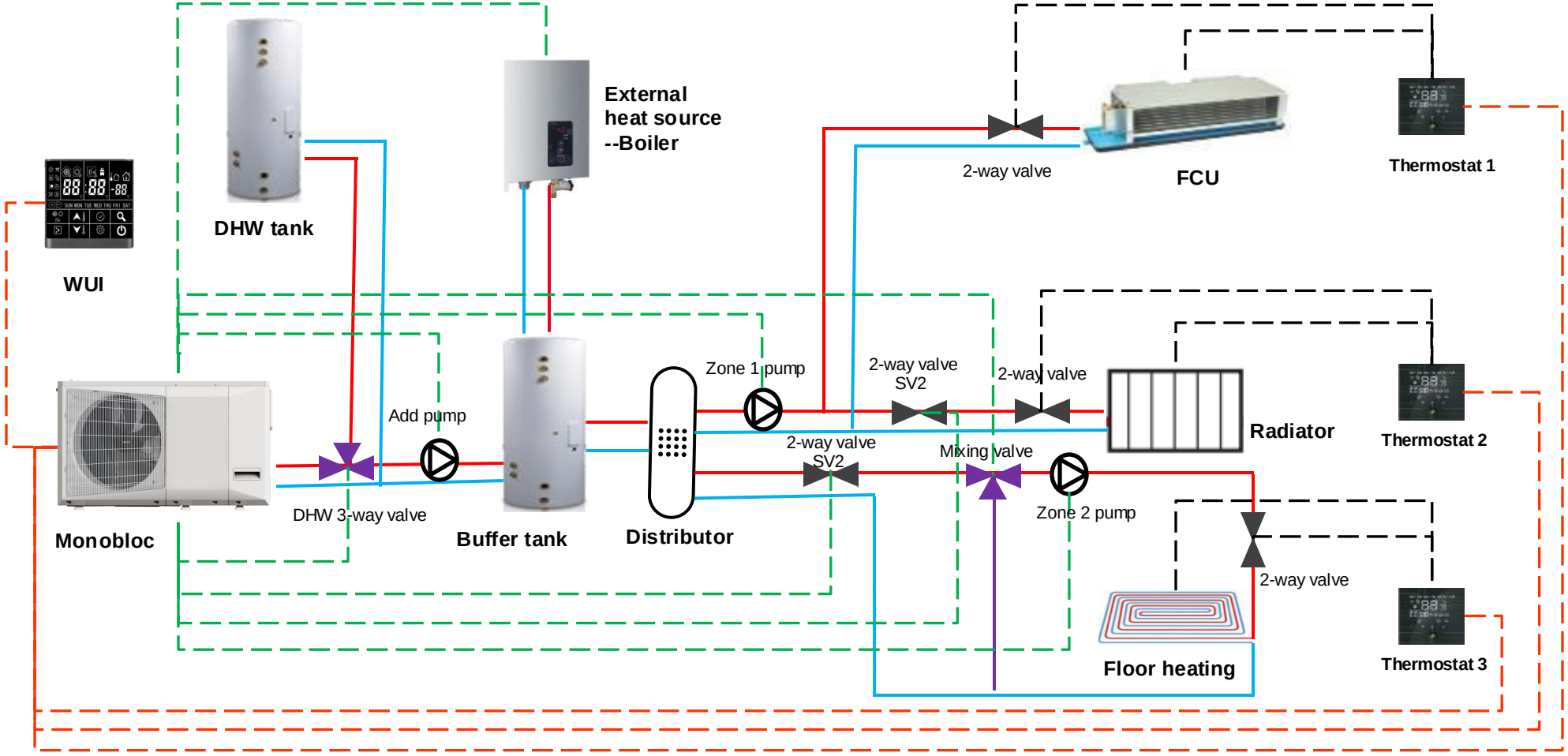
Application of A2W

- One solution for cooling/heating/DHW requirement for home application.
- Produce domestic hot water all year.
- Heating in winter and cooling in summer.
- Wide range of solutions: floor heating, radiators and fan coils.
- Create great comfort at home even at low outdoor temperatures.
- Environmental friendly: using R32 refrigerant.



Concept of A2W

This series of monobloc is using the R-32 refrigerant and reached the high efficiency with A+++.
It is designed for heating and cooling applications in new and existing individual homes and small businesses.
The unit is compatible with low to medium temperature emitters: underfloor heating, fan coil units, radiators, domestic hot water, etc.



Control signal to Monobloc:

Control signal from Monobloc:

Control signal from thermostat to terminal:

Why R-32?

Up to 77% less CO_2 equivalent than R-410A

R-32 with GWP = 675

R-32 helps protecting the environment and preserving HFC quotas

Up to 10% more energy efficient

Compared with R-410A and suitable for all climates

User friendly

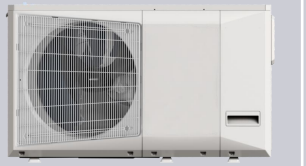
R-32 is available anywhere

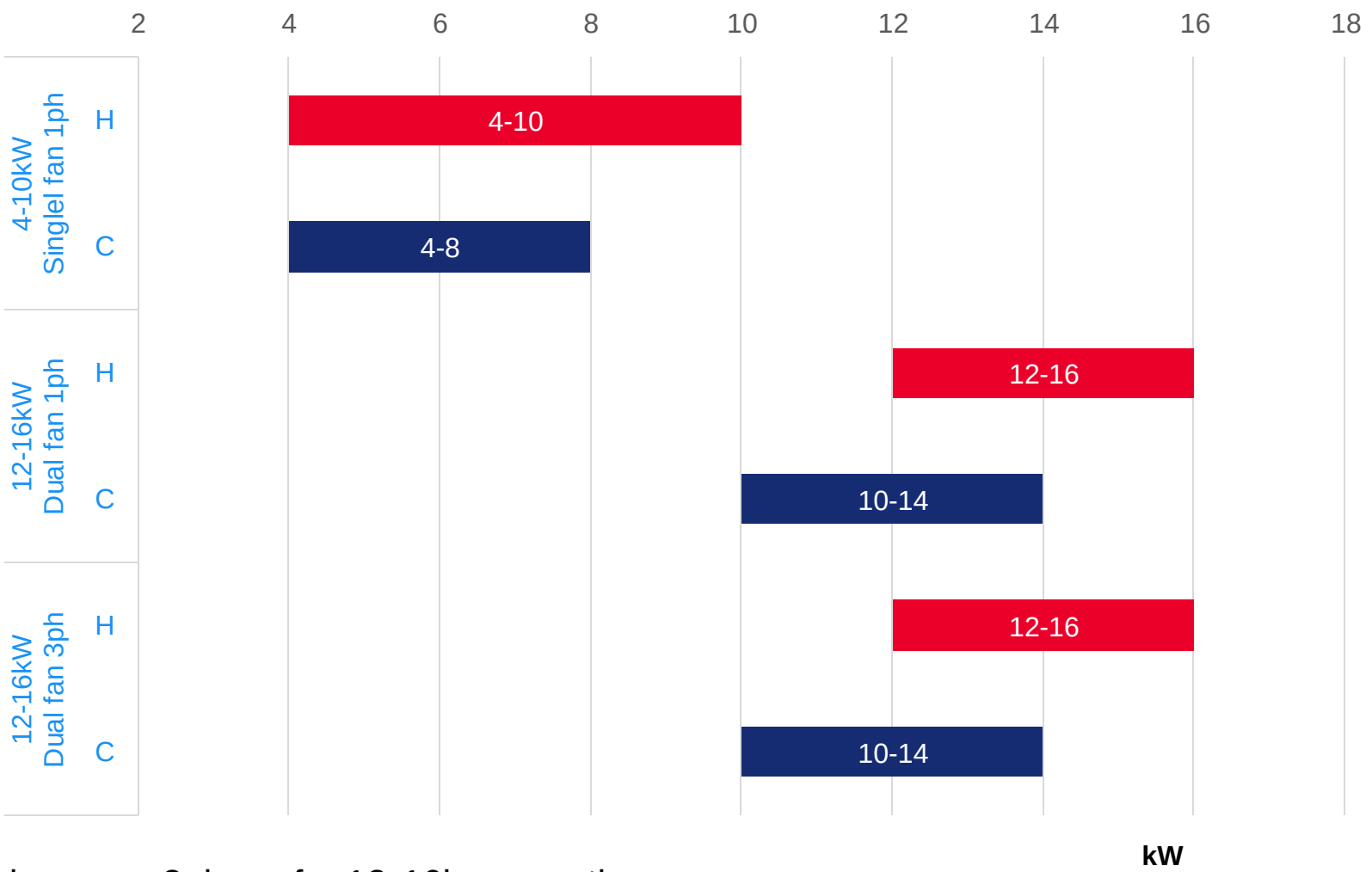
Safe

Easy installation, comissioning and maintenance*

** Specific safety requirements may apply for equipment transportation, operation and servicing*

Range Overview

Monobloc	Split type
	
	
	



- Multi power supply: 1phase for whole range, 3phase for 12-16kw as option.

Comparison

GCHV

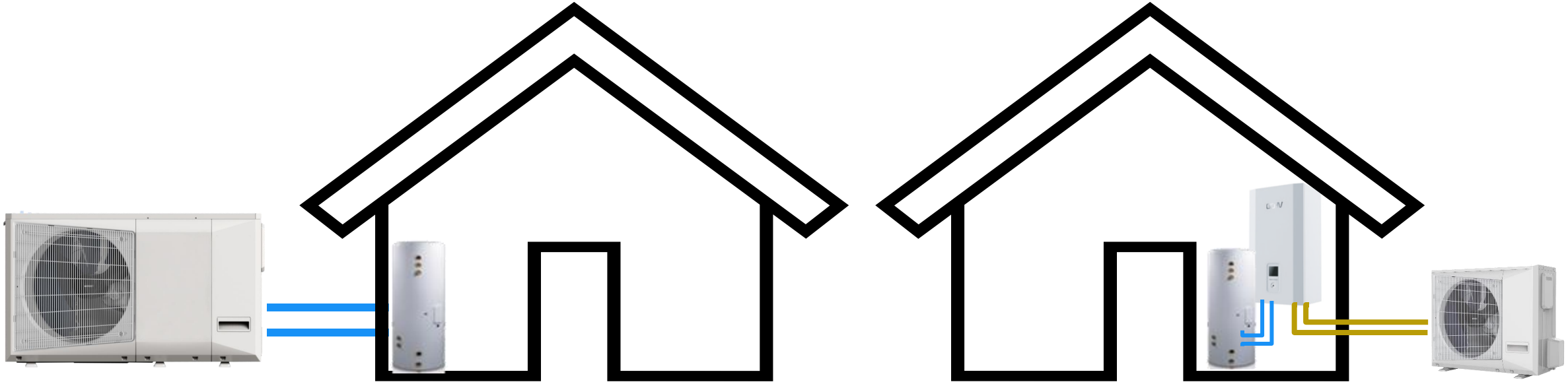
Monobloc

1. Only install water pipe
2. Need to use glycol or others when ambient temp. is low
3. Save indoor space

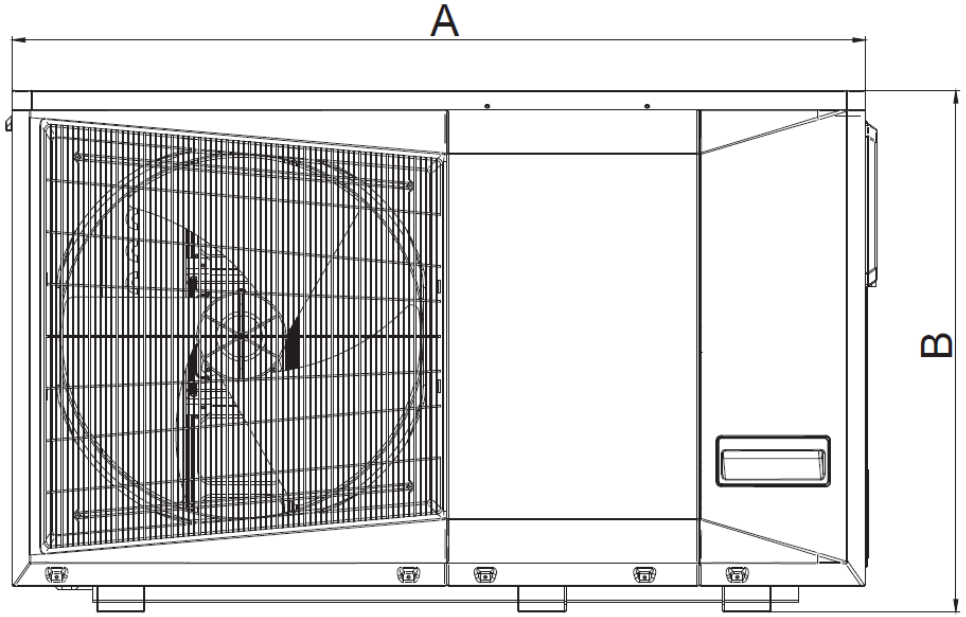
VS

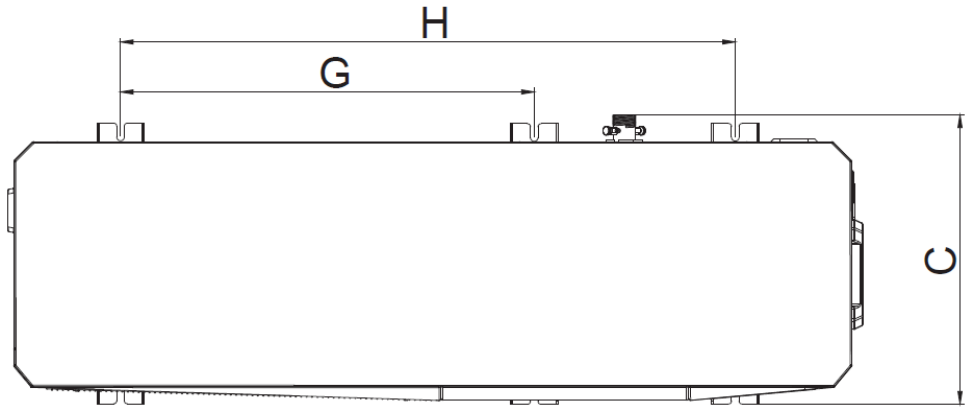
Split type

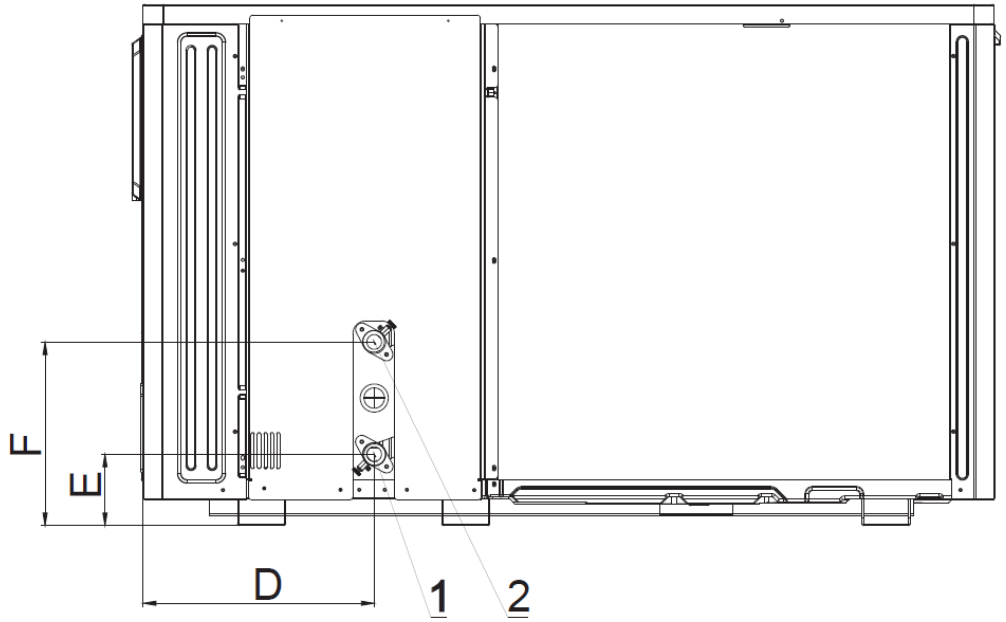
1. Install refrigerant pipe and water pipe
2. Water pipes are inside
3. Suitable for colder climate



