



# WiSAN-YSE1

10.1 - 55.2

**Manual for installation,  
use and maintenance**



16127160006834-H 03-2026

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Dear Customer,

We congratulate you on choosing these product

Clivet has been working for years to offer systems able to assure the maximum comfort for a long time with highly-reliable, efficient, high-quality and safe solutions.

The target of the company is to offer advanced systems, that assure the best comfort and reduce energy consumption as well as the installation and maintenance costs for the entire life-cycle of the system.

With this manual, we want to give you information that are useful for all phases: from reception, installation and use to disposal - so that such an advanced system can provide the best performances during installation and use.

Best regards and have a good read.

CLIVET Spa

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# 1. Safety considerations

## 1.1 Safety

Operate in compliance with safety regulations in force.

To carry out the operations use protection devices:

gloves, goggles, hard hat, ear protection, protective knee pads.

All operations must be carried out by personnel trained on possible risks of a general nature, electrical and deriving from operating with equipment under pressure.

Only qualified personnel can operate on the unit, as required by the regulation in force.

## 1.2 Manual

The manual provides correct unit installation, use and maintenance.

It is advisable to read it carefully so you will save time during operations.

Follow the written indications so you will not cause damages to things and injuries people.

The manual must be delivered to the User.

## 1.3 Risk situations

The unit has been designed and created to prevent injuries to people.

During designing it is not possible to plane and operate on all risk situation.

Read carefully "Residual risk" section where all situation which may cause damages to things and injuries to people are reported.

Installation, starting, maintenance and repair required specific knowledge; if they are carried out by inexperienced personnel, they may cause damages to things and injuries people.

## 1.4 Intended use

Use the unit only:

- for cooling/heating water or a water and glycol mix
- keep to the limits foreseen in the technical schedule and in this manual

The manufacturer accepts no responsibility if the equipment is used for any purpose other than the intended use.

## 1.5 Installation

### ► Outdoor installation

The positioning, hydraulic system, refrigerating, electrics and the ducting of the air must be determined by the system designer in accordance with local regulations in force.

Comply with local safety regulations in all operations.

Verify that the electrical line characteristics are in compliance with data quotes on the unit serial number

label.

## 1.6 Maintenance

Plan periodic inspection and maintenance in order to avoid or reduce repairing costs.

Turn the unit off before any operation.

## 1.7 Modification

All unit modifications will end the warranty coverage and the manufacturer responsibility.

## 1.8 Breakdown/Malfuction

Disable the unit immediately in case of breakdown or malfunction.

Contact a certified service agent.

## 1.9 User training

The installer has to train the user on:

- Start-up/shutdown
- Set points change
- Standby mode
- Maintenance
- What to do / what not to do in case of breakdown

## 1.10 Data update

Continuous product improvements may imply manual data changes.

Visit manufacturer web site for updated data.

## 1.11 Original instructions

The original instructions are written in Italian.

All other languages are translations of the original instructions.

## 2. Indications for the User

Keep this manual with the wiring diagram in an accessible place for the operator.

Note the unit data label so you can provide them to the assistance centre in case of intervention (see “Unit identification” section).

Provide a unit notebook that allows any interventions carried out on the unit to be noted and tracked making it easier to suitably note the various interventions and aids the search for any breakdowns.

### 2.1 Breakdown/Malfuction

Disable the unit immediately in case of breakdown or malfunction.

Contact a certified service agent.

Use original spares parts only.

Using the unit in case of breakdown or malfunction:

- voids the warranty
- it may compromise the safety of the unit
- may increase time and repair costs

### 2.2 The installer must train the user, particularly on:

- Start-up/shutdown
- Set points change
- Standby mode
- Maintenance
- What to do / what not to do in case of breakdown

### 2.3 Unit identification

The serial number label is positioned on the unit and allows to identify all the unit features.

The type plate shows the indications foreseen by the standards, in particular:

- unit type
- serial number (12 characters)
- year of manufacture
- wiring diagram number
- electrical data
- type of refrigerant
- refrigerant charge
- manufacturer logo and address

The matriculation plate must never be removed.

### 2.4 Serial number

It identifies uniquely each unit.

It must be cited when ordering spare parts.

### 2.5 Assistance request

Note data from the serial number label and write them in the chart on side, so you will find them easily when needed.

<b>Range</b>
<b>Size</b>
<b>Serial number</b>
<b>Year of production</b>
<b>Wiring diagram number</b>

### 3. Information on refrigerant gas

#### WARNING

- ▶ This product contains fluorinated greenhouse gases covered by the Kyoto protocol.
- ▶ Do not discharge gas into air.

#### Refrigerant characteristics

Type of refrigerant	R32
Safety class (ISO 817)	A2L
GWP	675

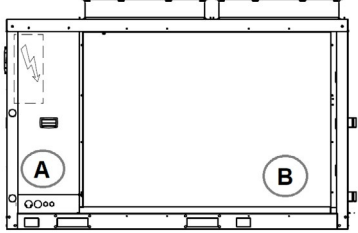
Quantity of refrigerant charged at the factory and tons of equivalent CO<sup>2</sup>:

Size	Refrigerant (Kg)	Ton CO2 eq.
10.1-14.1	7,9	5,53
16.2-22.2	14	9,45
30.2-40.2	17,5	11,80
43.2-45.2 EXC	26,5	17.89
45.2-55.2PRM	17,5	11.80

#### NOTE

- ▶ The refrigerant quantity is indicated on the unit plate

## 4. Accessories supplied

T5	DHW tank temperature probe	1	A	
Taf1	DHW tank antifreeze probe	1	A	
TW	Outlet water probe (pre-installed on the unit's supply pipe)	1	B	
	Probe well	1	A	
	Transformer for keypad power supply	1	A	
	Victaulic hydraulic pipe connection joints	2	B	

## 5. Before installation

### 5.1 Reception

You have to check before accepting the delivery:

- That the unit hasn't been damaged during transport
- That the materials delivered correspond with that indicated on the transport document comparing the data with the identification label positioned on the packaging.

In case of damage or anomaly:

- Write down on the transport document the damage you found and quote this sentence: "Conditional acceptance clear evidence of deficiencies/damages during transport"
- Contact by fax and registered mail with advice of receipt to supplier and the carrier.

#### WARNING

- ▶ **Any disputes must be made within 8 days from the date of the delivery. Complaints after this period are invalid.**

### 5.2 Storage

Observe external packaging instructions.

In particular:

Size		30/60/130 kW = 34 bar	90 kW = 30 bar
minimum ambient temperature	(A)	-20°C	-20°C
maximum ambient temperature	(B)	55 °C	49 °C
maximum relative humidity	(C)	95%	95%

Failure to comply with the above conditions can lead to:

- possible components damages
- possible safety valve opening
- possible damages to electrical components

#### WARNING

- ▶ **The unit may not be tilted more than 15° during transport.**

### 5.3 Packaging removing

Be careful not to damage the unit.

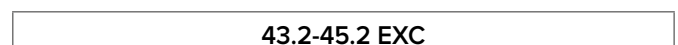
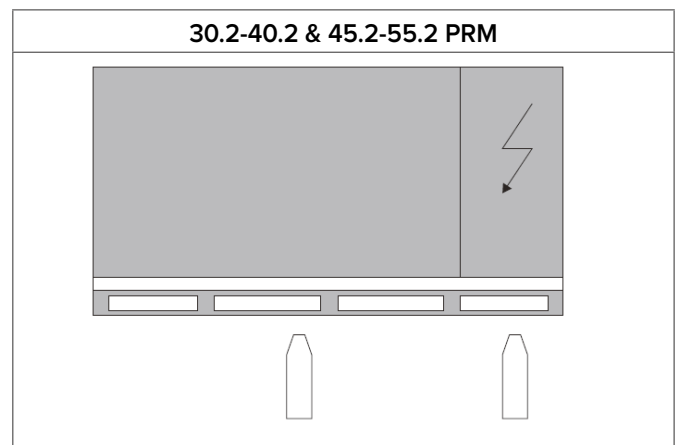
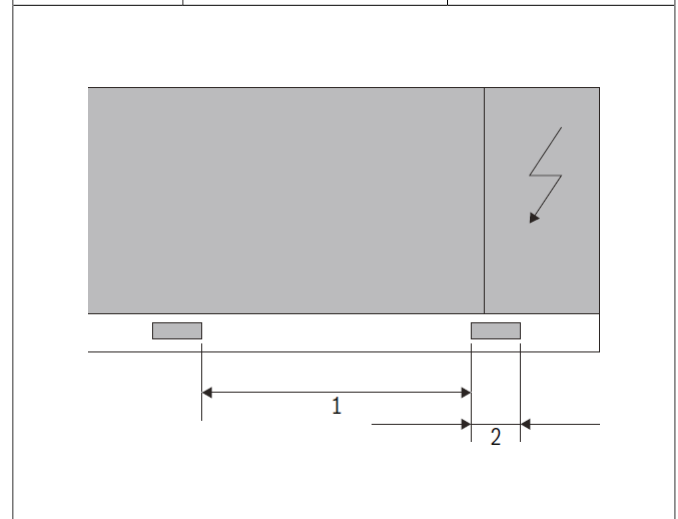
Recycle and dispose of the packaging material in conformity with local regulations.

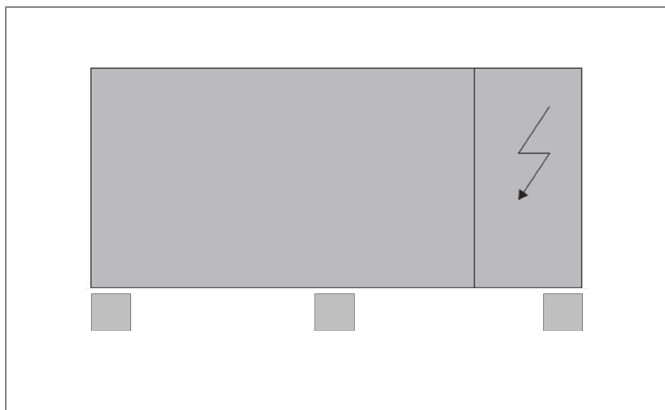
### 5.4 Handling

#### ATTENTION

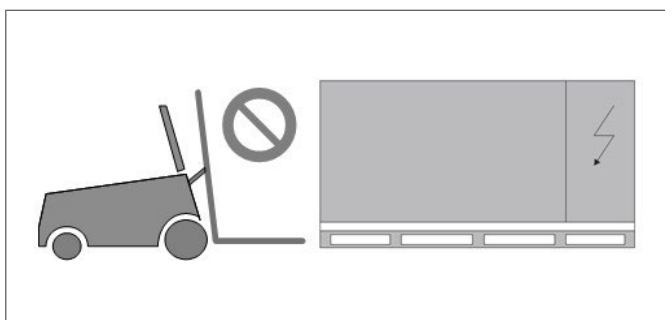
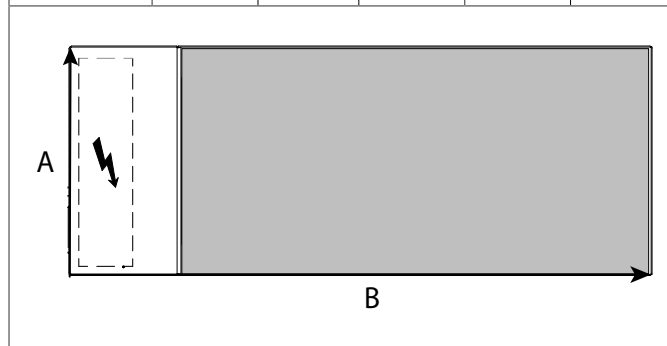
- ▶ **Check that all handling equipment complies with local safety regulations (cran, forklifts, ropes, hooks, etc.).**
- ▶ **Provide personnel with personal protective equipment appropriate for the situation, such as hard hat, gloves, safety shoes, etc.**
- ▶ **Observe all safety procedures in order to guarantee the safety of the personnel present and the of material.**
- ▶ **Check the unit weight and lifting equipment capacity. Refer to the TECHNICAL DATA chapter.**

Size	10.1-14.1	16.2-22.2
1	630	640
2	200	200



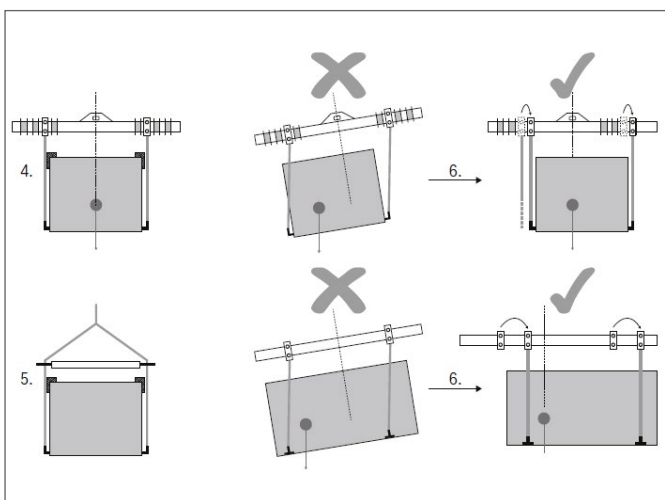


Barycentre					
Size	10.1-14.1	16.2-22.2	30.2-40.2	43.2-45.2 EXC	45.2-55.2 PRM
A (mm)	504	521	550	558	557
B (mm)	881	845	1136	1457	1180



**Do not lift from the short side**

- 1 Identify critical points during handling (disconnected routes, flights, steps, doors)
- 2 Protect the unit properly to prevent damage
- 3 Lifting with balance
- 4 Lifting with spacer bar
- 5 Align the barycenter to the lifting point
  - Gradually bring the lifting belts under tension, making sure they are positioned correctly
  - Before starting the handling, make sure that the unit is stable.



## 6. Selecting the installation site

### 6.1 General

Installation must be in accordance with local regulations. If they do not exist, follow EN378 .

During positioning consider these elements:

- customer approval
- weight of the unit and capacity of the bearing points
- safe accessible position
- functional spaces
- spaces for the air intake/exhaust
- Electrical connections
- max. distance allowed by the electrical connections
- Water connections

### 6.2 Maximum altitude of the installation

#### ATTENTION

- ▶ **The maximum altitude admitted for the installation is 1000 m.**
- ▶ **Altitude: above 1000 m, reduce the maximum ambient temperature by 1°C every 200 m.**
- ▶ **Highest possible altitude 2000 m.**

### 6.3 Electromagnetic compatibility (EMC)

Unit sizes from 43.2 to 55.2 fulfil the emission and immunity requirements of the harmonised generic standards EN 61000-6-4:2007/A11:2007 and EN 61000-6-2:2005/AC:2005 for industrial environments.

An industrial environment is defined as a site powered by a dedicated MV/LV transformer in compliance with the scope of the regulations applied.

The remaining sizes are suitable for installation in residential environments.

### 6.4 Functional spaces

Functional spaces are designed to:

- guarantee good unit operation
- carry out maintenance operations
- protect authorized operators and exposed people

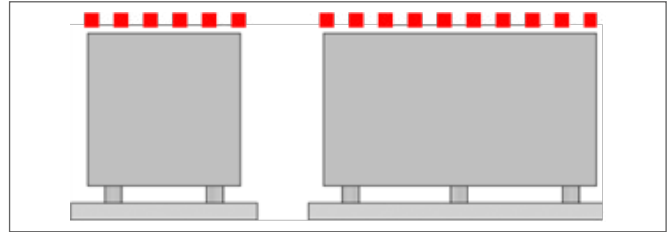
#### ATTENTION

- ▶ **Respect all functional spaces indicated in the DIMENSIONS section.**
- ▶ **Do not smoke or use open flames within this area**

### 6.5 Positioning

#### ATTENTION

- ▶ **Do not go up to the surface**
- ▶ **Do not place heavy loads.**



Units are designed to be installed:

- in fixed positions
- level

Put the unit in a position where any leaking gas cannot enter buildings or stagnate in closed areas. In the latter case, observe the rules for machinery rooms (ventilation, leak detection, etc.).

Choose the installation place according to the following criteria:

- avoid installations in places subject to flooding
- install the unit raised from the ground
- bearing points aligned and leveled
- discharged condensation water must not cause harm/danger to people and property
- the accumulation of snow must not cause clogging of the coils

Limit vibration transmission:

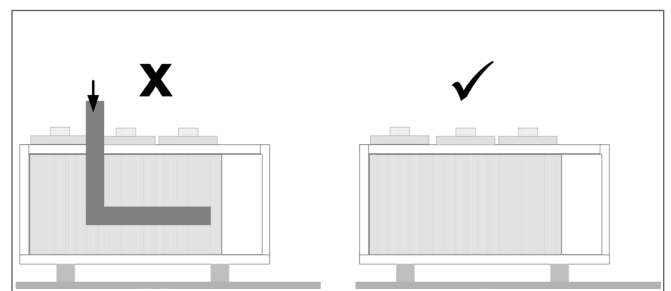
- use anti-vibration devices or neoprene strips on the unit support points
- install flexible joints on the hydraulic and aeraulic connections

Protect the unit with suitable fence in order to avoid access to unauthorised personnel (children, vandals, etc.)

### 6.6 Air flow-rate on the coils

#### ATTENTION

- ▶ **The air flow on the coils must not be obstructed.**



A correct circulation of the air is mandatory to guarantee

the good unit operating.

Avoid therefore:

- obstacles to the airflow
- difficulty of exchange
- leaves or other foreign bodies that can obstruct the air coil
- winds that hinder or favour the airflow
- heat or pollution sources close to the unit (chimneys, extractors etc.)
- stratification (cold air that stagnates at the bottom)
- recirculation (expelled air that is sucked in again)
- incorrect positioning, close to very high walls, attics or in angles that could give rise to stratification or recirculation phenomenons

Ignoring the previous indications could:

- reduce energy efficiency
- alarm lockout due to HIGH PRESSURE (in summer) or LOW PRESSURE (in winter)

### 6.7 Safety valve gas side

The installer is responsible for evaluating the opportunity of installing drain tubes, in conformity with the local regulations in force (EN 378).

If ducted, the valves must be sized according to EN13136.

Diametro scarico valvole: 0 1/2" M threaded

### 6.8 Condensate water

Only units in heat pump version.

When a heat pump is running it produces a considerable amount of water due to the defrosting cycles of the external coil.

The condensate must be disposed in order to avoid damages to people and things.

