AW HT

0031 ÷ 0071
10,4 ÷ 26,6 kW

Heat pump, air source for outdoor installation, high water temperature

(The photo of the unit is indicative and may change depending on the model)

- High efficiency
- Maximum reliability
- Silent operation
- Extensive range of operation
- Hot water production

INDEX

CE

ISO 14001 TÜV SÜD ISO 9001

Company quality system certified to UNI EN ISO 9001 and environmental certification UNI EN ISO 14001

Waiver of liability

This document cannot be considered comprehensive for the purposes of: installation, operation, precautions against risks, handling and transport. See the “General installation manual” for further information.
This document refers to standard configurations, in particular regarding dimensions, weights, electrical, refrigerant, water and air duct connections (where applicable). For further information, drawings and diagrams contact the Climaveneta Sales Office.
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The data contained in this publication may be changed without prior notice.

1. DESCRIPTION OF THE UNIT

High efficiency range
AW-HT represent the best solution for systems in which there is the need to produce high temperature hot water for both space heating and sanitary purposes. With this solution the space heating can be easily provided by using radiators, so without any major changes on the already existing distribution system available on site. The EVI technology compressor with additional steam injection in the compressing cycle assures a water temperature of 65°C and operating limits as low as -20°C. Neither probes nor connections pipes to wells are needed; the installation is simple, this is a suitable solution for all applications.

Air-water heat pump
Air-water heat pump. Unit supplied complete with non-freezing oil and refrigerant charge, and factory tested. Only water and electrical connections are required on site. Unit charged with R407C ecological refrigerant.

COMPOSITION OF STANDARD UNIT
Structure
Structure made from hot galvanised steel load-bearing base and panels, painted with polyester power coat. The load-bearing structure that holds together and supports the main components is designed to guarantee maximum access for service and maintenance.

Compressor
Hermetic rotary scroll compressors with vapour injection.
All compressors come complete with sump heater, electronic thermal overload protection with centralised manual reset, and two-pole electric motor.

Utility-side heat exchanger
Braze welded AISI 316 steel plate heat exchanger. The heat exchangers are lined on the outside with a layer of closed-cell neoprene to prevent condensation. The unit is also ready to operate, using non-freezing fluid mixes, down to exchanger outlet temperatures of -8°C.

Source-side heat exchanger
Finned coil heat exchanger made from copper tubes and aluminium fins, spaced apart so as to guarantee maximum heat exchange efficiency. The unit is fitted as standard of the grills of protection coil and of the tray condensate drain (up to model 0061).

Electric frost protection heater for the base
Modulating electric frost protection heater for the base, positioned between the finned heat exchanger and the base to improve and assist drainage of water during defrosts (up to model 0061).

Fans
Axial-flow fans with IP 54 index of protection, external impeller, with pressed plate blades, housed in aerodynamic tubes with accident prevention grill. Six-pole electric motor with built-in thermal cut-out.

Refrigerant circuit
Main components in the refrigerant circuit:
- refrigerant R407C
- dewatering filter,
- liquid flow indicator with moisture signal,
- thermostatic valve with external equaliser,
- high and low safety pressure switches,
- liquid receiver,
- 4-way reversing valve.
- vapour injection circuit composed of thermostatic valve, solenoid valves, braze welded plate heat exchanger (economiser)

Power and control electrical panel
Electrical control panel built in compliance with EN 60204-1/IEC 204-1, complete with:
- Main door lock disconnect switch,
- Thermal cut-out switches for compressors and fans,
- Remote ON/OFF terminals,
- Electrical panel for outdoor installation, with two doors and gaskets,
- Electronic controller,
- Numbered control circuit cables,
- Pump enabling relay,
- Peak limiter (single-phase and three-phase units),
- Compressor and fan start capacitor,
- Auxiliary circuit protection fuse,
- Phase sequence control relay
- Auxiliary heater relay,
- High pressure switch relay,
- Alarm relay,
- Boiler relay,
- Compressor control relay,
- Vapour injection solenoid valve relay
- Domestic hot water 3-way valve relay
- Compressor thermal overload switch,

The water circuit is completed by:
- Circulating pump
- Expansion vessel
- Safety valve (6 bar)
- Manual fill drain valve
- Pressure gauge.

VERSIONS AVAILABLE
AW HT_ms Heat pump, air source for outdoor installation, high water temperature, heating only, with domestic hot water production. Built-in water circuit assembly. Version "ms" with single-phas peak limiter.

AW HT_ts Heat pump, air source for outdoor installation, high water temperature, heating only, with domestic hot water production. Built-in water circuit assembly. Version "ts" with three-phase peak limiter.

AW HT_t Heat pump, air source for outdoor installation, high water temperature, heating only, with domestic hot water production. Built-in water circuit assembly. Version "t" **without** three-phase peak limiter.

SUPPLIED AS STANDARD
- Remote room control (must be installed)
- Outside air temperature probe for climate compensation (must be installed)
- Domestic hot water probe
- Coil protection grills

ACCESSORIES

- Wired seplified remote room control for system configuration
- Wired room remote keypad with display for system configuration
- Expansion module for system configuration
- Kit for radiant systems complete with hydraulic components (pump, mixer valve, probe and expansion module)
- Temperature sensor for system configuration
- 3-way selector valve for domestic hot water production.
- Supplementary electric heater for the heating system.
- DHW storage electric heater, as supplementary heat source and for Legionella prevention.
- Low-loss header, 35, 100 or 200 litres.
- Domestic hot water cylinder, 300 or 500 litres.
- Domestic hot water storage tank, 300 litres, to be combined with the DOMH2O instant domestic hot water production kit.
- Domestic hot water storage tank, 300, 500 and 1000 litres with solar heating coil, to be combined with the DOMH2O instant domestic hot water production kit.
- DOMH2O15 and DOMH2O24 instant domestic hot water production kit.
- Metal mesh filter
- Vibration dampers for floor installation
- Condensate pan, 0071 model

2. ELECTRONIC CONTROLLER

The AW HT electronic controller is based on an innovative and efficient approach to building air-conditioning.
Energy is only consumed when necessary and the energy sources are used based on availability, efficiency and cost, giving priority to renewable sources, where available.
The first significant advantage of introducing a single integrated control system is optimisation of energy savings through coordination between the different system components, eliminating inefficiencies in communication, simplifying installation and reducing the number of controllers.
Ensures dynamic control of water outlet temperature according to real needs in the building and the outside air temperature, optimising comfort and reducing wasted energy.
The remote keypad supplied with the unit can be used to freely set the room temperature, operating mode, domestic hot water production and operating times for each zone.
The control system for residential applications gives high operating flexibility by controlling the secondary circuits, that is, activating zone pumps and valves depending on the room temperature set on the remote keypad, and by controlling mixing valves to ensure the correct water temperature in radiant systems according to the climate conditions set for each circuit.
There are different types of pre-configured system for quick and easy installation, with the possibility to manage up to 2 remote keypads for controlling thermal load in likewise zones.

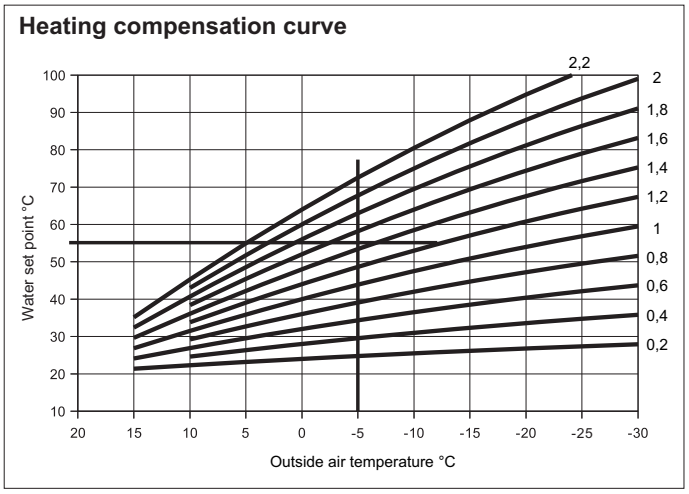
Some commands can be remoted:
- alarm signal
- compressor ON signal
- reduced electricity rate contact
- deactivation contact for excess power consumption
- on/off

Main functions
- Wired remote keypad with backlit display, complete with temperature and humidity probe
- Operating parameters with dedicated user and installer menus to configure the type of system
- A timer is available to customise differentiated activation and deactivation for each individual zone of the system and for domestic hot water production.
- Outside air temperature probe to control the system water temperature set point based on heating compensation curves. Fixed point operation also available.
- Domestic hot water production
- Supplementary electric heater management for domestic hot water storage and Legionella prevention cycle
- External resource (boiler or electric heater) management as supplementary or sole source of heat
- Different systems solutions by configuring the controller and using dedicated expansion modules (accessories), up to 2 zones with the possibility to control different temperature according to the selected compensation curves.
- Alarm signals
- Frost protection management based on inside or outside air temperature or water temperature, to protect the system pipes and heat exchangers inside the unit.

3. OPERATING CHARACTERISTICS

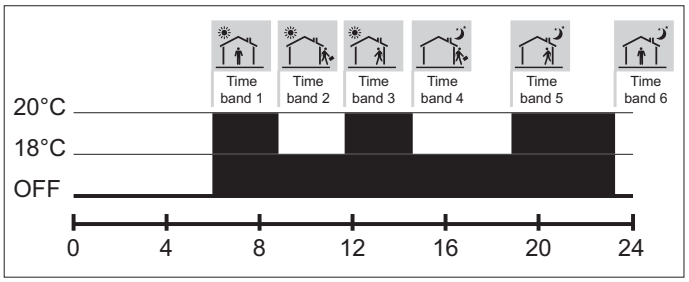
TEMPERATURE CONTROL

The water temperature delivered to the heating circuit is calculated by the controller and depends on the selected heating compensation curve. A building's thermal requirements do not remain constant throughout the day or the year, but rather increase or decrease based on the outside air temperature.
It's therefore a waste of energy to keep the water at a constant temperature. Delivering water at different temperatures to the terminals based on the outside air temperature achieves high seasonal efficiency ratios and brings considerable savings in running costs.
The compensation curve in heating mode can be adjusted to allow correct heat pump operation according to the system (radiant panels, radiators, fan coils).
Example: Selecting heating curve 1.4 with an outside air temperature of -5°C gives a water temperature of +55°C.
The compensation curve could be limited defining the temperature limits (minimum and maximum) for the circuit that will never be exceeded, thanks the dedicated parameters.
Dedicated compensation curves can be set for each zone, depending on the type of terminal unit, or alternatively a fixed point temperature can be selected.
A function called "room temperature influence" is available to quickly adapt the water temperature by modifying the compensation curve when the indoor conditions change, for example when there are more occupants in the room.



PROGRAMMING THE TIME BANDS

A timer is available to customise differentiated activation and deactivation for each individual zone of the system and for domestic hot water production.
Can also be selected the holiday program that allows the operation of the system in frost protection or with reduced set point.



DOMESTIC HOT WATER PRODUCTION

The controller manages domestic hot water production using a 3-way valve installed outside of the unit, deviating the flow of hot water to the DHW storage tank, which must be suitably sized according to the type of usage.
Production is enabled when the water temperature inside the DHW storage tank (probe BT1) is less than the DHW set point.
The production of domestic hot water is guaranteed in both summer and winter, according to the operating limits shown in this manual. If heat pump operation is expected outside of the limits, consider using a supplementary source of heat, managed directly by the controller.
An electric heater should be installed inside the DHW storage tank to ensure the temperature does not fall below 10°C in the event of extended periods of heat pump inactivity (standby).

LEGIONELLA PREVENTION FUNCTION

The Legionella prevention function ensures the elimination of the Legionella bacteria that reside in domestic water storage tanks. The temperature and duration of the Legionella prevention cycles to eliminate bacteria are typically:

- 2 minutes > 70°C
- 4 minutes > 65°C
- 60 minutes > 60°C

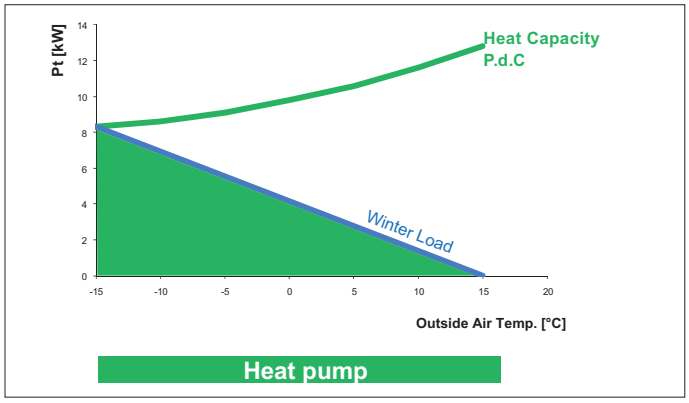
The Legionella prevention cycles are managed directly by the controller, enabling the heater in the domestic hot water storage tank domestic, with the possibility to set the duration, temperature, day and time.

AUXILIARY RESOURCES

System operation can be distinguished as monovalent, all-electric or bivalent. The controller can activate the external source to achieve one of the functions listed above.

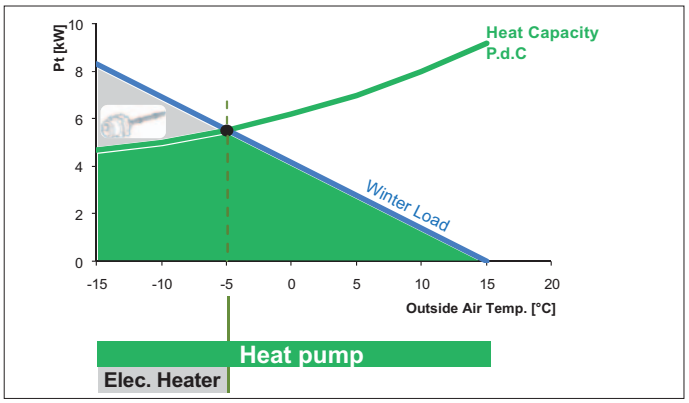
Funzionamento Monovalente

Nel caso di funzionamento monovalente la pompa di calore deve garantire l'intero fabbisogno dell'edificio.
Si potrebbe riscontrare una potenza termica eccessiva della pompa di calore soprattutto con temperature dell'aria esterna sopra lo zero ed una potenza elettrica elevata. Verificare se il contatore dell'abitazione è correttamente dimensionato.
Soluzione indicata per nuove abitazioni.



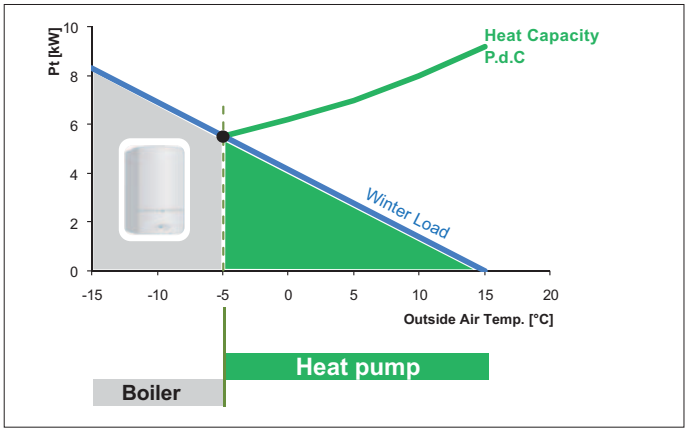
All-electric operation

In all-electric operation the heat pump is integrated with an electric heater to meet the entire demand of the building.
The electric heater is activated below certain outside temperatures so as to satisfy demand in the building that the heat pump cannot manage on its own.
Considering the reduced number of hours of heat pump operation at low outside temperatures during the winter period, operation of the supplementary heater will also be reduced, and consequently power consumption will be negligible.
Therefore the system's seasonal energy efficiency remains unchanged.
This solution is suggested for new homes and lower investments than monovalent heat pumps.



Bivalent operation

In the case of bivalent operation the heat pump meets the needs of the building down to a certain outside temperature, called the bivalence point.
Below the bivalence point the heat pump switches off and only the auxiliary source (e.g. boiler) provides heat for the building.
This solution is ideal for traditional systems and renovations.



SYSTEM MANAGEMENT

The control system for residential applications gives high operating flexibility by controlling the secondary circuits, that is, activating zone pumps and valves depending on the room temperature set on the remote keypad, and by controlling mixing valves to ensure the correct water temperature in radiant systems according to the climate conditions set for each circuit.
There are different types of pre-configured system for quick and easy installation, with the possibility to manage up to 2 remote keypads for controlling thermal load in likewise zones.
The following table indicates the different type of systems that can be controlled directly by heat pump control.
The controller can manage the valves in each individual zone or alternatively pumps, depending on the set temperature.
The system decides whether to activate the unit or the most energy efficient resources to meet demand.

The heat pump directly produces water at the right temperature for the system terminals connected to the high temperature circuits (e.g. fan coils, radiators, towel rails in bathrooms), while low temperature radiant panels are controlled by the mixing valves according to the specific compensation curves.
This means a compensation curve can be applied to the high temperature zones and different compensation curves for each low temperature zone.
Depending on the type and complexity of the system, expansion modules are required for connection of the components managed by the system (pumps, valves, probes etc.), as indicated in the table.
Simple installation by serial connection of the components making up the system.

N. System Configuration	Remote Keypad	Expansion Module	High Temp. Zone (ex. Radiator/ Fan Coil)	High Temp. Zone (ex. Radiator/ Fan Coil)	Low Temp. Zone (ex. Floor Heating)	Low Temp. Zone (ex. Floor Heating)	DHW electric heater	[1]Supplementary source (Boiler or electric heater)
0	x1 standard							x1 OR
1	x1 standard x1 optional							OR
2	x1 standard	x1						x1 OR
3	x1 standard + x1 optional	x2						OR
4	x1 standard + x1 optional	x2						OR

Key

- Mixing valve floor heating
- Circulation Zone pump or motorized valve
- Water probe
- Ambient thermostat

* N.1 ambient thermostat available with the heat pump
** Configurations from 1,3,4 are required additional ambient thermostat as
[1] **Required expansion module to manage the source auxiliary configurations 0 and 2 as well as the necessary form for the selected system configuration**

FROST PROTECTION

The frost protection function is active even when the heat pump is OFF.

Frost protection for system water temperature

The frost protection function is always active, even when the heat pump is off.
If the outlet temperature falls below 5 degrees, the compressor and the heating circuit pump are activated, irrespective of the operating mode.
When the outlet temperature rises back above of 7°C, the controller waits a further 5 minutes and then stops the production of heat and pumps.

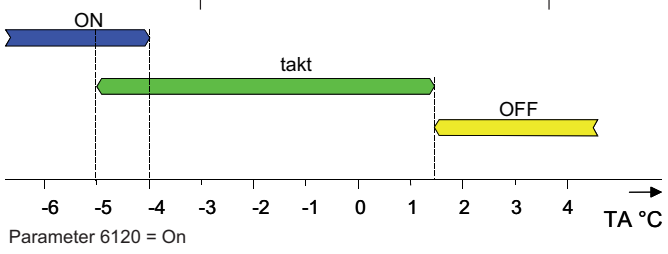
Frost protection for room temperature

The frost protection function is always active, even when the heat pump is off.
If the inside room temperature falls below 8°C (value set for parameter 714), the heat pump is started to prevent freezing in the pipes inside the home.

Frost protection for outside temperature

The frost protection function is always active, even when the heat pump is off.
The pump is activated according to the outside temperature, as shown in the following graph:

Outside temperature	Pump	Diagram
...-4 °C	ON continuously	ON
-5....1.5 °C	ON for 10 minutes at 6 hour intervals	(Cycles)
1.5 °C	OFF continuously	OFF



Parameter 6120 = On

ALARM SIGNALS

Correct unit operation and any alarms are displayed on the room thermostat, the latter by the symbol.
The diagnostics functions include complete alarm management, with an alarm log for more detailed analysis of unit behaviour.

4. ACCESSORIES

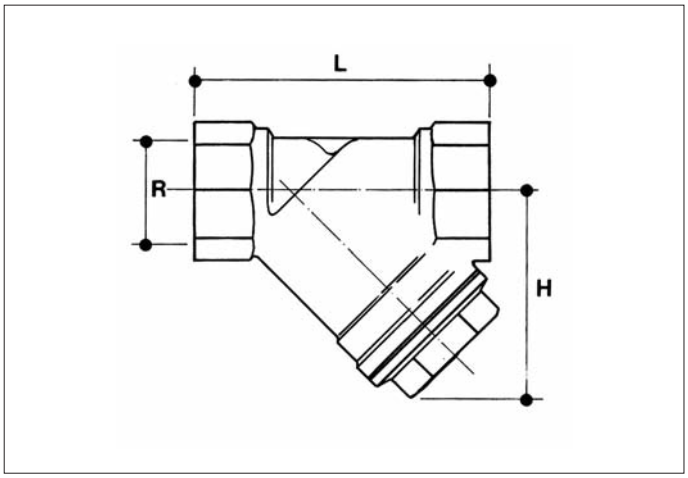
The accessories listed below are supplied separately.

METAL MESH WATER FILTER

This filter MUST be installed on the heat pump return pipe to trap any impurities in the water circuit that may damage the unit's heat exchanger.

Characteristics	
Body	Brass
Finish	Sanded
Body gasket	Betaflex 71
Thread	ISO 228/1
Filter	AISI 304 stainless steel micro-perforated sheet metal
Hole pitch	2 mm
Inscribed hole diameter	500 micron
Number of holes per cm^2	80

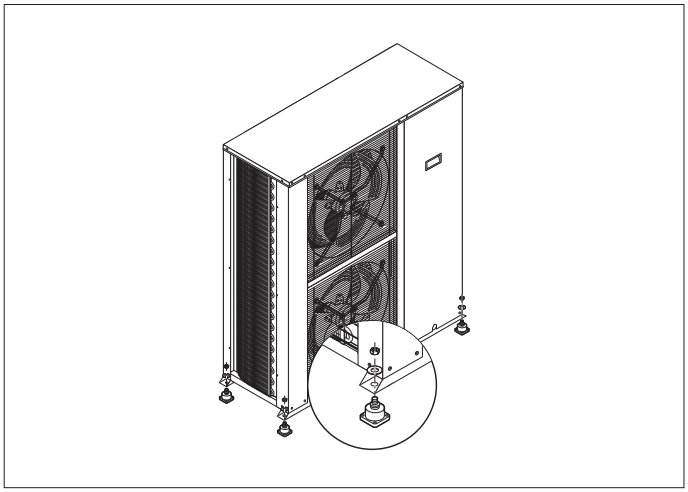
Dimensions		
DN		50
R	inch	2
L	mm	126
H	mm	90



Pressure drop		
R	inch	2
Kv		36

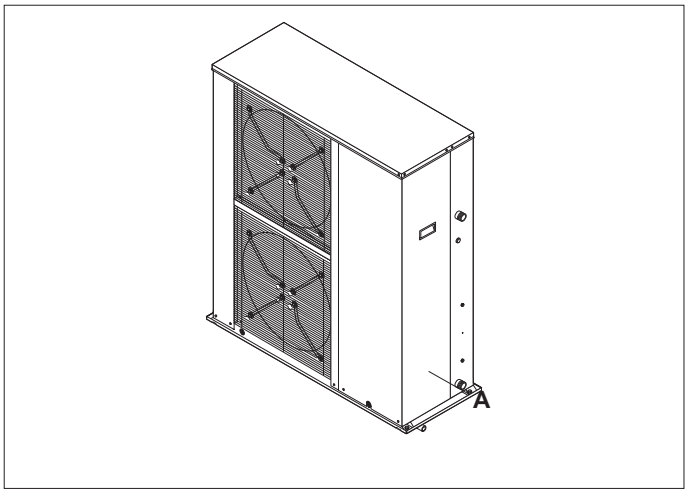
VIBRATION DAMPERS

Used between the heat pump and the support plane.
Vibration dampers made from rubber, elastomer and aluminium alloy casing for fastening to the floor.