Dimensions - Single Fan version







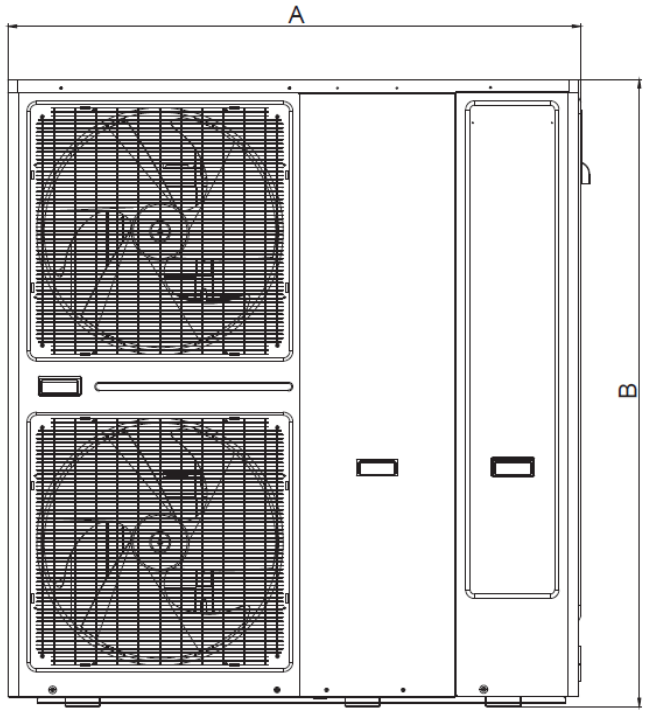
1 Water inlet

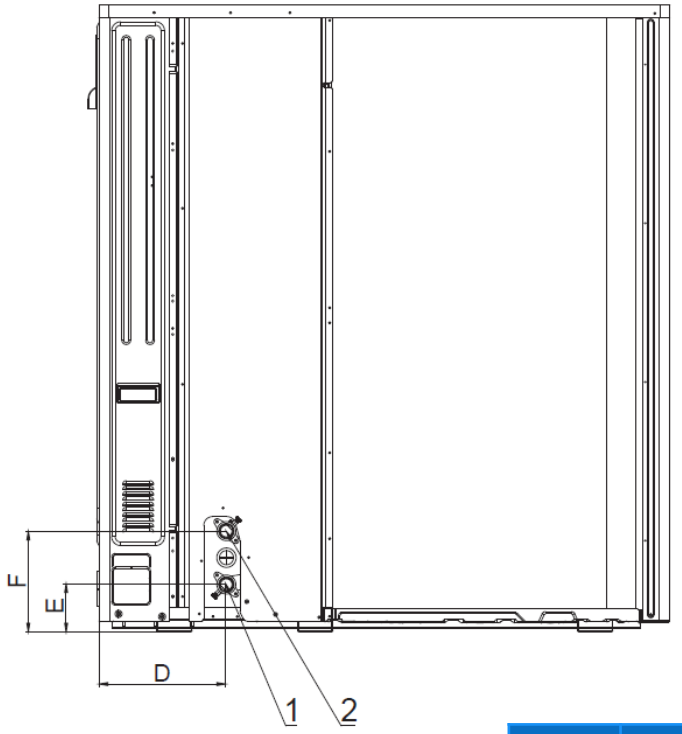
2 Water outlet

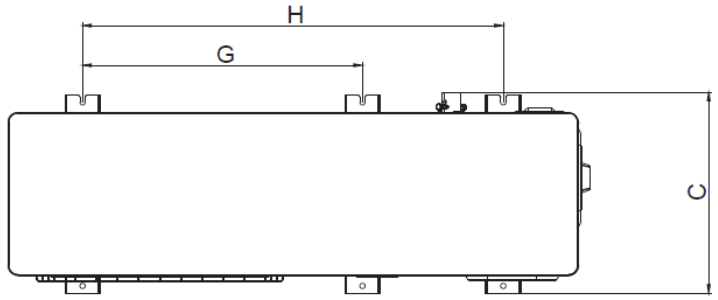
3 Water drainage

	A	B	C	D	E	F	G	H
4kW	1335	816	459	362	112	279	659	979
6kW	1335	816	459	362	112	279	659	979
8kW	1335	816	459	362	112	279	659	979
10kW	1335	816	459	362	112	279	659	979

Dimensions - Dual Fan version







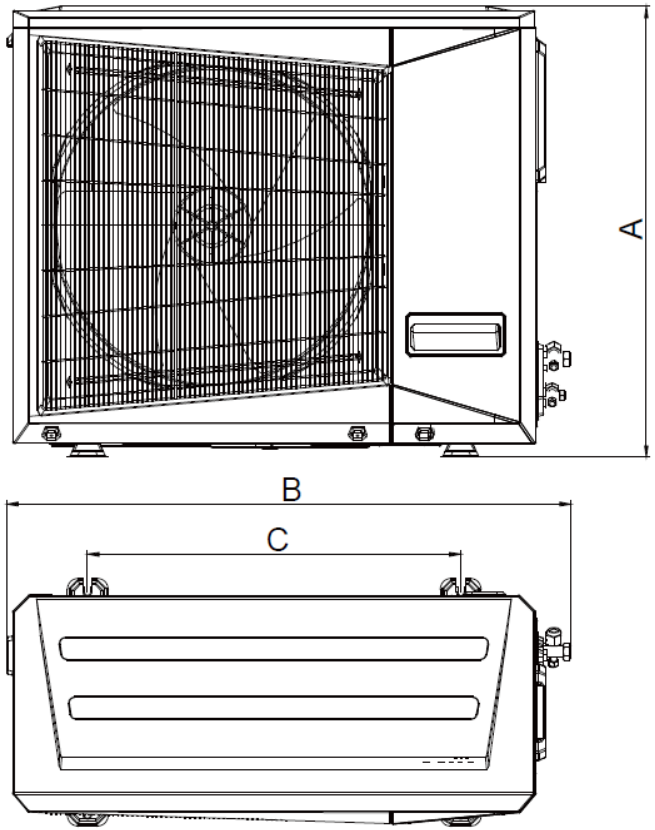
1 Water inlet

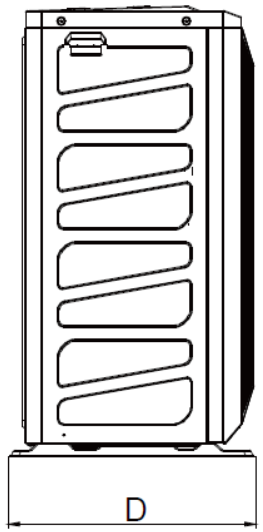
2 Water outlet

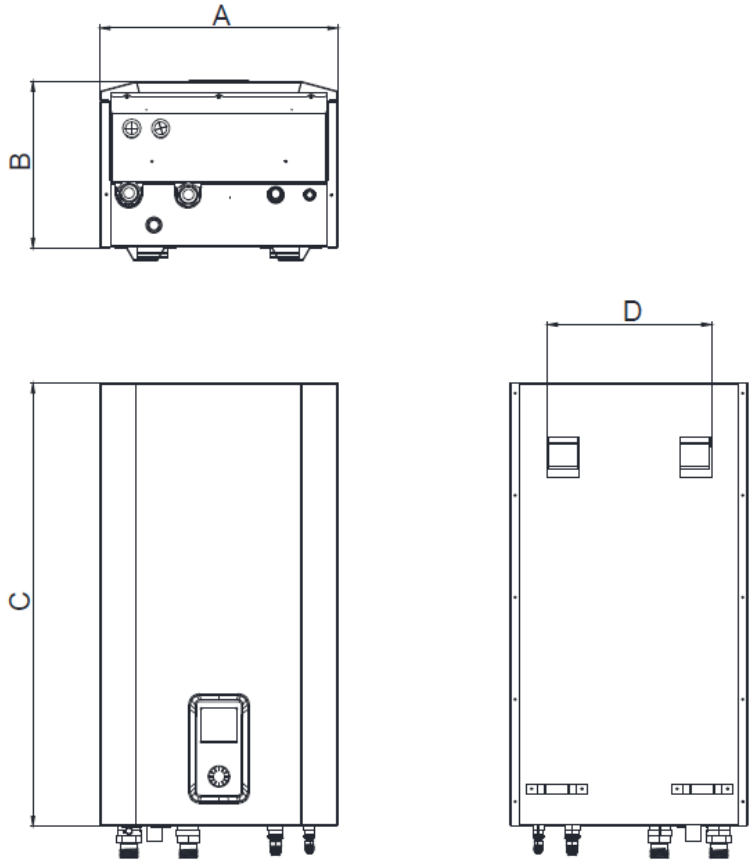
3 Water drainage

	A	B	C	D	E	F	G	H
12kW	1302	1425	456	290	107	229	636	956
14kW	1302	1425	456	290	107	229	636	956
16kW	1302	1425	456	290	107	229	636	956

Dimensions – split type



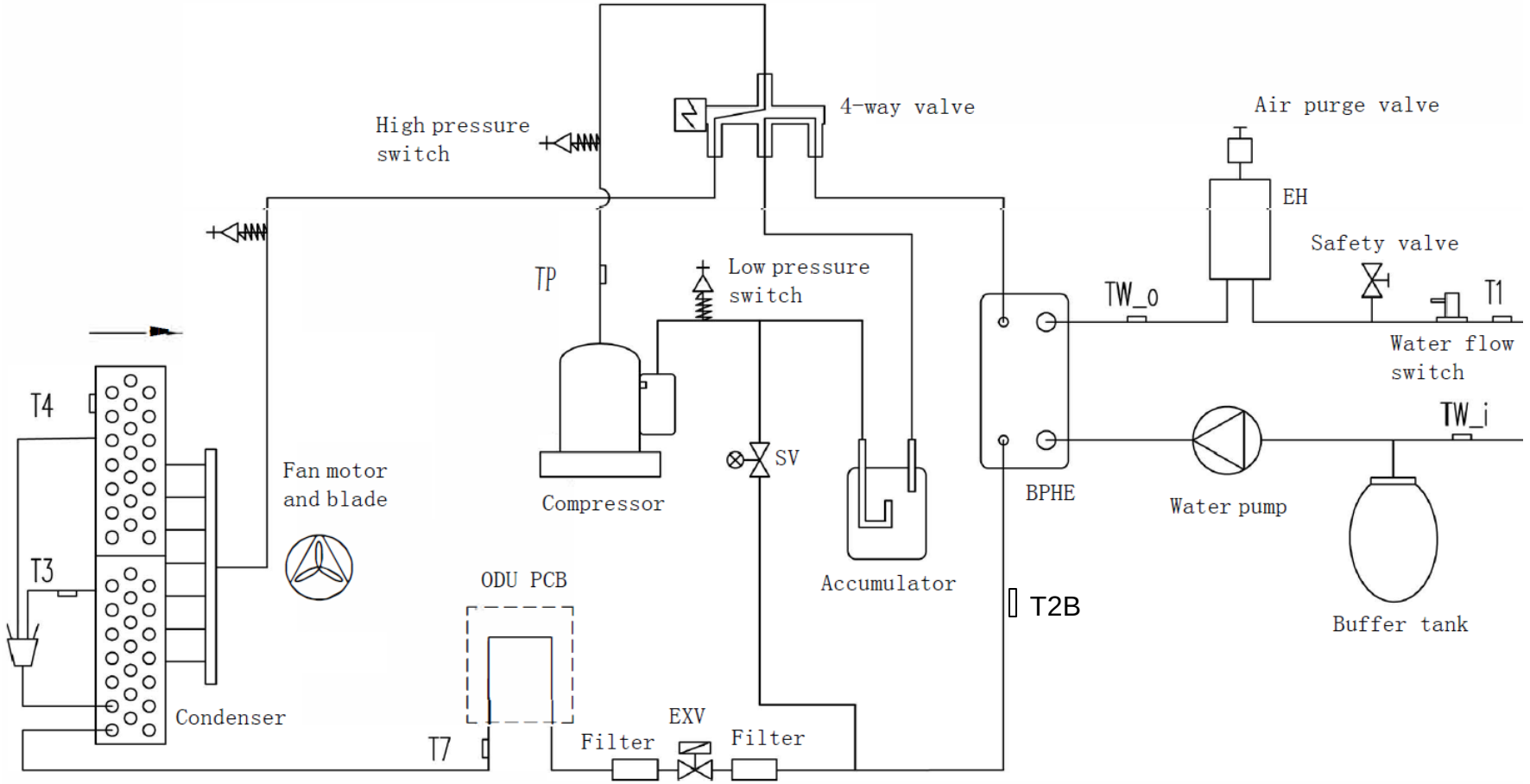




	A	B	C	D
4~10kW	807	1032	678	445
12~16kW	869	1098	635	528

	A	B	C	D
6/10/16kW	490	342	910	338

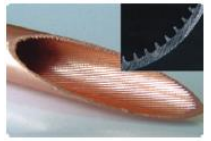
System diagram



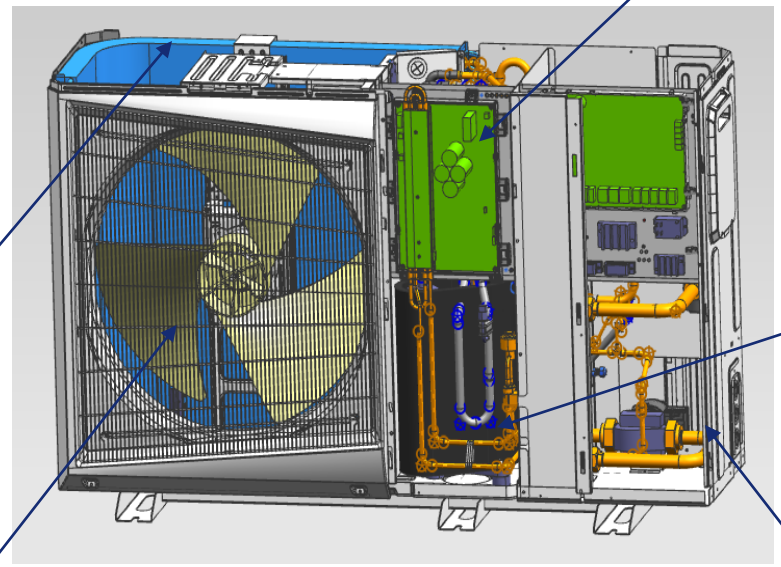
Acronym
T1: Leaving water sensor after electrical heater;
Tw-i: Entering water sensor
Tw-o: Leaving water sensor after BPHE;
T3: Refrigerant temperature of condenser;
T4: Outdoor ambient temperature;
TP: Discharged temperature;
T7: PCB refrigerant cooling pipe temperature;
BPHE: Brazed plate heat exchanger
EXV: Electronic expansion valve
SV: Solenoid valve

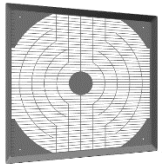
ATW Heat Pump Single Fan

- **CAPACITY:** 4-10kW
- **COMPRESSOR:** Full inverter twin Rotary compressor
- **Power supply:** 220~240V-1N
- **HIGH EFFICIENCY:** 35°C/55°C ➔A+++/A++
- **HYDRONIC KIT:** as standard
- Reliable cooling performance

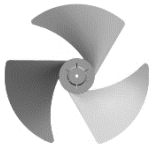


Inner grooved tube





Low pressure drop grill



Low noise fan

DC Fan motor

DC Inv. Twin Rotary compressor

EXV

Inv. Module board with Ref. cooling

Function board

Expansion tank

3kW EH

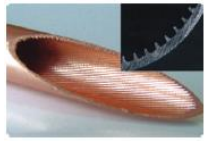
High efficiency BPHE

Inv. pump

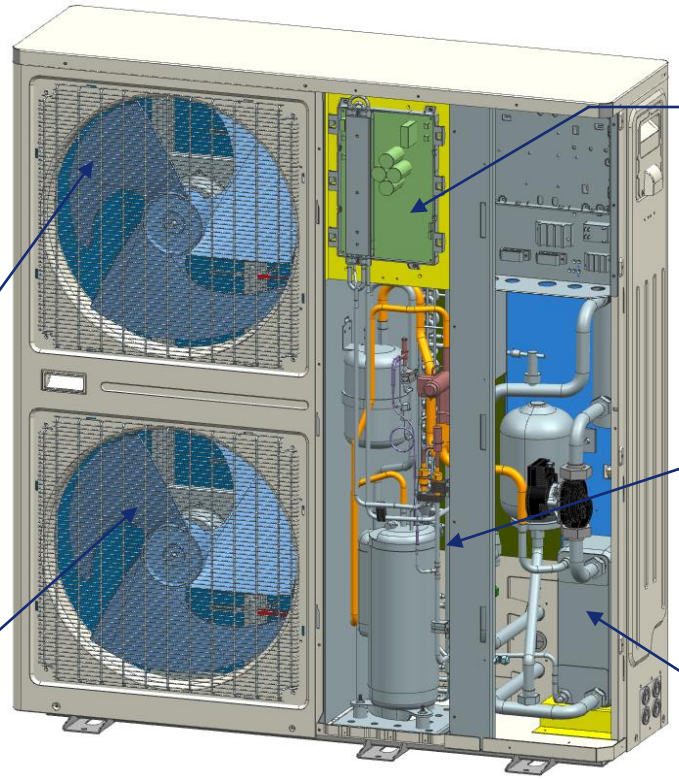
Water relief valve

Water flow switch

ATW Heat Pump Dual Fan



Inner grooved tube



- **CAPACITY:** 12-16kW
- **COMPRESSOR:** Full inverter
- **POWER SUPPLY:** 220~240V-1N/380~415V-3N
- **HIGH EFFICIENCY:** 35°C/55°C ➔A+++/A++
- **HYDRONIC KIT:** as standard
- Reliable cooling performance