### 6.9 Installation of the anti-vibration mounts

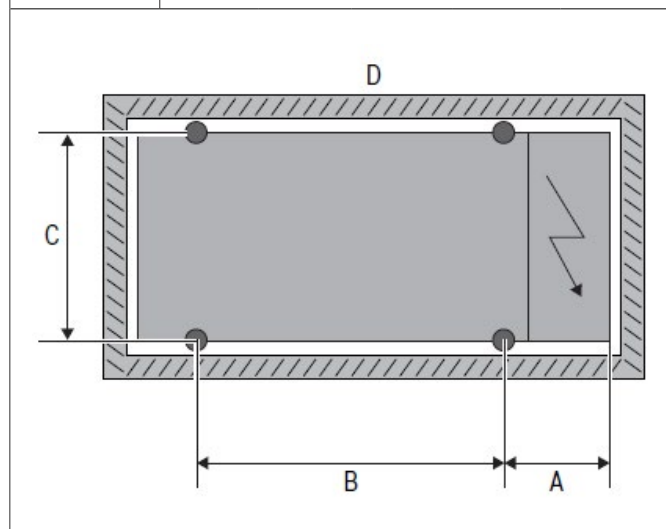
Place the anti-vibration mounts between the unit and the installation base.

Use the holes on the unit frame (15 mm diameter).

#### NOTE

► If spring anti-vibration mounts are installed, the total height of the unit increases

Supporting points					
Size	10.1-14.1	16.2-22.2	30.2-40.2	43.2-45.2 EXC	45.2-55.2 PRM
A (mm)	518	425	253	179	172
B (mm)	825	840	2715	3560	2486
C (mm)	930	995	1029	1111	1103
D	Condensate collection canal				



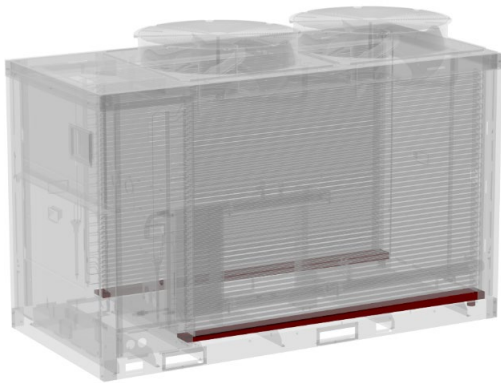
### 6.10 Condensate collection bowl

Option.

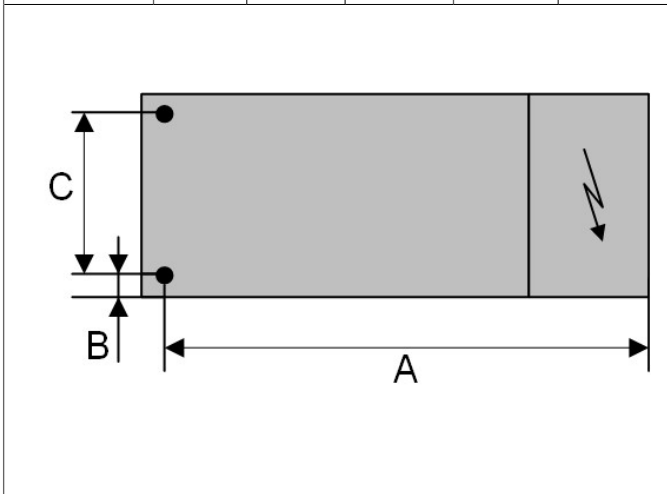
The unit can be supplied with drain pans under the coils.

The drain pans are fitted with antifreeze electric heaters.

Tray connection diameters	
Size	GAS - Male
10.1-14.1	1"
16.2-22.2	1 1/4"
30.2-55.2	1 1/2"



Condensate drain position					
Size	10.1-14.1	16.2-22.2	30.2-40.2	43.2-45.2 EXC	45.2-55.2 PRM
A (mm)	1790	2108	3141	3793	2724
B (mm)	82	95	129	152	153
C (mm)	827	849	832	1027	872



### 6.11 Water safety valve

The drain pipe connected to the safety valve must be installed in a continuous downward direction to a suitable drain and protected from frost.

Valve discharge diameter: 0 1/2" F threaded

## 6.12 Anti-vibration mount kit

Option

10.1-14-1				
<b>Unit configuration</b>	Standard	With water tank	Standard	With water tank
<b>Anti-vibration mount type</b>	Standard	Standard	Anti-seismic	Anti-seismic
<b>PE</b>	<b>PEND00010</b>	<b>PEND00029</b>	<b>PEND00031</b>	<b>PEND00030</b>
W1	BBS100-45Sh	BBS100-60Sh	LaLrLv 14	LaLrLv 22
W2	BBS100-35Sh	BBS100-45Sh	LaLrLv 9	LaLrLv 14
W3	BBS100-45Sh	BBS100-60Sh	LaLrLv 14	LaLrLv 22
W4	BBS100-35Sh	BBS100-45Sh	LaLrLv 9	LaLrLv 14
16.2–22.2				
<b>Unit configuration</b>	Standard	With water tank	Standard	With water tank
<b>Anti-vibration mount type</b>	Standard	Standard	Anti-seismic	Anti-seismic
<b>PE</b>	<b>PEND00029</b>	<b>PE2S00001</b>	<b>PEND00030</b>	<b>PEND00032</b>
W1	BBS100-60Sh	BBS100-60Sh	LaLrLv 22	LaLrLv 300
W2	BBS100-45Sh	BBS100-60Sh	LaLrLv 14	LaLrLv 30
W3	BBS100-60Sh	BBS100-60Sh	LaLrLv 22	LaLrLv 300
W4	BBS100-45Sh	BBS100-60Sh	LaLrLv 14	LaLrLv 300
30.2–40.2				
<b>Unit configuration</b>	Standard	With water tank	Standard	With water tank
<b>Anti-vibration mount type</b>	Standard	Standard	Anti-seismic	Antisismico
<b>PE</b>	<b>PEND00020</b>	<b>PEND00021</b>	<b>PEND00022</b>	<b>PEND00023</b>
W1	RQZ 402-Z108	RQZ 408-X104	LaLrVr 33	LaLrVr 50
W2	RQZ 403-X102	RQZ 405-X103	LaLrVr 22	LaLrVr 31
W3	RQZ 403-X102	RQZ 405-X103	LaLrVr 22	LaLrVr 31
W4	RQZ 402-Z108	RQZ 408-X104	LaLrVr 33	LaLrVr 50
45.2-55.2 PRM				
<b>Unit configuration</b>	Standard	With water tank	Standard	With water tank
<b>Anti-vibration mount type</b>	Standard	Standard	Anti-seismic	Anti-seismic
<b>PE</b>	<b>PEBU00012</b>	<b>PEBU00013</b>	<b>PEBU00010</b>	<b>PEBU00011</b>
W1	RQX 402-Z108	RQZ 408-X103	LaLrVr 33	LaLrVr47
W2	RQZ 505	RQZ 408-X103	LaLrVr 301	LaLrVr47
W3	RQX 401-102	RQZ 408-X103	LaLrVr 300	LaLrVr47
W4	RQX 402-Z108	RQZ 408-X103	LaLrVr 33	LaLrVr47
43.2-45.2 EXC				
<b>Unit configuration</b>	Standard	With water tank	Standard	With water tank
<b>Anti-vibration mount type</b>	Standard	Standard	Anti-seismic	Anti-seismic
<b>PE</b>	<b>PEBU00014</b>	<b>PEBU00015</b>	<b>PEBU00016</b>	<b>PEBU00017</b>
W1	RQZ 408-120	RQZ 512	LaLrVr 50	LaLrVr 51
W2	RQZ 402-Z108	RQZ 512	LaLrVr 33	LaLrVr 51
W3	RQZ 405-108	RQZ 512	LaLrVr 31	LaLrVr 51
W4	RQZ 408-120	RQZ 512	LaLrVr 50	LaLrVr 51

## 7. Water connections

### 7.1 Hydraulic system

The piping must be designed and manufactured to limit pressure drops as much as possible, i.e. optimise performance of the system.

Keep the following parameters to a minimum:

- overall length
- number of bends
- number of vertical changes of direction

### 7.2 Water quality

The water quality must be checked by qualified personnel.

Water with inadequate characteristics can cause:

- pressure drop increase
- reduces energy efficiency
- increased corrosion potential

Water features:

- within the limits indicated by table

Provide a water treatment system if values fall outside the limits.

### 7.3 Cleanliness

Before connecting the water to the unit, clean the system thoroughly with specific products effective to remove residues or impurities that may affect functioning. Existing systems must be free from sludge and contaminants and protected against build-ups.

### 7.4 New systems

In case of new installations, it is essential to wash the entire installation (with the circulator uninstalled) before commissioning the central installation. This removes residues of the installation process (welding, waste, joint products...).

The system must then be filled with clean high-quality tap water.

### 7.5 Existing systems

If a new unit is installed on an existing system, the system must be rinsed to avoid the presence of particles, sludge and waste.

The system must be drained before installing the new unit.

Dirt can be removed only with a suitable water flow.

Particular attention must also be paid to “blind spots” where a lot of dirt can accumulate due to the reduced water flow.

If, after rinsing, the quality of the water is still unsuitable, a few measures must be taken to avoid problems.

An option to remove pollutants is to install a filter.

### ATTENTION

- ▶ **The warranty does not cover damages caused by limestone formations, deposits and impurities from the water supply and/or from failure to clean the systems.**

Water component for corrosion limit on Copper	
PH (25°C)	7,5 ÷ 9,0
SO4--	< 100
HCO3- / SO4--	> 1
Total Hardness	8 ÷ 15 °f
Cl-	< 50 ppm
PO4 3-	< 2,0 ppm
NH3	< 0,5 ppm
Free Chlorine	< 0,5 ppm
Fe3 +	< 0,5 ppm
Mn++	< 0,05 ppm
CO2	< 50
H2S	< 50 ppb
Oxygen content	< 0,1 ppm
Sand	10 mg/L
Ferrite hydroxide Fe3O4 (black)	Dose < 7.5 mg/L 50% of mass diameter < 10 µm
Iron oxide Fe2O3 (red)	Dose < 7.5mg/L Diameter < 1 µm
Electrical conductivity (µS/cm)	<500
Sodium nitrate (mgNaNo3/l)	<100
Alkalinity(mgCaCo3/l)	<100
Copper (mgCu/l)	<1.0
Sulphide ion (S-/l)	None
Ammonium ion (mgNH4+/L)	<1.0
Silica (mgSiO2/l)	50
Max Ethylene, Propylene glycol	50%
Nitrates	<100
Free&aggressive Carbonic Acid	<5

### 7.6 Risk of freezing

If the unit or the relative water connections are subject to temperatures close to 0°C:

- mix water with glycol, or
- safeguard the pipes with heating cables placed under the insulation, or
- empty the system in cases of long non-use

## 7.7 Anti-freeze solution

The use of an anti-freeze solution results in an increase in pressure drop.

Make sure that the glycol type utilized is inhibited (not corrosive) and compatible with the water circuit components.

Do not use different glycol mixture (i.e. ethylene with propylene).

## ATTENTION

- ▶ **The unit must always be protected from freeze. Otherwise irreversible damage may occur.**
- ▶ **Let's consider that typically low quantity of glycol can lead to too accelerated corrosion of the plant. Take in consideration glycol datasheet specifications and respect their limits**

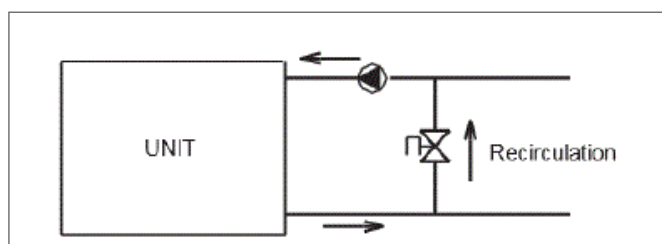
% GLYCOL ETHYLENE / PROPYLENE BY WEIGHT		5%	10%	15%	20%	25%	30%	35%	40%	45%	50%
Freezing temperature	°C	-2	-3.9	-6.5	-8.9	-11.8	-15.6	-19.0	-23.4	-27.8	-32.7
Safety temperature	°C	3	1	-1	-4	-6	-10	-14	-19	-23.8	-29.4

## 7.8 Water flow-rate

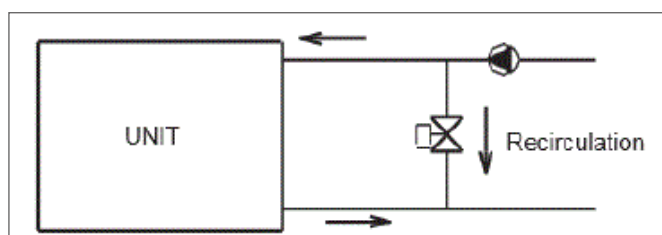
The design water-flow must be:

- inside the exchanger operating limits (see the TECHNICAL INFORMATION section)
- guaranteed, also with variable system conditions (for example in systems where some circuits are bypassed in particular situations).

If the system capacity is below the minimum flow, bypass the system as indicated in the diagram.



If the system capacity exceeds the minimum flow, bypass the system as indicated in the diagram.

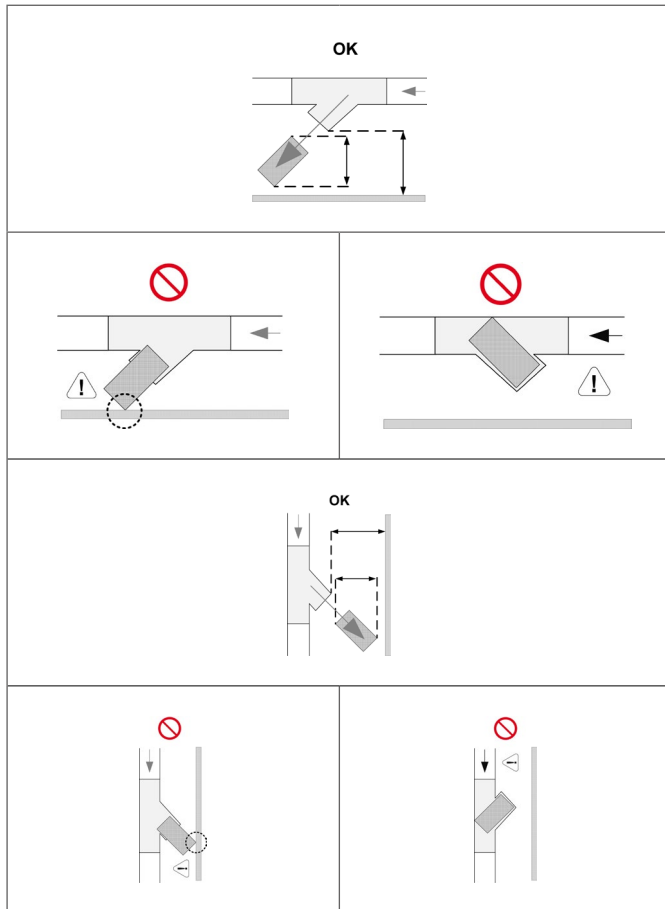


## 7.9 Minimum system water content

Minimum system water volumes are described within chapter TECHNICAL DATA and they have to be satisfied for a proper functioning of the unit.

### 7.10 Water filter

Must be installed immediately in the water input of the unit, in a position that is easily accessible for cleaning.



The filter must have an adequate mesh to prevent the entry of particles greater than:

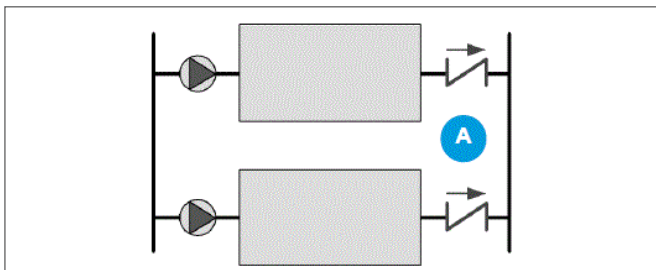
plate exchanger (mm) | 1,0

#### ATTENTION

► The filter never should be removed, this operation invalidates the guaranty.

### 7.11 Non-return valve

Provide for the installation of non-return valves (A) in the case of several units connected in parallel.



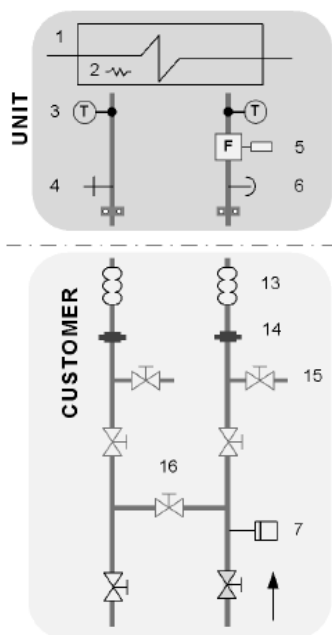
### 7.12 Hydronic units and connection diagrams recommended

The installer must define:

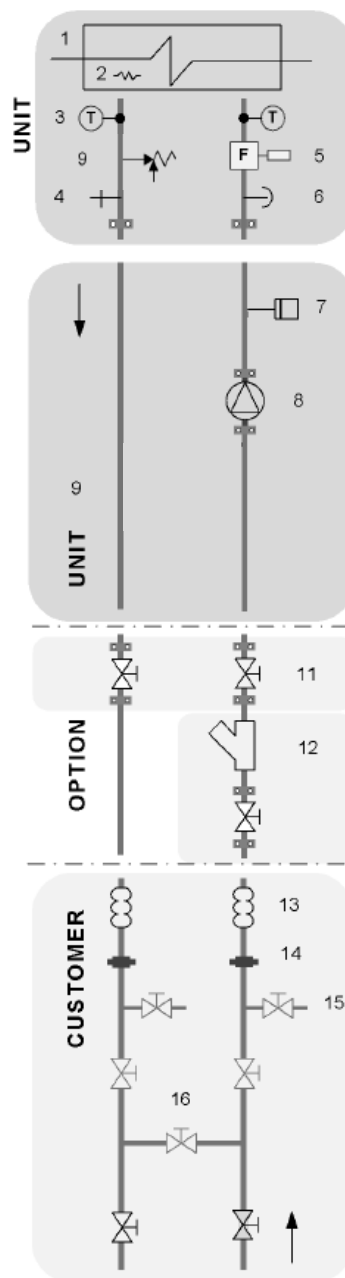
- type of components
- position in the system

See diagrams on the next pages.