CONDENSATE DRAIN PAN FOR MODEL 0071

Condensate drain pan to be used on model 0071 only when needing to collect in one single point the condensate produced by the heat pump during operation in heating mode.
The water collected can be carried to a suitable place via a plastic hose connected to drain **A** on the pan.
Use hot wires on the condensate drain hoses to prevent freezing.

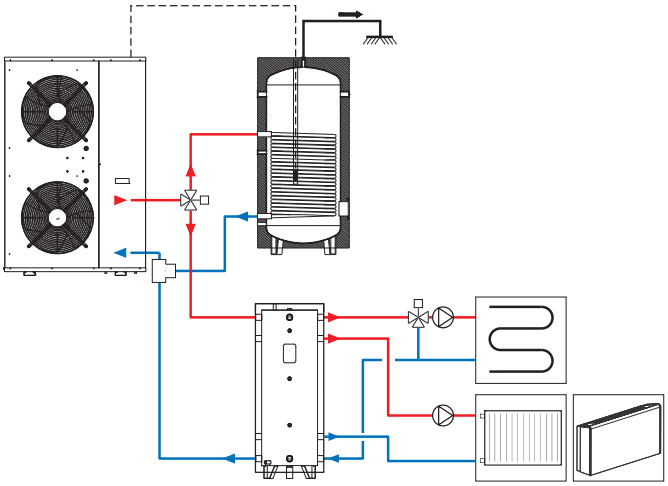


BT AND PT STORAGE TANKS

Storage tanks to be used in heating and cooling systems, to ensure minimum heat pump operating time in all operating conditions and avoid excessive starts and stops. It can also be used to isolate the water circuit from the heat pump and to partially meet energy demand during periods in which the unit is shutdown due to the electricity rate. For indoor installation.

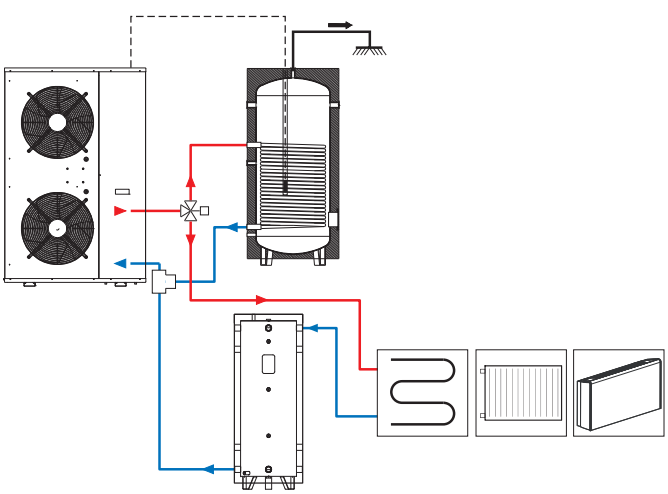
Models available	Volume
BT35	35 litres
BT100	100 litres
BT200	200 litres
TP300	300 litres

The diagram illustrates the use of the BT/TP storage tank as a low-loss header to separate the heat pump primary circuit from the secondary circuit to the terminal units.
This allows different flow-rates and temperatures to be managed depending on the type of terminal used.
Correctly sized, it guarantees the minimum water volume required by the heat pump.



The diagram shown is purely indicative.

The diagram illustrates the use of the BT/TP storage tank as a storage tank on the heat pump return pipe so as to increase the volume of water available in the system, avoiding excessive starts and stops.
In this case, make sure the available pressure head of the pump on the unit is sufficient to guarantee correct system operation.



The diagram shown is purely indicative.

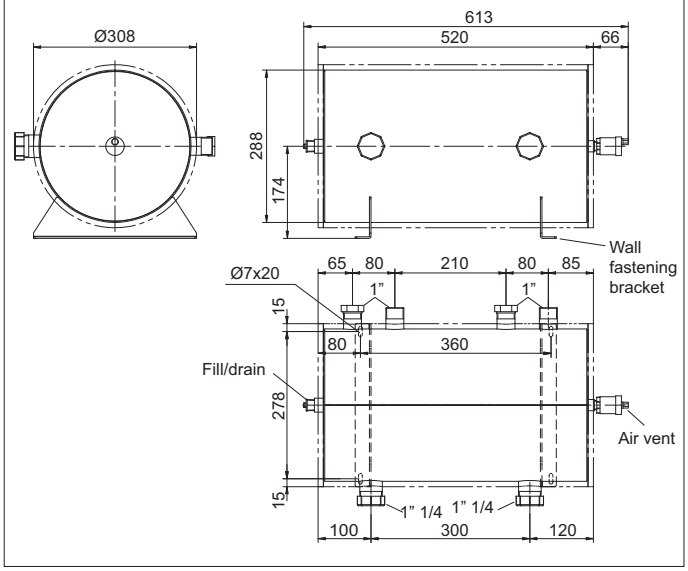
Technical specifications

The storage tanks are made from carbon steel plate welded using the best technology and undergo strict water pressure tests (9 bars, allowing an operating pressure of 6 bars).

Being a container of water for heating and cooling, this product does not require internal treatment, while the outside is coated with rustproof paint.

The tanks are protected on the outside with a closed cell elastomeric foam lining, 50 mm thick, with soft blue PVC exterior finish, for models BT 100/200 and TP300; polyethylene foam insulation, 10 mm thick, with metallic exterior finish for models BT35.

Dimensions - Model BT35

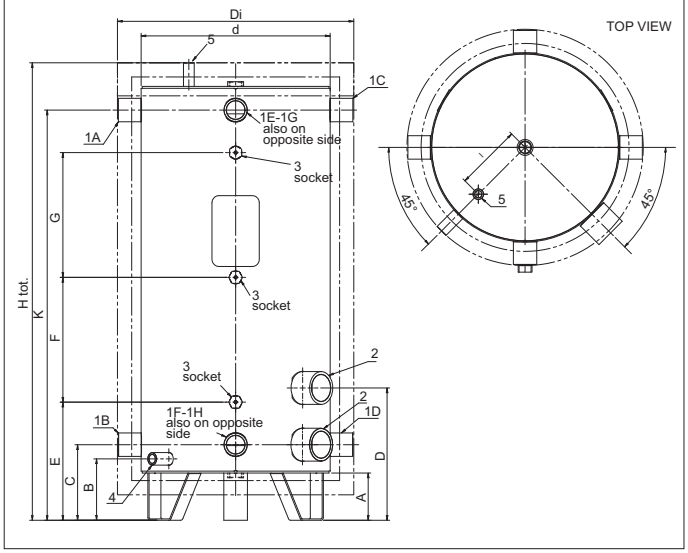


Volume	Storage tank dimensions											
	Di	d	Htot	A	B	C	D	E	F	G	K	I
litres	mm											
100	500	400	970	100	130	160	280	250	264	264	868	140
200	550	450	1410	100	130	160	280	430	374	386	1298	170
300	700	600	1235	100	130	160	280	320	321	332	1133	200

Volume	Fittings				
	1	2	3	4	5
litres	inch				
100	1"1/4	2"	1/2"	1/2"	3/8"
200	1"1/4	2"	1/2"	1/2"	3/8"
300	1"1/4	2"	1/2"	1/2"	3/8"

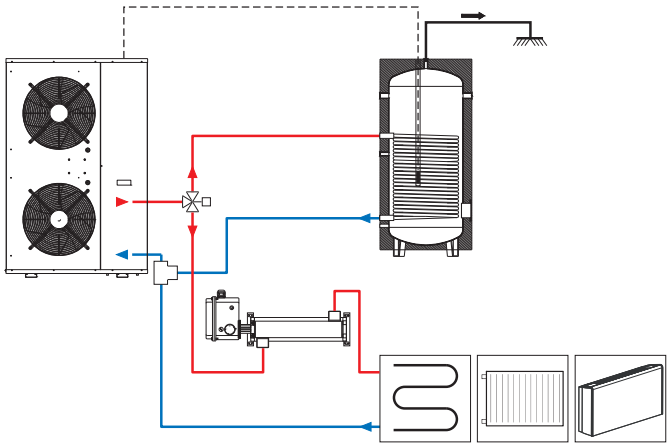
Pos.	Description
1A	Heat pump outlet
1B	Heat pump return
1C	System outlet
1D	System return
1E- G	Supplementary source outlet
1F-1H	Supplementary source return
2	Electric heater attachment
3	Probe socket
4	Drain/load
5	Vent

Dimensions - Model BT100, BT200, TP300



OUTLET ELECTRIC HEATER

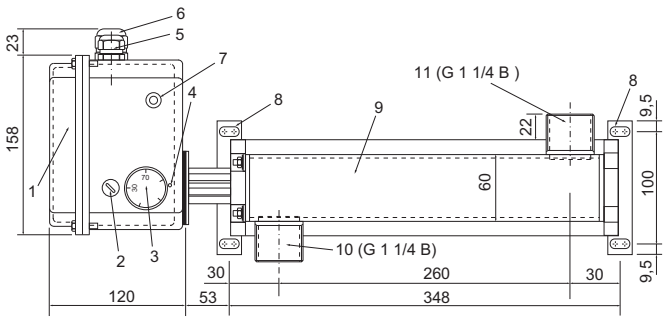
The outlet electric heaters are available with power ratings of 3 kW single-phase and 3, 6 and 9 kW three-phase.
Used on the system outlet, these guarantee the heating demand of the building at low outside temperatures by supplementing the heating capacity of the heat pump.
The electric heaters are deactivated as soon as the heat pump alone can meet heating demand.
Considering that normally the heat pump operates only a short time at low outside temperatures, operation of the supplementary heater is also reduced and consequently power consumption is negligible.
Therefore, the system's seasonal efficiency ratio remains unchanged.
Wall-mounted installation using the fastening brackets.



The diagram shown is purely indicative.

Technical specifications		
Power supply	230V/50Hz	400V/50Hz
Power	3000 W	3000-6000-9000 W
Maximum pressure	6 Bar	
Min/max operating temperature	5...90°C	
Safety thermostat	90 +/- 5°C	
Adjustable thermostat	30...70°C	
Heating element material	Incoloy 800	
Threaded attachment	1" 1/4 M GAS	
Index of protection	IP 55	
Indicator light	Red; on when heater operating	

Dimensions



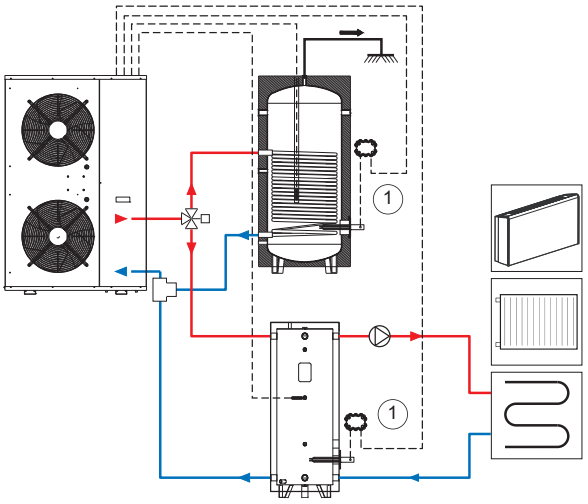
1 Terminal block cover
2 Safety thermostat manual reset
3 Control thermostat knob
4 Reference for knob full scale
5 Cable gland for control cable
6 Cable gland for power cable
7 Red light, on when the heater is operating
8 Wall fastening brackets
9 Heater body
10 Water inlet
11 Water outlet

IMMERSION ELECTRIC HEATER

The single-phase immersion electric heater can deliver 1 kW, 2k W or 3 kW depending on the electrical connections, and must only be used in immersion, via the water connections provided on the HWC storage cylinders or the BT, TP and TPS storage tanks.

The electric heater guarantees Legionella prevention or works to supplement domestic hot water production at low outside temperatures.

If used inside the TP storage tanks it can help meet building heating demand in the event of operation outside of the heat pump operating limits.

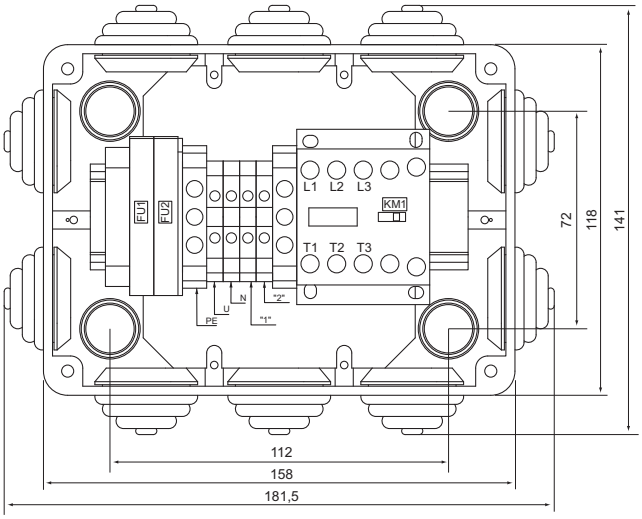


(1) Immersion electric heater

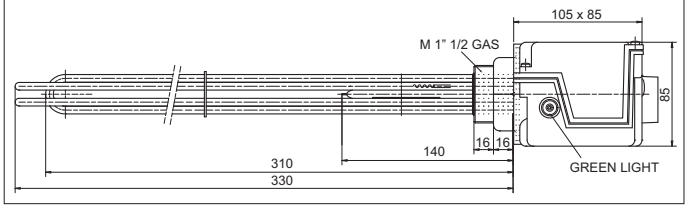
The diagram shown is purely indicative.

Technical specifications	
Power supply	230V/50Hz
Power	1000, 2000, 3000 W (+5%/ -10%); power in relation to the electrical connection.
Maximum pressure	6 Bar
Max temperature, heating area	300°C
Max temperature, seal area	120°C
Adjustable safety thermostat	9….75°C
Heating element material	Incoloy 800
Terminal block protection material	PVC
Threaded attachment	1" ½ M GAS
Gasket	ASBERIT 60*48*3
Index of protection	IP 44
Indicator light	Green; on when heater operating

Dimensions - Electrical panel



Dimensions - Immersion electric heater



1”¼ 3-WAY VALVE FOR DOMESTIC HOT WATER PRODUCTION:

The 3-way valve deviates the flow of water to the domestic hot water storage tank when the temperature read by probe BT1 falls below the set point.
The servomotor is also fitted with an auxiliary contact.
Contact closed when the valve is open and contact open when the valve is closed. The 3-way selector valve for domestic hot water production must have the following characteristics for correct heat pump operation:

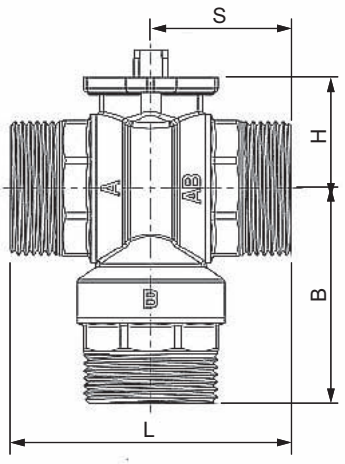
- Voltage 230V AC, 50/60 Hz
- If valve rotation takes more than 10 s, the time can be set by parameter.
- Delta P 500 kPa
- Fluid temperature 0°C to 90°C
- Pressure drop below 20 kPa.

In the total height of the valve (body + servo control) also take into account 40 mm for the extension supplied with the kit, required for correct insulation of the pipes.

Technical specifications - Valve body	
Operating pressure	PN16 for water at 90°C. PN20 for chilled water
Leaks	None
Fluid temperature	Water 0°C to 90°C
Angle of rotation	90°
Thread	Gas UNI ISO 228
Valve body and fitting	Brass OT58, UNI575/65
Stem	Brass
Gasket	PTFE seat, EPDM O-ring
Ball	Chrome-plated brass
Weight	1,28 Kg

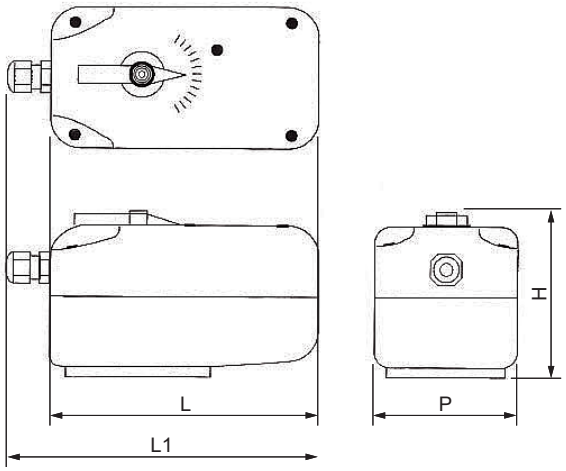
Technical specifications - Servomotor	
Power supply	230VAC, +10% - 15%
Frequency	50Hz
Power consumption	4 VA
Travel time (open/close)	10s
Free auxiliary contact (end travel)	230V - 1A (resistive)
Allowable operating temperature	0 ... + 50 °C
Allowable transport and storage temperature	- 10 ... + 80 °C
Allowable humidity	Class G, DIN 40040
Index of protection	IP 54
Connection cable	6 x1 mm², 0.8 m long
Manual control	manual open/close control
Weight	0,45 Kg

Dimensions - Valve body



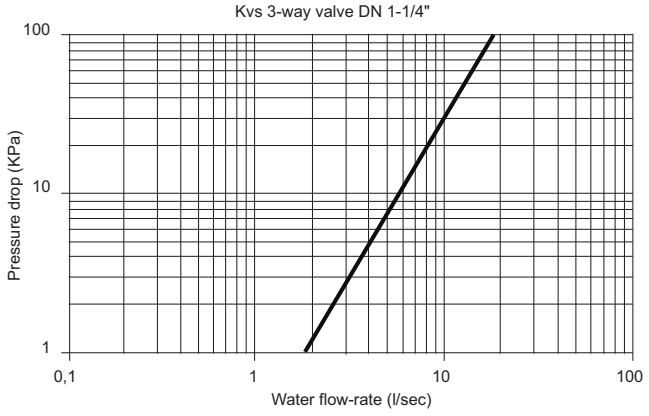
Fittings	inch	1”1/4 G
L	mm	102,6
B	mm	76,8
H	mm	51,3
S	mm	39,8

Dimensions - Servo control



L	mm	131
L1	mm	156
H	mm	75
P	mm	70

Graph of valve pressure drop



HWC DOMESTIC HOT WATER CYLINDER

The HWC storage cylinders are made especially for domestic hot water production in combination with heat pumps, thanks to the inside coil with large heat exchange area.
The heat pump is connected to the inside coil that heats the domestic hot water contained in the storage tank.
Legionella prevention cycles are managed by an electric heater that can be installed in the fitting provided on the flange.
The Legionella prevention cycles are managed by the NadiSystem controller on the heat pump.

Models available	Volume
HWC300	300 litres
HWC500	500 litres

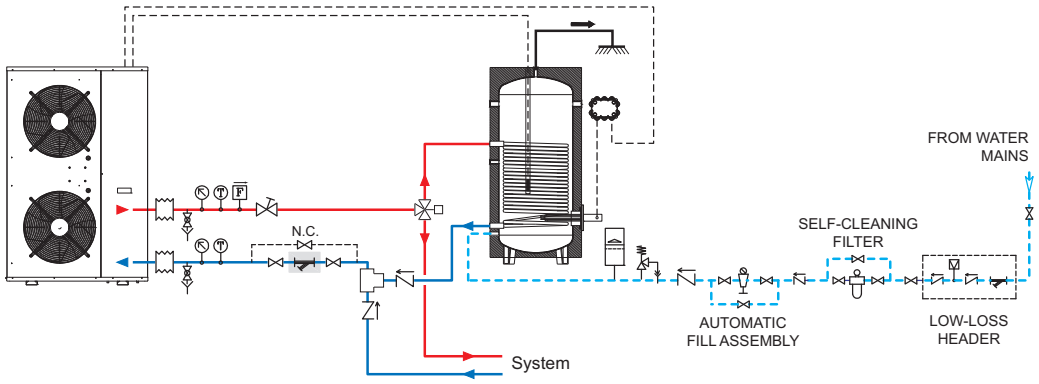
Storage cylinder and heat pump combinations						
Storage cylinder	Coil water content	Coil surface area	Combined heat pumps			
	(l)	(m^2)	31	41	61	71
HWC 300	22,3	3,5	x	N.A	N.A	N.A
HWC 500	38,5	5,9	x	x	x	N.A

The combinations proposed exclude the 0071 heat pump, which require the TPS series storage tanks.

Technical specifications

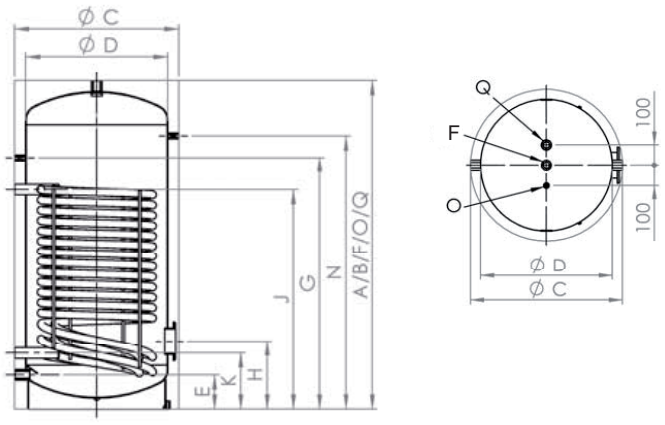
The cylinders are made from S275JR steel plate in accordance with DIN 4753 and undergo strict water pressure tests (9 bars, allowing an operating pressure of 6 bars). Lined on the inside with double layer of enamel in accordance with DIN 4753.
Protection against corrosion guaranteed by the magnesium anode, provided with the accessories supplied as standard with the storage cylinder. The cylinders are protected on the outside by 50 mm rigid CFC-free PUR lining with white skai casing.

