TOSHIBA
Leading Innovation

ESTIA

HFC
R410A

AIR TO WATER HEAT PUMP

Installation Manual

Monobloc Outdoor Unit

Model name:

RUA – CP1701H*
RUA – CP2101H*

* See next page for model naming convention

Installation Manual

English

Model naming convention:-

RUA - CP 170 1 H ❑ ❑ 8 ❑ - E

Area	
E	Europe

Factory option: Coil Protection	
Blank	No Coil Protection
Z	Coil Protection

Power Supply	
8	3 phase 380/415V

Factory option: Open network	
Blank	No open Network
B	CCN Bacnet gateway
T	CCN Lontalk gateway

Factory option: Pump	
Blank	Variable speed pump / Expansion vessel
FP	Fixed speed pump / Expansion vessel
L	Pumpless type / No expansion vessel

Type of System	
H	Heat pump
Blank	Cooling only

Series Number	
0-9	1 = 1 Series

Capacity	
Based on heating capacity (kW)	
170	17.0kW
210	21.0kW

Please read this Installation Manual carefully before installing the Air to Water Heat Pump.
- This Manual describes the installation method of the Monobloc outdoor unit.

REFRIGERANT

This Air to Water Heat Pump uses an HFC refrigerant (R410A) in order to prevent destruction of the ozone layer.

Table of contents

1.0 General Information

Monobloc Outdoor Unit

Parameter		RUA-CP1701H*	RUA-CP2101H*
Power supply		360 ~ 440V 3N~ 50Hz	
Type		Inverter	
Function		Heating & Cooling	
Heating (H1) [A7/6 W40/45]	Capacity (kW)	17.1	21.1
	Input power (kW)	4.17	5.15
	COP (W/W)	4.1	4.1
	Eurovent class	A	A
Cooling (C1) [A35 W12/7]	Capacity (kW)	14.9	18.6
	Input power (kW)	4.97	6.0
	EER	3.0	3.1
	Eurovent class	B	A
Refrigerant	Type	R410A	
	Weight (kg)	8.0	8.0
Dimensions HxWxD (mm)		1579 x 1141 x 584	
Weight (kg) *	(HL / H / HFP)	189.7 / 204.2 / 208.0	198.2 / 212.7 / 216.5

* Values are guidelines only. Refer to the unit nameplate (Dry Weight).

Hot Water Cylinder (option)

Parameter	HWS-1501CSHM3-E HWS-1501CSHM3-UK	HWS-2101CSHM3-E HWS-2101CSHM3-UK	HWS-3001CSHM3-E HWS-3001CSHM3-UK
Water volume (l)	150	210	300
Power supply	230VAC ~ 50Hz (-E) 240VAC ~ 50Hz (-UK)		
Maximum water temperature (°C)	75		
Electric heater (kW)	2.75 (-E) 3.00 (-UK)		
Height (mm)	1,090	1,474	2,040
Diameter (Ømm)	Ø550		
Weight (kg)	181 [Full]	251 [Full]	360 [Full]
Material	Stainless steel		

2.0 Accessory Parts

No	Parts Name		Quantity
1	Installation manual [ENGLISH] (this document)		1
2	Owners manual [ENGLISH]		1
3	Multi-Language CD [ENG + DEU / ESP / FIN / FRA / ITA / NLD / TRK]		1
4	Remote controller		1

3.0 Preparation for Installation

■ Parts required to connect this product (Common items)

Category	Part	Specification	Quantity
Water piping	Strainer (water filter)*	1.2mm mesh	1
	Drain cock	For water charge	1
	Isolating ball valves	Inlet: 1 1/4" ** or 1" *** Outlet: 1"	2
Electrical system	Earth leakage breaker for main power supply	30mA	1
	Earth leakage breaker for auxiliary power supplies	30mA	Depends on system setup

Note: * Included with hydronic module option
** Diameter with hydronic module option
*** Diameter without hydronic module option

■ Options required for each function

Function	Accessory / Option	Field Supply
Cooling	-	Fan coil (s)
	-	Under floor cooling
	-	Under floor safety thermostat
Heating	-	Radiators
	-	Fan coil (s)
	-	Under floor heating
	-	Under floor safety thermostat
Heating & cooling (all rooms)	-	Fan coil (s)
	-	Under floor cooling / heating
Heating & cooling (part heating only)	-	Motorised 2 way valve
	-	Relay & Earth leakage breaker (2WV)
Hot water supply	Estia DHW cylinder (includes DHW Heater & DHW sensor)	Motorised 3 way valve
		Relay & Earth leakage breaker (3WV)
		Relay & Earth leakage breaker (DHW Heater)
	Domestic hot water sensor	Field supply DHW Cylinder (includes DHW Heater)
		Motorised 3 way valve
		Relay & Earth leakage breaker (3WV)
		Relay & Earth leakage breaker (DHW Heater)

■ Options

No	Description	Application	Comments
1	Italcoat heat exchanger protection	Heat exchanger fins pre-treated with polyurethane / epoxy	Factory fitted. *See model naming convention*
2	Fixed speed hydronic module with expansion tank	Fixed speed pump for high external pressure applications	
3	Variable speed hydronic module with expansion tank	Variable speed pump for medium external pressure applications	
4	BACnet gateway	Bi directional communication PCB for connection to BACnet BMS system	
5	LON gateway	Bi directional communication PCB for connection to LON BMS system	

■ Accessories

No	Description	Code	Application
1	Wired Remote (WUI)	RBP-AMT11E	Additional WUI can be used by installer for service / maintenance
2	Header / Follower sensor	RBP-RTMS1MNR-E	Sensor required for header / follower connection (up to 4 units)
3	Domestic hot water sensor	RBP-RTDH1MNR-E	Necessary for DHW production
4	Additional outdoor ambient temperature sensor	RBP-RTAM1MNR-E	Accurate reading of outdoor air temperature

4.0 Safety Precautions

■ General Safety Precautions

- Prior to the installation and the initial start-up of the Monobloc outdoor unit, the people involved should be thoroughly familiar with these instructions and technical data for the installation
- Ensure that all Local, National and International regulations are satisfied during the installation
- Turn off the main power supply switch (or breaker) before unit maintenance
- The procedures in this manual are arranged in the sequence required for machine installation, start-up, operation and maintenance
- The precautions described below include the important items regarding safety – Observe them without fail
- After the installation work has been completed, perform a test run to check for any problems
- Follow the Owner's Manual to explain how to use and maintain the unit to the customer.
- Ask the customer to keep the Installation Manual along with the Owner's Manual

■ CAUTION

- Never push or lever on any of the enclosure panels of the unit. Only the base of the unit frame is designed to withstand such stresses. If a unit includes a hydronic module, the hydronic module and pump piping must be installed in a way that does not submit it to any strain. The hydronic module pipes must be fitted so that the pump does not support the weight of the pipes.

■ Refrigerant Precautions

- This product contains fluorinated greenhouse gas.
  Refrigerant type: R410A
  Global Warming Potential (GWP): 2088

Periodic inspections for refrigerant leaks may be required depending on European or local legislation. Please contact your local dealer for more information

- Any intervention on the refrigerant circuit of this product should be performed in accordance with the applicable legislation. In the EU, the regulation is called F-Gas, N°517/2014.
- Ensure that the refrigerant is never released to the atmosphere during installation, maintenance or equipment disposal.
- Before opening a refrigerant circuit, transfer the refrigerant to bottles specifically provided for this purpose and consult the pressure gauges. Change the refrigerant after an equipment failure, following a procedure such as the one described in NF E29-795 or carry out a refrigerant analysis in a specialist laboratory.
- Do not attempt to remove refrigerant circuit components or fittings, while the machine is under pressure or while it is running. Be sure pressure is at 0 kPa and that the unit has been shut-down and de-energised before removing components or opening a circuit.
- The deliberate gas release into the atmosphere is not allowed
- If a refrigerant leak is detected, ensure that it is stopped and repaired as quickly as possible.
- Only a qualified and certified personnel can perform installation operations, maintenance, refrigerant circuit leak test as well as the equipment disposal and the refrigerant recovering
- The gas recovery for recycling, regeneration or destruction is at customer charge

⚠ WARNING

- Be sure you understand and follow the procedures and safety precautions contained in the instructions supplied with the machine, as well as those listed in this guide, such as: protective clothing such as gloves, safety glasses, safety shoes and appropriate tools, and suitable qualifications (electrical, air conditioning, local legislation).
- Ask an authorized dealer or qualified installation professional to install/maintain the Air to Water Heat Pump System. Inappropriate installation may result in water leaks, electric shock or fire.
- All refrigerant circuit work must be carried out by a trained person, fully qualified to work on these units. They must have been trained and be familiar with the equipment and the installation. All welding operations must be carried out by qualified specialists.
- Perform installation work properly in accordance with the installation manual. Inappropriate installation may result in water leaks, electric shock or fire.
- Electrical work must be performed by a qualified electrician in accordance with the installation manual. An inappropriate power supply capacity or installation may result in fire.
- When completing any electrical works to the system ensure that all Local, National and International regulations are satisfied.
- Inappropriate grounding may result in electric shock.
- Ensure all electrical cables, used for the ESTIA installation, comply with all Local and National regulations. Check all electrical terminations are secure and tight.
- Install an earth leakage breaker without fail. Incomplete grounding can cause electric shock.
- Do not earth wires to gas pipes, water pipes, lightning rods or telephone cable earth wires.
- This unit must be connected to the main power supply using a circuit breaker or switch with a contact separation of at least 3 mm.
- Be sure to turn off all main power supply switches or the circuit breaker before starting any electrical work. Ensure all power switches are off, failure to do so can cause electric shock. Use an exclusive power circuit for the Air to Water Heat Pump system using the rated voltage.
- Ensure refrigeration system remains sealed to external gases and air. Should air or other gases contaminate the refrigeration circuit, high system pressures could result in burst pipes and injuries.
- Tighten all flare nuts with a torque wrench in the specified manner. Excessive tightening of the flare nut may result in cracking of the pipe work or flare nut which may result in a refrigerant leakage.
- Do not modify or bypass any of safety guards or switches in this system.
- DO NOT COVER ANY PROTECTION DEVICES. This applies to fuse plugs and relief valves (if used) in the refrigerant or heat transfer medium circuits. Check if the original protection plugs are still present at the valve outlets. These plugs are generally made of plastic and should not be used. If they are still present, please remove them. Install devices at the valve outlets or drain piping that prevent the penetration of foreign bodies (dust, building debris, etc.) and atmospheric agents (water can form rust or ice). These devices, as well as the drain piping, must not impair operation and not lead to a pressure drop that is higher than 10% of the control pressure.

- Ensure regularly that the vibration levels remain acceptable and close to those at the initial unit start-up.
- When the unit is subjected to fire, safety devices prevent rupture due to over-pressure by releasing the refrigerant. The fluid may then be decomposed into toxic residues when subjected to the flame:
  - Stay away from the unit.
  - Set up warnings and recommendations for personnel in charge to stop the fire.
  - Fire extinguishers appropriate to the system and the refrigerant type must be easily accessible.
- All factory-installed relief valves are lead-sealed to prevent any calibration change.
- Relief valves must be checked periodically to ensure that they do not show any corrosion or any signs of leaks.
- Provide a drain in the discharge circuit, close to each relief valve, to avoid an accumulation of condensate or rain water.
- All precautions concerning handling of refrigerant must be observed in accordance with local regulations.
- Accumulation of refrigerant in an enclosed space can displace oxygen and cause asphyxiation or explosions
- Inhalation of high concentrations of vapour is harmful and may cause heart irregularities, unconsciousness, or death. Vapour is heavier than air and reduces the amount of oxygen available for breathing. These products cause eye and skin irritation. Decomposition products can be hazardous.
- No part of the unit must be used as a walkway, rack or support. Periodically check and repair if necessary replace any component or piping that shows signs of damage.
- Do not climb on a machine. Use a platform, or staging to work at higher levels.

Maintenance safety logbook
Manufacturer recommends the following drafting for a logbook (the table below should not be considered as reference and does not involve Manufacturer responsibility):

	Safety accessory*	Damage limitation accessory** in case of an external fire
Refrigerant side		
High-pressure switch	X	
External relief valve***		X
Rupture disk		X
Fuse plug		X
Heat transfer fluid side		
External relief valve	****	****

* Classified for protection in normal service situations.
** Classified for protection in abnormal service situations.
*** The instantaneous over-pressure limited to 10% of the operating pressure does not apply to this abnormal service situation. The control pressure can be higher than the service pressure. In this case either the design temperature or the high pressure switch ensures that the service pressure is not exceeded in normal service situations.
**** The classification of these relief valves must be made by the personnel that completes the whole hydronic installation.

■ Notes on system design

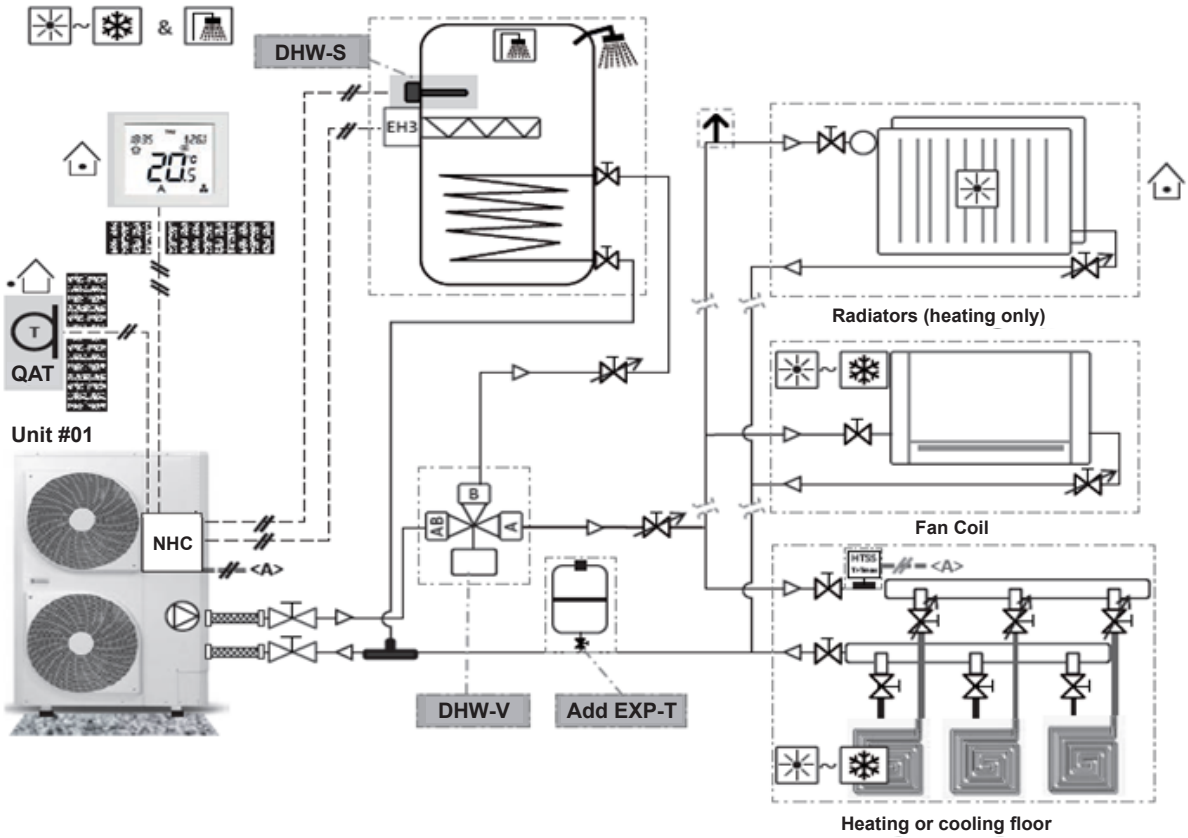
- The inlet water temperature to the Monobloc outdoor unit must be 56°C or less for 21kW Monobloc (59°C or less for 17kW Monobloc). Care should be taken when there is an external heating source such as a boiler or external electric heater. When hot water over these limits returns to the Monobloc outdoor unit, it may result in a failure of the unit or water leakage.
- The flow rate of the circulating water must meet the following range.

  17 kW: 0.45 L/sec or more 21 kW: 0.57 L/sec or more

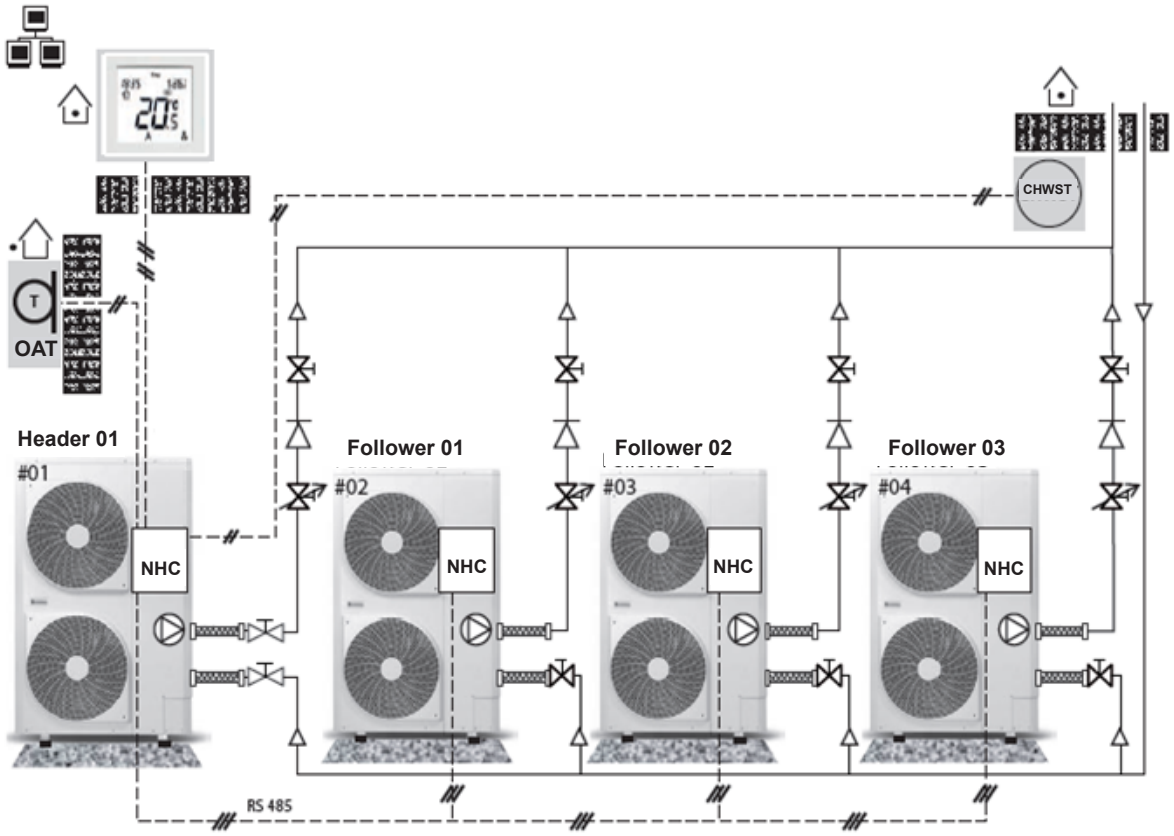
  If the flow rate becomes less than the minimum, the protective device is activated to stop the operation.
- To ensure the minimum flow rate of the water system, install a bypass valve on one water circuit.
- The system operation is designed around a closed water circuit. Do not use an open circuit design.

5.0 Example of Monobloc Outdoor Unit Installation

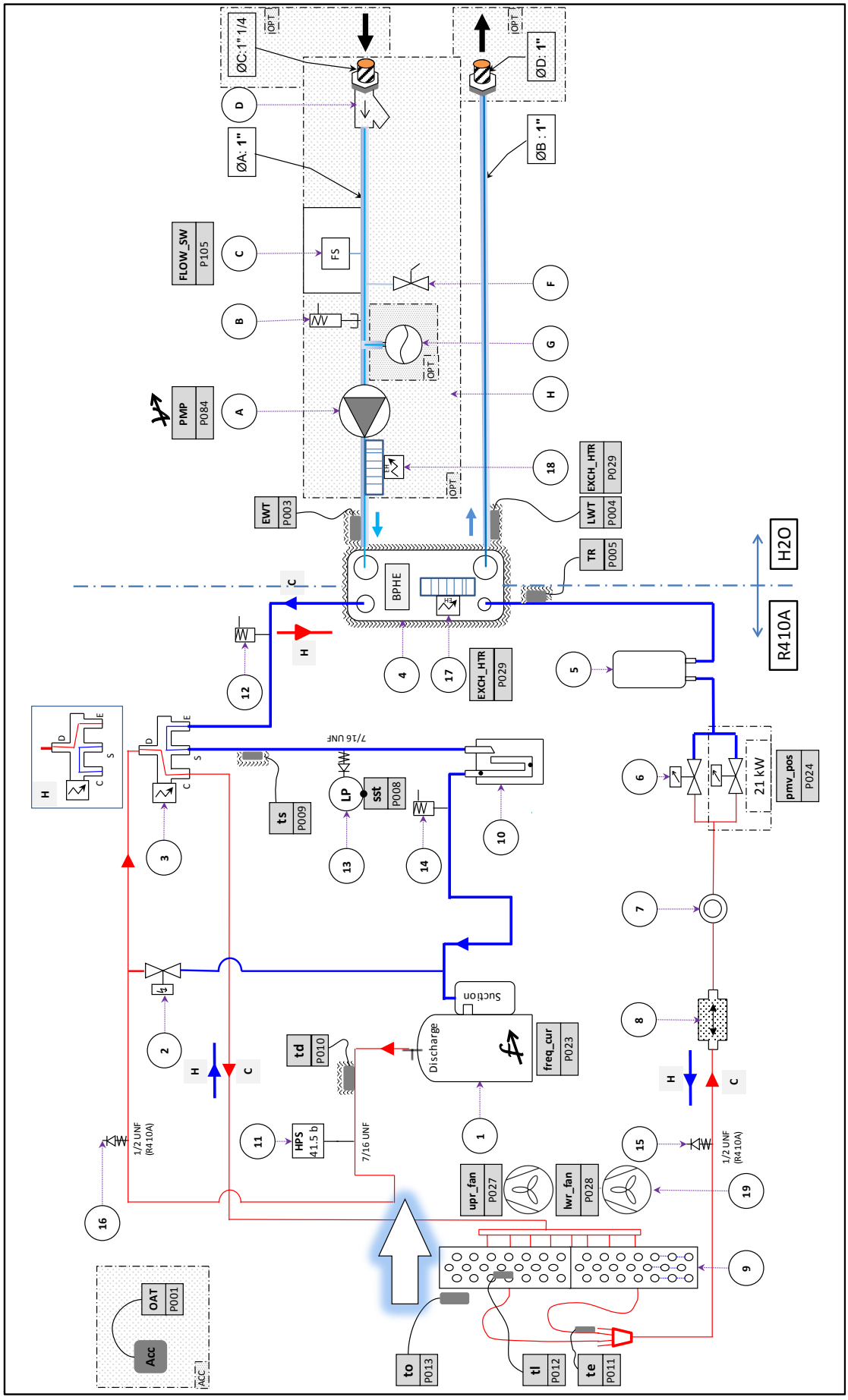
5.1 Standard installation with domestic hot water (DHW) production



5.2 Standard installation with header / follower (3 x follower units) configuration



6.0 Main Components of the ESTIA Monobloc Outdoor Unit



6.1 Water side legend

Label Description

A Water Pump -Main water pump -primary loop (in Hydronic module option)
B Water High Pressure Safety Relief Valve (300 kPa) (in Hydronic module option)
C Flow Switch (standard)
D Water Filter (standard in Hydronic module option)
--> To be supplied on field with a unit without Hydronic module option (mandatory).
F Drain valves (in hydronic module option)
G Expansion tank (standard in Hydronic module option)
H Hydronic module (option) equipped with fixed or variable speed single pump

6.2 Unit refrigeration circuit legend

Label Description

1 Variable speed rotary compressor
2 2 way solenoid valve -CP Warm-up at start
3 Reverse 4 way valve (energized when in Heating mode)
4 Water exchanger - BPHE
5 Receiver
6 Expansion valve - pulse modulating valve (2x EXV for size 21)
7 Sight Glass
8 Filter Dryer
9 Air cooled Exchanger
10 Accumulator or anti-slugging bottle
11 High Pressure Switch (4 150 kPa ~ 41.5 bar g)
12 Pressure safety release valve @ suction on BPHE
13 Low Pressure transducer (mounted on Schrader valve)
14 Pressure safety release valve @ suction
15 Service Pressure Automatic Port (Schrader) on LP side
16 Service Pressure Automatic Port (Schrader) on HP side
17 Electrical Heater on BPHE: water anti-freeze protection
18 Electrical Heater on BPHE Inlet pipe (only with Hydronic module option), water anti-freeze protection
19 Upper & Lower fans
DAT Software point
P001 Value read under «Parameter number»; i.e.: OAT value read @ parameter 001 ‘P001’

7.0 ESTIA Monobloc Outdoor Unit Installation

⚠ Cautions

- Install the Monobloc outdoor unit in a location that meets the following conditions after the customer's consent has been obtained:
    - A well ventilated location free from obstacles near the air intakes and air discharge
    - A location that is not exposed to rain or direct sunlight
    - A location that does not increase the operating noise or vibration of the outdoor unit
    - A location that does not produce any drainage problems from discharged water

- **Do not install the outdoor unit in the following locations**:
    - A location with a saline atmosphere (coastal area) or one that contains sulphide gas (hot spring area) as special maintenance is required
    - A location subject to oil, vapour, oily smoke or corrosive gases
    - A location in which organic solvent is used
    - A location where high frequency equipment (including inverter equipment, private power generator, medical equipment and communication equipment) is used. Installations in these locations may cause malfunction or the air to water heat pump, abnormal control or problems due to noise from such equipment
    - A location in which the discharged air of the Monobloc outdoor unit blows against the window of a neighbouring house
    - A location where the operating noise of the Monobloc outdoor unit is transmitted through other structures
    - A location where drain water poses any problems
    - When the outdoor unit is installed in an elevated position, be sure to secure the unit using the feet attached to the unit

Safety Considerations

- Be sure you understand and follow the procedures and safety precautions contained in the instructions supplied with the machine, as well as those listed in this guide, such as: protective clothing – gloves, safety glasses, safety shoes, appropriate tools etc.

7.1 Moving and Positioning the Unit

7.1.1 Moving the Unit:

Do not remove the pallet or the packaging until the unit is in its final position. These units can be moved with a fork lift truck, as long as the forks are positioned in the right place and direction on the unit.

The units can also be lifted with slings (refer to Figure 2 and 3). Use slings with the correct capacity, and always follow the lifting instructions on the certified drawings supplied for the unit.

Before lifting the unit, check that all casing panels are securely fixed in place. Lift and set down the unit with great care. Tilting and jarring can damage the unit and impair unit operation.

Safety is only guaranteed, if these instructions are carefully followed. If this is not the case, there is a risk of material deterioration and injuries to personnel.

Figure 1: Transportation configuration

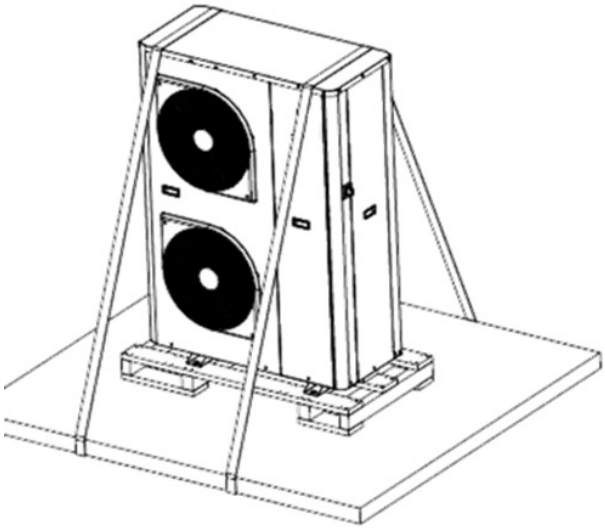


Figure 2: Offloading configuration

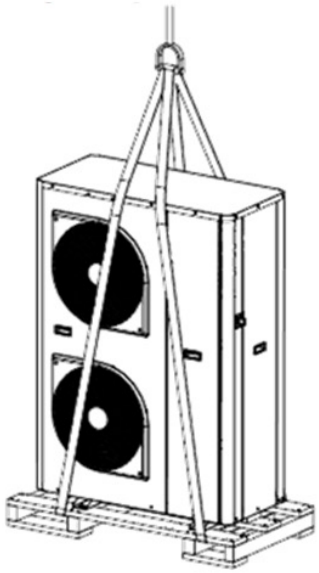
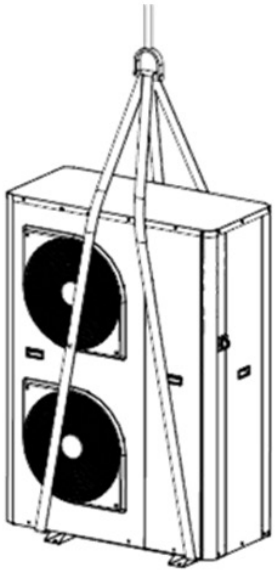


Figure 3: Installation configuration



- If the Monobloc outdoor units are hoisted with rigging, it is advisable to protect coils against crushing while a unit is being moved. Use struts or a lifting beam to spread the slings above the unit. Do not tilt a unit more than 15°.

- Never push or lever on any of the enclosure panels of the unit. Only the base of the unit frame is designed to withstand such stresses. If a unit includes a hydronic module, the hydronic module and pump piping must be installed in a way that does not submit it to any strain. The hydronic module pipes must be fitted so that the pump does not support the weight of the pipes.

7.1.2 Positioning the Unit:

In case of extra-high units the machine environment must permit easy access for maintenance operations.

Always refer to the Dimensions and Clearances figure to confirm that there is adequate space for all connections and service operations. For the centre of gravity coordinates, the position of the unit mounting holes, and the weight distribution points, refer to the certified dimensional drawing supplied with the unit.

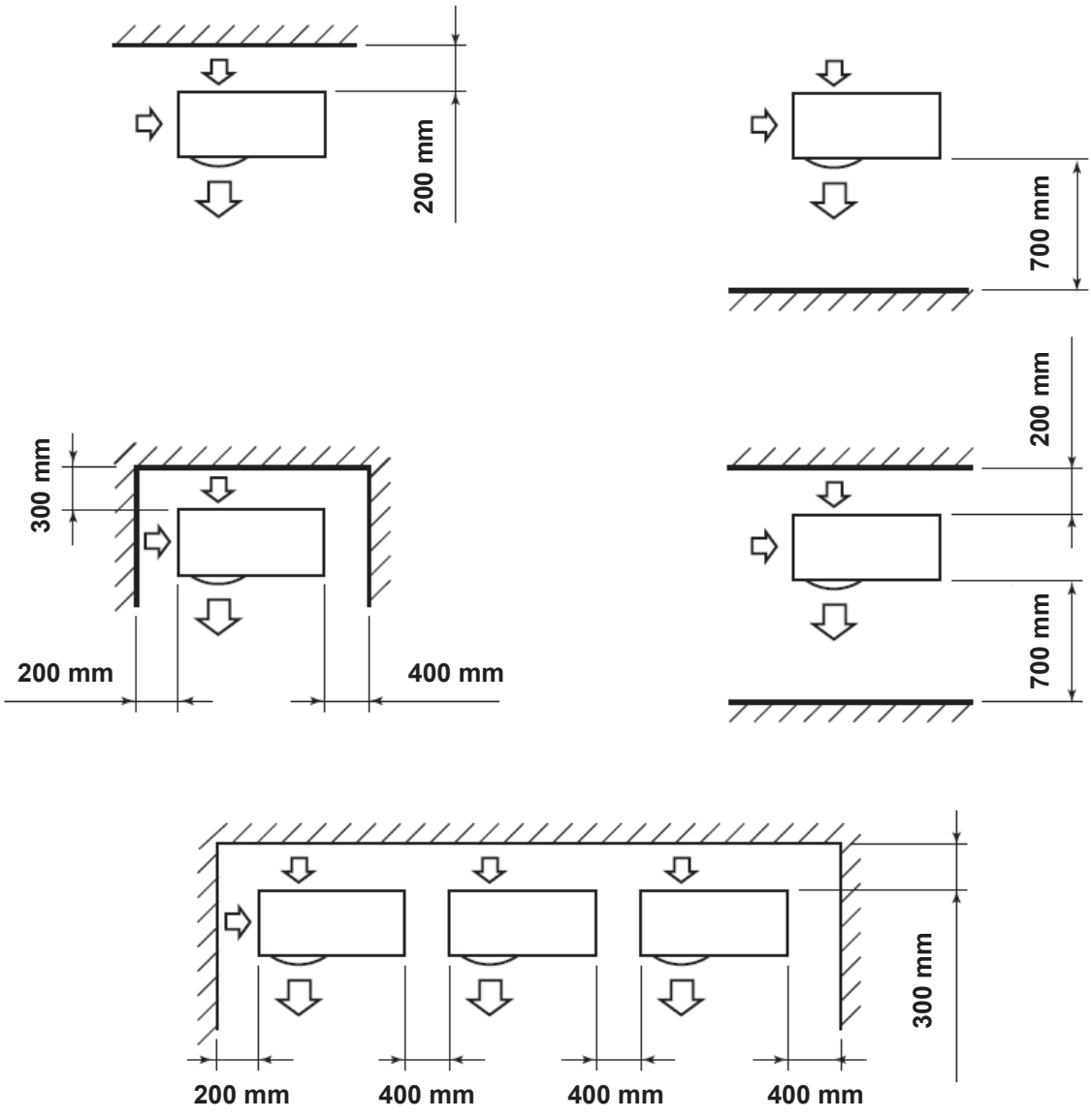
Typical applications of these units do not require earthquake resistance. Earthquake resistance has not been verified.