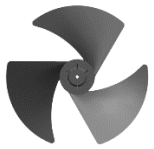
DC Inv. Twin Rotary compressor

EXV

Inv. Module board with Refrigerant cool

Function board

Low pressure drop grill



Low noise fan

DC Fan motor

Expansion tank

3kW EH*

High efficiency BPHE

Inv. pump

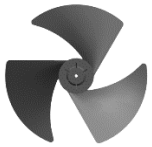
Water relief valve

Water flow switch

*: can customize 9kW EH for 3ph unit

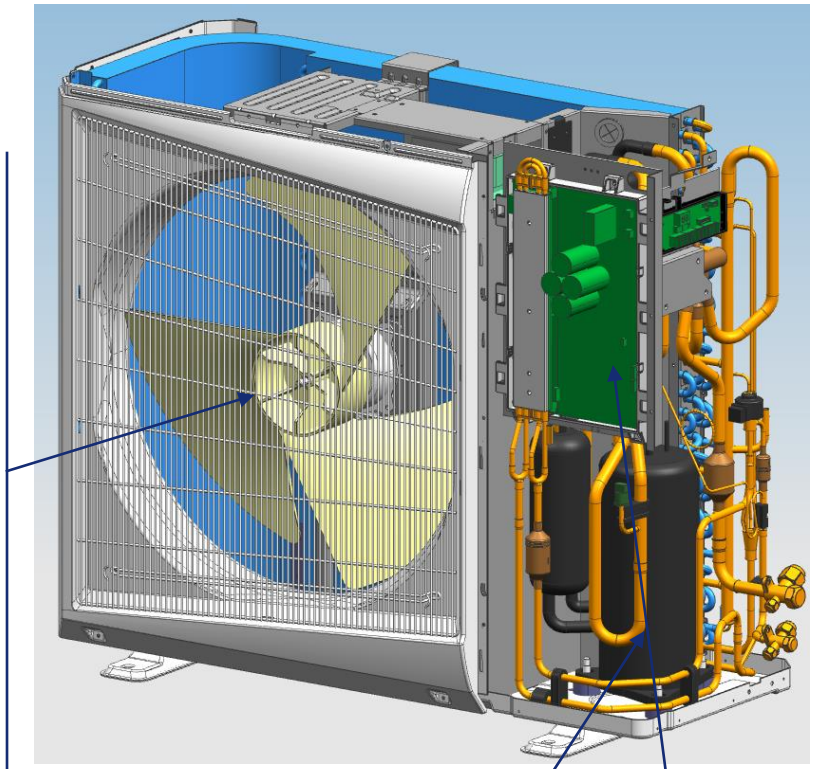
ATW Heat Pump- split type

Low pressure drop grill



Low noise fan

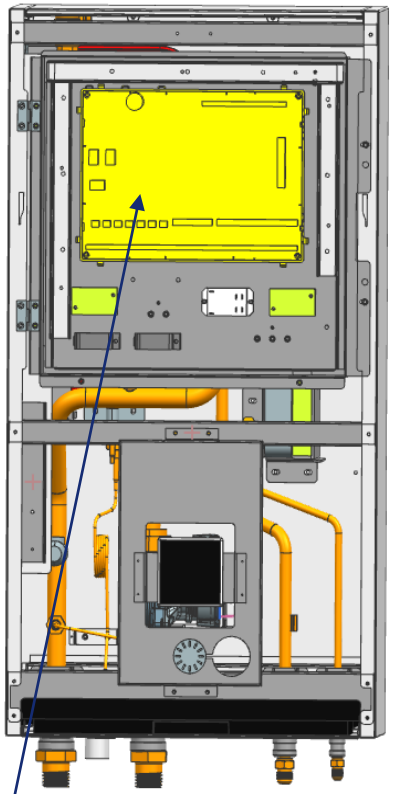
DC Fan motor

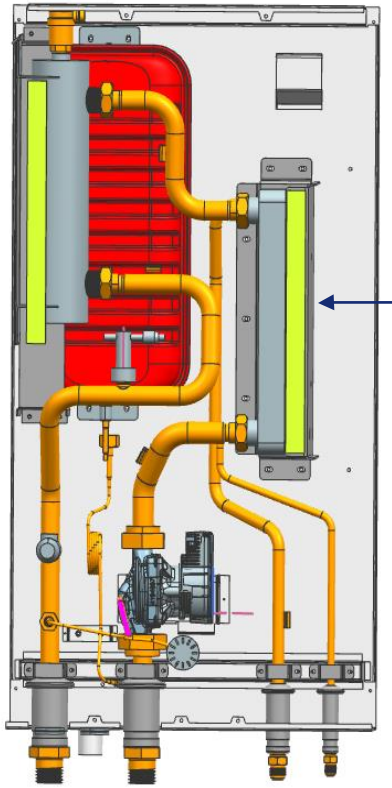


DC Inv. Twin Rotary compressor

Inv. Module board with Refrigerant cool

Function board





8L flat expansion tank

3kW EH

High efficiency BPHE

Inv. pump

Water relief valve

Water flow switch

Product certificate

PED
Pressure Equipment

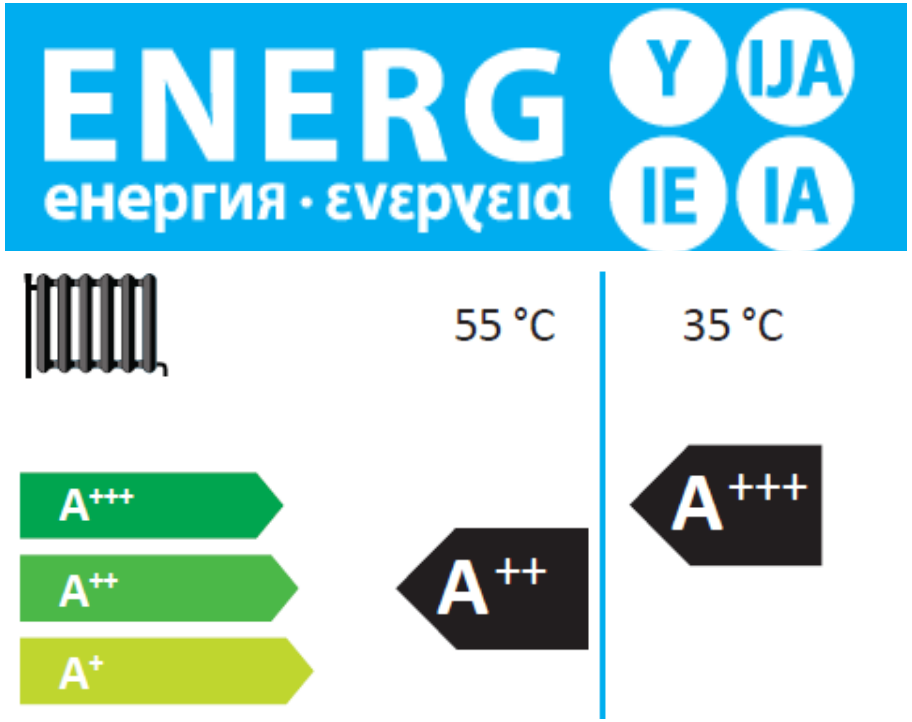
RoHS

ERP directive:

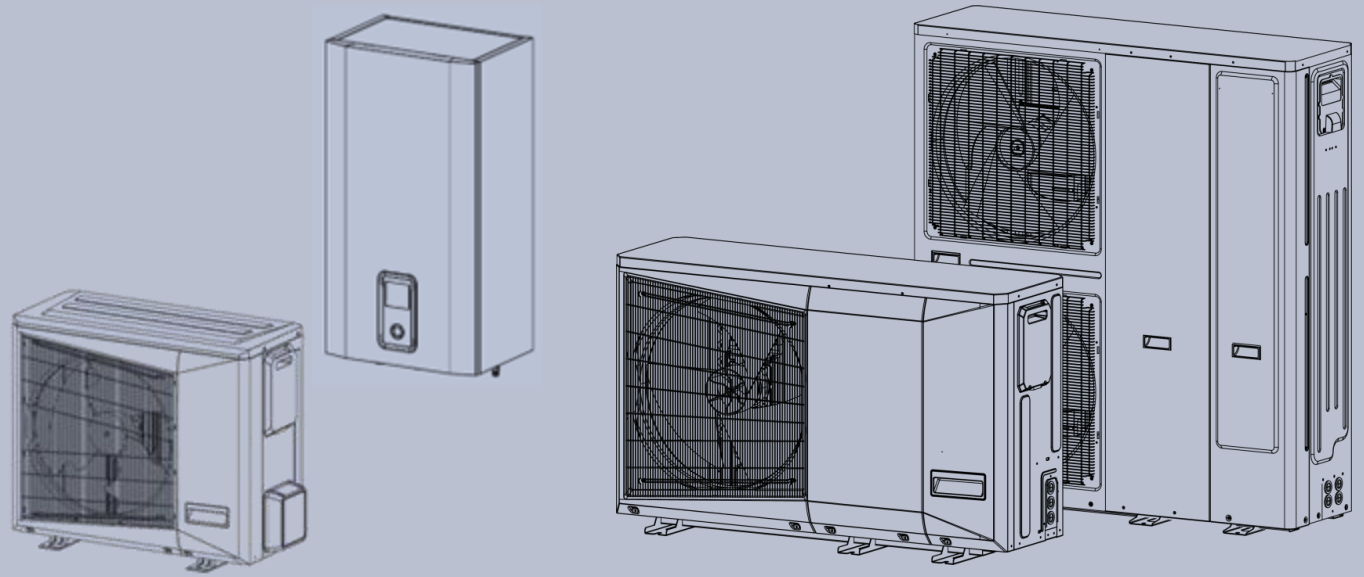
ηs , Seasonal space heating energy efficiency

ηs average up to **A+++** @ 35°C

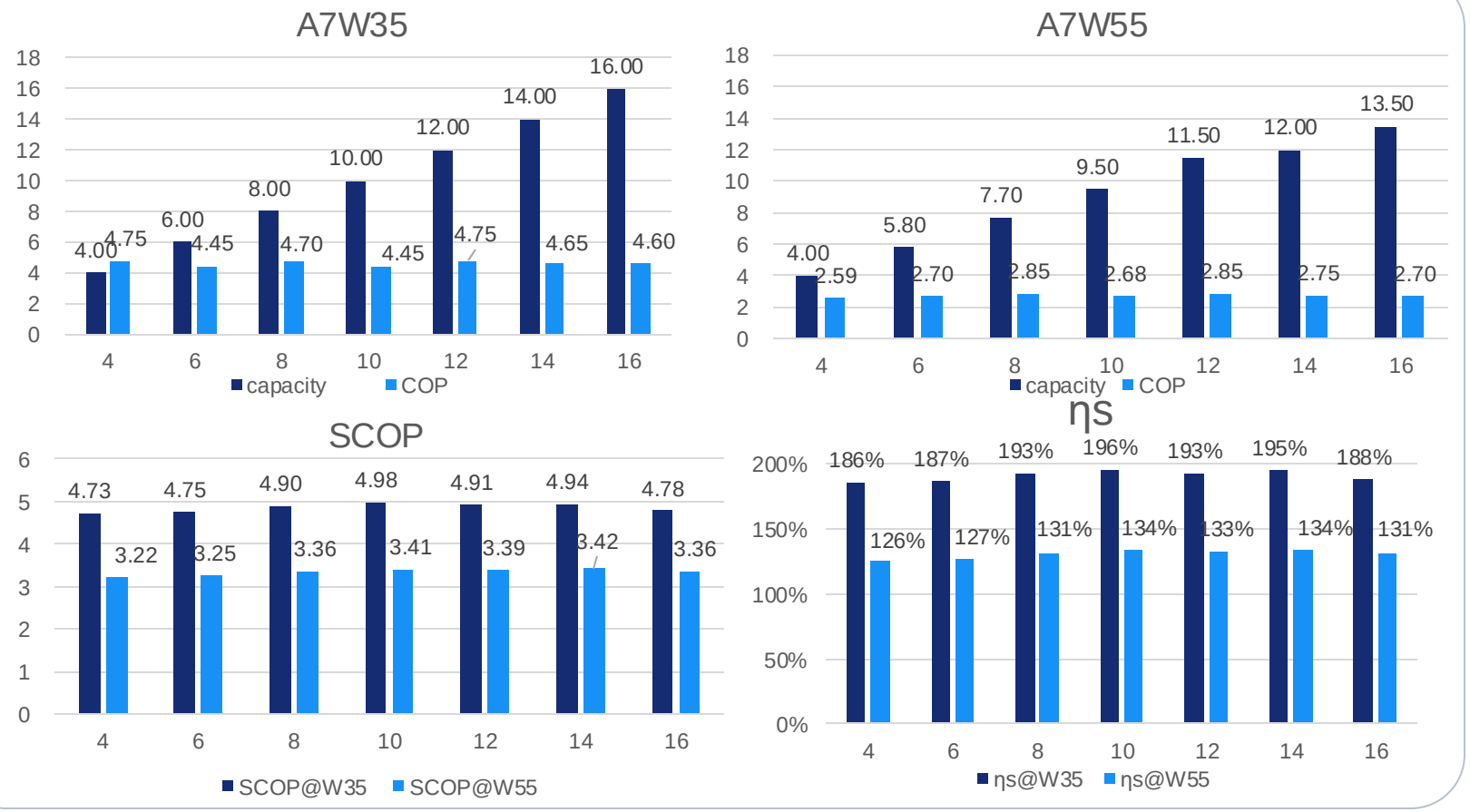
ηs average up to A++ @ 55°C



MAIN FEATURES



High efficiency



Monobloc parameter

Rotary DC Inverter compressor
High pressure ratio
Good performance in low ambient temperature

High efficiency BPHE

Intelligent refrigerant cooling

A+++ @30/35 and A++ @50/55

High efficiency to match the EU standard, saving the electrical cost (Lab test data)

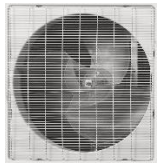
Nominal conditions

High efficiency

High efficiency

DC inv. compressor

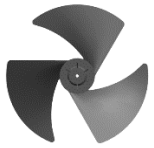
DC Fan motor



Low pressure drop grill

Ref. cooling

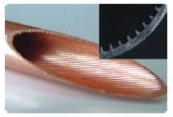
High efficiency BPHE



High air flow fan blade

EXV

Inv. pump



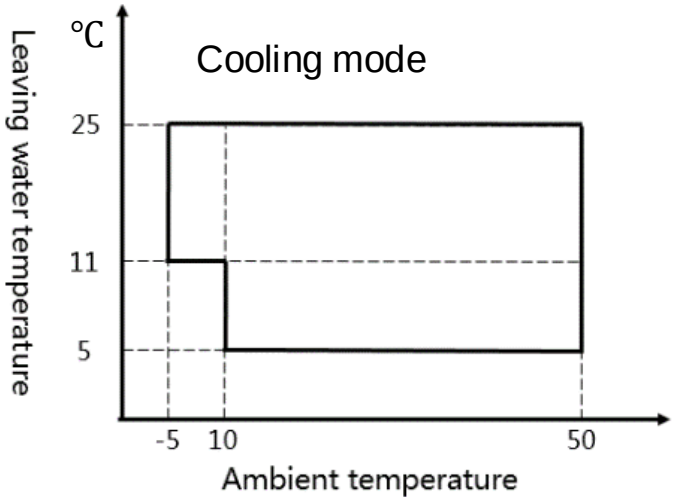
Inner grooved pipe

- **DC inverter rotary compressor**
  High pressure ratio up to 13
  Good performance in low ambient environment
- **DC motor**
  DC brushless fan motor
  Higher efficiency, lower noise
- **Refrigerant cooling**
  Keep PCB /FAN /refrigerant system working efficient
  Save space & excellent air path design
- **High efficiency BPHE**
  Good heat exchanger performance between water and refrigerant
  Efficient for both heating and cooling
  Small footprint & excellent air path design
  Withstand high temperatures and high pressures
- **Electrical expansion valve**
  Precise control and regulation of refrigerant flow
  0-480 pulses
- **Inverter water pump**
  High efficiency inverter water pump
  With high water pressure head up to 9m

Low ambient performance

Operating range

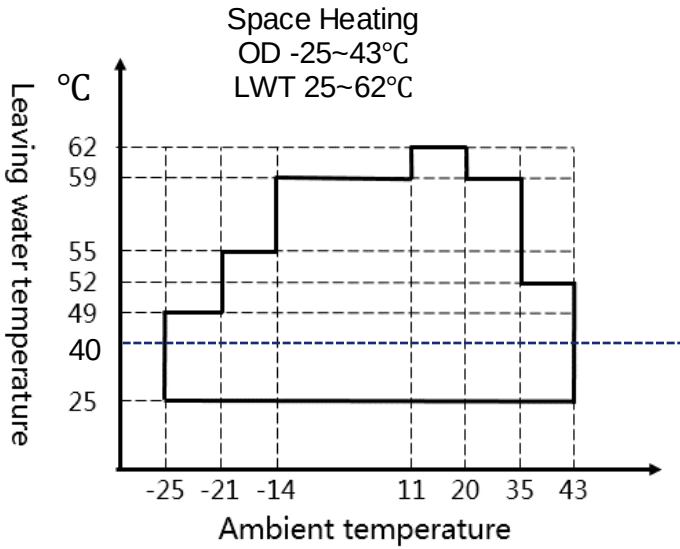
Cooling cycle			
Evaporator Water Temperature	℃	Minimum	Maximum
Entering water temperature at start-up		11	/
Leaving water temperature during operation		5	25
Condenser Air Temperature	℃	Minimum	Maximum
Standard unit		-5	50
Healing cycle			
Condenser Air Temperature	℃	Minimum	Maximum
Entering water temperature at start-up		/	59
Leaving water temperature during operation		25	62
Evaporator Air Temperature	℃	Minimum	Maximum
Standard unit		-25	43

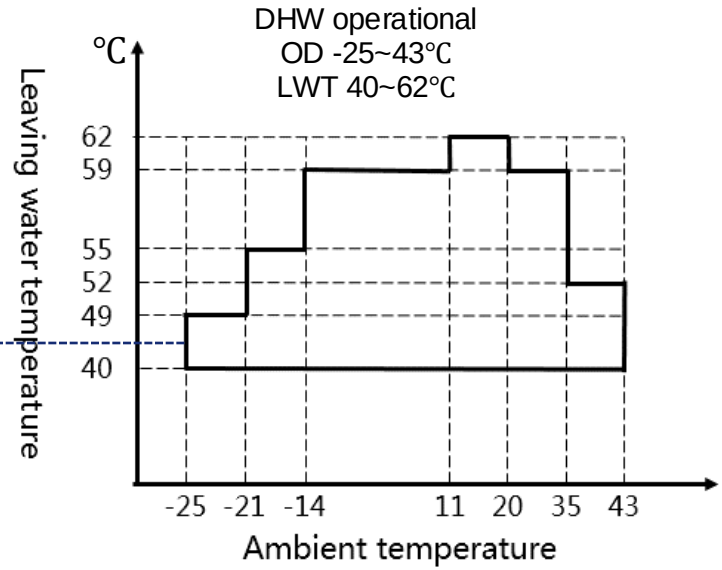


From **-25°C to 43°C**
external temperatures for heating

Low ambient performance

- High LWT up to 62℃
- Down to -21℃ ambient with 55℃ LWT





Better reliability

Refrigerant Cooling solution

- Good performance with enhanced refrigerant cooling solution
- Intelligent refrigerant control technology to protect PCB
- Quick action speed to make the main PCB working at suitable temperature range
- High reliability