Water circuit diagram

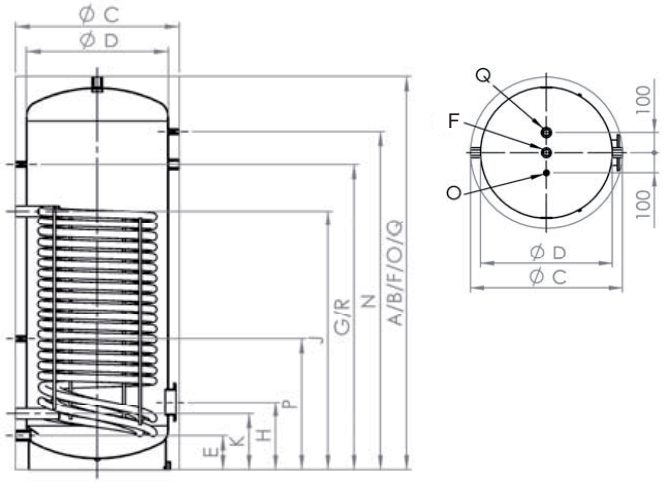


The diagram shown is purely indicative.

Dimensions - Model HWC300



Dimensions - Model HWC500



	Use	Dimensions	300	500
A	Height	with insulation - mm	1570	1800
B		without insulation - mm	-	-
C	Diameter	with insulation - mm	650	750
D		without insulation - mm	550	650
E	Cold water	height - mm	140	155
		fitting - R"	1 ¼"	1 ¼"
F	Hot water	height - mm	1570	1800
		fitting - R"	1 ¼"	1 ¼"
G	Recirculation	height - mm	1200	1400
		fitting - R"	½"	½"
H	Flange with 2" bushing for electric heater	height - mm	295	310
		Ø - mm	180/120	180/120
		fitting - R"	2"	2"
J	Heat pump outlet	height - mm	920	1185
		fitting - R"	1 ¼"	1 ¼"
K	Heat pump return	height - mm	240	255
		fitting - R"	1 ¼"	1 ¼"
N	Thermometer	height - mm	1350	1550
		fitting - R"	½"	½"
O	Probe socket	height - mm	1570	1800
		fitting - R"	½"	½"
P	Probe socket	height - mm	-	600
		fitting - R"	-	½"
Q	Magnesium anode	height - mm	1570	1800
		fitting - R"	1 ¼"	1 ¼"
R	Magnesium anode	height - mm	-	1400
		fitting - R"	-	1 ¼"

Weight with insulation	kg	145	220
Water content heat exchange	l	22,3	38,5
Surface area heat exchanger	m^2	3,5	5,9

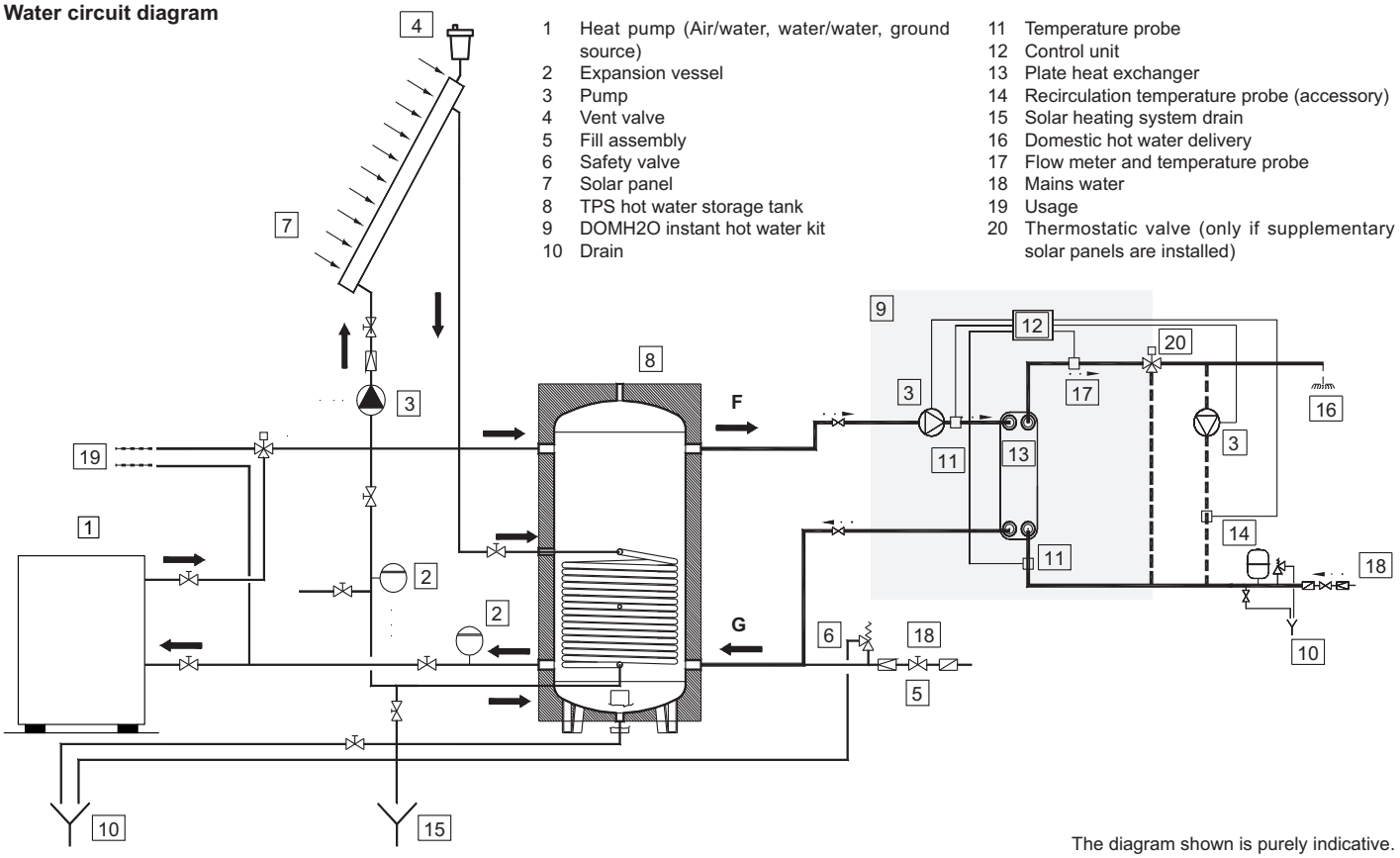
TPS STORAGE TANKS AND DOMH2O INSTANT DOMESTIC HOT WATER PRODUCTION KIT

The TPS storage tank is used to store water heated by a heat pump, and allow further supplementary heat from the solar heating coils fitted inside. In addition, tank connections are also available for other sources of heating, for example gas- or wood-fired appliances. Two electric heaters can be installed using the 2" fittings provided.
Domestic hot water production is guaranteed by the DOMH2O15 and DOMOH2O24 instant kits combined with the storage tanks.
The instant domestic hot water production kit draws energy from the storage tank and via heat exchange with the plate heat exchanger ensures the correct domestic hot water temperature, controlled by modulation of the primary circuit pump.
The control unit with graphic display allows the user to monitor operation, as well as set the set point and operating parameters.

Storage tank model available	Volume
TPS300	300 Litres
TPS500	500 Litres
TPS1000	1000 Litres

Instant domestic hot water production kit model available
DOMH20 15
DOMH20 24

Water circuit diagram



The diagram shown is purely indicative.

Technical specifications

TPS storage tanks

The storage tanks are made from carbon steel plate welded using the best technology and undergo strict water pressure tests (9 bars, allowing an operating pressure of 6 bars).
Being a container of hot and cold water, this product does not require internal treatment, while the outside is coated with rust-proof paint.
The tanks are protected on the outside with a closed cell elastomeric foam lining, 70 mm thick, with soft blue PVC exterior finish.

DOMH2O instant domestic hot water production kit

The instant domestic hot water production kit features the following components:
- AISI 316 stainless steel plate heat exchanger, insulated
- Circulating pump with low power consumption and electronic speed control
- Control unit with graphic display indicating the temperature and heat delivered
- Insulated copper pipes and connectors
- Sheet metal structure and thermoformed RAL panels, wall-mounted installation.

The control unit adjusts the speed of the primary circuit pump to maintain the set domestic hot water temperature, adjustable from 30°C to 65°C. If the domestic hot water temperature leaving the heat exchanger reaches Tmax (between 60°C and 75°C) the primary circuit pump is switched off.
When the temperature falls below the threshold (Tmax) the pump is started again.
For systems with supplementary solar heating, the primary circuit temperature may exceed the maximum limit of 65°C and pump speed modulation may not guarantee the DHW set point.

In this case, a thermostatic valve should be used at the instant domestic hot water production kit outlet to avoid excessive domestic hot water temperatures.
The DHW recirculating pump can be managed (maximum power 185 W) by setting the water temperature in the recirculation circuit.
When the temperature falls below the set point the recirculating pump is activated, and vice-versa.
In addition, on and off times can be set for the recirculation circuit and a custom program created for each day of the week.

Selection guide

To choose the best system made up of storage tank and external instant hot water production unit, the following three parameters need to be verified:

1. Tank volume is sufficient to produce the DHW required by the system.
2. Instant flow-rate of the external unit is higher than peak delivery flow-rate.
3. Storage tank volume is higher than the minimum recommended volume for correct heat pump operation (based on heat output).
   This condition is normally verified as the volume is quite low.

1. Storage tank volume

Tank volume and the characteristics of the primary source (heat output and outlet temperature) are the parameters that determine the amount of water that can be delivered in a certain unit of time. The following equation can be used to size the tank in terms of volume.

$$V = [Wf*(Tout-Tin)/(T0-Tf)] - [(P*tm*1000)/(Cp*(T0-Tf)]$$

Where:

V: Required storage tank volume in litres
Wf: Amount of domestic hot water required in the peak period, in litres
Tm: Duration of the peak period in minutes
T0: Temperature inside the storage tank [°C]
Tf: Minimum usable storage tank temperature [°C]
Tin: Mains water inlet temperature [°C]
Tout: DHW delivery temperature [°C]
Cp: Specific heat of water 4.186 kJ/kg °K
P: Primary source heat output [kW]

2. Instant DHW production

The amount of domestic hot water required at the points of delivery must be less than the amount produced by the unit.
The graphs on the previous pages illustrate the amount of water produced by the units as the primary circuit temperature changes.

3. Thermal inertia

The storage tank, as well as accumulating energy to be used when necessary, also acts as a buffer for the primary source of energy, reducing the number of starts and stops.
The volume of the storage tank must therefore be greater than the value recommended by the manufacturer of the primary source (heat pump or other appliance).

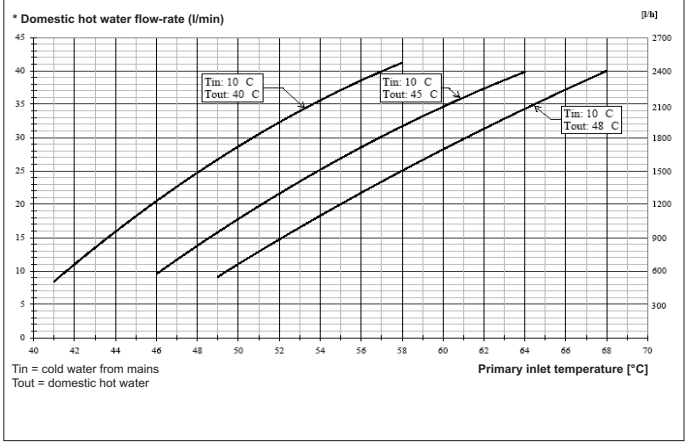
Typical combinations

Below are some combinations for typical residential applications with heat pumps.

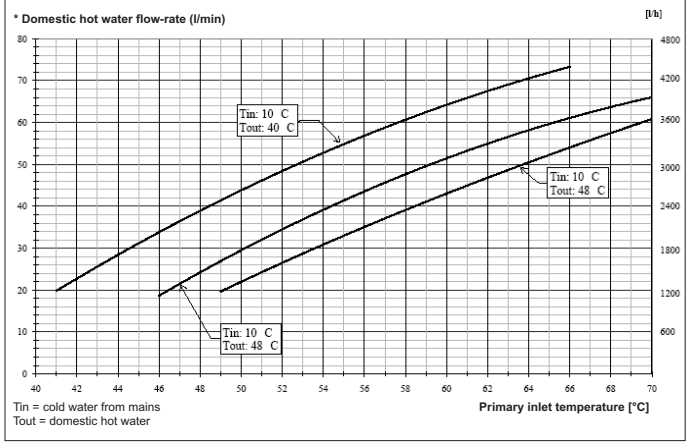
Type of home	no. of people	no. of bathrooms	Heat pump heat output	Storage tank volume	DOMH20 model
Single home	<3	1	4 - 6 kW	300	15
Single home	4 - 5	2	6 - 8 kW	500	15
Single home	5 - 6	2	10 - 13 kW	1000	24
Single home	6 - 7	3	15 - 18 kW	1000	24
2 apartments	4 - 5	2	6 - 8 kW	500	15
2 apartments	7 - 8	5	15 - 18 kW	1000	24
3 apartments	7 - 8	3	15 - 18 kW	1000	24
3 apartments	9 - 12	6	20 - 22 kW	1000	24

The combinations are calculated based on the following peak consumption:
- 60 l per person in single homes,
- 250 l per apartment with one bathroom,
- 350 l per apartment with two bathrooms,
- Simultaneous use factor

DOMH20 15 heating performance



DOMH20 24 heating performance



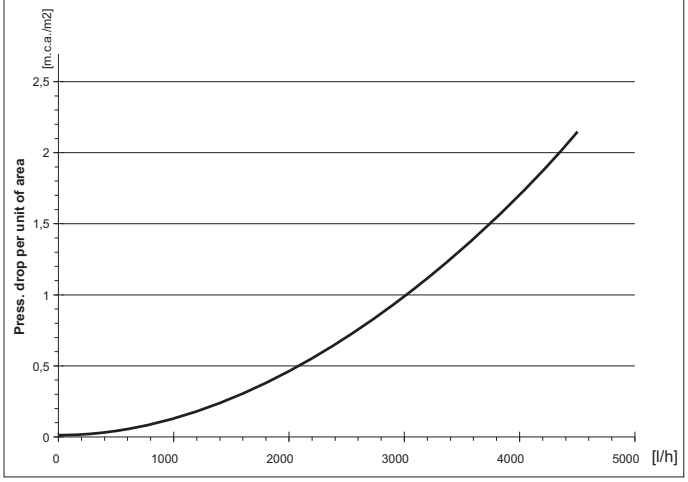
* The domestic hot water flow-rate shown on the performance curves remains constant for a variable time, depending on the volume of the storage tank. Also see the instructions in the "Selection guide".

Volume	Storage tank dimensions															
	Di	d	Htot	A	B	C	D	E	F	G	K	I	L	M	SR	SM
litres	mm															
300	690	550	1470	130	325	425	575	735	1060	1035	1185	635	835	325	370	785
500	790	650	1755	135	375	685	630	880	1336	1295	1445	780	980	330	375	870
1000	1050	850	2100	120	410	950	765	1105	1476	1560	1710	950	1150	380	425	1105

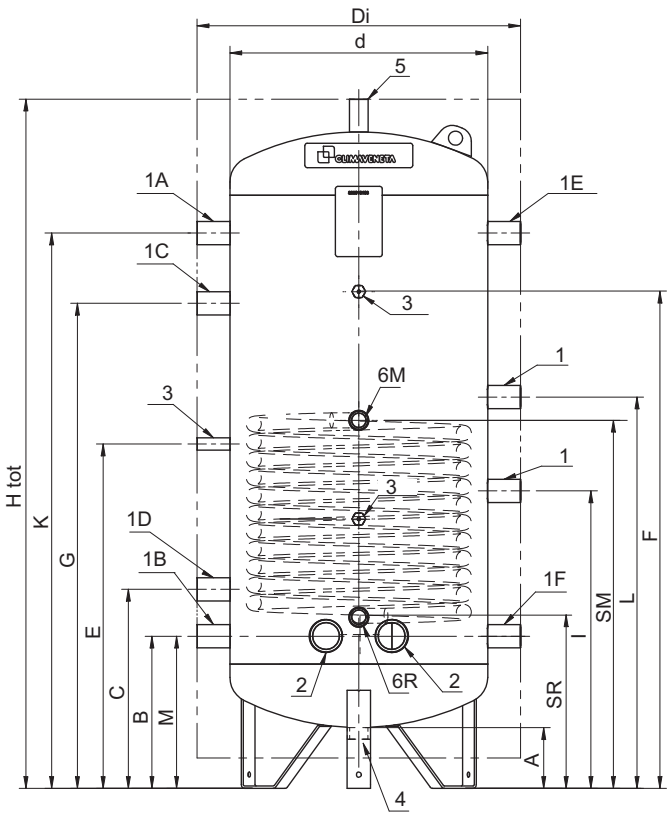
Volume	Fittings						Fixed coil	
	1	2	3	4	5	6	Surface area	Internal volume
litres	inch						m^2	l
300	1"1/4	2"	1/2"	1"1/4	1"	1"	1,5	9
500	1"1/4	2"	1/2"	1"1/4	1"	1"	2,1	13
1000	1"1/4	2"	1/2"	1"1/4	1"	1"	4	25

Pos.	Description
1A	Heat pump outlet
1B	Heat pump return
1C	Supplementary source outlet
1D	Supplementary source return
1E	Instant DHW kit outlet
1F	Instant DHW kit return
2	Electric heater attachment
3	Probe socket
4	Drain/fill
5	Vent
6M	Solar collector circuit outlet
6R	Solar collector circuit return

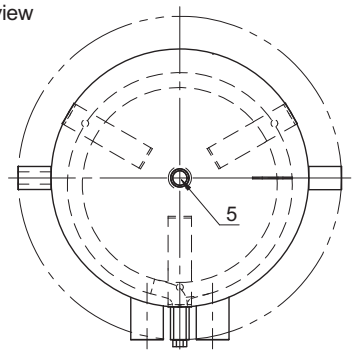
Solar heating coil pressure drop in TPS storage tanks



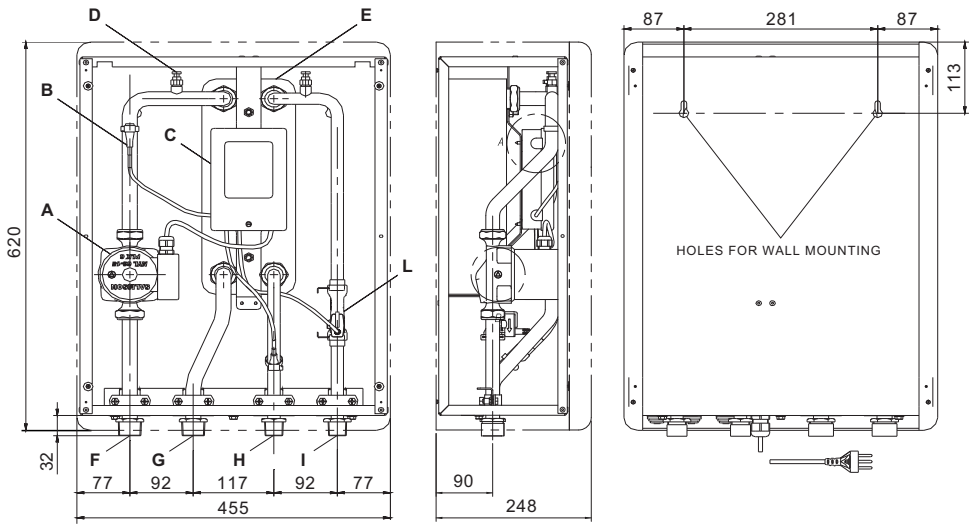
Dimensions - TPS storage tank



Top view



Dimensions - DOMH2O instant domestic hot water production kit



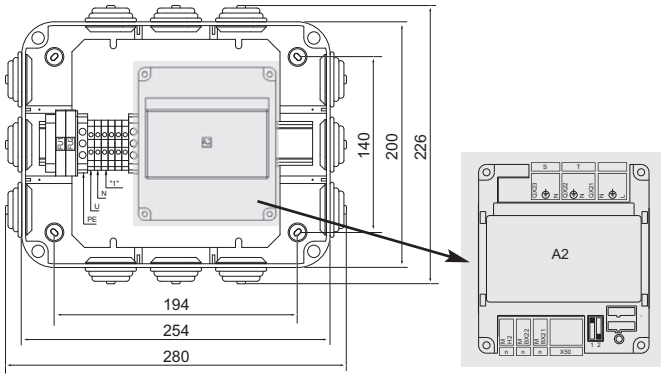
Pos.	Description
A	Primary circuit pump
B	Primary circuit temperature probe
C	Control unit
D	Manual vent valve
E	Plate heat exchanger
F	Primary circuit outlet
G	Primary circuit return
H	Mains water inlet
I	Domestic hot water outlet
L	Flow meter and temperature probe

EXPANSION MODULE FOR SYSTEM CONFIGURATION

The control system for residential applications gives high operating flexibility, activating zone pumps and valves depending on the set room temperature, and controlling mixing valves to ensure the correct water temperature in radiant systems according to the climate conditions set for each circuit.
There up to 4 different types of system pre-configurations for quick and easy installation, and up to 2 remote keypads for controlling thermal load in likewise zones.

The expansion module is used to connect the secondary circuit components and corresponding zone thermostats depending on the selected configuration.
Up to 2 expansion modules can be used to create more complex systems.
The meaning of the terminals may change based on the selected configuration, the connections are shown on the instruction sheet provided with the expansion module.