Before siting the unit check that:

- The permitted loading at the site is adequate or that appropriate strengthening measures have been taken.
- If the unit has to operate as a heat pump in temperatures below 0°C it must be raised at least 300 mm from the ground. This is necessary to avoid ice build-up on the unit chassis and also to permit correct unit operation in locations where the snow level may reach this height.
- The unit is installed level on an even surface (maximum tolerance is 5 mm in both axes).
- There is adequate space above the unit for air flow and to ensure access to the components (see dimensional drawings).
- The number of support points is adequate and that they are in the right places.
- The location is not subject to flooding.
- For outdoor installations, where heavy snowfall is likely and long periods of sub-zero temperatures are normal, provision has to be made to prevent snow accumulating by raising the unit above the height of drifts normally experienced. Baffles may be necessary to deflect strong winds. They must not restrict air flow into the unit.

7.1.3 Clearances to ensure correct air flow:

The diagrams below show the minimum clearance distances required to ensure correct air flow onto the air heat exchanger:



7.2 Water Connections

⚠ WARNING

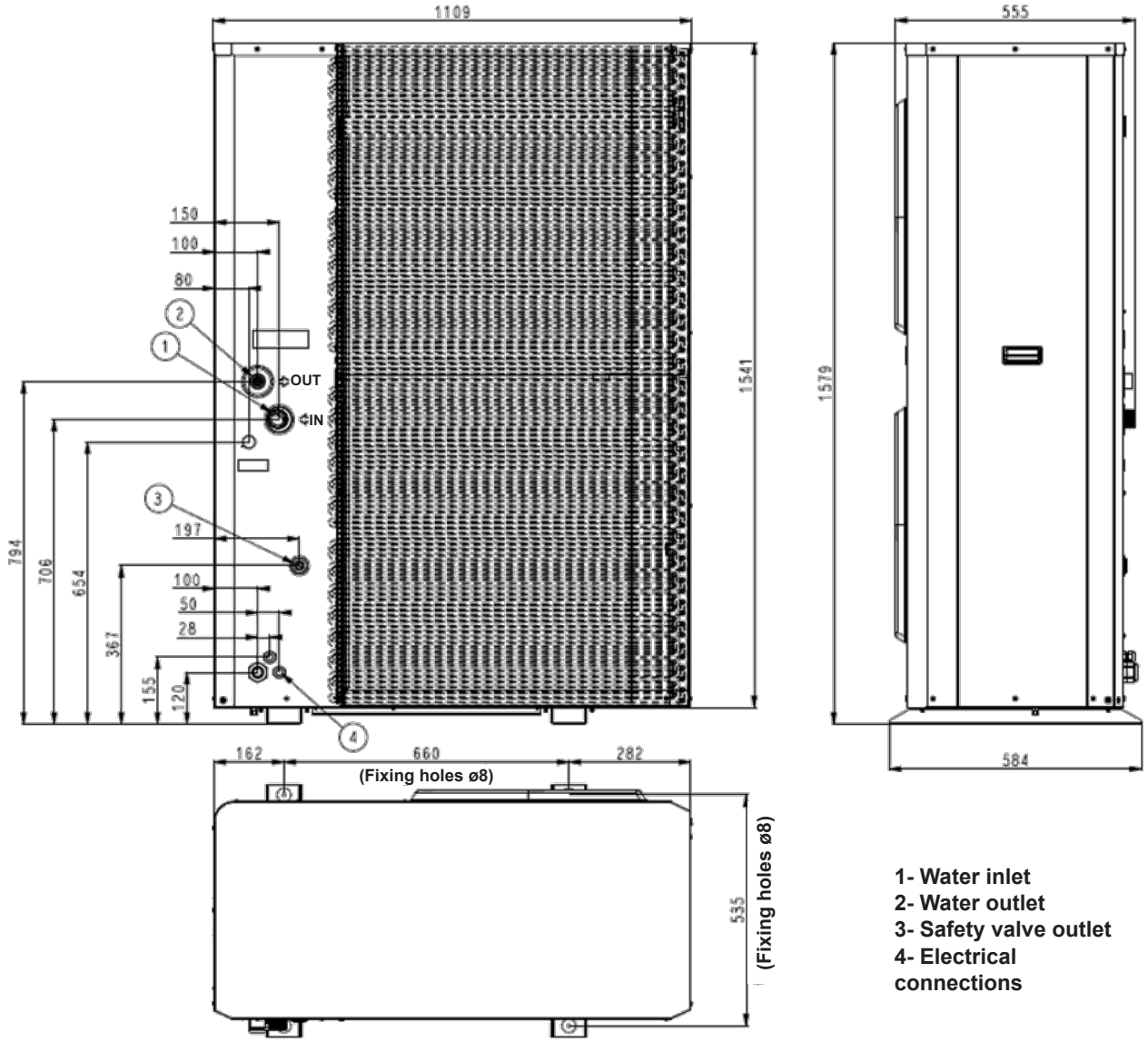
- Install water pipes according to the regulations of respective countries.
- Install water pipes in a freeze-free place.
- Make sure that water pipes have sufficient pressure resistance.

The setting value of the pressure relief valve is 0.3 MPa. (3 bar)

⚠ CAUTION

- Do not use zinc plated water pipes. When steel pipes are used, insulate both ends of the pipes.
- The water to be used must meet the water quality standard specified in EN directive 98/83 EC.

7.2.1 Dimensional Drawing



1- Water inlet
2- Water outlet
3- Safety valve outlet
4- Electrical connections

7.2.2 Water Connection

For size and position of the unit water inlet and outlet connections refer to the certified dimensional drawings supplied with the unit. The water pipes must not transmit any radial or axial force, or vibration, to the heat exchangers.

The water supply must be analysed and appropriate filtering, treatment, control devices, shut-off and bleed valves and circuits built in, to prevent corrosion (example: damage to the protection of the tube surface if the fluid is polluted), fouling and deterioration of the pump fittings.

Before any start-up verify that the heat exchange fluid is compatible with the materials and the water circuit coating.

Water quality

In case additives or other fluids, other than those recommended by the manufacturer are used, ensure that the fluids are not considered as a gas, and that they belong to class 2, as defined in directive 97/23/EC.

Recommendations on heat exchange fluids:

- No NH4+ ammonium ions in the water, they are very detrimental for copper. This is one of the most important factors for the operating life of copper piping. A content of several tenths of mg/l will badly corrode the copper over time.
- Cl- Chloride ions are detrimental for copper with a risk of perforations by corrosion by puncture. If possible keep below 10 mg/l.
- $SO4_2$- sulphate ions can cause perforating corrosion, if their content is above 30 mg/l.
- No fluoride ions (< 0.1 mg/l).
- No Fe2+ and Fe3+ ions with non-negligible levels of dissolved oxygen must be present. Dissolved iron < 5 mg/l with dissolved oxygen < 5 mg/l.
- Dissolved silicon: silicon is an acid element of water and can also lead to corrosion risks. Content < 1mg/l.
- Water hardness: > 0.5 mmol/l. Values between 1 and 2.5 mmol/l can be recommended. This will facilitate scale deposit that can limit corrosion of copper. Values that are too high can cause piping blockage over time.
- Alkalimetric Titre (TAC) below 100mg/l is desirable.
- Dissolved oxygen: Any sudden change in water oxygenation conditions must be voided. It is as detrimental to deoxygenate the water by mixing it with inert gas as it is to over-oxygenate it by mixing it with pure oxygen. The disturbance of the oxygenation conditions encourages destabilisation of copper hydroxides and enlargement of particles.
- Electric conductivity: 0.001-0.06 S/m (10-600 µS/cm)
- pH: Ideal case pH neutral at 20-25°C (7 < pH < 8).

CAUTION:
Charging, adding, draining and sampling fluid from the water circuit must be done by qualified personnel, using air vents and materials suitable for the products. Water circuit charging devices are field-supplied. Charging, sampling or removing heat exchange fluids should be done with devices that must be included on the water circuit by the installer. Never use the unit heat exchangers to add heat exchange fluid.

CAUTION: The use of units in an open loop is forbidden.

7.2.3 - Operating precautions and recommendations

- The water circuit should be designed to have the least number of elbows and horizontal pipe runs at different levels. Below the main points to be checked for the connection:
- Comply with the water inlet and outlet connections shown on the unit.
- Install manual or automatic air purge valves at all high points in the circuit.
- Use a pressure reducer to maintain pressure in the circuit(s) and install a relief valve as well as an expansion tank. Units with the hydronic module include a relief valve and an expansion tank.
- Install a water pressure gauge (manometer) to monitor the water pressure in the heating circuit.
- Install drain connections at all low points to allow the whole circuit to be drained.
- Install stop valves, close to the entering and leaving water connections.
- Use flexible connections to reduce vibration transmission.

- Insulate all pipework, after testing for leaks, both to reduce thermal leaks and to prevent condensation.
- Wrap the insulations with a demisting screen.
- If the external unit water pipes are in an area where the ambient temperature is likely to fall below 0°C, they must be protected against frost (frost protection solution or trace heating).
- The use of different metals on hydraulic piping could generate electrolytic pairs and consequently corrosion. If necessary install sacrificial anodes or di-electric couplings to eliminate the corrosion between dissimilar metals.

NOTE:
For units not equipped with a hydronic module a screen filter must be installed. This must be installed on the water entering pipes close to the unit heat exchanger. It must be located in a position that is easily accessible for removal and cleaning. The mesh size of the filter must be 1.2 mm.

Please ensure that all water pipework, associated with the heating circuit, is flushed / cleaned before starting the ESTIA Monobloc system.

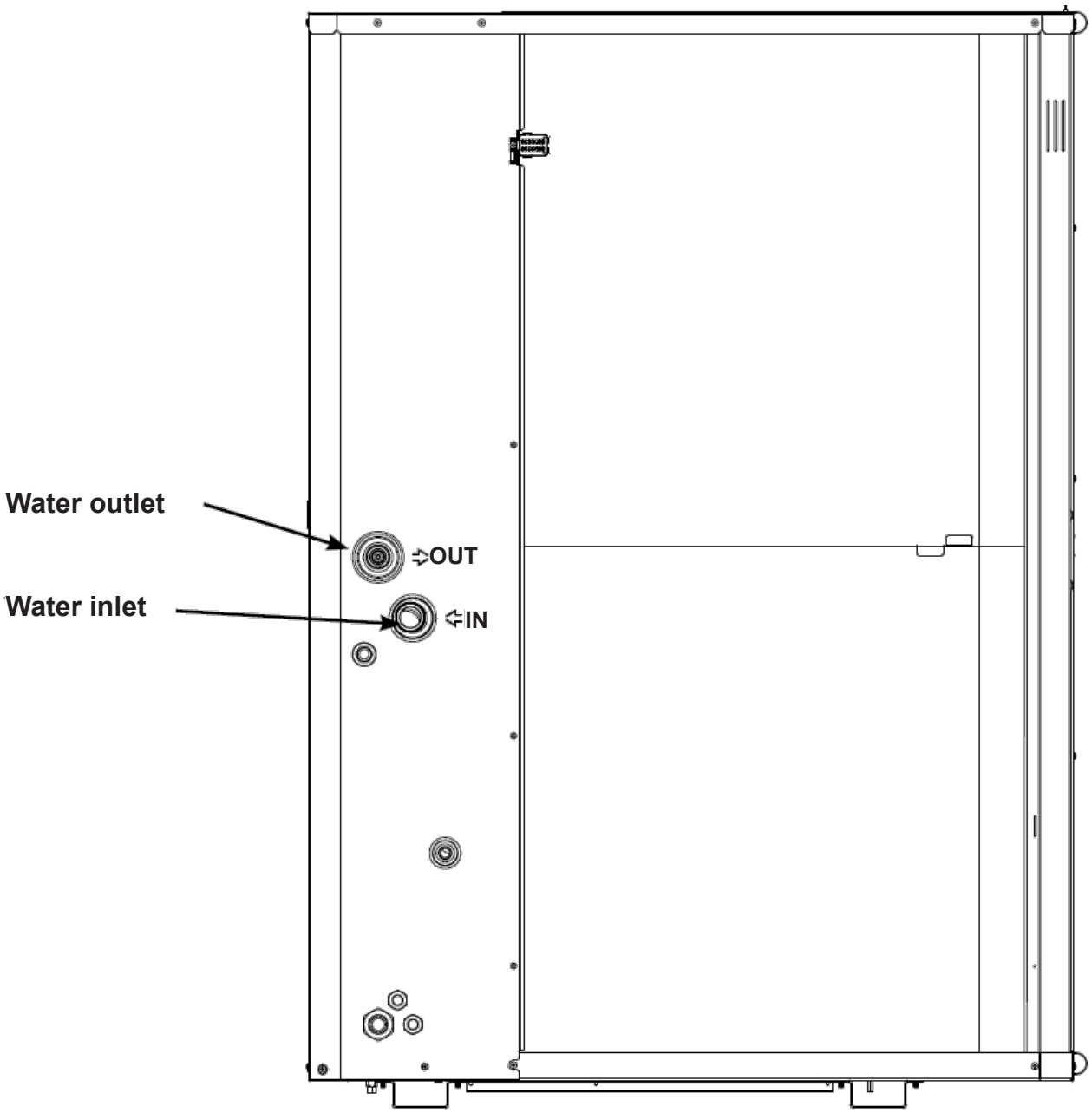
The plate heat exchanger can foul up quickly at the initial unit start-up, as it complements the filter function, and the unit operation will be impaired (reduced water flow rate due to increased pressure drop).

Units with hydronic module are equipped with this type of filter.

Do not introduce any significant static or dynamic pressure into the heat exchange circuit (with regard to the design operating pressures).

The products that may be added for thermal insulation of the containers during the water piping connection procedure must be chemically neutral in relation to the materials and coatings to which they are applied. This is also the case for the products originally supplied by the manufacturer.

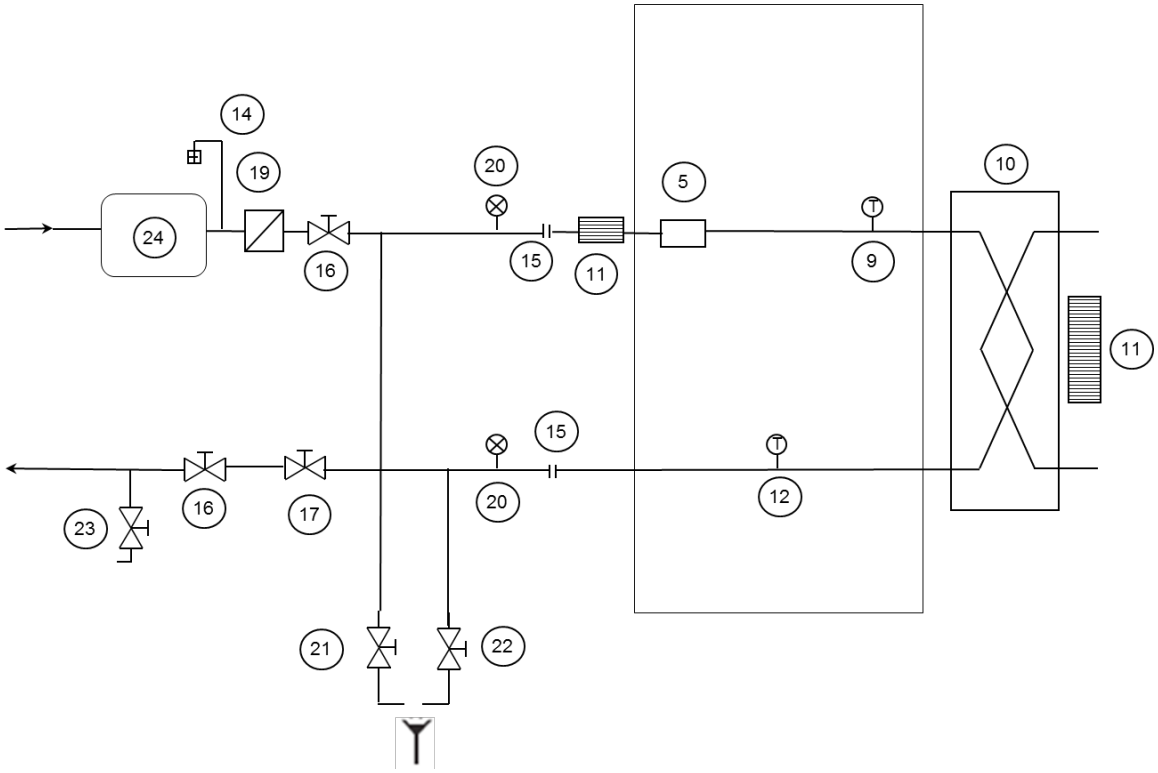
7.2.4 - Water connection on unit



Connection	RUA-CP1701H*	RUA-CP2101H*
Water connections (without hydronic module)		
Inlet diameter (BSP Gas)	1”	1”
Outlet diameter (BSP Gas)	1”	1”
Water connections (with hydronic module)		
Inlet diameter (BSP Gas)	1¼”	1¼”
Outlet diameter (BSP Gas)	1”	1”

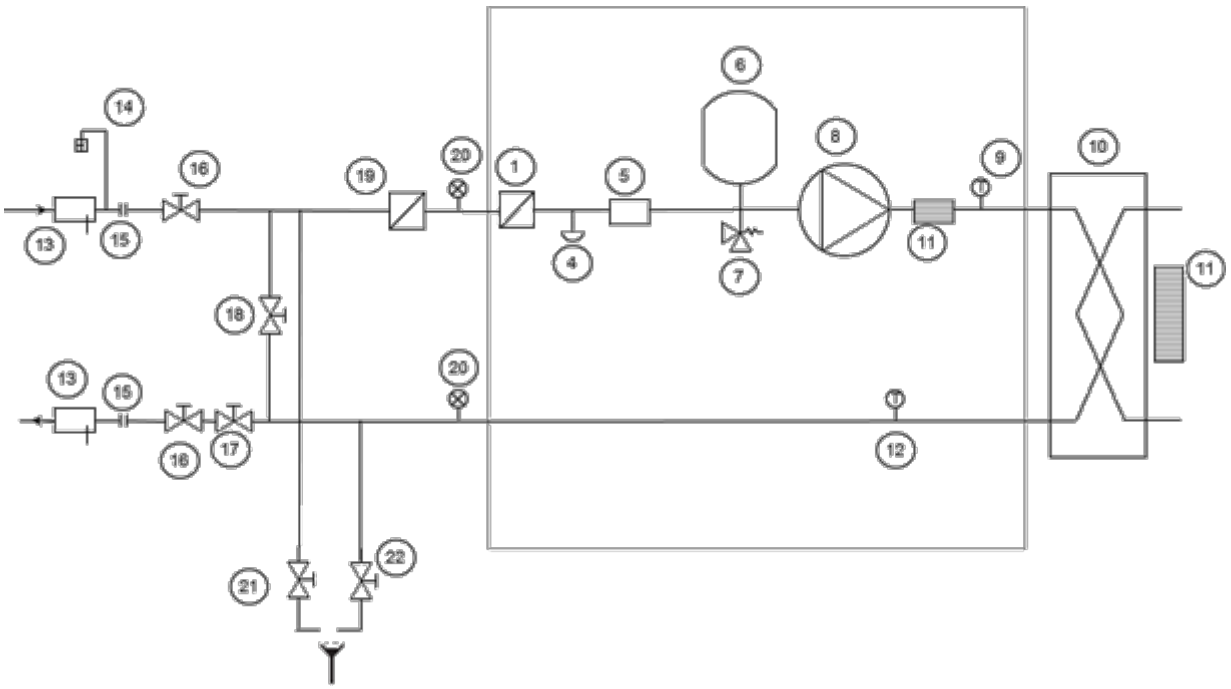
7.2.5 - Unit without hydronic kit option

Typical diagram of the hydronic circuit without the hydronic module



7.2.6 - Unit with hydronic kit option

Typical diagram of the hydronic circuit with the hydronic module



7.2.7 Legend:

Hydronic Components:

1. Mesh filter (1.2mm mesh)
4. Water drain valve
5. Paddle flow switch
6. Expansion tank
7. Safety valve (3 bar)
8. Pump
9. Temperature sensor (return water)
10. Brazed plate heat exchanger
11. Anti freeze electric heater
12. Temperature sensor (flow water)

System Components:

13. Pocket for temperature sensor
14. Air purge valve
15. Flexible water connections
16. Isolating ball valve
17. Water flow control valve (supplied with optional hydronics module)
18. Bypass valve for anti-freeze protection (when in winter the isolating ball valves are closed)
19. Mesh filter (1.2mm mesh mandatory for a unit without the optional hydronics kit fitted)
20. Pressure gauge
21. Water drain valve from the plant
22. Water drain valve from refrigerant – water exchanger
23. Charge valve
24. Buffer tank (if required)

——— Components provided with unit option

Note: The unit must be protected against frost

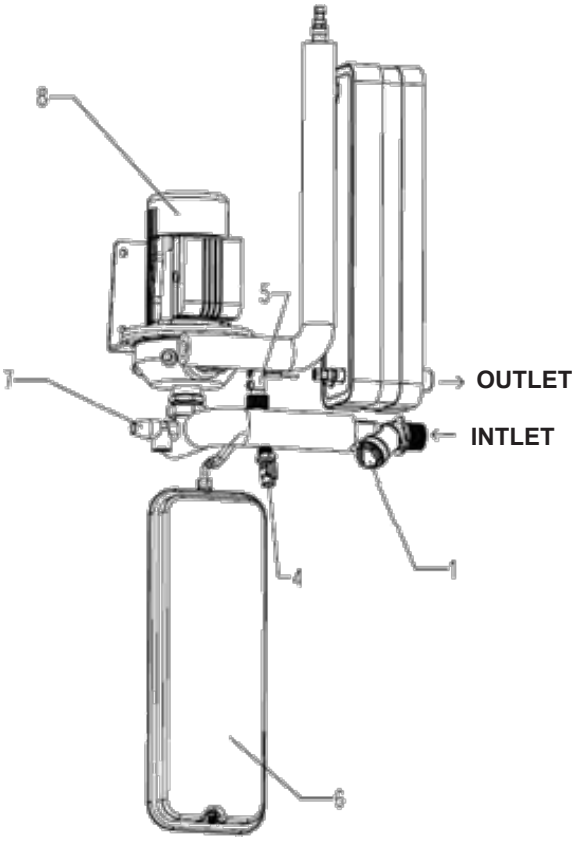
7.3 Hydronic module

There are 3 hydronic options for the unit **RUA – CP1701H*, RUA – CP2101H***:

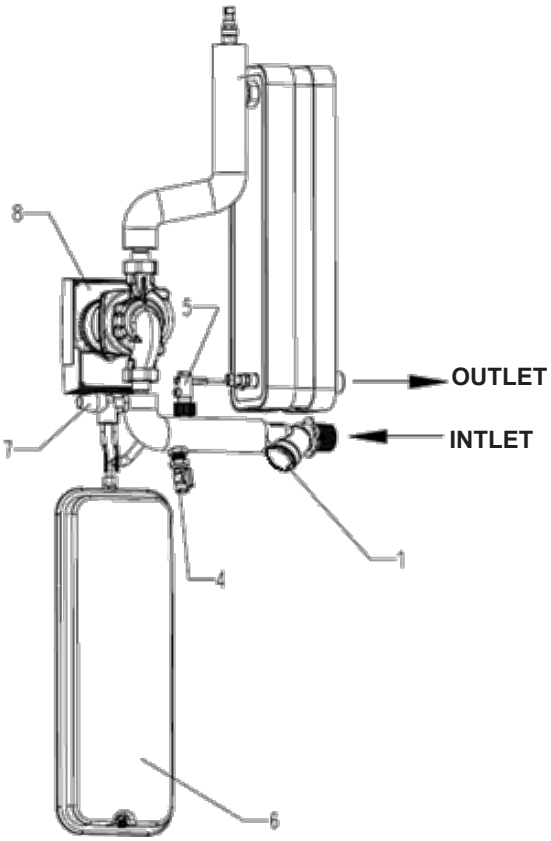
1 Pumpless: No Hydronic module
2 Hydronic module equipped with fixed speed single pump
3 Hydraulic module equipped with variable speed single pump (low available pressure)

CAUTION: The use of the hydronic module on open loop is prohibited.

Fixed speed pump



Variable speed pump



Legend:

1 Mesh filter (1.2mm mesh)
4 Water drain valve
5 Paddle flow switch
6 Expansion tank (8 litre / 1.0 bar g)
7 Safety valve (3.0 bar g)
8 Pump

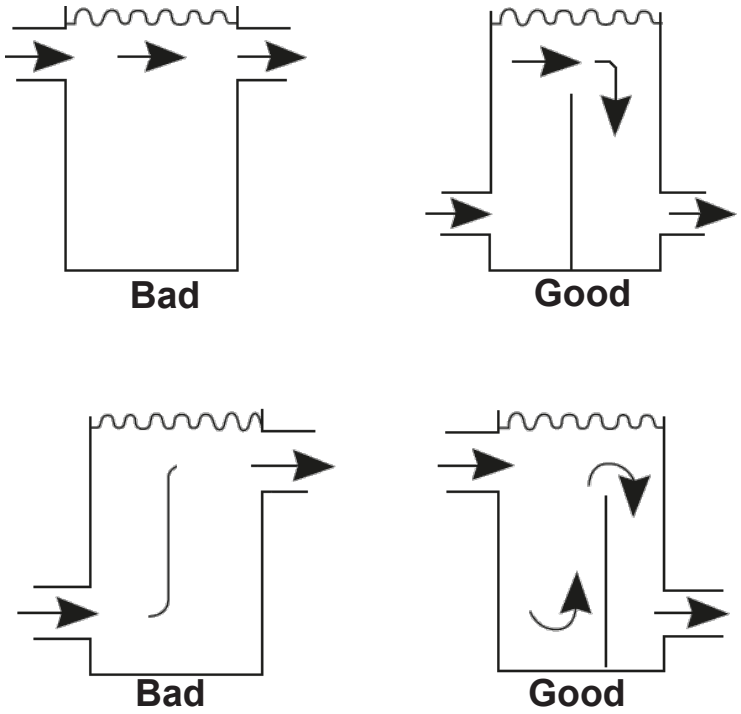
Both Fixed speed and variable speed Hydronics modules come with an expansion tank.

7.4 Minimum water loop volume

This volume is required to obtain temperature stability and precision:-

Application	RUA-CP	1701H*	2101H*
Air Conditioning	L	52.2	65.1
Heating or DHW application	L	102.6	126.6

To achieve the minimum water volume, it may be necessary to add a storage tank to the circuit.This tank should be equipped with baffles to allow mixing of the fluid (water or brine). Please refer to the examples below:



7.5 Maximum water loop volume

Units supplied with the optional hydronic module incorporate an 8L expansion tank that limits the water loop volume. The table below gives the maximum loop volume for pure water or ethylene glycol with various concentrations.

If the total system volume is higher than the values given above, the installer must add another expansion tank, suitable for the additional volume.

Static pressure	bar g	1.0	1.5	2.0	2.5	3
Fresh water	L	250	200	150	100	50
Ethylene glycol 10%	L	190.5	150	109	68.5	28
Ethylene glycol 20%	L	137	110	82.5	55	28
Ethylene glycol 30%	L	112	90	67.5	45	23
Ethylene glycol 40%	L	95	76	57	38	19

7.6 Water charging

Fill the heating system with water until the system water pressure is 0.2MPa (2.0 bar g). Check all of the water side connections to ensure that all connections are watertight and that there is no water leakage.
During the water filling air may be trapped in the heating system / pipework. Release all air trapped in the system using the air purge valves (locally supplied) fitted to the system.
The hydraulic pressure may drop when the system test run begins. If the hydraulic pressure drops refill the heating system until the water pressure is 0.2MPa (2.0 bar g).

7.7 Water flow rate control

If the installation flow rate is below the minimum flow rate, there is a risk of excessive fouling and of the system stopping due to the internal low water flow control.

The maximum flow rate is limited by the permitted water heat exchanger pressure drop. Also, a minimum water heat exchanger ΔT of 2.8 K must be guaranteed, which corresponds to a water flow rate of 5.4 l/m per kW.

Details for the plate heat exchanger water flow rate are shown below:

Monobloc outdoor units without hydronic module		
	Minimum Water flow rate, l/s	Maximum water flow rate, l/s
RUA – CP1701H*	0.45	1.3
RUA – CP2101H*	0.57	1.5

Monobloc outdoor units with fixed speed hydronic module		
	Minimum Water flow rate, l/s	Maximum water flow rate, l/s
RUA – CP1701H*	0.45	1.4
RUA – CP2101H*	0.57	1.6

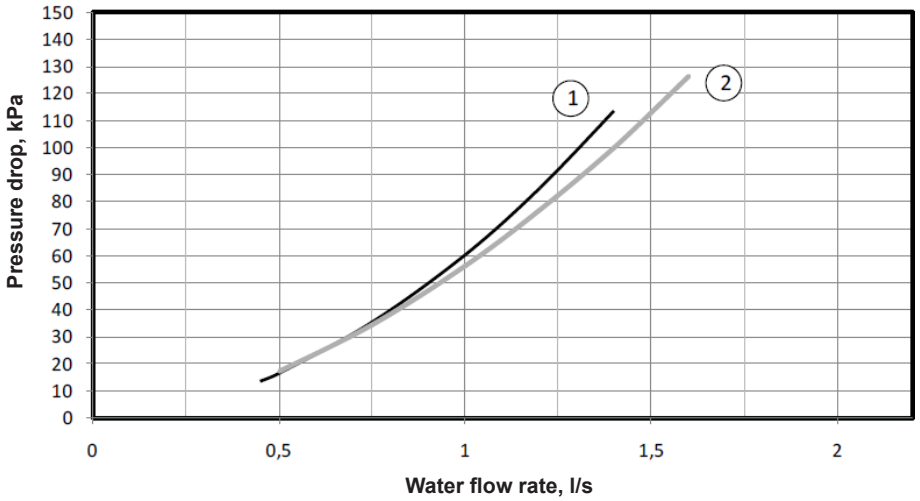
Monobloc outdoor units with variable speed hydronic module		
	Minimum Water flow rate, l/s	Maximum water flow rate, l/s
RUA – CP1701H*	0.45	1.2
RUA – CP2101H*	0.57	1.2

The data shown above is applicable for fresh water at a temperature of 20°C (if glycol is used in the system then the maximum water flow rate is reduced)

Plate heat exchanger pressure drop (including internal piping)

Units without hydronic module

Pressure drop for unit without hydronic module 17 and 21 kW (heat exchanger + internal piping)

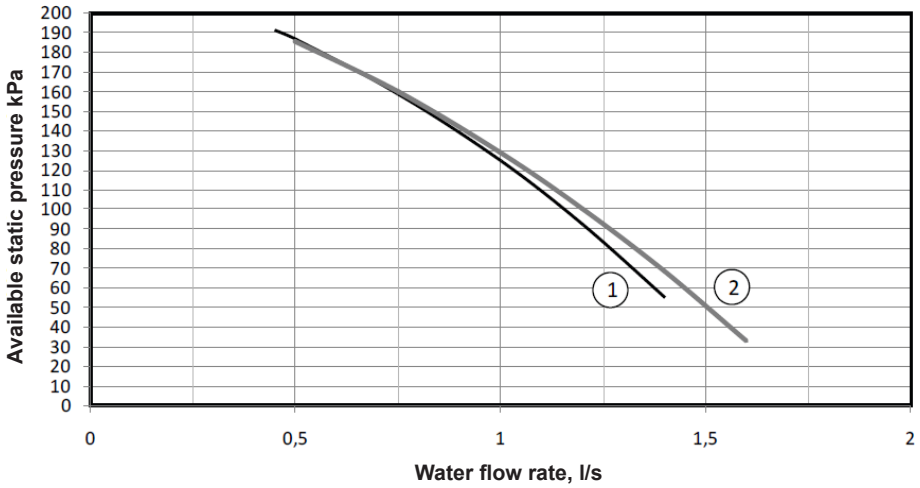


Legend:
① RUA-CP1701H*
② RUA-CP2101H*

Data for fresh water at 20°C

Available external static pressure

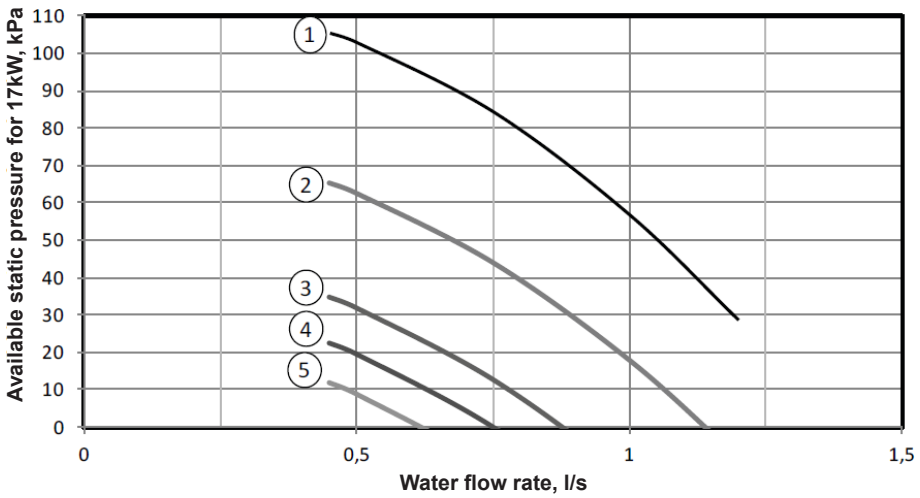
Available external static pressure for unit with fixed speed hydronic module 17 and 21kW



Legend:
① RUA-CP1701H*
② RUA-CP2101H*

Data for fresh water at 20°C
Maximum flow rate reduced if glycol is used in the heating system

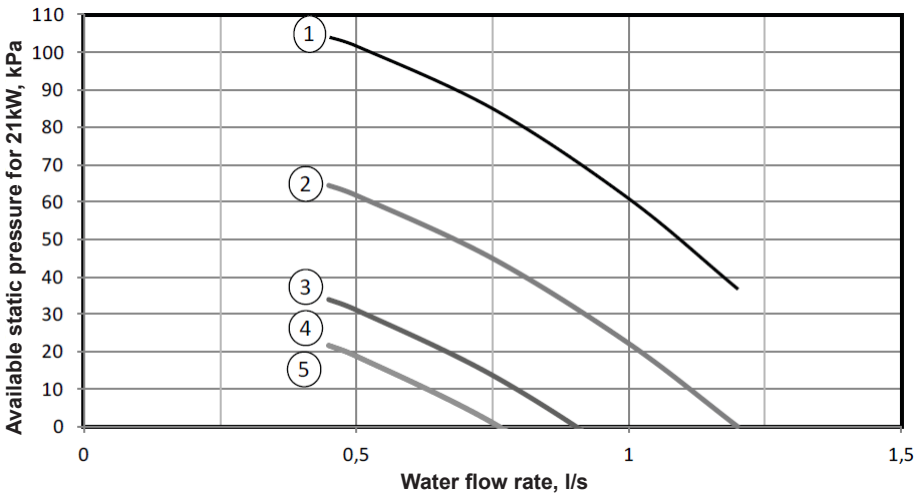
Available external static pressure for 17kW unit with variable speed hydronic module



Legend:
① Pump speed = 100%
② Pump speed = 75%
③ Pump speed = 50%
④ Pump speed = 38%
⑤ Pump speed = 25%

Data for fresh water at 20°C
Maximum flow rate reduced if glycol is used in the heating system

Available external static pressure for 21kW unit with variable speed hydronic module



Legend:

① Pump speed = 100%
② Pump speed = 75%
③ Pump speed = 50%
④ Pump speed = 38%
⑤ Pump speed = 25%

Data for fresh water at 20°C
Maximum flow rate reduced if glycol is used in the heating system

7.8 Electrical connections

⚠ WARNING

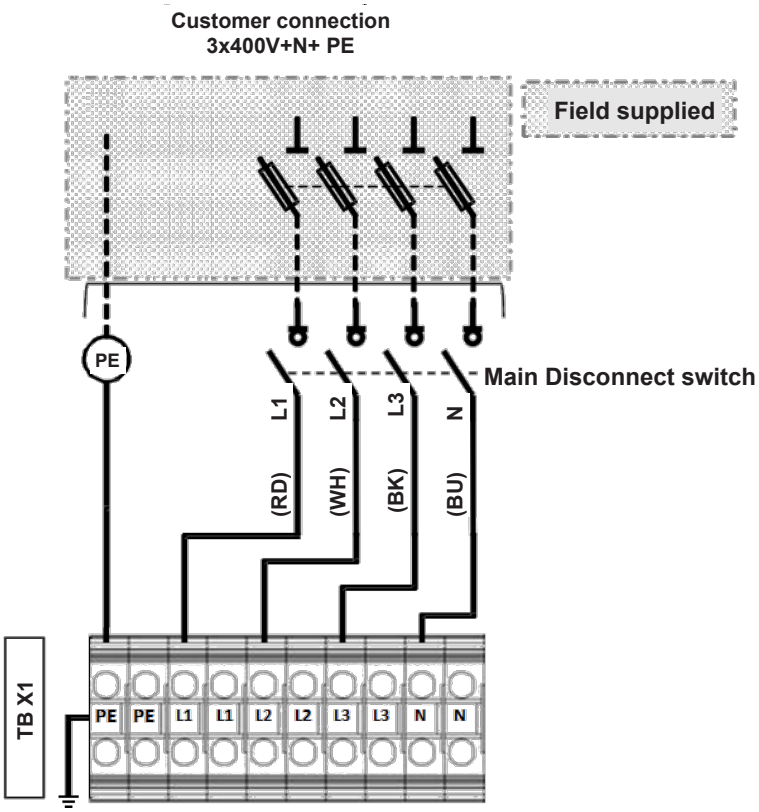
- Ensure electrical circuits are isolated before commencing the electrical installation.
- The electrical installation must be completed by a qualified electrician.
- The electrical installation must comply to all Local, National and International electrical installation regulations.
- This product must be earthed in accordance with Local, National and International electrical installation regulations.