### 7.13 Standard unit



### 7.14 Unit + pump



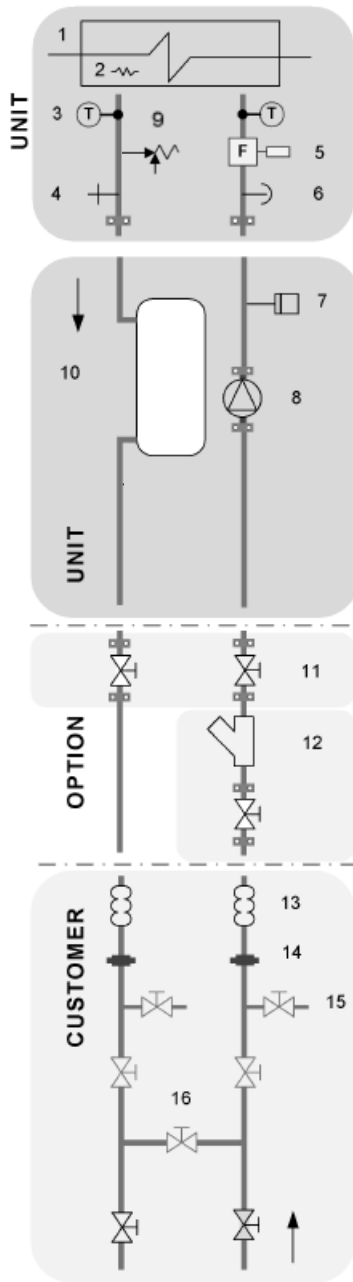
- 1 Exchanger
- 2 Antifreeze heater
- 3 Water temperature probe
- 4 Drain
- 5 flow switch
- 6 vent
- 7 system load safety pressure switch
- 8 pump
- 9 safety valve

- 10 inertial tank
- 11 shut-off valves
- 12 filter
- 13 flexible couplings
- 14 piping supports
- 15 Exchanger chemical cleaning bypass
- 16 System washing bypass (interlock closed during operation)
- 17 domestic hot water valve

Note.

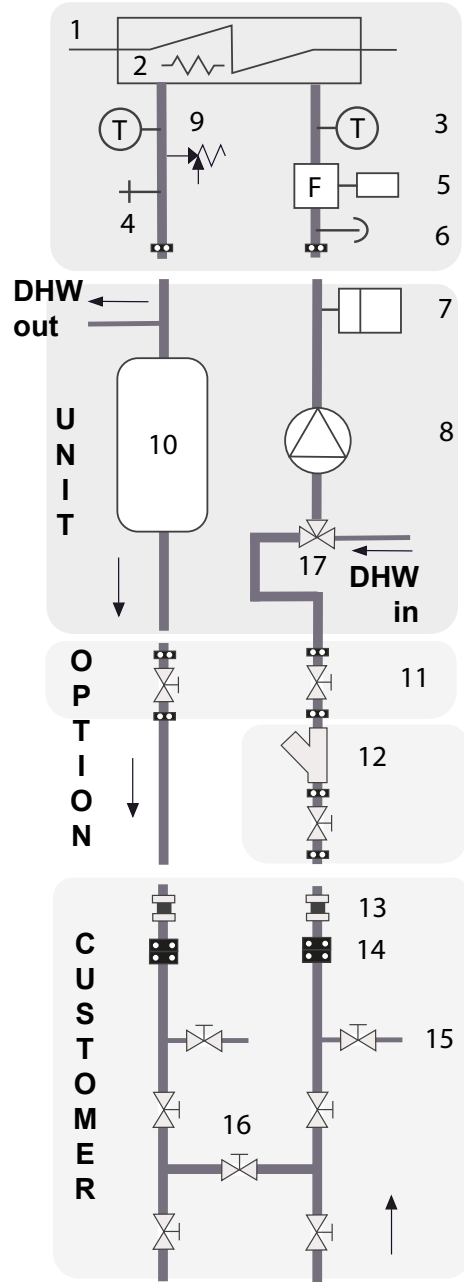
The diagrams indicated above are purely indicative of the necessary system components. It is not certain that the components are placed in all the configurations in the order shown.

### 7.15 Unit + pump + water tank



- 1 Exchanger
- 2 Antifreeze heater
- 3 Water temperature probe
- 4 Drain
- 5 flow switch
- 6 vent
- 7 system load safety pressure switch
- 8 pump
- 9 safety valve
- 10 inertial tank

### 7.16 Unit + pump + water tank + DHW valve



- 11 shut-off valves
- 12 filter
- 13 flexible joints (also to be provided on DHW connections)
- 14 pipe supports (also to be provided on DHW connections)
- 15 Exchanger chemical cleaning bypass
- 16 System washing bypass (interlock closed during operation)
- 17 domestic hot water valve

Note.

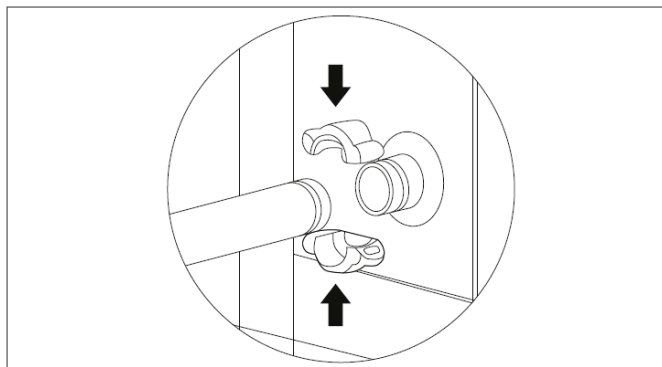
The diagrams indicated above are purely indicative of the necessary system components. It is not certain that the components are placed in all the configurations in the order shown.

## 7.17 Victaulic fittings

- 1 Remove the connection fitting supplied and use the Victaulic connection joint.
- 2 Fix the fitting to the system pipe.
- 3 Connect the system pipe to the evaporator with the joint.

Do not weld the system pipe with the Victaulic connection joint attached.

The rubber gaskets might be irreparably damaged



## ATTENTION

- ▶ **Neglecting the washing will lead to several filter cleaning interventions and at worst cases can cause damages to the exchangers and the other parts.**

## 7.19 Unit in modular configuration

See specific chapter at the end of the manual.

## 7.18 Operation sequence

Before starting the unit pump:

- 1 Close all vent valves in the high points of the unit hydraulic circuit
- 2 if there is a pump onboard, close the pump discharge opening with the plug that is supplied with the unit together with the manual and paper documentation, typically placed in the refrigerant compartment.
- 3 Close all drain shut-off valves in the low points of the unit's water circuit
  - exchangers
  - pumps
  - collectors
  - storage tanks
- 4 carefully wash the system with clean water: fill and drain the system several times
- 5 use the bypass to exclude the exchanger from the flow (diagram on the previous page)
- 6 fill and empty the system multiple times.
- 7 Apply additives to prevent corrosion, fouling, formation of mud and algae.
- 8 Fill the plant
- 9 do not use the unit pump.
- 10 Execute leakage test.
- 11 Isolate the pipes to avoid heat dispersions and formation of condensate.  
Leave various service points free (wells, vents, etc).

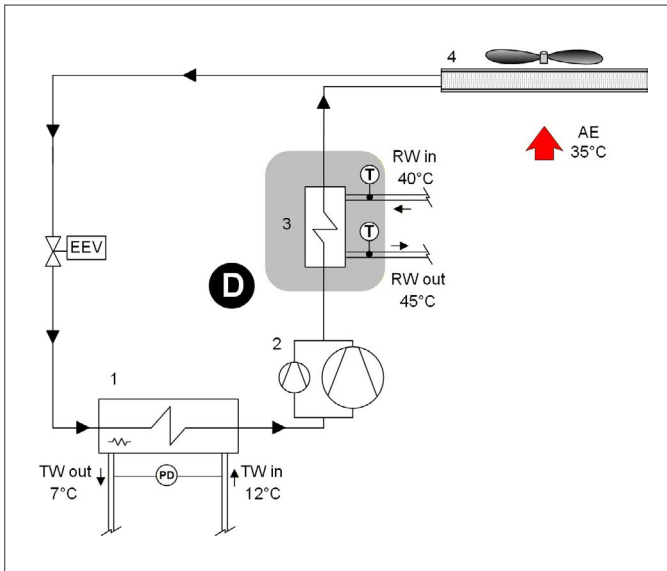
## 7.20 Partial energy recovery

(only for sizes 43.2-45.2 EXC / 45.2-55.2 PRM)

### Option

Configuration which enables the production of hot water free-of-charge while operating in cooling mode, thanks to the partial recovery of condensation heat that would otherwise be disposed of into the external heat source.

The recovery exchanger must always be kept full of water. The lack of water amplifies the noise generated by operation.



D - Partial recovery device

- 1 Internal exchanger
- 2 Compressors
- 3 Recovery exchanger
- 4 External exchanger
- 5 Electronic expansion valve

TW in - Chilled water inlet

TW out - Chilled water outlet

Rw in - Recovery water inlet

RW out - Recovery water outlet

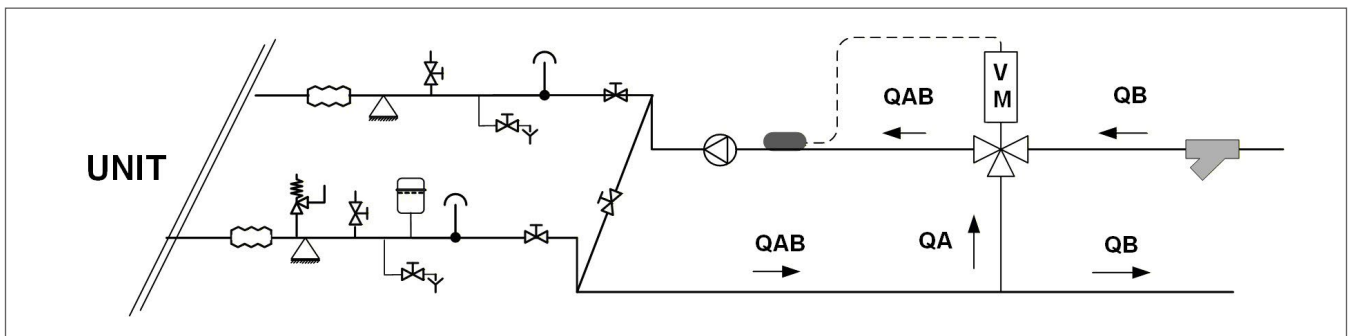
T - Temperature probe

PD - Differential pressure switch

AE - Outdoor air

When the temperature of the water to be heated is particularly low, it is advisable to install an air flow adjustment valve in the system's water circuit to maintain the outlet temperature at recovery above 35°C and thus prevent condensation of the refrigerant in the partial energy recovery device.

Water connections for partial heat recovery are 1¼" for all unit size.



### ATTENTION

The water temperature can reach high levels (exceeding 100°C); therefore:

- Prevent the **RISK OF BURNS** by taking all necessary precautions ( insulating pipes, using to thermostatically to control the water temperature for domestic use, etc.)
- Install appropriately sized safety valves and expansion tanks within the hydraulic circuit.

Take the necessary precautions to prevent the risk of freezing (e.g., insulate pipes, drain the system, or add antifreeze to the circuit).

## 8. Electrical connections

The characteristics of the electrical lines must be determined by qualified electrical personnel able to design electrical installations; moreover, the lines must be in conformity with regulations in force.

The protection devices of the unit power line must be able to stop all short circuit current, the value must be determined in accordance with system features.

The power cables and the protection cable section must be defined in accordance with the characteristics of the protections adopted.

All electrical operations should be performed by trained personnel having the necessary qualifications required by the regulations in force and being informed about the risks relevant to these activities.

Operate in compliance with safety regulations in force.

### 8.1 Electrical data

The serial number label reports the unit specific electrical data, included any electrical accessories.

The electrical data indicated in the technical bulletin and in the manual refer to the standard unit, accessories excluded.

The type plate shows the indications foreseen by the standards, in particular:

Voltage

F.L.A.: full load ampere, absorbed current at maximum admitted conditions

F.L.I.: full load input, full load power input at max. admissible condition

Electrical wiring diagram Nr.

### 8.2 Connections

- 1 Refer to the unit electrical diagram (the number of the diagram is shown on the serial number label).
- 2 Verify that the electrical supply has characteristics conforming to the data shown on the serial number label.
- 3 Before starting work, ensure the unit is isolated, unable to be turned on and a safety sign used.
- 4 Ensure correct earth connection.
- 5 Ensure cables are suitably protected.
- 6 Prevent dust, insects or rodents from entering the electrical panel as they can damage components and cables.
- 7 Use the special holes on the bottom of the frame for the power line inlet. Seal any residual openings to prevent noise from escaping the compressors compartment.
- 8 Fix the cables: if vacated, they may be subject to tearing.
- 9 The cables must not touch the compressor and the refrigerant piping ( they reach high temperatures ).
- 10 Do not drill holes in the electrical panel.
- 11 Alternatively, restore the IP rating with watertight systems.
- 12 Before power the unit, make sure that all the protections that were removed during the electrical connection work have been restored.

### 8.3 Power supply network requirements

- 1 The short circuit capacity of the line must be less than 10 kA
- 2 The units can only be connected to TN, TT distribution systems \*
- 3 Voltage 400-3-50 +/-10%
- 4 Phase unbalance < 2%
- 5 Harmonic distortion less than 12% (THDv<12%)
- 6 Voltage interruptions lasting no longer than 3ms and with at least 1 s between each one
- 7 Voltage dips not exceeding 20% of the RMS value, lasting no longer than a single period (50Hz) and with at least 1 s between each dip.
- 8 Earth cable as specified in the table:

Cross-section of the line conductors (mm <sup>2</sup> )	Minimum cross-section of the protective conductor (PE) (mm <sup>2</sup> )
S ≤ 16	S
16 < S ≤ 35	16
S > 35	S/2

\* Note:

- For installation of the unit in TN systems it's mandatory to have an automatic overcurrent protection, that in case of a short-circuit, is able to guarantee an intervention time below or equal to 5 s as required by EN 60204-1:2018.
- For installation of the unit in TT systems
- When the unit has to be connected to a TT-type distribution system, differential protection (RCD) may be required when the fault loop impedance is high.
- The tripping threshold of the residual current device (RCD) must guarantee a contact voltage not exceeding 50 V (AC), according to Annex A2.2.2 of EN 60204-1:2018.
- The use of differential protection, the tripping of which causes a complete disconnection of the power supply, is mandatory for installations in TT systems, only in Italy.

### 8.4 Signals / data lines

Do not exceed the maximum power allowed, which varies, according to the type of signal.

Lay the cables far from power cables or cables having a different voltage and that are able to emit electromagnetic disturbances.

Do not lay the cable near devices which can generate electromagnetic interferences.

Do not lay the cables parallel to other cables, cable crossings are possible, only if laid at 90°.

The type of cable must be suitable for RS-485 serial data communication.

A 3-pole shielded bus cable is required.

The data transmission bus cable must be verified according to the type of installation in which it will be placed and must comply with local standards.

The bus cable must comply with non-prescribed local electrical standards (e.g. insulation, voltages, flame propagation, etc.).

The cable shield must be grounded at a single point free from disturbances.

In order to ensure correct communication, the earth connection of the shield can also be configured differently depending on the area and the types of interference.

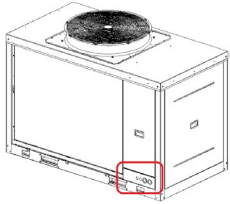
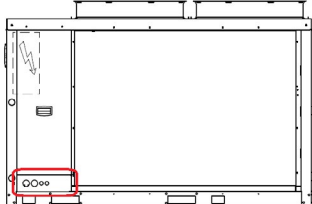
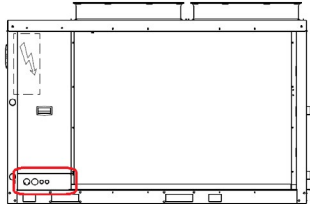
Inside the unit, do not secure power cables to pipe-work (pipes can become very hot during operation).

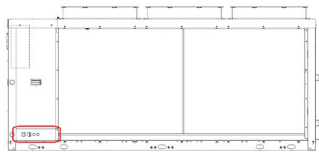
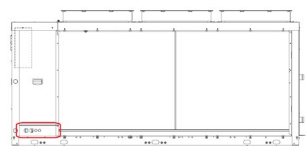
Allowed topology: daisy-chain (enter and exit).

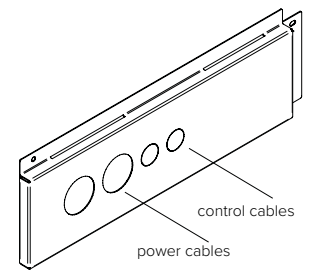
Other types such as "ring" or "star" are not allowed.

Do not use cable lugs on the communication bus.