Dimensions - Expansion module

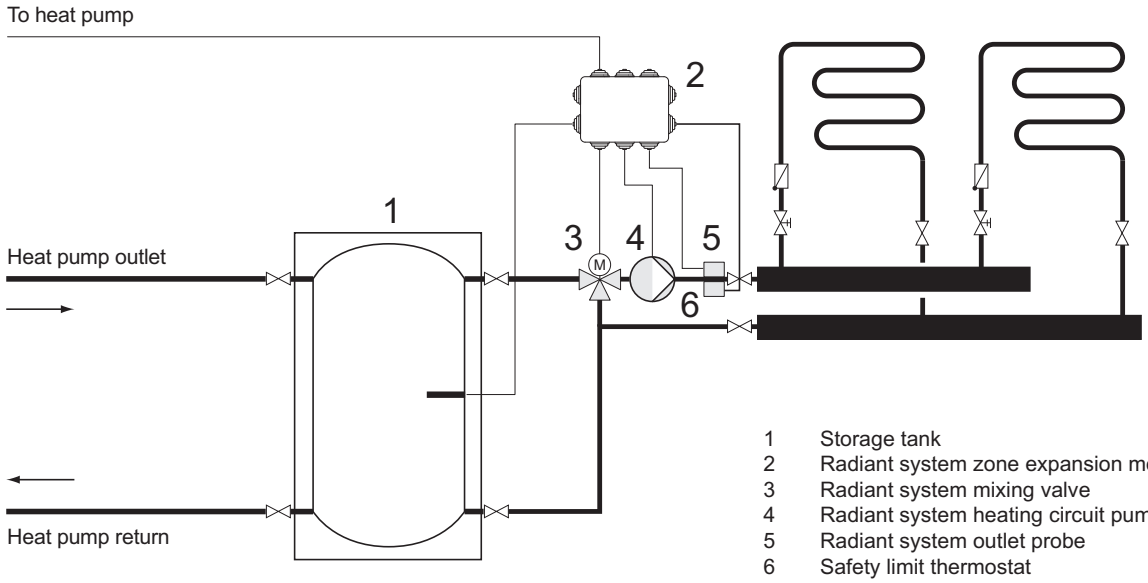


FU1-FU2	5x20T 0.5A slow-blow fuses
PE-U-N	230V power supply terminals
1-2	Connection terminal block safety thermostat (radiant systems only)
3-4	Heating circuit pump connection terminal block
A2	Expansion module for system management

KIT FOR RADIANT SYSTEMS

The kit is designed to control low temperature zone with mixing valve, and the components are:
- n. 1 Expansion module for system configuration (characteristics described in the previous paragraph)
- n. 1 Temperature probe
- n. 1 230V three-position mixing valve
- n. 1 Three-speed circulating pump

Example diagram



1	Storage tank
2	Radiant system zone expansion module
3	Radiant system mixing valve
4	Radiant system heating circuit pump
5	Radiant system outlet probe
6	Safety limit thermostat

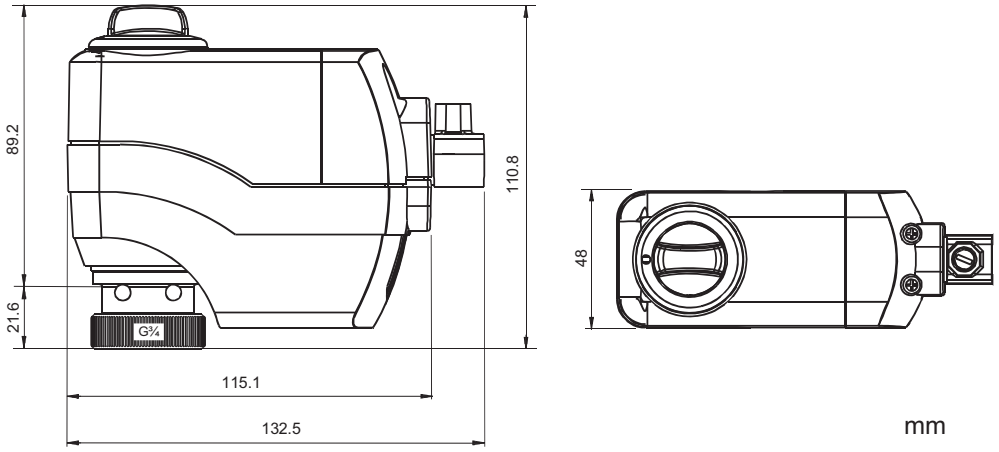
Servo control mixing valve

SERVO CONTROL TECHNICAL SPECIFICATIONS		
Power supply	Rated voltage	AC 230 V
	Voltage tolerance	± 15 %
	Rated frequency	50 / 60 Hz
	Max. power consumption	6 VA
	Fuse for incoming cable (fast)	2 A
Control	Control signal	3-position
	Parallel operation (number of actuators)*	max. 10
Functional data	Running time for 5.5 mm stroke	150 s ± 2 %
	Nominal stroke	5.5 mm
	Nominal force	> 300 N
	Permissible temperature of medium in the connected valve	1...110 °C
Electrical connections	Terminal block, pluggable	screw terminals for max. 3 mm^2
	Terminal block color	green
	Cable strain relief	for cables 4...11 mm dia.
Industry standards	Meets the requirements for CE marking: EMC directive Low-voltage directive	89/336/EEC emissions EN 50081-1 immunity EN 61000-6-2 73/23/EEC EN 60730-1
	Safety class	II
	Housing protection standard	IP40 in base a EN 60529
Dimensions / weight	Dimensions	refer to «Dimensions»
	Coupling thread to valve	coupling nut G¾
	Weight	0.26 kg
Housing	Base	plastic, RAL 7035, light-grey
	Cover, rotary knob	plastic, RAL 7035, light-grey

* Provided the controllers' output is sufficient

		Operation IEC 721-3-3	Transport IEC 721-3-2	Storage IEC 721-3-1
General ambient conditions	Environmental conditions	class 3K3	class 2K3	class 1K3
	Temperature	+5...+50 °C	–25...+70 °C	–25...+70 °C
	Humidity	5...95 % r.h.	< 95 % r.h.	5...95 % r.h.

Dimensions

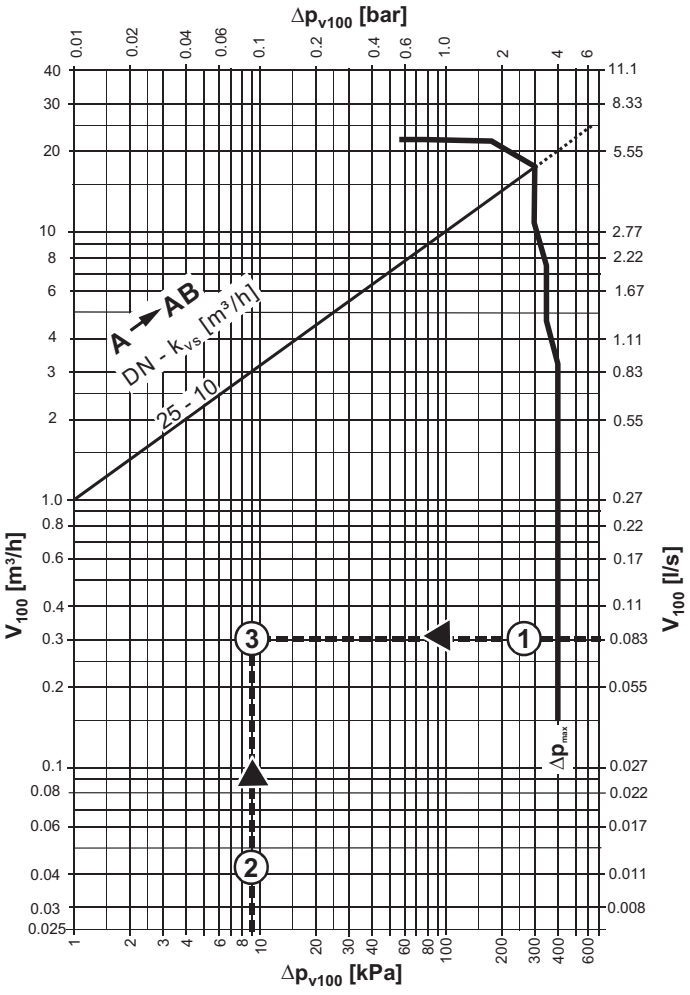


mm

Body of the mixing valve

VALVE BODY TECHNICAL SPECIFICATIONS		
Functional data	PN class	PN16 to EN 1333
	Permissible operating pressure	1600 kPa (16 bar) to ISO 7628 / EN 1333
	Valve flow characteristic Through-port A → AB to k_{vs} 6.3 Through-port A → AB from k_{vs} 10 Bypass B → AB	 equal percentage; n_{gl} = 2.2 to VDI / VDE 2173 linear linear
	Leakage rate	to DIN EN 1349
	Through-port A → AB	0…0.02 % of k_{vs}-value
	Bypass B → AB	0…0.02 % of k_{vs}-value
	Permissible media	low temperature hot water, chilled water, water recommendation: water treatment to VDI 2035
	Medium temperature	1...110 °C, short-term max. 120 °C
	Rangeability Sv	> 50 resp. > 100 (refer to «Type summary»)
	Nominal stroke	5.5 mm
Industry standards	Pressure Equipment Directive	PED 97/23/EC
	Pressure Accessories	as per article 1, section 2.1.4
	Fluid group 2	without CE-marking as per article 3, section 3 (sound engineering practice)
Materials	Valve body	bronze CC491K (Rg5)
	Stem	stainless steel
	Plug, seat, gland	brass
	Sealing gland	EPDM-O-rings
Dimensions / Weight	Dimensions	refer to «Dimensions»
	Threaded connections Valve Screwed fittings	 G...B to ISO 228/1 R/Rp... to ISO 7/1, G... to ISO 228/1
	Actuator connection	G¾"
	Weight	refer to «Dimensions»

Graph of valve pressure drop and valve characteristic curve



Δp_{max} = Maximum differential pressure allowed across complete valve control path, applying to the entire range of the motor-driven valve actuator

Δpv_{100} = Pressure differential across the valve when fully open and valve control path with a volume flow of V100

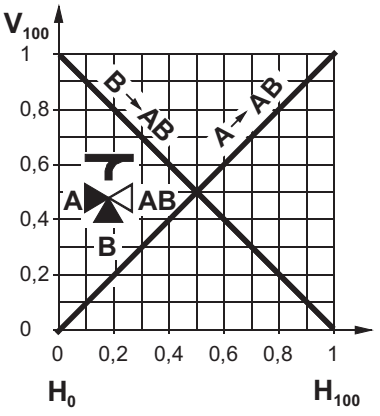
V_{100} = Flow-rate of the valve when fully open (H_{100})

100 kPa = 1 bar

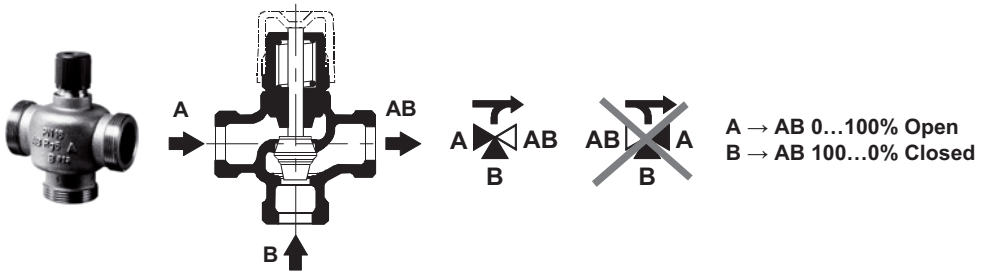
1 m³/h = 0.278 l/s water at 20 °C

Example: **1 V_{100} = 0,083 l/s**
2 Δpv_{100} = 9 kPa
3 → k_{vs}-value = 1.0 m³/h

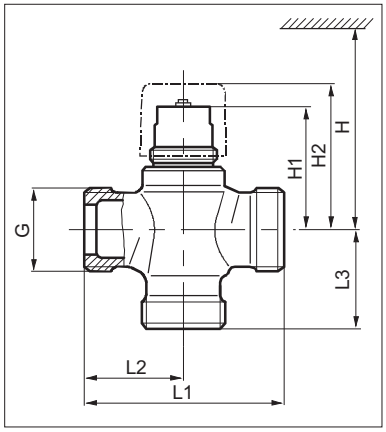
Valve flow-rate characteristics



Dimensions



A → AB 0…100% Open
B → AB 100…0% Closed

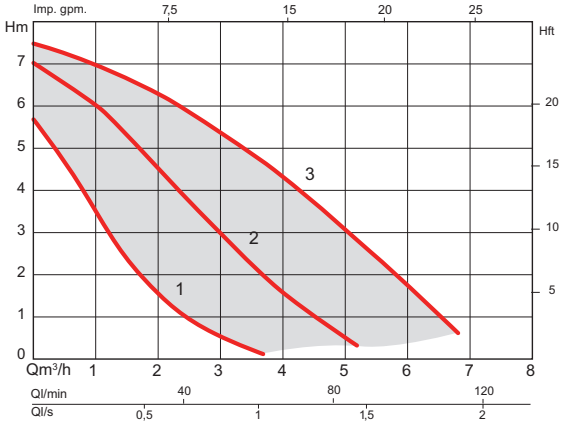


Dimensions	H (mm)	H1 (mm)	H2 (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	kg
3-position valve 1"1/2	> 280	62,5	≈ 71	105	52,5	52,5	62,5	1,29

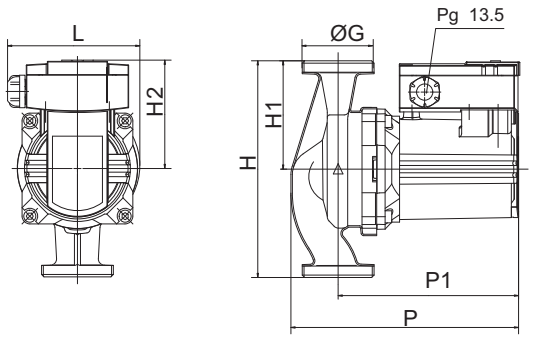
Three-speed circulating pump

Circulating pump technical specifications	
Temperature	-20°C ÷ +110°C
Operating pressure	max 10 bar
Maximum ambient temperature	40°C
Frequency	50 Hz
Voltage	1x230 V
Power and current drawn based on speed:	
speed 1:	115 W - 0.6A
speed 2:	165 W - 0.8A
speed 3:	205 W - 1.0A
Degree of protection	IP 44
Insulation class	F
Product compliant with European CE standards	
Immunity	EN 61000-6-2
Emissions	EN 61000-6-3

Circulating pump curve



Dimensions



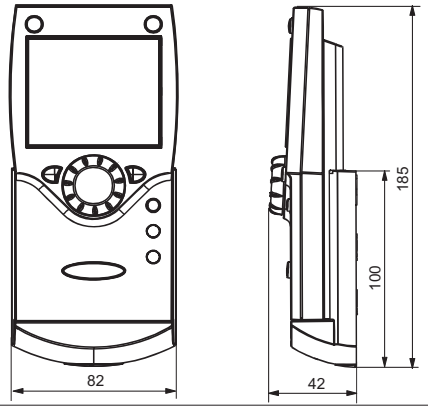
H mm	H1 mm	H2 mm	P mm	P1 mm	L mm	weigth kg	Ø Water connections
180	90	90	189	150	110	4	G2”

REMOTE KEYPAD PRO-EXTENDED

The room temperature, operating mode and time band settings are simple and intuitive using the knob on the front and the buttons.
The remote keypad can be used to access the unit and system configuration parameters, according to different access levels, while pressing the info button displays system operating status, providing useful information such as set point, central heating and domestic hot water temperature.
The keypad is fitted with a temperature probe as standard, meaning it can be used as a zone timer-thermostat as described in the paragraph on system configuration.
The simple and functional backlit display allows rapid viewing of the settings and environmental conditions.

The main settings are:
- Room temperature setting (temperature probe supplied is standard)
- Operating mode setting: heating, automatic mode changeover
- Enable domestic hot water production
- Served zone on/off
- Program time bands
- Wall-mounted installation (maximum distance 200 metres)

Dimensions

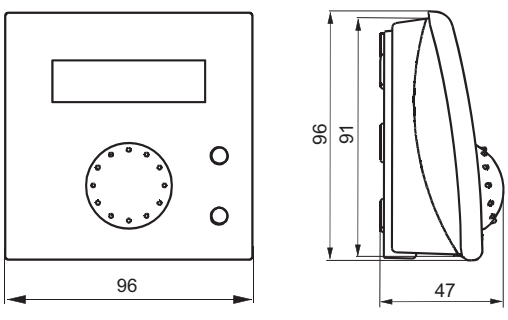


SIMPLIFIED REMOTE ROOM CONTROL UNIT

The simplified remote room control unit can be used in place of the pro-extended remote keypad to manage the second heating system zone (configuration 1, 3, 4 in the “system configuration” table).
This can be used to set the room temperature and operating mode in the corresponding zone.
The heat pump settings and system configuration are managed by the Pro-Extended remote keypad supplied with the unit.

The main settings are:
- Room temperature setting
- Operating mode setting
- Backlit display
- Wall-mounted installation (maximum distance 200 metres)

Dimensions



5. GENERAL TECHNICAL DATA

AW HT 230V RADIANT PANEL APPLICATION

SIZE		0031	0041					
AW HT/230 /B								
HEATING	(1)							
Heating capacity	**kW**	**10,4**	**14,9**					
Total power input (unit)	kW	2,55	3,54					
COP		4,16	4,26					
Heat exchanger water flow	m³/h	1,81	2,58					
Heat exchanger pressure drop	kPa	12,6	13,1					
COMPRESSORS								
Number	N°.	1	1					
Number of capacity	N°.	1	1					
Number of circuits	N°.	1	1					
Type of regulation		ON-OFF	ON-OFF					
Minimum capacity steps	%	100	100					
Type of refrigerant		R407C	R407C					
Refrigerant charge	kg.	2,3	3					
Oil charge	kg.	1	2					
FANS								
Number	N°.	2	2					
Air flow	m³/s	1,86	1,88					
Single power input	kW	0,15	0,15					
NOISE LEVELS	(2)							
Total sound power	dB(A)	70	70					
Total sound pressure	dB(A)	55	55					
DIMENSIONS AND WEIGHTS	(3)							
Length	mm.	900	900					
Width	mm.	420	420					
Height	mm.	1240	1390					
Weight	kg.	150	160					

1 Ambient temperature 7 C°
Exchanger water (in/out) 30/35 C°

2 Sound power on the basis of measurements made in compliance with ISO 9614 and Eurovent 8/1 for Eurovent certified units; in compliance with ISO 3744 for non-certified units
Average sound pressure level, at 1 (m.) distance, unit in a free field on a reflective surface; non-binding value obtained from the sound power level

3 Standard configuration

\- Not available

AW HT 400V RADIANT PANEL APPLICATION

SIZE		0041	0061	0071				
AW HT /B								
HEATING	(1)							
Heating capacity	**kW**	**14,1**	**19,7**	**26,6**				
Total power input (unit)	kW	3,32	4,71	6,08				
COP		4,27	4,19	4,36				
Heat exchanger water flow	m³/h	2,45	3,42	4,60				
Heat exchanger pressure drop	kPa	11,9	18,3	24,0				
COMPRESSORS								
Number	N°.	1	1	1				
Number of capacity	N°.	1	1	1				
Number of circuits	N°.	1	1	1				
Type of regulation		100	100	ON-OFF				
Minimum capacity steps	%	1	1	100				
Type of refrigerant		R407C	R407C	R407C				
Refrigerant charge	kg.	3	4	5,86				
Oil charge	kg.	2	2	4				
FANS								
Number	N°.	2	2	3				
Air flow	m³/s	1,88	1,68	2,94				
Single power input	kW	0,15	0,15	0,15				
NOISE LEVELS	(2)							
Total sound power	dB(A)	70	71	74				
Total sound pressure	dB(A)	55	56	58				
DIMENSIONS AND WEIGHTS	(3)							
Length	mm.	900	900	1470				
Width	mm.	420	420	570				
Height	mm.	1390	1390	1700				
Weight	kg.	160	170	320				

1 Ambient temperature 7 C°
Exchanger water (in/out) 30/35 C°

2 Sound power on the basis of measurements made in compliance with ISO 9614 and Eurovent 8/1 for Eurovent certified units; in compliance with ISO 3744 for non-certified units
Average sound pressure level, at 1 (m.) distance, unit in a free field on a reflective surface; non-binding value obtained from the sound power level

3 Standard configuration

\- Not available

AW HT 230V HYDRONIC TERMINAL APPLICATION

SIZE		0031	0041					
AW HT/230 /B								
HEATING	(1)							
Heating capacity	**kW**	**10,4**	**15,1**					
Total power input (unit)	kW	2,96	4,24					
COP		3,47	3,60					
Heat exchanger water flow	m³/h	1,80	2,63					
Heat exchanger pressure drop	kPa	12,5	13,7					
COMPRESSORS								
Number	N°.	1	1					
Number of capacity	N°.	1	1					
Number of circuits	N°.	1	1					
Type of regulation		ON-OFF	ON-OFF					
Minimum capacity steps	%	100	100					
Type of refrigerant		R407C	R407C					
Refrigerant charge	kg.	2,3	3					
Oil charge	kg.	1	2					
FANS								
Number	N°.	2	2					
Air flow	m³/s	1,86	1,88					
Single power input	kW	0,15	0,15					
NOISE LEVELS	(2)							
Total sound power	dB(A)	70	70					
Total sound pressure	dB(A)	55	55					
DIMENSIONS AND WEIGHTS	(3)							
Length	mm.	900	900					
Width	mm.	420	420					
Height	mm.	1240	1390					
Weight	kg.	150	160					

1 Ambient temperature 7 C°
Exchanger water (in/out) 40/45 C°

2 Sound power on the basis of measurements made in compliance with ISO 9614 and Eurovent 8/1 for Eurovent certified units; in compliance with ISO 3744 for non-certified units
Average sound pressure level, at 1 (m.) distance, unit in a free field on a reflective surface; non-binding value obtained from the sound power level

3 Standard configuration

\- Not available

AW HT 400V HYDRONIC TERMINAL APPLICATION

SIZE		0041	0061	0071				
AW HT /B								
HEATING	(1)							
Heating capacity	**kW**	**14,3**	**19,7**	**27,1**				
Total power input (unit)	kW	3,97	5,62	7,45				
COP		3,58	3,52	3,66				
Heat exchanger water flow	m³/h	2,48	3,43	4,70				
Heat exchanger pressure drop	kPa	12,3	18,4	25,1				
COMPRESSORS								
Number	N°.	1	1	1				
Number of capacity	N°.	1	1	1				
Number of circuits	N°.	1	1	1				
Type of regulation		100	100	ON-OFF				
Minimum capacity steps	%	1	1	100				
Type of refrigerant		R407C	R407C	R407C				
Refrigerant charge	kg.	3	4	5,86				
Oil charge	kg.	2	2	4				
FANS								
Number	N°.	2	2	3				
Air flow	m³/s	1,88	1,68	2,94				
Single power input	kW	0,15	0,15	0,15				
NOISE LEVELS	(2)							
Total sound power	dB(A)	70	71	74				
Total sound pressure	dB(A)	55	56	58				
DIMENSIONS AND WEIGHTS	(3)							
Length	mm.	900	900	1470				
Width	mm.	420	420	570				
Height	mm.	1390	1390	1700				
Weight	kg.	160	170	320				

1 Ambient temperature 7 C°
Exchanger water (in/out) 40/45 C°

2 Sound power on the basis of measurements made in compliance with ISO 9614 and Eurovent 8/1 for Eurovent certified units; in compliance with ISO 3744 for non-certified units
Average sound pressure level, at 1 (m.) distance, unit in a free field on a reflective surface; non-binding value obtained from the sound power level

3 Standard configuration

\- Not available

AW HT 230V HEATING PERFORMANCE

0031																		
Ta	**-20**	**-15**	**-12**	**-5**	**2**	**7**	**-20**	**-15**	**-12**	**-5**	**2**	**7**	**-20**	**-15**	**-12**	**-5**	**2**	**7**
Tcd			**35**						**45**						**50**			
Pt	**5,68**	**6,13**	**6,49**	**7,61**	**9,12**	**10,4**	**5,90**	**6,27**	**6,60**	**7,64**	**9,08**	**10,4**	**-**	**6,33**	**6,66**	**7,71**	**9,14**	**10,4**
Qcd	0,983	1,06	1,12	1,32	1,58	1,81	1,03	1,09	1,15	1,33	1,58	1,80	-	1,10	1,16	1,34	1,59	1,81
Pcd	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pat	2,28	2,31	2,34	2,40	2,48	2,55	2,65	2,66	2,68	2,75	2,86	2,96	-	2,81	2,86	2,98	3,12	3,24
Ta	**-20**	**-15**	**-12**	**-5**	**2**	**7**	**-20**	**-15**	**-12**	**-5**	**2**	**7**	**-20**	**-15**	**-12**	**-5**	**2**	**7**
Tcd			**55**						**60**						**65**			
Pt	**-**	**6,38**	**6,74**	**7,82**	**9,24**	**10,5**	**-**	**-**	**6,83**	**7,98**	**9,39**	**10,6**	**-**	**-**	**6,93**	**8,17**	**9,59**	**10,7**
Qcd	-	1,11	1,18	1,36	1,61	1,82	-	-	1,19	1,39	1,64	1,85	-	-	1,21	1,43	1,68	1,88
Pcd	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pat	-	2,95	3,04	3,25	3,44	3,56	-	-	3,23	3,56	3,81	3,94	-	-	3,43	3,90	4,22	4,36