Compared to the air- cooling system

- Space saving
  Compact electrical box contributes to easy maintenance
- More efficient and timely
  Refrigerant cooling solution can cool the IPM directly with better efficient which is good to compressor control and system reliability

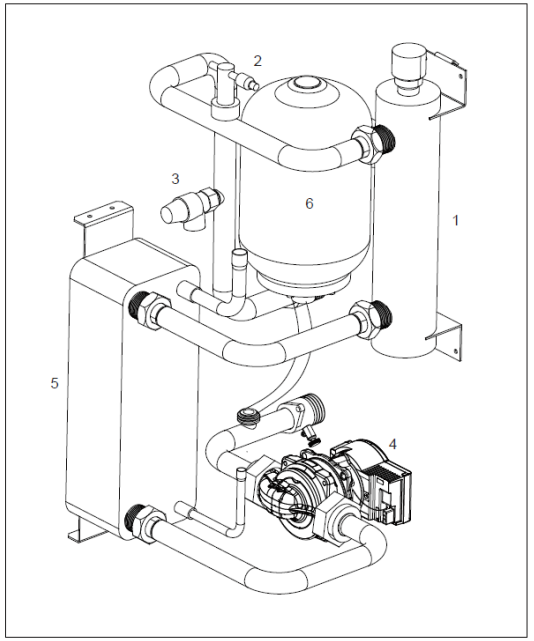
Air cooling solution

Integrated design

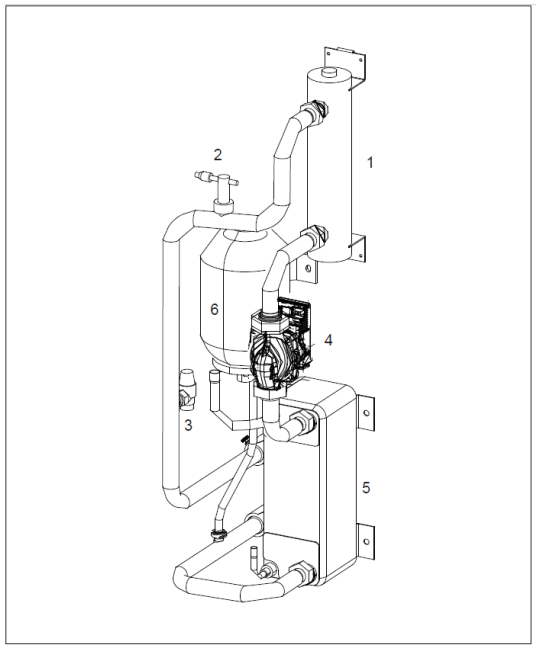
The hydraulic module enables the installation time to be reduced.

The unit is factory-equipped with the main hydraulic components needed for installation:

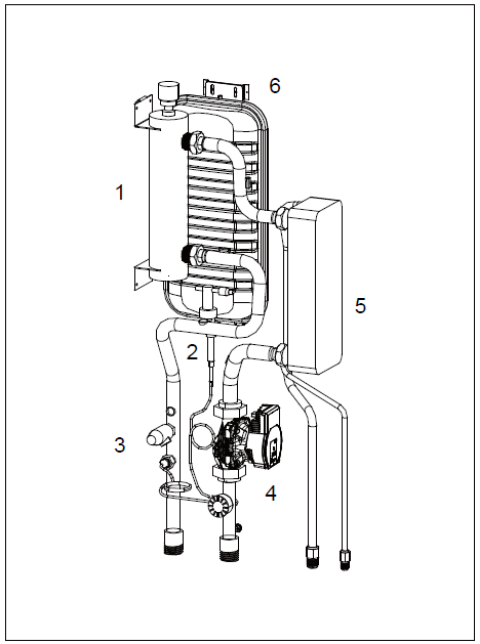
- variable speed Circulation pump
- expansion vessel
- safety valve



Monobloc 4-10 kW



Monobloc 12- 16kW



Split type hydro box

LEGEND:

1: Electrical heater component 2: Flow switch; 3: Safety valve outlet ; 4: Circulation pump ; 5: BPHE; 6 :Expansion vessel

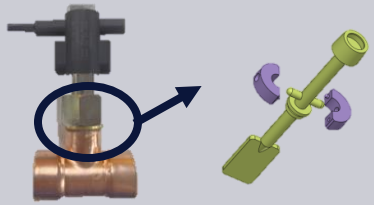
Safety

Multi-protection function

- Current protection
  - DC current protection to protect the system against the over-current
- Voltage protection
  - Voltage protection to against the over high/low voltage
- Pressure protection
  - High pressure protection
  - Low pressure protection
- Over-heat protection
  - Discharged temperature over-heat protection
  - Condenser coil temperature over-heat protection
  - IPM over-heat protection
- Anti-frozen protection
  - Water temperature detect to anti-frozen protection
  - Refrigerant temperature detect to anti-frozen protection

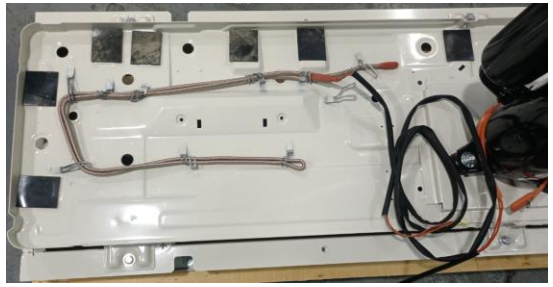
Safety

Built in components to ensure safety

	Water flow switch	Shut down the system immediately When water flow is insufficient
	Built-in expansion tank	Keep water pressure stable
	Safety valve	Open when water pressure is too high
	Air purge valve	Installed on the top of the module

Safety

Built in components to ensure safety



Base-pan craft heater

4-10kw: 150W;

12-16kw: 120W

→ Ice building protection for base-pan while in low ambient temp.

Anti-frozen heater

→ Protect the water circuit of expansion tank and its connecting pipe in low ambient temp. (for monobloc)

Compressor craft heater

→ Pre-heat the compressor oil in low ambient temp. to more smoothly running

Controls

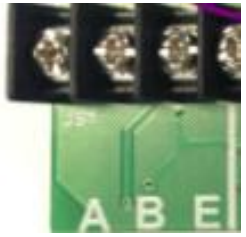
For the heat pump, it has three types of control inputs

Wired controller

Modbus

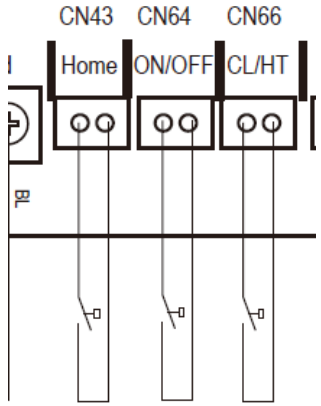
PC

Modbus controller



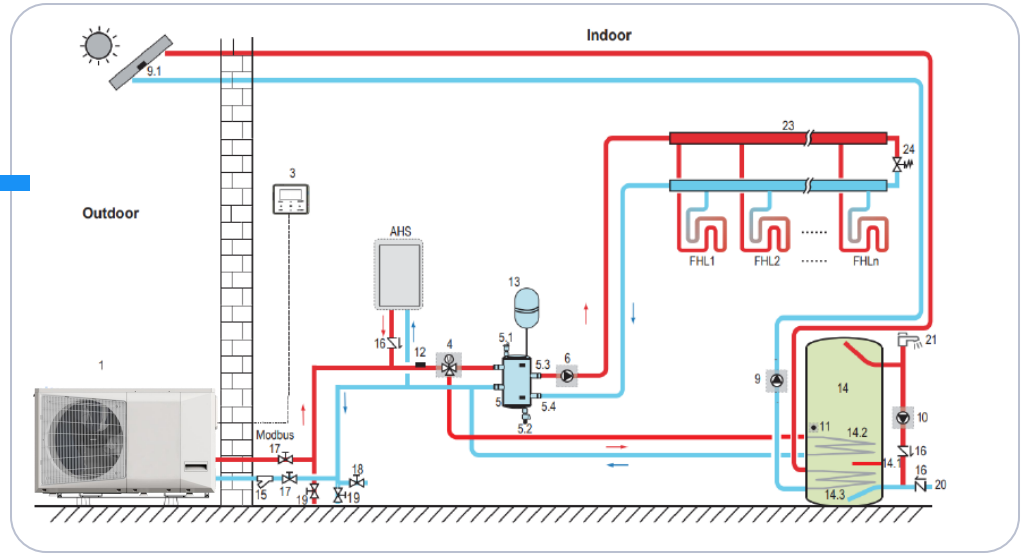
Modbus connection

Dry contact



Control - Wired controller

Wall-mounted wired controller



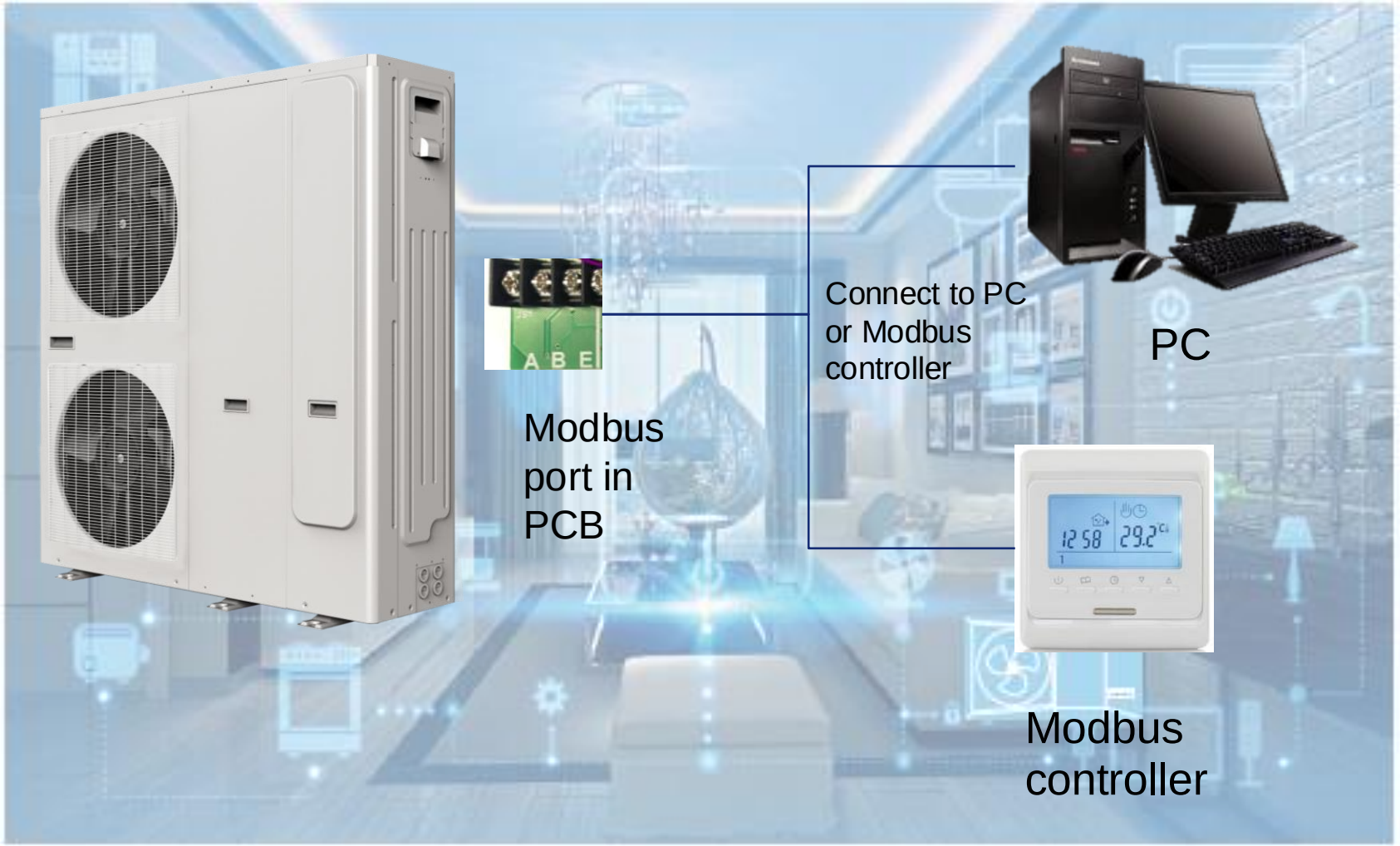
- Window design, easy to operate & view
- Mode control, temperature setting, heating mode, cooling mode, DHW mode
- DHW schedule setting
- Occupancy mode select
- Electric heater
- Forced defrosting
- Sterilization
- Anti-freezing protection
- WIFI

Application of WUI:

① Power supply: Take power supply from IDU board (12V power supply);
② Working temperature range: -30℃~50℃ ;
③ Working humidity range: RH10%~95%

Control - Modbus

Modbus control

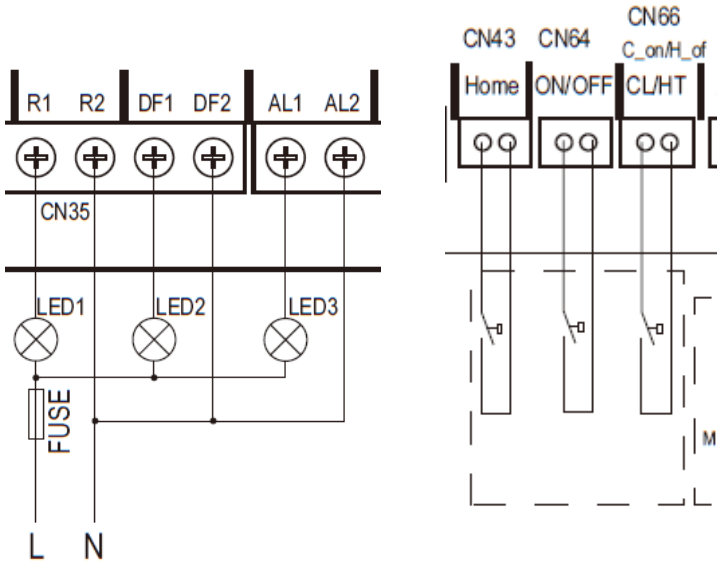


★ Built-in the Modbus control in the PCB, can connect to 3rd part controller via Modbus protocol

★Suitable to use with BMS system or other type controller by Modbus

Control - Dry contact

Dry contact logic Intro.

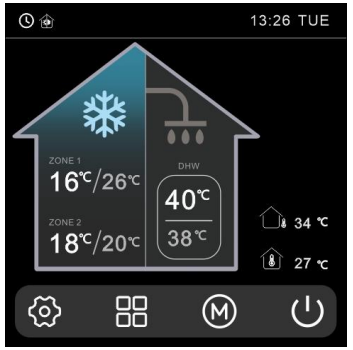


- The heat pump equips with contact to control the system in order to match different controlled requirements.
- Select “Dry contact” in technical parameter configuration in wired controller first.
- It equips with 3 dry contacts as standard and 4 dry contacts as customized, as well as 3 standard output contacts and 3 customized outputs which are 230V output terminals.