⚠ Monobloc Outdoor Unit CAUTION

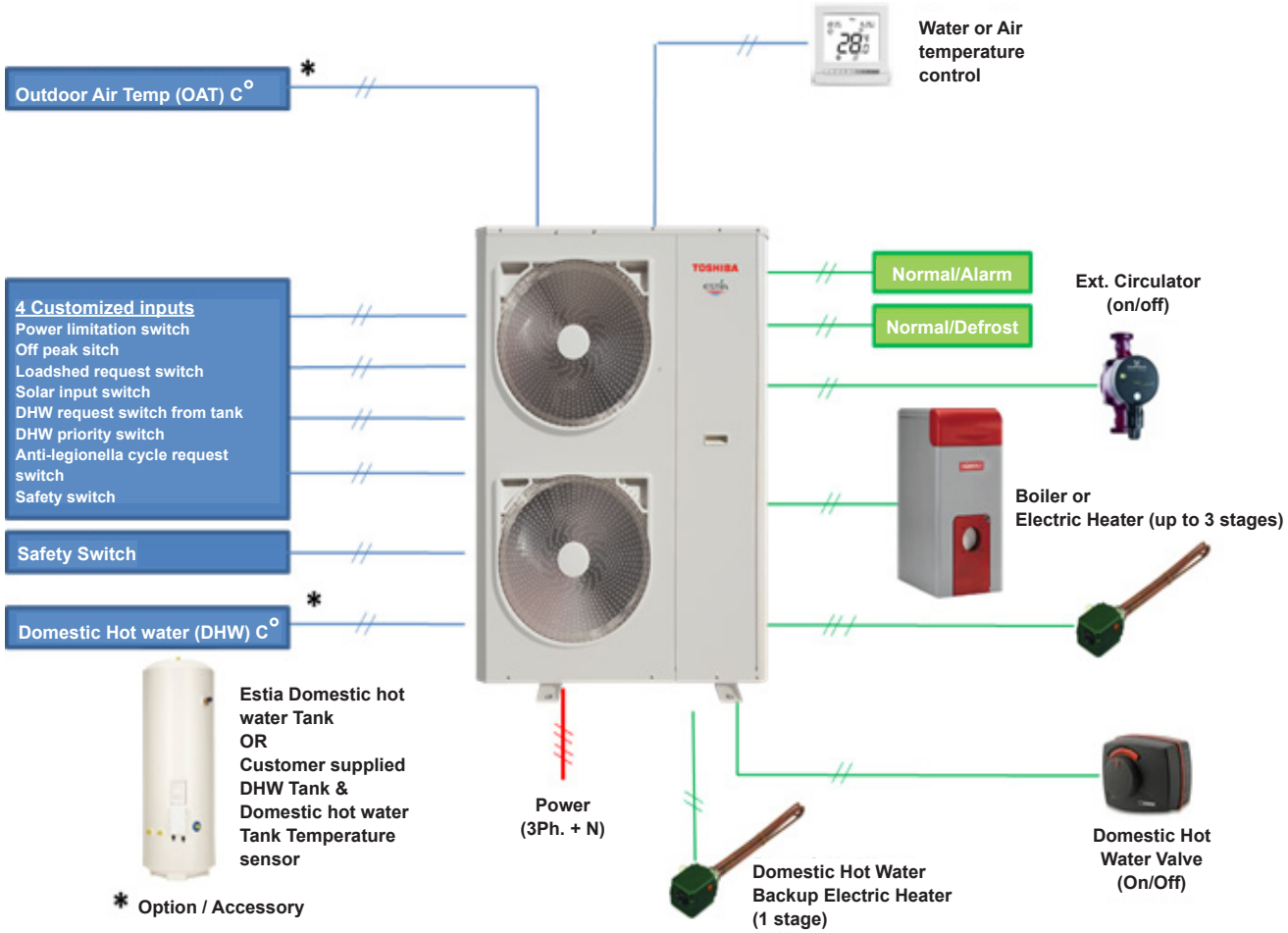
- The Monobloc outdoor unit must be connected to a dedicated power supply for the back up heater circuit.
- The electrical supply must be protected by a suitably sized over current protection device (fuse, MCB etc.) and an earth leakage protection device.
- The Monobloc outdoor Unit must be connected to the mains power supply using a isolating switch which disconnects all poles and has a contact separation of at least 3 mm.
- The cord clamps, attached to the Monobloc outdoor unit, must be used to secure the electrical cables.
- Wrong connection of electrical cables may result in electrical component failure or fire.
- Ensure the electrical cables are sized in accordance with the installation instructions.

Please refer to the certified wiring diagram supplied with the unit.

7.8.1 Power Line Connection



7.8.2 Control Line Connection



7.8.3 Electrical supply / cable specifications

Cable specifications (power)

The power supply must conform to the specification on the Monobloc outdoor unit nameplate. The supply voltage must be within the range specified in the electrical data table shown below:

Model Name (RUA)	Power Supply[1]	Maximum Current (A)	Installation Fuse Rating (A)[2]	Power Wire (mm^2)[3]	Connection Destination
CP1701H*	360-440V 3N~ 50Hz	18.5	25	4	TB X1 L1, L2, L3, N
CP2101H*	360-440V 3N~ 50Hz	21.2	25	4	

Note:

1 Nominal power supply = 400V 3N~ 50Hz

2 When using a circuit breaker use 25A Type C
When using fuses use 25A Type gG

3 Use H07RNF cable to connect the power supply to the Monobloc outdoor unit.
Maximum permissible cable = 5G6mm^2
The maximum cable length will be determined by the installation method (free air, conduit etc.) and the volt drop for the circuit (maximum permissible volt drop ≤5%)

⚠ ***CAUTION:***

After the unit has been commissioned, the power supply must only be disconnected for quick maintenance operations (one day maximum). For longer maintenance operations or when the unit is taken out of service and stored (e.g. during the winter or if the unit does not need to generate cooling) the power supply must be maintained to ensure supply to the electric heaters (compressor coil heater, unit frost protection).

Recommended wire sections

Wire sizing is the responsibility of the installer, and depends on the characteristics and regulations applicable to each installation site. The following is only to be used as a guideline, and does not make Manufacturer in any way liable. After wire sizing has been completed, using the certified dimensional drawing, the installer must ensure easy connection and define any modifications necessary on site.

The connections provided as standard for the field-supplied power entry cables are designed for the number and type of wires, listed in the table below.

The calculations are based on the maximum machine current (see nameplate and electrical data tables), and standard installation practises, in accordance with IEC 60364, table 52C have been applied:

- No. 17: suspended aerial lines,
- No. 61: buried conduit with a derating coefficient of 20.

The calculation is based on PVC or XLPE insulated cables with copper core. A maximum ambient temperature of 46°C has been taken into consideration. The given wire length limits the voltage drop to < 5% (length L in metres - see table below).

IMPORTANT:

Before connection of the main power cables (L1 - L2 - L3 – N - PE) on the terminal block, it is imperative to check the correct order of the 3 phases before proceeding to the connection and the good connection of the neutral wire (if the neutral conductor is not connected correctly, the unit can be damaged permanently).

7.8.4 Control cable specifications (dependant on parameter settings)

Description	Designation	Line Spec.	Length	Cross Sectional Area (mm^2)	Connection Destination (TB X2)
Integrated sensor for Estia DHW cylinder (10KOhm)	AO#01	2 wire	6m (Max.)	≥0.75	14, 18
Accessory Sensor for field supply DHW cylinder (10KOhm)	AO#01	2 wire (Integrated)	6m	≥0.75	14, 18
Chiller water system temperature sensor (5KOhm)	AO#02	2 wire (integrated)	15m	≥0.75	15, 18
Outdoor air temperature sensor (3KOhm)	AO#04	2 wire	50m (Max.)	≥0.5	17, 18
Remote controller (WUI)	12V, B-, 0v, B+	4 wire	50m (Max.)	≥0.75	24, 3, 25, 1

7.8.5 Output line specifications (dependant on parameter settings)

Description	Designation	Output	Maximum Current	Connection Destination (TB X2)
Main water pump (Fixed Speed)	DO#01	230VAC (Relay)	5A *	30, 32
Additional water pump	DO#03	230VAC (Relay)	5A *	29, 32
Diverting Valve	DO#06	230VAC (Triac)	100mA Control Only **	19, 23
Electrical Heater / Boiler demand	DO#07	230VAC (Triac)	100mA Control Only **	20, 23
Customized output Alarm	DO#08	230VAC (Triac)	100mA Control Only **	21, 23
Customized output Defrost	DO#09	230VAC (Triac)	100mA Control Only **	22, 23

* The maximum total relay output is 5A if the combined specification for both a main water pump and additional water pump is higher than 5A, then field supplied contactors or relays must be used.
** The TRIAC output must only be used for control switching of field supplied contactors or relays.

7.8.6 External input line specifications

Description	Designation	Input	Connection Destination (TB X2)
ON / OFF	DI#01	Dry Contact (5V)	4, 13
Mode: Cool / Heat	DI#02	Dry Contact (5V)	5, 13
Comfort / Eco	DI#03	Dry Contact (5V)	6, 13
Safety input switch	DI#04	Dry Contact (5V)	7, 13

For connections refer to the wiring diagrams.

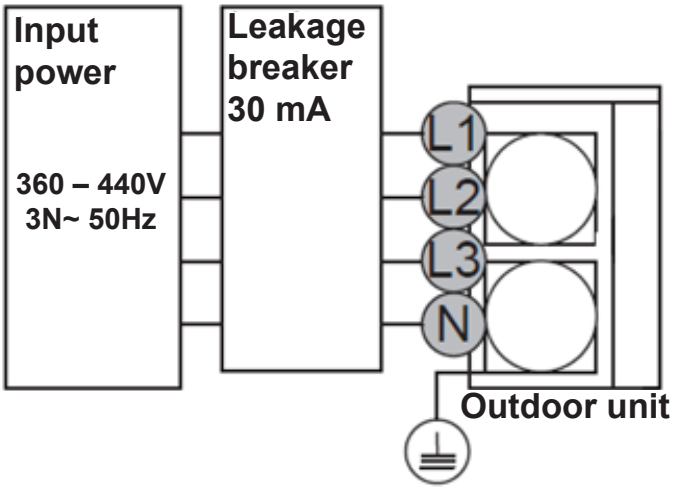
⚠ CAUTION

Earthing arrangements

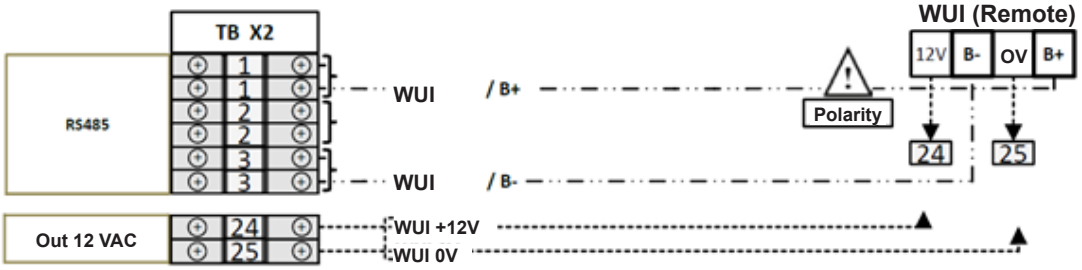
The Monobloc outdoor unit and related equipment must be earthed in accordance with your local and national electrical regulations. It is essential that the equipment is earthed to prevent the electric shock and damage to the equipment.

7.8.7 Electrical connection to the Monobloc outdoor unit

- Ensure electrical circuits are isolated before commencing work
- Remove the side cover and the electrical box cover from the Monobloc outdoor unit
- The electrical power cable, for the Monobloc outdoor unit, must be sized in accordance Local, National and International regulations. Please refer to “Cable specifications (power)” for guidance
- Connect the electrical power cable to Terminal TB X1 as shown below



7.8.8 Electrical connection for the remote controller



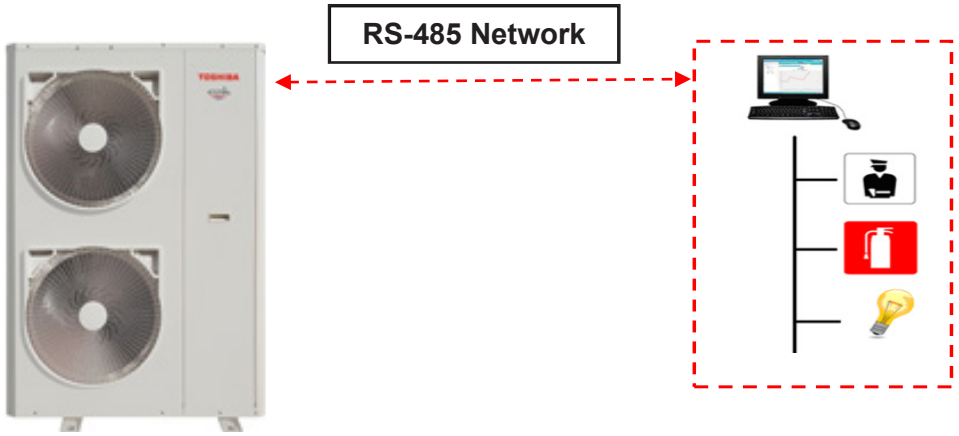
- The remote controller must be installed indoors by the installer
- Connect the remote controller to TB X2, on the Monobloc outdoor unit, in accordance with diagram shown above
- Care should be taken when connecting the remote controller as the device is polarity conscious.

Check the polarity of the connections before switching on the power to the system

7.8.9 External electrical connections – external control

JBus / ModBus Controller

As standard the Toshiba Monobloc outdoor units are supplied with a JBus / ModBus controller. The controller provides a secondary port to be connected to a system network thanks to an RS485 bus. The controller has the ability to communicate without an amplifier. The length of the bus does not exceed 500m.



Description	Line Spec.	Maximum Length (m)	Connection Destination			
RS-485 connection	2 wire shielded	500m	NHC PCB J10	Pin 1	A	+RS485
				Pin 2	GND	GND
				Pin 3	B	-RS485

Connect the RS-485 network cable to J10 on the Monobloc outdoor unit NHC PCB, using the connector supplied with the unit.

The following parameters have to be set to configure the JBus / ModBus communication:

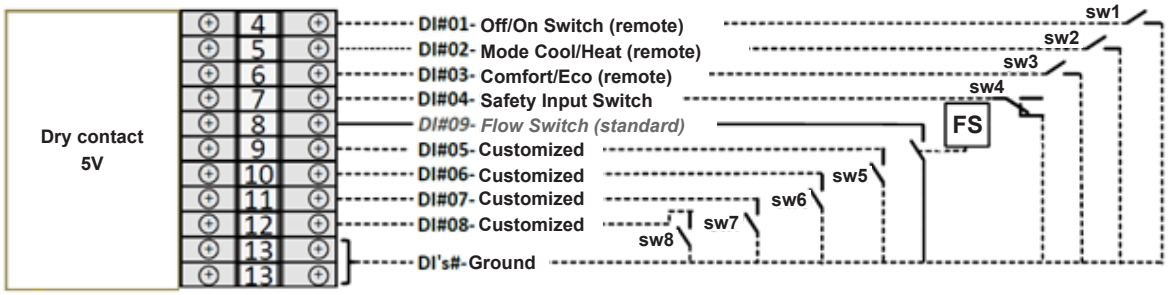
1. P761: JBus control enable
2. P762: JBus follower address
3. P646: JBus baud rate
4. P764: JBus frame type
5. P766: JBus communication timeout

Please see section 8.3 for details of the JBus register addresses.

BACnet / LON Gateways:

It is possible to connect the Toshiba Monobloc outdoor unit to either a BACnet or LON system network. These connections are possible by using a factory fitted gateway, as an optional accessory, and as such have to be ordered when the order for the Monobloc outdoor unit is placed.

7.8.10 External electrical connections – digital inputs (5V)



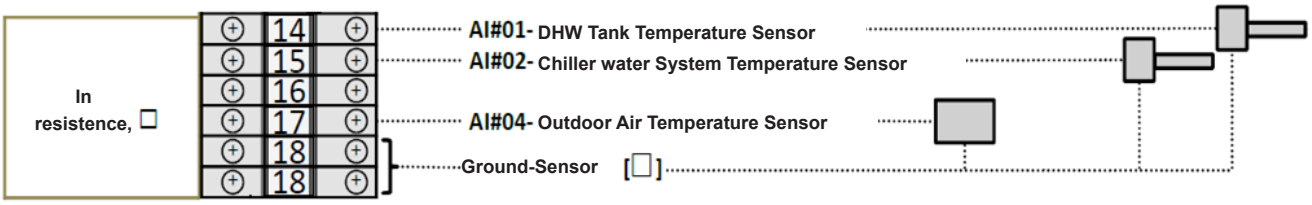
Function	Switch No	DI Open	DI Short
DI#01	SW1	Operation OFF	Operation ON
DI#02	SW2	COOL mode active	HEAT mode active
DI#03	SW3	Comfort mode active	ECO mode active
DI#04 *	SW4	Safety Input ON	Safety Input OFF
DI#05	SW5	User defined function	
DI#06	SW6	User defined function	
DI#07	SW7	User defined function	
DI#08	SW8	User defined function	
DI#09	FS	No water flow detected	Water flow detected

*** DI#04 is a normally closed contact, a wire bridge is provided from the factory between T7 & T13**

Some modes described below (summer mode / night mode…) could be activated or deactivated by switches. Moreover other remote contacts can be connected to the unit in order to add new features. If the unit is managed by remote contacts, it is necessary to change the value of parameter User Interface type with [P521] = 1.

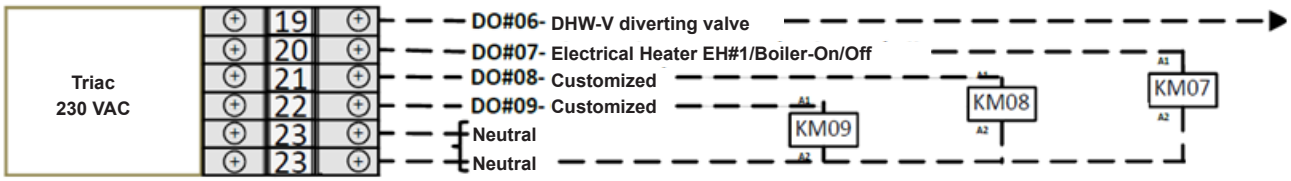
Switch	Definition
ON/OFF switch (remote)	Used to START / STOP the unit (in no user interface)
Mode Heat/Cool (remote)	Used to select (if no user interface): - Cooling Mode = contact opened - Heating Mode = contact closed
Normal/Eco (remote)	Used to select (if no user interface): - Home (Normal) Mode = contact opened - Away (Eco) Mode = contact closed
Safety Input Contact	This contact should be a 'normally closed' type. Parameter [P501] is used to configure the safety contact type: 1 = Full Safety Contact: unit is stopped when contact is opened 2 = Under Floor Heating Safety Contact: Heating Mode is not allowed when contact is opened 3 = Under Floor Cooling Safety Contact: Cooling Mode is not allowed when contact is opened
Power Limitation Contact (Night Mode)	Used to reduce the compressor maximum frequency to avoid noise
Off Peak Contact	This switch is to close when the rate electricity price is high (Electric Heat Stages are not allowed)
Loadshed Request Switch	This contact is requested by electricity company (i.e. in Germany) to control the green electricity (wind, solar) production and consumption more efficiently. When the switch is closed the unit shall be stopped as soon as possible
Solar Input Contact	When switch is closed then the unit is not allowed to run in Heating or DHW Mode because hot water is produced from a solar source
DHW Request Switch from tank	When this input is closed, the Domestic Hot Water production is requested. A thermal switch mounted on the Domestic Hot Water tank shall be connected to this input
DHW Priority Button (thermal switch)	When the status of this input is pulsed open > closed > open (falling edge), the unit is switched to Domestic Hot Water production for the programmed duration [P115] regardless of the Space Heating demand and the current DHW schedule
Anti-Legionella Cycle Request Button	When the status of this input is pulsed open > closed > open (falling edge), the Domestic Hot Water production is requested with the Anti-Legionella setpoint
Summer Switch	Used to select the Summer Mode (contact closed)
Energy Meter Input	This input is used to count the number of pulses received from an external energy meter (not supplied)
External Alarm Indication Input	When this input is opened, alarm is tripped. This alarm is for information only, it does not affect the unit operation.

7.8.11 External electrical connections – analogue inputs (resistance)



Function	Description	Set Up Parameter
AI#01	DHW cylinder temperature sensor	P719
AI#02	Chiller water system temperature sensor	-
AI#04	Outdoor air temperature sensor	P511

7.8.12 External electrical connections – digital outputs (230VAC Triac)



Function	Description
DO#06	DHW 3-way diverting valve
DO#07	Electrical heater EH#1 / boiler ON/OFF
DO#08	User defined function
DO#09	User defined function

3-way valve (diverter) connection

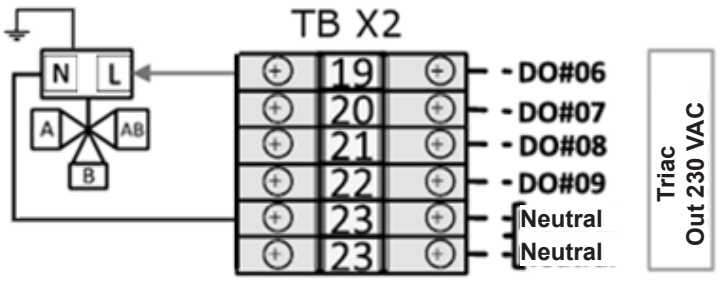
The 3-way diverter valve is used to select either domestic hot water or space heating operation
Recommended valve specification:

- Kvs = 16
- Max. Temperature = 150°C
- L-Port style

2 Types of 3-way valve (diverter) can be used:

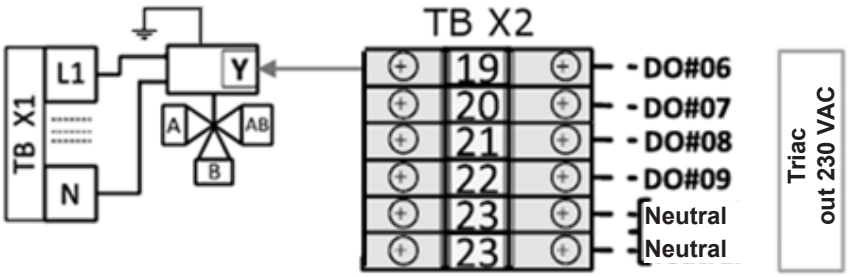
- 2-Wire (Spring Return)
- 3-Wire SPST

2-Wire (Spring Return)



3-Wire (SPST)

- Ensure 230VAC is not applied to terminal 19 on TB X2

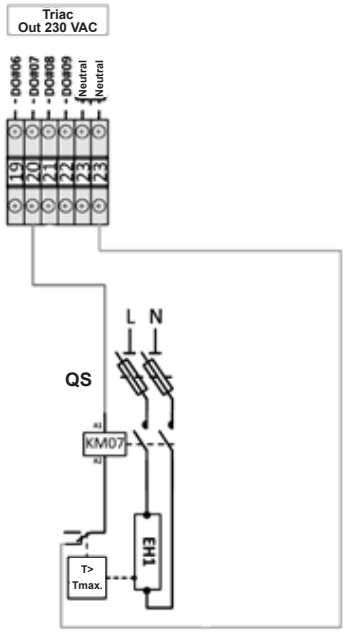


External electrical heater connection / boiler ON/OFF signal

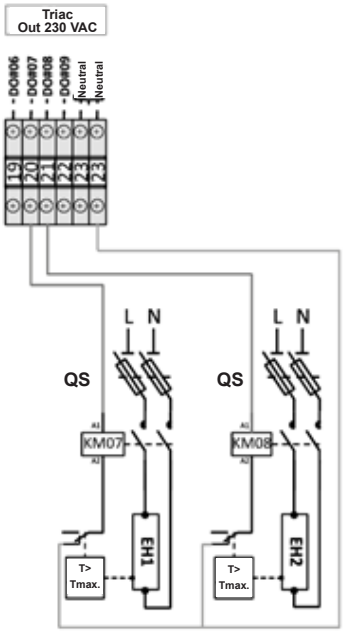
NOTE:

- It is possible to include electric heaters in the hydraulic circuit to ensure heating in case of low OAT or heat pump failure
- The installer is responsible for ensuring that the installation complies with the applicable legislation in terms of electrical and thermal safety

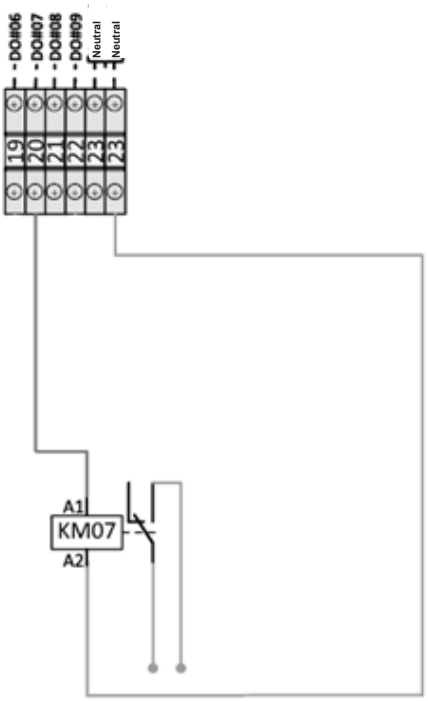
One stage electrical heater



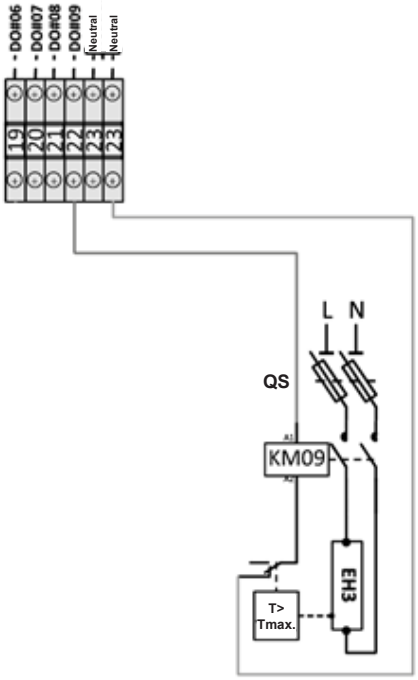
Two stage electrical heater



Boiler ON/OFF



DHW cylinder heater connection (optional)



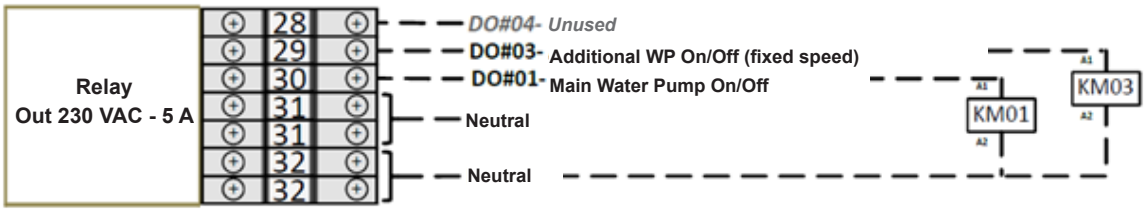
Depending on the configuration, it is possible to control up to three electric heaters or three electric heat stages

i) One electric heat stage with one customized discrete output: EH1
ii) Two electric heat stages with two customized discrete outputs: EH1 and EH2
iii) Three electric heat stages with two customized discrete outputs: EH1 and EH2
iv) Three electric heat stages* with three customized discrete outputs: EH1 and EH2 and EH3.
**__*This configuration cannot be activated if DHW heater is present.*__*

The boiler ON/OFF and the stage 1 electric heater use the same output. It is not possible to operate the boiler ON/OFF and the stage 1 electric heater at the same time.

Each discrete output can control a contactor (not supplied with the unit).

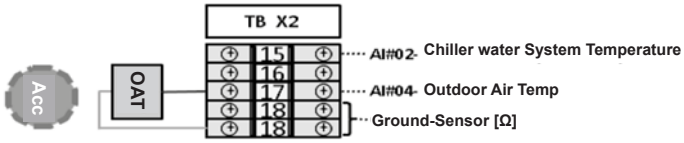
7.8.13 External electrical connections – digital outputs (230VAC relay)



Function	Description
DO#01	Main water pump ON/OFF
DO#03	Additional water pump ON/OFF
DO#04	No function (future development)

7.8.14 External electrical connections – additional outside air temperature (OAT) sensor

If the unit is unfavourably located, leading to incorrect reading of OAT, it is possible to install an additional outdoor air temperature sensor, located in an appropriate position. Follow the connection details as shown below. Use parameter P511 to configure the OAT sensor.
This sensor is available as an accessory. For more details on its installation, refer to accessory document.