0041																		
Ta	**-20**	**-15**	**-12**	**-5**	**2**	**7**	**-20**	**-15**	**-12**	**-5**	**2**	**7**	**-20**	**-15**	**-12**	**-5**	**2**	**7**
Tcd			**35**						**45**						**50**			
Pt	**7,54**	**8,51**	**9,17**	**11,0**	**13,1**	**14,9**	**8,05**	**8,97**	**9,60**	**11,3**	**13,4**	**15,1**	**-**	**9,35**	**9,95**	**11,6**	**13,6**	**15,3**
Qcd	1,31	1,47	1,59	1,90	2,28	2,58	1,40	1,56	1,67	1,97	2,33	2,63	-	1,63	1,73	2,02	2,37	2,66
Pcd	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pat	3,02	3,11	3,17	3,31	3,44	3,54	3,53	3,67	3,76	3,94	4,12	4,24	-	4,01	4,11	4,33	4,54	4,67
Ta	**-20**	**-15**	**-12**	**-5**	**2**	**7**	**-20**	**-15**	**-12**	**-5**	**2**	**7**	**-20**	**-15**	**-12**	**-5**	**2**	**7**
Tcd			**55**						**60**						**65**			
Pt	**-**	**9,85**	**10,4**	**11,9**	**13,8**	**15,4**	**-**	**-**	**10,9**	**12,3**	**14,1**	**15,6**	**-**	**-**	**11,5**	**12,8**	**14,4**	**15,8**
Qcd	-	1,72	1,81	2,08	2,41	2,69	-	-	1,91	2,15	2,46	2,72	-	-	2,02	2,23	2,52	2,76
Pcd	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pat	-	4,39	4,51	4,77	5,00	5,15	-	-	4,95	5,25	5,51	5,68	-	-	5,43	5,77	6,07	6,25

Ta [°C] - Air temperature
Tcd (°C) - Source (side) heat exchanger output water temperature
Pt (kW) - Heating capacity
Pat (kW) - Total power input
Qcd (m^3/h) - Source (side) heat exchanger water flow
Dpcd (kPa) - Source (side) heat exchanger pressure drop
'-' - Conditions outside the operating range
Waterflow and pressure drop on heat exchangers calculated with 5°C of delta T
NOTE: Data on grey background: unit switched to non-silenced operation

AW HT 230V HEATING PERFORMANCE

0031																		
Ta	**10**	**12**	**14**	**16**	**18**	**20**	**10**	**12**	**14**	**16**	**18**	**20**	**10**	**12**	**14**	**16**	**18**	**20**
Tcd			**40**						**45**						**50**			
Pt	**11,3**	**11,9**	**12,5**	**13,2**	**14,0**	**14,7**	**11,2**	**11,8**	**12,5**	**13,2**	**13,9**	**14,7**	**11,2**	**11,8**	**12,5**	**13,1**	**13,8**	**14,6**
Qcd	1,95	2,06	2,17	2,30	2,42	2,55	1,95	2,06	2,17	2,29	2,42	2,55	1,96	2,06	2,17	2,29	2,41	2,53
Pcd	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pat	2,79	2,83	2,88	2,93	2,98	3,03	3,03	3,08	3,13	3,19	3,25	3,31	3,31	3,36	3,41	3,47	3,53	3,58
Ta	**10**	**12**	**14**	**16**	**18**	**20**	**10**	**12**	**14**	**16**	**18**	**20**	**10**	**12**	**14**	**16**	**18**	**20**
Tcd			**55**						**60**						**65**			
Pt	**11,3**	**11,8**	**12,5**	**13,1**	**13,7**	**14,4**	**11,3**	**11,9**	**12,4**	**13,0**	**13,6**	**14,3**	**11,4**	**11,9**	**12,4**	**13,0**	**13,5**	**14,1**
Qcd	1,97	2,07	2,17	2,28	2,40	2,52	1,98	2,08	2,17	2,28	2,38	2,49	2,00	2,09	2,18	2,27	2,36	2,46
Pcd	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pat	3,64	3,68	3,73	3,77	3,81	3,85	4,00	4,04	4,06	4,09	4,10	4,11	4,41	4,43	4,43	4,42	4,40	4,37

0041																		
Ta	**10**	**12**	**14**	**16**	**18**	**20**	**10**	**12**	**14**	**16**	**18**	**20**	**10**	**12**	**14**	**16**	**18**	**20**
Tcd			**40**						**45**						**50**			
Pt	**16,1**	**16,9**	**17,8**	**18,6**	**19,5**	**20,4**	**16,2**	**17,0**	**17,8**	**18,7**	**19,5**	**20,4**	**16,4**	**17,1**	**17,9**	**18,7**	**19,6**	**20,4**
Qcd	2,80	2,94	3,08	3,23	3,38	3,54	2,82	2,96	3,10	3,24	3,39	3,55	2,85	2,98	3,12	3,26	3,41	3,56
Pcd	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pat	3,93	3,97	4,01	4,05	4,09	4,13	4,31	4,36	4,40	4,45	4,49	4,53	4,75	4,80	4,84	4,89	4,94	4,98
Ta	**10**	**12**	**14**	**16**	**18**	**20**	**10**	**12**	**14**	**16**	**18**	**20**	**10**	**12**	**14**	**16**	**18**	**20**
Tcd			**55**						**60**						**65**			
Pt	**16,5**	**17,2**	**18,0**	**18,8**	**19,6**	**20,4**	**16,6**	**17,3**	**18,0**	**18,8**	**19,6**	**20,4**	**16,7**	**17,3**	**18,0**	**18,8**	**19,5**	**20,3**
Qcd	2,87	3,00	3,13	3,27	3,41	3,56	2,90	3,02	3,15	3,28	3,42	3,56	2,92	3,04	3,16	3,29	3,42	3,56
Pcd	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pat	5,23	5,28	5,34	5,39	5,43	5,48	5,77	5,82	5,88	5,93	5,98	6,03	6,35	6,41	6,47	6,53	6,58	6,62

Ta [°C] - Air temperature
Tcd (°C) - Source (side) heat exchanger output water temperature
Pt (kW) - Heating capacity
Pat (kW) - Total power input
Qcd (m^3/h) - Source (side) heat exchanger water flow
Dpcd (kPa) - Source (side) heat exchanger pressure drop
'-' - Conditions outside the operating range
Waterflow and pressure drop on heat exchangers calculated with 5°C of delta T
NOTE: Data on grey background: unit switched to non-silenced operation

AW HT 400V HEATING PERFORMANCE

0041																		
Ta	**-20**	**-15**	**-12**	**-5**	**2**	**7**	**-20**	**-15**	**-12**	**-5**	**2**	**7**	**-20**	**-15**	**-12**	**-5**	**2**	**7**
Tcd			**35**						**45**						**50**			
Pt	**7,26**	**8,15**	**8,76**	**10,4**	**12,5**	**14,1**	**7,85**	**8,64**	**9,21**	**10,8**	**12,7**	**14,3**	**-**	**8,97**	**9,49**	**11,0**	**12,8**	**14,4**
Qcd	1,26	1,41	1,52	1,81	2,16	2,45	1,36	1,50	1,60	1,87	2,21	2,48	-	1,56	1,65	1,91	2,23	2,50
Pcd	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pat	2,97	3,03	3,07	3,16	3,25	3,32	3,53	3,59	3,64	3,75	3,87	3,97	-	3,96	4,00	4,11	4,24	4,34
Ta	**-20**	**-15**	**-12**	**-5**	**2**	**7**	**-20**	**-15**	**-12**	**-5**	**2**	**7**	**-20**	**-15**	**-12**	**-5**	**2**	**7**
Tcd			**55**						**60**						**65**			
Pt	**-**	**9,35**	**9,82**	**11,2**	**13,0**	**14,5**	**-**	**-**	**10,2**	**11,5**	**13,1**	**14,6**	**-**	**-**	**10,6**	**11,7**	**13,3**	**14,7**
Qcd	-	1,63	1,71	1,95	2,26	2,52	-	-	1,78	2,00	2,29	2,55	-	-	1,86	2,05	2,33	2,57
Pcd	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pat	-	4,37	4,41	4,52	4,65	4,75	-	-	4,87	4,97	5,09	5,20	-	-	5,39	5,47	5,58	5,68

0061																		
Ta	**-20**	**-15**	**-12**	**-5**	**2**	**7**	**-20**	**-15**	**-12**	**-5**	**2**	**7**	**-20**	**-15**	**-12**	**-5**	**2**	**7**
Tcd			**35**						**45**						**50**			
Pt	**10,7**	**11,8**	**12,6**	**14,8**	**17,5**	**19,7**	**10,8**	**12,0**	**12,8**	**15,0**	**17,6**	**19,7**	**-**	**12,2**	**13,0**	**15,1**	**17,6**	**19,7**
Qcd	1,85	2,04	2,18	2,56	3,03	3,42	1,88	2,09	2,23	2,61	3,06	3,43	-	2,12	2,26	2,63	3,07	3,43
Pcd	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pat	4,04	4,14	4,20	4,37	4,56	4,71	4,78	4,92	5,00	5,21	5,44	5,62	-	5,41	5,50	5,73	5,98	6,16
Ta	**-20**	**-15**	**-12**	**-5**	**2**	**7**	**-20**	**-15**	**-12**	**-5**	**2**	**7**	**-20**	**-15**	**-12**	**-5**	**2**	**7**
Tcd			**55**						**60**						**65**			
Pt	**-**	**12,4**	**13,1**	**15,2**	**17,7**	**19,6**	**-**	**-**	**13,3**	**15,3**	**17,6**	**19,5**	**-**	**-**	**13,6**	**15,4**	**17,6**	**19,4**
Qcd	-	2,16	2,29	2,65	3,08	3,42	-	-	2,33	2,68	3,08	3,41	-	-	2,37	2,70	3,08	3,39
Pcd	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pat	-	5,96	6,07	6,32	6,57	6,76	-	-	6,70	6,97	7,24	7,43	-	-	7,40	7,68	7,96	8,16

0071																		
Ta	**-20**	**-15**	**-12**	**-5**	**2**	**7**	**-20**	**-15**	**-12**	**-5**	**2**	**7**	**-20**	**-15**	**-12**	**-5**	**2**	**7**
Tcd			**35**						**45**						**50**			
Pt	**13,2**	**15,1**	**16,3**	**19,6**	**23,5**	**26,6**	**13,2**	**15,3**	**16,6**	**20,1**	**24,0**	**27,1**	**-**	**15,7**	**17,0**	**20,4**	**24,3**	**27,3**
Qcd	2,28	2,61	2,83	3,40	4,07	4,60	2,30	2,66	2,89	3,49	4,17	4,70	-	2,73	2,96	3,56	4,23	4,76
Pcd	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pat	4,94	5,19	5,33	5,63	5,91	6,08	5,80	6,13	6,32	6,76	7,17	7,45	-	6,89	7,07	7,50	7,93	8,25
Ta	**-20**	**-15**	**-12**	**-5**	**2**	**7**	**-20**	**-15**	**-12**	**-5**	**2**	**7**	**-20**	**-15**	**-12**	**-5**	**2**	**7**
Tcd			**55**						**60**						**65**			
Pt	**-**	**16,3**	**17,6**	**20,9**	**24,7**	**27,6**	**-**	**-**	**18,3**	**21,5**	**25,1**	**27,9**	**-**	**-**	**19,2**	**22,1**	**25,5**	**28,2**
Qcd	-	2,84	3,07	3,65	4,30	4,82	-	-	3,20	3,75	4,38	4,88	-	-	3,37	3,87	4,47	4,94
Pcd	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pat	-	7,84	7,98	8,35	8,79	9,13	-	-	9,05	9,33	9,73	10,1	-	-	10,3	10,4	10,8	11,1

Ta [°C] - Air temperature
Tcd (°C) - Source (side) heat exchanger output water temperature
Pt (kW) - Heating capacity
Pat (kW) - Total power input
Qcd (m^3/h) - Source (side) heat exchanger water flow
Dpcd (kPa) - Source (side) heat exchanger pressure drop
'-' - Conditions outside the operating range
Waterflow and pressure drop on heat exchangers calculated with 5°C of delta T
NOTE: Data on grey background: unit switched to non-silenced operation

AW HT 400V HEATING PERFORMANCE

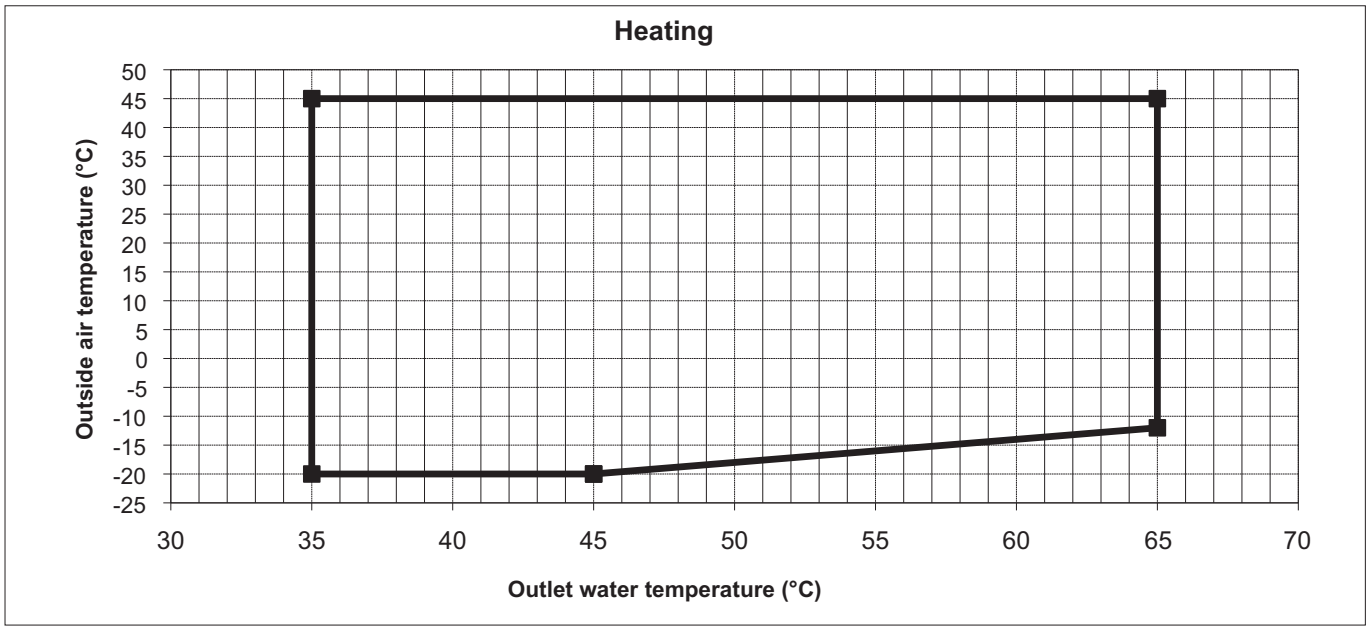
0041																		
Ta	**10**	**12**	**14**	**16**	**18**	**20**	**10**	**12**	**14**	**16**	**18**	**20**	**10**	**12**	**14**	**16**	**18**	**20**
Tcd			**40**						**45**						**50**			
Pt	**15,3**	**16,0**	**16,8**	**17,6**	**18,4**	**19,3**	**15,3**	**16,1**	**16,8**	**17,6**	**18,4**	**19,3**	**15,4**	**16,1**	**16,9**	**17,6**	**18,4**	**19,3**
Qcd	2,65	2,78	2,91	3,05	3,19	3,34	2,66	2,79	2,92	3,06	3,20	3,35	2,68	2,81	2,94	3,07	3,21	3,36
Pcd	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pat	3,68	3,72	3,75	3,79	3,83	3,87	4,03	4,07	4,11	4,16	4,20	4,25	4,41	4,45	4,50	4,55	4,60	4,65
Ta	**10**	**12**	**14**	**16**	**18**	**20**	**10**	**12**	**14**	**16**	**18**	**20**	**10**	**12**	**14**	**16**	**18**	**20**
Tcd			**55**						**60**						**65**			
Pt	**15,5**	**16,2**	**16,9**	**17,7**	**18,5**	**19,3**	**15,5**	**16,2**	**17,0**	**17,7**	**18,5**	**19,3**	**15,6**	**16,3**	**17,0**	**17,8**	**18,5**	**19,4**
Qcd	2,70	2,82	2,95	3,08	3,22	3,37	2,72	2,84	2,96	3,10	3,23	3,38	2,74	2,85	2,98	3,11	3,25	3,39
Pcd	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pat	4,82	4,87	4,92	4,97	5,02	5,08	5,27	5,31	5,36	5,42	5,47	5,53	5,74	5,79	5,84	5,90	5,95	6,01

0061																		
Ta	**10**	**12**	**14**	**16**	**18**	**20**	**10**	**12**	**14**	**16**	**18**	**20**	**10**	**12**	**14**	**16**	**18**	**20**
Tcd			**40**						**45**						**50**			
Pt	**21,2**	**22,2**	**23,2**	**24,3**	**25,4**	**26,6**	**21,1**	**22,1**	**23,1**	**24,1**	**25,2**	**26,3**	**21,0**	**22,0**	**22,9**	**23,9**	**24,9**	**26,0**
Qcd	3,68	3,85	4,03	4,21	4,41	4,61	3,67	3,84	4,01	4,19	4,38	4,57	3,66	3,82	3,99	4,16	4,34	4,52
Pcd	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pat	5,24	5,31	5,38	5,45	5,53	5,61	5,72	5,80	5,88	5,95	6,03	6,11	6,27	6,35	6,43	6,51	6,59	6,67
Ta	**10**	**12**	**14**	**16**	**18**	**20**	**10**	**12**	**14**	**16**	**18**	**20**	**10**	**12**	**14**	**16**	**18**	**20**
Tcd			**55**						**60**						**65**			
Pt	**20,9**	**21,8**	**22,7**	**23,6**	**24,6**	**25,6**	**20,7**	**21,6**	**22,5**	**23,4**	**24,3**	**25,2**	**20,5**	**21,3**	**22,2**	**23,0**	**23,9**	**24,8**
Qcd	3,65	3,80	3,96	4,12	4,29	4,47	3,62	3,77	3,92	4,08	4,24	4,41	3,60	3,74	3,88	4,03	4,19	4,35
Pcd	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pat	6,88	6,96	7,04	7,12	7,20	7,28	7,55	7,63	7,71	7,79	7,87	7,94	8,28	8,35	8,43	8,51	8,59	8,66

0071																		
Ta	**10**	**12**	**14**	**16**	**18**	**20**	**10**	**12**	**14**	**16**	**18**	**20**	**10**	**12**	**14**	**16**	**18**	**20**
Tcd			**40**						**45**						**50**			
Pt	**28,8**	**30,1**	**31,5**	**33,0**	**34,5**	**36,0**	**29,0**	**30,4**	**31,7**	**33,2**	**34,6**	**36,1**	**29,2**	**30,6**	**31,9**	**33,3**	**34,8**	**36,3**
Qcd	4,99	5,23	5,47	5,72	5,98	6,24	5,04	5,28	5,52	5,76	6,02	6,28	5,09	5,32	5,56	5,80	6,05	6,31
Pcd	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pat	6,85	6,94	7,02	7,10	7,17	7,24	7,61	7,71	7,81	7,91	8,01	8,11	8,44	8,57	8,70	8,83	8,95	9,08
Ta	**10**	**12**	**14**	**16**	**18**	**20**	**10**	**12**	**14**	**16**	**18**	**20**	**10**	**12**	**14**	**16**	**18**	**20**
Tcd			**55**						**60**						**65**			
Pt	**29,5**	**30,8**	**32,1**	**33,5**	**34,9**	**36,4**	**29,7**	**31,0**	**32,3**	**33,6**	**35,0**	**36,4**	**30,0**	**31,2**	**32,5**	**33,8**	**35,1**	**36,5**
Qcd	5,14	5,37	5,60	5,84	6,09	6,34	5,20	5,42	5,65	5,88	6,12	6,37	5,25	5,47	5,69	5,91	6,15	6,39
Pcd	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pat	9,36	9,51	9,67	9,83	10,00	10,2	10,4	10,5	10,7	10,9	11,1	11,4	11,4	11,6	11,9	12,1	12,4	12,7

Ta [°C] - Air temperature
Tcd (°C) - Source (side) heat exchanger output water temperature
Pt (kW) - Heating capacity
Pat (kW) - Total power input
Qcd (m^3/h) - Source (side) heat exchanger water flow
Dpcd (kPa) - Source (side) heat exchanger pressure drop
'-' - Conditions outside the operating range
Waterflow and pressure drop on heat exchangers calculated with 5°C of delta T
NOTE: Data on grey background: unit switched to non-silenced operation

6. OPERATING LIMITS



Water temperature head min/max= 3/8 °C
Water circuit pressure min/max = 1/6 bar
Maximum glycol percentage = 40%

The temperature of the fluid leaving the unit must always be within the manufacturer's specified operating range, even during start-up and when first putting into heating mode. To ensure this, the water circuit can be fitted with a bypass valve and/or other solutions, such as electric heaters with temperature control inside the storage tank.

7. ETHYLENE GLYCOL MIXTURE

Ethylene glycol and water mixture, used as a heat-conveying fluid, cause a variation in unit performance. For correct data, use the factors indicated in the following tabel.

	Freezing point (°C)							
	0	-5	-10	-15	-20	-25	-30	-35
	Ethylene glycol percentage by weight							
	0	12%	20%	30%	35%	40%	45%	50%
cPf	1	0,985	0,98	0,974	0,97	0,965	0,964	0,96
cQ	1	1,02	1,04	1,075	1,11	1,14	1,17	1,2
cdp	1	1,07	1,11	1,18	1,22	1,24	1,27	1,3

cPf: cooling power correction factor
cQ: flow correction factor
cdp: pressure drop correction factor

For data concerning other kind of anti-freeze solutions (e,g, propylene glycol) please contact our Sale Department.

8. FOULING FACTORS

Performances are based on clean condition of tubes (fouling factor = 1). For different fouling values, performance should be adjusted using the correction factors shown in the following table.