### 8.5 Controller wiring sections

	10.1-14.1	16.2-22.2	PRM 45.2-55.2
Max. cable section Cu (mm <sup>2</sup> )	16	25	50
Power cable inlet hole diameter (mm)	27	47	47
Power line inlet			

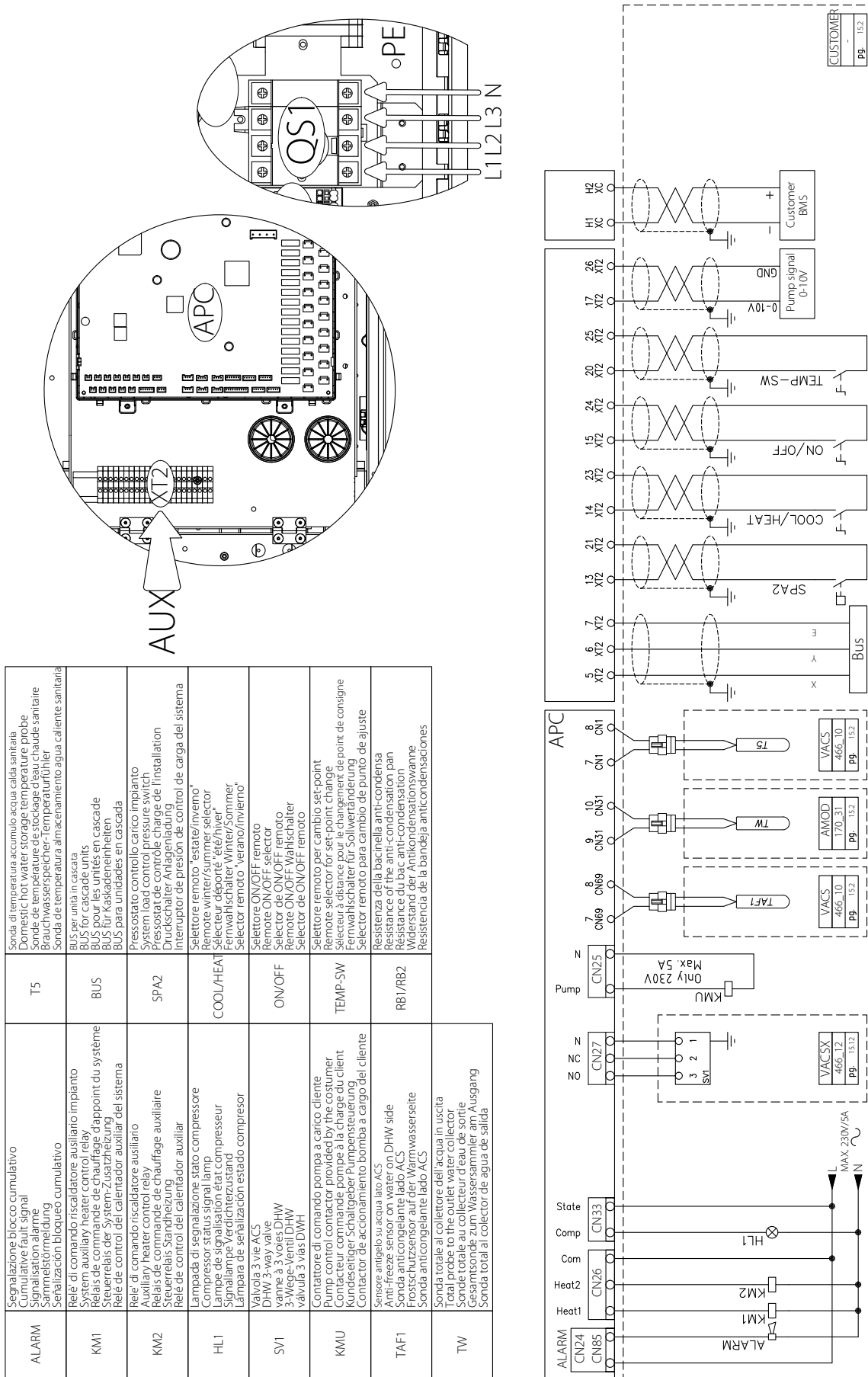
	30.2-40.2	EXC 43.2-45.2
Max. cable section Cu (mm <sup>2</sup> )	25	50
Power cable inlet hole diameter (mm)	47	47
Power line inlet		



► It is mandatory for the cable inlet to be protected with a cable gland. Due to the variety of cables used, the installer shall select a suitable cable gland.

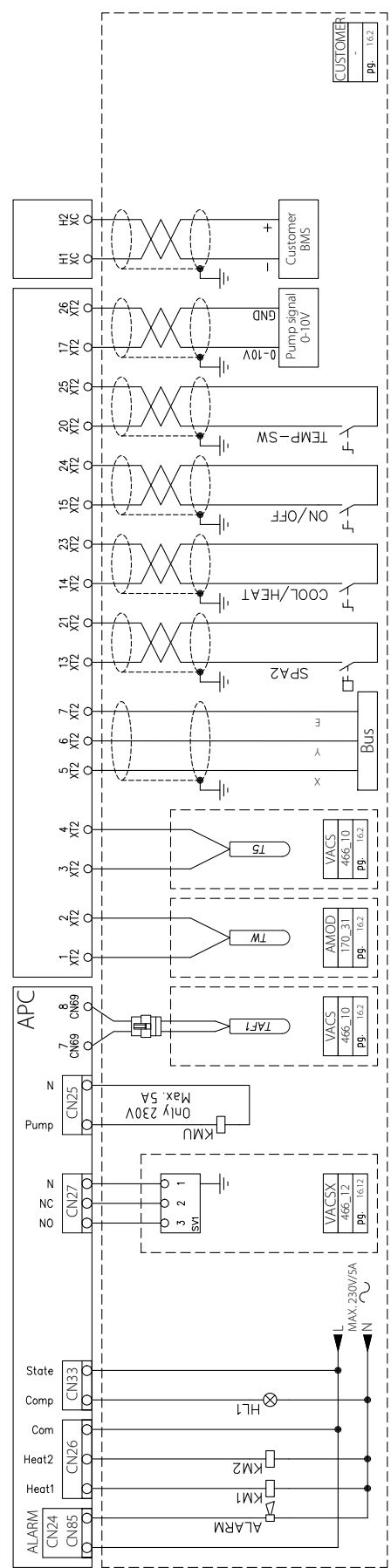
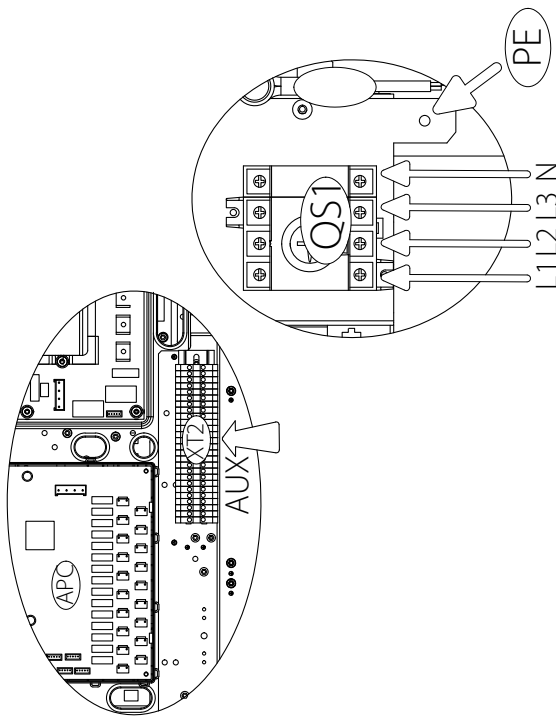
## 8.6 Connections performed by Customer

Size 10.1 - 14.1

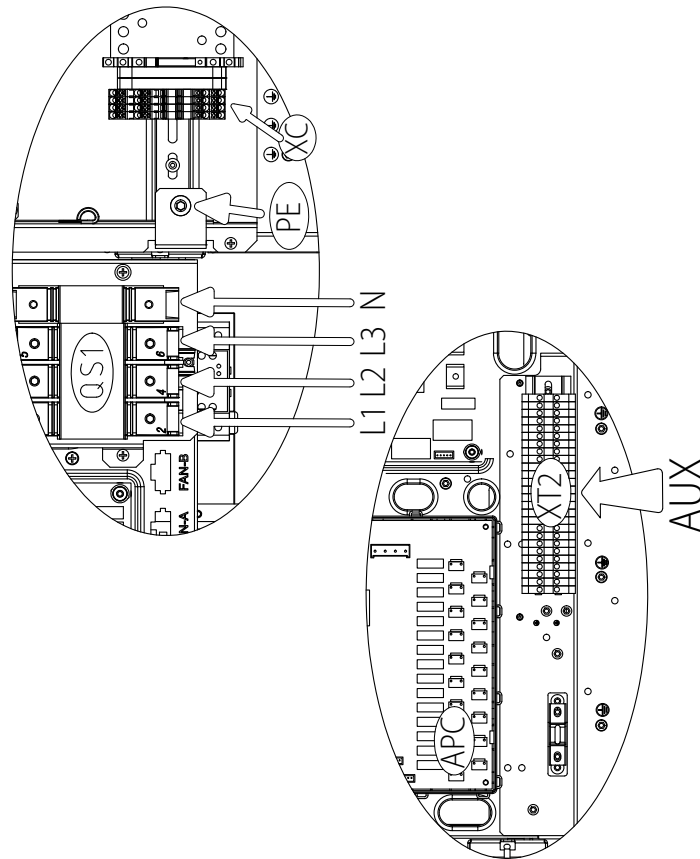


Size 16.2 - 40.2

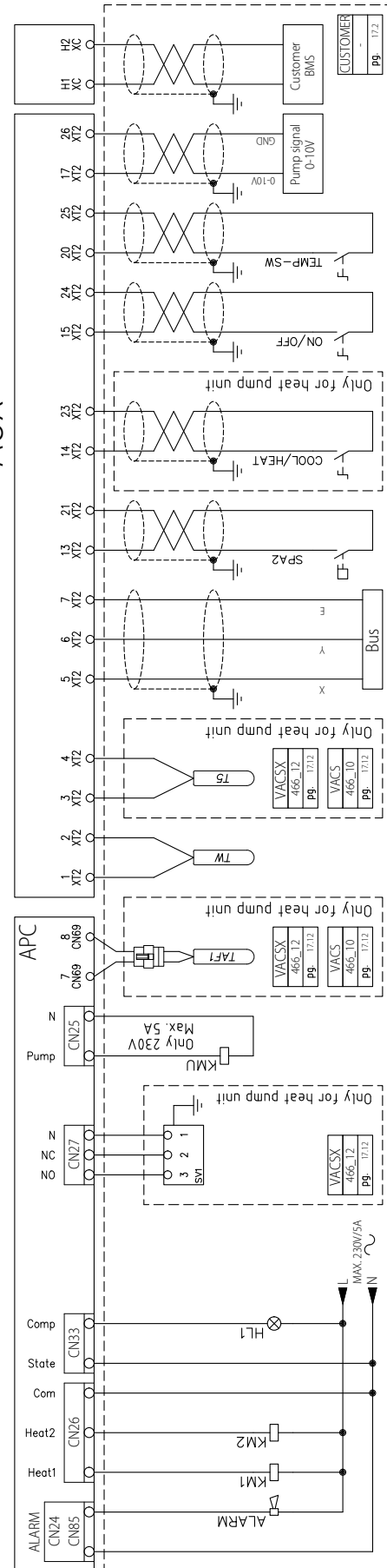
ALARM	Segnalazione blocco cumulativo Cumulative fault signal Signalisation alarme Sammelstörungmeldung Senhalización bloqueo cumulativo	T5	Sonda di temperatura accumulata acqua calda sanitaria Domestic hot water storage temperature probe Sonde de température de stockage d'eau chaude sanitaire Brauchwasserspeicher-Temperaturfühler Sonda de temperatura almacenamiento agua caliente sanitaria
KM1	Relè di comando riscaldatore ausiliario impianto System auxiliary heater control relay Relais de commande de chauffage d'appoint du système Steuerrelais der System-Zusatzheizung Relé de control del calentador auxiliar del sistema	BUS	BUS per unità in cascata BUS for cascade units BUS pour les unités en cascade BUS für Kaskadeneinheiten BUS para unidades en cascada
KM2	Relè di comando riscaldatore ausiliario Auxiliary heater control relay Relais de commande de chauffage auxiliaire Steuerrelais Standheizung Relé de control del calentador auxiliar	SPA2	Pressostato controllo carico impianto System load control pressure switch Pressostat de contrôle charge de l'installation Druckschalter Anlagenladung Interruptor de presión de control de carga del sistema
HL1	Lampada di segnalazione stato compressore Compressor status signal lamp Lampe de signalisation état compresseur Signal Lampe Verdichtenzustand Lámpara de señalización estado compresor	COOL/HEAT	Selettore remoto "estate/inverno" Remote winter/summer selector Sélecteur déporté "été/hiver" Fernwählschalter "Winter/Sommer" Selector remoto "verano/invierno"
SV1	Valvola 3 vie ACS DHW 3-way valve vanne à 3 voies DHW 3-Weg-Ventil DHW valvula 3 vías DHW	ON/OFF	Selettore ON/OFF remoto Remote ON/OFF selector Selector de ON/OFF remoto Remote ON/OFF-Wahlschalter Selector de ON/OFF remoto
KMU	Contattore di comando pompa a carico cliente Pump control contactor provided by the customer Contacteur commande pompe à la charge du client Kundenseitiger Schaltegeber Pumpensteuerung Contactor de accionamiento bomba a cargo del cliente	TEMP-SW	Selettore remoto per cambio set-point Remote selector for set-point change Sélecteur à distance pour le changement de point de consigne Fernwählschalter für Sollwertänderung Selector remoto para cambio de punto de ajuste
TAF1	Sensore antigelo su acqua lato ACS Anti-freeze sensor on water on_DHW side Sonda anticongelante lato ACS Frostschutzsensor auf der Warmwasserseite Sonda anticongelante lado ACS	RB1/RB2	Resistenza della bacinella anti-condensa Resistance of the anti-condensation pan Résistance du bac anti-condensation Widerstand der Antikondensationswanne Resistencia de la bandeja anticondensaciones
TW	Sonda totale al collettore dell'acqua in uscita Total probe to the outlet water collector Sonde totale au collecteur d'eau de sortie Gesamtsonde zum Wassersammler am Ausgang Sonda total al colector de agua de salida		



Size 43.2 - 55.2



ALARM	Segnalazione blocco cumulativo Cumulative fault signal Signalisation alarme Sammeiselmeldung Señalización bloqueo cumulativo	TW	Sonda di temperatura in mandata comune per unità installate in cascata Supply temperature probe for units installed in cascade Sonde de température en commun pour les unités installées en cascade Gemeinsamer Temperaturfühler für in Kaskade installierte Geräte Sonda de temperatura em comum para unidades instaladas em cascada.
KM1	Relè di comando riscaldatore ausiliario impianto System auxiliary heater control relay Relais de commande de chauffage d'appoint du système Steuerrelais der System-Zusatzheizung Relé de control del calentador auxiliar del sistema	T5	Sonda di temperatura accumulata acqua calda sanitaria Domestic hot water storage temperature probe Sonde de température de stockage d'eau chaude sanitaire Brauchwasserspeicher-Temperaturfühler Sonda de temperatura almacenamiento agua caliente sanitaria
KM2	Relais de commande de chauffage auxiliaire Auxiliary heater control relay Relais de commande de chauffage auxiliaire Steuerrelais Standheizung Relé de control del calentador auxiliar	BUS	BUS per unità in cascata BUS for cascade units BUS pour les unités en cascade BUS für Kaskadeneinheiten BUS para unidades en cascada
HL1	Lampada di segnalazione stato compressore Compressor status signal lamp Lampe de signalisation état compresseur Signallampe Verdichtierzustand Lámpara de señalización estado compresor	SPA2	Pressostato controllo carico impianto System charge control pressure switch Pressostat de contrôle de charge du système Druckschalter zur Steuerung der Systemlast Pressostato de control de carga del sistema
SV1	Valvola 3 vie ACS DHW 3-way valve vanne à 3 voies DHW 3-Wege-Ventil DHW válvula 3 Vías DHW	COOL/HEAT	Selettore remoto "estate/inverno" Remote winter/summer selector Sélecteur déporté "été/hiver" Fernwählschalter Winter/Sommer Selector remoto "verano/invierno"
KMU	Connettore di comando pompa a carico cliente Pump control connector provided by the customer Contacteur commande pompe à la charge du client Kundeseitiger Schaltegeber Pumpensteuerung Conector de accionamiento bomba a cargo del cliente	ON/OFF	Selettore ON/OFF remoto Remote ON/OFF selector Selector de ON/OFF remoto Remote ON/OFF Wahlschalter Selector de ON/OFF remoto
TAF1	Sensore antigelo su acqua lato ACS Anti-freeze sensor on water on DHW side Sonda anticongelante lato ACS Froschutzsensor auf der Warmwasserseite Sonda anticongelante lado ACS	TEMP-SW	Selettore remoto per cambio set-point Remote selector for set-point change Sélecteur à distance pour le changement de point de consigne Fernwählschalter für Sollwertänderung Selector remoto para cambio de punto de ajuste



## 8.7 Remote control of the unit

With S5\_3 ON, the unit is controlled remotely.

The wired controller is disabled.

ON/OFF status controlled by the On/Off input:

- input ON = unit ON

Heat/Cool mode controlled by the Heat/Cool input:

- On = heating, Off = Cooling

Double setpoint controlled by the TEMP-SW contact:

- input ON = 2nd setpoint

With the units in modular configuration, remote control must be applied to the master unit, which transmits it to the slave units.

After setting S5\_3, disconnect and reconnect the power supply to confirm the change.

## 8.8 Remote control of the unit

With the additional board option for advanced function management REMAU or REMAUX.

See the diagram on the next page.

With S5\_3 OFF, see the instructions of the separately supplied accessory for operation.

The ON/OFF or Heat/Cool enabling function cannot be wired on the customer's terminal block and enabled on the REMAU at the same time. This can create conflicts.

Note: REMAU connection should have a length lower than 30 m for conformity to EMC directive.



## 8.10 TW probe

- The total system supply water flow control probe is installed on the supply pipe in the fan compartment.
- With the unit in modular configuration, the TW probe of the master unit must be re-installed as far away as possible on the common supply line of the system. Use the additional probe support in the electrical panel. Maintain the connection to the electrical panel, only remove the sensor fitted in the support inside the water supply pipe. The probe is secured by a sealing gland.
- Contact on XT2 board: 1-2.

## 8.11 Taf1 probe

- The domestic hot water antifreeze protection probe is in a plastic bag with a 10 m long cable inside the electrical panel.
- To control the Taf1 probe remotely, electrically disconnect the cable in the electrical panel (only 3 m long) and connect the cable in the bag marked Taf1 to the same connector. Install the probe on the discharge pipe from the hot water inertial tank.
- Contact on APC board: 7-8.

## 8.12 T5 probe

- The temperature probe that switches from the system to domestic hot water is in a plastic bag with a 10 m long cable inside the electrical panel. Connect it to the free connector marked "T5" in the electrical panel.
- Contact on XT2 board: 3-4.

## 8.13 Backup heater control HEAT1 - KM1

HEAT 1 is the backup heater control for the heating system.

The function only applies to heat pump operation.

The heater can be used:

- as an antifreeze electric heater. This function is useful when the unit is expected to be switched OFF for long periods with low outdoor air temperatures. The heaters are activated for water temperatures below 6°C.
- Integration with the heat pump in the following cases:
  - as a replacement for the heat pump if it is shut down due to failure or protection.
  - on manual forcing.
  - with low air temperature, as integration with the heat pump.
  - to extend the operation limits, as integration with the heat pump.

Contact on APC board: CN26\_HEAT1-KM1.

Refer to the Service manual for configuration.

## 8.14 Backup heater control HEAT2 - KM2

HEAT 2 is the backup heater control for DHW.

The heater can be used:

- as a replacement for the heat pump if it is shut down due to failure or protection.

- on manual forcing.
- with low air temperature, as integration with the heat pump.
- to extend the operation limits, as integration with the heat pump.
- when the DHW tank temperature is too low, as a replacement for the heat pump.
- in case of frequent compressor ON-OFF cycles, as a replacement for the heat pump.