7.8.15 External electrical connections – Header / Follower system configuration

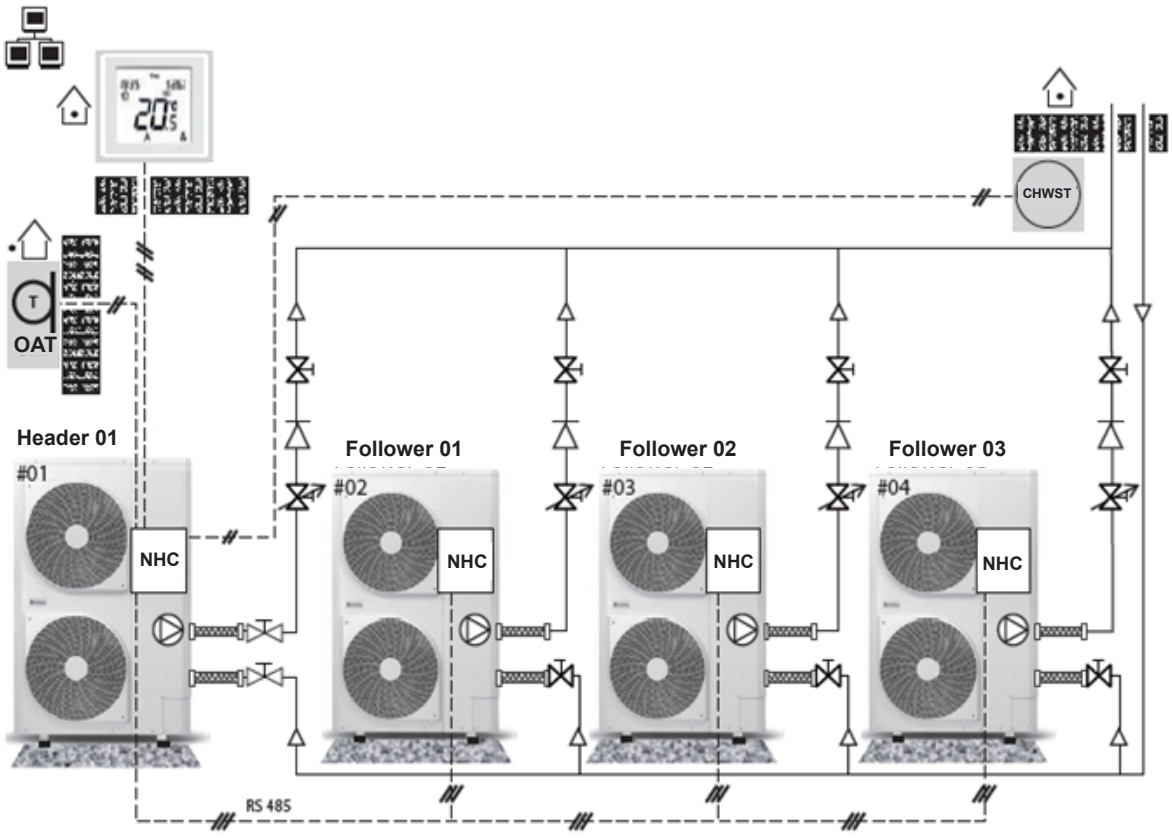
A header / follower installation permits connection of up to four units in parallel: one header unit can control from one to three follower units.
This kind of installation must comprise:

- same unit size (17kW or 21kW)
- equipped with hydronic kit (variable or fixed speed kit).

If the unit is fitted with a variable speed hydraulic kit, the pump must be controlled by the adjustable constant speed logic (no ΔT logic).The header / follower operation is incompatible with Domestic Hot Water production.

Only the header unit can be fitted with remote controller and BACnet or LON gateway options.

An additional common leaving water temperature sensor must be installed on site, on the common piping.



8.0 System configuration

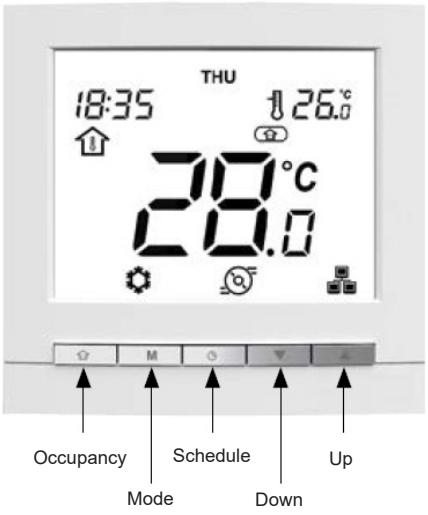
Internal parameters are software codes that can be adjusted to optimize the performance of the system depending on the installation and the customers' requirements.
There are 3 access levels for the system Parameters:

1. Access to parameters not allowed
2. Access to end user parameters only
3. Access to End User and Service parameters

Details of the parameter setting procedure and a list of available parameters are shown in the following sections.

8.1 Parameter setting procedure

The parameters, used to optimize the performance of the system, are accessed using the remote controller:

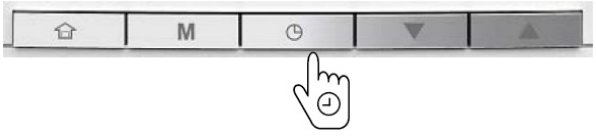


There are two steps required to set up the system parameters:

8.1.1 Initial step of configuration: Setting the time and day

Before using any parameter menu on the WUI, it is necessary to set the time and day of the control.
The following sections explain the procedures for unit with user interface. If there is no user interface on the unit, it is necessary to use Customer communication bus (Proprietary Protocol or Jbus) to configure the unit.

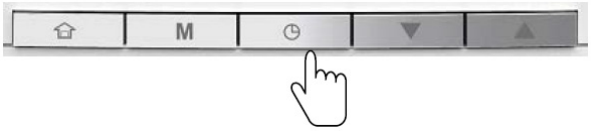
To access the time configuration menu, press and hold the **Schedule** key for 2 seconds.



Day of the week setting
The current day starts flashing:

If necessary, **press** the **Down** key or the **Up** key to change the day of the week.

Press the **Schedule** key to confirm your selection and go to the next parameter.

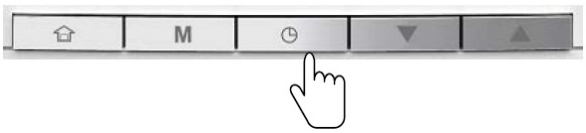


Time format setting
Once the day of the week has been confirmed, set the time format. Press the **Down** key or the **Up** key to change the time format.

12-hour format

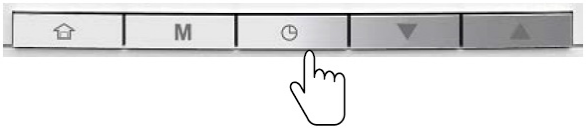
24-hour format

Press the **Schedule** key to confirm the time display.



Time setting:
Once the time format has been confirmed, set the time. Press the **Down** key or **the Up** key to set the time.

For 24-hour format: Set the hour and press the **Schedule** key to confirm. Then, set minutes and press the **Schedule** key to confirm.
To confirm all changes, press and hold the Schedule key for 2 seconds.



8.1.2 Second step of configuration: Parameter menu

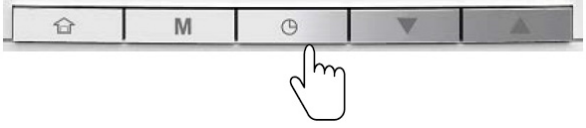
According to the application of unit, several parameters are to be configured to allow the correct operation of system. The following sections explain some standard cases of installation. But to configure the unit, it is necessary to access the parameter menu. If there is no user interface on the unit, it is necessary to use Customer communication bus (Proprietary Protocol or Jbus) to configure the unit. Otherwise in the case with user interface, follow the next procedure.

To access the parameter menu
If the user interface is in standby mode, press one key to activate the remote controller screen. Press and hold the **Occupancy** key and the **Schedule** key simultaneously for 2 seconds.

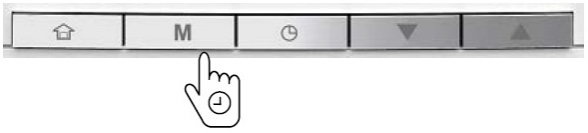
The password screen is displayed:

Enter the password: **0120**. To change the number, press the **Up** or **Down** key.

To validate each number, press the **Schedule** key.



To validate the password and access parameter configuration, press and hold the **Mode** key for 2 seconds.



To navigate in the parameter menu

a - First possibility - Press and hold the **Up** or **Down** key.

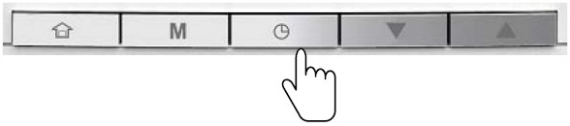
Select the Parameter Number with the **Up** or **Down** key. Scroll until the required parameter is reached.

b - Second possibility

Press the **Up** or **Down** key until reach the required parameter.

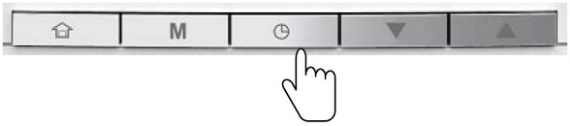
To change a setting

Press and hold the **Schedule** key for 2 seconds.

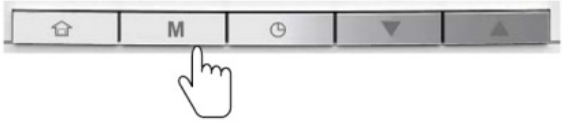


To change the value of one digit, press the **Up** or **Down** key.

To validate each digit, press the **Schedule** key.



Repeat these steps for each digit of the setting. When all the digits are selected and correct, press the **Mode** key to freeze the value.



Next navigate through the parameter menu and configure all those necessary for the correct operation of the unit (refer to the following sections).

To exit the parameter menu

Press and hold the **Occupancy** key until the home screen is displayed.

8.2 Parameter setting list

No.	Step	Parameter Description	Para No.	Range	Default
User Configuration Codes					
1	User configuration	User interface type: Selects type of user interface connected to the system: 0 = No user interface (RC will not initiate communication) 1 = Remote control by contacts 2 = RC remotely installed in the house (Air setpoint) 3 = RC remotely installed in the house (Water setpoint)	521	0 ~ 3	0
2		Parameter access levels: Selects the level of access to internal parameters: 0 = Access to parameters not allowed 1 = Access to User parameters only 2 = Access to User and Service parameters 3 = No use	522	0~3	3
3		Interface communication timeout: If no communication message is received from the User Interface for more than the timeout delay, the unit will be stopped and the alarm will be activated. If this parameter is set to 0, the communication timeout is ignored (sec) NOTE: If P523=0 the communication timeout is ignored	523	0 ~ 240	60
4		RC backlight timeout: The RC backlight is switched OFF when no key is pressed within a configured period of time: 0 = Backlight always OFF (disabled) 1 = 15 seconds 2 = 30 seconds 3 = 1 minute 4 = 2 minutes 5 = 5 minutes 6 = 30 minutes 7 = Always ON (backlight is always ON)	524	0 ~ 7	2
5		Buzzer on key press: Enables or disables a buzzer when the buttons on the RC are pressed	525	No / Yes	No
6		Interface time broadcast: Allows the RC to broadcast the date and time over the Network bus: No = RC shall read the Date and Time in the Main Controller Yes = RC shall broadcast Date and Time over the Network bus	526	No / Yes	Yes
7		Service password: Sets the password to access User and Service Parameters when P522=2	527	0 ~ 9999	120
8		User password: Sets the password to access User parameters when P522=1	528	0 ~ 9999	0
Water Setpoint Codes					
9	Water setpoint	Heat home setpoint: These setpoints are used when the Heating Auto Curve is selected - P581 = -1 (°C)	401	20 ~ 60	45
10		Heat sleep offset:Temperature offset applied to the heat home setpoint (P401) for night time operation (°C)	402	-10~ 0.0	0
11		Heat Away Offset:Temperature offset applied to the heat home setpoint (P401) when the property is not occupied (°C)	403	-10 ~ 0	-5
12		DHW Eco setpoint;Setpoint temperature for the DHW cylinder when the property is not occupied (°C)	404	20 ~ 60	45
13		DHW anti- bacteria setpoint: Setpoint temperature for the DHW cylinder used for the anti-bacteria cycle – used with P714 & P715 (°C)	405	50 ~ 60	60
14		DHW setpoint: Setpoint temperature used for the DHW cylinder during normal operation (°C)	406	30 ~ 60	50
15		Cool home setpoint: These setpoints are used when Cooling Auto Curve is selected – P586 = -1 (°C)	407	0 ~ 18	12
16		Cool sleep offset: Temperature offset applied to the cool home setpoint (P407) for night time operation (°C)	408	0 ~ 10	0
17		Cool away offset: Temperature offset applied to the cool home setpoint (P407) when the property is not occupied (°C)	409	0 ~ 10	0
18	Heat hysteresis	Heat hysteresis: Determines whether cooling mode should be started or stopped. Used in conjunction with Control Temp and Control point.	410	0.5 ~ 2.0	1.0
19	Cool hysteresis	Cool hysteresis: Determines whether cooling mode should be started or stopped. Used in conjunction with Control Temp and Control point.	411	0.5 ~ 2.0	0.5
20	Heat curve maximum setpoint offset	When using heating climatic curves, the Heat maximum water setpoint (P585) can be offset by the Heat curve maximum setpoint offset to suit customer needs.	412	-5 ~ 5	0
21	Cool curve minimum setpoint offset	When using cooling climatic curves, the Cool minimum water setpoint (P589) can be offset by the Cool curve minimum setpoint offset to suit customer needs.	413	-5 ~ 5	0

No.	Step	Parameter Description	Para No.	Range	Default
Compressor Configuration Codes					
22	Compressor Configuration	Power limitation value: The compressor frequency is limited to this percentage of the maximum allowed frequency when the *Frequency Reduction Mode (P068)* parameter [FREQ_RED] is set to “Yes” (LOADFACT). It can be activated with the power limitation switch. (%)	541	50 ~ 100	75
23	Compressor Configuration	Night limitation value: The compressor frequency is limited to this percentage of the maximum allowed frequency when the Night Mode is active. (%)	542	50 ~ 100	75
24		DHW limitation value The compressor frequency is limited to this percentage of the maximum allowed frequency when running in Domestic Hot Water Mode.	543	50 ~ 100	100
Pump Configuration Codes					
25	Pump configuration	Fluid type: Sets the fluid type in the heating circuit: 1 = Water; fluid type is always set to “water”	560	1	1
26		External main pump control: This parameter is taken into consideration only when Factory Par. 804 is set to “0”, i.e. internal pump is NOT available. If there is no internal pump on the unit, then the external pump control can be enabled.	561	No / Yes	No
27		Flow checked if pump OFF: Allows the water flow rate to be checked if the water pump is OFF	562	No / Yes	Yes
28		Anti seize function : Pump anti seize function: The pump is started and run for 30 seconds provided that the pump has been inactive for 24 hours 0 = anti seize function disabled 1 =anti seize function enabled	563	0~1	1
29		Pump sampling time standby: Pump sampling time (Stdby): If no user interface or local user interface and P565=2 then the water pump will cycle, depending on the value of P564 in order to obtain a correct refreshed water control measurement (minute) Must be used with P565=2 to enable this control	564	5~240	15
30		Main pump logic: This parameter is used to define the state of the pump in Standby mode: 1 = Always On 2 = Water Sampling (RC local, On/Off according to P564) 3 = According to Space Temp (RC remote as Thermostat)	565	1 ~ 3	1
31		Variable speed pump logic: Allows the variable speed pump logic to be set depending on installation requirements: 0 = Adjustable speed (use “vsp_max” to set the fixed speed) 1 = Speed controlled by the Water Delta T	566	0 ~ 1	1
32		Minimum pump speed: Sets the minimum permissible pump speed when a variable speed pump is fitted to the Monobloc outdoor unit. (%)	567	19 ~ 50	19
33		Maximum pump speed: Sets the maximum permissible pump speed when a variable speed pump is fitted to the Monobloc outdoor unit. (%)	568	50 ~ 100	100
34		Water ΔT set-point	569	2.0~20.0	5.0
35		**ΔT proportional gain**	570	-10.000 ~ -0.001	-6.000
36		**ΔT integral time**	571	10 ~ 120	20
37		**ΔT sample time**	572	10 ~ 120	10
38		Additional pump logic: This parameter defines the status of the additional pump when the unit is in Standby: 0 = No additional Pump (no add. Pump logic active) 1 = Always On 2 = According to Space Temp (RC remote) 3 = Always On, but Off when DHW is active 4 = According to Space Temp (RC), but Off when DHW is active	573	0 ~ 4	0
Climatic Curves Codes					
39	**Climatic Curve Settings**	Heat Clim Curve Select : -1 = No Curve / Fixed Water Setpoint 0 = Custom Climatic Curve using the following parameters (P582 to P585) 1 = Heating Climatic Curve #1 2 = Heating Climatic Curve #2 3 = Heating Climatic Curve #3 4 = Heating Climatic Curve #4 … 12 = Heating Climatic Curve #12	581	-1 ~ 12	-1

No.	Step	Parameter Description	Para No.	Range	Default
40	**Climatic Curve Settings**	Heat Minimum OAT (°C)	582	-30 ~ 10	-7.0
41		Heat Maximum OAT (°C)	583	10 ~ 30	20
42		Heat Min Water Setpoint (°C)	584	20 ~ 40	20
43		Heat Max Water Setpoint (°C)	585	30 ~ 60	38
44		Cool Clim Curve Select: -1 = No Curve / Fixed Water Setpoint 0 = Custom Climatic Curve using the following parameters (P587 to P590) 1 = Cooling Climatic Curve #1 2 = Cooling Climatic Curve #2	586	-1 ~ 2	-1
45		Cool Minimum OAT (°C)	587	0 ~ 30	20
46		Cool Maximum OAT (°C)	588	24 ~ 46	35
47		Cool Min Water Setpoint (°C)	589	5 ~ 20	10
48		Cool Max Water Setpoint (°C)	590	5 ~ 20	18
Drying Mode Codes					
49	**Floor drying mode**	Drying Starting Setpoint (°C)	595	20 ~ 40	20
50		Drying Warm-up days	596	0 ~ 99	3
51		Drying Ramp-up days	597	0 ~ 99	4
52		Drying Hold-up days	598	0 ~ 99	4
Backup Configuration Codes					
53	**Backup configuration**	Backup Type 0 = No backup 1 = Booster by 1 Electric Heating Stage (EH1) 2 = Booster by 2 Electric Heating Stages (EH1/EH2) * 3 = Booster by 3 Electric Heating Stages with 2 outputs (EH1/EH2) * 4 = Booster by 3 Electric Heating Stages with 3 outputs (EH1/EH2/EH3) ** 5 = DHW Backup (EH3) *** 6 = Booster by 1 Electric Heating Stage (EH1) + DHW Backup (EH3) *** 7 = Booster by 2 Electric Heating Stages (EH1/EH2) + DHW Backup (EH3) ** 8 = Booster by 3 Electric Heating Stages with 2 outputs (EH1/EH2) + DHW Backup (EH3) ** 9 = Backup by Oil or Gas Boiler * One Customer Discrete Output shall be configured as EH2: [P506] = 10 or [P507] = 10 ** Both Customer Discrete Outputs shall be configured as EH2 and EH3: [P506] = 10, [P507] = 11 *** One Customer Discrete Output shall be configured as EH3: [P506] = 11 or [P507] = 11	601	0 ~ 9	0
54		Booster Warm Up Time (min)	602	5 ~ 120	30
55		Booster Delta Temp (°C)	603	1 ~ 20	5
56		Booster OAT Threshold: The backup heating is allowed to run if OAT goes below this threshold (with 1 K hysteresis). See also the *Backup Type* Parameter (P601). (°C)	604	-30 ~ 15	-7
57		EHS Proportional Gain	605	0.001 ~ 10.000	2.000
58		EHS Integral Time (sec)	606	10 ~ 240	30
59		EHS Sampling Time (sec)	607	10 ~ 240	30
Domestic Hot Water Codes					
60	DHW Configuration	Domestic Hot Water Type 0 = No DHW management 1 = Diverting Valve NO 2-points (valve energized in DHW position) 2 = Diverting Valve NC 2-points (valve de-energized in DHW position) 3 = Dedicated DHW Circulator or Pump	701	0 ~ 3	0
61		DHW 3-way Valve run time (sec)	702	0 ~ 240	30
62		DHW Priority: 0 = Automatic Priority 1 = Priority to Domestic Hot Water 2 = Priority to Space Heating	703	0 ~ 2	0
63		SHC Minimum Runtime (min)	704	0 ~ 720	20
64		SHC Maximum Runtime If this parameter is configured to -1, maximum SHC or DHW Runtime is ignored. Note: If SHC Maximum Runtime is set ([P705], it is also necessary to set DHW Maximum Runtime [P707]. Otherwise, the unit will **never** switch back to DHW (min)	705	-1 (or 30) ~ 720	60
65		DHW Minimum Runtime (min)	706	0 ~ 720	20

No.	Step	Parameter Description	Para No.	Range	Default
66	DHW Configuration	DHW Maximum Runtime If this parameter is configured to -1, maximum SHC or DHW Runtime is ignored. Note: If SHC Maximum Runtime is set ([P705], it is also necessary to set DHW Maximum Runtime [P707]. Otherwise, the unit will **never** switch back to DHW (min)	707	-1 (or 30) ~ 720	60
67		DHW Exception Time (hr)	708	1 ~ 24	2
68		Pump Speed in DHW (variable speed pump only) (%)	710	19 ~ 100	100
69		DHW Schedule Days Domestic hot water priority request: b7 | b6 | b5 | b4 | b3 | b3 | b2 | b1 | b0 b7: Monday b6: Tuesday b5: Wednesday b4: Thursday b3: Friday b2: Saturday b1: Sunday b0: unused **Example: If value "1111 1110" is set, the DHW will be started each and every day.**	711	0000 0000 to 1111 1110	1111 1110
70		DHW Starting Time (hh:mm)	712	00:00 to 23:59	21:00
71		DHW Stopping Time (hh:mm)	713	00:00 to 23:59	06:00
72		Anti-Legionella Start DOW Anti-legionella start request day of week. b7 | b6 | b5 | b4 | b3 | b3 | b2 | b1 | b0 b7: Monday b6: Tuesday b5: Wednesday b4: Thursday b3: Friday b2: Saturday b1: Sunday b0: unused **Example: If value "1000 0000" is configured, the Anti-Legionella will be requested every Monday.**	714	0000 0000 to 1111 1111	0000 0000
73		Anti-Legionella Start Time (hh:mm)	715	00:00 ~ 23:59	02:00
74		Summer Mode OAT Threshold (°C)	716	15 ~ 30	20
75		Summer Mode On Delay: The summer mode is set when the Summer Mode switch is closed. Summer Mode is set to "On" if OAT is above *Summer Mode OAT Threshold* [P716] for at least the period of a given delay [P717] (h)	717	0 ~ 12	5
76		Summer Mode Off Delay: Summer Mode is reset if OAT goes below *Summer Mode OAT Threshold* [P716] minus 2 K for at least the period of a given delay [P718] (h)	718	0 ~ 12	5
77		DHW Tank Sensor Type 0 = DHW Thermostat (thermal switch) 1 = DHW Sensor (thermistor 10 KΩ) 2 = DHW Sensor (thermistor 5 KΩ) 3 = DHW Sensor (thermistor 3 KΩ)	719	0 ~ 3	0
78		DHW Tank Sensor Bias (°C)	720	-5 ~ 5	0
79		DHW Tank Delta T (start): DHW mode is requested if Tank Water Temperature goes below DHW Setpoint [P406] minus DHW Tank Delta T [P721] (°C)	721	2 ~ 10	5
80		EWT Delta T (stop DHW) DHW mode is stopped if EWT goes above *DHW Setpoint* [P406] minus *DHW Tank Delta T* [P722] (°C)	722	0 ~ 20	10
Header / Follower Configuration Codes					
81	Header / Follower configuration	Header / Follower Selection 0 = Disable (Unit operates in Standalone mode) 1 = Header 2 = Follower	742	0 ~ 2	0
82		Follower #1 Address: The address of the Follower unit. Please note that up to 3 follower units can be configured to operate in the same header / follower assembly	743	0 ~ 239	0

No.	Step	Parameter Description	Para No.	Range	Default
83	Header / Follower configuration	Follower #2 Address: The address of the Follower unit. Please note that up to 3 follower units can be configured to operate in the same header / follower assembly	744	0 ~ 239	0
84		Follower #3 Address: The address of the Follower unit. Please note that up to 3 follower units can be configured to operate in the same header / follower assembly	745	0 ~ 239	0
85		Capacity to Start Next Unit (%)	746	0 ~ 100	75
86		Cascade Type: This parameter is used to define the start/stop function applicable to units operating in the same header / follower assembly: 0 = Starting Header unit first, then follower units are started (beginning with the first follower and ending with the last follower); Stopping process beginning with the last follower – the header unit is stopped as the last one. 1 = Starting / Stopping units according to the wear factor 2 = All units, i.e. header and follower(s) are started/stopped at the same time	751	0 ~ 2	1
87		H/F Heat Proportional Gain	752	0.001 to 10.000	0.900
88		H/F Heat Integral Time (sec)	753	10 ~ 120	30
89		H/F Heat Sampling Time (sec)	754	10 ~ 120	30
90		H/F Cool Proportional Gain	755	-10.000 to -0.001	-6.000
91		H/F Cool Integral Time (sec)	756	10 ~ 120	30
92		H/F Cool Sampling Time (sec)	757	10 ~ 120	30
93		Header / Follower Pump Type: This parameter is used to define pump control for units operating in the header/follower assembly: 0 = No pump control 1 = Common Water Pump; a pump is installed outside the unit on the water loop and it is controlled by the Header 2 = Individual Water Pump: Running according to the Header / Follower overall status (P229); each Header or Follower unit has its own pump 3 = Individual Water Pump: Pump is stopped when the unit is satisfied	758	0 ~ 3	2
94	JBus configuration	JBus Baud Rate 0 = 9600 bauds 1 = 19200 bauds 2 = 38400 bauds	646	0 ~ 2	0
95		JBus Control Enable 0 = JBus/Modbus communication disabled 1 = JBus communication enabled 2 = Modbus communication enabled JBus and Modbus protocols are similar except for the addressing: JBus: To access register n, use “n” address. Modbus: To access register n, use “n-1” address	761	0 ~ 2	0
96		JBus Follower Address	762	1 ~ 255	11
97		JBus Frame Type 0 = No parity, 1 stop bit 1 = Odd parity, 1 stop bit 2 = Even parity, 1 stop bit 3 = No parity, 2 stop bits 4 = Odd parity, 2 stop bits 5 = Even parity, 2 stop bits	764	0 ~ 5	0
98		JBus Comm. Timeout: If no JBus request is received for more than the timeout delay, the unit will be stopped and an alarm will be activated. If this parameter is configured to “0”, the timeout is ignored (sec)	766	0 ~ 600	600

8.3 JBus Register Addresses

Par.	JBus Addr	Mnemonic	Description	Range	Unit	RC	JBus
001	0001H	OAT	Outdoor Air Temperature	-	1/10°C	RO/d	RO/F
002	0002H	IAT	Indoor Air Temperature	-	1/10°C	RO/d	RO/F
003	0003H	EWT	Entering Water Temperature	-	1/10°C	RO	RO/F
004	0004H	LWT	Leaving Water Temperature	-	1/10°C	RO	RO/F
005	0005H	TR	Refrigerant Temperature	-	1/10°C	RO	RO/F
006	0006H	SPARE_T	Spare Temperature	-	1/10°C	RO	RO/F
008	0008H	sst	Saturated Suction Temp	-	1/10°C	RO	RO
009	0009H	ts	Suction Temperature	-	1/10°C	RO	RO
010	000AH	td	Discharge Temperature	-	1/10°C	RO	RO
011	000BH	te	Lower Air Exchanger Temp	-	1/10°C	RO	RO
012	000CH	tl	Upper Air Exchanger Temp	-	1/10°C	RO	RO
013	000DH	to	Inv. Outdoor Air Temp	-	1/10°C	RO	RO
014	000EH	th	Heatsink Temperature	-	1/10°C	RO	RO
015	000FH	sh	Superheat Temperature	-	1/10 K	RO	RO
016	0010H	sh_targ	Superheat Target Temp	-	1/10 K	RO	RO
017	0011H	dc_volt	Inverter DC High Voltage	-	V	RO	RO
018	0012H	hv_stat	HV Bus Comm. Status	0/1 [Normal/Alarm]	-	RO	RO
019	0013H	inv_mod	Inverter Current Mode	-	-	RO	RO
020	0014H	freq_min	Actual Min Compr. Freq	-	1/10 Hz	RO	RO
021	0015H	freq_max	Actual Max Compr. Freq	-	1/10 Hz	RO	RO
022	0016H	FREQ_REQ	Requested Compr. Freq	-	1/10 Hz	RO	RO/F
023	0017H	freq_cur	Actual Compressor Freq	-	1/10 Hz	RO	RO
024	0018H	pmv_pos	PMV Position	0 to 500	step	RO	RO
027	001BH	upr_fan	Upper Fan Speed	0 to 1000	rpm	RO	RO
028	001CH	lwr_fan	Lower Fan Speed	0 to 1000	rpm	RO	RO
029	001DH	EXCH_HTR	Exchanger Heater	0/1 [Off/On]	-	RO	RO/F
030	001EH	BOILER	Boiler Output	0/1 [Off/On]	-	RO	RO/F
031	001FH	EHS	Electrical Heat Stages	0 to 3	-	RO	RO/F
041	0029H	CHIL_OCC	Occupancy Mode	0 to 2 [Away/Sleep/Home]	-	RW/d	RW/F
042	002AH	sum_mode	Summer Mode	0/1 [No/Yes]	-	RO	RO
043	002BH	nightmod	Night Mode	0/1 [No/Yes]	-	RO	RO
044	002CH	MOD_REQ	System Mode Request	0 to 9	-	RW/d	RW/F
045	002DH	MOD_STAT	System Mode Status	0 to 109	-	RO/d	RO
047	002FH	mod_ovr	System Mode Override	0 to xxx	-	RO	RO
048	0030H	setpoint	Current Setpoint	0.0 to 60.0	1/10°C	RW/d	RO
049	0031H	RESET	User Adjust Temperature	-5.0 to 5.0	1/10 K	RO	RO/F
051	0033H	CTRL_PNT	Control Point	0.0 to 60.0	1/10°C	RO/d	RO/F
052	0034H	CTRL_TMP	Control Temp	-40.0 to 115.0	1/10°C	RO/d	RO/F
061	003DH	cmp_req	Compressor Mode Request	-	-	RO	RO
063	003FH	cmp_stat	Compressor Mode Status	-	-	RO	RO
064	0040H	cap_ovr	Capacity Override	-	-	RO	RO
065	0041H	cap_tmr	Capacity Timer	-	s	RO	RO
066	0042H	CAP_T	Total Capacity	0 to 100	%	RO	RO/F
067	0043H	DEM_LIM	Demand Limit	0 to 100	%	RO	RO/F
068	0044H	FREQ_RED	Frequency Reduction Mode	0/1 [No/Yes]	-	RO	RO/F
069	0045H	RUNNING	Unit Running Status	0/1 [No/Yes]	-	RO	RO/F
081	0051H	pmp_ovr	Pump Override	-1 to 16	-	RO	RO
082	0052H	flow_err	Water Flow Failure	0/1 [Normal/Alarm]	-	RO	RO
083	0053H	dtstp	Current DeltaT Setpoint	-	°C	RO	RO
084	0054H	delta_t	Water Delta Temperature	-	1/10 K	RO	RO
085	0055H	PMP	Water Pump Speed	0 to 100	%	RO	RO/F
088	0058H	ADD_PMP	Additional Pump Output	0/1 [Off/On]	-	RO	RO/F
091	005BH	Backup_ovr	Backup Override	-1 to 100	-	RO	RO
092	005CH	back_flg	Backup Authorized flag	0 to 1	-	RO	RO
093	005DH	warmtime	Booster Warm Up timer	0 to 18	s	RO	RO
094	005EH	BACK_CAP	Backup Capacity	0 to 100	%	RO	RO/F
101	0065H	ONOFF_SW	On/Off Switch Status	0/1 [Open/Close]	-	RO	RO/F
102	0066H	HC_SW	Heat/Cool Switch Status	0/1 [Open/Close]	-	RO	RO/F
103	0067H	ECO_SW	Eco Switch Status	0/1 [Open/Close]	-	RO	RO/F
104	0068H	SAFE_SW	Safety Switch Status	0/1 [Open/Close]	-	RO	RO/F
105	0069H	FLOW_SW	Flow Switch Status	0/1 [Open/Close]	-	RO	RO/F
106	006AH	CUST_DI5	Customized DI#5 Status	0/1 [Open/Close]	-	RO	RO/F
107	006BH	CUST_DI6	Customized DI#6 Status	0/1 [Open/Close]	-	RO	RO/F
108	006CH	CUST_DI7	Customized DI#7 Status	0/1 [Open/Close]	-	RO	RO/F