FOULING FACTORS	EVAPORATOR			CONDENSER/RECOVERY			DESUPERHEATER
ff (m² °CW)	F1	FK1	KE [°C]	F2	FK2	KC [°C]	R3
0	1,000	1,000	0,0	1,000	1,000	0,0	1,000
1,80 x 10^{-5}	1,000	1,000	0,0	1,000	1,000	0,0	1,000
4,40 x 10^{-5}	1,000	1,000	0,0	0,990	1,030	1,0	0,990
8,80 x 10^{-5}	0,960	0,990	0,7	0,980	1,040	1,5	0,980
13,20 x 10^{-5}	0,944	0,985	1,0	0,964	1,050	2,3	0,964
17,20 x 10^{-5}	0,930	0,980	1,5	0,950	1,060	3,0	0,950

ff: fouling factors
f1 - f2: potential correction factors
fk1 - fk2: compressor power input correction factors
r3: capacity correction factors

KE: minimum condenser outlet temperature increase
KC: maximum condenser outlet temperature decrease

9. HYDRAULIC DATA

Water flow and pressure drop

Water flow in the heat exchangers is given by: Q=Px0,86/Dt
Q: water flow (m^3/h)
Dt: difference between inlet and outlet water temp. (°C)
P: heat exchanger capacity (kW)

Pressure drop is given by: Dp= K x Q2/1000
Q: water flow (m^3/h)
Dp: pressure drop (kPa)
K: unit size ratio

	PLANT SIDE COLD HEAT EXCHANGER					PLANT SIDE HOT HEAT EXCHANGER				AUXILIARY SIDE HEAT EXCHANGER			
SIZE	**K**	**Q min m^3/h**	**Q max m^3/h**	**C.A.S. dm^3**	**C.a. min m^3**	**K**	**Q min m^3/h**	**C.A.S. dm^3**	**Q max m^3/h**	**K**	**Q min m^3/h**	**C.A.S. dm^3**	**Q max m^3/h**
0031 230V	-	-	-	-	0,068	3833	1,12	-	2,98	-	-	-	-
0041 230V	-	-	-	-	0,098	1984	1,6	-	4,27	-	-	-	-
0041 400V	-	-	-	-	0,093	1984	1,52	-	4,05	-	-	-	-
0061 400V	-	-	-	-	0,128	1571	2,12	-	5,65	-	-	-	-
0071 400V	-	-	-	-	0,173	1130	2,86	-	7,62	-	-	-	-

Q min: minimum water flow admitted to the heat exchanger
Q max: maximum water flow admitted to the heat exchanger
C.a. min: minimum water content admitted in the plant, using traditional control logic
C.A.S.: heat exchanger water content
- - -

10. MINIMUM AND MAXIMUM SYSTEM WATER CONTENT

Minimum system water content
The minimum water content for the system shown in table 1 allows the number of compressor starts and stops to be limited.

Tab. 1	Size		0031	0041	0061	0071
	Minimum water content	l	75	105	130	175

Maximum system water content
The heat pumps are fitted as standard with an expansion vessel and safety valve. The maximum system water content depends on the capacity of the expansion vessel (see **table 2**) and the calibration of the safety valve (see **table 3**).

Tab. 2	Size		0031	0041	0061	0071
	Expansion vessel	l	4	5	5	8

Tab. 3	Grandezza		0031	0041	0061	0071
	Safety valve	bar	6	6	6	6

Table 4 shows an example of the maximum water content in the specified normal operating conditions.
If the volume of water in the system is higher, an additional, correctly sized expansion vessel is required.
(Example only valid for 0041 and 0061 units with expansion vessel 5 litres. For other units the water content must be calculated).

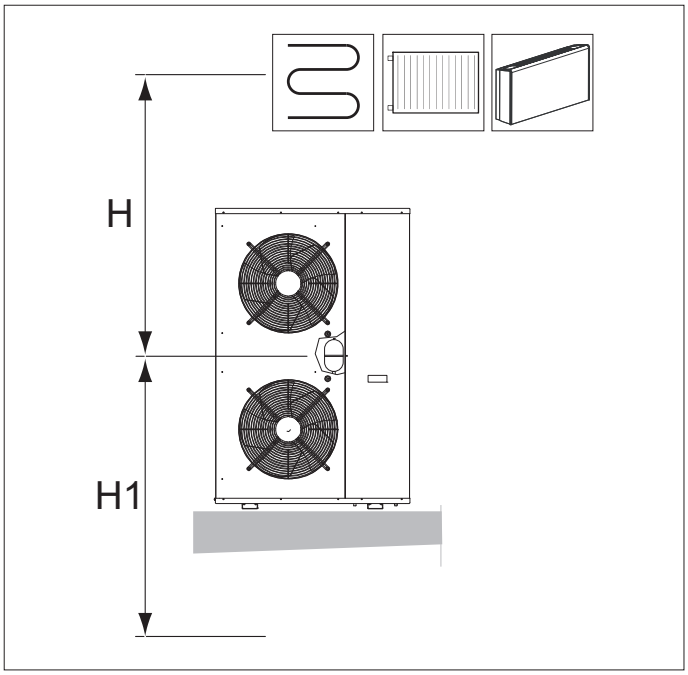
Tab. 4						
	System water temperature	**°C**	**35**			
	Hydraulic head	m	30	25	20	15
	Expansion vessel pre-charge	bar	3,2	2,8	2,3	1,8
	Maximum water content	l	340	400	460	520
	System water temperature	**°C**	**45**			
	Hydraulic head	m	30	25	20	15
	Expansion vessel pre-charge	bar	3,2	2,8	2,3	1,8
	Maximum water content	l	200	235	270	307
	System water temperature	**°C**	**55**			
	Hydraulic head	m	30	25	20	15
	Expansion vessel pre-charge	bar	3,2	2,8	2,3	1,8
	Maximum water content	l	135	160	185	210
	System water temperature	**°C**	**60**			
	Hydraulic head	m	30	25	20	15
	Expansion vessel pre-charge	bar	3,2	2,8	2,3	1,8
	Maximum water content	l	115	135	155	175

The data shown in the table refer to minimum water temperature of 4°C

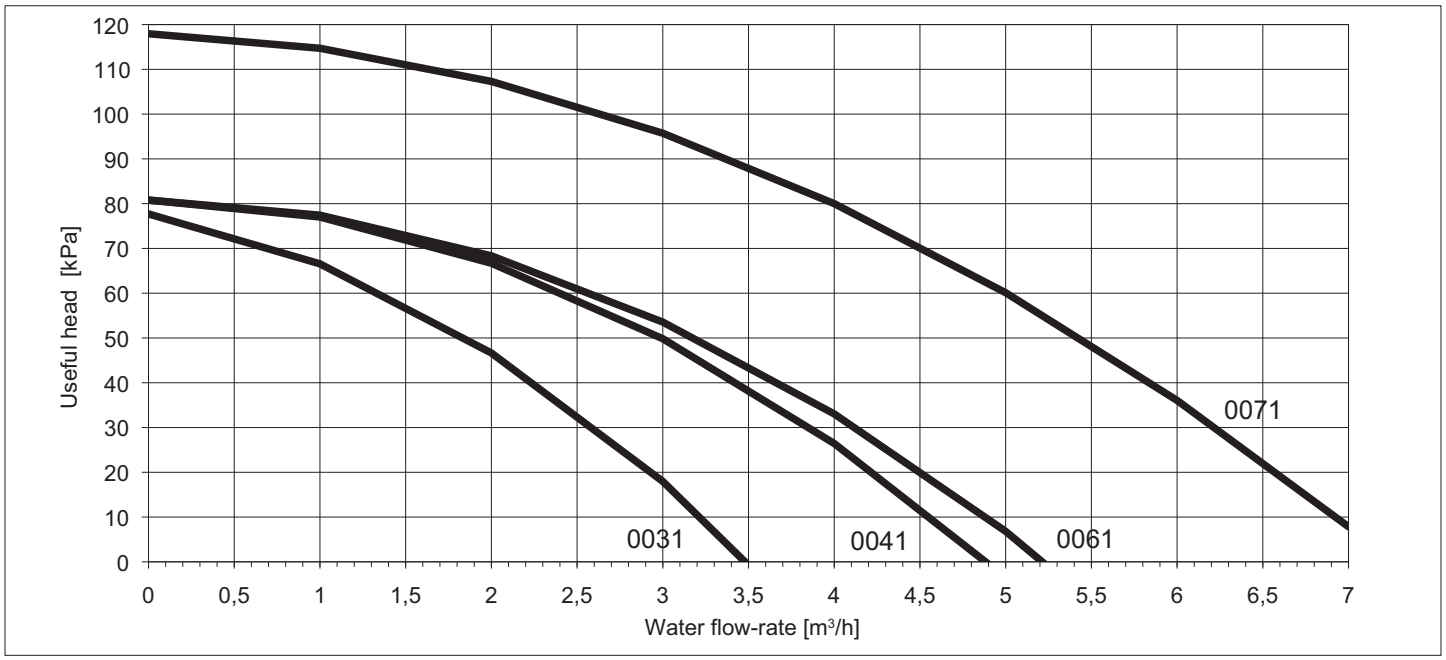
Expansion vessel calibration
The expansion vessels are pre-charged to a standard pressure of 1 bar.
The pre-charge pressure is chosen depending on the maximum difference in height between the system terminal and the heat pump, as shown in the figure.

The maximum height must not exceed 55 metres due to the maximum vessel pre-charge pressure of 6 bars.

Make sure that the system terminal at the lowest point H1 can withstand the pressure of the water column at that point.



11. SYSTEM PUMP CURVES



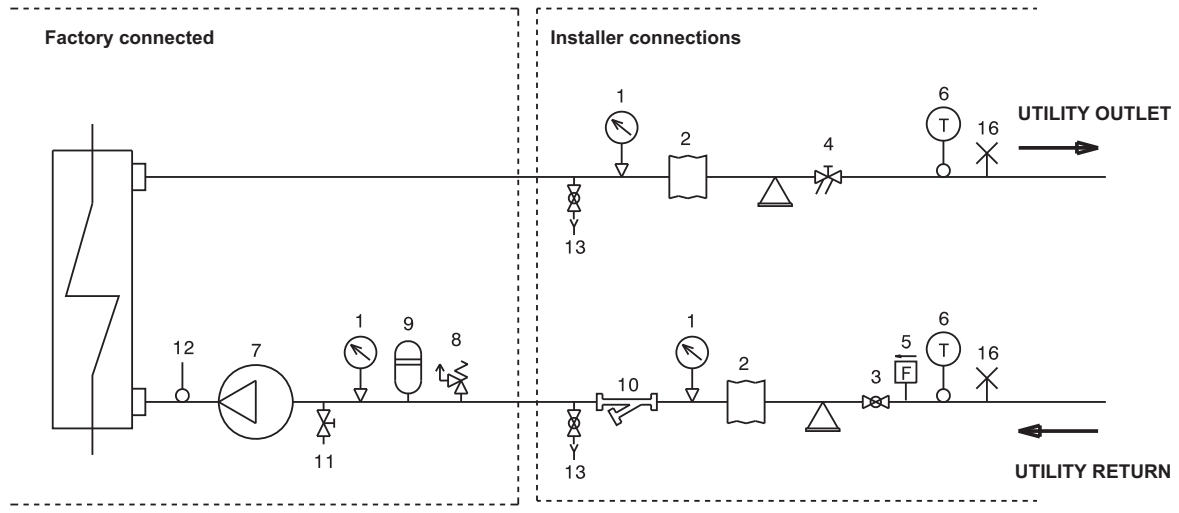
The pressure head refers to the values at the fittings.

Standard system pump

Model	Power supply	Pt (2)	Q (2)	H (2)	F.L.I.	Pump
		kW	m³/h	kPa	kW	
AW HT 0031 ms	230v-50Hz-1Ph	10,5	1,81	50,4	0,2	SXM 32 - 50
AW HT 0041 ms	230v-50Hz-1Ph	14,9	2,57	57,2	0,21	SXM 32 - 60
AW HT 0041 ts-t	230v-50Hz-1Ph	14,1	2,45	59,3	0,21	SXM 32 - 60
AW HT 0061 ts-t	230v-50Hz-1Ph	19,7	3,41	45,2	0,21	SXM 32 - 61
AW HT 0071 ts-t	230v-50Hz-1Ph	26,6	4,61	67,9	0,41	SXM 32 - 80

Values refer to rated conditions:
Pt (2) Heating capacity: System water temperature 30/35°C, outside temperature air 7°C b.s./ 6°C b.u.
Q (1) (2) system flow-rate
H (1) (2) available pressure head in system circuit
F.L.I Maximum pump power consumption

12. UTILITY WATER CIRCUIT CONNECTION DIAGRAM



1	Pressure gauge	5	Flow switch	9	Expansion vessel	13	Drain/chemical washing valve
2	Vibration damper joint	6	Thermometer	10	Mesh filter		
3	Shut-off valve	7	Pump	11	Unit fill/drain valve		
4	Calibrating valve	8	Safety valve	12	Temperature probe		

13. ELECTRICAL DATA AT MAXIMUM CONDITIONS ALLOWED (FULL LOAD)

AW HT	Power supply	Maximum values			Fuses (5x20T 250V)	
		F.L.I.	F.L.A.	L.R.A.	FU1	FU2
	(V-Ph-Hz)	(kW)	(A)	(A)	(A)	(A)
0031ms	230~50	4,42	23,0	44	6,3	6,3
0041ms	230~50	6,33	32,2	45	6,3	6,3
0041t	400-3N~50	5,98	12,2	64	6,3	6,3
0061t	400-3N~50	8,64	16,4	101	6,3	6,3
0071t	400-3N~50	12,60	22,5	99	6,3	6,3
0041ts	400-3N~50	5,98	12,2	35	6,3	6,3
0061ts	400-3N~50	8,64	16,4	56	6,3	6,3
0071ts	400-3N~50	12,60	22,5	54	6,3	6,3

F.L.I. Maximum power input
F.L.A. Maximum current input
L.R.A. Start-up current

Give the typical operating conditions of units designed for outdoor installation, which can be associated (according to reference document IEC 60721) to the following classes:
- climatic conditions class 4K4H: air temperature range from -20 up to 55°C (*), relative humidity range from 4 up to 100%, with possible precipitations, at air pressure from 70 and 106 kPa and a maximum solar radiation of 1120 W/m^2
- special climatic conditions negligible
- biological conditions class 4B1 and 4C2: locations in a generic urban area
- mechanically active substances class 4S2: locations in areas with sand or dust representative of urban areas
- mechanical conditions class 4M1: locations protected from significant vibrations or shocks

The required protection level for safe operation, according to reference document IEC 60529, is IP43XW (protection against access, to the most critical unit's parts, of external devices with diameter larger than 1 mm and rain).
The unit can be considered IP44XW protected, i.e. protected against access of external devices (with diameter larger than 1 mm) and water in general.
(*) for the unit's operating limits, see "selection limits" section

14. FULL LOAD SOUND LEVEL

SOUND POWER									
SIZE	Octave band [Hz]								Total sound level
	63	125	250	500	1000	2000	4000	8000	
	Sound power level dB(A)								
0031 230V	69	70	72	67	66	61	53	45	70
0041 230V	69	71	72	67	66	61	53	45	70
0041 400V	69	71	72	67	66	61	53	45	70
0061 400V	70	72	73	68	67	62	54	46	71
0071 400V	76	75	74	72	70	65	57	52	74

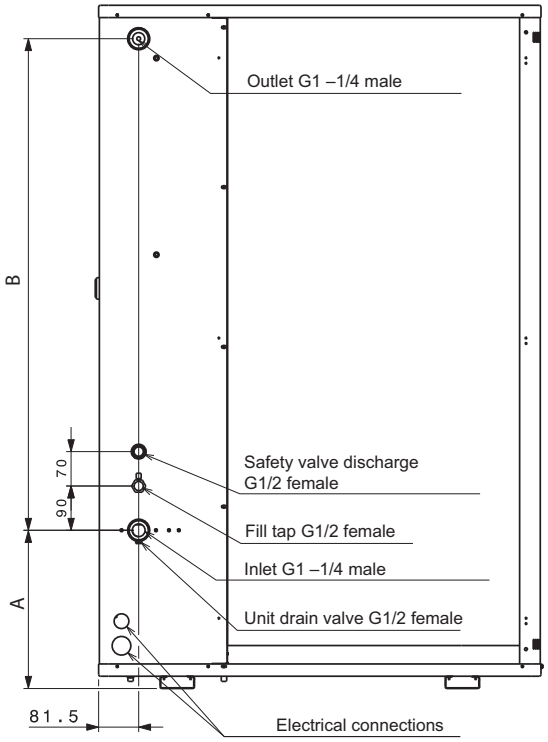
Working conditions
Ambient temperature 7 C°
Exchanger water (in/out) 40/45 °C
Exchanger water (in/out) 40/45 °C
Sound power on the basis of measurements made in compliance with ISO 9614 and Eurovent 8/1 for Eurovent certified units; in compliance with ISO 3744 for non-certified units
Such certification refers specifically to the sound Power Level in dB(A). This is therefore the only acoustic data to be considered as binding.

SOUND PRESSURE LEVEL									
SIZE	Octave band [Hz] at 1 m								Total sound level
	63	125	250	500	1000	2000	4000	8000	
	Sound pressure level dB(A)								
0031 230V	54	56	57	52	51	46	38	30	55
0041 230V	54	56	57	52	51	46	38	30	55
0041 400V	54	56	57	52	51	46	38	30	55
0061 400V	55	57	58	53	52	47	39	31	56
0071 400V	60	59	58	56	54	49	41	36	58

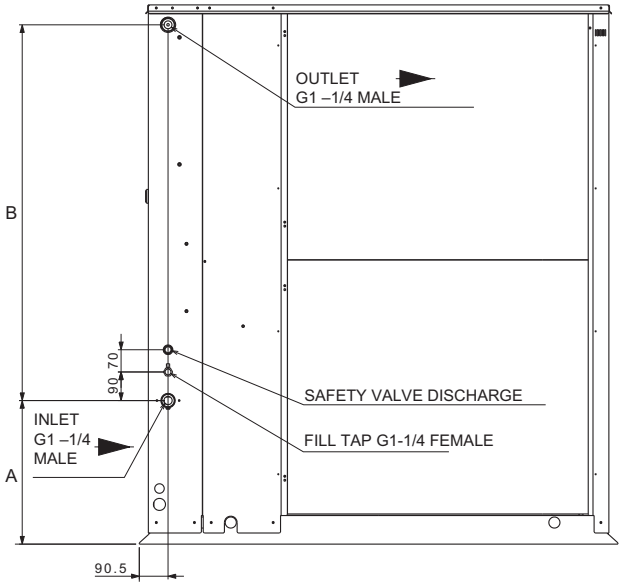
Working conditions
Ambient temperature 7 C°
Exchanger water (in/out) 40/45 °C
Exchanger water (in/out) 40/45 °C
Average sound pressure level, at 1 (m.) distance, unit in a free field on a reflective surface; non-binding value obtained from the sound power level.

15. POSITION OF THE WATER CONNECTIONS

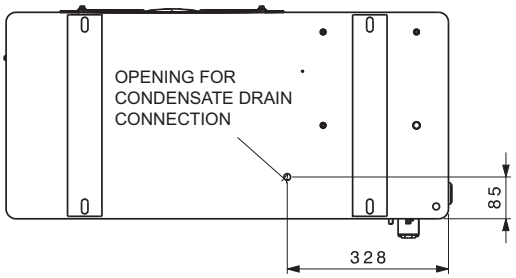
0031÷0061



0071

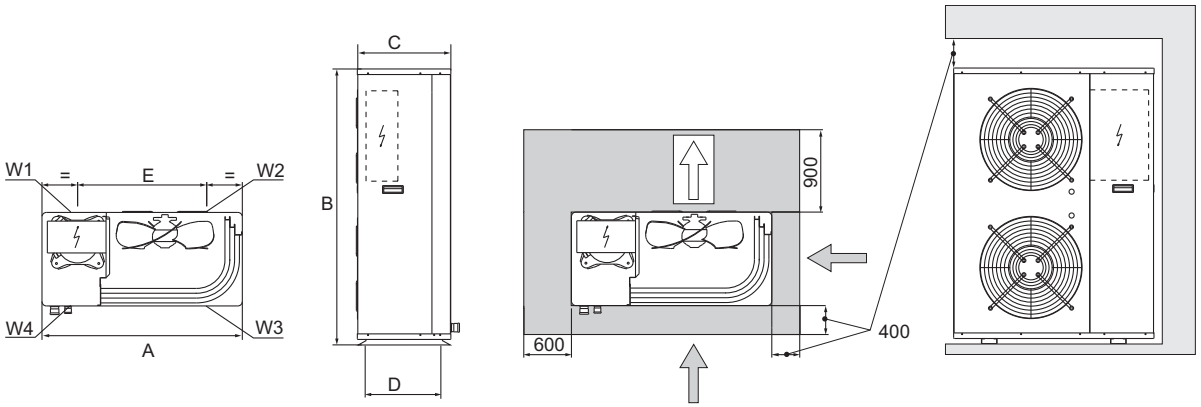


CONDENSATE DRAIN POSITION 0031÷0061



Dimensions		0031	0041	0061	0071
A	mm	210	322	322	452
B	mm	975	1000	1000	1183
Water connections M in/out	Ø	1"1/4	1"1/4	1"1/4	1"1/4

16. DIMENSIONAL DRAWINGS



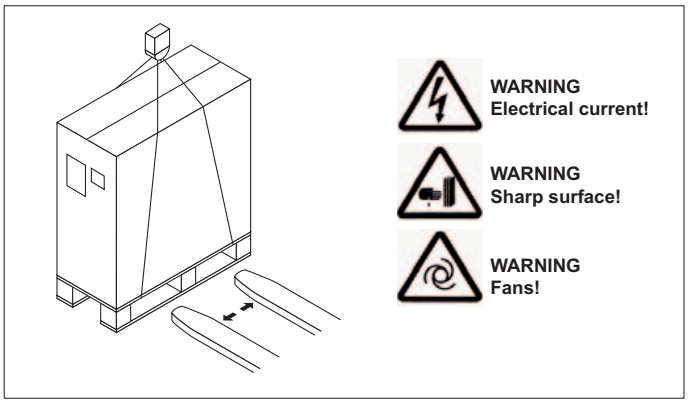
Dimensions		0031	0041	0061	0071
A	mm	900	900	900	1470
B	mm	1240	1240	1400	1700
C	mm	420	420	420	570
D	mm	370	370	370	497
E	mm	580	580	580	1477

Weight distribution		0031	0041	0061	0071
W1 rear R	kg	64	65	71	110
W2 rear L	kg	20	22	24	49
W3 front L	kg	18	21	22	46
W4 front R	kg	53	57	63	115
tot	kg	155	165	180	320

17. HOISTING - SYMBOLS - CLEARANCES AND POSITIONING

HOISTING INSTRUCTIONS

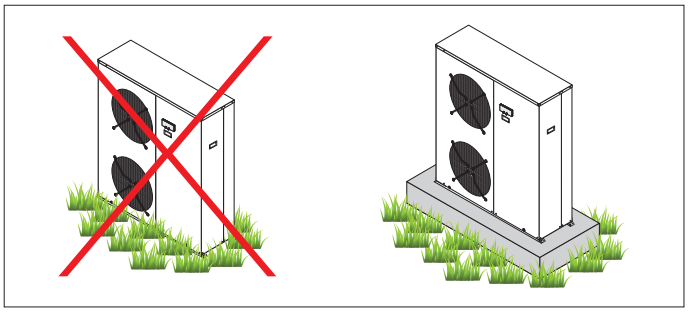
- Make sure all the panels are securely fastened before handling the unit.
- Before hoisting, check the weight of the unit on the CE rating label.
- Use all of the hoisting points indicated, and no others,
- Use equal length cables or slings.
- Use a spreader bar (not included)
- Handle the unit with care and without sudden or jerky movements.