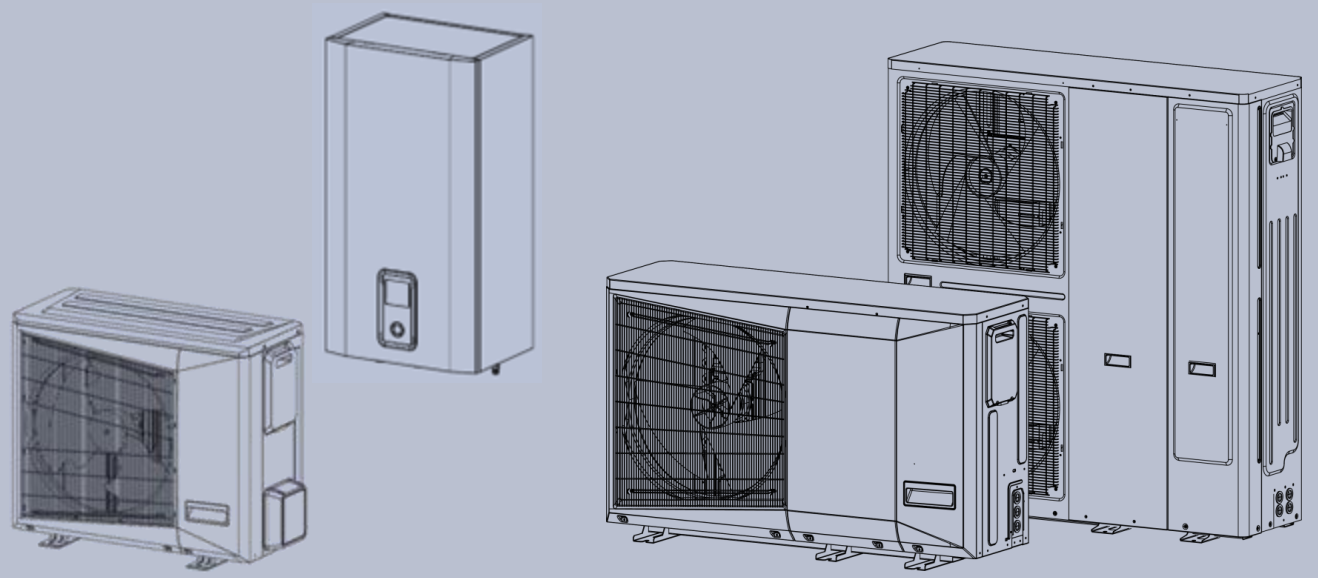
Standard	ON/OFF (CN64)	ON / OFF operation
	CL/HT (CN66)	Cooling mode / heating mode operation
	HOME (CN43)	Home / away operation
	R1/R2	Unit is in operating state
	DF1/DF2	Unit is defrosting
	AL1/AL2	Unit is in alarm
Customized (Set in wired controller)	DI1	1. Disable 2. Power limitation (Night mode activate) 3. Load-shed electrical heaters 4. Domestic hot water request 5. Anti-legionella request 6. Domestic hot water priority
	DI2	
	DI3	
	DI4	
	DO1	1. Disable 2. Unit is in alarm 3. Unit is in standby mode 4. Unit is running 5. Unit is in cooling mode 6. Unit is in heating mode 7. Unit is in domestic hot water mode 8. Unit is defrosting 9. Unit is controlled by Modbus
	DO2	
	DO3	

New controller – *Release at Dec.*

- Full touch screen controller, colorful display;
- Easier to operate & identify the system state

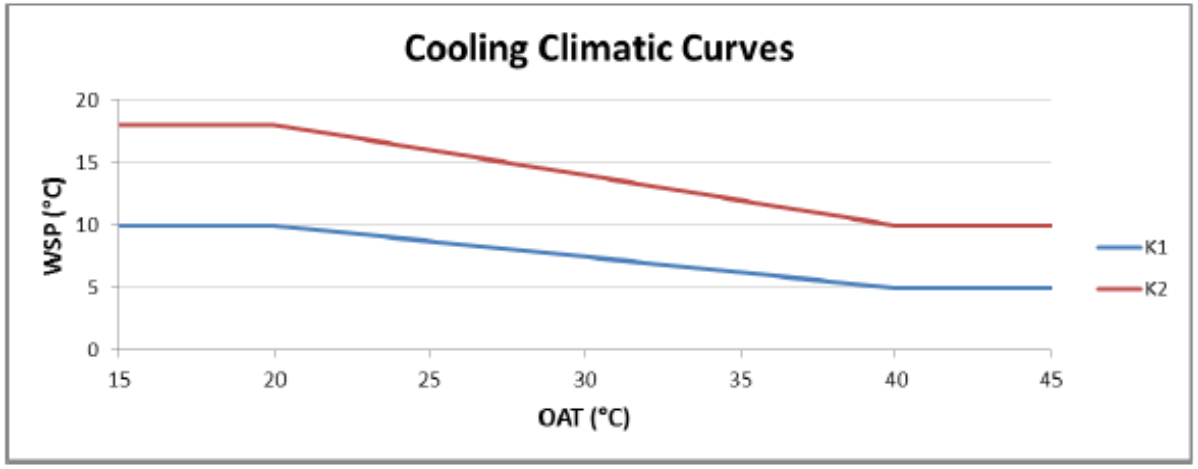


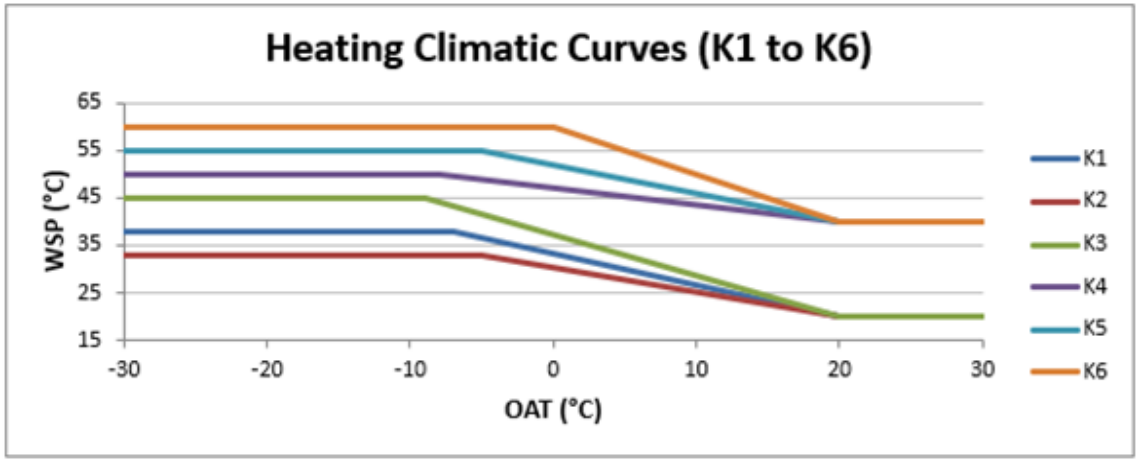
FUNCTIONS

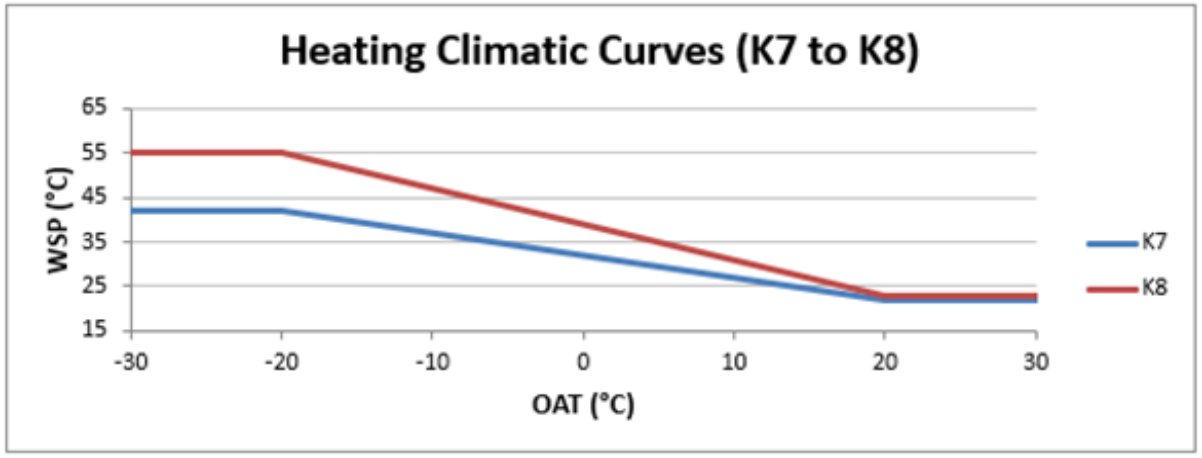


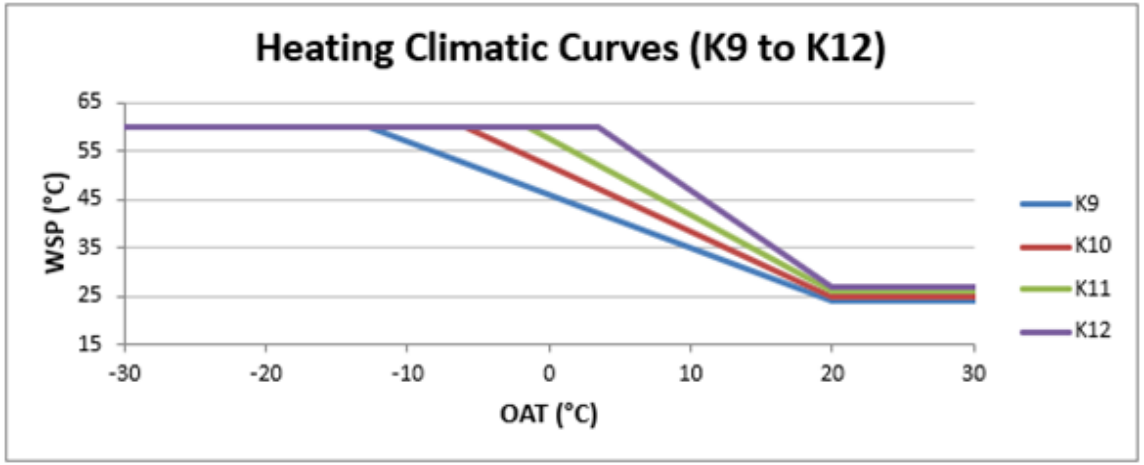
Automatic control- climate curve

- Choose different climate curves to control the unit automatically according to ambient temperature and terminals.
- Can create a new climate curves by yourself.
- Set in technical parameter configuration.





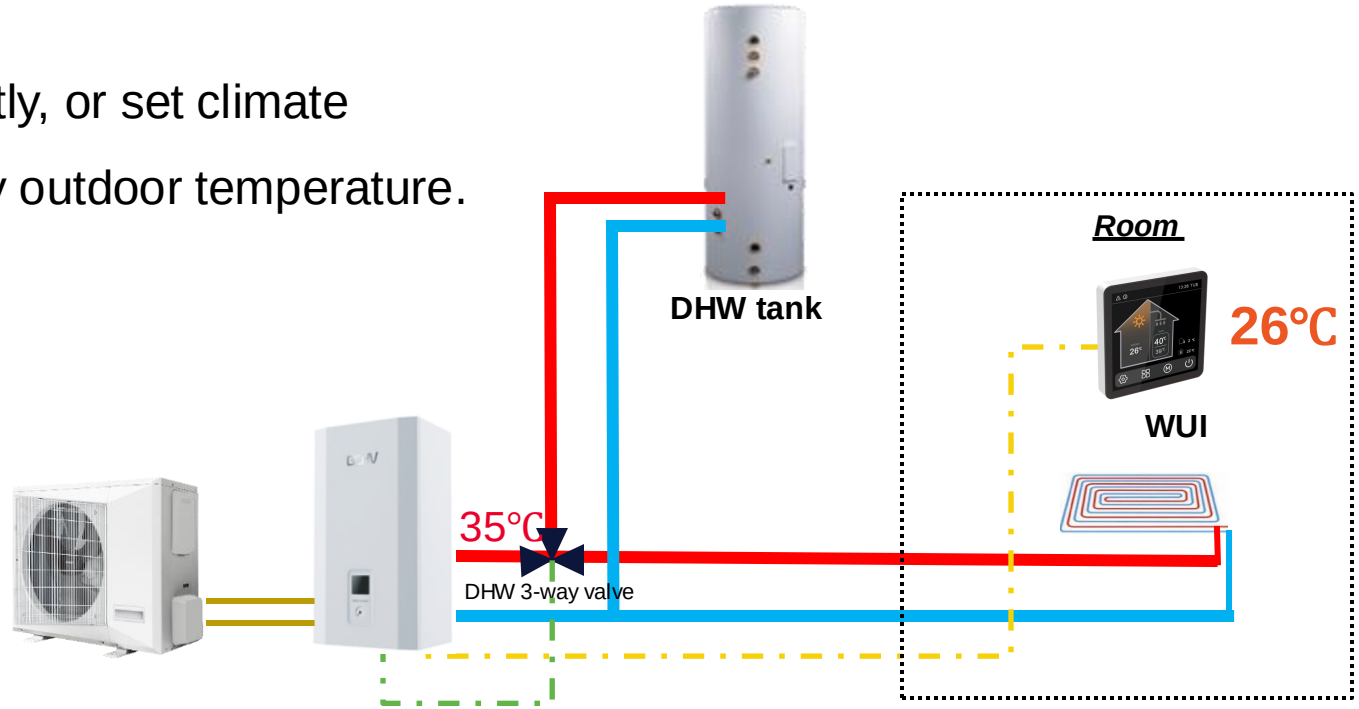




Room temp control

- Install wired controller inside and use controller to detect indoor room temperature
- Select “Air setpoint control” in technical parameter configuration.
- Set target room temperature in controller
- Set required water outlet temperature directly, or set climate curve to control water outlet temperature by outdoor temperature.

No.	Item	Description
0	Control setpoint type	0- Water setpoint control 1- Air setpoint control

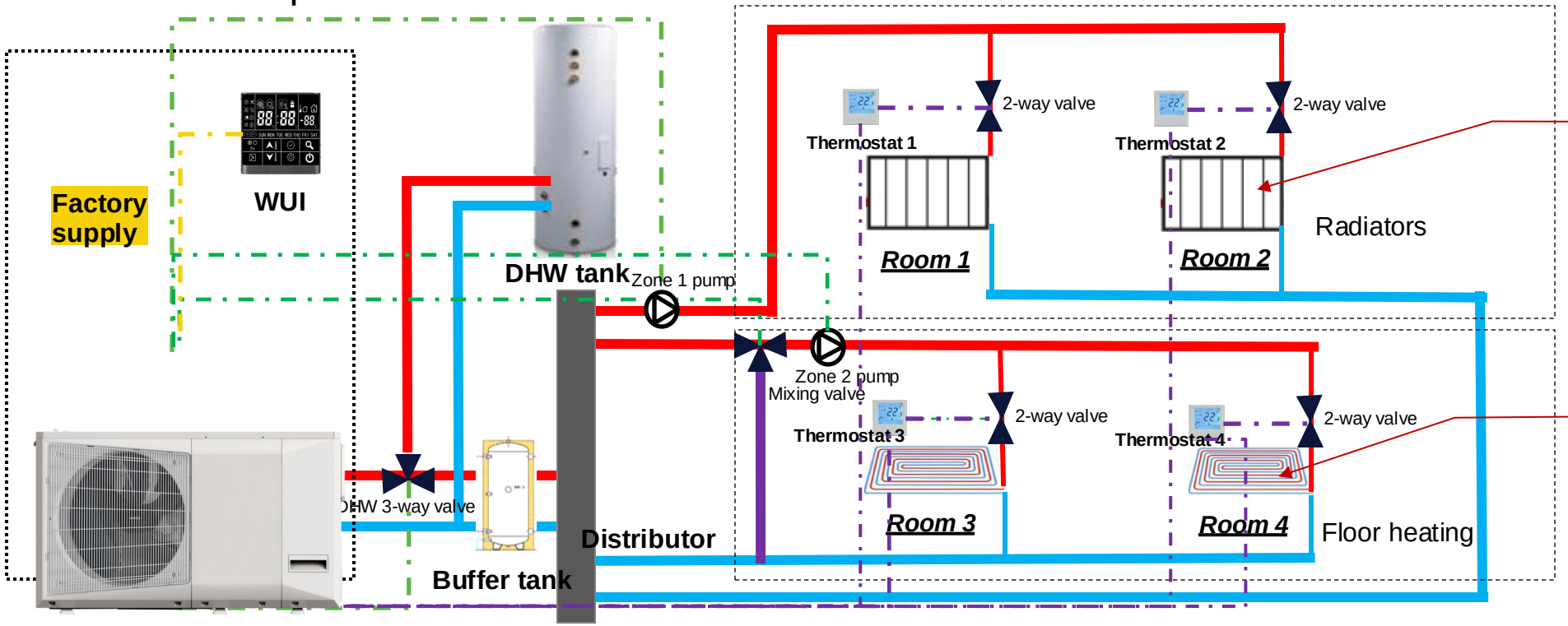


2-zone control

- Different terminals require different water temperatures.

Terminal type	Floor heating	Radiator	FCU
Water temp. range	30-35℃	40-50℃	30-45℃

- Set different temperatures for different zones.



Zone1, high temperature, over **50℃**

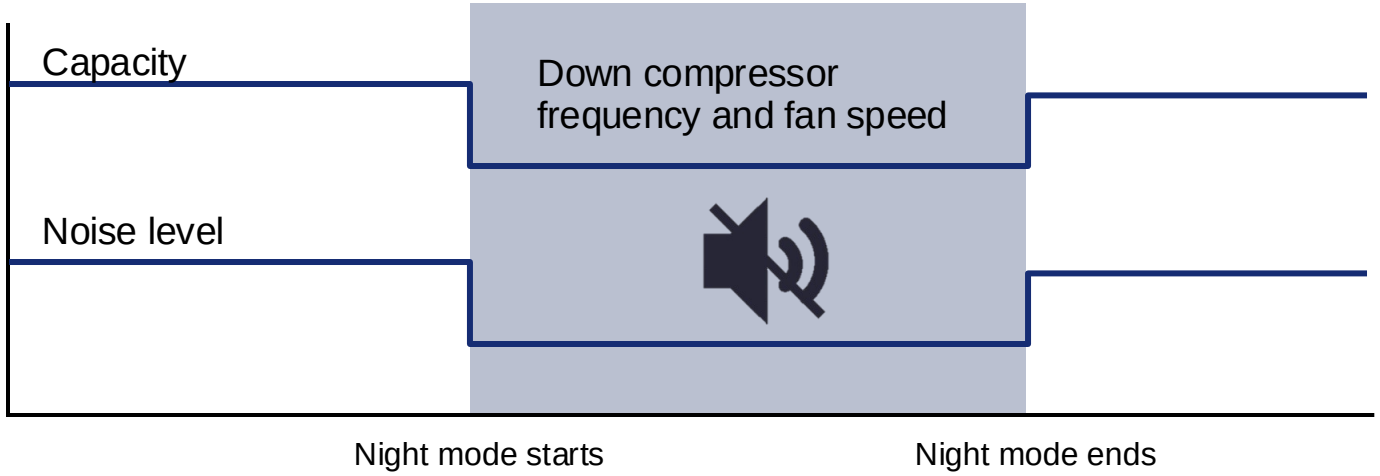
Zone2, low temperature, about **35℃**

22	Second zone setting	0 – No bi-zone function 1- Bi-zone function for heating mode only 2- Bi zone function for both cooling and heating mode

Night mode

- Outdoor unit can be switched to silent mode during the night.
- When night mode is configurated, the unit will limit its max. compressor frequency and fan speed to reduce the noise.
- Set the night time in wired controller freely (user parameter configuration).