Par.	JBus Addr	Mnemonic	Description	Range	Unit	RC	JBus
109	006DH	CUST_DI8	Customized DI#8 Status	0/1 [Open/Close]	-	RO	RO/F
110	006EH	RED_SW	Power Limitation Switch	0/1 [Open/Close]	-	RO	RO/F
111	006FH	OPEAK_SW	Off Peak Hour Switch	0/1 [Open/Close]	-	RO	RO/F
112	0070H	LSHED_SW	Loadshed Request Switch	0/1 [Open/Close]	-	RO	RO/F
113	0071H	SOLAR_SW	Solar Input Switch	0/1 [Open/Close]	-	RO	RO/F
114	0072H	DHW_REQ	DHW Request from tank	0/1 [Open/Close]	-	RO	RO/F
115	0073H	DHW_PRIO	DHW Priority Switch	0/1 [Open/Close]	-	RO	RO/F
116	0074H	DHW_ANTI	DHW Anti-Legionella Req.	0/1 [Open/Close]	-	RO	RO/F
117	0075H	SUMM_SW	Summer Switch	0/1 [Open/Close]	-	RO	RO/F
120	0078H	EXALM_SW	External Alarm Switch	0/1 [Open/Close]	-	RO	RO/F
201	00C9H	DHW_MODE	DHW Mode	0 to 2 [Eco/Anti-Leg. /Reg.]	-	RW	RO/F
202	00CAH	dhw_ovr	DHW Override	-1 to 100	-	RO	RO
203	00CBH	dhw_dem	DHW Demand from Tank	0/1 [No/Yes]	-	RO	RO
204	00CCH	dhw_cond	DHW Conditions	0/1 [True/False]	-	RO	RO
205	00CDH	DHW_CTLP	DHW Control Point	20.0 to 60.0	1/10°C	RO	RO/F
206	00CEH	DHW_TT	DHW Tank Temperature	-	1/10°C	RO	RO/F
207	00CFH	shc_time	Current SHC Runtime	-	min	RO	RO
208	00D0H	dhw_time	Current DHW Runtime	-	min	RO	RO
209	00D1H	DHW_EXCP	DHW Exception Timer	0 to 1440	min	RO	RO/F
210	00D2H	DHW_VLV	DHW Diverting Valve	0/1 [Off/On]	-	RO	RO/F
211	00D3H	DHW_EHS	DHW Elec Heat Stage	0/1 [Off/On]	-	RO	RO/F
212	00D4H	DHW_RUN	DHW Running Status	0/1 [No/Yes]	-	RO	RO/F
221	00DDH	CHWSTEMP	Chiller Water System Temp	-	1/10°C	RO	RO/F
222	00DEH	ms_cap	Header/Follower Total Capacity	0 to 100	%	RO	RO
230	00E6H	mast_sta	Header Status	-1 to 101	-	RO	RO
231	00E7H	slv1_sta	Follower #1 Status	-1 to 101	-	RO	RO
232	00E8H	slv2_sta	Follower #2 Status	-1 to 101	-	RO	RO
233	00E9H	slv3_sta	Follower #3 Status	-1 to 101	-	RO	RO
234	00EAH	MS_LIM	Header/Follower Demand Limit	0 to 100	%	RO	RO/F
340	0154H	ALMRESET	Alarm Reset 0	0/1 [No/Yes]	-	RW	RW/F
341	0155H	ALM	Alarm Status	0/1 [Normal/Alarm]	-	RO/d	RO
342	0156H	ALERT	Alarm Status	0/1 [No/Yes]	-	RO	RO
343	0157H	SHUTDOWN	Shutdown Status	0/1 [No/Yes]	-	RO	RO
344	0158H	inv_err	Inverter Error (Code)	0 to 255	-	RO	RO
350	015EH	alm_01	Current Alarm #1	0 to 100	-	RO	RO
351	015FH	alm_02	Current Alarm #2	0 to 100	-	RO	RO
352	0160H	alm_03	Current Alarm #3	0 to 100	-	RO	RO
353	0161H	alm_04	Current Alarm #4	0 to 100	-	RO	RO
354	0162H	alm_05	Current Alarm #5	0 to 100	-	RO	RO
360	0168H	alm_01p	Past Alarm #1	0 to 100	-	RO	RO
361	0169H	alm_02p	Past Alarm #2	0 to 100	-	RO	RO
362	016AH	alm_03p	Past Alarm #3	0 to 100	-	RO	RO
363	016BH	alm_04p	Past Alarm #4	0 to 100	-	RO	RO
364	016CH	alm_05p	Past Alarm #5	0 to 100	-	RO	RO
371	0173H	comp1_st	Compressor Starts Nb	-	-	RO	RO
372	0174H	comp1_hr	Compressor Run Hours	-	h	RO	RO
373	0175H	pmp_st	Water Pump Starts Nb	-	-	RO	RO
374	0176H	pmp_hr	Water Pump Run Hours	-	h	RO	RO
381	017DH	RUN2_RST	User Runtime Reset	0 to 3	-	RW	RW
382	017EH	comp_hr	Compressor Run Hours	-	h	RO	RO
383	017FH	back_hr	Backup Running Hours	-	h	RO	RO
384	0180H	cool_hr	Cooling Mode Hours	-	h	RO	RO
385	0181H	heat_hr	Heating Mode Hours	-	h	RO	RO
386	0182H	dhw_hr	DHW Mode Hours	-	h	RO	RO
387	0183H	dfrt_hr	Defrost Mode Hours	-	h	RO	RO
388	0184H	nrg_heat	Energy consumed in Heat	-	kWh	RO	RO
389	0185H	nrg_cool	Energy consumed in Cool	-	kWh	RO	RO
391	0187H	CHIL_S_S	Unit Start/Stop	0/1 [Stop/Start]	-	RO	RO/F
392	0188H	HC_SEL	Heat/Cool Select	0/1 [Cool/Heat]	-	RO	RO/F
401	0191H	hwoccstp	Heat Home Setpoint (Water)	20.0 to 60.0	1/10°C	RW	RW
402	0192H	hwunooff	Heat Sleep Offset (Water)	-10.0 to 0.0	1/10 K	RW	RW
403	0193H	hwecooff	Heat Away Offset (Water)	-10.0 to 0.0	1/10 K	RW	RW
405	0195H	leg_stp	DHW Anti-Legionella Stp	50.0 to 60.0	1/10°C	RW	RW
406	0196H	dhw_stp	DHW Setpoint	30.0 to 60.0	1/10°C	RW	RW
407	0197H	cwoccstp	Cool Home Setpoint (Water)	0.0 to 18.0	1/10°C	RW	RW
408	0198H	cwunooff	Cool Sleep Offset (Water)	0.0 to 10.0	1/10 K	RW	RW
409	0199H	cwecooff	Cool Away Offset (Water)	0.0 to 10.0	1/10 K	RW	RW
421	01A5H	htoccstp	Heat Home Setpoint (Air)	12.0 to 34.0	1/10°C	RW	RW
422	01A6H	htunooff	Heat Sleep Offset (Air)	-10.0 to 0.0	1/10 K	RW	RW

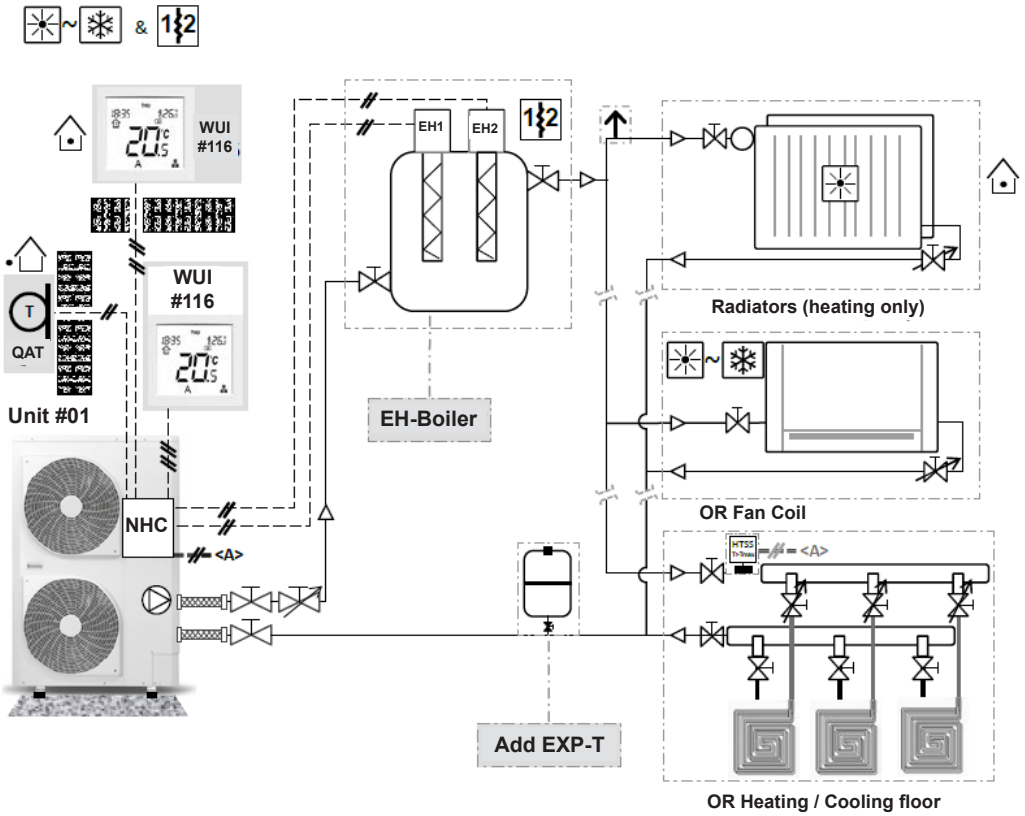
Par.	JBus Addr	Mnemonic	Description	Range	Unit	RC	JBus
423	01A7H	htecooff	Heat Away Offset (Air)	-10.0 to 0.0	1/10 K	RW	RW
424	01A8H	cloccstp	Cool Home Setpoint (Air)	20.0 to 38.0	1/10°C	RW	RW
425	01A9H	clunooff	Cool Sleep Offset (Air)	0.0 to 10.0	1/10 K	RW	RW
426	01AAH	clecooff	Cool Away Offset (Air)	0.0 to 10.0	1/10 K	RW	RW
427	01ABH	freezstp	Home AntiFreeze Setpoint	6.0 to 12.0	1/10°C	RW	RW
646	0286H	jbus_bdr	Secondary Baud Rate	0 to 2 [9600/19200/38400]	-	RW	RW
761	02F9H	jbus_ena	JBus Control Enable	0 to 3	-	RW	RW
762	02FAH	jbus_add	JBus Follower Address	1 to 255	-	RW	RW
764	02FCH	jbus_frm	JBus Frame Type	0 to 5	-	RW	RW
766	02FEH	jbus_tmt	JBus Comm. Timeout	0 to 600	s	RW	RW

Legend:
No No access
RO Read-Only
RW Read/Write
RO/d Read-Only and Display on the RC
RO/F Read-Only and Parameter Forcing

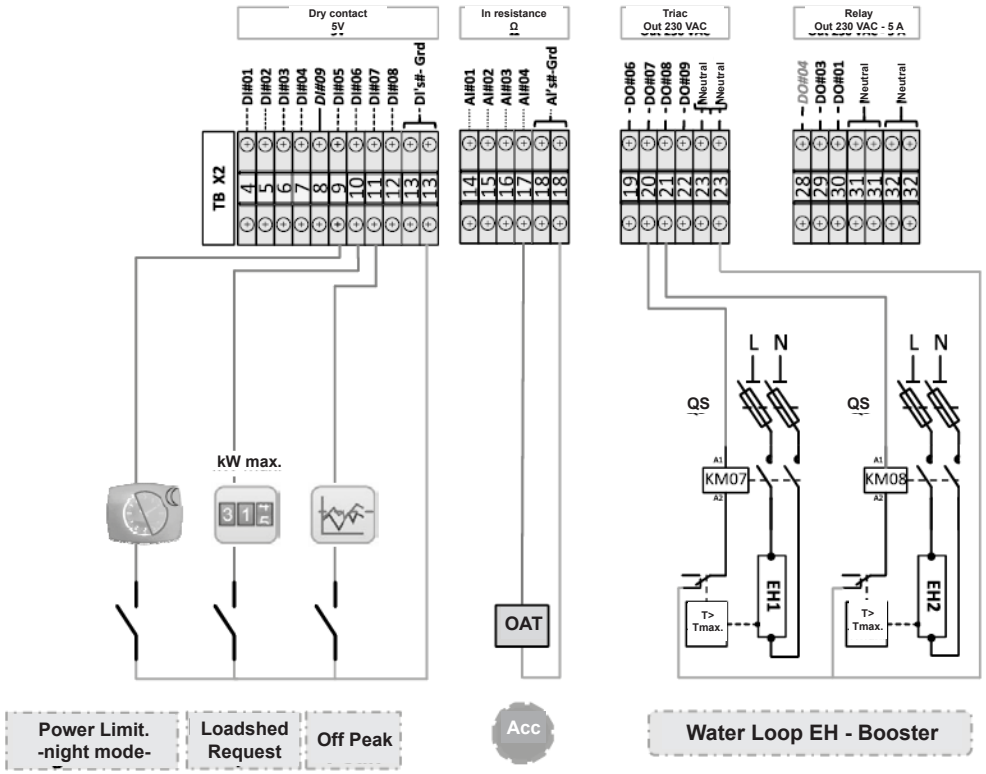
9.0 Standard installations

9.1 Standard installation with booster electric heaters

9.1.1 Schematic



9.1.2 Electrical connections

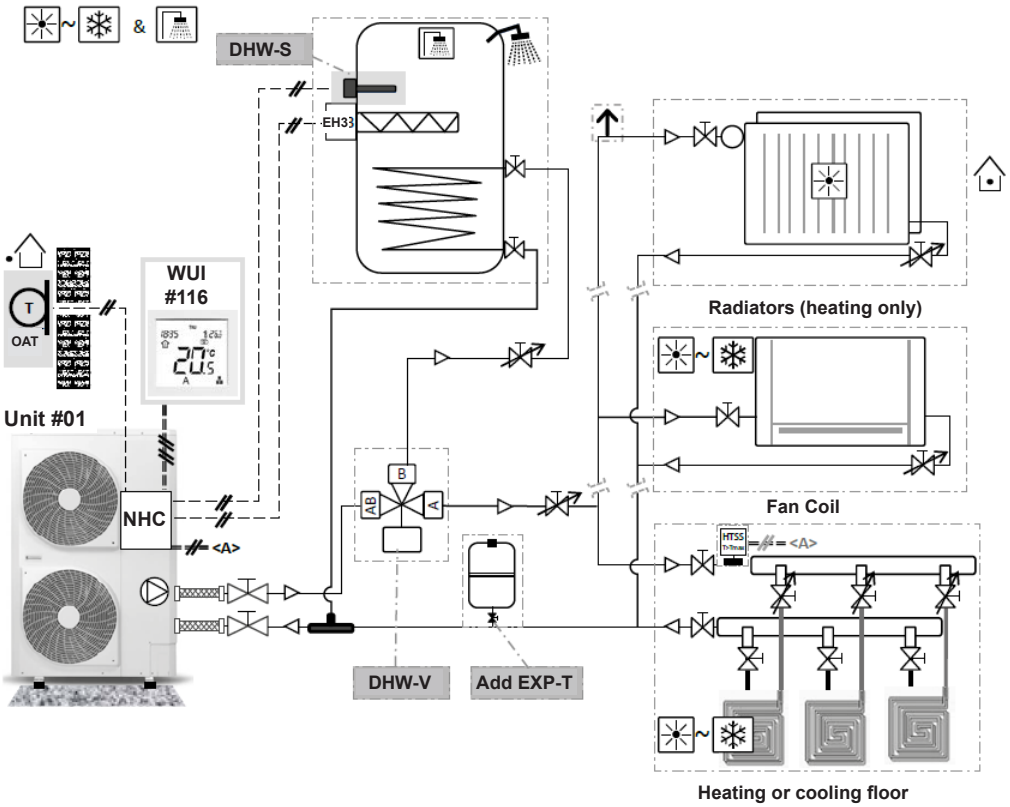


9.1.3 Control configuration steps

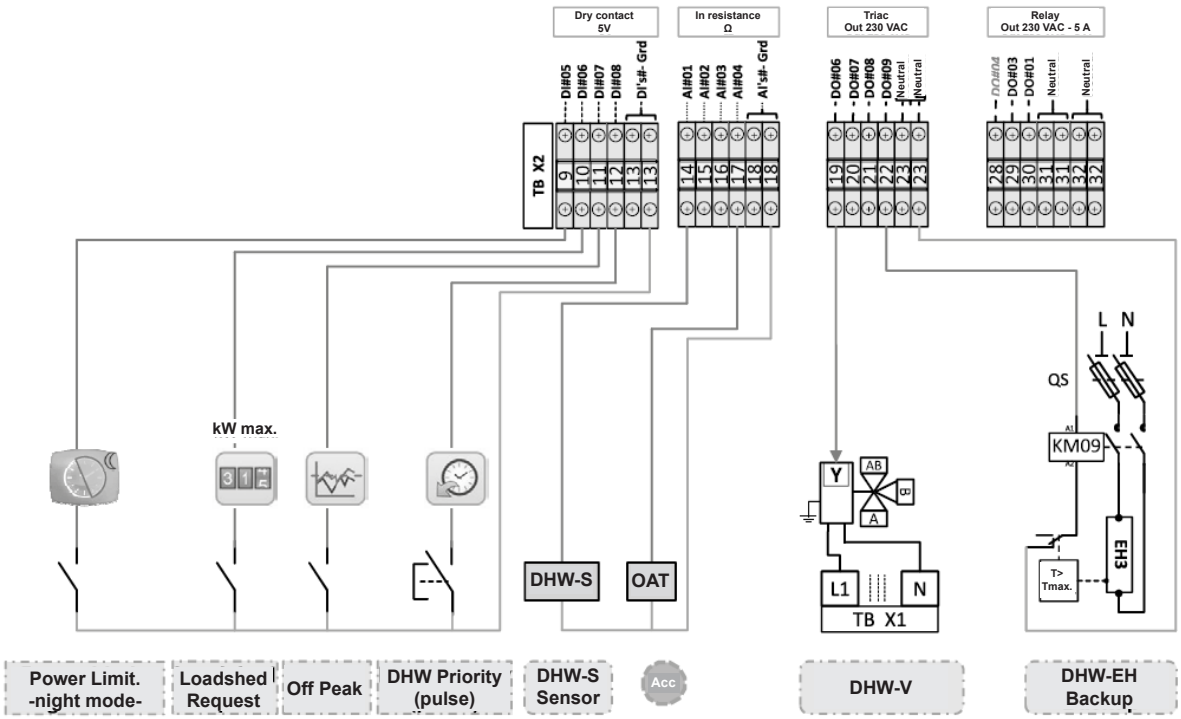
No.	Step	Parameter Description	Para No.	Range	Default	Example Set Up
1	**Booster Heater Set Up**	Booster heater configuration: 0 = No backup 1 = Booster by 1 electric heater stage (EH1) 2 = Booster by 2 electric heater stage (EH1/EH2) 3 = Booster by 3 electric heater stages with 2 outputs (EH1/EH2) 4 = Booster by 3 electric heater stages with 3 outputs (EH1/EH2/EH3) 5~9 = No use for this configuration	601	0~9	0	3
		Booster heater warm up timer: Once the unit has started, if after this timer has expired the capacity demand is at maximum and the set-point isn't reached, then the booster heater is activated (minute)	602	5~120	30	20
		Booster heater outside air threshold temperature: Booster heating is allowed to run if OAT goes below this threshold (°C with 1 K hysteresis).	604	-30~15	-7.0	2
		Customisation of digital output DO#8: Allows the end user / installer to select the function of DO#8. 0 = Output disabled 10 = Electrical heat stage #2 11 = Electrical heat stage # 3 1~9 & 12 = No use	506	0~12	1	10
2a	**Scenario 1: If no internal pump is fitted in the unit**					
	Control of external pump using unit logic	External main pump control: Allows the connection and control of an external main pump using the unit control logic) 0 = no internal pump connected 1 = internal pump connected Must be used with P804. P561 is only enabled when P804=0	561	0~1	1	1
2b	**Scenario 2: If internal pump = fixed speed pump is fitted in the unit**					
	If the internal pump is fixed speed no configuration set up is required (factory set)					
2c	**Scenario 3: If internal pump = variable speed pump is fitted in the unit**					
	If internal pump is variable speed then some parameters need to be configured (see Nominal System Water Flow Control on section 11.1)					
3	Advanced water pump operation (no internal pump or internal pump fixed or variable speed)	Pump anti seize function: The pump is started and run for 30 seconds provided that the pump has been inactive for 24 hours 0 = anti seize function disabled 1 =anti seize function enabled	563	0~1	1	1
		Pump sampling time (Stdby): If no user interface or local user interface and P565=2 then the water pump will cycle, depending on the value of P564 in order to obtain a correct refreshed water control measurement (minute) Must be used with P565=2 to enable this control	564	5~240	15	120
		Main pump logic: Allows the operation of the main water pump to be set when the system is in standby / thermos OFF mode: 1 = Always ON 2 = Water sampling only (used with P564) 3 = According to room temperature (using remote controller or optional indoor air temperature sensor as thermostat)	565	1~3	1	2

9.2 Standard installation with DHW production

9.2.1 Schematic



9.2.2 Electrical connections



9.2.3 Parameter configuration

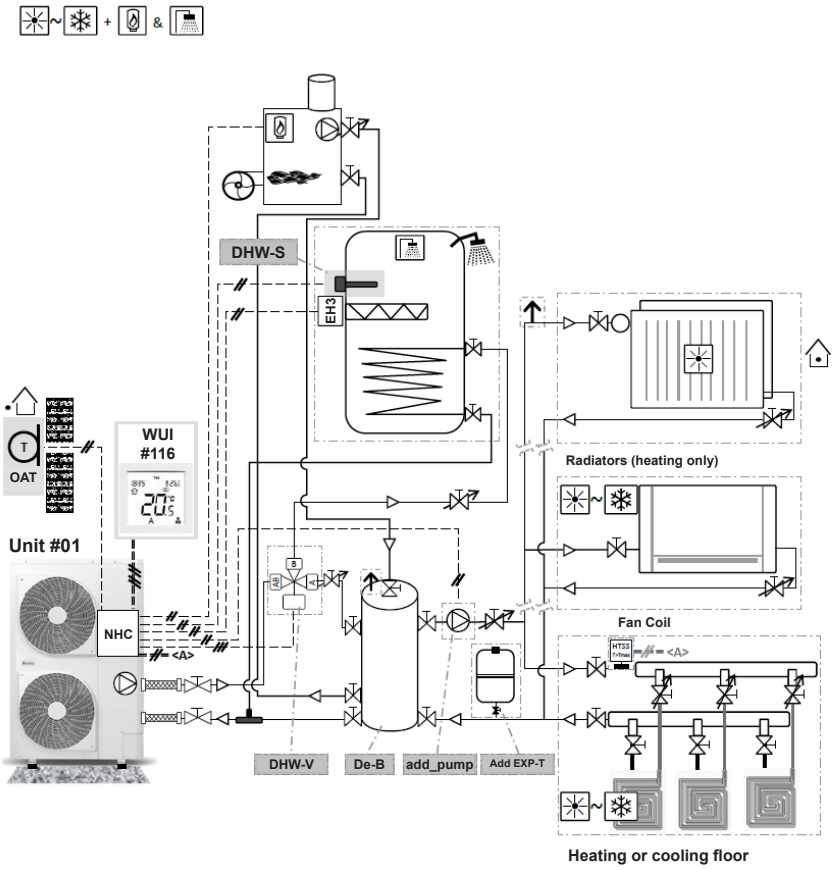
No.	Step	Parameter Description	Para No.	Range	Default	Example Set Up
1	DHW Configuration	3-way diveter valve selection: 0 = No DHW management 1 = Diverting valve 2 –points – NO contact (valve energized in DHW position) 2 = Diverting valve 2 –points – NC contact (valve de-energized in DHW position) 3 = Not used	701	0~3	0	1
		DHW cylinder sensor selection: 0 = DHW thermostat (thermal switch) 1 = DHW sensor (thermistor 10kΩ) 2 = DHW sensor (thermistor 5kΩ) 3 = DHW sensor (thermistor 3kΩ) NOTE: If no sensor is selected (P719=0) the DHW request is always true and the function of switching back to space heating / cooling is managed using timers)	719[1]	0~3	0	1
2	**If the internal pump = a variable speed pump then it is necessary to set the pump speed for DHW mode (only possible with adjustable constant speed control logic)**					
	The position of the 3 way diverting valve must be manually set to the DHW position before starting the DHW test					
	Pump Speed Selection for DHW Mode Only	Quick test enable: 0 = Quick test control disabled 1 = Quick test control enabled	321	0~1	0	1
		Water pump speed: Adjusts the water pump speed to obtain the expected flow rate for DHW production (%)	331	0~100	0	Depending on DHW circuit
		Water pump speed: When the pump speed has been identified and the water flow rate is correct – STOP the water pump (%)	331	0~100	0	0
		Quick test enable: 0 = Quick test control disabled 1 = Quick test control enabled	321	0~1	0	0
		Water pump speed: Sets the pump speed identified during the “Quick Test” detailed above (%)	710	19~100	100	As determined above (P331)
3	DHW Set-Point	DHS set-point normal operation: Sets the DHW set-point for normal DHW production (°C)	406	30~60	50	55
		DHW set-point – anti bacteria: Sets the DHW set-point for the anti legionella cycle (°C)	405	50~60	60	60
4	DHW Cylinder Heater Set Up	Customisation of digital output DO#9: Allows the end user / installer to select the function of DO#9. 0 = Output disabled 10 = Electrical heat stage #2 11 = Electrical heat stage # 3 1~9 & 12 = No use	507	0~12	1	11
		Booster heater configuration: 0 = No backup 5 = DHW back up (EH3) 6 = Boostered by 1 electric heater stage (EH1) + DHW back up (EH3) 7 = Boostered by 2 electric heater stages (EH1/EH2) + DHW back up (EH3) 8 = Boosterd by 3 electric heater stages with 2 outputs (EH1/EH2) + DHW back up (EH3) 1~4 & 9 = No use for this configuration	601	0~9	0	5
		Booster heater outside air threshold temperature: Booster heating is allowed to run if OAT goes below this threshold (°C with 1 K hysteresis).	604	-30~15	-7.0	2
5	DHW Schedule Configuration	DHW schedule days: Selects the days for system operation in DHW mode: Mon / Tue / Wed / Thu / Fri / Sat / Sun	711	Yes / No	Yes	Yes
		DHW starting time: Selects the START time for DHW mode (hh:mm)	712	00:00 ~ 23:59	21:00	07:00
		DHW stopping time: Selects the STOP time for DHW mode (hh:mm)	713	00:00 ~ 23:59	06:00	22:00
6	Anti legionella schedule Configuration	Anti-legionella start day: Selects the days for operation of the anti-legionella control: Mon / Tue / Wed / Thu / Fri / Sat / Sun	714	Yes / No	No	No
		Anti-bacteria start time: Selects the START time for the anti-legionella control (hh:mm)	715	00:00 ~ 23:59	02:00	05:00

Note 1 = For ESTIA DHW cylinder set P719 = 1

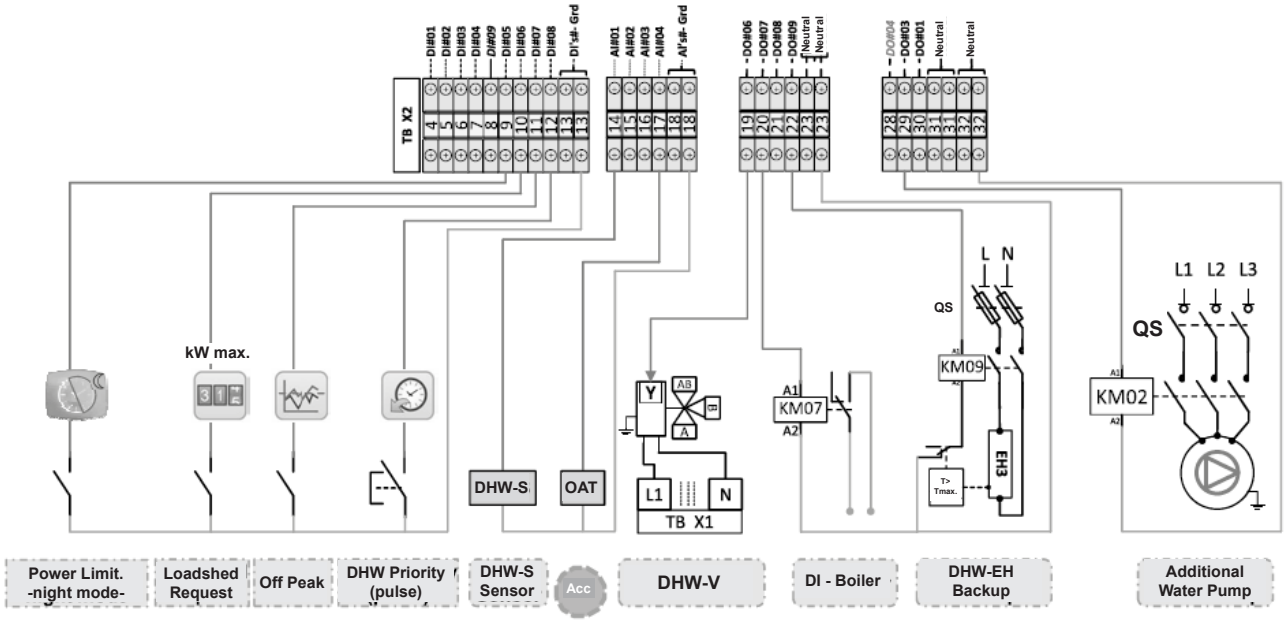
No.	Step	Parameter Description	Para No.	Range	Default	Example Set Up
7	START / STOP Criteria for DHW	DHW Cylinder ΔT (START): DHW mode is requested if the DHW cylinder water temperature drops below the DHW set-point temperature (P406) minus the DHW cylinder ΔT (P721) (K)	721	2 ~ 10	5	6
		EWT ΔT (STOP): DHW mode is stopped if the EWT (of the Monobloc outdoor unit) increases above the DHW set-point (P406) plus the LWT ΔT (P722) (K)	722	0 ~ 20	10	15
8	Operating time between the DHW mode and the space heating / cooling mode	Space heating/cooling (SHC) minimum run time: Sets the minimum operating time of the system in SHC mode (min)	704	0 ~ 720	20	20
		SHC maximum run time: Sets the maximum operating time of the system in SHC mode (min) NOTE: If P705 = -1 the maximum runtime for DHW or DHW is ignored. If the DHW maximum runtime (P707) is set, it is necessary to also set the maximum SHC runtime (P705). If P705 is not set the system will never change back to DHW mode DHW minimum runtime: Sets the minimum runtime of the system when in DHW mode (min)	705	-1 ~ 720	60	60
			706	0 ~ 720	20	20
		DHW maximum runtime: Sets the maximum runtime of the system when in DHW mode (min) NOTE: If P707 = -1 the maximum runtime for DHW or DHW is ignored. If the DHW maximum runtime (P707) is set, it is necessary to also set the maximum SHC runtime (P705). If P705 is not set the system will never change back to DHW mode	707	-1 ~ 720	60	60
9	**The summer mode is set when the summer mode switch (P502, 503, 504 or 505 = 8) is CLOSED**					
	Summer mode configuration	Summer mode OAT threshold: Sets the OAT threshold temperature for summer mode operation (°C)	716	15 ~ 30	20	22
		Summer mode ON delay: Summer mode is set to ON if OAT is above the summer mode Oat threshold (P716) for at least the summer mode ON delay (P717) (h)	717	0 ~ 12	5	7
		Summer mode OFF delay: Summer mode is reset if OAT drops below the summer mode OAT threshold (P716) minus 2K for at least the summer mode OFF delay (P718) (h)	718	0 ~ 12	5	7
10	Set DHW limitation mode	DHW mode limit value: The compressor frequency is limited to the percentage set in P543 of the maximum allowed frequency when running in DHW mode	543	50 ~ 100	100	75
11	**If an additional water pump is installed refer to the “Installation with DHW Production and Boiler” for configuration**					

9.3 Standard installation with DHW production and boiler

9.3.1 Schematic



9.3.2 Electrical connections

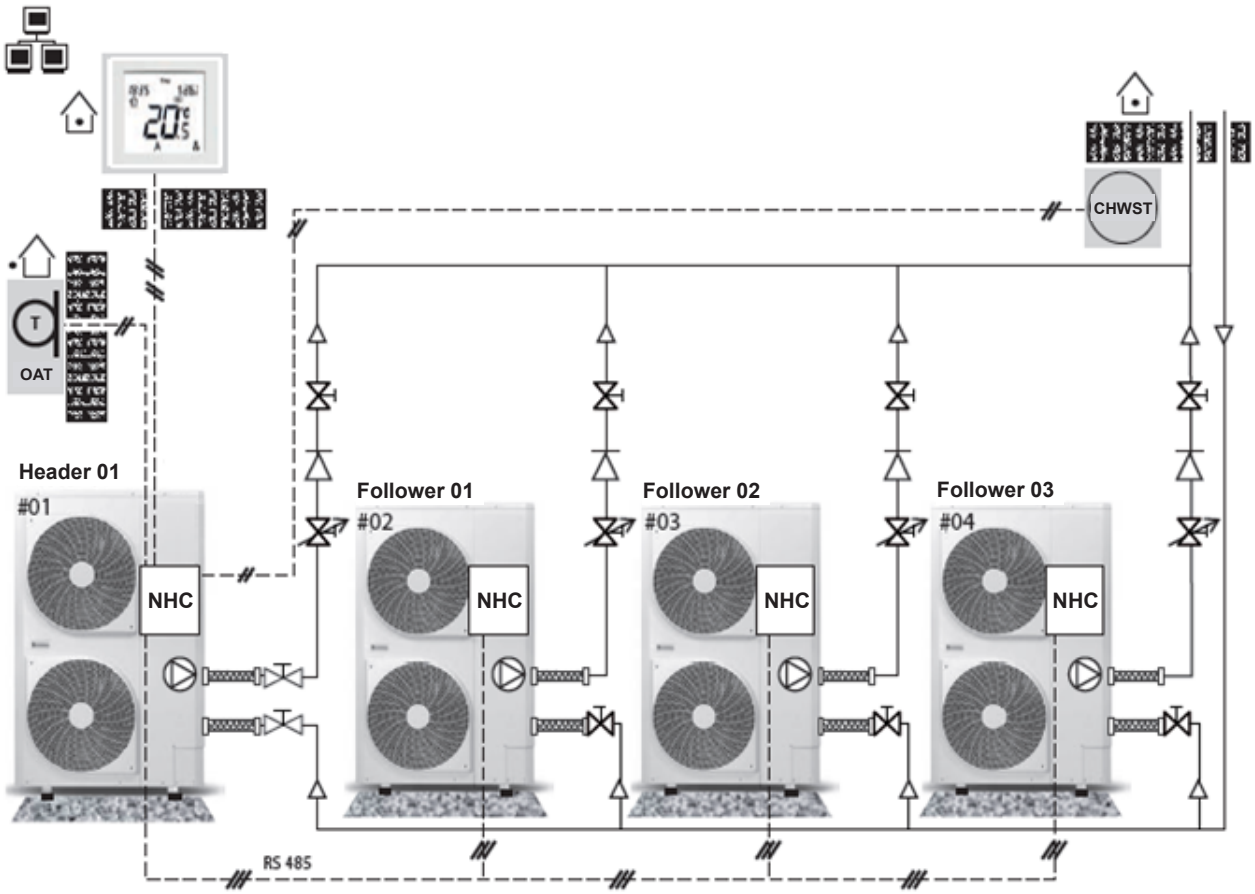


9.3.3 Parameter configuration

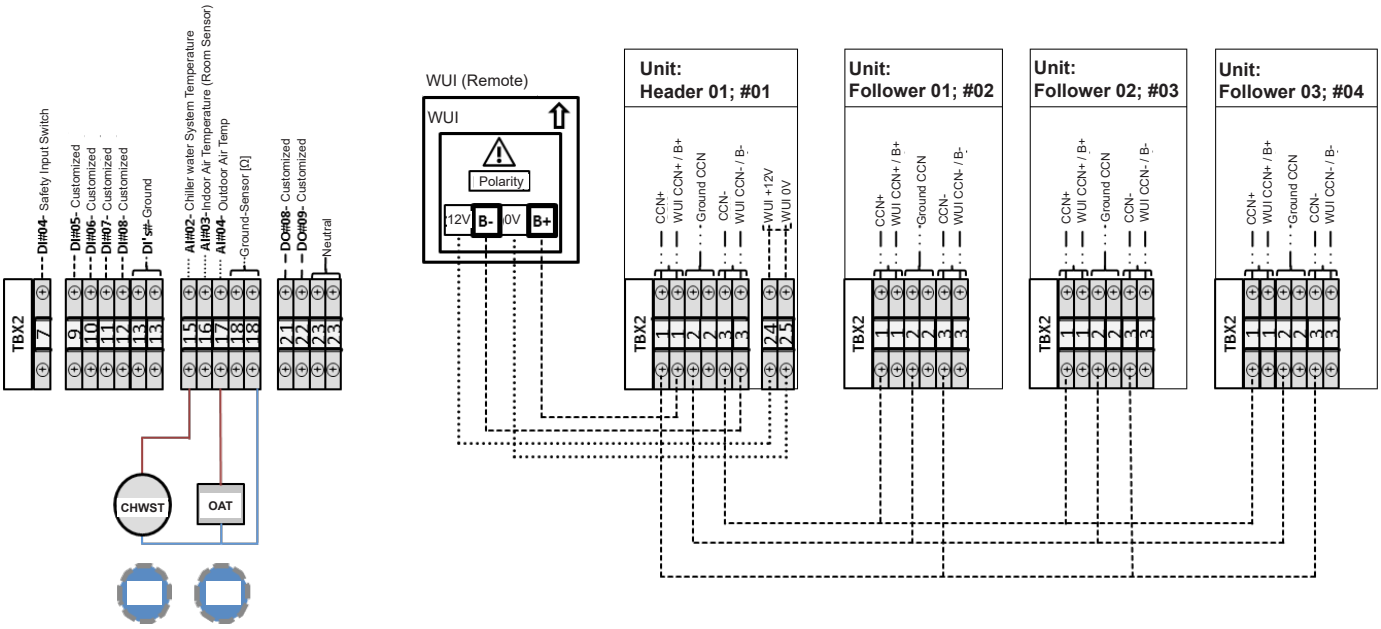
No.	Step	Parameter Description	Para No.	Range	Default	Example Set Up
1	DHW Mode Config.	Refer to “Installation with DHW Production” for DHW set-up				
2	Boiler Config.	Back up type: Selects the type of boiler used on installation: 0 = No backup 9 = Backup by Oil or Gas boiler 1 to 8 = not used for this configuration	601	0 ~ 9	0	9
		Minimum OAT for heating: The heat pump is not allowed to run in heating mode if the OAT drops below this threshold temperature (°C)	514	-20 ~ 10	-20	-7
3	Additional Pump Config.	Additional pump logic: This Parameter defines the function of an additional pump, in standby mode, if no user interface or local user interface is connected 0 = No additional pump 1 = Always ON except in OFF mode 3 = Always ON except in OFF mode or when DHW mode is active 2 & 4 = not used in this configuration	573	0 ~ 4	0	See pump configuration (section 10.8)
		Additional pump logic: This Parameter defines the function of an additional pump, in standby mode, if a remote user interface is connected 0 = No additional pump 1 = According to space temperature: pump OFF except when there is a demand from the room temperature 4 = Pump OFF except when there is a demand from the room temperature and no DHW is active 1 & 3 = not used in this configuration		0 ~ 4	0	See pump configuration (section 10.8)