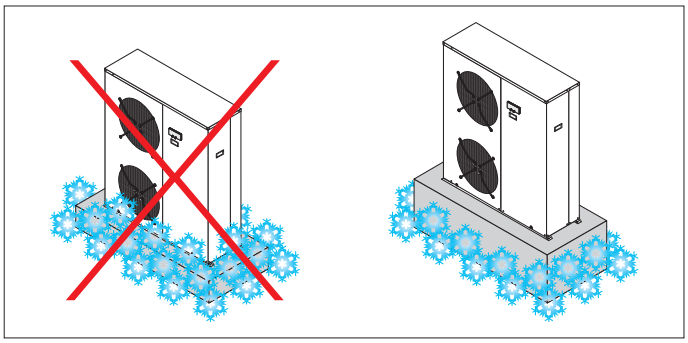
CLEARANCES AND POSITIONING

Install the outdoor unit so that the finned coil and fans remain clean.
Therefore, avoid installing the appliance near shrubs or bushes that may affect correct operation of the unit due to falling leaves.

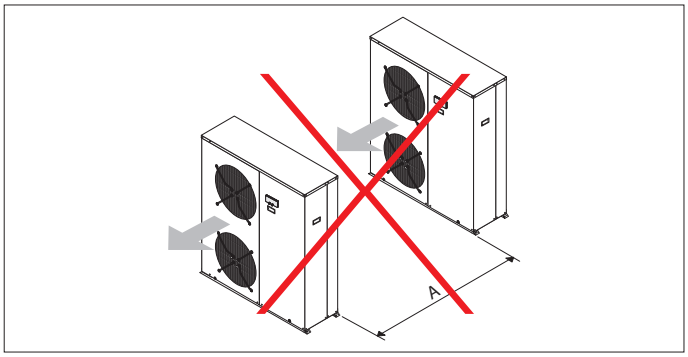
Install the unit on a base at least 15 cm high and in any case high enough to separate the unit from the ground and any element in the immediate vicinity that may affect operation of the fans, coil or condensate drain, causing the unit to malfunction.



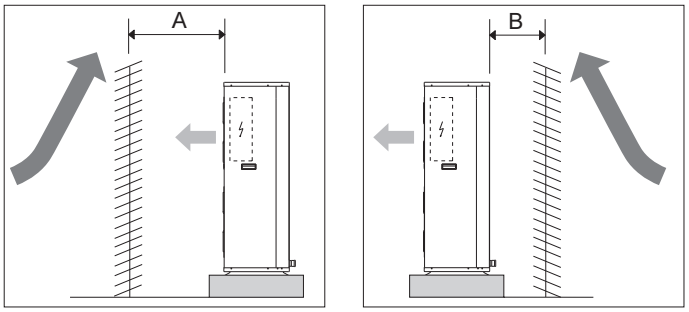
Determine the height of the base where the unit is installed considering the maximum height of snowfall during the winter period, which must not exceed the height of the base.



Two or more units must not be installed facing in the same direction, one in front of the other, or in any case in positions whereby the outlet of air from the fans on the rear unit can flow into the finned coil on the front unit.
If necessary, install barriers in accordance with the clearances defined previously.

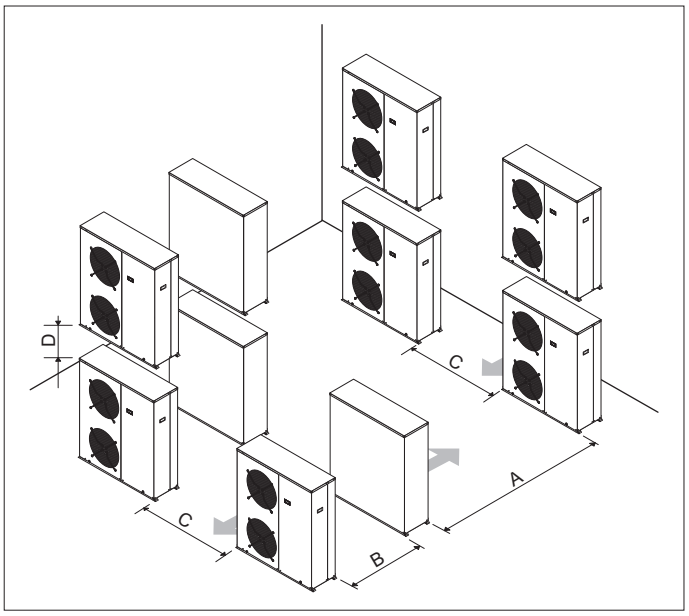


In caso di installazione in luoghi caratterizzati da venti di rilevante intensità, prevedere barriere frangivento da installare sul lato della macchina interessata dai venti predominanti garantendo le distanze di rispetto dell'unità sopra illustrate.



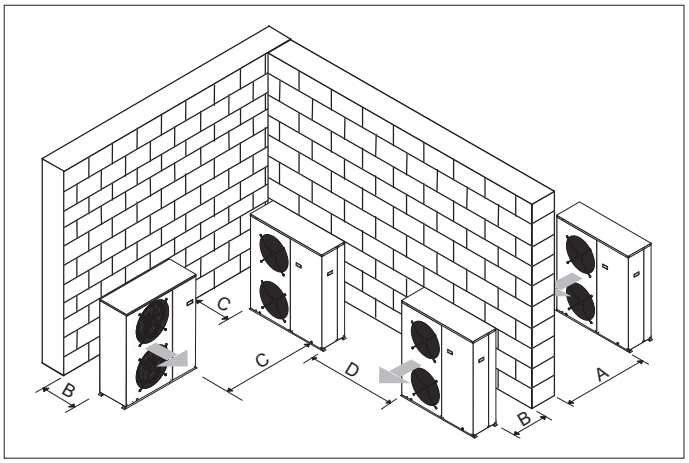
If installing a series of units, even on different levels, ensure the minimum clearance as illustrated in the figure on the side and in the following table.

Units on different levels (mm)			
A	**B**	**C**	**D**
1800	800	1000	400



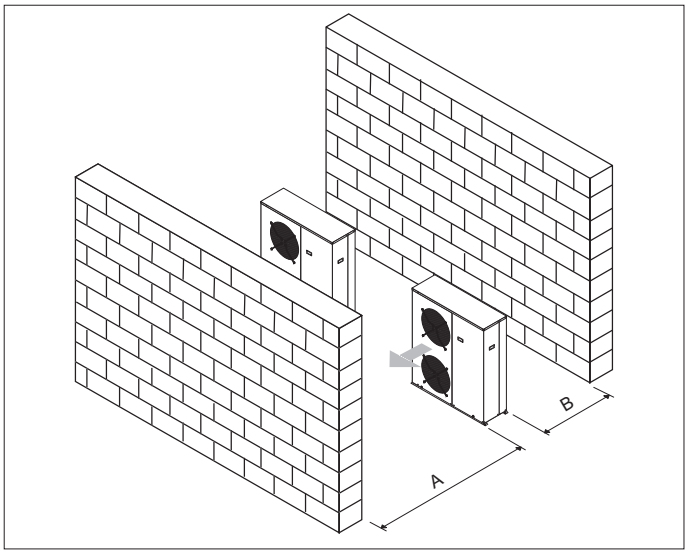
If installing one or more units near vertical walls, ensure the minimum clearance between the units and between unit and wall, as illustrated in the drawing on the side and in the following table.

Units in relation to walls (mm)			
A	**B**	**C**	**D**
900	800	1000	400



If installing units between two vertical walls, the clearance between individual units should be tripled to prevent the flow leaving the fans from interacting with the intake flow, causing continual malfunctioning.

Units between walls (mm)	
A	**B**
2700	1200



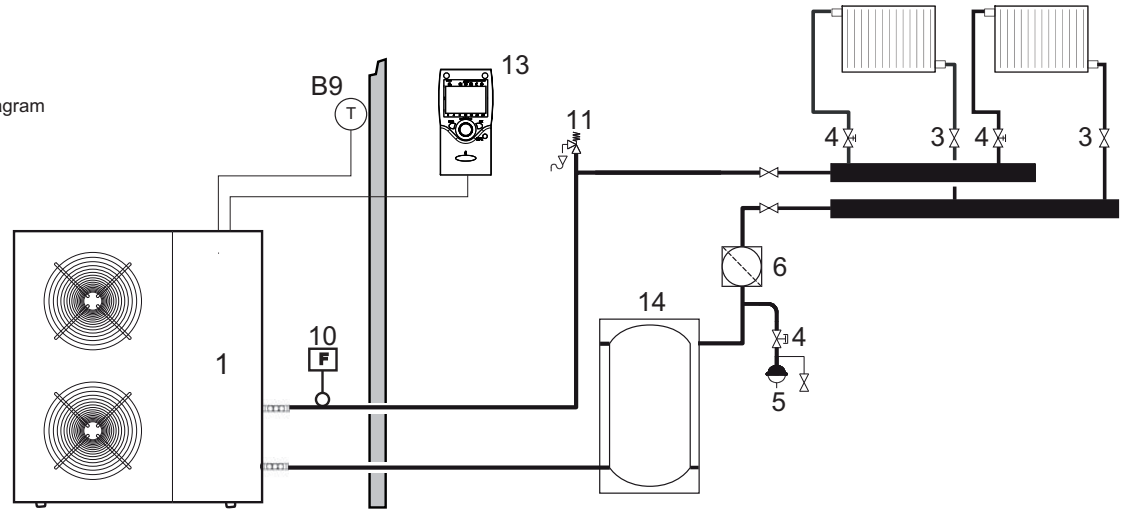
18. OPERATING DIAGRAMS

SYSTEM DIAGRAM WITH DIRECT HEATING

No changes are required to the parameters, simply connect the probes and the utilities as shown in the diagram for correct operation.

Heat pump connected directly to the heating circuit.The storage tank 14 is required to ensure the minimum water content required for correct heat pump operation. Check the minimum content required in the chap. “Water circuit data”.

Example water circuit diagram



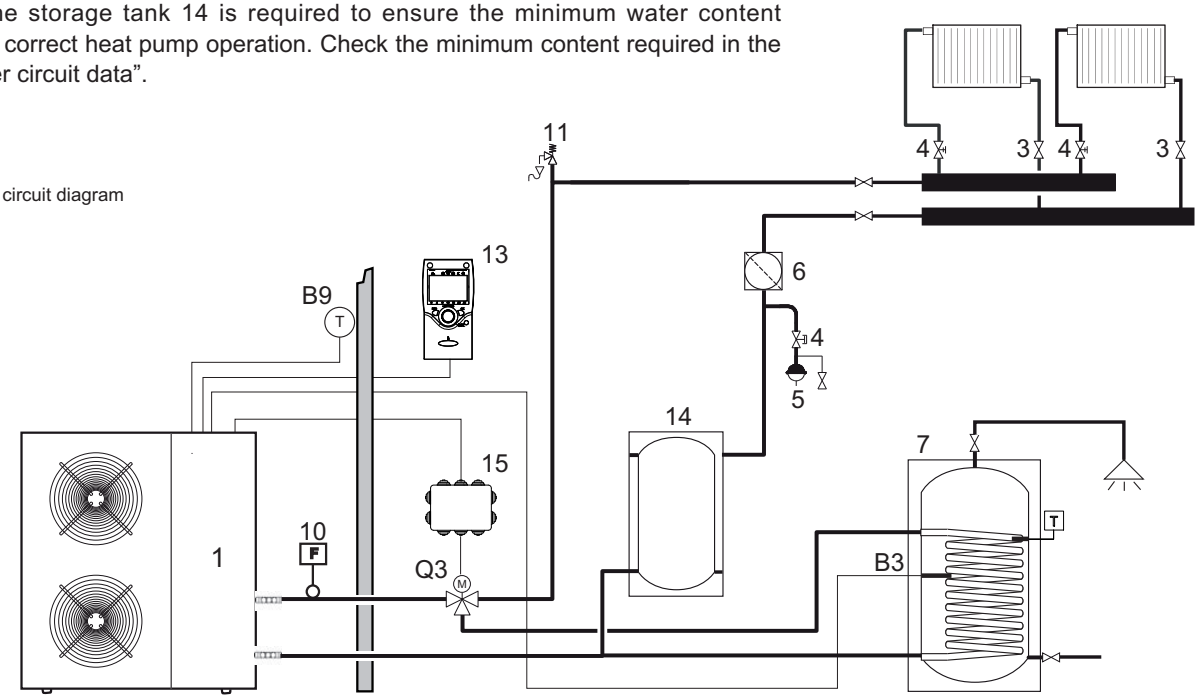
1	Heat pump AW HT	5	Expansion vessel	11	Safety valve	B9	Outside air temperature sensor
3	Control valve	6	Air separator	13	Room unit		
4	Shut off valve	10	Flow switch	14	Storage tank		

SYSTEM DIAGRAM WITH DIRECT HEATING AND DOMESTIC HOT WATER PRODUCTION

No changes are required to the parameters, simply connect the probes and the utilities as shown in the diagram for correct operation.

Heat pump connected directly to the heating circuit with domestic hot water production Q3. The storage tank 14 is required to ensure the minimum water content required for correct heat pump operation. Check the minimum content required in the chap. “Water circuit data”.

Example water circuit diagram

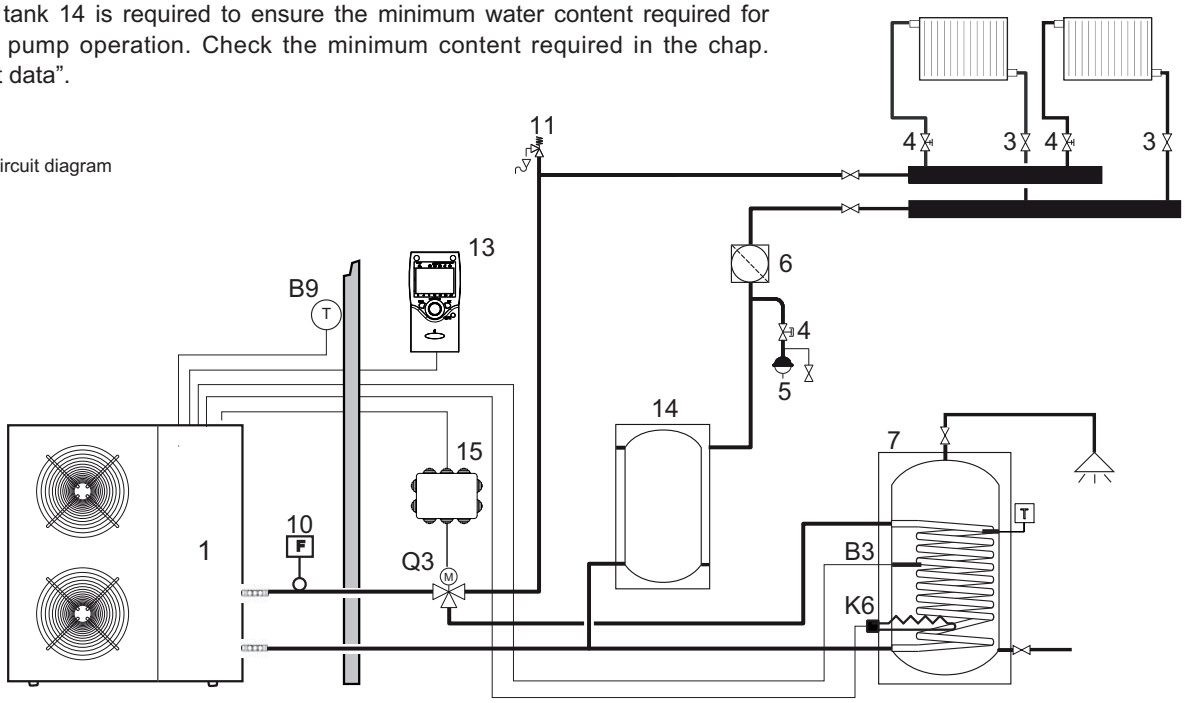


1	Heat pump AW HT	6	Air separator	13	Room unit	Q3	3-way valve for domestic hot water production
3	Control valve	7	DHW storage tank	14	Storage tank	B3	DHW storage temperature sensor
4	Shut off valve	10	Flow switch	15	Electrical panel for DHW 3-way valve	B9	Outside air temperature sensor
5	Expansion vessel	11	Safety valve				

SYSTEM DIAGRAM WITH DIRECT HEATING, DOMESTIC HOT WATER PRODUCTION AND ELECTRIC HEATER

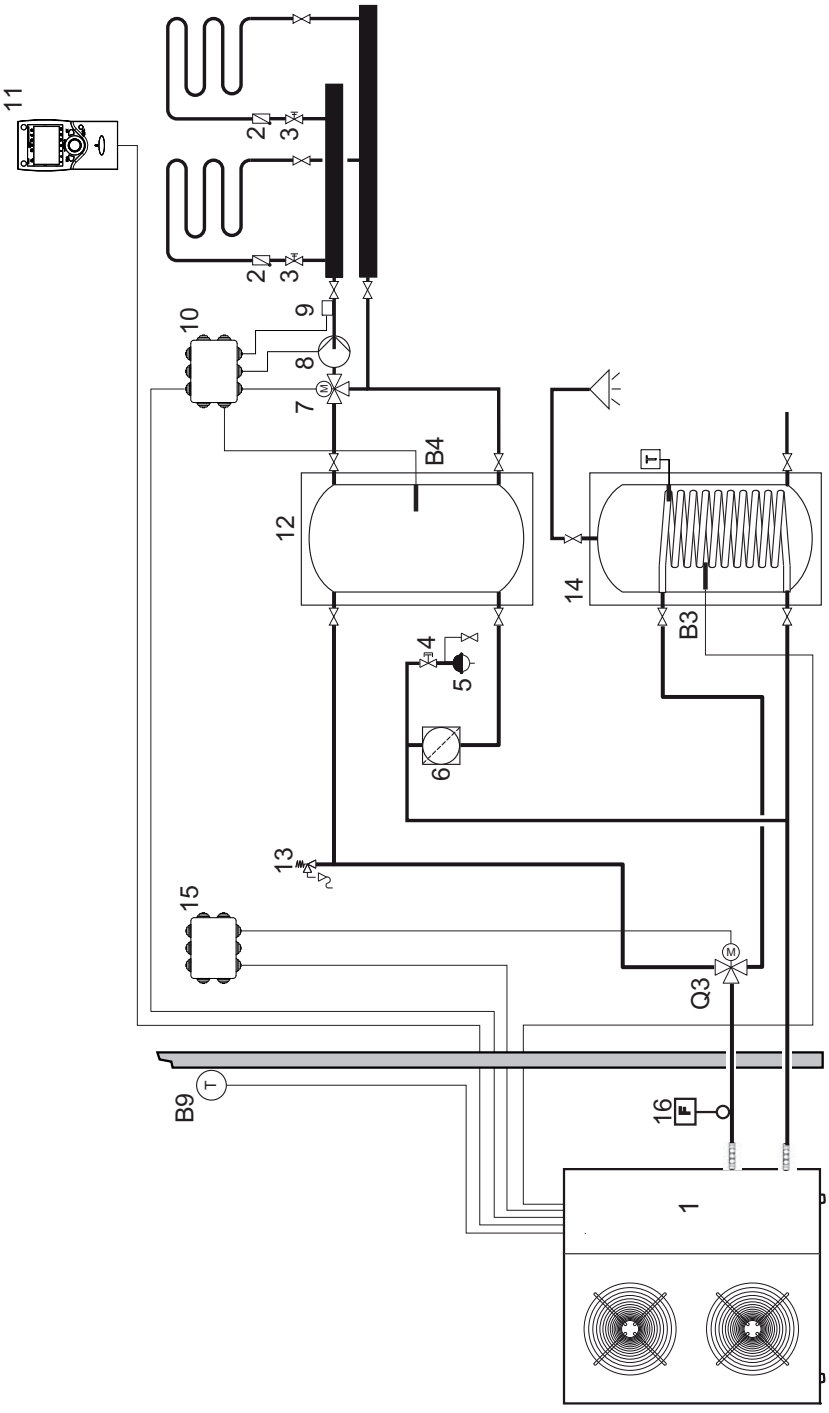
Heat pump connected directly to the heating circuit with domestic hot water production Q3 and auxiliary heating element DHW K6.
The storage tank 14 is required to ensure the minimum water content required for correct heat pump operation. Check the minimum content required in the chap. “Water circuit data”.