Contact on APC board: CN26\_HEAT2-KM2.

Refer to the Service manual for configuration.

## 8.15 Alarm signal

### ALARM

- Closed contact with the unit in alarm.
- Contact on APC board: CN24\_1-2.

## 8.16 Compressor running signal

### HL1

- Connect the warning light as shown in the diagram.
- Contact on APC board: CN33\_COMP-STATE.

## 8.17 External pump control

### PUMP-N

- If a unit is supplied without a circulation pump, control the external pump as shown in the diagram. Use an auxiliary relay.
- Contact on APC board: CN25\_PUMP-N.

## 8.18 Use remote keypad control

The HMI is supplied, installed and wired on board the unit as standard.

If necessary, it is possible to remove it from the unit and install it remotely.

In this case, the following rules must be respected depending on the distance (A) between the HMI and the unit:

- if  $A < 40$  meters, it is possible to power the HMI electrically through the terminal block on board the unit.

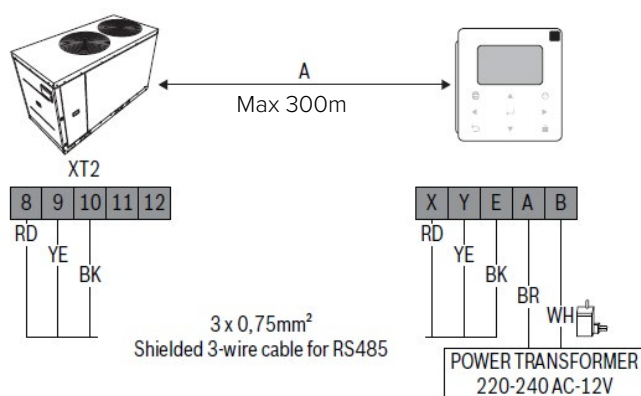
Follow the unit wiring diagram.

- if  $A > 40$ , it is necessary to provide a separate power adapter or transformer for the HMI. In this case, the maximum distance must be less than 300m.

As standard, the unit is supplied with a dedicated transformer to this function as shown in the picture below.

If a third-party power adapter or transformer is used, it must have the following characteristics:

- output range consentito in DC: 9V to 14V (min 400mA)
- output range consentito in AC: 7V to 10V (min 400mA)

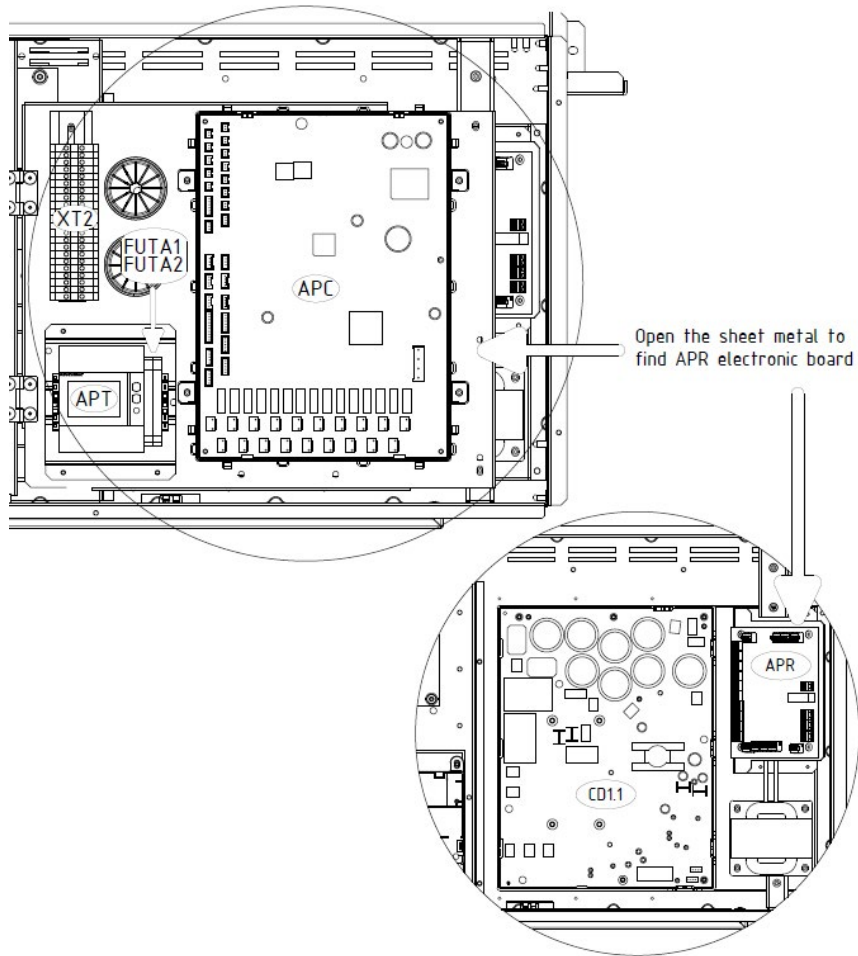


## 8.19 Unit in modular configuration

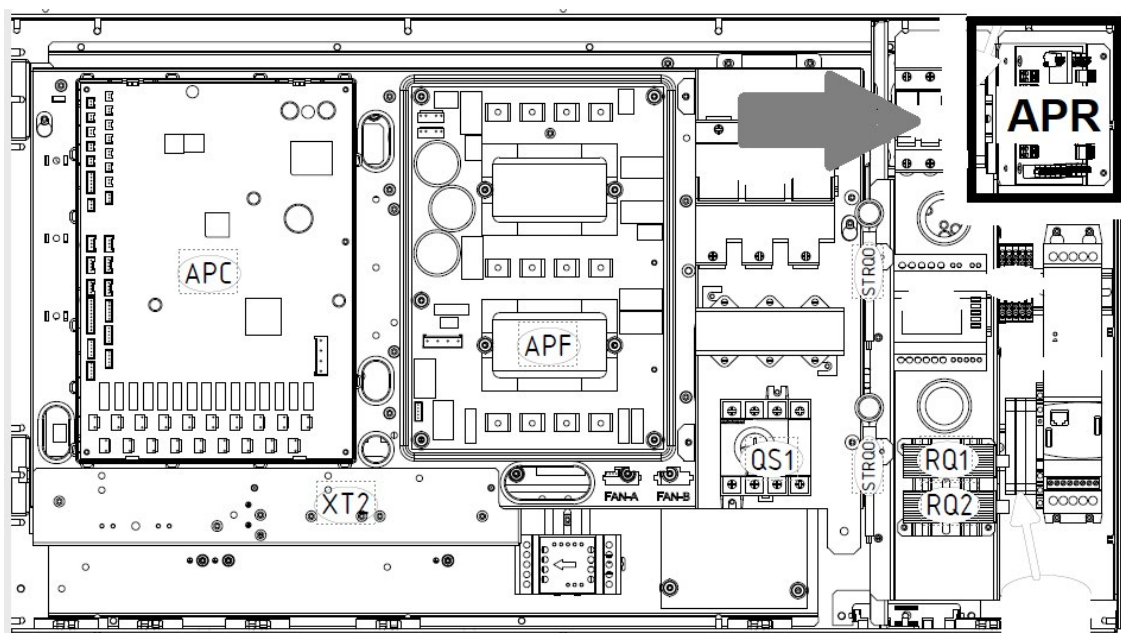
See specific chapter at the end of the manual.

## 8.20 APR board access

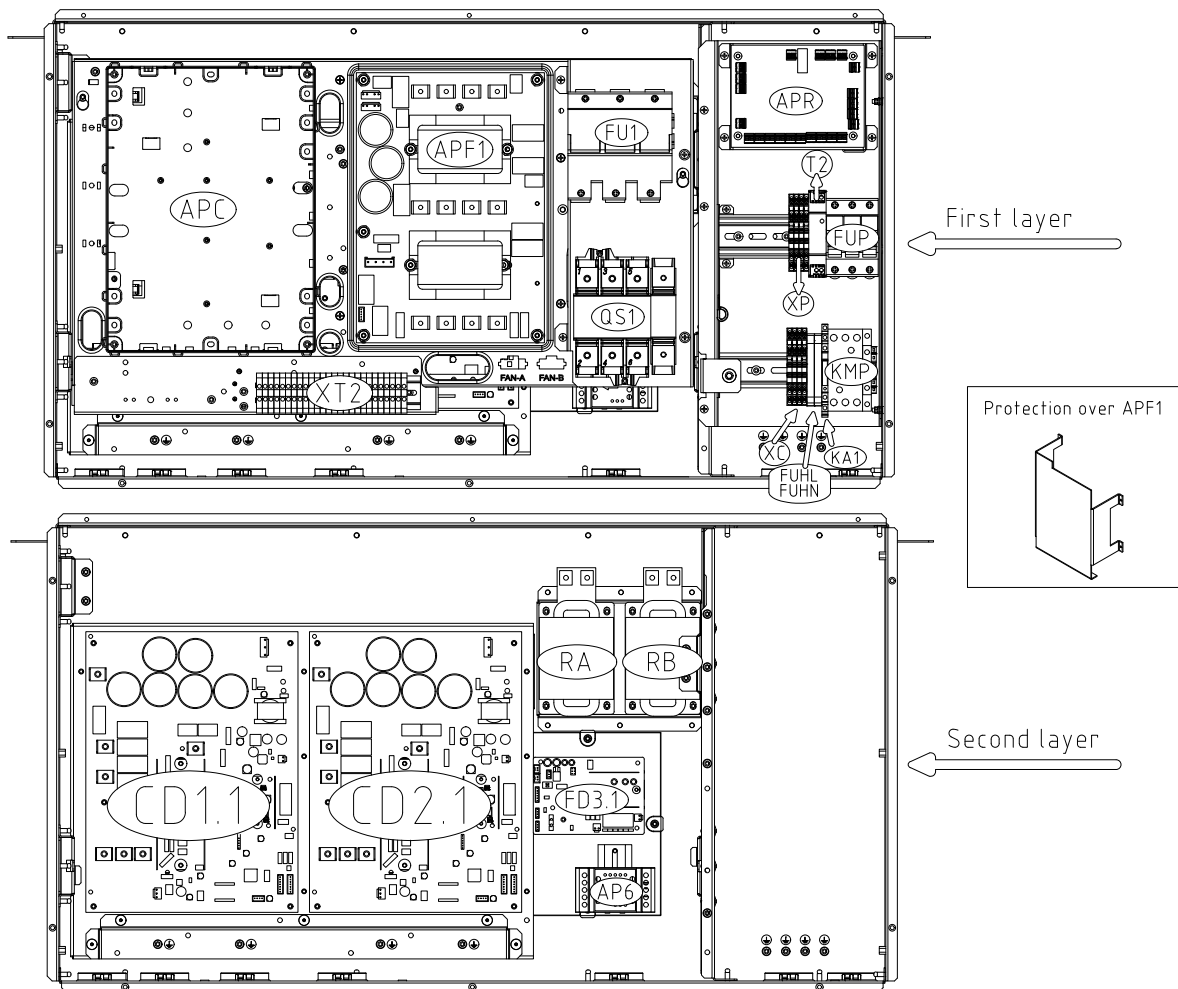
Sizes 10.1-14.1



Sizes 16.2-40.2

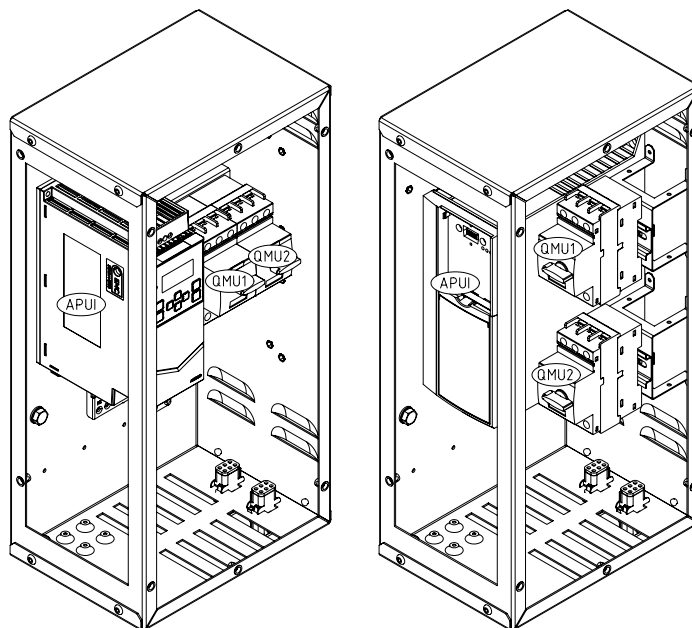


Sizes 43.2-55.2



### 8.21 Access to pumping group inverter on unit (only for sizes 43.2-55.2)

The access is for extraordinary maintenance only and, depending on the inverter used, the entrance can either be on the side or on the front (from the angled sheet metal).





## 9. Start-up

The operations indicated should be performed by qualified technicians with specific training on the product.

Upon request, the service centres can perform the start-up.

The electric, hydraulic connections and the other work of the system are the responsibility of the installer.

Please agree upon the start-up date with the service centre with sufficient advance.

### Attention

- ▶ **A slight buzz noise is normal when the pump with inverter integrated is powered on**

Before checking, please verify the following:

- the unit should be installed properly and in compliance with this manual
- the electrical power supply line should be isolated at the beginning
- the unit isolator is open, locked and equipped with the suitable warning
- make sure no voltage is present

### Attention

- ▶ **After turning off the power, wait at least 5 minutes before accessing to the electrical panel or any other electrical component.**
- ▶ **Before accessing check with a multimeter that there are no residual voltages.**

## 9.1 Start-up sequence

For details refer to the different manual sections.

Unit OFF power supply

		✓
1	safety access	
2	suitable frame to withstand unit weight + people weight	
3	functional spaces	
4	air flow: correct return and supply (no bypass, no stratification)	
5	considered level to be reachable by snow	
6	considered main winds: there are deflectors, windbreaks, suitable anchor system	
7	lack of chimneys / corrosive atmospheres / pollutants	
8	structure integrity	
9	fans run freely	
10	unit on vibration isolators	
11	unit on level ground	
12	there is condensate drainage (only for heat pump units)	
13	unit input water filter + shut-off valves for cleaning	
14	hydraulic connections as per recommended diagram	
15	expansion tank (indicative volume = 10% system content)	
16	minimum system water content	
17	cleaned system	
18	loaded system + corrosion inhibitor	
19	antifreeze protections: glycol solution + possible heating cable	
20	system under pressure + vented	
21	refrigerant circuit visual check	
22	earthing connection	
23	power supply features	
24	Customer connections: electrically connected, configured	

## 9.2 Start-up sequence

For details refer to the different manual sections.

Unit ON power supply

			✓
1	compressor crankcase heaters operating at least since 8 hours		
2	off-load voltage measure		
3	phase sequence check		
4	pump manual start-up and flow check		
5	shut-off valve refrigerant circuit open		
6	unit ON		
7	load voltage measure		
8	verify the lack of bubbles in the liquid light (if applicable)		
9	check of all fan operating: no abnormal noises or vibrations		
10	measure return and supply water temperature		
11	measure super-heating and sub-cooling		
12	run tests in both heat and cool mode (only for heat pump units)		
13	check no anomalous vibrations are present		
14	pump configuration: dip-switch S12-2, possible customisation of pump ON-OFF cycles	*	
15	HEAT1 and HEAT2 backup heater control configuration	*	
16	Climatic curve configuration	*	
17	Energy monitoring configuration	*	
18	climatic curve personalization		
19	scheduling customisation		
20	check that all panels are closed and fastened properly		
21	complete and available unit documentation		
*	Refer to the Service Manual for detailed instructions		

### 9.3 Refrigeration circuit

- 1 Check carefully the refrigeration circuit: the presence of oil stains can mean leakage caused by transportation, movements or other).
- 2 Verify that the refrigeration circuit is in pressure: Using the unit manometers, if present, or service manometers.
- 3 Make sure that all the service outlets are closed with proper caps; if caps are not present a leak of refrigerant can be possible.
- 4 Open the valves of the refrigeration circuit, if there are any.

### 9.4 Electric Circuit

- 1 Verify that the unit is connected to the ground plant.
- 2 Check the conductors are tightened as the vibrations caused by handling and transport might cause these to come loose.
- 3 Connect the unit by closing the sectioning device, but leave it on OFF.
- 4 Check the voltage and line frequency values which must be within the limits: 400-3-50 +/-10%
- 5 Check and adjust the phase balance as necessary: it must be lower than 2%

#### Attention

- ▶ **Working outside of these limits can cause irreversible damages and voids the warranty.**

### 9.5 Options

Menu accessible only after having entered the password.

Access reserved only to specifically trained personnel.

Changing the parameters can cause irreversible damage.

### 9.6 Start-up report

Identifying the operating objective conditions is useful to control the unit over time.

With unit at steady state, i.e. in stable and close-to-work conditions, identify the following data:

- total voltages and absorptions with unit at full load
- absorptions of the different electric loads (compressors, fans, pumps etc)
- temperatures and flows of the different fluids (water, air) both in input and in output from the unit
- temperature and pressures on the characteristic points of the refrigerating circuit (compressor discharge, liquid, intake)

The measurements must be kept and made available during maintenance interventions.

### 9.7 2014/68/UE PED directive

DIRECTIVE 2014/68/UE PED gives instructions for installers, users and maintenance technicians as well.

Refer to local regulations; briefly and as an example, see the following:

Compulsory verification of the first installation:

- only for units assembled on the installer's building site (for ex. Condensing circuit + direct expansion unit)

Certification of setting in service:

- for all the units

Periodical verifications:








- to be executed with the frequency indicated by the Manufacturer (see the "maintenance inspections" paragraph)

## 10. Control

### 10.1 Panel



### 10.2 Buttons

Button	Name	Function
	UNLOCK	Locks/unlocks the buttons
	UP DOWN	Changes the current setpoint
	MENU	Opens the various menus from the HOME screen
	UP DOWN LEFT RIGHT	Moves the cursor, changes the selection, changes the set value.
	ENTER	Confirms an operation.
	ON OFF	Switches on/off.
	BACK	Returns to the previous level/page.

### 10.3 Lock/Unlock keys

Press for 3 seconds.