9.4 Standard installation with Header / Follower (example with 3 followers)

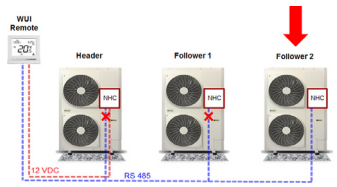
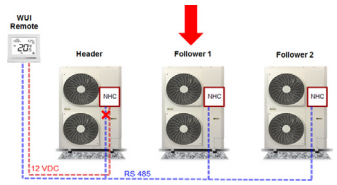
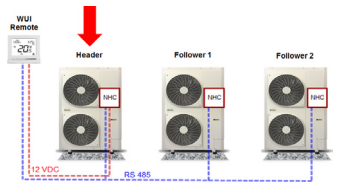
9.4.1 Schematic

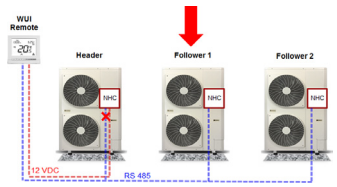
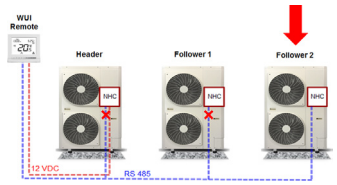
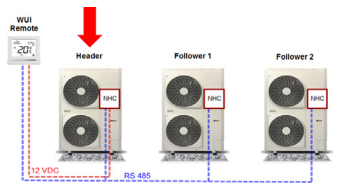


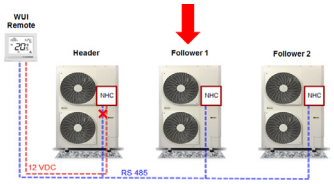
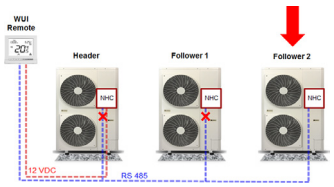
9.4.2 Electrical connections



9.4.3 Parameter configuration

No.	Step	Figure	FC	Designation	Description	Range	Default	Ex.
1	Change follower 2 NHC address to 3		For header unit with a RC, to address the different units of header/follower installation, it is necessary to disconnect RS485 bus (Green connector J6) from Header and all Followers **except the last one.** But RC is switched on by header unit (12VDC)					
			641	Unit address	It is necessary to set the NHC board address of Follower 2 different as NHC board address of Header	0 ~ 239	0	3
			Wait 30s before next step. An error can appear on RC screen, but it is not a problem to continue the configuration.					
2	Change follower 1 NHC address to 2		Connect the RS485 bus (Green connector J6) on Follower 1, besides Follower 2					
			641	Unit address	It is necessary to set the NHC board address of Follower 1 different as NHC board address of Header	0 ~ 239	0	2
			Wait 30s before next step. An error can appear on RC screen, but it is not a problem to continue the configuration.					
3	Configure Header board		Connect the RS485 bus (Green connector J6) on Header, besides Follower 1 + 2					
			743	Follower # 1 address	It is necessary to set the Follower address different as Header address	0 ~ 239	0	2
			744	Follower # 2 address	It is necessary to set the Follower address different as Header address	0 ~ 239	0	3
			742	Header / Follower selection	Allow the Header/Follower operation as Header: 0 = Disable 1 = Header 2 = Follower	0 ~ 2	0	1
4	Compressor control method choice		751	Cascade type	The cascade type configuration refers to the control of header / follower operation. 0 = Starting Header first, then first Follower to last Follower. Stopping Last Follower to first Follower, then Header. 1 = Starting/stopping units according to their wear factors. 2 = All units (Header and Followers) are started/stopped at the same time	0 ~ 2	1	1
			746	Capacity to start next unit	If Cascade Type = 0 or 1, then it is possible to set this parameter [P746]. It defines the percentage of capacity that the operating unit must reach before starting the next unit. This parameter is defined only on header unit.	0 ~ 100	75	75

No.	Step	Figure	FC	Designation	Description	Range	Default	Ex.
5	Configure Follower 1		Apply procedure “Manage the Header and Follower units with a common user interface” to pass on Follower 1 status					
			742	Header / Follower selection	Allow the Header/Follower operation as Follower: 0 = Disable 1 = Header 2 = Follower	0 ~ 2	0	2
			521	User interface type	Configure User interface for Follower: 0 = No User Interface 1 = Remote control by contacts or SUI 2 = RC remotely installed in the house (Air setpoint) 3 = RC remotely installed in the house (Water setpoint)	0 ~ 3	0	1
6	Configure Follower 2		Apply procedure “Manage the Header and Follower units with a common user interface” to pass on Follower 2 status					
			742	Header / Follower selection	Allow the Header/Follower operation as Follower: 0 = Disable 1 = Header 2 = Follower	0 ~ 2	0	2
			521	User interface type	Configure User interface for Follower: 0 = No User Interface 1 = Remote control by contacts or SUI 2 = RC remotely installed in the house (Air setpoint) 3 = RC remotely installed in the house (Water setpoint)	0 ~ 3	0	1
7	Main Variable speed pump configuration for Header/ Follower installation	**If the units are fitted with internal main variable speed pump, then several parameters are to set for each unit of Header / Follower installation**						
			**To configure main pump of Header unit, the other units of installation must be in mode OFF (only Header unit is activated)**					
			Apply procedure “Manage the Header and Follower units with a common user interface” to pass on Header status					
			758	Header / Follower pump type	0 = No pump control 1 = Common Water Pump (a pump is installed outside of the unit on the water loop and is controlled by the Header unit) 2 = Individual Water Pump: running according to H/F Overall Status (P229) 3 = Individual Water Pump: stopped if unit is satisfied	0 ~ 3	2	2
			Determine the minimum pump speed and adjust the pump speed to obtain the expected water flow rate to allow closure of flow switch (see section 11.4) – Line “variable speed pump – control on adjustable constant speed					

No.	Step	Figure	FC	Designation	Description	Range	Default	Ex.
7	Main Variable speed pump configuration for Header/Follower installation		**To configure main pump of Follower 1 unit, the other units of installation must be in mode OFF (only Follower 1 unit is activated)**					
			Apply procedure “Manage the Header and Follower units with a common user interface” to pass on Follower 1 status					
			758	Header / Follower pump type	0 = No pump control 1 = Common Water Pump (a pump is installed outside of the unit on the water loop and is controlled by the Header unit) 2 = Individual Water Pump: running according to H/F Overall Status (P229) 3 = Individual Water Pump: stopped if unit is satisfied	0 ~ 3	2	2
			Determine the minimum pump speed and adjust the pump speed to obtain the expected water flow rate to allow closure of flow switch (see page 80) – Line “variable speed pump – control on adjustable constant speed					
			**To configure main pump of Follower 2 unit, the other units of installation must be in mode OFF (only Follower 2 unit is activated)**					
			Apply procedure “Manage the Header and Follower units with a common user interface” to pass on Follower 2 status					
			758	Header / Follower pump type	0 = No pump control 1 = Common Water Pump (a pump is installed outside of the unit on the water loop and is controlled by the Header unit) 2 = Individual Water Pump: running according to H/F Overall Status (P229) 3 = Individual Water Pump: stopped if unit is satisfied	0 ~ 3	2	2
			Determine the minimum pump speed and adjust the pump speed to obtain the expected water flow rate to allow closure of flow switch (see section 11.4) – Line “variable speed pump – control on adjustable constant speed					
8	**The Header unit is then used for all the other configuration points (setpoint…). To know the status of different Followers, follow the procedure below (refer to Manage the Header and Follower units with a common user interface”**							

9.4.4 Manage the Header unit and Follower units with a common user interface

With the remote controller connected to the Header unit, it is possible to access data of Follower (main screen, parameter menu...).

The procedure to navigate between the different general status of units and pass from Header to Follower 1, then to Follower 2 (if existing), then to Follower 3 (if existing), is the following:

To navigate from Header to Follower or Follower to Follower, press and hold the **Occupancy** key and **Up** key simultaneously for 2 seconds:

From this screen, it is possible to access all data of Follower 1 (parameter menu…).

To finish the commissioning, it is necessary to configure the setpoint according to the user interface configuration

Control Configuration for unit with remote user interface

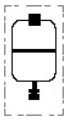
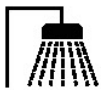
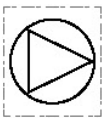
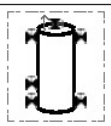
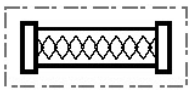
No.	Step	FC Description	FC No.	Range	Default	Example Set Up
1	Check on RC screen that the unit is configured in Remote Interface	User Interface Type 0 = No User Interface 1 = Remote control by contacts or SUI 2 = RC remotely installed in the house (Air setpoint) 3 = RC remotely installed in the house (Water setpoint)	521	0 ~ 3	0	2
		Check on RC screen that the unit is configured in Air setpoint				
2	Control on air setpoint	Heat Home Setpoint Air setpoint for heating mode when Occupancy mode = Home (°C)	421	12 ~ 34	19	20
		Heat Sleep Offset Air offset for heating mode when Occupancy mode = Sleep (°C)	422	-10 ~ 0	-2.0	-1
		Heat Away Offset Air offset for heating mode when Occupancy mode = Away (°C)	423	-10 ~ 0	-4.0	-3
		Cool Home Setpoint Air setpoint for cooling mode when Occupancy mode = Home (°C)	424	20 ~ 38	26	24
		Cool Sleep Offset Air offset for cooling mode when Occupancy mode = Sleep (°C)	425	0 ~ 10	2	2
		Cool Away Offset Air offset for cooling mode when Occupancy mode = Away (°C)	426	0 ~ 10	4	4
3a	First possibility: control on predefined climatic curve	Heat Climatic Curve Select: -1 = No Curve / Fixed Water Setpoint 0 = Custom Climatic Curve 1 to 12 = Heating Climatic Curve #number	581	-1 ~ 12	-1	2
		Heat Curve Max Setpoint Offset: Heat Maximum Water Setpoint can be offset by this parameter, to adjust the setpoint to the customer needs (°C)	412	-5 ~ 5	0	5
		Cool Climatic Curve Select -1 = No Curve / Fixed Water Setpoint 0 = Custom Climatic Curve 1 to 2 = Cooling Climatic Curve #1number	586	-1 ~ 2	-1	1
		Cool Curve Minimum Setpoint Offset: Cool Minimum Water Setpoint can be offset by this parameter, to adjust the setpoint to the customer needs (°C)	413	-5 ~ 5	0	5

No.	Step	FC Description	FC No.	Range	Default	Example Set Up
3b	Second possibility: control on fixed LWT setpoint	Heat Climatic Curve Select: -1 = No Curve / Fixed Water Setpoint 0 = Custom Climatic Curve 1 to 12 = Heating Climatic Curve #number	581	-1 ~ 12	-1	-1
		Heat Home Setpoint Air setpoint for heating mode when Occupancy mode = Home (°C)	401	20 ~ 60	45	50
		Heat Sleep Offset Air offset for heating mode when Occupancy mode = Sleep (°C)	402	-10 ~ 0	0	-5
		Heat Away Offset Air offset for heating mode when Occupancy mode = Away (°C)	403	-10 ~ 0	-5	-10
		Cool Climatic Curve Select -1 = No Curve / Fixed Water Setpoint 0 = Custom Climatic Curve 1 to 2 = Cooling Climatic Curve #1number	586	-1 ~ 2	0	-1
		Cool Home Setpoint Air setpoint for cooling mode when Occupancy mode = Home (°C)	407	0 ~ 18	12	18
		Cool Sleep Offset Air offset for cooling mode when Occupancy mode = Sleep (°C)	408	0 ~ 10	0	2
		Cool Away Offset Air offset for cooling mode when Occupancy mode = Away (°C)	409	0 ~ 10	5	5
3c	Third possibility: customer control on climatic curve	Heat Climatic Curve Select: -1 = No Curve / Fixed Water Setpoint 0 = Custom Climatic Curve 1 to 12 = Heating Climatic Curve #number	581	-1 ~ 12	-1	0
		Heat Minimum OAT: In heating mode, Customer minimum OAT	582	-30 ~ 10	-7	-20
		Heat Maximum OAT: In heating mode, Customer maximum OAT	583	10 ~ 30	20	20
		Heat Minimum Water Setpoint: In heating mode, Customer minimum Water Temperature	584	20 ~ 40	20	20
		Heat Maximum Water Setpoint: In heating mode, Customer maximum Water Temperature	585	30 ~ 60	38	38
		Heat Curve Max Setpoint Offset: Heat Maximum Water Setpoint can be offset by this parameter, to adjust the setpoint to the customer needs (°C)	412	-5 ~ 5	0	5
		Cool Climatic Curve Select -1 = No Curve / Fixed Water Setpoint 0 = Custom Climatic Curve 1 to 2 = Cooling Climatic Curve #1number	586	-1 ~ 2	-1	0
		Cool Minimum OAT: In cooling mode, Customer minimum OAT	587	0 ~ 30	20	22
		Cool Maximum OAT: In cooling mode, Customer maximum OAT	588	24 ~ 46	35	35
		Cool Minimum Water Setpoint: In cooling mode, Customer minimum Water Temperature	589	5 ~ 20	10	7
		Cool Maximum Water Setpoint: In cooling mode, Customer maximum Water Temperature	590	5 ~ 20	18	15
		Cool Curve Min Setpoint Offset: Cool Min Water Setpoint can be offset by this parameter, to adjust the setpoint to the customer	413	-5 ~ 5	0	5

9.5 Schematic acronyms

IAT: Indoor Air Temperature
BPHE: Brazed Plate Heat Exchanger
CHWS: Chiller Water System
DHW: Domestic Hot Water
EHS: Electric Heater Stage
EWT: Entering Water Temperature
FCU: Fan Coil Unit
LWT: Leaving Water Temperature
NHC: New Hydronic Control (refer to wiring diagram ‘Main control card’)
OAT: Outdoor Air Temperature
PMV: Pulse Modulating Valve
SHC: Space Heating / Cooling Control
TR: Refrigerant Temperature
UFC: Underfloor Cooling
UFH: Underfloor Heating
WUI: Remote controller - user Interface (Wall-mounted User Interface)

9.6 Schematic Legend

Label	Symbol	Designation	Notes
-		Device	Field supplied
-		Accessory	Field mounted
-		Option	Factory mounted
-		Balancing valve	Field supplied Balancing to adjust the water flowrate
-		Stop valve	Field supplied
-		Automatic Air vent	Field supplied Automatic air vent(s) on highest position in the loop
Add EXP-T		Additional expansion tank	Field supplied Additional expansion tank depending the total water in the loop contend - taking in account the expansion tank embedded in hydronic module
-		Boiler	Boiler used to boost or backup the heatpump for comfort
EH1 & EH2		Electrical Heater (1 or 2)	Electrical heaters up to two with a max. stages up to 3 Used to boost or backup the heat pump for comfort
EH3		DHW-Electrical Heater Backup (1 stage)	Domestic Hot Water Electrical Heater - one stage used to backup DHW (when conditions are out of heat pump map)
DHW-T		Domestic Hot Water - Tank	Field supplied
DHW-S		Domestic Hot Water - Sensor	Accessory to mount on top of the DHW-Tank Measure DHW-Temperature
DHW-V		Domestic Hot Water - Diverting Valve	Accessory to mount on top of the DHW-Tank Measure DHW-Temperature
add_pmp		Additional Water Pump	Field Supplied, it is used for comfort loop as a secondary loop
De-Coupling Tank		De-Coupling Tank	Field Supplied, it is used to connect different water loop rates as well as to receive the boiler loop
		Flexible	Field supply, it is used to lower vibrations transmissions if necessary
HTSS		High Temperature Safety Switch	Field supplied, use to stop system when UFH max, water temperature is triggered
-		Non-Return valve	Field supplied, use with Header / Follower

10.0 Control overview

10.1 Operating modes

Occupancy mode:
Depending on unit configuration, the system can be controlled in two ways. The first possible method embraces the use of setpoints, where the outdoor air temperature has no effect on the temperature set by the control. The second control method is based on a climatic curve. In this case, the water temperature is adjusted in response to changes in the external temperature.
The unit may operate in HOME, SLEEP, or AWAY mode. The occupancy can be set manually by the user or automatically according to the schedule (refer to remote controller end user manual).

Occupancy	RC Display	Comfort Type
Home		Comfort
Sleep		Comfort
Away		Eco

CAUTION: In case of power cycle, the previous operating mode (cooling / heating / DHW) or occupancy mode (home / sleep / away) will be automatically restored.

10.2 Operating modes:

The user can normally choose one of three available operating modes, i.e. cooling, heating or domestic hot water production only. Other modes such as booster cooling or booster heating, purge, and drying, can be selected only with service access level.

The unit may run in the following modes:

- Off: Unit is requested to stop.
- Cool: Unit is requested to run in Cooling mode.
- Heat: Unit is requested to run in Heating mode.
- DHW Only: Unit is requested to run in DHW mode Only.
- Booster Cool: Unit is requested to run in Cooling mode at maximum compressor frequency.
- Booster Heat: Unit is requested to run in Heating mode at maximum compressor frequency.
- Purge: Water pump is requested to run in order to purge the hydraulic circuit.
- Drying: Unit is requested to run in Heating mode and the heating water setpoint is increased in order to dry UFH.

System Mode	RC Display	Icon
Off	-	[no icon]
Cool		[steady icon]
Heat		[steady icon]
DHW only		[steady icon]
Booster Cool*		[flashing fast]
Booster Heat*		[flashing fast]
Purge*		[flashing fast]
Drying*		[flashing slow]

*Service access level only (with password 0120)

For more information on user interface, please refer to the WUI end user manual.

When Cooling mode is selected, the chiller or heat pump will operate in the Cooling mode in order to cool the water loop to the selected temperature.

When the heat pump is in Heating mode, the heat pump heats the water loop to the selected temperature. When the outdoor air temperature is very low, electric heaters or boiler heating can be used in order to satisfy the heating demand. When DHW only is requested, the unit is not allowed to operate in cooling or heating modes. It is also possible for the unit to operate in DHW mode when heating mode or cooling mode is selected, according to schedule / temperature condition / maximum runtime.

When the system is in the Off mode, the compressor and the pump are stopped (except for home anti-freeze protection and water freeze protection, refer to Home anti-freeze protection (Section 10.5) and Water freeze protection (section 10.6)).

Operating mode control:
The operating mode selection may differ depending on access level and the use of communication methods, i.e. RC display or JBus / ModBus communication.

In the following sections of this document, the configuration steps are the same for all of these three communication methods, except when the configuration is described with RC direct access.

i) RC control:
When the RC has been connected to the unit, the mode selection can be done by direct access on RC. When the unit is Off, press the **Mode** key to wake up the user interface and then press the **Mode** key successively to select the required operating mode.

ii) Jbus / ModBus communication:
The unit can be started or stopped and its System Mode can be selected from the JBus or ModBus network. Refer to JBus registers in Parameter setting (section 8.3).

10.3 Setpoint:

Depending on the unit configuration, the system control can be based on either water or air setpoint control.

To achieve better comfort, it is possible to adjust the room temperature setpoint (remote user interface) or water temperature setpoint according to your needs. Please note that the temperature setpoint can be adjusted only within a range defined for each occupancy mode.

The water setpoint calculation can be based on:

1. **Predefined Climatic Curves** depending on OAT: climatic curves already preconfigured in the control logic.
2. **Fixed Water Setpoint:** using a fixed value for each occupancy mode.
3. **Custom Climatic Curve** depending on OAT: define customised climatic curves in function of the application.
4. **Offset on climatic curves** (predefined and customer)

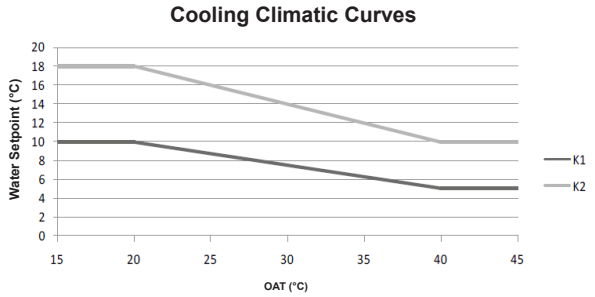
10.3.1 Predefined Climatic Curves:

COOLING: If the cooling climatic curve [P586] is configured to “1” or “2”, the water setpoint will be calculated according to the selected cooling climatic curve.

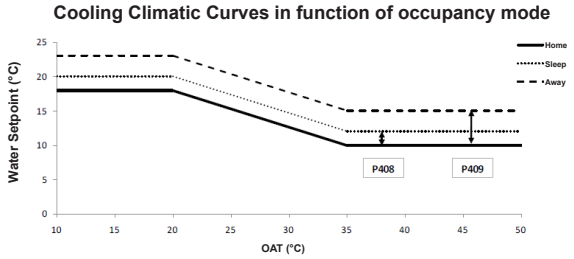
Two predefined cooling climatic curves are available:

Climatic Curve	Min. OAT	Max. OAT	Min. Water Temp	Max. Water Temp	Application
K1	20°C	40°C	5°C	10°C	FCU
K2	20°C	40°C	10°C	18°C	UFC

- If OAT is invalid (not transmitted by the Inverter, out of range value, etc.), the Water Setpoint is equal to the current Min. Water Temp
- If OAT is above the current Maximum OAT threshold, the Water Setpoint is equal to the current Max. Water Temp



- The climatic curve corresponds to the water setpoint in Home mode. To define the other occupancy modes, it is necessary to configure Cool Sleep Offset [P408] and Cool Away Offset [P409]:



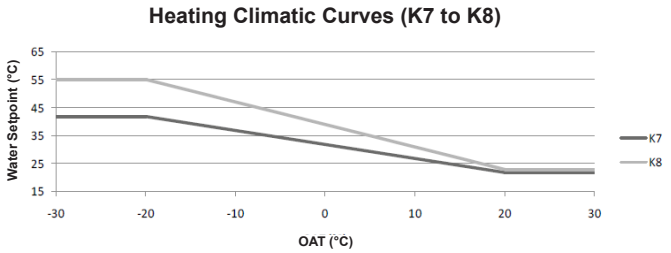
HEATING: *If the heating climatic curve [P581] is configured to a parameter from “1” to “12”, the water setpoint will be calculated according to the selected heating climatic curve.*

Twelve predefined heating climatic curves are available:

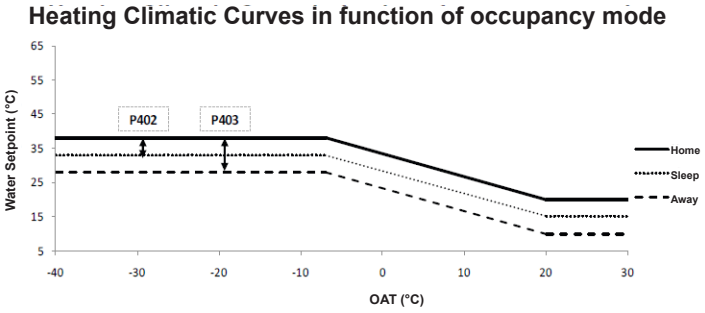
Climatic Curve	Min. OAT	Max. OAT	Min. Water Temp	Max. Water Temp	Application
K1	-7°C	20°C	20°C	38**°C**	UFH
K2	-5°C	20°C	20°C	33**°C**	Ufh
K3	-9°C	20°C	20°C	45°C	FCU
K4	-8°C	20°C	40°C	50°C	FCU
K5	-5°C	20°C	40°C	55°C	Radiator
K6	0°C	20°C	40°C	60°C	Radiator
K7	-20°C	20°C	22°C	42°C	FCU
K8	-20°C	20°C	23°C	55°C	Radiator
K9	-12.7°C	20°C	24°C	60°C	Radiator
K10	-5.9°C	20°C	25°C	60°C	Radiator
K11	-1.5°C	20°C	26°C	60°C	Radiator
K12	3.5°C	20°C	27°C	60°C	Radiator

- If OAT is invalid (not transmitted by the Inverter, out of range value, etc.), the Water Setpoint is equal to the current Max. Water Temp.
- If OAT is above the current Maximum OAT threshold, the Water Setpoint is equal to the current Min. Water Temp.

Example:



- The climatic curve corresponds corresponds to the water setpoint in Home mode. To define the other occupancy modes, it is necessary to configure Heating Sleep Offset [P402] and Heating Away Offset [P403]:



10.3.2 Fixed water setpoint:

If the cooling climatic curve [P586] or the heating climatic curve [P581] is configured to “-1”, the water control point will be determined according to the Occupancy mode.

The water setpoint can be configured in two ways:

-- By direct access to the RC (refer to owner’s manual)

-- By accessing the parameter menu via RC or JBus / ModBus

COOLING:

RC Occupancy	Water setpoint on RC direct access	Range	Water setpoint on parameter menu	Range
	Cool Home Setpoint	5 to 18°C	Cool Home Setpoint [P407]	5 to 18°C
	Cool Sleep Setpoint	5 to 18°C	Cool Home Setpoint [P407] + Cool Sleep Offset [P408]	0 to 10°C
	Cool Away Setpoint	5 to 18°C	Cool Home Setpoint [P407] + Cool Away Offset [P409]	0 to 10°C

HEATING:

RC Occupancy	Water setpoint on RC direct access	Range	Water setpoint on parameter menu	Range
	Heat Home Setpoint	20 to 60°C	Heat Home Setpoint [P401]	20 to 60
	Heat Sleep Setpoint	20 to 60°C	Heat Home Setpoint [P401] + Heat Sleep Offset [P402]	-10 to 0°C
	Heat Away Setpoint	20 to 60°C	Heat Home Setpoint [P401] + Heat Away Offset [P403]	-10 to 0°C

DHW only (setpoints defined below change also the setpoints for DHW mode):

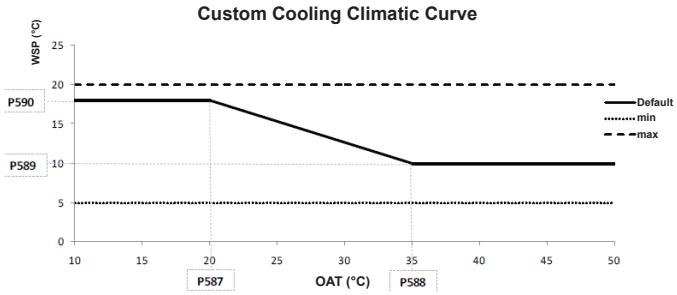
RC Occupancy	Water setpoint on RC direct access	Range	Water setpoint on parameter menu	Range
	DHW Setpoint	30 to 60°C	DHW Setpoint [P406]	30 to 60°C
	DHW Anti Legionella Setpoint	50 to 60°C	DHW Anti-Legionella Stp [P405]	50 to 60°C

10.3.3 Custom climatic curve:

COOLING: If the cooling climatic curve [P586] is configured to “0”, the water setpoint will be calculated according to the custom cooling climatic curve.This custom cooling climatic curve can be defined using the following parameters:

Parameter	Description	Default	Min.	Max.
P587	Custom Minimum OAT	20°C	0°C	30°C
P588	Custom Maximum OAT	35°C	24°C	46°C
P589	Custom Minimum Water Temp	10°C	5°C	18°C
P590	Custom Maximum Water Temp	18°C	5°C	18°C

Example:

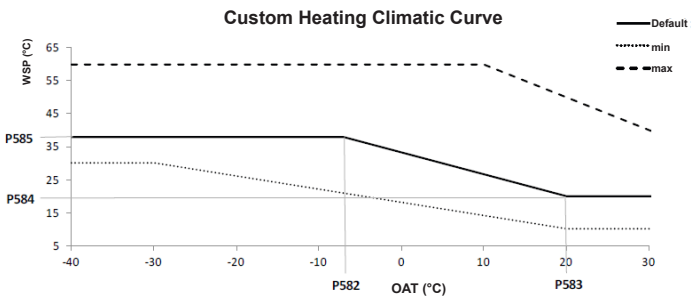


- If OAT is invalid, the Water Setpoint is equal to the Custom Minimum Water Temp [P589].
- If OAT is above the current Maximum OAT threshold, the Water Setpoint is equal to the Custom Maximum Water Temp [P590].
- If Minimum OAT is greater or equal to Maximum OAT threshold, the Water Setpoint is equal to the Custom Maximum Water Temp [P590].

HEATING: If the heating climatic curve [P581]is configured to “0”, the water setpoint will be calculated according to the custom heating climatic curve. This custom heating climatic curve can be defined using the following parameters:

Parameter	Description	Default	Min.	Max.
P582	Custom Minimum OAT	-7°C	-30°C	10°C
P583	Custom Maximum OAT	20°C	10°C	30°C
P584	Custom Minimum Water Temp	20°C	20°C	40°C
P585	Custom Maximum Water Temp	38°C	30°C	60°C

Example:



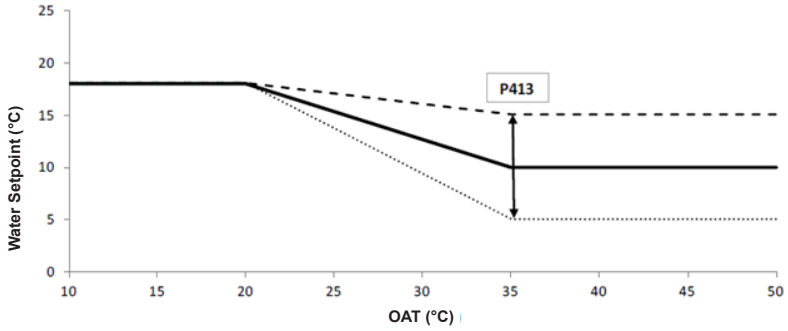
- If OAT is invalid, the Water Setpoint is equal to the Custom Max. Water Temp [P585].
- If OAT is above the current Maximum OAT threshold, the Water Setpoint is equal to the Custom Min. Water Temp [P584].
- If Min. OAT is greater or equal to Max. OAT threshold, the Water Setpoint is equal to the Custom Max. Water Temp [P584].