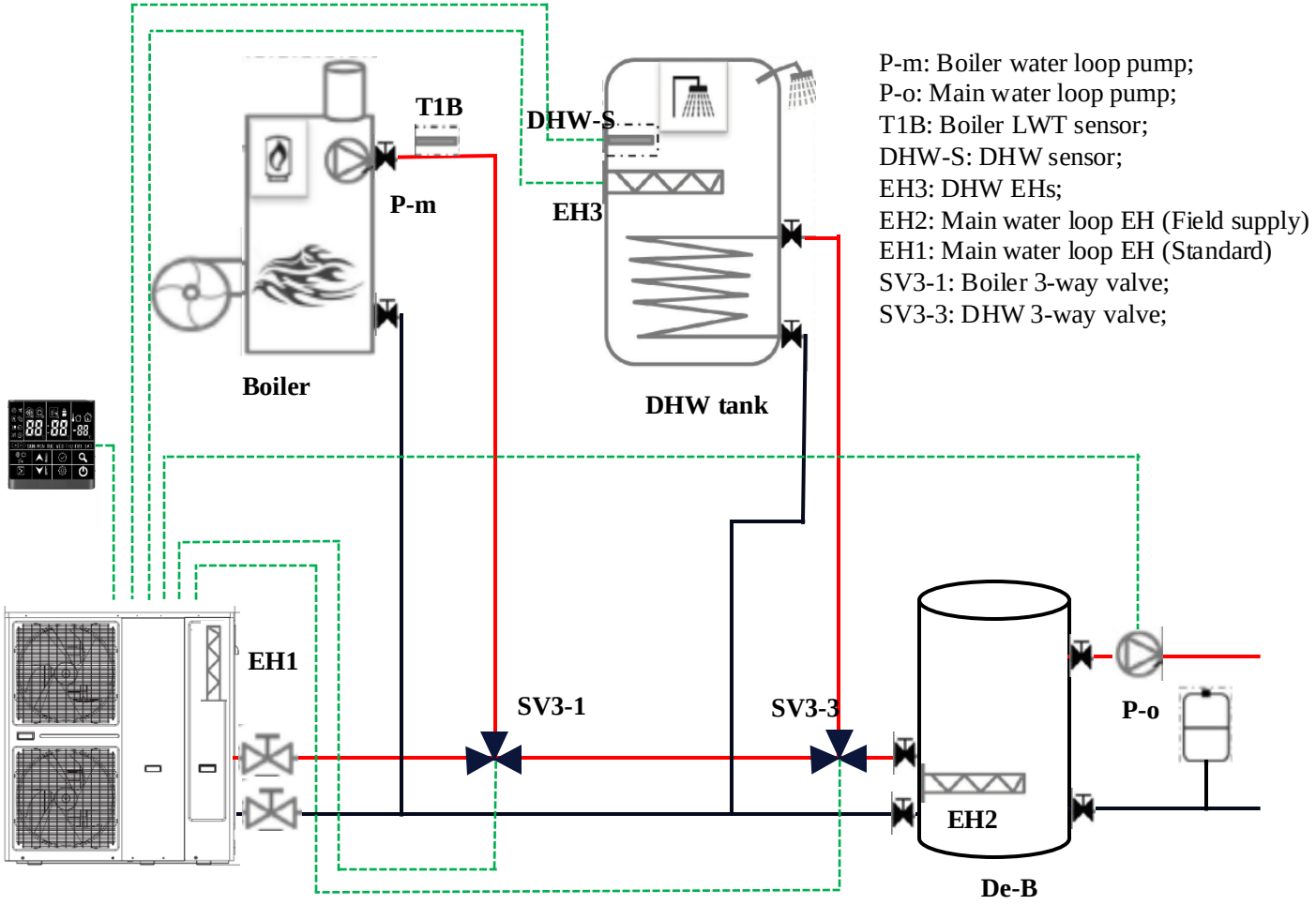
Starting time	The time of start night mode (00:00-23:59)
Exiting time	The time of exit night mode (00:00-23:59)



Backup heater

- It can set the boiler, main water loop EH, DHW EH as backup or booster
- The boiler and DHW EH can operate individual if the heat pump is out of work
- The boiler and all EH can work as booster to super-heat the water in low ambient temperature in order to balance the capacity drop of the heat pump.
- Set in technical parameter configuration.

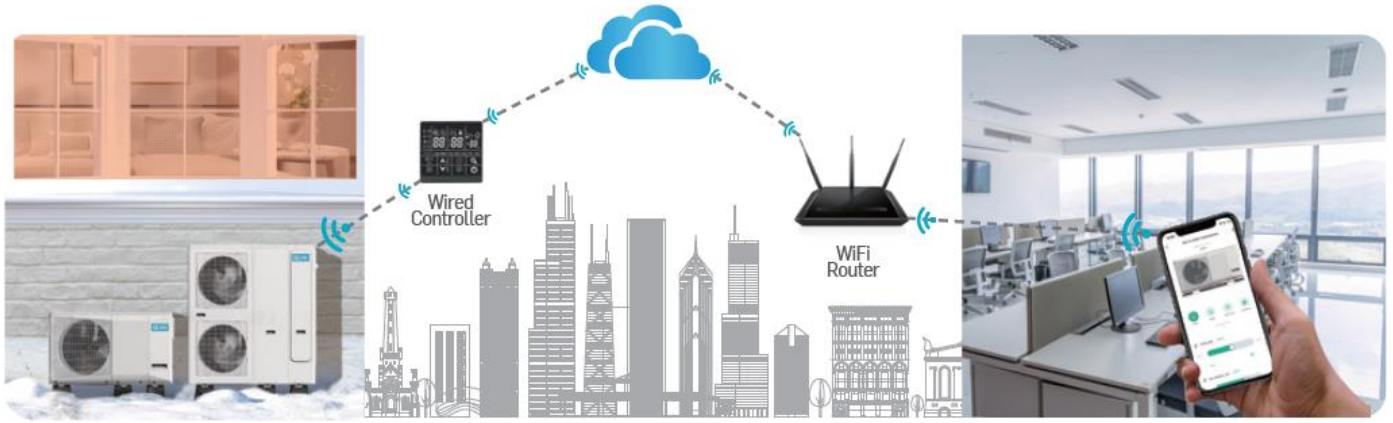
2	Back up function	0- Main water loop EHs + DHW EHs + boiler 1- Main water loop EHs + DHW EHs 2- DHW EHs + boiler 3-Main water loop EHs + boiler 4- DHW EHs only 5- Boiler only 6- Main water loop EHs only 7- Non back up



P-m: Boiler water loop pump;
P-o: Main water loop pump;
T1B: Boiler LWT sensor;
DHW-S: DHW sensor;
EH3: DHW EHs;
EH2: Main water loop EH (Field supply)
EH1: Main water loop EH (Standard)
SV3-1: Boiler 3-way valve;
SV3-3: DHW 3-way valve;

WIFI function

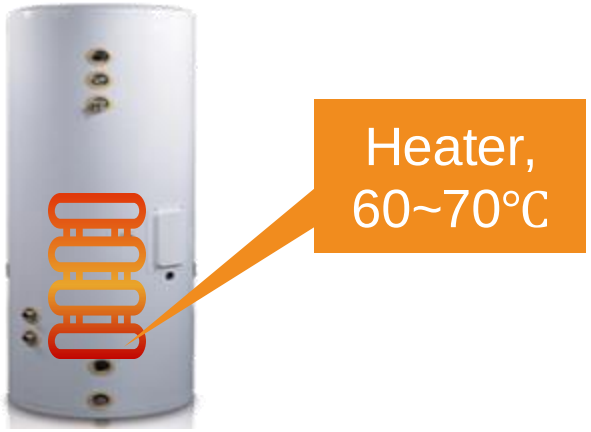
- The wired controller is with WIFI module inside.
- Control the monobloc through the phone easily when you are away from home.
- Weekly schedule management
- Some parameters enquiry



Safety function

Anti-legionella control

- In order to protect the health of human, it must have the anti-legionella function once configurate the domestic hot water.
- The anti-legionella function is controlled to turn on/off according to the temperature of the domestic hot water and schedule or manually by controller.

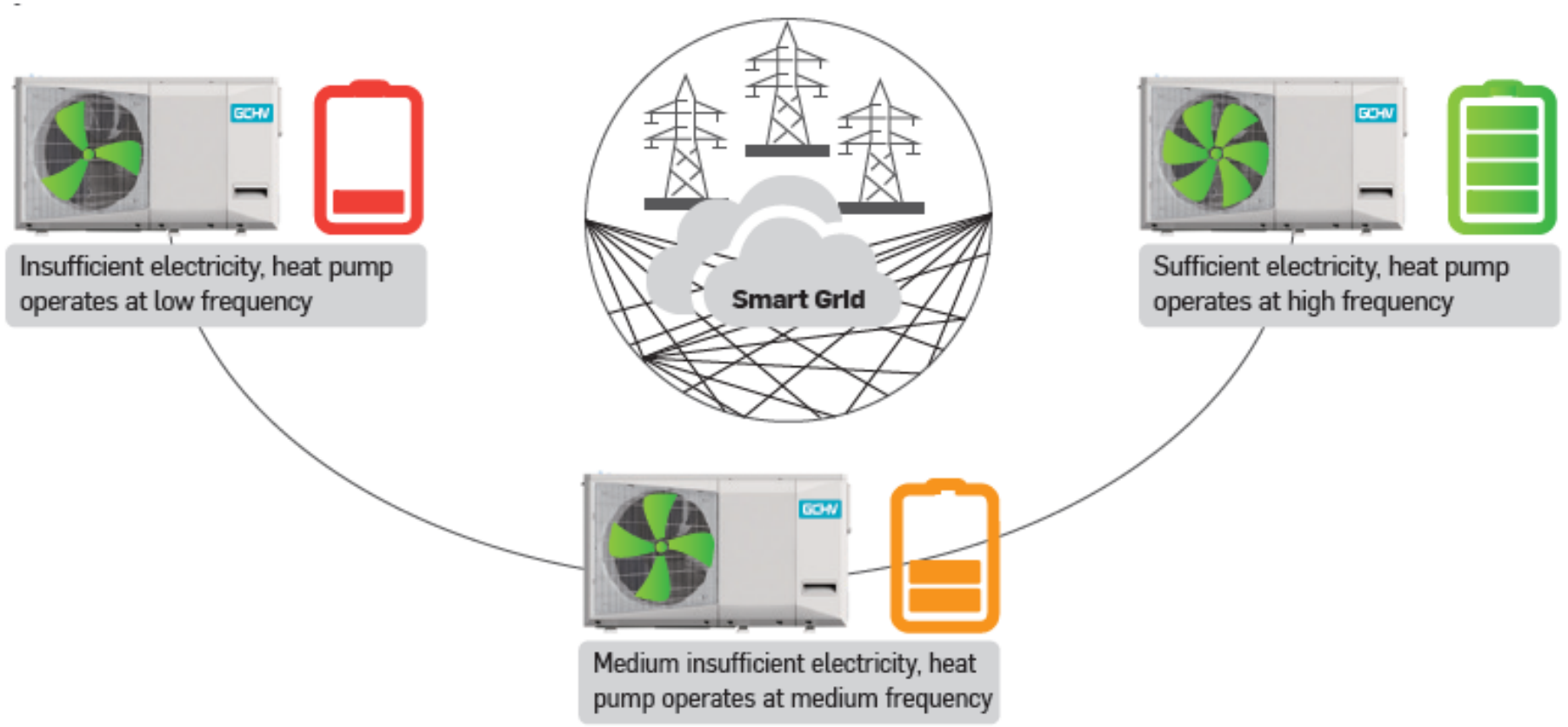


Anti-frozen control

- This control is used to protect the water system from low ambient temperature or low water temperature to against the damage of water system such as BPHE, water pipe, etc.
- It operates according to the ambient temperature, running mode, water temperature.

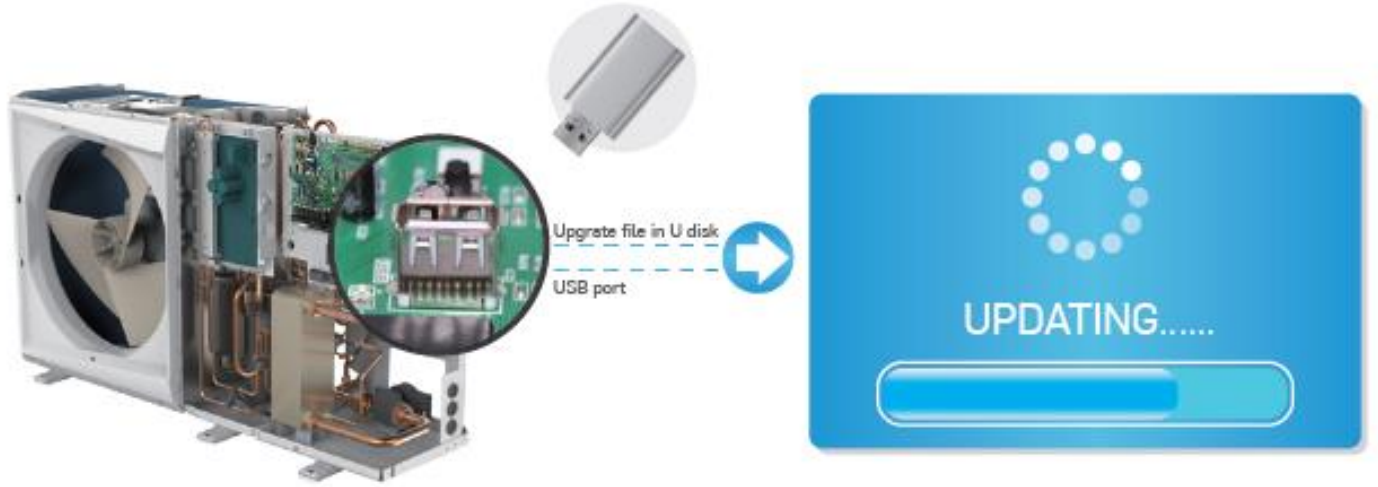
Smart Grid *– release at Dec.*

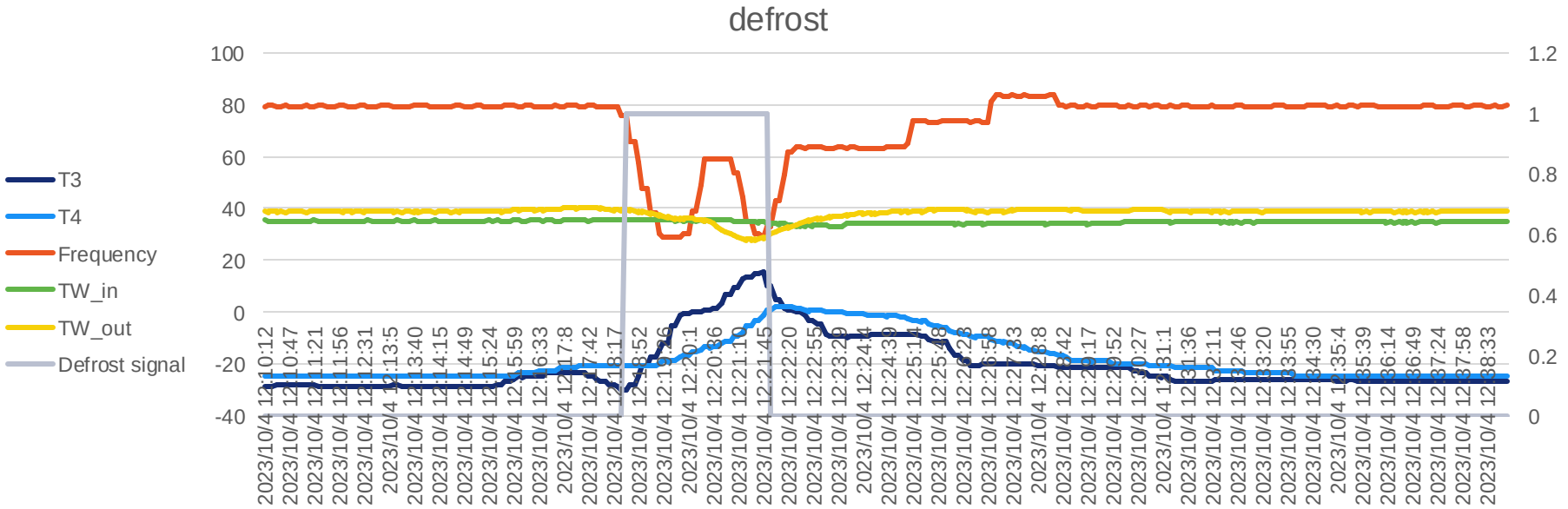
- Smart Grid function to match the actual electrical grid;
- 40%-100% capacity output can be re-set to suit the electrical grid