### 10.4 Switch-On/Off

Press



### 10.5 Unit in modular configuration

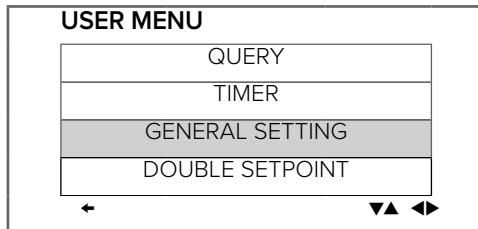
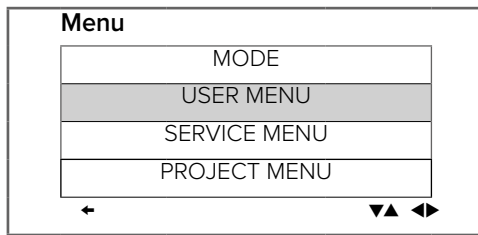
The information displayed on ALL controllers refers to the MASTER unit.

On the slave controllers, only the password-protected SERVICE menu can be opened.

## 10.6 Display

Icon	Meaning
 <b>Cool</b>	Cooling
 <b>Heat</b>	Heating
 <b>DHW</b>	Domestic hot water
<b>OFF</b>	Controller off
	Weekly timer active
	Compressor in operation
	Fan in operation
	Pump in operation
	Backup electric heater in operation
	Manual antifreeze or defrosting in operation
	Remote control: the unit is set from the keypad to be controlled by a remote terminal or by a remote selector switch.
	SILENT MODE
	Button lock
	Timer active
	Alarm: indicator on when there is a fault or a protection is tripped.

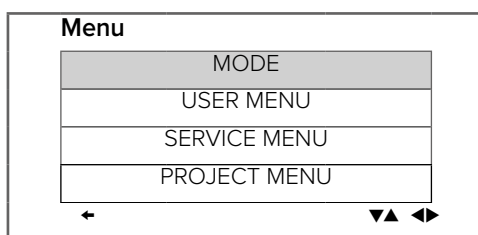
## 10.7 Set Date, Time, Language



GENERAL SETTING	
YEAR	◀ 2022 ▶
MONTH	◀ 7 ▶
Day	◀ 6 ▶
12-24HOUR	◀ 12 ▶
Time	◀ 10 ▶
← 1/2 ▼▲▶▶◀▶	

GENERAL SETTING	
MINUTE	◀ 55 ▶
AM/PM	◀ AM ▶
LANGUAGE	◀ ▶
BACKLIGHT OFF DELAY(s)	◀ 60 ▶
← 2/2 ▼▲▶▶◀▶	

## 10.8 Set MODE and TEMPERATURE



Press	
Select Mode	▲▼
Confirm	↵
Select the mode or the temperature	◀▶
Control the mode or the temperature	▲▼
Confirm	↵

If no operations are performed for more than 60 seconds, the system automatically saves the mode setting and returns to the home page.

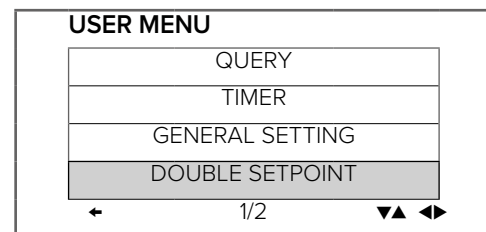
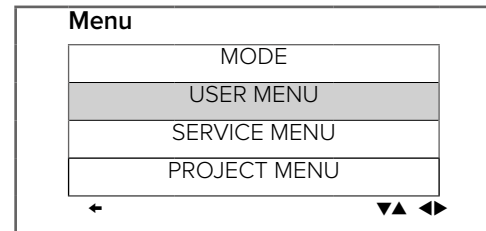
- ▶ In cooling mode with ext T < 15°C, the setpoint is forced to 10 °C (see Operation limits)

## 10.9 Double setpoint

The unit is capable of handling two different setpoints, in both heating and cooling modes.

The value can be set with the user interface.

Activation is via a dry contact on the specific terminal block.

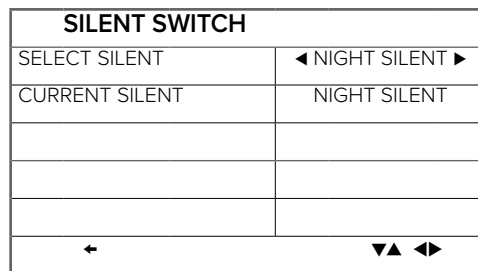
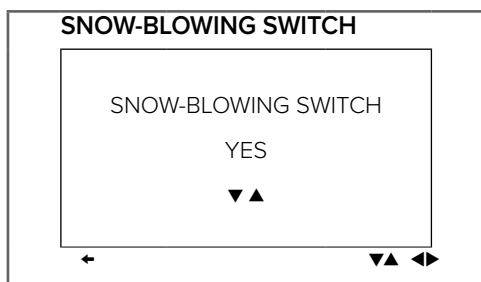
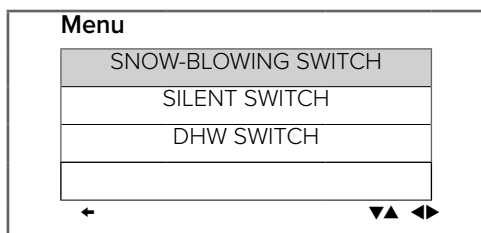
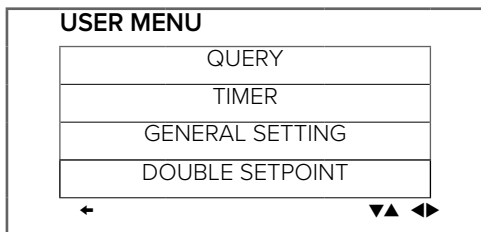
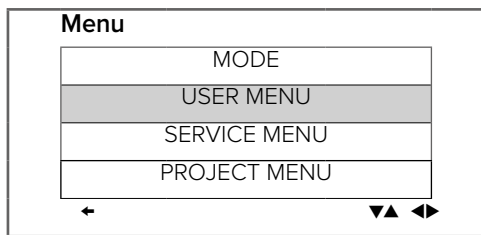


DOUBLE SETPOINT	
DOUBLE SETPOINT	◀ DISABLE ▶
SETPOINT COOL_1	◀ 7 ▶ °C
SETPOINT COOL_2	◀ 10 ▶ °C
SETPOINT HEAT_1	◀ 35 ▶ °C
SETPOINT HEAT_2	◀ 30 ▶ °C
← ▼▲▶▶◀▶	

## 10.10 Snow protection function

If enabled, the function activates the fans in order to prevent a build-up of snow.

The fans start for 2 minutes every 30 minutes when the air temperature is below 3°C and the unit is stopped.



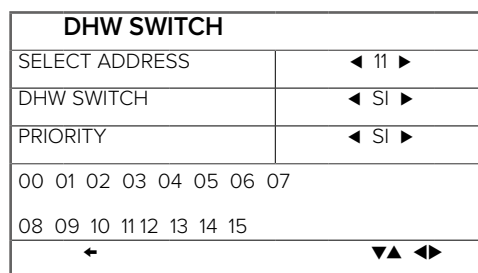
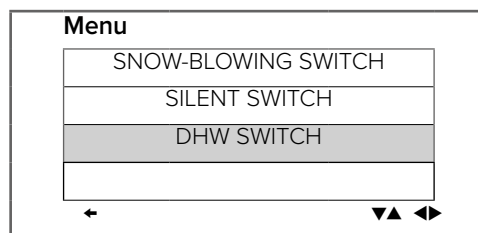
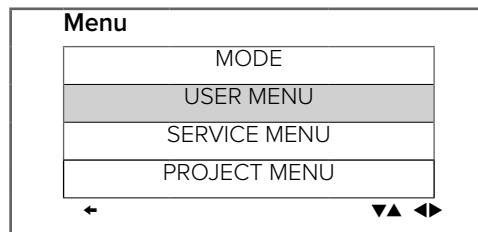
### 10.12 Domestic hot water

Option.

The unit is capable of handling domestic hot water production.

A dedicated valve diverts the water flow from the system to the domestic hot water tank until the DHW setpoint set on the user interface is attained.

The function must be enabled from the user interface.



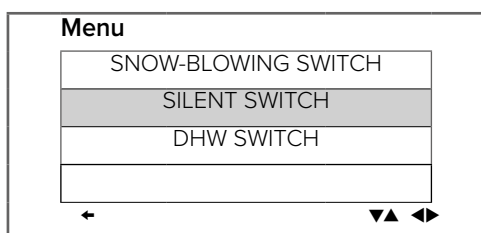
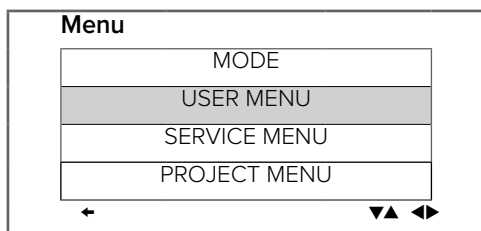
### 10.11 Silent mode

The SILENT MODE function lowers the sound emission level, which is especially useful at night.

The compressor and fan speed is reduced.

There are four silence levels available: Standard, Silent, Super silent, Night.

Refer to the technical data in the different modes for the noise level reduction and power reduction levels of each sound configuration.



### 10.13 Querying variables

The function displays some unit variables: operation status, temperatures, alarm history.

Menu	
MODE	
USER MENU	
SERVICE MENU	
PROJECT MENU	
← ▼▲ ▶	

USER MENU	
QUERY	
TIMER	
GENERAL SETTING	
DOUBLE SETPOINT	
← 1/2 ▼▲ ▶	

QUERY	
STATE QUERY	
TEMP QUERY	
HISTORY ERRORS QUERY	
← ▼▲ ▶	

Select the unit's address (only for units in modular configuration)

STATE QUERY	
SELECT ADDRESS	◀ 11 ▶
OPERATION STATE	STANDBY
RUNNING MODE	COOL
CURRENT SILENT MODE	SUPER SILENT
← 1/3 ▼▲ ▶	

STATE QUERY	
CURRENT CAPACITY	100 KW
CURRENT POWER	50 KW
CURRENT EFFICIENCY	2
TOTAL CAPACITY	100 MW
TOTAL POWER	50 MW
← 2/3 ▼▲ ▶	

STATE QUERY	
TOTAL POWER	50 MW
← 3/3 ▼▲ ▶	

QUERY	
STATE QUERY	
TEMP QUERY	
HISTORY ERRORS QUERY	
← ▼▲ ▶	

TEMP QUERY	
SELECT ADDRESS	◀ 11 ▶
INLET WATER TEMP	25 °C
OUTLET WATER TEMP	25 °C
TOTAL OUTWATER TEMP	25 °C
AMBIENT TEMP	25 °C
← 1/2 ▼▲ ▶	

TEMP QUERY	
INLET BPHE TEMP	25 °C
← 2/2 ▼▲ ▶	

QUERY	
STATE QUERY	
TEMP QUERY	
HISTORY ERRORS QUERY	
← ▼▲ ▶	

HISTORY ERRORS QUERY	
SELECT ADDRESS	◀ 11 ▶
1 2 3 4 5 6 7 8	
EU: 11/03/2020 15:05	
Tz sensor error	
← ▼▲ ▶	

QUERY	
8:04 02-02-2022 Wed	
E2 Main control and wired control transmission error	
← ▼▲ ▶	

### 10.14 Timer

A daily or weekly schedule can be set.

If the unit is controlled via remote ON-OFF or via Modbus, the timers are disabled.

<b>Menu</b>	
MODE	
<b>USER MENU</b>	
SERVICE MENU	
PROJECT MENU	
←	▼▲▶

<b>USER MENU</b>	
QUERY	
<b>TIMER</b>	
GENERAL SETTING	
DOUBLE SETPOINT	
←	▼▲▶

<b>TIMER</b>	
DAILY TIMER	
WEEKLY SCHEDULE	
←	▼▲▶

<b>TIMER</b>	
DAILY TIMER(DISALBE)	
WEEKLY SCHEDULE(DISALBE)	
←	▼▲▶

<b>DAILY TIMER</b>	
TIMER	◀1▶
ACT	◀OFF▶
TIME ON	◀10:00▶
TIME OFF	◀12:00▶
MODE	◀HEAT▶
←	1/2 ▼▲▶

<b>DAILY TIMER</b>	
TWS	◀40▶ °C
SILENT MODE	◀NIGHT SILENT1▶
←	2/2 ▼▲▶

<b>DAILY TIMER</b>	
Timer1 is useless.	
The start time is same to the end time	
←	▼▲▶

<b>WEEKLY SCHEDULE</b>	
WEEKLY SCHEDULE	◀MON▶
WEEKLY SWITCH	◀ON▶
←	▼▲▶

<b>MONDAY TIMER</b>	
TIMER	◀1▶
ACT	◀OFF▶
TIME ON	◀10:00▶
TIME OFF	◀12:00▶
MODE	◀HEAT▶
←	1/2 ▼▲▶

<b>MONDAY TIMER</b>	
TWS	◀40▶ °C
SILENT MODE	◀NIGHT SILENT1▶
←	2/2 ▼▲▶

## 10.15 Unit statuses

Code	Description
0.xx	unit address
1.xx	nominal unit capacity (30/60/90 kW)
2.xx	number of units
3.xx	T4 correction
4.xx	Mode (8: Off; 0: Standby; 1: Cooling; 2: Heating)
5.xx	fan speed 1
6.xx	fan speed 2
7.xx	T3: coil temperature
8.xx	T4: outdoor temperature
9.xx	T5: DHW temperature
10.xx	Taf1: exchanger outlet temperature, DHW antifreeze protection
11.xx	Taf2: exchanger outlet temperature, System antifreeze protection
12.xx	Tw: common outlet water temperature, after the last unit
13.xx	TwI water inlet
14.xx	Two outlet water
15.xx	Tz common coils
16.xx	Tm_heatR recovery
17.xx	Tp1 compressor 1 discharge temperature
18.xx	Tp2 compressor 2 discharge temperature
19.xx	Tfin1 Power module 1 (inverter) temperature
20.xx	Tfin2 Power module 2 (inverter) temperature
21.xx	Tdsh: compressor discharge temperature desuperheating
22.xx	compressor 1 current input
23.xx	compressor 2 current input
24.xx	reserved
25.xx	electronic expansion valve opening A (/20)
26.xx	electronic expansion valve opening B (/20)
27.xx	electronic expansion valve opening C (/4)
28.xx	high pressure
L.xx	low pressure
30.xx	Tssh overheating in cooling mode
31.xx	Th suction temperature
32.xx	silent (1st digit: 0= night mode, 1= silent mode, 2= super silence, 3= standard)
33.xx	reserved
34.xx	DC voltage A (reserved)
35.xx	DC voltage B (reserved)

Code	Description
xx.xx	frequency limitation statuses: BIT0: T4 frequency limitation BIT1: Tp frequency limitation BIT2: Tz frequency limitation BIT3: Tfin frequency limitation BIT4: outlet water cooling frequency limitation BIT5: high pressure heating frequency limitation BIT6: current limit BIT7: voltage limit BIT8: DC bus current limit BIT9: cooling low pressure frequency limit BIT10: outlet water heating frequency limitation BIT11: heating Tdsh frequency reduction BIT12: power limitation mode BIT13: silent mode BIT14: reserved BIT15: reserved
37.xx	defrosting status (1st digit: T4 selection solution; 2nd digit: at intervals; 3rd and 4th digits: defrosting on timer)
38.xx	reserved
39.xx	reserved
40.xx	initial frequency
41.xx	reserved
42.xx	reserved
43.xx	T6a: economiser inlet temperature
44.xx	T6b: exchanger outlet temperature
45.xx	software version
46.xx	last error
47.xx	----

## 10.16 Alarms

Alarm reset: switch the unit off and on again.

### NOTE

- ▶ **Before resetting an alarm, identify and remove the cause of the alarm.**
- ▶ **Repeated resets can cause irreversible damage.**

The unit is in protection mode in the following conditions:

- High pressure or protection due to discharge temperature
- low voltage
- compressor current protection
- frequency protection of the inverter compressor
- high coil temperature
- high temperature difference between the inlet water and the outlet water
- antifreeze protection
- discharge temperature sensor malfunction
- low evaporator temperature
- frequency protection by voltage
- compressor inverter malfunction
- fan motor protection
- water return high temperature, in cooling mode
- low pressure antifreeze protection
- high temperature of the inverter compressor module

When the unit fails or is in protection mode, the water pump continues working (except for water flow alarm, voltage protection, phase sequence protection).

All of the temperature sensors are classed as faulty when the voltage on the corresponding input is lower than 0,05 V or higher than 4,95 V.

After an error has been signalled, all units stop. The error is eliminated after the sensor has been reset.

Code	Description
E2	communication error between main board and keypad
E3	“total” water outlet temperature probe Tw failure - (only for master unit)
E4	water outlet temperature probe Two failure
xE5	1E5-T3A: condenser temperature probe failure
	2E5-T3B: condenser temperature probe failure
E7	environment temperature probe T5 failure
E8	power output phase detector alarm
xE9	E9: no flow (manual reset) - discharge system
	2E9: water pressure detection failure

Code	Description
xEb	1Eb-Taf1: antifreeze probe failure
	2Eb-Taf2: antifreeze probe failure
CE	Slave module reduction
Ed	Tp1/Tp2: compressor discharge temperature probe failure
xEE	1EE-T6A: refrigerant temperature probe failure
	2EE-T6B: refrigerant temperature probe failure
EF	Twi: return water temperature probe failure
EP	Tp: discharge temperature probe failure
EU	Tz: total condenser temperature probe failure
P0	system high pressure protector or Tp protection
P1	system low pressure protection
P2	Tz: total condenser output high temperature
P3	T4: out of cooling operation range
P4	compressor and fan 1 current protection
P5	compressor and fan 2 current protection
P7	T3: condenser high temperature
P9	difference between inlet and outlet water is too high
PA	difference between inlet and outlet water is abnormal
xPb	Pb antifreeze reminder
	1Pb: insufficient electric heating reminder
	2Pb: seriously insufficient electric heating reminder
PC	evaporator low pressure in cooling mode
PE	antifreeze protection evaporator low temperature in cooling mode
PH	high room temperature probe T4
xPF	pump 1Pf circuit breaker pre-alarm
	pump 2Pf circuit breaker pre-alarm
PL	Tfin: module, high temperature
xPU	fan A module protection 1PU-DC
	fan B module protection 2PU-DC
	fan C module protection 3PU-DC
H5	high / low voltage
xH9	1H9: driver compressor A - configuration error
	2H9: driver compressor B - configuration error

Code	Description
xHE	thermostatic valve connector A not connected or faulty 1HE
	thermostatic valve connector B not connected or faulty 2HE
	thermostatic valve connector C not connected or faulty 3HE
xF0	1F0: IPM module communication failure
	2F0: IPM module communication failure
F2	insufficient discharge overheating protection or discharge temperature sensor not fitted in the well
xF4	1F4: protection L0 or L1 occurs 3 times in 60 min, alarm originates from compressor A inverter
	2F4: protection L0 or L1 occurs 3 times in 60 min, alarm originates from compressor B inverter
xF6	1F6 A: system bus voltage failure (PTC)
	2F6 B: system bus voltage failure (PTC)
Fb	pressure sensor failure
Fd	Th suction temperature sensor failure
xFF	fan A failure 1FF-DC
	fan B failure 2FF-DC
	fan C failure 3FF-DC
FP	multiple/single pump configuration inconsistency
C0	circuit model configuration failure
C2	types of cascade system units are not combined
C7	PL error 3 times
dF	defrosting pre-alarm
L0	inverter L0 protection
L1	low voltage protection
L2	high voltage protection
L3	reserved
L4	reserved
L5	reserved
L6	reserved
L7	no phase
L8	variation of frequency higher than 15Hz
L9	15Hz frequency difference between compressors A and B
xbH	1bH: the relay of module 1 is stuck or the auto-control of chip 908 has failed
	2bH: the relay of module 2 is stuck or the auto-control of chip 908 has failed

## 11. R32 gas safety warnings

### 11.1 Area checks

Before working on systems containing flammable refrigerants, perform safety checks to reduce the risk of combustion to the minimum. Before performing any reparation operations on the cooling system, comply with the following warnings.