10.3.4 Offset on climatic curves (predefined and customer)

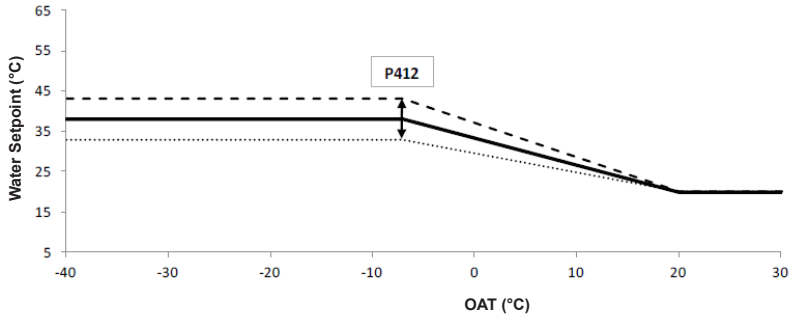
Two other parameters are also configurable to adjust water setpoint to suit customer needs:

- For cooling curve - Cool Minimum Water Setpoint [P589]can be offsetted by an offset on foot of the curve (Cool Curve Min Stp Offset [P413])
- For heating curve - Heat Maximum Water Setpoint [P585] can be offsetted by an offset on head of the curve (Heat Curv Max Stp Offset [P412])

Custom Cooling Climatic Curve: offset on foot of the curve



Heating Climatic Curve: offset on head of the curve



10.4 Installation with remote user interface:
When the unit is equipped with a remote user interface, the control can be based on the air setpoint.
Depending on the occupancy and heating/cooling/DHW mode, the air setpoint is as given below. The air setpoint can be configured in two ways:

- By direct access to the RC (refer to owner's manual)
- By access to the parameter menu via the RC or JBus / ModBus

COOLING:

RC Occupancy	Air setpoint on RC direct access	Range	Air setpoint on parameter menu	Range
	Cool Home Setpoint	20 to 38°C	Cool Home Setpoint [P424]	20 to 38°C
	Cool Sleep Setpoint	20 to 38°C	Cool Home Setpoint [P424] + Cool Sleep Offset [P425]	0 to 10°C
	Cool Away Setpoint	20 to 38°C	Cool Home Setpoint [P424] + Cool Away Offset [P426]	0 to 10°C

HEATING:

RC Occupancy	Air setpoint on RC direct access	Range	Air setpoint on parameter menu	Range
	Heat Home Setpoint	12 to 34°C	Heat Home Setpoint [P421]	12 to 34°C
	Heat Sleep Setpoint	12 to 34°C	Heat Home Setpoint [P421] + Heat Sleep Offset [P422]	-10 to 0°C
	Heat Away Setpoint	12 to 34°C	Heat Home Setpoint [P421] + Heat Away Offset [P423]	-10 to 0°C

Once air setpoints are defined, water setpoints must be configured for each occupancy.

10.5 Home Anti-freeze protection:
This protection is used on RUA-CP**01H, only when the remote user interface is connected. It is used to maintain the minimum room temperature which is by default set to 6°C. When the room temperature goes below the Home Anti-freeze setpoint [P427], the unit will run in Heating mode until the room temperature is increased: [P427] + 2°C.

Never switch off the unit, otherwise home anti-freeze protection cannot be guaranteed. For this reason the main unit and / or customer circuit disconnect switch must always be left closed.

10.6 Water freeze protection:
When the OAT is low (and pump is stopped), the risk to freeze the water exchanger and the water pipes is high. The pump shall be turned on regularly or continuously to make water circulate and decrease the risk. Likewise the BPHE and piping electric heaters present on the hydronic kit (refer to Figures 7 and 8) are activated in some cases.

The pump is controlled as follows:

- If OAT goes below AntiFreezeDeltaSetpoint* [P517] + 6°C, the pump runs for 1 minute every 15 minutes at maximum speed.
- If OAT goes below AntiFreezeDeltaSetpoint* [P517] + 6°C and EWT or LWT goes below AntiFreezeDeltaSetpoint* [P517] + 4°C, the pump runs continuously at maximum speed.
- A 1K hysteresis is applied to exit these two overrides.

The electric heaters are controlled as follows:

- The electric heaters are energized during defrost and for 1 minute after defrost end.
- The electric heaters are energized if OAT is below the AntiFreezeDeltaSetpoint* [P517] + 6.0 °C and if either EWT or LWT are lower than AntiFreezeDeltaSetpoint* [P517] + 4.0 °C.

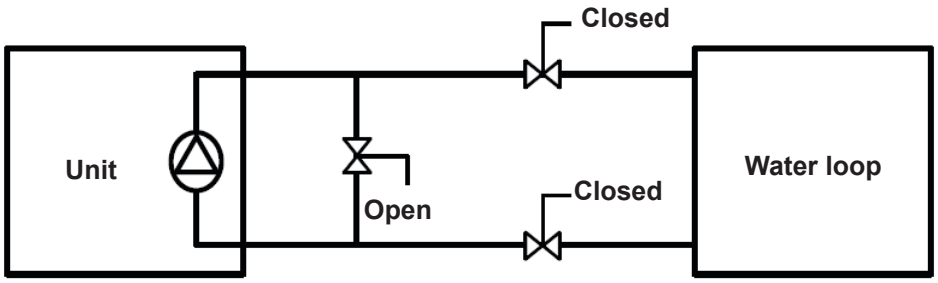
- The electric heaters are de-energized if OAT is above the AntiFreezeDeltaSetpoint* [P517] + 7.0 °C or if both EWT (if configured) and LWT are higher than AntiFreezeDeltaSetpoint* [P517] + 4.5 °C.
- The electric heaters are energized if either alarm #50 or alarm #51 is active and can still automatically be reset

**** Modifying the pre-configured value is at the user's responsibility.***

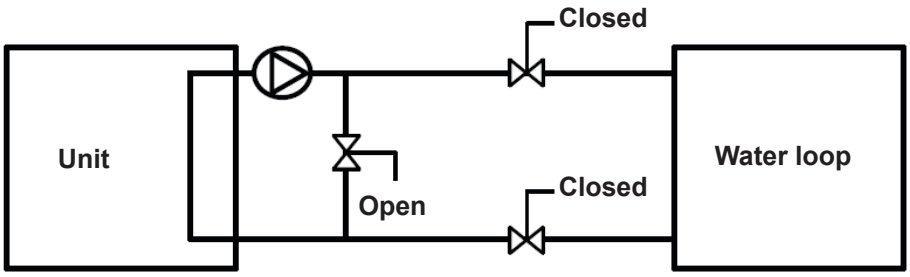
Never switch off the unit, otherwise freeze protection cannot be guaranteed. For this reason the main unit and/or customer circuit disconnect switch must always be left closed.

If a shut-off valve is installed, a bypass must be included as shown below:

Winter position for unit with hydronic module:



Winter position for unit without hydronic module:



IMPORTANT: Depending on the atmospheric conditions in your area you must do the following when switching the unit off in winter:

- ***Add ethylene glycol or propylene glycol with an adequate concentration to protect the installation up to a temperature of 10 K below the lowest temperature likely to occur at the installation site***
- ***If the unit is not used for an extended period, it should be drained, and ethylene glycol or propylene glycol should be charged in the heat exchanger as a safety precaution, using the water inlet purge valve connection***
- ***At the start of the next season, refill the unit with water and add an appropriate inhibitor.***

- ***For the installation of auxiliary equipment, the installer must comply with basic regulations, especially for minimum and maximum flow rates (section 7.6 & 7.7)***
- ***To prevent corrosion by differential aeration, the complete drained heat transfer circuit must be charged with nitrogen for a period of one month. If the heat transfer fluid does not comply with the manufacturer regulations, the nitrogen charge (0.5Bar Max) must be added immediately***
- ***If frost protection is dependent on electric trace heaters, never switch off their power***

- ***If trace heating is not used, or during a prolonged power failure, the unit water system must be drained to protect the unit***
- ***The heat exchanger temperature sensors are part of frost protection: If piping trace heaters are used, ensure the external heaters do not affect the measurement of these sensors***

⚠ ***CAUTION:***
Please note that "water freeze protection" and "home anti-freeze protection" are two different modes. Water freeze protection is used in order to reduce the risk to freeze the water exchanger and the water pipes, whereas the home anti-freeze protection is used to maintain the minimum room temperature.

10.7 Domestic hot water mode:
The DHW mode is used to produce hot water for domestic purposes. The system control manages the operation of the hot domestic water tank, as well as the diverting valve. If the unit is fitted with a variable speed hydraulic kit, then in DHW mode, the pump must be controlled by the adjustable constant speed logic (no ΔT logic). And an additional water pump can be installed on secondary water loop (refer to Installation with DHW production and boiler example for details).

10.7.1 DHW diverting valve:
The Monobloc outdoor unit can drive a diverting valve to manage a domestic hot water storage tank application. In case of a domestic hot water request, the operating logic controls a diverting valve which directs the hot water to the storage tank.

Characteristics
The 3-way diverter valve is used to select either domestic hot water or space heating operation
Recommended valve specification:
- Kvs = 16
- Max. Temperature = 150°C
- L-Port style

2 Types of 3-way valve (diverter) can be used :-
- 2-Wire (Spring Return)
- 3-Wire SPST

Electrical connection	Refer to Section 7.3 Electrical connections
Configuration	Refer to Installation with DHW production example

10.7.2 DHW temperature sensor or thermostat:
According the configuration, it is possible to control the DHW option with either a temperature sensor or thermostat

	Temperature sensor	**Thermostat**
Characteristics	Accessory	When the thermostat is closed, the domestic hot water mode is requested
	Resistance = 10 KOhms	
	Cable length = 6 m	

Electrical connection	Refer to Installation with DHW production example
Configuration	Refer to Installation with DHW production example

The DHW production is possible when:
- DHW only mode is selected and there is DHW production demand (temperature conditions)
- DHW schedule is activated and there is DHW production demand (temperature conditions) and operating time in this mode is below DHW Maximal Runtime [P707].

10.7.3 DHW electric heater:
When the unit is requested to run in DHW mode, the DHW electric heater (if configured) can be used in order to provide domestic hot water.The discrete output can control a contactor (not supplied with unit).

Characteristics	Contactor Coil:
	230 VAC
	50Hz

Electrical connection	Refer to Installation with DHW production example
Configuration	Refer to Installation with DHW production example

The electric heater is started when the tank temperature is below the DHW setpoint and one of the following conditions is true:
- OAT is below Booster OAT Threshold [P604]
- OAT is above Maximum OAT for Heating [P515]
- Anti-legionella mode is active
- Defrost is active
- In case of unit of failure

IMPORTANT: Electric heating is disabled when Off Peak or Load Shedding is active or in the case of DHW thermistor sensor failure (refer to "Possible switches to install on system").

10.7.4 Domestic water tank:
The water inside the domestic water tank must be constantly controlled in order to minimize the risk of any contamination, including legionella bacteria. Bearing this in mind, it is important to inform the user about the significance of water temperature control.

Water tank protection system:
The system is scheduled to heat up water in the domestic hot water tank in order to eliminate the possibility of legionella growth or kill any existing bacteria.
Legionella will not survive if the temperature is above 50°C. The risk of contamination is practically non-existent when the water temperature is set to 60°C.

Water tank protection settings:
To protect the domestic water tank against legionella bacteria, the following parameters must be set:
- Anti-Legionella Start Day of Week [P714]
- Anti-Legionella Start Time [P715]
- Anti-Legionella Water Setpoint [P405] (anti-legionella protection is stopped when the water temperature reaches the pre-set temperature)

10.7.5 DHW limitation mode:
DHW limitation mode [P543] reduces noise levels, by reducing the compressor frequency when DHW mode is active. For configuration, refer to Installation with DHW production example.

10.8 Pump configuration:

There are a number of possible configurations of the hydraulic circuit:

- Unit with hydronic module (internal main pump included)
- Unit without hydronic module. An external pump is necessary
- If a secondary hydraulic loop is used, this will have its own additional pump

Different configurations with pump	Internal main pump (option)			External main pump (not supplied)	Additional pump (not supplied)
	Fixed speed pump	Variable speed pump		Fixed speed pump	Fixed speed pump
		Adjustable speed	ΔT		
Internal main pump				X	✓
External main pump	X				✓
Header / Follower Installation	✓	✓	X	X	✓ (connected on header unit)

For external main pump and additional pump, the discrete output can control a contactor (not supplied with unit).

Characteristics Contactor Coil:
230 VAC
50Hz

Electrical connection Refer to Installation with DHW production and boiler example
Configuration Refer to Installation with DHW production and boiler example

⚠ ***CAUTION:***
The installer is responsible for ensuring the protection of any additional pump against the low water flow rate (no flow switch can be managed by unit control).

The management of different states of main pump (ON / OFF) is different according to the kind of installation (options, accessories, applications). In the compatibility table below, the different control logics for main pump are presented in function of installation:

Different control logic for main pump:

Main Pump Logic [P565]	No RC	Wired RC	OFF Mode	Cooling / Heating Mode		Boiler	
				Satisfied Demand	Demand	On	Off
Always On	✓	✓	Off	On	On	Off	N.A.
Water Sampling	✓	N.A.	Off	Off (On for sampling)	On	Off	N.A.
According to Space Temp	N.A.	✓	Off	According to IAT vs Air Setpoint	On	Off	N.A.

The management of different states of additional pump (ON / OFF) is different according to the kind of installation (options, accessories, applications). In the compatibility table below, the different control logics for additional pump are presented in function of installation:

Additional Pump Logic [P573]	No RC	Wired RC	OFF Mode	Cooling / Heating Mode		Boiler		DHW	
				Satisfied Demand	Demand	On	Off	Active	Inactive
No additional pump	✓	✓	Off	Off	Off	Off	N.A.	N.A.	N.A.
Always On	✓	✓	Off	On	On	On	N.A.	N.A.	N.A.
According to Space Temp	N.A.	✓	Off	According to IAT vs Air Setpoint	On	On	N.A.	N.A.	N.A.
Always On, but Off when DHW activated	✓	✓	Off	On	On	On	N.A.	Off	N.A.
According to Space Temp, but Off when DHW activated	N.A.	✓	Off	According to IAT vs Air Setpoint	On	On	N.A.	Off	N.A.

10.9 Electric Heaters:

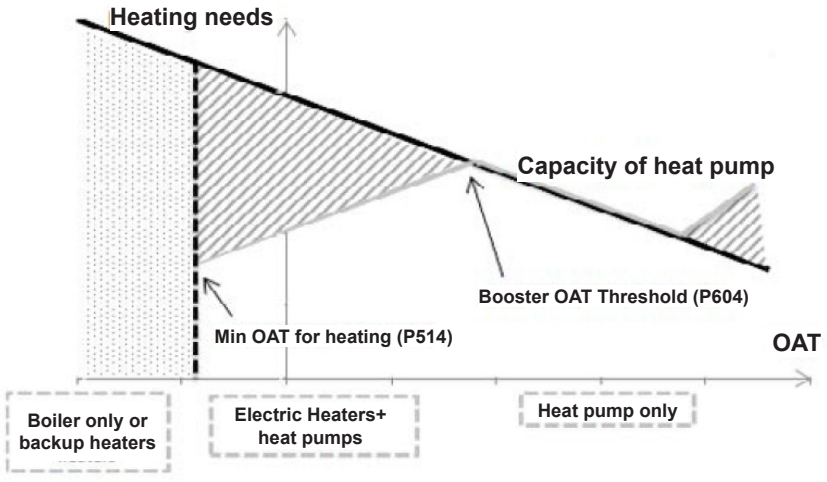
NOTE:
The installer is responsible for ensuring that the installation complies with the applicable legislation in terms of electrical and thermal safety.

It is possible to include electric heaters in the hydraulic circuit to ensure heating in case of low OATor heat pump failure.

When the OAT is below the Booster OAT Threshold [P604], then the booster electric heaters can be activated. The booster electric heaters can operate at the same time as the heat pump.

When OAT is below Min OAT for heating [P514], the heat pump is stopped, and the electric heaters can be activated.

Operation of booster and backup:



Depending on the configuration, it is possible to control up to three electric heaters or three electric heat stages (see section 7.8.12):

- One electric heat stage with one customized discrete output: EH1.
- Two electric heat stages with two customized discrete outputs: EH1 and EH2.
- Three electric heat stages with two customized discrete outputs: EH1 and EH2.
- Three electric heat stages with three customized discrete outputs: EH1 and EH2 and EH3. This configuration cannot be activated if DHW heater is present.

Each discrete output can control a contactor (not supplied with unit).

Characteristics	Contactor Coil:
	230 VAC
	50Hz
Electrical connection	Refer to Installation with booster electric heaters example
Configuration	Refer to Installation with booster electric heaters example

10.10 Boiler:

To satisfy the heating demand during periods very low ambient temperature, it is possible to install a boiler. The boiler is considered as a backup: when it is activated, the heat pump cannot operate. Boiler is activated when OAT is below Minimum OAT for Heating [P514] or in case of heat pump failure.

Characteristics	Contactor Coil:
	230 VAC
	50Hz
Electrical connection	Refer to Installation with DHW and boiler example
Configuration	Refer to Installation with DHW and boiler example

10.11 Coil heating control for compressor:

⚠ ***CAUTION:***
When the unit doesn't operate, the compressor can be energized. The coil heating control has the function of heating the compressor by applying a current to the compressor when not operating instead of using a case heater.

This control is for the purpose of preventing stagnation of the refrigerant inside the compressor.

10.12 Defrost cycle:

When the outdoor air temperature is low and the ambient humidity is high, the probability of frost forming on the surface of the outdoor coil increases. The frost covering the outdoor coil may reduce the air flow across the coil and impair the performance of the unit. To remove the frost from the coil, the control initiates the defrost cycle when necessary.

During the defrost cycle, the refrigerant circuit is forced into the cooling mode. To prevent the water loop from cooling down, BPHE and piping electric heaters may be started.

⚠ ***CAUTION:***
Please note that "defrost" and "home anti-freeze protection" are two different modes. Defrost is used in order to remove the frost that is covering the outside coil, whereas the home anti-freeze protection is used to maintain the minimum room temperature.

10.13 Night mode capacity control:

The night period is defined by the start hour and the end hour which can be set by the user. The night mode allows users to configure the unit to operate with specific parameters within a given period of time, e.g. night period. Particularly this mode permits the reduction of compressor frequency (and noise level) during defined period.

10.14 Drying mode:

The Drying mode enables a gradual water temperature ramp-up in Heat mode for UFH drying. This operating mode can only be selected from the service access level, it is automatically stopped at the end of the configured period.

The following parameters need to be set to operate in drying mode:
- Drying Starting Setpoint [P595]
- Drying Warm-up days [P596]
- Drying Ramp-up days [P597]
- Drying Hold-up days [P598]
- Heating Home Water Setpoint [P401]

10.15 Summer mode:

The RUA-CP**01H units may operate in Summer mode which is active under the following conditions:
- when the Summer Switch is closed
- or when conditions on OAT [P716] and time [P717] and [P718] are validated (see section 8.2)

When the Summer mode is active, then the unit may operate only as specified below.

Cooling Mode	Heating Mode	DHW Mode
✓	X	✓

11.0 Start Up

Before operating your system, for the first time, please complete the following checks:

1. Is there any shipping damage?
2. Unit is level in its installation
3. Power supply agrees with the unit name plate
4. Electrical circuit wiring has been sized and installed properly
5. Unit ground wire has been connected
6. Unit neutral wire has been connected
7. All terminals are tight
8. All cables and thermistors have been inspected for crossed wires
9. All plug assemblies are tight
10. All air handlers are operating
11. All water valves are open
12. All fluid piping is connected properly
13. All air has been vented from the system
14. Water pump is operating with the correct rotation
15. Water pump control has been properly interlocked with the heat pump
16. Unit has been leak checked (including fittings): Locate, repair, and report any refrigerant leak
17. All incoming power voltage is within rated voltage range

As part of the setup for your system it is important that the nominal flow rate, for the system is determined and that all air is purged from the water pipework / heating circuit. Details on how to set the nominal flow rate and how to purge the air from your system are shown below:

11.1 Nominal system water flow control:

The water circulation pumps of the RUA-CP***1H units have been sized to allow the hydronic modules to cover all possible configurations based on the specific installation conditions, i.e. for various temperature differences between the entering and the leaving water (ΔT) at full load, which can vary between 3 and 10 K.

This required difference between the entering and leaving water temperature determines the nominal system flow rate. Use this specification for the unit selection to find the system operating conditions. In particular, collect the data to be used for the control of the system flow rate:

- Unit without a hydronic module (with external main pump): nominal unit pressure drop (plate heat exchanger + internal piping),
- Unit with fixed speed pump: nominal available external static pressure,
- Units with variable speed pump-control on adjustable constant speed: nominal flow rate,
- Units with variable speed pump - control on temperature difference: heat exchanger ΔT (variable flow).

If the information is not available at the system start-up, contact the technical service department responsible for the installation to get it. These characteristics can be obtained from the technical literature using the unit performance tables for a ΔT of 5 K at the water heat exchanger.

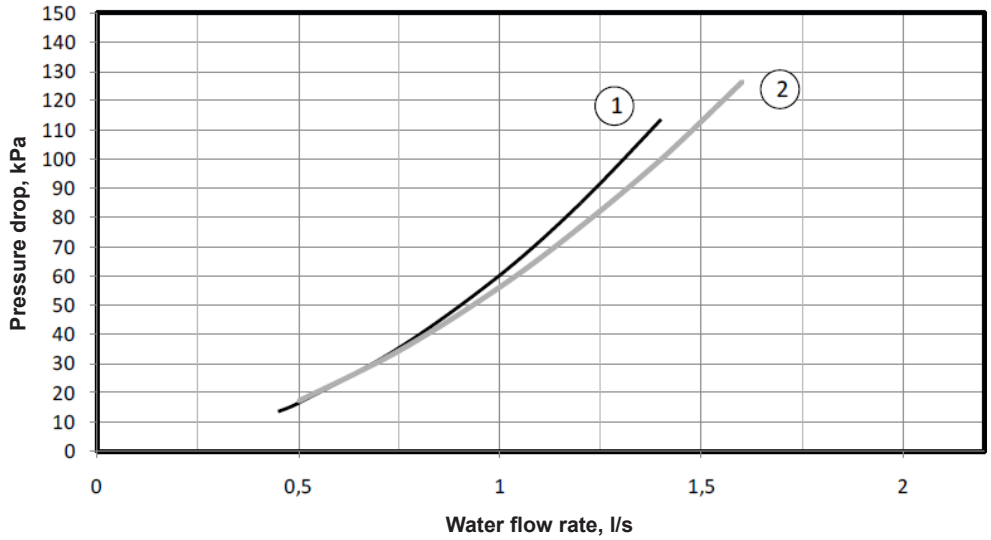
11.2 Steps to clean, purge, and define a flow rate for hydraulic circuit

	N°	Without Hydronic Module	With fixed speed hydronic module	With Variable Speed Hydronic Module Adjustable constant speed	With variable speed hydronic module △T
Cleaning procedure	1	Open the manual control valve fully (item 17)		No manual control valve required	
	2	Set the system pump *			
	3	Read the BPHE pressure drop…	Read the available external static pressure…		
	4	…by taking the difference of the readings of the pressure gauge connected to the unit inlet and outlet (items 20***)			
	5	Take another reading			
	6	Compare this value to the initial value			
	7	If the pressure drop…	If the available external static pressure…		
		…has decreased, this indicates that the screen filter must be removed and cleaned, as the hydronic circuit contains solid particles			
	8	In this case stop the pump* and close the shut-off valves at the water inlet and outlet (items 16) and remove the screen filter (item 19) after emptying the hydronic section of the unit (items 21 and 22)			
	9	Repeat, if necessary, to ensure that the filter is not contaminated			
Purge protection	1	After filling with water, wait about 24hrs before activating the purge procedure			
	2	Activate the purge mode*: water pump is requested to run continuously at maximum speed to purge the hydraulic circuit regardless the flow switch value**			
	3	The air purge is field-supplied (item 14***)			
		If the purge is automatic, air will vent from circuit automatically			
		If the purge is manual, open the valve to vent air from the circuit			

11.3 Steps to clean, purge, and define a flow rate for hydraulic circuit

	N°	Without Hydronic Module	With fixed speed hydronic module	With Variable Speed Hydronic Module Adjustable constant speed	With variable speed hydronic module △T
Water flow control procedure	1	When the circuit is cleaned and purged, activate the pump in quick test mode*, and read the pressures at the pressure gauges (enteing water pressure – leaving water pressure)…			No need to adjust the flow rate because of △T control. But it is necessary to adjust the minimum pump speed [P567] to ensure closure of the switch
	2	…to find out the unit pressure drop (plate heat exchanger and internal water piping)			
	3	Compare the value obtained with the pressure drop (Graph1 below)	Compare the value obtained with the available external static pressure (Graph 2 below)	Compare this value to the graph of available external static pressure using the appropriate speed curve (Graphs 3 & 4 below)	
	4	If the pressure read is higher than the value specified the unit flow rate (and thus system flow) is too high. The pump supplies an excessive flow rate based on the global pressure drop of the application. In this case close the control valve and read the new pressure difference		If the flow rate corresponding is higher, decrease the pump speed*, and vice versa	
	5	Proceed by successfully closing the control valve until you obtain the specific pressure that corresponds to the nominal flow rate at the required unit operating point		Proceed by successfully adjusting the pump speed until the expected water flow rate is achieved	

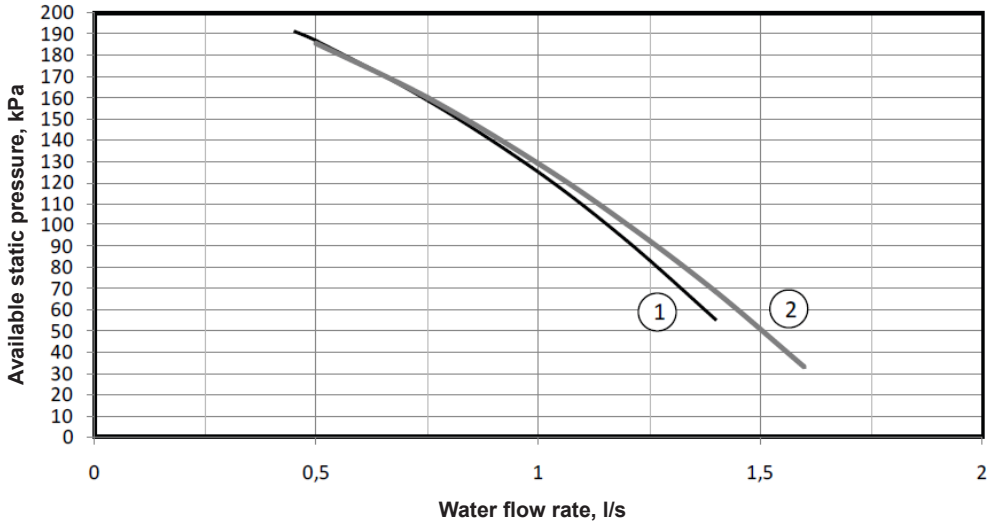
1. Pressure drop for unit without hydronic module 17 and 21 kW (heat exchanger + internal piping)



Legend:
1. RUA-CP1701H*
2. RUA-CP2101H*

Data for fresh water at 20°C
Maximum flow rate reduced if glycol is used in the heating system

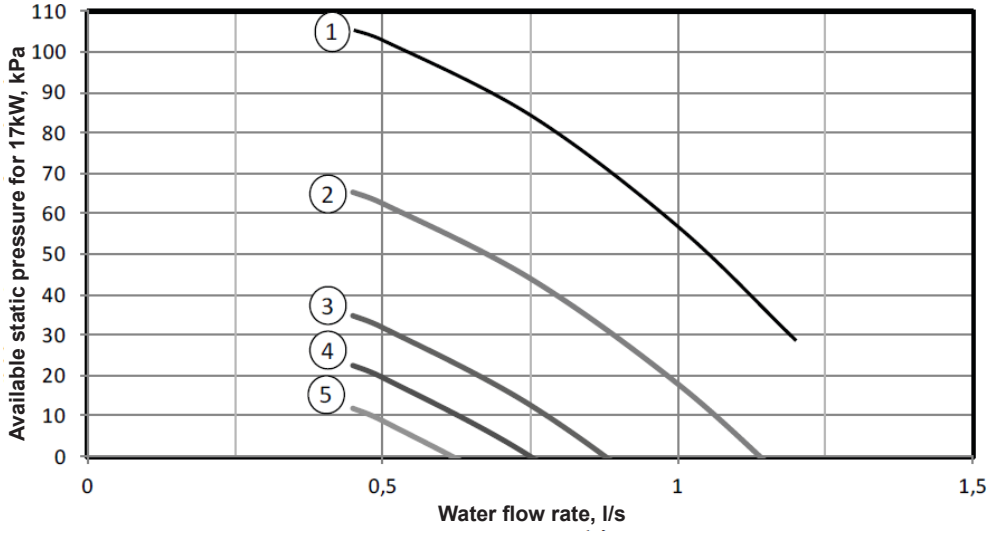
2. Available external static pressure for unit with fixed speed hydronic module 17 and 21kW



Legend:
1. RUA-CP1701H*
2. RUA-CP2101H*

Data for fresh water at 20°C
Maximum flow rate reduced if glycol is used in the heating system

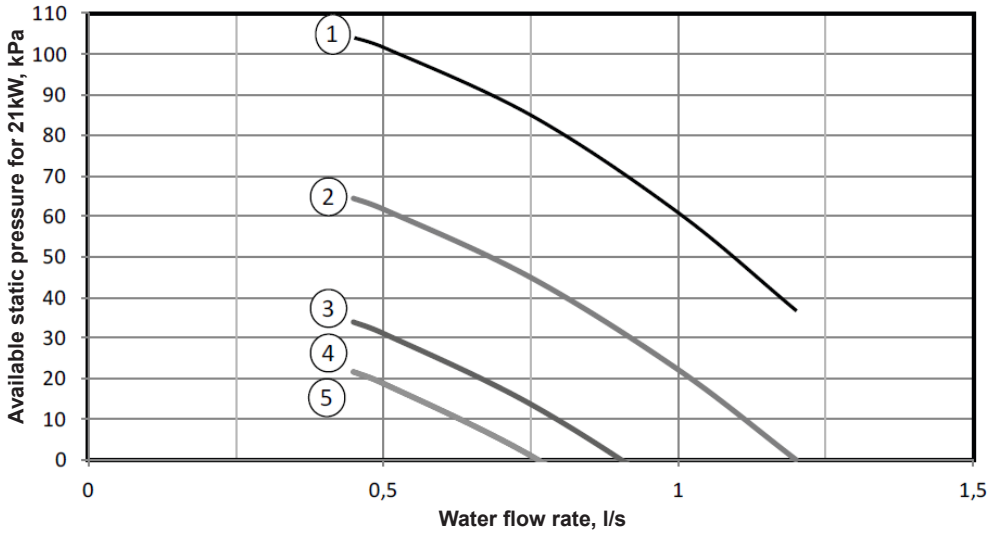
3. Available external static pressure for 17kW unit with variable speed hydronic module



Legend:
1. Pump speed = 100%
2. Pump speed = 75%
3. Pump speed = 50%
4. Pump speed = 38%
5. Pump speed = 25%

Data for fresh water at 20°C
Maximum flow rate reduced if glycol is used in the heating system

4. Available external static pressure for 21kW unit with variable speed hydronic module



Legend:
1. Pump speed = 100%
2. Pump speed = 75%
3. Pump speed = 50%
4. Pump speed = 38%
5. Pump speed = 25%

Data for fresh water at 20°C
Maximum flow rate reduced if glycol is used in the heating system

11.4 Actions in RC parameter menu or Service tools to activate the cleaning purge and control of flow rate for hydraulic circuit

Steps		Table	Par.	Designation	Description	Range	Default	Ex.	Unit
Cleaning procedure		QCK_TEST	**321**	Quick Test Enable	Access to Quick test mode	0 ~ 1	0	1	-
			331	Water Pump Speed	Activate the pump	0 ~ 100	0	100	%
			Wait around 2h that the hydronic circuit is cleaned						
			331	Water Pump Speed	Stop the pump	0 ~ 100	0	0	%
			321	Quick Test Enable	Exit the Quick test mode	0 ~ 1	0	0	-
Purge Procedure		MOD_REQ	44	System Mode Request	8 = Purge (water pump is constantly running to purge the hydraulic circuit) 0 ~ 6 & 9 = not used for this configuration	0 ~ 9	-	8	-
			Wait that the circuit purges						
			44	System Mode Request	To exit purge mode, change the value of [P044] with the wanted mode (0 or 1 or 2 or 4)	0 ~ 9	-	0/1/2/4	-
Water flow control procedure	**Fixed speed pump (internal or external main pump)**	QCK_TEST	**321**	Quick Test Enable	Access to Quick test mode	0 ~ 1	0	1	-
			331	Water Pump Speed	Activate the pump	0 ~ 100	0	100	%
			Adjust the control valve to set the nominal flow rate (refer to Graphic 2)						
			331	Water Pump Speed	Stop the pump	0 ~ 100	0	0	%
			321	Quick Test Enable	Exit the Quick test mode	0 ~ 1	0	0	-
	Variable speed pump – control on adjustable constant speed	QCK_TEST	**321**	Quick Test Enable	Access to Quick test mode	0 ~ 1	0	1	-
			331	Water Pump Speed	Adjust water pump speed until obtain the expected design water flow (refer to Graphics 3 & 4)	0 ~ 100	0	?	%
			331	Water Pump Speed	When the pump speed is identified, stop the pump	0 ~ 100	0	0	%
			321	Quick Test Enable	Exit the Quick test mode	0 ~ 1	0	0	-
		PUM_CONF	**566**	Var Speed Pump Logic	0 = Adjustable Constant Speed (use [P568] parameter to set the water pump constant speed) 1 = not used for this configuration	0 ~ 1	1	0	-
			568	Maximum Pump Speed	If variable speed pump configuration is set to adjustable speed, then the maximum pump speed parameter corresponds to the design water flow	50 ~ 100	100	Enter pump speed determined at the last step [P331]	%
	Variable speed pump – control on △T	PUM_CONF	**566**	Var. Speed Pump Logic	1=Water pump speed controlled by the water delta T 0= not used for this configuration	0 ~ 1	1	1	-
			569	Water Delta T Setpoint	Set a △T value	2.0 ~ 20.0	5	5	K
Determine the min pump speed to allow closure of flow switch	**Variable speed pump: - control on adjustable constant speed - and control on △T**	QCK_TEST	**321**	Quick Test Enable	To determine the minimum pump speed in function of pressure drop and closing of flow switch of hydraulic circuit, activate the quick test	0 ~ 1	0	1	-
			331	Water Pump Speed	Increase the water pump speed until the closing of the flow switch (to check the status of the flow switch refer to parameter Flow Switch Status [P105]	0 ~ 100	0	?	%
			321	Quick Test Enable	When the minimum pump speed is determined, exit of quick test mode	0 ~ 1	0	0	-
		PUM_CONF	**567**	Minimum Pump Speed	Enter the minimum pump speed	19 ~ 50	19	?	%

NOTE:

If the system has an excessive pressure drop in relation to the available static pressure provided by the system pump the nominal water flow rate cannot be obtained (the resulting flow rate is lower) and the temperature difference between the water heat exchanger entering and leaving water will increase.