Example water circuit diagram



1 Heat pump AW HT
3 Control valve
4 Shut off valve
5 Expansion vessel
6 Air separator
7 DHW storage tank
10 Flow switch
11 Safety valve
13 Room unit
14 Storage tank
15 Electrical panel for DHW 3-way valve
Q3 3-way valve for domestic hot water production
B3 DHW storage temperature sensor
B9 Outside air temperature sensor
K6 DHW storage electric heater

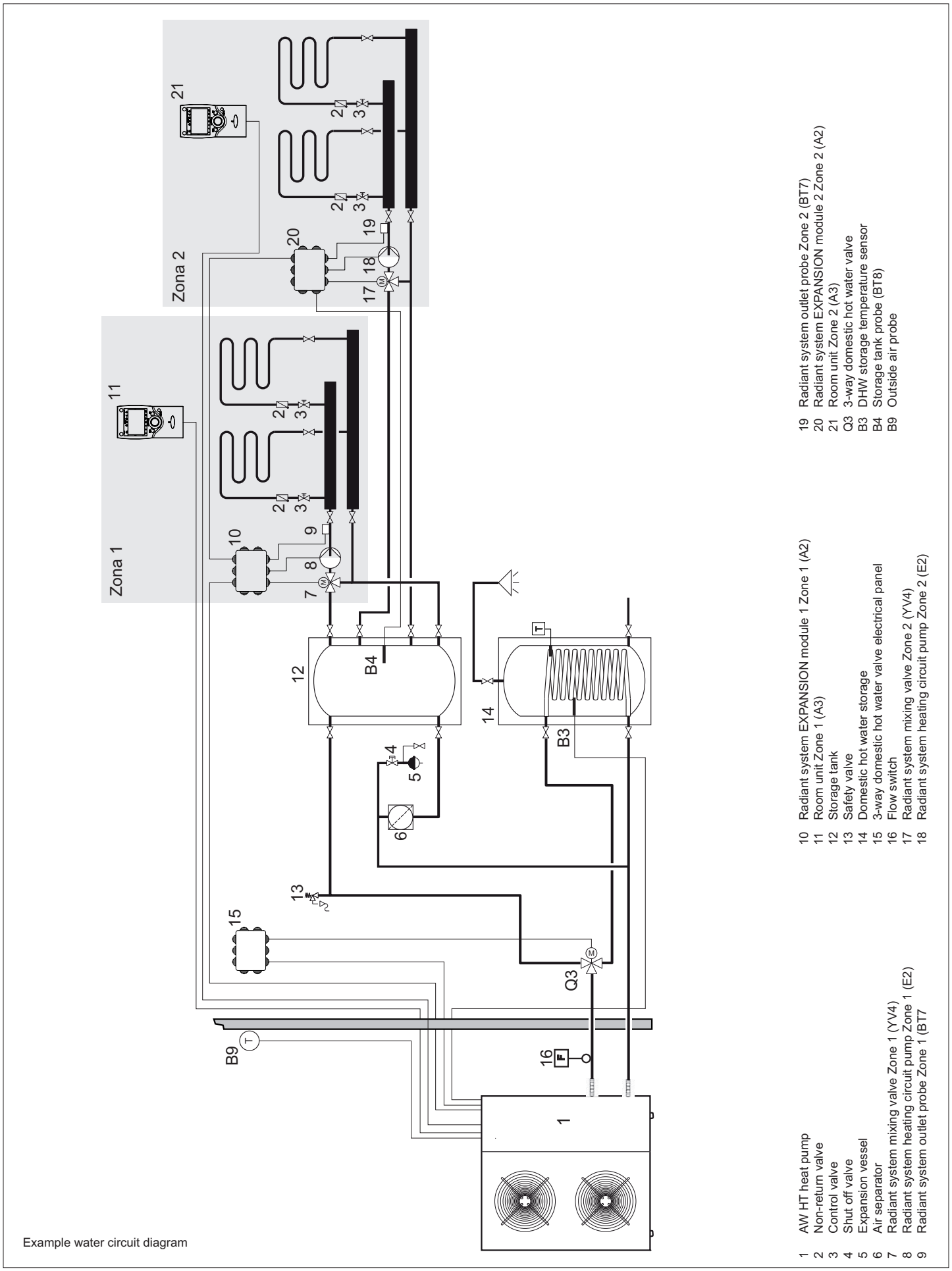
DIAGRAM FOR 1 RADIANT SYSTEM ZONE



1 AW HT heat pump
2 Non-return valve
3 Control valve
4 Shut off valve
5 Air separator
7 Radiant system mixing valve (YV4)
8 Radiant system heating circuit pump (E2)
9 Radiant system outlet probe (BT7)
10 Radiant system zone expansion module (A2)
11 Room unit (A3)
12 Storage tank
13 Safety valve
14 Domestic hot water storage
15 3-way domestic hot water valve electrical panel
16 Flow switch
Q3 3-way domestic hot water valve
B3 DHW storage temperature sensor
B4 Storage tank probe (BT8)
B9 Outside air probe

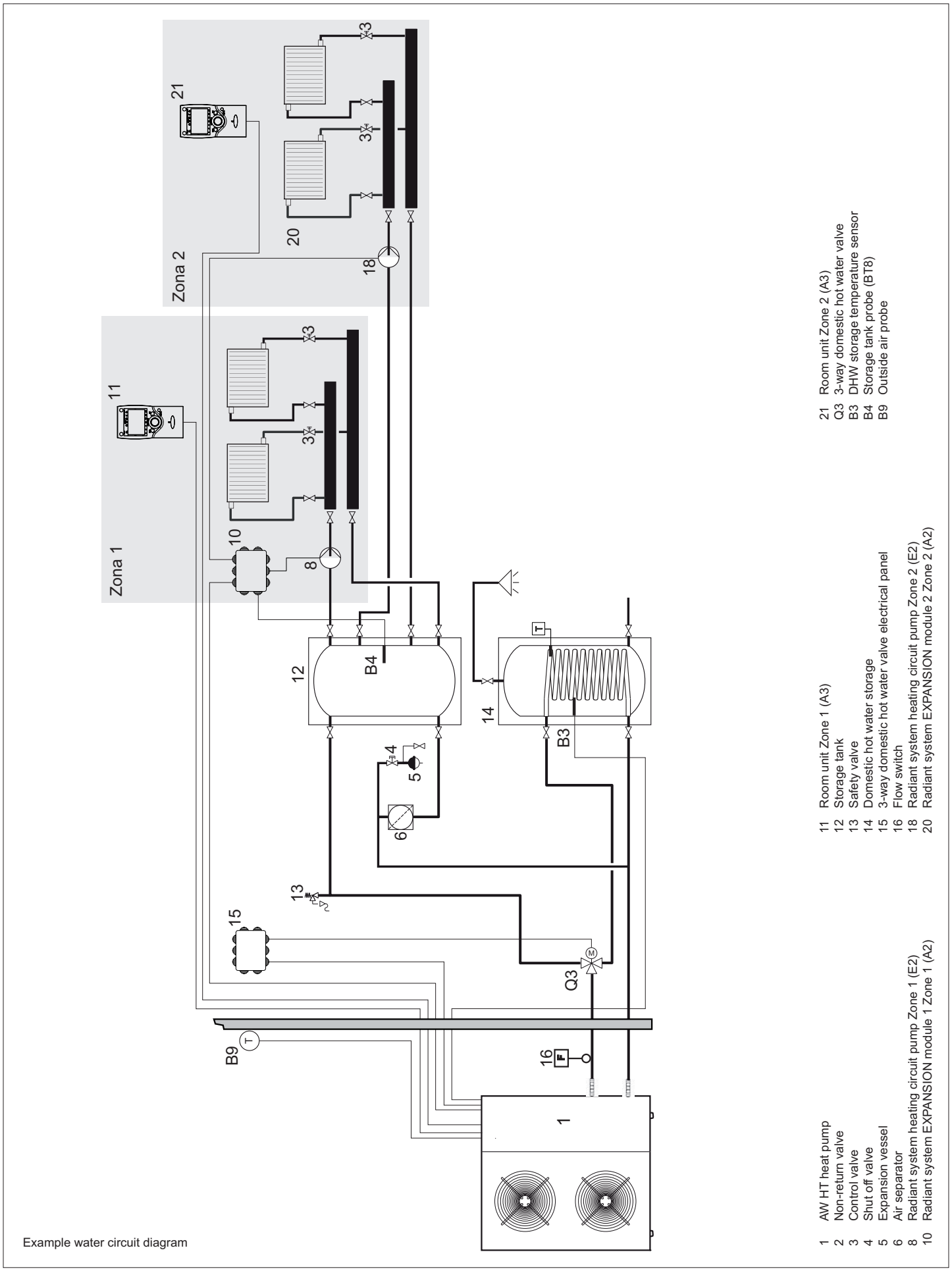
Example water circuit diagram

DIAGRAM FOR 2 RADIANT SYSTEM ZONES



Example water circuit diagram

DIAGRAM FOR 2 ZONES WITH RADIATOR SYSTEM



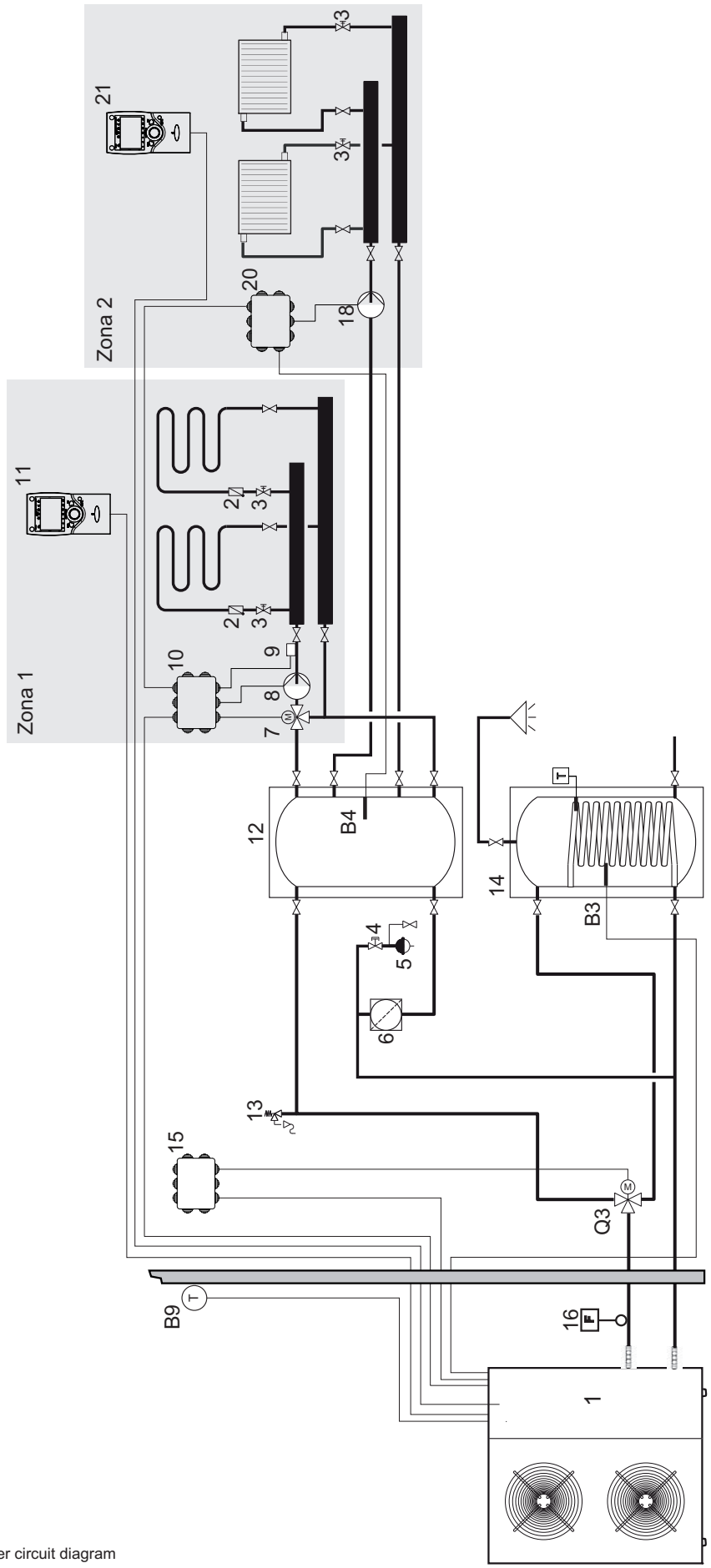
Example water circuit diagram

1 AW HT heat pump
2 Non-return valve
3 Control valve
4 Shut off valve
5 Expansion vessel
6 Air separator
8 Radiant system heating circuit pump Zone 1 (E2)
10 Radiant system EXPANSION module 1 Zone 1 (A2)

11 Room unit Zone 1 (A3)
12 Storage tank
13 Safety valve
14 Domestic hot water storage
15 3-way domestic hot water valve electrical panel
16 Flow switch
18 Radiant system heating circuit pump Zone 2 (E2)
20 Radiant system EXPANSION module 2 Zone 2 (A2)

21 Room unit Zone 2 (A3)
Q3 3-way domestic hot water valve
B3 DHW storage temperature sensor
B4 Storage tank probe (BT8)
B9 Outside air probe

DIAGRAM FOR 1 RADIATOR SYSTEM ZONE AND 1 RADIANT SYSTEM ZONE



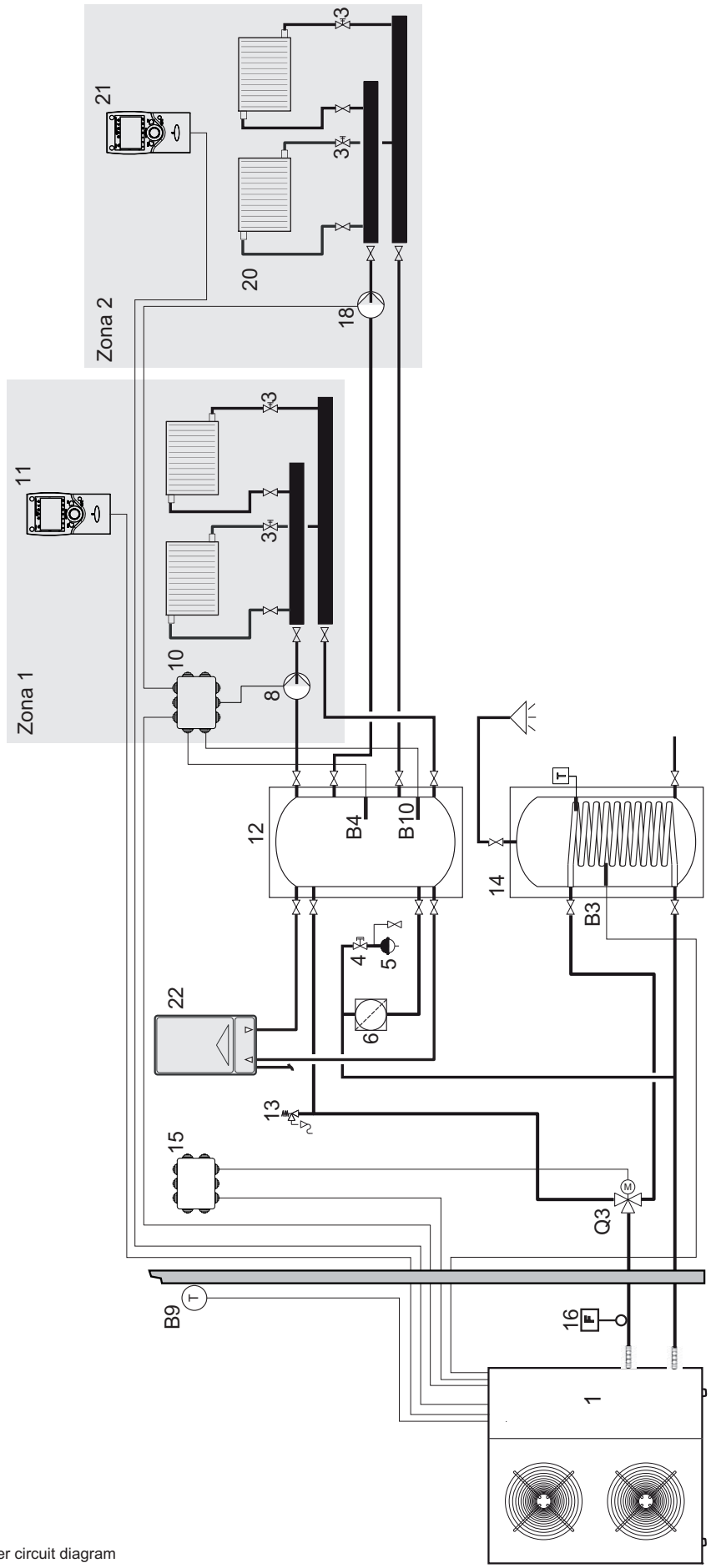
Example water circuit diagram

1 AW HT heat pump
2 Non-return valve
3 Control valve
4 Shut off valve
5 Expansion vessel
6 Air separator
8 Radiator system heating circuit pump Zone 1 (E2)
9 Radiant system outlet probe Zone 1 (BT7

10 Radiator system EXPANSION module 1 Zone 1 (A2)
11 Room unit Zone 1 (A3)
12 Storage tank
13 Safety valve
14 Domestic hot water storage
15 3-way domestic hot water valve electrical panel
16 Flow switch
18 Radiator system heating circuit pump Zone 2 (E2)

20 Radiator system EXPANSION module 2 Zone 2 (A2)
21 Room unit Zone 2 (A3)
Q3 3-way domestic hot water valve
B3 DHW storage temperature sensor
B4 Storage tank probe (BT8)
B9 Outside air probe

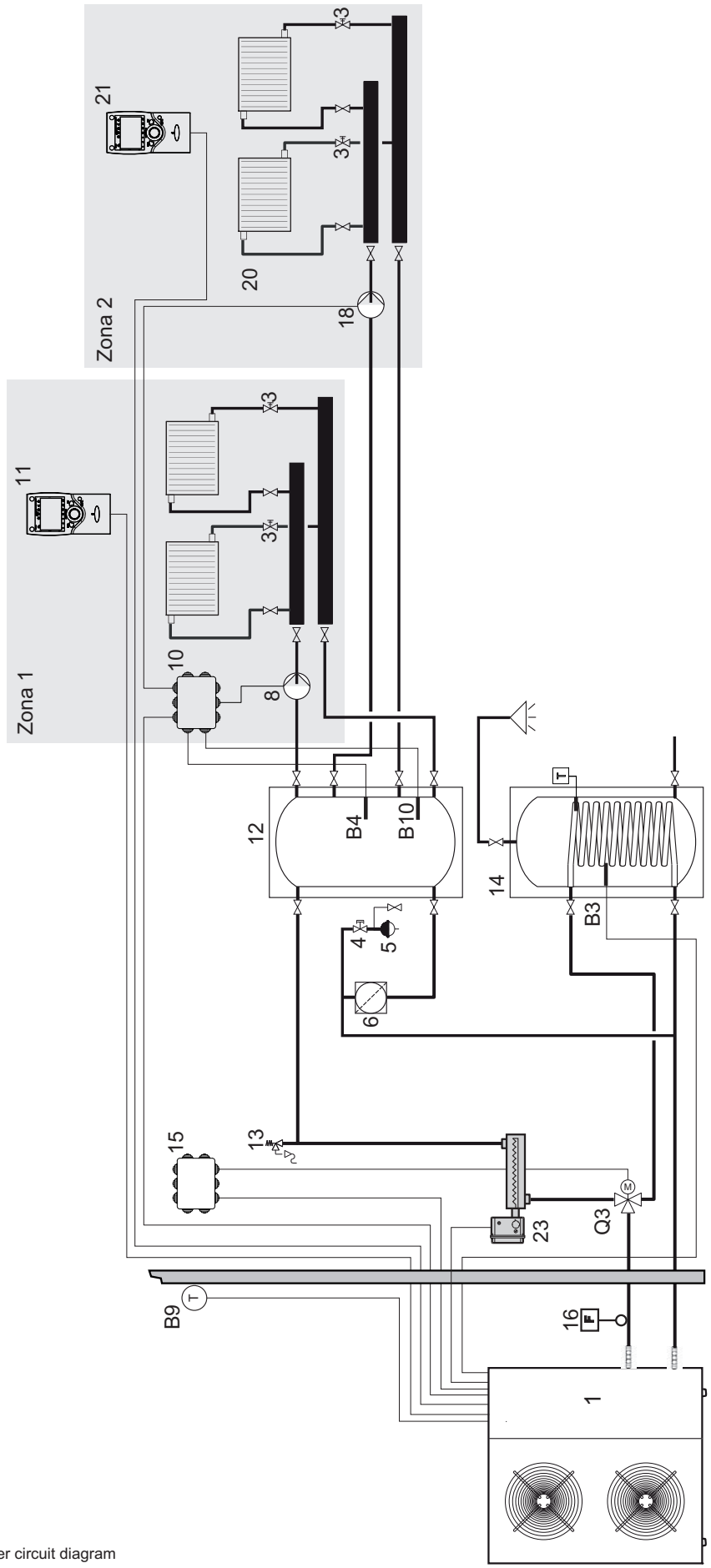
DIAGRAM FOR 2 RADIATOR SYSTEM ZONE WITH GAS BOILER IN ADDITION OR SUBSTITUTION



Example water circuit diagram

1 AW HT heat pump
2 Non-return valve
3 Control valve
4 Shut off valve
5 Expansion vessel
6 Air separator
7 Radiant system mixing valve Zone 1 (YV4)
8 Radiator system heating circuit pump Zone 1 (E2)
9 Radiant system outlet probe Zone 1 (BT7)
10 Radiator system EXPANSION module 1 Zone 1 (A2)
11 Room unit Zone 1 (A3)
12 Storage tank
13 Safety valve
14 Domestic hot water storage
15 3-way domestic hot water valve electrical panel
16 Flow switch
18 Radiator system heating circuit pump Zone 2 (E2)
20 Radiator system EXPANSION module 2 Zone 2 (A2)
21 Room unit Zone 2 (A3)
22 Boiler
Q3 3-way domestic hot water valve
B3 DHW storage temperature sensor
B4 Storage tank probe (BT8)
B9 Outside air probe
B10 Storage tank probe for auxiliary source management

DIAGRAM FOR 2 RADIATOR SYSTEM ZONE WITH ELECTRICAL HEATER ON FLOW IN ADDITION OR SUBSTITUTION



Example water circuit diagram

1 AW HT heat pump
2 Non-return valve
3 Control valve
4 Shut off valve
5 Expansion vessel
6 Air separator
7 Radiant system mixing valve Zone 1 (YV4)
8 Radiator system heating circuit pump Zone 1 (E2)
9 Radiant system outlet probe Zone 1 (BT7)
10 Radiator system EXPANSION module 1 Zone 1 (A2)
11 Room unit Zone 1 (A3)
12 Storage tank
13 Safety valve
14 Domestic hot water storage
15 3-way domestic hot water valve electrical panel
16 Flow switch
18 Radiator system heating circuit pump Zone 2 (E2)
20 Radiator system EXPANSION module 2 Zone 2 (A2)
21 Room unit Zone 2 (A3)
23 Outlet electric heater
Q3 3-way domestic hot water valve
B3 DHW storage temperature sensor
B4 Storage tank probe (BT8)
B9 Outside air probe
B10 Storage tank probe for auxiliary source management

Climaveneta S.p.A.
Via Sarson 57/c
36061 Bassano del Grappa (VI)
Italy
Tel +39 0424 509500
Fax +39 0424 509509
info@climaveneta.com
www.climaveneta.com

Climaveneta France
3, Village d'Entreprises
ZA de la Couronne des Prés
Avenue de la Mauldre
78680 Epone
France
Tel +33 (0)1 30 95 19 19
Fax +33 (0)1 30 95 18 18
info@climaveneta.fr
www.climaveneta.fr

Climaveneta Deutschland
Rhenus Platz, 2
59439 Holzwickede
Germany
Tel +49 2301 91222-0
Fax +49 2301 91222-99
info@climaveneta.de
www.climaveneta.de

Climaveneta
Espana - Top Clima
Londres 67, 1° 4°
08036 Barcelona
Spain
Tel +34 963 195 600
Fax +34 963 615 167
topclima@topclima.com
www.climaveneta.com

Climaveneta Chat Union
Refrig. Equipment Co Ltd
88 Bai Yun Rd, Pudong Xinghuo
New dev. zone 201419 Shanghai
China
Tel 008 621 575 055 66
Fax 008 621 575 057 97

Climaveneta Polska Sp. z o.o.
Ul. Sienkiewicza 13A
05-120 Legionowo
Poland
Tel +48 22 766 34 55-57
Fax +48 22 784 39 09
info@climaveneta.pl
www.climaveneta.pl

Climaveneta India
Climate Technologies (P) LTD
#3487, 14th Main, HAL 2nd stage
Indiranagar, Bangalore 560008
India
Tel +91-80-42466900 - 949
Fax +91-80-25203540
sales@climaveneta.in

Climaveneta UK LTD
Highlands Road,
Shirley Solihull
West Midlands B90 4NL
Tel: +44 (0)871 663 0664
Fax: +44 (0)871 663 1664
Freephone: 0800 801 819
response@climaveneta.co.uk
www.climaveneta.co.uk