USB port built-in PCB *– release at Dec.*

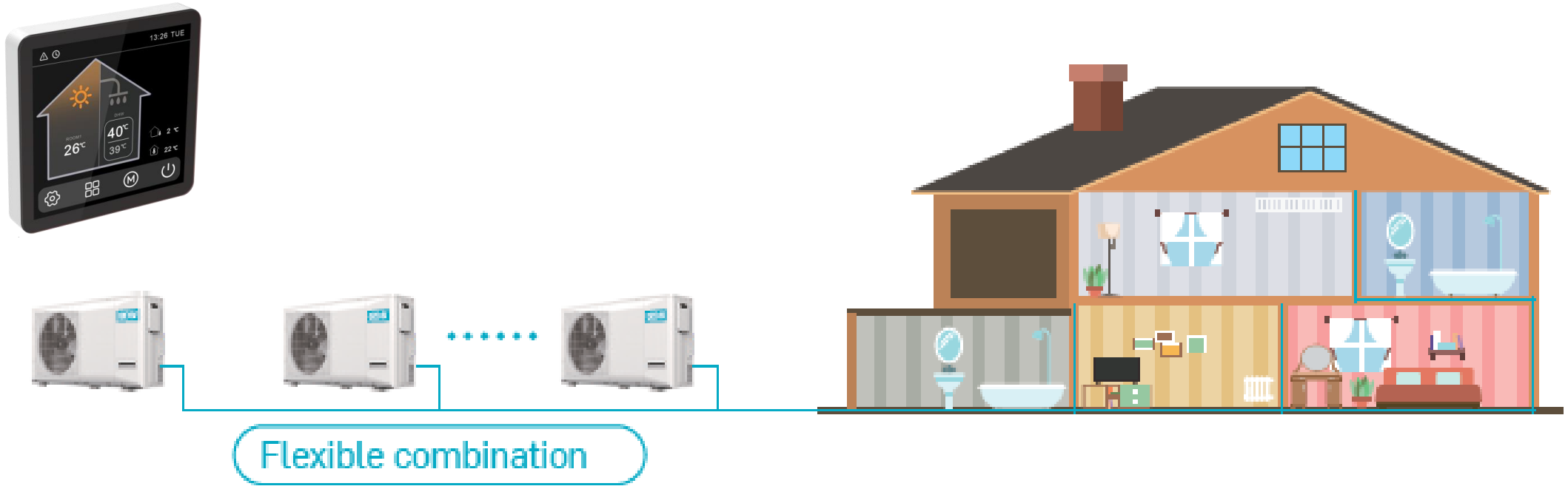
- Using for software updating
- System running parameter record



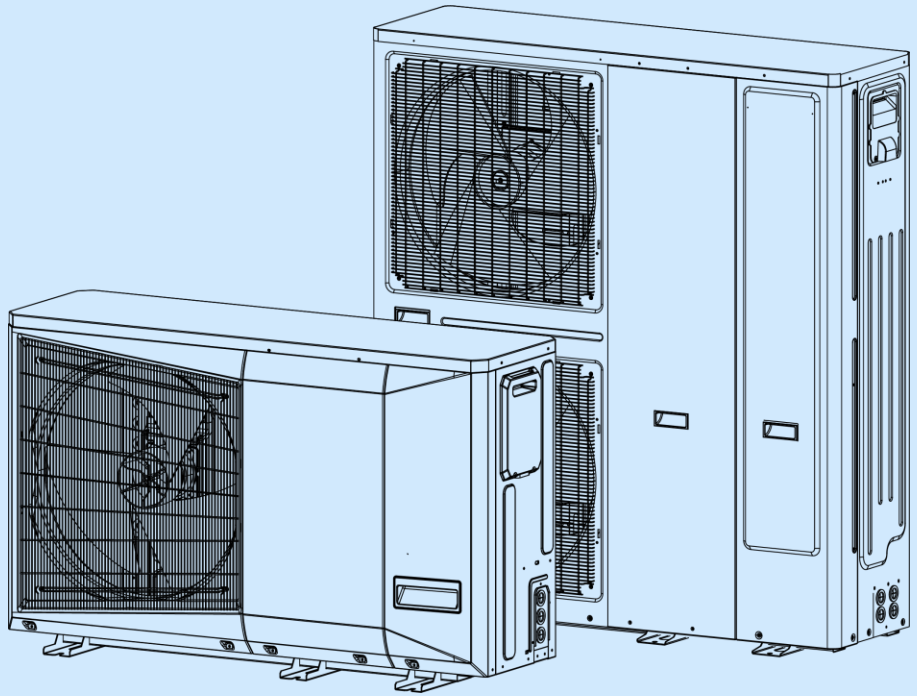


Cascade Control *– Release at Dec.*

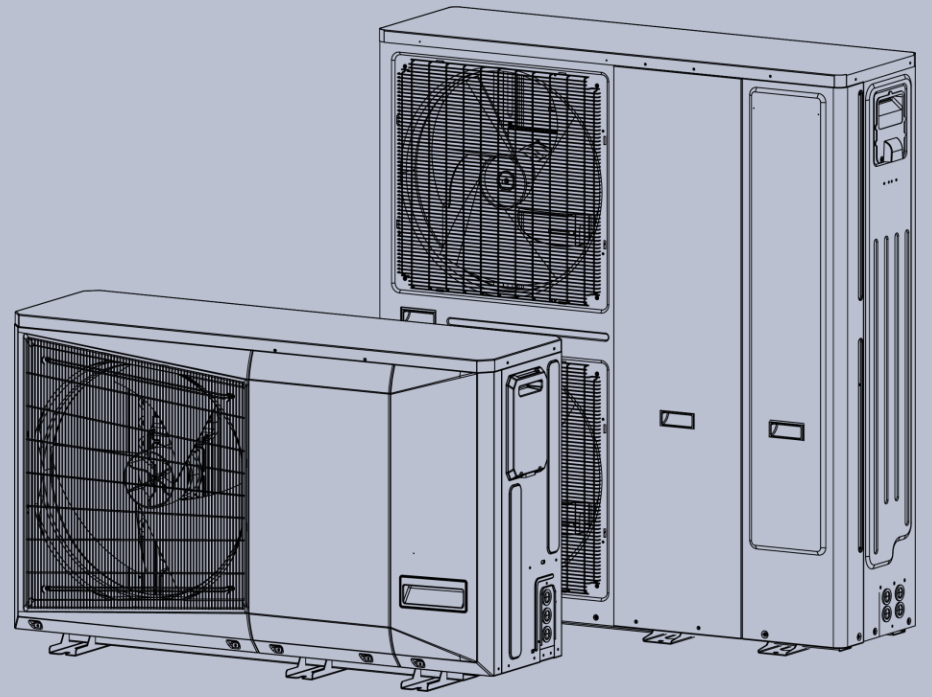
- Max. 8 units can be combined in one system to achieved high capacity;
- Suitable for large area application;
- Single universal controller to realize the function



THANK YOU!



BACKUP



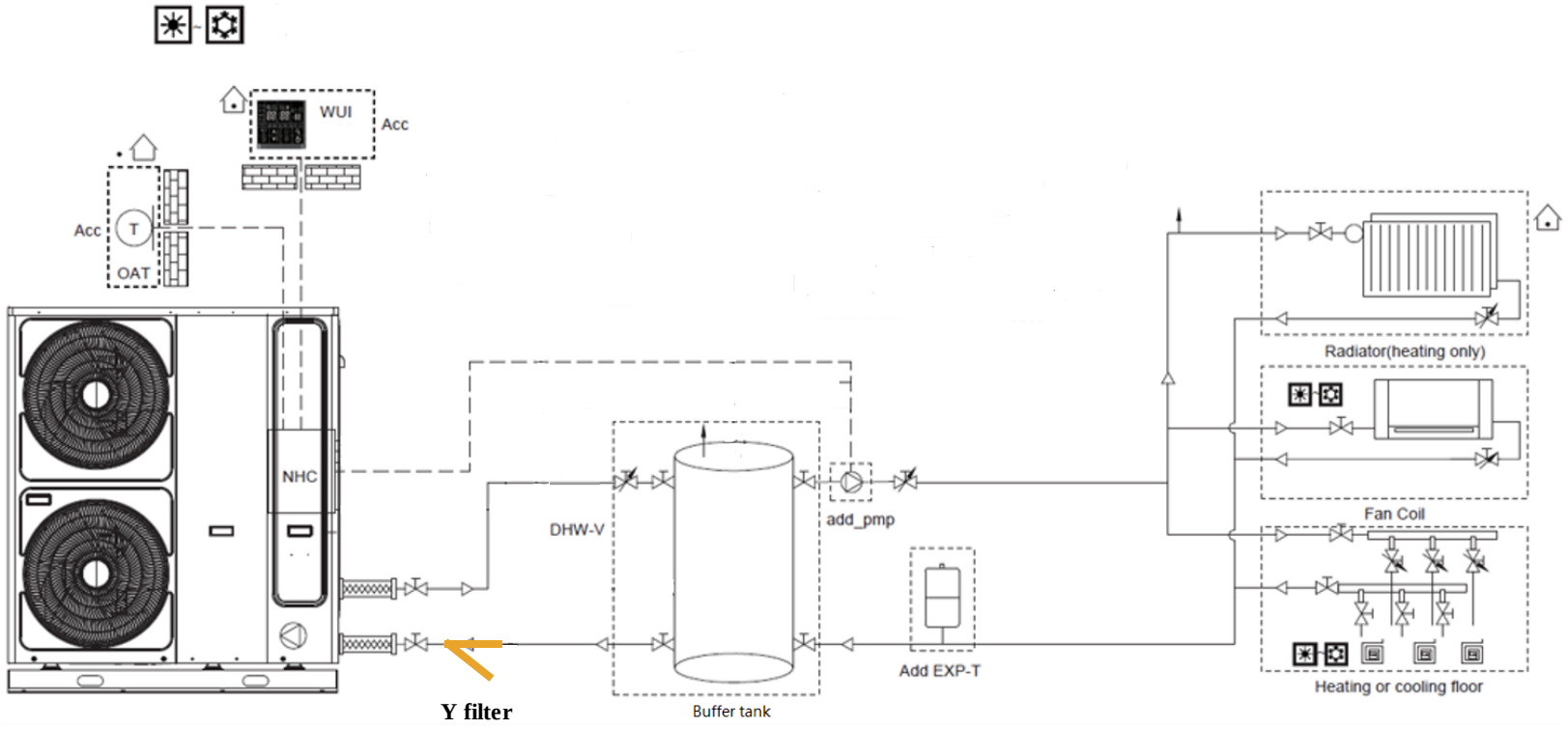
New functions in the future

Items	Detailed information	Lead time
2-zone control	1. Zone 2 mixing valve control from L1/L2/N 2. Zone 2 mixing temp sensor from Tw2 and max temp limit 3. Zone 2 temp setting from wired controller	2023.7.30
Cooling SV2 control	Cold water enter underfloor heating with water temp limit setting	2023.7.30
USB + FOAT software update	1. Indoor PCB built-in USB port for software update 2. Controller built-in WIFI module for IDU PCB software upgrade	2023.7.30 2023.12.30
Improve some functions	MODBUS, climate curve, timer of single mode, TUYA APP	2023.7.30
Solar panel linkage control	1. Heat pump DHW and heating co-production with solar panel 2. Solar panel operation takes priority	2023.12.30
SG ready	Smart heat pump controller port, connecting to SG	2023.12.30
Cascade control	Can connect several heat pump units to one system	2023.12.30
New touch screen controller	1. Various parameter settings, enabling installers and users 2. One-stop guide commissioning with multi language 3. Easy to use	2023.12.30
Real time performance display	Show the capacity and efficiency on the controller	TBD

Installation

Typical application with heating/cooling only

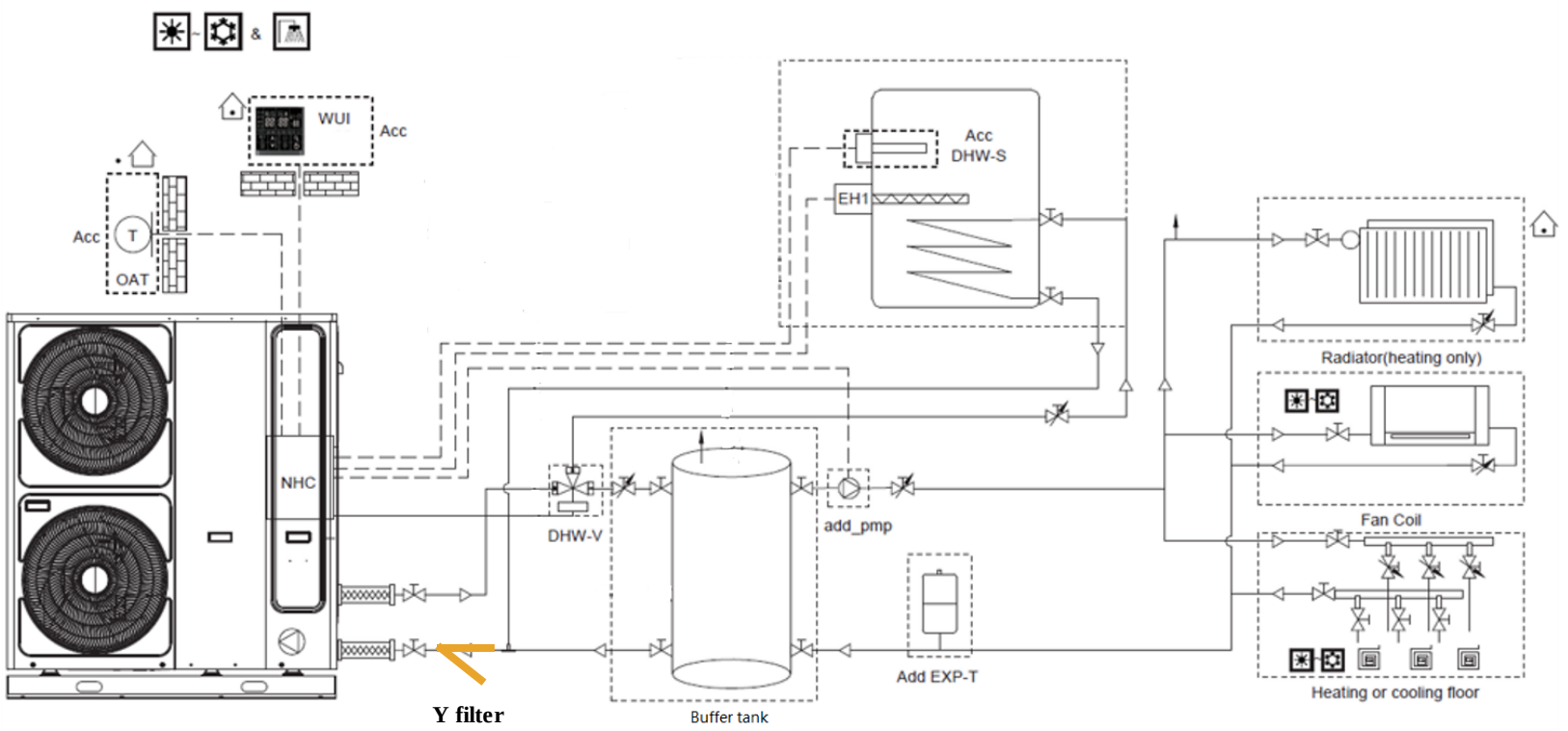
There is standard equip with 3kw EH in the unit.
And it has 2 ports of EH for external water loop, which are field supply.