### 11.2 Work procedures

Operations must be performed following a controlled procedure so as to reduce the risk of flammable gases or vapours developing.

### 11.3 General work area

All the personnel in charge with maintenance operations and other operators working in the local area must be instructed and monitored as regards the nature of the intervention.

Avoid working in tight spaces. The area surrounding the working space must be cordoned off. Make sure the area is secured by monitoring the flammable material.

### 11.4 Check the presence of refrigerant

Both before and during operations, the area must be monitored with a dedicated refrigerant detector to make sure the technician is aware of the presence of potentially-flammable environments.

Make sure the leak detection equipment is suitable for use with flammable refrigerants and therefore without sparks, suitably sealed or intrinsically safe.

### 11.5 Presence of the fire extinguisher

If hot interventions are not performed on cooling equipment or connected components, suitable fire fighting equipment must be kept at hand.

Keep a dry-powder or CO<sub>2</sub> extinguisher near the loading area.

### 11.6 No ignition source

It is absolutely forbidden to use ignition sources that may lead to fire or explosion during operations on the cooling system or on pipes that contain or have contained flammable refrigerant.

All possible ignition sources, including cigarettes, must be kept sufficiently away from the installation, reparation, removal and disposal site as flammable refrigerant may be released in the surrounding area.

Before starting operations, the area surrounding the equipment must be inspected to guarantee the absence of flammables or combustion risks. "SMOKING IS FORBIDDEN" signs must be affixed.

### 11.7 Ventilated area

Before intervening on the system or performing any hot intervention, make sure to be in an outdoor or suitably ventilated area.

Ventilation must be maintained during operations. Ventilation must disperse the released refrigerant safely, preferably outdoors in the atmosphere.

### 11.8 Cooling equipment checks

Should a replacement be necessary, the new components installed must be suitable for the purpose envisaged and compliant with specifications.

Always follow the manufacturer guidelines on maintenance and assistance. In case of doubt, contact the manufacturer technical office for assistance.

The following checks must be performed on systems containing flammable refrigerants:

- the quantity of the charge must comply with the size of the room where the parts containing refrigerant are installed;
- the machine and ventilation intake function correctly and are not obstructed;
- If an indirect cooling circuit is used, the secondary circuits must be checked to verify the presence of refrigerants; the marking on the equipment remains visible and readable;
- Make sure markings and symbols are always readable; cooling pipes or components must be installed in a position that makes improbable their exposure to substances that may corrode the components containing refrigerant, unless they are manufactured with material intrinsically resistant to corrosion or suitably protected against corrosion.

### 11.9 Electrical device checks

The reparation and maintenance of electric components must include initial safety checks and component inspection procedures.

In case of a fault that compromises safety, do not perform any electrical connection to the circuit until said fault is suitably resolved.

If it is not possible to repair the fault immediately and electrical components need to remain functioning, a temporary solution must be adopted. This must be reported to the owner of the equipment so as to keep all parties informed.

Initial safety checks must include:

- that capacitor are emptied. This operation must be performed safely to avoid any sparks;
- that electrical components and wiring are not exposed during the charging, recovering or venting phases;
- That the earth conductor is continuous

## 11.10 Repairing sealed components

- During the reparation operations of sealed components, disconnect all the equipment before removing sealed casings etc. If, during operations, it is absolutely necessary for the equipment to remain connected, a leak detection device must be placed in the most critical point so as to report any potentially-dangerous situation.
- Pay particular attention to what follows to guarantee that, while intervening on electrical components, the housing is not altered in a way so as to affect the level of protection. This includes damage to cables, an excessive number of connections, terminals not compliance with the original specifications, damage to gaskets, an unsuitable installation of gaskets, etc.
- Make sure the device is installed safely.
- Check that the seals or sealing materials are not altered in such a way that they no longer impede the entry of flammable environments. Spare parts must comply with manufacturer specifications.

### Warning

- ▶ **Using silicone sealants may inhibit the effectiveness of a few types of leak detection equipment. It is not necessary to isolate intrinsically safe components before performing operations on them.**

## 11.11 Reparation of intrinsically safe components

Do not apply permanent inductive or capacitive loads to the circuit without making sure that they do not exceed the admissible voltage and current allowed for equipment in use.

Intrinsically safe components are the only component type on which operations can be performed in a flammable atmosphere. The testing device must show a correct value. Replace components only with the parts specified by the manufacturer.

Following a leak, other parts could lead to the combustion of the refrigerant in the atmosphere.

## 11.12 Wires

Make sure wires are not subjected to wear, corrosion, excessive pressure or vibration, that there are no sharp edges and that they do not produce other negative effects on the environment. The inspection must also keep into consideration the effects of fine or the continuous vibration caused e.g. by compressors or fans.

## 11.13 Detection of flammable refrigerants

Under no circumstance is it possible to use potential ignition sources to search or detect refrigerant leaks.

Do not use halide lights (or any other open flame detectors).

## 11.14 Leak detection methods

The following leak detection methods are considered acceptable for systems containing flammable refrigerants. Electric leak detectors must always be used to identify flammable refrigerants, although they do not present a suitable sensitivity level or require recalibration (detection equipment must be calibrated in an area free from refrigerants).

Check that the detector is not a possible source of ignition and that it is suitable for the refrigerant. Leak detection equipment must always be set to an LFL percentage and calibrated depending on the refrigerant used, so the correct gas percentage (25% max) must be verified.

Leak detection fluids are suitable for most refrigerants, although using detergents containing chlorine should be avoided as this substance may react with the refrigerant and corrode copper pipes.

If a leak is suspected, all open flames must be removed or switched off.

If a leak is identified that requires brazing, all the refrigerant must be recovered from the system or isolated (using interception valves) in a section of the system far away from the leak. Oxygen-Free-Nitrogen (OFN) is then purged through the system both before and during the brazing procedure.

## 11.15 Removal and evacuation

When intervening on the cooling circuit to perform repair work or any other type of work, always follow the normal procedure. However, considering the risk of flammability, we recommend following the best practices. Comply with the following procedure:

- remove the refrigerant;
- purge the circuit with inert gas;
- evacuate;
- Purge again with inert gas;
- Interrupt the circuit with interruption or brazing.

The refrigerant charge must be collected in suitable recovery tanks. To make the unit safe, flushing with Oxygen-free-Nitrogen must be performed. This procedure may have to be repeated multiple times. Do not use compressed air or oxygen for this operation.

Flushing is obtained interrupting the system vacuum with OFN and filling until the operating pressure is obtained, then releasing into the atmosphere and restoring the vacuum. This process must be repeated until there is no trace of refrigerant in the system.

When using the final OFN charge, the system must be vented to the atmospheric pressure to allow the intervention. This step is essential to perform brazing operations on the pipes.

Make sure that the vacuum pump intake is not near ignition sources and that there is suitable ventilation.

## 11.16 Charging operations

In addition to conventional charging operations, the following requirements must be complied with:

- When using charging equipment, make sure that the various refrigerants are not contaminated. Flexible tubes or conduits must be as short as possible to reduce to the minimum the quantity of refrigerant contained.
- Tanks must be kept in a vertical position.
- Before loading the system with refrigerant, check that the cooling system is earthed.
- Label the system when fully charged (unless already labelled).
- Make sure not to fill the cooling system excessively.
- Before recharging the system, the pressure must be tested with OFN. A leak test must be performed after the charging operations but before commissioning. Before leaving the site, perform an additional leak test.

## 11.17 Dismantling

Before performing this procedure, it is essential that the technician has become familiar with the equipment and the relative details.

We recommend employing good practices for a safe recovery of the refrigerants.

Before performing the operation, take a sample of oil and refrigerant should an analysis be necessary before reusing the regenerated refrigerant. Before performing the operation, check the availability of electricity.

- Become familiar with the equipment and how it functions.
- Electrically isolate the system.

Before attempting the procedure, check that:

- The mechanical manipulation equipment is available, if necessary, to handle refrigerant tanks;
- All the personal protection equipment is available and employed correctly;
- The recovery procedure is monitored at all times by skilled personnel;
- The recovery equipment and tanks comply with suitable standards.
- If possible, pump the cooling system.
- If it is not possible to obtain a vacuum, make sure that a collector removes the refrigerant from various parts of the system.

- Before proceeding with the recovery, check that the tank is located on the scales.
- Start up the recovery machine and use it following the instructions by the manufacturer.
- Do not fill the tanks excessively. (Do not exceed 80% of the liquid volume).
- Do not exceed the tank's maximum operating pressure, not even momentarily.
- Once the tanks are filled correctly and the process is over, make sure that the tanks and equipment are immediately removed from the site and that all insulation valves on the equipment are closed.
- The refrigerant recovered must not be loaded into another cooling system unless it has been cleaned and checked.

## 11.18 Labelling

Equipment must be labelled reporting the dismantling and emptying of the refrigerant.

Labels must be dated and signed.

Make sure all the equipment is labelled and reporting the presence of flammable refrigerant.

## 11.19 Recovery

When removing the refrigerant from the system, please adopt good practices to remove all refrigerants safely in case of both assistance or decommissioning operations.

When transferring the refrigerant into the tanks, make sure only suitable tanks are used to recover the refrigerant.

Make sure enough tanks are used.

All the tanks to be used are designated for the recovered refrigerant and are labelled for that specific refrigerant (e.g. special tanks for refrigerant collection).

Tanks must be equipped with a perfectly-functioning safety valve and relative interception valves.

Empty recovery tanks are evacuated and, if possible, cooled before recovery.

Recovery equipment must be perfectly functioning with the respective instruction booklets at hand and they must be suitable to recover flammable refrigerants. A series of perfectly-functioning calibrated scales must also be available.

Flexible tubes must be equipped with leak-proof disconnection fittings in good condition. Before using the recovery machine, make sure it is in good condition, maintained and that all associated electrical components are sealed to avoid combustion in case of a refrigerant leak. Please contact the manufacturer in case of doubt.

The refrigerant recovered must be taken to the supplier in suitable recovery tanks and with the relative waste transfer note suitably filled in.

Do not mix the refrigerants in the recovery units nor in the tanks.

If it is necessary to remove compressors or compressor oils, make sure they are evacuated to an acceptable level

to make sure no trace is left of the flammable refrigerant inside the lubricant. The evacuation process must be performed before taking the compressors back to the suppliers.

The electric resistance must be used with the compressor body only to accelerate this process.

Operations to discharge the oil from the system must be performed in full safety.

## 11.20 Transport, mark and storage

- 1 Transport of equipment containing flammable refrigerants.  
Compliance with transport regulations
- 2 Marking of equipment with symbols.  
Compliance with local regulations
- 3 Disposal of equipment employing flammable refrigerants.  
Compliance with national regulations
- 4 Storage of equipment/devices.  
The equipment must be stored in compliance with the instructions provided by the manufacturer.
- 5 Storing packed (unsold) equipment.  
Packing must be performed in such a way that mechanical damage to the equipment inside it does not cause refrigerant leaks. The maximum number of elements that can be stored together is determined by local regulations.

## 12. Maintenance

### 12.1 Safety

Operate in compliance with safety regulations in force.

To carry out the operations use protection devices:

gloves, goggles, hard hat, ear protection, protective knee pads.



All operations must be carried out by personnel trained on possible risks of a general nature, electrical and deriving from operating with equipment under pressure.

Only qualified personnel can operate on the unit, as required by the regulation in force.

### 12.2 General

Maintenance must be done by authorized centres or by qualified personnel.

The maintenance allows to:

- maintain the unit efficiency
- increase the life span of the equipment
- assemble information and data to understand the state of the unit efficiency and avoid possible damages

#### Warning

- ▶ **before checking, please verify the following:**
- ▶ **the electrical power supply line should be isolated at the beginning**
- ▶ **the unit isolator is open, locked and equipped with the suitable warning**
- ▶ **make sure no voltage is present**
- ▶ **After turning off the power, wait at least 5 minutes before accessing to the electrical panel or any other electrical component.**
- ▶ **Before accessing check with a multimeter that there are no residual voltages.**

### 12.3 Inspections frequency

Perform an inspection every 6 months minimum.

The frequency, however, depends on the use.

In the event of frequent use it is recommended to plan inspections at shorter intervals:

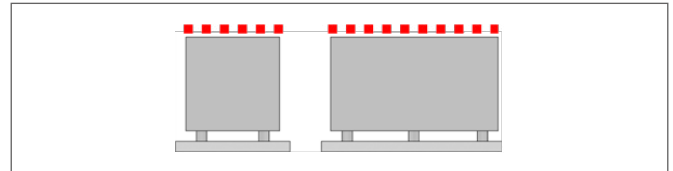
- frequent use (continuous or very intermittent use, near the operating limits, etc)
- critical use (service necessary)

#### Warning

- ▶ **Before performing any work, carefully read: SAFETY WARNINGS FOR OPERATIONS ON UNITS CONTAINING R32**

#### ATTENTION

- ▶ **Do not go up to the surface**
- ▶ **Do not place heavy objects.**



### 12.4 Unit booklet

It's advisable to create a unit booklet to take notes of the unit interventions.

In this way it will be easier to adequately note the various interventions and aid any troubleshooting.

Report on the booklet:

- date
- intervention description
- carried out measures etc.

### 12.5 Standby mode

If a long period of inactivity is foreseen:

- turn off the power
- avoid the risk of frost (empty the system or add glycol)
- Turn off the power to avoid electrical risks or damages by lightning strikes.
- With lower temperatures keep heaters turned on in of the electrical panel (option).

It's recommended that the re-start after the stopping period is performed by a qualified technician, especially after seasonal stops or seasonal switching.

When restarting, refer to what is indicated in the "start-up" section.

Schedule technical assistance in advance to avoid misunderstandings and to guarantee that the system can be used when required.

## 12.6 Recommended periodical checks

intervention frequency (months)		1	6	12
1	presence of corrosion			X
2	panel fixing			X
3	fan fixing		X	
4	coil cleaning		X	
5	water filter cleaning		X	
6	water: quality, ph, weight of glycol (%)		X	
7	check the heat exchanger efficiency	X		
8	circulating pumps			X
9	check of the fixing and the insulation of the power cables			X
10	check of the earthing cable			X
11	cleaning the electrical panel			X
12	power contactors status			X
13	terminals closing, cable insulation integrity			X
14	voltage and phase unbalancing (no load and on-load)			X
15	absorptions of the single electrical loads		X	
16	test of the compressor crankcase heaters		X	
17	Checking for leaks		X	
18	survey of the refrigeration circuit operating parameters			*
19	safety valve		X	
20	protective device test: pressure switches, thermostats, flow switches etc.			*
21	control system test: setpoint, climatic compensations, capacity stepping, water / air flow-rate variations		X	
22	control device test: alarm signalling, thermometers, probes, pressure gauges etc..		X	
23	control device test: alarm signalling, thermometers, probes, pressure gauges etc.		X	
24	electrical heaters check - option			X
25	water coil check - option			X

### Warning

- **\*Refer to the local regulations. Companies and technicians performing installation, maintenance/repair, leak control and recovery operations must be CERTIFIED as set out by the local regulations.**

## 12.7 System drain

The system must be drained only if necessary.

Do not drain the system periodically; this can lead to corrosion.

- 1 empty the system
- 2 empty the exchanger, use all of the shut-off valves and grub screws present
- 3 blow the exchanger with compressed air
- 4 dry the exchanger with hot air; for greater safety, fill the exchanger with glycol solution
- 5 protect the exchanger from air by filling it with nitrogen
- 6 take the drain caps off the pumps

Any antifreeze liquid contained in the system should not be discharged freely as it is a pollutant. It must be collected and reused.

Before start-up, wash the system.

It's recommended that the re-start after the stopping period is performed by a qualified technician, especially after seasonal stops or seasonal switching.

When restarting, refer to what is indicated in the "start-up" section.

Schedule technical assistance in advance to avoid misunderstandings and to guarantee that the system can be used when required.

## 12.8 Compressor crankcase heater

Check:

- closing
- Operation

## 12.9 Water side exchanger

The exchanger must be able to provide the maximum thermal exchange, therefore its inner surfaces must be cleaned from dirt and incrustations.

Check the difference between the outlet water temperature and the evaporation temperature: if the difference is greater than 8°C–10°C, it is advisable to clean the exchanger.

It must be cleaned:

- with circulation opposite to the usual one
- at least 1.5 times faster than the nominal one
- with an appropriate moderately acid product (95% water + 5% phosphoric acid)
- after washing, rinse with water to remove detergent residues

## 12.10 Water filter

Check that no impurities prevent the correct passage of water.

## 12.11 Flow Switch

- check operation
- remove scale from the blade

## 12.12 Circulation pumps

Check:

- there are no leaks
- status of the bearings (anomalies are indicated by abnormal noises and vibrations)
- the terminal protection covers are closed and the cable holders are properly positioned

## 12.13 Insulations

Check the status of the insulations: if necessary, apply glue and renew the seals.