To reduce the pressure drops of the hydronic system:

- reduce the individual pressure drops as much as possible (bends, level changes, options, etc.).
- use a correctly sized piping diameter.
- avoid hydronic system extensions, wherever possible.

11.5 Commissioning modes:

IMPORTANT:
Field connection of interface circuits may lead to safety risks: any control box modification must maintain equipment conformity with local regulations. Precautions must be taken to prevent accidental electrical contact between circuits supplied by different sources:

- ***The routing selection and/or conductor insulation characteristics must ensure dual electric insulation.***
- ***In case of accidental disconnection, conductor fixing between different conductors and/or in the control box prevents any contact between the conductor ends and an active energised part.***

Refer to the RUA-CP**01H wiring diagram supplied with the unit for the field control wiring of the following features:

- Safety switch (normally close contact, mandatory)

Three possible control configurations:

1. **Connections to the customer remote control**

- On/Off remote switch
- Heat/Cool select remote switch
- Home/Sleep select remote switch
- Alarm/Alert or Operation report…

2. **Connections to the user interface**
   When the remote-mounted user interface accessory is chosen, the user interface has to be connected at the terminal block (see section 7.8.8).

NOTE:
It is not possible to have both local user interface and remote user interface on the same unit.

3. **Connections to the customer communication bus**

- Connection to Jbus / ModBus is made using a connector provided directly on the NHC electrical board (see the wiring diagram provided with the unit).

Check before start the unit

Never be tempted to start the chiller without reading fully, and understanding, the operating instructions and without having carried out the following pre-start checks:

- Ensure that all electrical connections are properly tightened.
- Ensure that the unit is level and well-supported.
- Check that the hydraulic circuit has sufficient water flow and that the pipe connections correspond to the installation diagram.
- Ensure that there are no water leaks. Check the correct operation of the valves installed.
- All panels should be fitted and firmly secured with the corresponding screws.
- Make sure that there is sufficient space for servicing and maintenance purposes.
- Ensure that there are no refrigerant leaks.
- Confirm that the electrical power source agrees with the unit nameplate rating, wiring diagram and other documentation for the unit.
- Ensure that the power supply corresponds to the applicable standards.
- Make sure that compressors float freely on the mounting springs.

⚠ ***CAUTION:***

- ***Commissioning and start-up of the heat pump must be supervised by a qualified refrigeration qualified technician.***
- ***Start-up and operating tests must be carried out with a thermal load applied and water circulating in the water heat exchanger.***
- ***All set point adjustments and control tests must be carried out before the unit is started up.***

Ensure that all safety devices are operational, especially that the high pressure switches are functioning on and that any alarms are acknowledged.

Note:
If the Manufacturer instructions (power and water connections and installation) are not observed, the Manufacturer warranty becomes invalid.

System Start Up:

Start the system in heating mode. Check the following parameters during the test and ensure that no error codes are generated during the start-up test.

Date / Hour							
	Air	Outdoor Air Temp (°C)	P001				
	Water	Entering Water Temp (°C)	P003				
		Leaving Water Temp (°C)	P004				
		Water Control Temp (°C)	P052				
	Suction	Saturated Suction Temp (°C)	P008				
		Suction Temperature (°C)	P009				
		Superheat Temperature (°C)	P015				
		Superheat Target Temp (°C)	P016				
	Discharge	Discharge Temperature (°C)	P010				
		Refrigerant Temperature (°C)	P005				
	Compressor	Requested Compressor Frequency (Hz)	P022				
		Actual Compressor Frequency (Hz)	P023				
	Water control	Water Control Point (°C)	P051				
		Flow Switch Status	P105				
		Safety Switch Status	P104				
	Water pressure / flow rate	Entering water heat exchanger pressure (kPa)	-				
		Leaving water heat exchanger pressure (kPa)	-				
		Pressure drop (without internal pump)(kPa)	-				
		Flow rate from curves (without internal pump) (l/sec)	-				
		Or available external pressure (with internal pump) (kPa)	-				
		Flow rate from curves (with internal pump) (l/sec)	-				
	Power	Network Voltage (V)	-				
		Input Amperage (A)	-				

Repeat the above test with the heat pump system operating in cooling mode and DHW mode.

12.0 Maintenance

Standard maintenance
To ensure optimal efficiency and reliability of the units, we recommend establishing a maintenance contract with your local Service organisation. This contract will include regular inspections by Service specialists so that any malfunction is detected and corrected quickly, ensuring that no serious damage can occur.

A Service maintenance contract is the best way to ensure the maximum operating life for your equipment and, through the expertise of technicians, provides the ideal way to manage your system cost effectively. Air conditioning equipment must be maintained by professional technicians, whilst routine checks can be carried out locally by specialised technicians.
See the standard EN 378-4 or ISO5149.

All refrigerant charging, removal, draining and sampling operations must be carried out by a qualified technician and with the correct material for the unit. Any inappropriate handling can lead to uncontrolled fluid or pressure leaks.

⚠ ***CAUTION:***
Before doing any work on the machine ensure that the power is switched off. If a refrigerant circuit is opened, it must be evacuated, recharged and tested for leaks. Before any operation on a refrigerant circuit, it is necessary to remove the complete refrigerant charge from the unit with a refrigerant charge recovery group.

Simple preventive maintenance will allow you to get the best performance from your HVAC unit:
- improved cooling and heating performance
- reduced power consumption
- prevention of accidental component failure
- prevention of major time-consuming and costly interventions
- protection of the environment

There are five maintenance levels for HVAC units, as defined by the AFNOR X60-010 standard.

NOTE:
Any deviation or non-observation of these maintenance criteria will render the guarantee conditions for the HVAC unit null and void, and the manufacturer, will no longer be responsible.

Level 1 maintenance

Simple procedures can be carried out by the user on a weekly basis:
- Visual inspection for oil traces (sign of a refrigerant leak),
- Air heat exchanger cleaning
- Check for removed protection devices, and badly closed panels,
- Check the unit alarm report when the unit does not work (refer RC end user manual),
- General visual inspection for any signs of deterioration,
- Verify the charge in the sight-glass.
- Regularly monitor the surface of the components to detect cavernous corrosion. To do this check an uninsulated part of the pressure vessel or at a joint in the insulation.

Check that the water temperature difference between the heat exchanger inlet and outlet is correct.

Level 2 maintenance
This level requires specific know-how in the electrical, hydronic and mechanical fields. The frequency of this maintenance level can be monthly or annually depending on the verification type. In these conditions, the following maintenance operations are recommended.

Carry out all level 1 operations, then:

Electrical checks
- At least once a year tighten the power circuit electrical connections
- Check and retighten all control/command connections, if required
- Remove the dust and clean the interior of the control boxes, if required.
- Check the status of the contactors, disconnect switches and capacitors.
- Check the presence and the condition of the electrical protection devices.
- Check the correct operation of all electric heaters.
- Check that no water has penetrated into the control box.

Mechanical checks
- Check the tightening of the fan tower, fan, compressor and control box fixing bolts.

Water circuit checks
- Always take care when working on the water circuit to ensure that the condenser close by is not damaged.
- Check the water connections.
- Check the expansion tank for signs of excessive corrosion or gas pressure loss and replace it, if necessary.
- Purge the water circuit (see section 11.4).
- Clean the water filter (see section 11.4).
- Examine the fixed speed pump bearing after 17500 hours of operation with water and the fixed speed pump mechanical seal after 15000 hours. Check the operation of the low water flow rate safety device.
- Check the status of the thermal piping insulation.
- Check the concentration of the anti-freeze protection solution (ethylene glycol or propylene glycol). Regularly check for possible presence of impurities (e.g. silicon grains) in the heat exchange fluids. These impurities maybe the cause of the wear or corrosion by puncture.
- Periodically check the sacrificial anode condition (if fitted) and change if necessary.

Refrigerant circuit
- Fully clean the air heat exchangers with a low-pressure jet and a bio-degradable cleaner.
- Check the unit operating parameters and compare them with previous values.
- Carry out an oil contamination test.
- Check the operation of the high-pressure switch. Replace it if there is a fault.
- Check the fouling of the filter drier. Replace it if necessary.
- Keep and maintain a maintenance sheet, attached to each HVAC unit.

All these operations require strict observation of adequate safety measures: individual protection garments, compliance with all industry regulations, compliance with applicable local regulations and using common sense.

Level 3 (or higher) maintenance

The maintenance at this level requires specific skills/approval/tools and know-how and only the manufacturer, his representative or authorised agent are permitted to carry out these operations. These maintenance operations concern for example:
- A major component replacement (compressor, evaporator),
- Any intervention on the refrigerant circuit (handling refrigerant),
- Changing of parameters set at the factory (application change),
- Removal or dismantling of the HVAC unit,
- Any intervention due to a missed established maintenance operation,
- Any intervention covered by the warranty.
- One to two leak checks per year with a certified leak detector and carried out by a qualified person.

To reduce waste, the refrigerant and the oil must be transferred in accordance with applicable regulations, using methods that limit refrigerant leaks and pressure drops and with materials that are suitable for the products.

Any detected leaks must be repaired immediately. The compressor oil that is recovered during maintenance contains refrigerant and must be treated accordingly.
Refrigerant under pressure must not be purged to the open air.

If a refrigerant circuit is opened, plug all openings, if the operation takes up to one day, or for longer periods charge the circuit with nitrogen to prevent penetration of atmospheric humidity and resulting corrosion.

NOTE:
Any deviation or non-observation of these maintenance criteria will render the guarantee conditions for the HVAC unit null and void, and the manufacturer will no longer be held responsible.

Tightening torques for the main electrical connections:

Component	Designation in the unit	Value (N.m)
Disconnecting switch	L1 /L2 /L3/N/PE	2
Terminal Bloc X1	L1 /L2 /L3/N/PE	1.5 to 1.8
Terminal Bloc X3		0.6 to 0.8
Contactor (Power and control)		1.5
Thermal relay		2.5
Transformer		1.7
Connections on compressor		
Screw on phases (Only for 21kW)		2.5
Compressor variable speed drive		
6 M10 nuts	L1 /L2 /L3/N	1.2
2 M10 or M8 nuts PE 1,2		
9 M8 nuts (with fuses and busbars)	1/2/3	1.2

Tightening torques for the main bolts and screws:

Component	Utilisation	Value (N.m)
M8 H Wood screw	Chassis fixing to shipping pallet	13
M8 H nut	Compressor fixing to base pan BPHE & Receiver fixing	15
Taping screw D=4,2mm	Sheet metal parts, Plastic grid & electrical components	4.2
Taping screw D=3mm	Deflector assembly on front panel	2
M6 Taping screw	Fan sub assembly & Chassis assembly on feet	7
M6 Taping screw	Fan sub assembly & Chassis assembly on feet	7
M8 Screw	Water pump assembly on the partition panel	15
D1” & D1”1/4” Nut	Water pump inlet and outlet pipe connections	70
D1/2” Nut	Nut assembly on inlet water pump pipe	20
M6 H nut	Fan propellers assembly on fan motor	7

Air heat exchanger

We recommend, that finned coils are inspected regularly to check the degree of fouling. This depends on the environment where the unit is installed, and will be worse in urban and industrial installations and near trees that shed their leaves.

For coil cleaning, two maintenance levels are used, based on the AFNOR X60-010 standard:
- If the air heat exchangers are fouled, clean them gently in a vertical direction, using a brush.
- Only work on air heat exchangers with the fans switched off.
- For this type of operation switch off the HVAC unit if service considerations allow this.
- Clean air heat exchangers guarantee optimal operation of your HVAC unit. This cleaning is necessary when the air heat exchangers begin to become fouled. The frequency of cleaning depends on the season and location of the HVAC unit (ventilated, wooded, dusty area, etc.).
  Clean the coil, using appropriate products.

⚠ ***CAUTION:***
Never use pressurised water without a large diffuser. Do not use high-pressure cleaners for Cu/Cu and Cu/Al coils.
Concentrated and/or rotating water jets are strictly forbidden. Never use a fluid with a temperature above 45°C to clean the air heat exchangers.
Correct and frequent cleaning (approximately every three months) will prevent 2/3 of the corrosion problems.

Water heat exchanger maintenance
Check that:
- the insulating foam is intact and securely in place.
- the BPHE and piping electric heaters are operating, secure and correctly positioned.
- the water-side connections are clean and show no sign of leakage.

Unit maintenance

CAUTION:

Before any work on the unit ensure that the circuit is isolated and there is no voltage present. Note that it may take 5 minutes for the circuit capacitors to fully discharge after isolating the circuit. Only appropriately qualified personnel are authorised to work on the IPDU.

In case of any alarm or persistent problem related to the IPDU, contact Service.
The IPDUs fitted with RUA – CP**01H units do not require an insulation test, even if being replaced; they are systematically verified before delivery. Moreover, the filtering components installed in the IPDU can falsify the measurement and may even be damaged. If there is a need to test the insulation of the unit components (fan motors and pumps, cables, etc.), the IPDU must be disconnected at the power circuit.

Refrigerant volume

The unit must be operated in cooling mode to find out, if the unit charge is correct, by checking the actual subcooling.

Following a small refrigerant leak a loss of refrigerant, compared to the initial charge will be noticeable in the cooling mode and affect the subcooling value obtained at the air heat exchanger (condenser) outlet, but it will not be noticeable in the heating mode.

IMPORTANT:
It is therefore not possible to optimise the refrigerant charge in the heating mode after a leak. The unit must be operated in the cooling mode to check, if an additional charge is required.

Saturated temperatures based on the gauge pressure (in kPa g)

Saturated Temp. °C	Gauge pressure (kPa g)	Saturated Temp. °C	Gauge pressure (kPa g)	Saturated Temp. °C	Gauge pressure (kPa g)
-20	297	0	700	20	1344
-19	312	1	726	21	1384
-18	328	2	752	22	1425
-17	345	3	779	23	1467
-16	361	4	807	24	1509
-15	379	5	835	25	1596
-14	397	6	864	26	1552
-13	415	7	894	27	1641
-12	434	8	924	28	1687
-11	453	9	956	29	1734
-10	473	10	987	30	1781
-9	493	11	1020	31	1830
-8	514	12	1053	32	1880
-7	535	13	1087	33	1930
-6	557	14	1121	34	1981
-5	579	15	1156	35	2034
-4	602	16	1192	36	2087
-3	626	17	1229	37	2142
-2	650	18	1267	38	2197
-1	674	19	1305	39	2253
40	2311	51	3017	62	3874
41	2369	52	3088	63	3961
42	2429	53	3161	64	4049
43	2490	54	3234	65	4138
44	2551	55	3310	66	4229
45	2614	56	3386	67	4322
46	2678	57	3464	68	4416
47	2744	58	3543	69	4512
48	2810	59	3624	70	4610
49	2878	60	3706	-	-
50	2947	61	3789	-	-

The units use high-pressure R-410A refrigerant (the unit operating pressure is above 40 bar, the pressure at 35°C air temperature is 50% higher than for R-22). Special equipment must be used when working on the refrigerant circuit (pressure gauge, charge transfer, etc.).

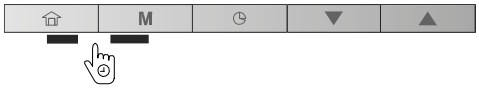
13.0 Sensor Temperature Monitoring Function

Normally when the user interface will have the current **indoor air temperature** and the **air set point** displayed on the screen. If the system has been configured for water temperature control the user interface will have the current **water temperature** and the **water set point** displayed on the screen.
In addition to these temperatures, WUI gives you the option to check other parameters allowing you to monitor the status of the units (see table given below). Please note that these parameters (1-15) are in read-only access.

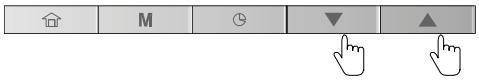
No.	Description	Parameter number
1	Outdoor Air Temp	P001
2	Entering Water Temp	P003
3	Leaving Water Temp	P004
4	Water Control Temp	P052
5	Saturated Suction Temp	P008
6	Suction Temperature	P009
7	Superheat Temperature	P015
8	Superheat Target Temp	P016
9	Discharge Temperature	P010
10	Refrigerant Temperature	P005
11	Requested Compressor Frequency	P022
12	Actual Compressor Frequency	P023
13	Water Control Point	P051
14	Flow Switch Status	P105
15	Safety Switch Status	P104

To display the required parameter

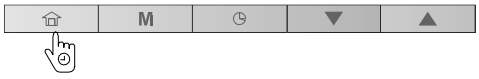
1. Press and hold the Occupancy key and the Mode key simultaneously for 2 seconds.



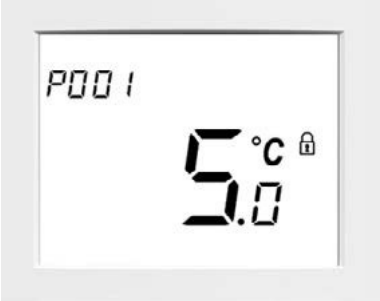
2. The first parameter will be displayed.
3. Press the Down key or the Up key to switch between all parameters listed in the table above.



4. To exit the current screen, press and hold the Occupancy key until the home screen is displayed or wait for 30 seconds (screen timeout).



Example: Outdoor Air Temp (Parameter: P001)



14.0 Troubleshooting

Fault Symptoms:

Symptom	Possible Cause	Corrective Action
Room is not heated or cooled. Water is not hot enough.	Incorrect remote controller setting	Check remote controller operation and temperature setting
	Incorrect Parameter setting	Check Parameter setting with the Parameter table.
	Backup heater disconnected	Check backup heater installation and set up
	Insufficient capacity	Check selection of equipment.
	Sensor defect	Check whether temperature sensor is installed at the normal position.
Nothing is displayed on the remote controller.	Power is not supplied.	Check power supply wiring.
	Incorrect setting	Check the setting with the Parameter table.
Flow rate switch is activated.	Air trapped in the pump	Release air completely according to the procedure.
	Low hydraulic pressure	Set hydraulic pressure considering pipe height, and replenish water until manometer shows a value of set hydraulic pressure or more.
	Strainer is clogged.	Clean the strainer.
	Large resistance on the heating circuit side	Install larger diameter water pipe work or adopt a bypass valve.
	Malfunction of motorized 3-way valve for hot water supply	Check wiring and parts.
Hot water leaks from pressure relief valve.	Excessive hydraulic pressure	Set hydraulic pressure considering pipe height, and replenish water until manometer shows a value of set hydraulic pressure or more.
	Insufficient capacity of expansion tank	Check expansion tank capacity compared to total water amount. If it is insufficient, install another expansion tank.
	Expansion tank failure	Check the air pressure in expansion tank. Replace expansion tank

Alarm Listing

Check Code		Diagnostic functional operation			Determination and action
Alarm [P344]	Current Alarm [P346] to [P349] Past Alarm [P350] to [P354]	Operational Cause	Unit Status	Automatic Reset	
-	1	EWT sensor failure	Continue	X	Automatic reset when the sensor returns within the correct range. 1. Check EWT sensor (EWT) 2. Check NHC board
-	2	LWT sensor failure	Stop	X	Automatic reset when the sensor returns within the correct range. 1. Check LWT sensor (LWT) 2. Check NHC board
-	3	Refrigerant Temperature (TR) sensor failure	Compressor stop	X	Automatic reset when the sensor returns within the correct range. 1. Check TR sensor (TR) 2. Check NHC board
-	4	OAT sensor failure	Continue	X	Automatic reset when the sensor returns within the correct range. 1. Check additional OAT sensor (OAT) 2. Check NHC board
-	5	DHW_TT sensor failure	DHW failed	X	Automatic reset when the sensor returns within the correct range. 1. Check DHW sensor (DHW) 2. Check NHC board
-	6	CHWSTEMP sensor failure		X	Automatic reset when the sensor returns within the correct range. 1. Check CHWSTEMP sensor (CHWSTEMP) 2. Check NHC board
-	7	IAT sensor failure	Continue	X	Automatic reset when the sensor returns within the correct range. 1. Check IAT sensor (IAT) 2. Check NHC board
-	8	RC indoor temperature failure	Continue	X	Automatic reset when the sensor returns within the correct range. 1. Check RC indoor temperature sensor 2. Check NHC board

Check Code		Diagnostic functional operation			Determination and action
Alarm [P344]	Current Alarm [P346] to [P349] Past Alarm [P350] to [P354]	Operational Cause	Unit Status	Automatic Reset	
100	10	Inverter discharge temperature (TD) sensor failure	Compressor stop	O	Alarm reset by resetting the power supply to the Monobloc outdoor unit. Error becomes definite after retrying operation 4 times. 1. Check discharge temperature sensor (TD)
102	11	Inverter air exchanger temperature (TE) sensor failure	Compressor stop	O	Alarm reset by resetting the power supply to the Monobloc outdoor unit. Error becomes definite after retrying operation 4 times. 1. Check temperature sensor (TE)
103	12	Inverter liquid temperature (TL) sensor failure	Compressor stop	O	Alarm reset by resetting the power supply to the Monobloc outdoor unit. Error becomes definite after retrying operation 4 times. 1. Check temperature sensor (TL)
104	13	Inverter TO sensor failure	Continue	O	Alarm reset by resetting the power supply to the Monobloc outdoor unit. Unit operation continues in backup mode. TO sensor value fixed to 30°C in cooling, 10°C in heating. Backup mode is cancelled when any other value is detected by TO sensor. 1. Check outside temperature sensor (TO)
108	14	Inverter Suction Temperature (TS) Sensor failure	Compressor stop	O	Alarm reset by resetting the power supply to the Monobloc outdoor unit. Error becomes definite after retrying operation 4 times. 1. Check suction temperature sensor (TS)
109	15	Inverter heatsink temperature failure	Compressor stop	O	Alarm reset by resetting the power supply to the Monobloc outdoor unit. Error becomes definite after retrying operation 8 times. 1. Check correct fan operation
111	16	Inverter TE & TS sensors wrongly connected	Compressor stop	O	Alarm reset by resetting the power supply to the Monobloc outdoor unit. Error becomes definite after retrying operation 4 times. 1. Check temperature sensor (TE, TS)
119	17	Inverter suction pressure (PS) sensor failure	Compressor stop	O	Alarm reset by resetting the power supply to the Monobloc outdoor unit. Error becomes definite after retrying operation for 2 times for disconnection detection and 4 times for high pressure. 1. Check suction pressure sensor (LP)
-	20	Loss of communication with RC	Continue	X	Alarm reset when a new message is received from the RC 1. Check RC connections (RC & Monobloc outdoor unit)
-	21	Loss of communication with inverter	Compressor stop	X	Alarm reset when a new message is received from the inverter. 1. Check connections between inverter PCB & NHC board
221	22	Loss of communication between inverter PCB's	Compressor stop	O	Alarm caused by delay in communication. Alarm reset by resetting the power supply to the Monobloc outdoor unit.
-	23	Loss of communication with follower units	Header continues	X	Automatic reset when communication between follower units is restored.
-	24	Loss of communication with header unit	Stop	X	Automatic reset when communication with the header unit is restored.
-	31	Safety input	Unit stop OR heat stop OR cool stop	X	Automatic reset when the safety input is closed.
-	32	Flow switch failure	Compressor stop	O	Alarm reset by resetting the power supply to the Monobloc outdoor unit. Error becomes definite after retrying operation for 5 times. 1. Check flow switch operation / connections 2. Check / clean water filter
228	33	Inverter high pressure release failure	Compressor stop	O	Alarm reset by resetting the power supply to the Monobloc outdoor unit. Error detected when discharge pressure exceeds HP switch limit pressure. 1. Check of outdoor fan operation. 2. Check motor error of outdoor fan. 3. Check clogging of outdoor PMV. 4. Check clogging of heat exchanger. 5. Check for re-cycling of air around air heat exchanger
-	50	Exchanger freeze protection on water temperature (in cooling)	Stop	X	Automatic reset when EWT or LWT is ≥4°C. Alarm is activated during cooling mode or a defrost operation and when EWT or LWT < 4°C Cooler heater is energized while the alarm is active. Water pump is forced to run. 1. Check water flow rate 2. Check water pressure drop 3. Check EWT sensor 4. Check LWT sensor
-	51	Exchanger freeze protection on refrigerant temperature (in cooling)	Stop	O	Alarm reset by resetting the power supply to the Monobloc outdoor unit. Energized Cooler Heater while alarm is active. Force pump to run until alarm reset kind becomes manual. Error becomes definite after retrying operation more than 12 occurrences within a 2 hours period 1. Check TR, TD, TS & BP sensors 2. Check PMV is operating correctly 3. Check refrigerant circuit for leaks 4. Check refrigerant pipes are not damaged

Check Code		Diagnostic functional operation			Determination and action
Alarm [P344]	Current Alarm [P346] to [P349] Past Alarm [P350] to [P354]	Operational Cause	Unit Status	Automatic Reset	
243	60	Reversing valve protection	Compressor stop	O	Alarm reset by resetting the power supply to the Monobloc outdoor unit. Error becomes definite after retrying operation for 4 times. 1. Check operation of 4-way valve. 2. Check air heat exchanger (TE), suction temp. sensor (TS). 3. Check BPHE sensor (TR). 4. Check 4-way valve coil. 5. Check PMV (Pulse Motor Valve).
246	61	Fan error	Compressor stop	O	Alarm reset by resetting the power supply to the Monobloc outdoor unit. Error becomes definite after retrying operation for 8 times.Error detected in either of the following condition; 1) Fan motor lock 2) Fan motor IPM over currentat start up 3) Fan IPDU DCvoltage abnormal Check: 1. Check lock of fan motor. 2. Check power supply voltage between L2 and N.
250	62	Compressor inverter short circuit protection	Compressor stop	O	Alarm reset by resetting the power supply to the Monobloc outdoor unit. Error becomes definite after retrying operation for 8 times. Error detected in either of the following condition; 1) Compressor IPM short circuit detection at start up 2) Compressor IPM short circuit detection during coil heating
253	63	Compressor motor position detection error	Compressor stop	O	Alarm reset by resetting the power supply to the Monobloc outdoor unit. Error becomes definite after retrying operation for 8 times. Error detected when offset voltage of motor current sensor is abnormal before compressor start up.
129	64	Compressor breakdown	Compressor stop	O	Alarm reset by resetting the power supply to the Monobloc outdoor unit. Error becomes definite after retrying operation for 8 times. Error detected in either of the following condition; 1) Compressor over current 2) Compressor IPM short circuit 3) Compressor motor control failure Check: 1. Check power supply voltage. 2. Overload operation of refrigerating cycle
130	65	Compressor lock	Compressor stop	O	Alarm reset by resetting the power supply to the Monobloc outdoor unit. Error becomes definite after retrying operation for 8 times. Error detected in either of the following condition; 1) Compressor motor lock 2) Compressor motor IPM over current at start up Check: 1. Trouble of compressor (Lock, etc.): Replace compressor. 2. Wiring error of compressor (Open phase)
132	70	Compressor thermal switch release failure	Compressor stop	O	Alarm reset by resetting the power supply to the Monobloc outdoor unit. Error becomes definite after retrying operation for 10 times. 1. Check case thermostat and connector. 2. Check gas leak, recharge 3. Check PMV (Pulse Motor Valve). 4. Check broken pipe.
134	71	Suction pressure too low	Compressor stop	O	Alarm reset by resetting the power supply to the Monobloc outdoor unit. Error becomes definite after retrying operation for 8 times. 1. Check clogging of outdoor PMV. 2. Check 2-way valve circuit. 3. Check Ps sensor error (LP). 4. Check clogging of refrigerant filter. 5. Check clogging of refrigerant pipe. 6. Check of fan operation (In heating mode). 7. Check short of refrigerant.
244	72	High Pressure System error (Pressure Switch, Compressor Case Temperature, Power Supply)	Stop	O	Alarm reset by resetting the power supply to the Monobloc outdoor unit. Error becomes definite after retrying operation for 10 times. 1. Check outdoor heat exchanger sensor (TL). 2. Check fan. 3. Check PMV (Pulse Motor Valve). 4. Check clogging and short circuit of heat exchanger. 5. Overcharge of refrigerant. Recharge
131	73	Current detection circuit error	Compressor stop	O	Alarm reset by resetting the power supply to the Monobloc outdoor unit. Error becomes definite after retrying operation for 8 times. Error detected in either of the following condition; 1) Motor current sensor failure

Check Code		Diagnostic functional operation			Determination and action
Alarm [P344]	Current Alarm [P346] to [P349] Past Alarm [P350] to [P354]	Operational Cause	Unit Status	Automatic Reset	
227	74	Discharge temperature too high	Compressor stop	O	Alarm reset by resetting the power supply to the Monobloc outdoor unit. Error becomes definite after retrying operation for 4 times. 1. Check refrigerant circuit (Gas leak). 2. Check electronic expansion valve. 3. Check discharge temp. sensor (TD).
229	75	Missing phase in power cable	Compressor stop	O	Alarm reset by resetting the power supply to the Monobloc outdoor unit. Error becomes definite after retrying operation for 8 times. 1. Check power supply voltage.
231	76	Inverter heatsink temperature too high	Compressor stop	O	Alarm reset by resetting the power supply to the Monobloc outdoor unit. Error becomes definite after retrying operation for 4 times. 1. Check heat sink airflow path.
-	80	Real time clock failure on NHC board	Continue	X	
-	81	EEPROM corrupted on NHC board	Continue	O	
127	82	Inverter EEPROM not readable of EEPROM number out of range	Stop	O	Alarm reset by resetting the power supply to the Monobloc outdoor unit. Error caused by delay of communication
-	90	Invalid configuration	Stop	X	Automatic reset when configuration is correct
-	100	Emergency stop	Stop	X	Automatic reset when [P055] is reset
-	200	External alarm	Continue	X	Automatic reset when contact is closed

15.0 Air to water heat pump operating conditions

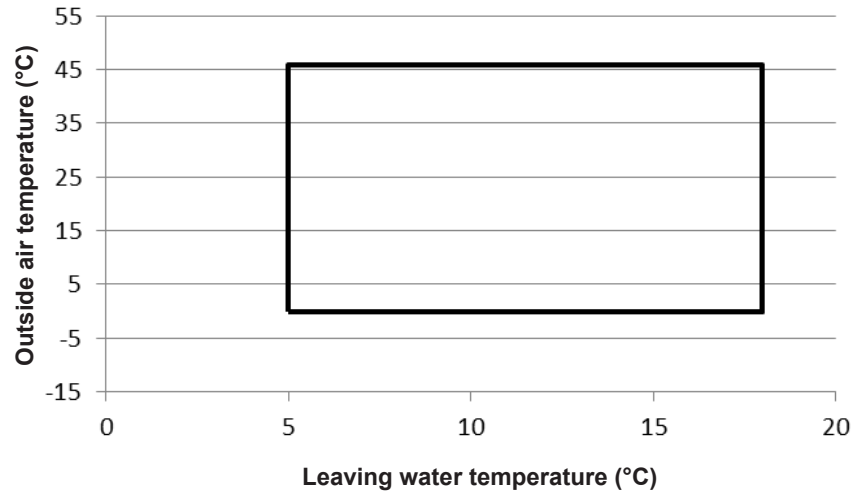
For proper performance, operate the air to water heat pump under the following temperature conditions:

Cooling operation		**Minimum**	**Maximum**
Outdoor temperature	°C	0	46
Entering Water temperature:	°C	6	30
Leaving Water temperature:	°C	5	18
Heating operation *		**Minimum**	**Maximum**
Outdoor temperature	°C	–20 *	30
Entering Water temperature:	°C	10	45
Leaving Water temperature:	°C	20	57 (CP2101H*) / 60 (CP1701H*)

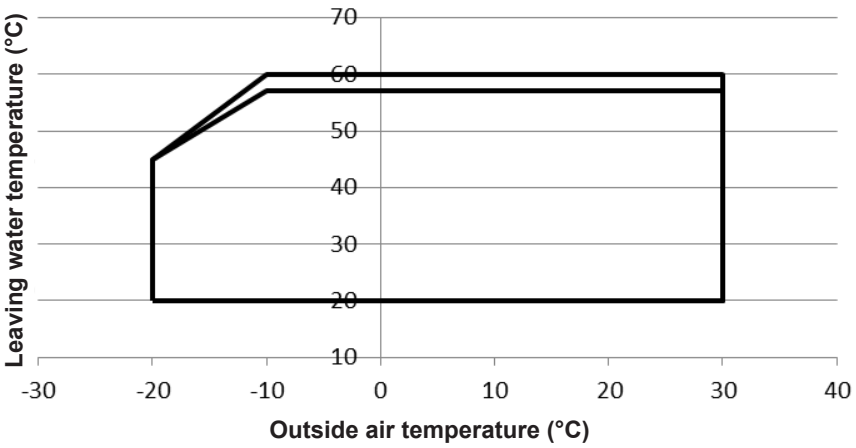
* For operation at outdoor ambient temperature below 0°C (cooling mode and heating mode), the water freeze protection should be available and according to the water installation, the water loop can be protected against frost by the installer, using an anti-freeze solution or trace heater.

If air to water heat pump is used outside of the above conditions, safety protection may work.

Operating range 30RQV 17-21 units, Cooling mode



Operating range 30RQV 17-21 units, Heating mode



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