Installation

Typical application with DHW

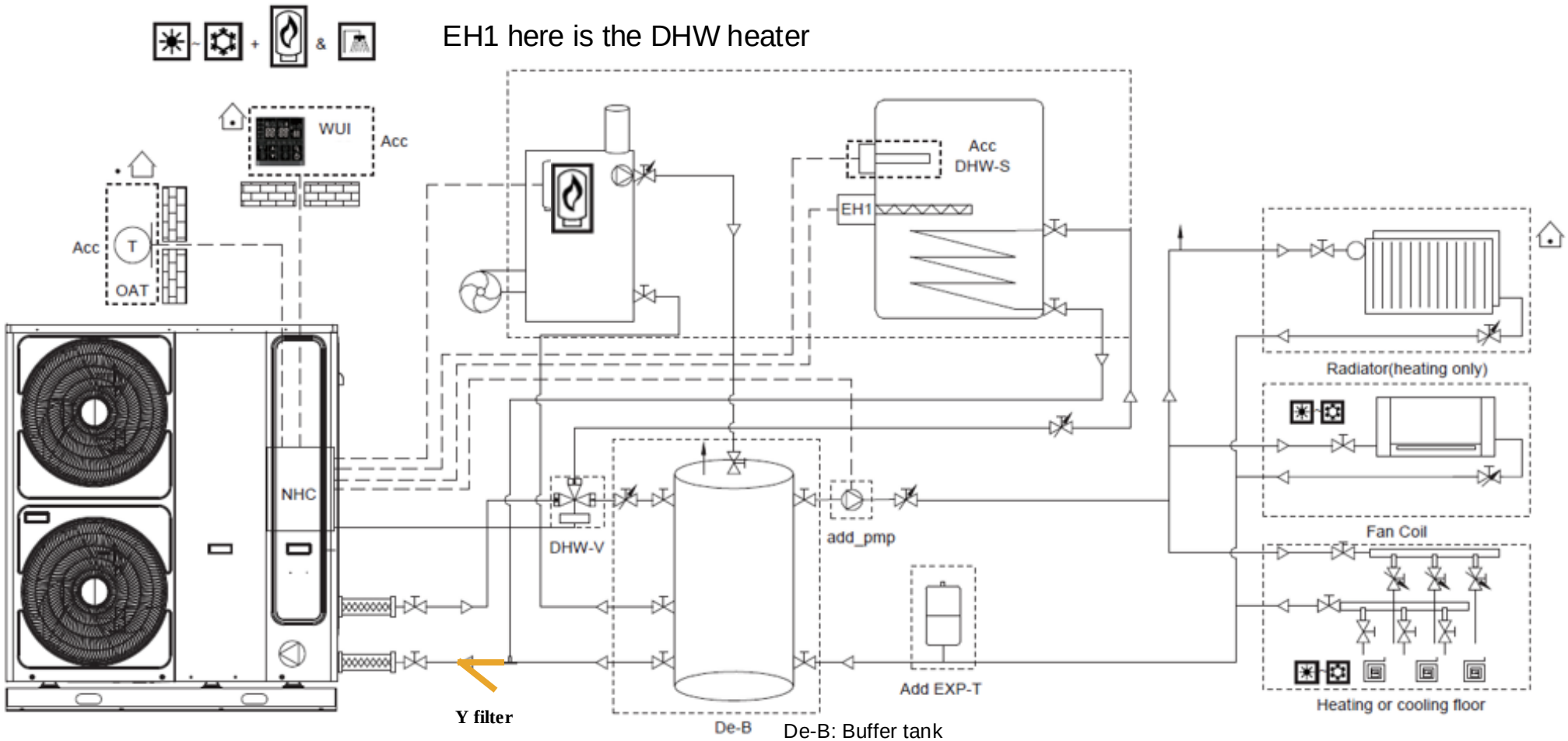
EH1 here is the DHW heater



Installation

Typical application with DHW and boiler

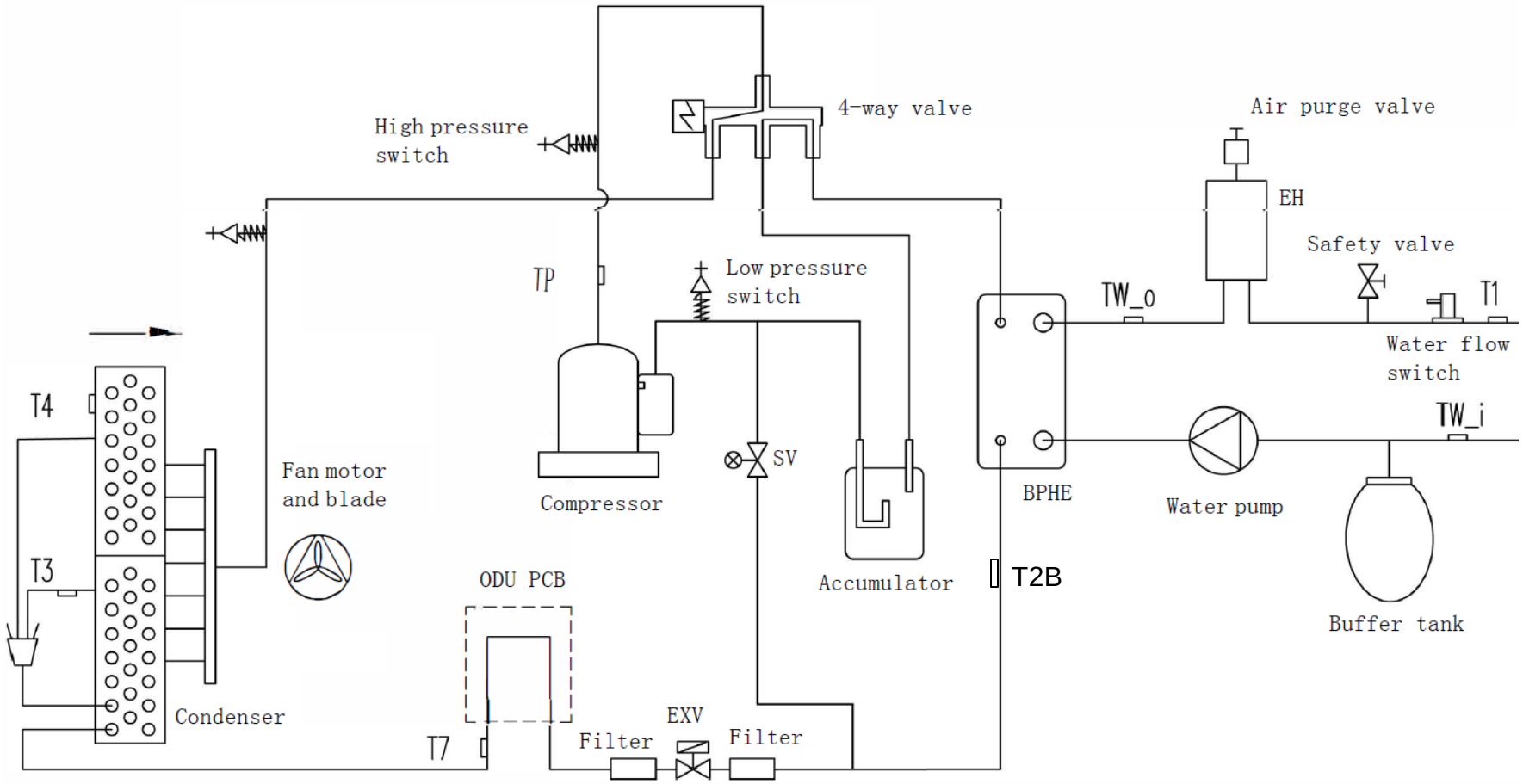
EH1 here is the DHW heater



De-B: Buffer tank

System diagram

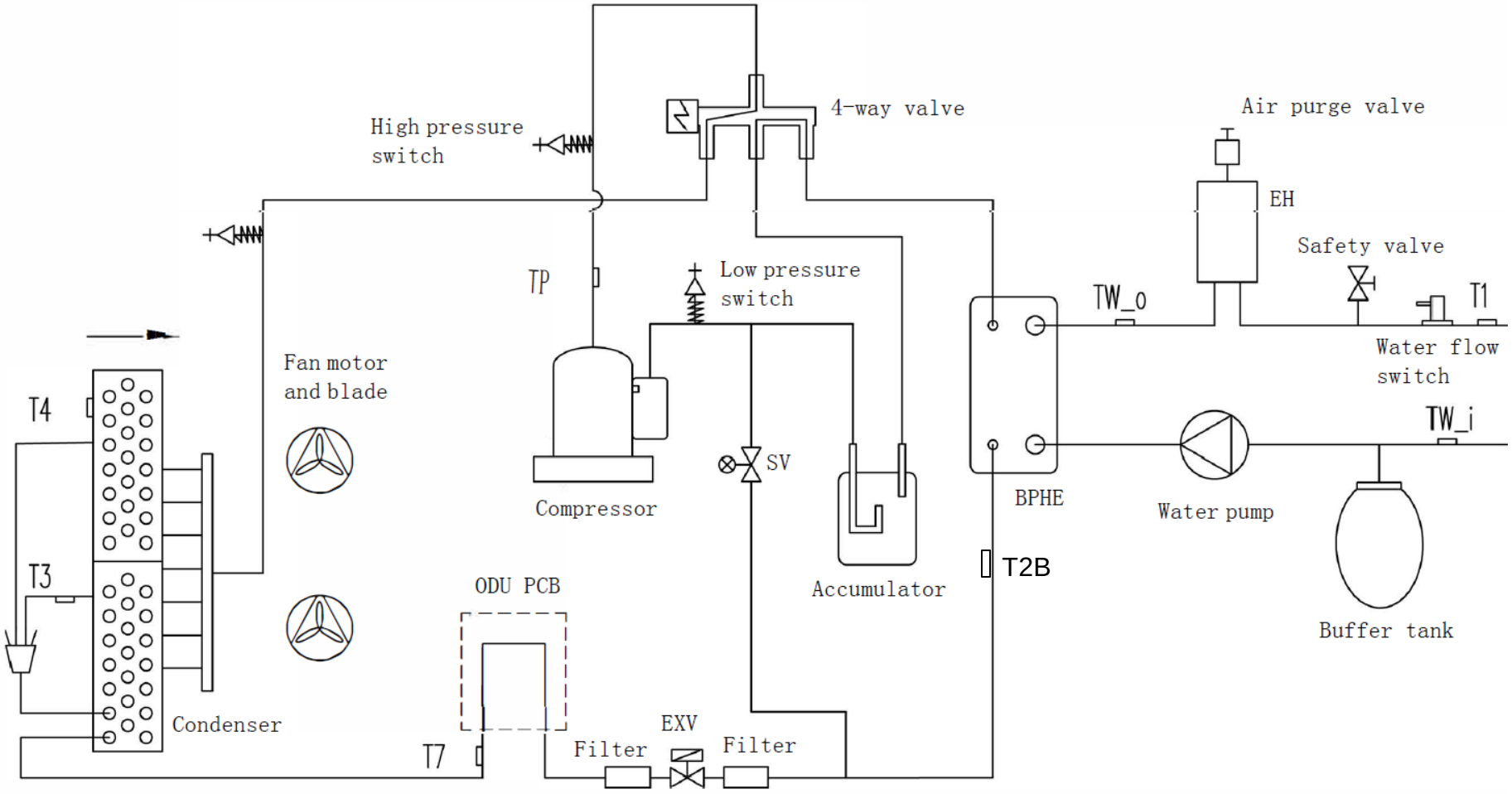
5-9kW



Acronym
T1: Leaving water sensor after electrical heater;
Tw-i: Entering water sensor
Tw-o: Leaving water sensor after BPHE;
T3: Refrigerant temperature of condenser;
T4: Outdoor ambient temperature;
TP: Discharged temperature;
T7: PCB refrigerant cooling pipe temperature;
BPHE: Brazed plate heat exchanger
EXV: Electronic expansion valve
SV: Solenoid valve

System diagram

11-15kW



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T7: PCB refrigerant cooling pipe temperature;
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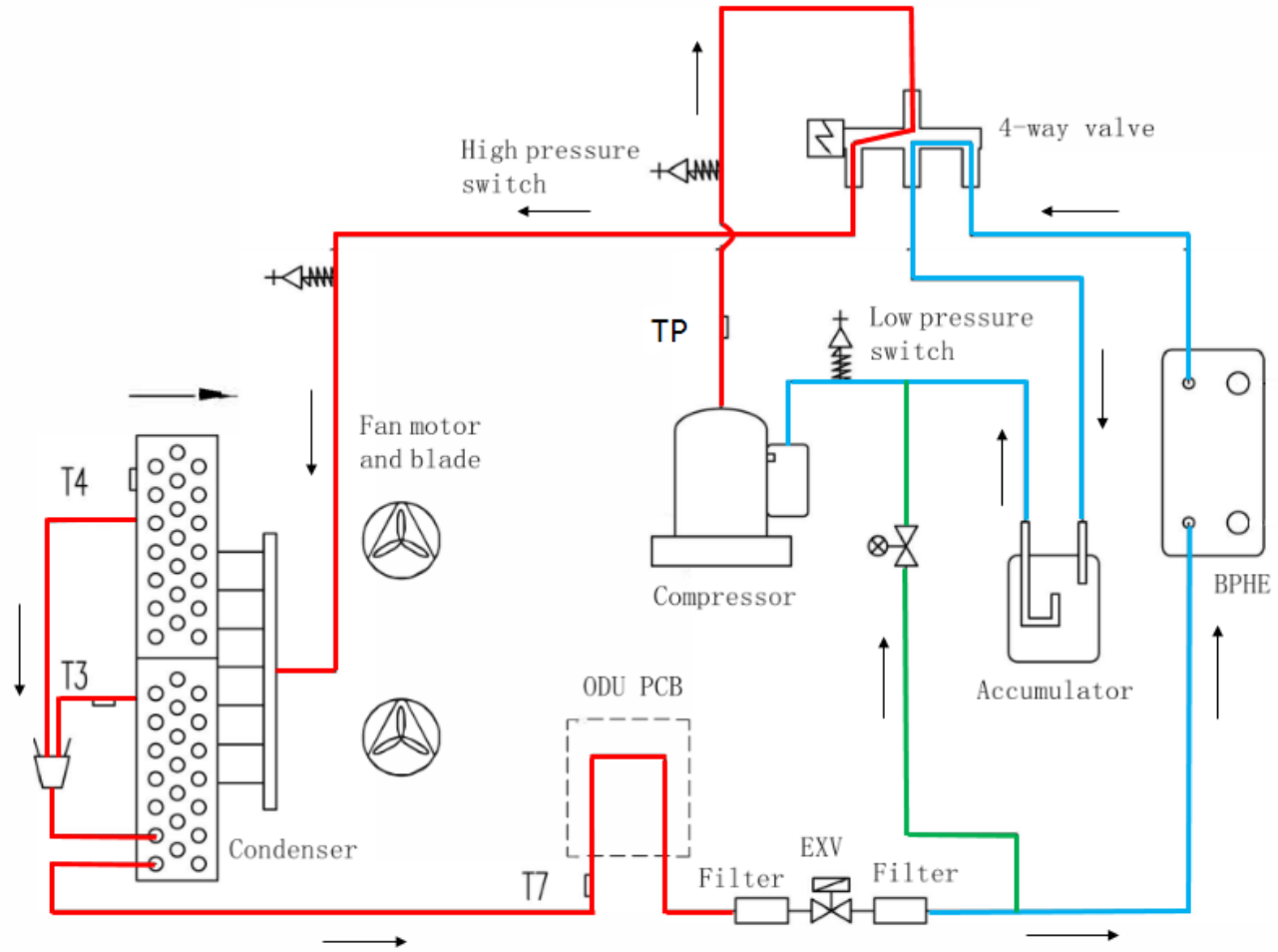
EXV: Electronic expansion valve
SV: Solenoid valve

Refrigerant flow diagram

Cooling mode and defrost operation



(11-15kW, 5-9kw):

: High temperature refrigerant;

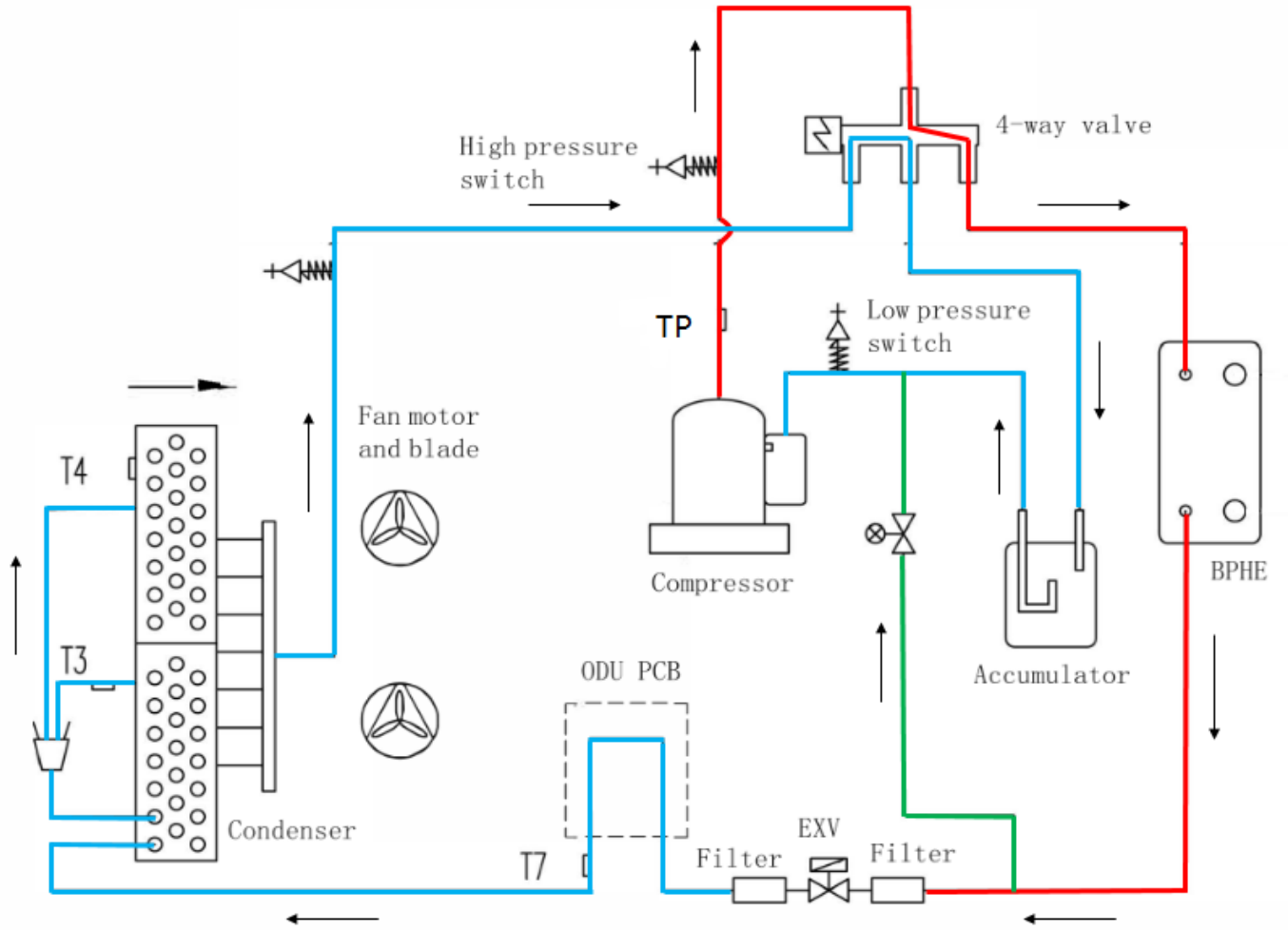
: Low temperature refrigerant;

: Spray liquid cooling pipe;

: Flow direction;

Refrigerant flow diagram

Heating mode and domestic hot water operation



(11-15kW, double fan for example):

: High temperature refrigerant;

: Low temperature refrigerant;

: Spray liquid cooling pipe;

: Flow direction;