## 12.14 Pressure relief valve

The pressure relief valve must be replaced:

- if it is activated
- if there is oxidation
- based on the date of manufacture, in accordance with local regulations.

## 12.15 Structure

- Wash it at least once or twice a year, depending on exposure (pollution, salt deposits, dirt).

Clean with neutral detergent and cold or warm water (max 30°C).

Do not use solvents or acid, alkaline, abrasive products.

- Check the condition of the parts making up the structure.

Treat those parts of the unit subject to oxidation, with paints act at eliminating or reducing the oxidation phenomena.

- Check fastening of the unit external panelling.

Bad fastening give rise to anomalous noises and vibrations.

## 12.16 Air side exchanger

- ▶ **Accidental contact with the exchanger fins can cause cutting injuries: use protective gloves.**

The coil must give the maximum thermal exchange, therefore its surface must be cleaned from dirt and incrustations.

Clean at least every three months.

The cleaning frequency must be increased according to the build-up of dirt/dust and the environment (e.g. coastal

areas with chlorides and salts or industrial areas with aggressive substances).

Clean the air inlet side.

Use a soft brush, vacuum dirt exhauster, pressurised air jet or high-pressure washer.

Keep the direction parallel to the fins to avoid damage.

Check that the aluminium fins are not bent or damaged, in the event of damages contact the authorised service centre which will “comb” the coil to restore optimal air flow

## 12.17 Electric fans

Check:

- ensure that the fan and its protection grilles are fixed properly
- the fan bearings (anomalies are indicated by abnormal noise and vibrations)
- the terminal protection covers are closed and the cable holders are properly positioned

## 13. Decommissioning

### 13.1 Disconnection

#### Warning

- **Before performing any work, carefully read: SAFETY WARNINGS FOR OPERATIONS ON UNITS CONTAINING R32**

Avoid leak or spills into the environment.

Before disconnecting the unit, the following must be recovered, if present:

- refrigerant gas
- Anti-freeze solutions in the hydraulic circuit

Awaiting decommissioning and disposal, the unit can also be stored outdoors, as bad weather and rapid changes in temperature do not harm the environment provided that the electric, cooling and hydraulic circuits of the unit are intact and closed.

### 13.2 WEEE INFORMATION

The manufacturer is registered on the EEE National Register, in compliance with implementation of Directive 2012/19/EU and relevant national regulations on waste electrical and electronic equipment.

This Directive requires electrical and electronic equipment to be disposed of properly.

Equipment bearing the crossed-out wheelee bin mark must be disposed of separately at the end of its life cycle to prevent damage to human health and to the environment.

Electrical and electronic equipment must be disposed of together with all of its parts.

To dispose of “household” electrical and electronic equipment, the manufacturer recommends you contact an authorised dealer or an authorised ecological area.

“Professional” electrical and electronic equipment must be disposed of by authorised personnel through established waste disposal authorities around the country.

In this regard, here is the definition of household WEEE and professional WEEE:

WEEE from private households: WEEE originating from private households and WEEE which comes from commercial, industrial, institutional and other sources which, because of its nature and quantity, is similar to that from private households. Subject to the nature and quantity, where the waste from EEE was likely to have been by both a private household and users of other than private households, it will be classed as private household WEEE;

Professional WEEE: all WEEE which comes from users other than private households.

This equipment may contain:

- refrigerant gas, the entire contents of which must be recovered in suitable containers by specialised personnel with the necessary qualifications;

- lubrication oil contained in compressors and in the refrigeration circuit to be collected;
- mixtures with antifreeze in the water circuit, the contents of which are to be collected;
- mechanical and electrical parts to be separated and disposed of as authorised.

When machine components to be replaced for maintenance purposes are removed or when the entire unit reaches the end of its life and needs to be removed from the installation, waste should be separated by its nature and disposed of by authorised personnel at existing collection centres.



## 14. Residual risks

### 14.1 General

In this section the most common situations are indicated, as these cannot be controlled by the manufacturer and could be a source of risk situations for people or things.

### 14.2 Danger zone

This is an area in which only an authorised operator may work.

The danger zone is the area inside the unit which is accessible only with the deliberate removal of protections or parts thereof.

### 14.3 Handling

The handling operations, if implemented without all of the protection necessary and without due caution, may cause the drop or the tipping of the unit with the consequent damage, even serious, to persons, things or the unit itself.

Handle the unit following the instructions provided in the present manual re-garding the packaging and in compliance with the local regulations in force.

Should the refrigerant leak please refer to the refrigerant "Safety sheet".

### 14.4 Installation

The incorrect installation of the unit could cause water leaks, condensate accumulation, leaking of the refrigerant, electric shock, poor operation or damage to the unit itself.

Check that the installation has been implemented by qualified technical personnel only and that the instructions contained in the present manual and the local regulations in force have been adhered to.

The installation of the unit in a place where even unfrequent leaks of flammable gas and the accumulation of this gas in the area surrounding the area occur could cause explosions or fires.

Carefully check the positioning of the unit.

The installation of the unit in a place unsuited to support its weight and/or guarantee adequate anchorage may result in consequent damage to things, people or the unit itself.

Carefully check the positioning and the anchoring of the unit.

Easy access to the unit by children, unauthorised persons or animals may be the source of accidents, some serious.

Install the unit in areas which are only accessible to authorised person and/or provide protection against intrusion into the danger zone.

### 14.5 General risks

Smell of burning, smoke or other signals of serious anomalies may indicate a situation which could cause damage to people, things or the unit itself.

Electrically isolate the unit (yellow-red isolator).

Contact the authorised service centre to identify and resolve the problem at the source of the anomaly.

Accidental contact with exchange batteries, compressors, air delivery tubes or other components may cause injuries and/or burns.

Always wear suitable clothing including protective gloves to work inside the danger zone.

Maintenance and repair operations carried out by non-qualified personnel may cause damage to persons, things or the unit itself.

Always contact the qualified assistance centre.

Failing to close the unit panels or failure to check the correct tightening of all of the panelling fixing screws may cause damage to persons, things or the unit itself.

Periodically check that all of the panels are correctly closed and fixed.

If there is a fire the temperature of the refrigerant could reach values that increase the pressure to beyond the safety valve with the consequent possible projection of the refrigerant itself or explosion of the circuit parts that remain isolated by the closure of the tap.

Do not remain in the vicinity of the safety valve and never leave the refrigerating system taps closed.

### 14.6 Electric parts

An incomplete attachment line to the electric network or with incorrectly sized cables and/or unsuitable protective devices can cause electric shocks, intoxication, damage to the unit or fires.

Carry out all of the work on the electric system referring to the electric layout and the present manual ensuring the use of a system thereto dedicated.

An incorrect fixing of the electric components cover may lead to the entry of dust, water etc inside and may consequently electric shocks, damage to the unit or fires.

Always fix the unit cover properly.

When the metallic mass of the unit is under voltage and is not correctly connected to the earthing system it may be as source of electric shock and electrocution.

Always pay particular attention to the implementation of the earthing system connections.

Contact with parts under voltage accessible inside the unit after the removal of the guards can cause electric shocks, burns and electrocution.

Open and padlock the general isolator prior to removing the guards and signal work in progress with the appropriate sign.

Contact with parts that could be under voltage due to the start up of the unit may cause electric shocks, burns and electrocution.

When voltage is necessary for the circuit open the isolator on the attachment line of the unit itself, padlock it and display the appropriate warning sign.

### **14.7 Moving parts**

Contact with the transmissions or with the fan aspiration can cause injuries.

Prior to entering the inside of the unit open the isolater situated on the con-nection line of the unit itself, padlock and display the appropriate warning sign.

Contact with the fans can cause injury.

Prior to removing the protective grill or the fans, open the isolator on the attachment line of the unit itself, padlock it and display the appropriate warning sign.

### **14.8 Refrigerant**

The intervention of the safety valve and the consequent expulsion of the gas refrigerant may cause injuries and intoxication.

Always wear suitable clothing including protective gloves and eyeglasses for operations inside the danger zone.

Should the refrigerant leak please refer to the refrigerant "Safety sheet".

Contact between open flames or heat sources with the refrigerant or the heating of the gas circuit under pressure (e.g. during welding operations) may cause explosions or fires.

Do not place any heat source inside the danger zone.

The maintenance or repair interventions which include welding must be carried out with the system off.

### **14.9 Hydraulic parts**

Defects in tubing, the attachments or the removal parts may cause a leak or water projection with the consequent damages to people, things or shortcircuit the unit.

## 15. Unit in modular configuration

Maximum number of connectable units: **16**

The system is completely controlled by the Master unit.

Each module can be equipped with an inertial system storage tank.

Each unit with DHW option must have its own DHW tank.

### 15.1 Control logic

In a cascade system, Tw (supply water flow temperature for the entire system) and TWS (set point temperature) are measured by the master unit.

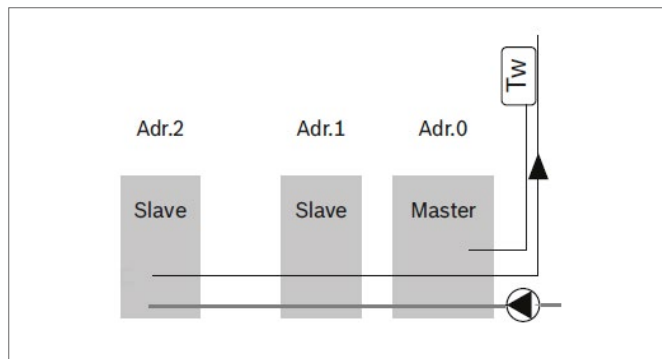
The master unit will periodically (standard time 80 seconds) evaluate the current load based on the outlet water temperature, the set point distance and speed difference of the water temperature.

Depending on evaluation of the load performed by the master unit, the number of units running will either be kept stable, increased or reduced.

Once it is switched on, a unit will continue to operate according to its own logic (T4, water temperature, etc.).

### 15.2 Tw control probe

The TW probe must be installed on the supply line of the unit, as far away as possible.



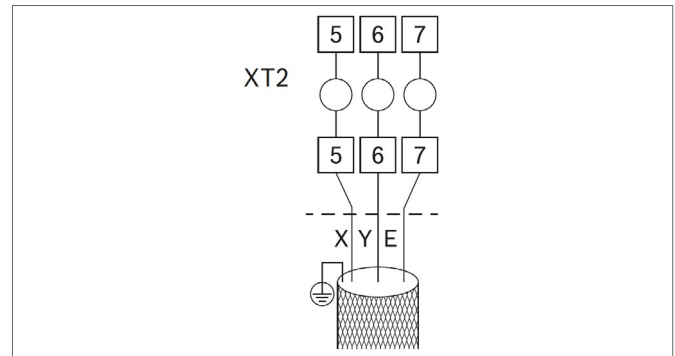
### 15.3 Domestic hot water

In a cascade system with DHW provision, the system configuration must be as follows:

each unit must be fitted with its own pump, the S12-2 dial on all the units must be ON. Each unit must be fitted with its own external DHW boiler because the DHW load will be evaluated by each slave unit. In a system containing units with and without DHW valve, the highest address numbers must be assigned to the DHW units.

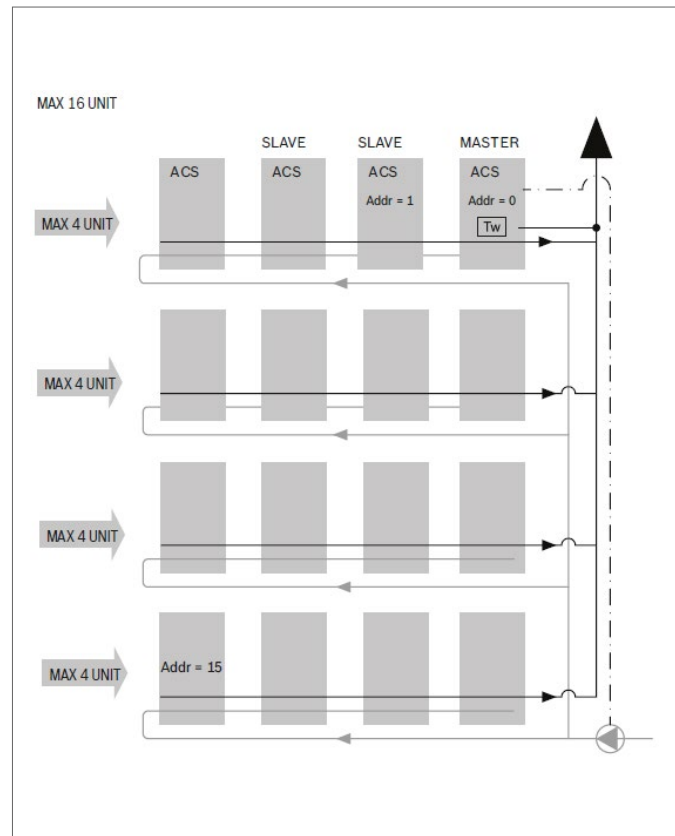
### 15.4 Electrical connections

All units must be electrically connected to each other via the X-Y-E BUS.



The TW outlet water temperature control probe, the flow switch and the backup electric heater must be controlled by the master unit.

### 15.5 System with reversed return connection



### 15.6 Input and output manifolds

Cooling capacity (kW)		In-out water piping
Min	Max	
15	30	DN40
30	90	DN50
90	130	DN65
130	210	DN80
210	325	DN100
325	510	DN125
510	740	DN150
740	1300	DN200
1300	2080	DN250

### 15.7 Single/multiple pump system

Configure DIP switch S12-2 according to the type of system.

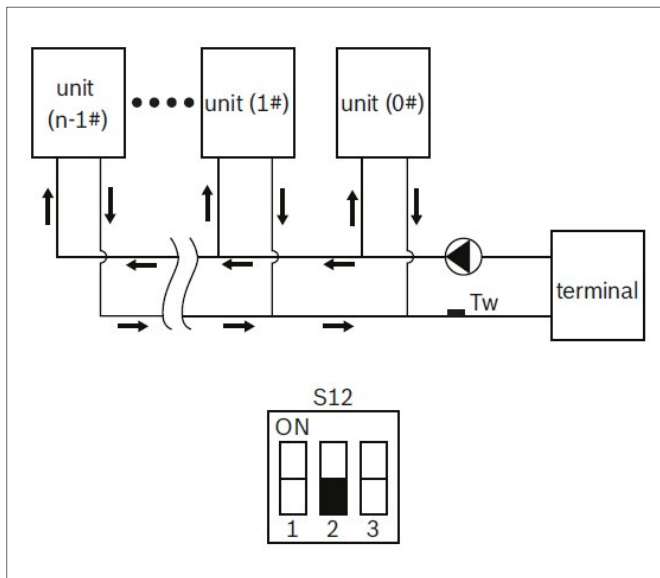
- ▶ In case of an external pump, in order to ensure correct operation of the unit, the control for switching the pump on/off must be carried out from the unit via the contact described above.

#### 15.7.1 Single water pump

When the pump's periodic function is set, its function is the same as that of a single unit system: it is also recommended to disable the periodic function for slave pumps via the HMI.

A check valve is not required in this configuration.

Pump control is only enabled on the master unit



#### 15.7.2 Multiple water pumps

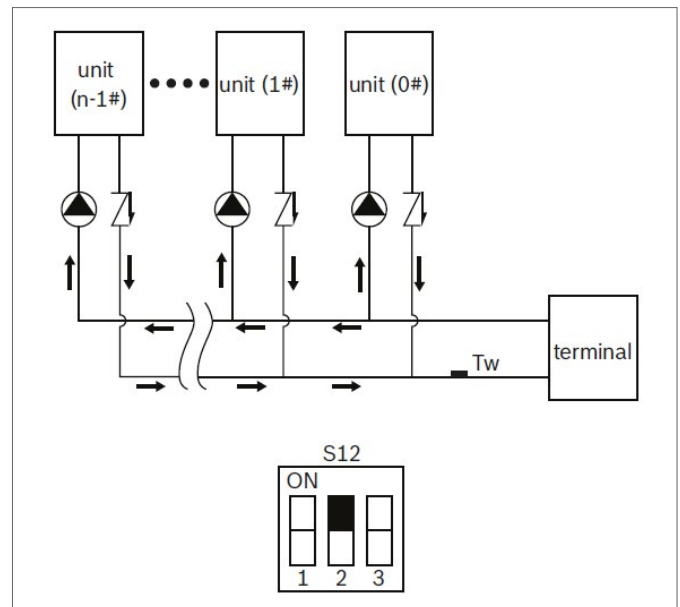
The periodic function of the pump connected to the master unit operates with the logic of a single-unit system.

The periodic function of the pump connected to the master unit operates with the logic of a single-unit system:

- when a slave unit X reaches the set temperature or is switched off, pump X switches off after a delay of 2 minutes. Subsequently, pump X operates for 2 minutes every 20 minutes (this function is not valid when the system is in DHW mode, i.e. domestic hot water).

A check valve is required for each unit in this configuration.

Pump control is enabled on each unit



### 15.8 Addressing

Each connected module is identified by an address, from 0 to 15: the Master unit is identified as 0.

Set the correct date and time on each unit before connecting them to the network

Enable multiple configuration on each unit:

SW12-2 : |t|l

- ON units with on-board pump
- OFF units without on-board pump and a single pump in the system

The modular configuration consists of two networks: the controller network and the unit network (main boards).

Each network can have up to 16 addresses (from 0 to 15) and must be addressed separately.

Each network has its own master, which must have address = 0.

If some of the slave units do not have the DHW option:

- configure a unit without a DHW option as the master.
- assign the higher addresses to the slave units with DHW option

### 15.8.1 Addressing units

Units are addressed using encoder ENC4 on the back of the board.

The address is the number on the encoder.

The address is shown on display DSP1.

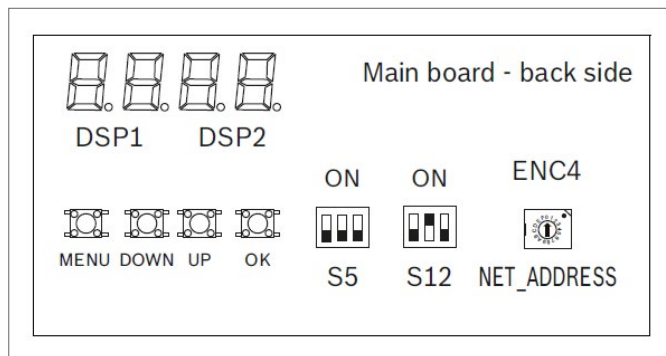
E.g.:

MASTER : address = 0 encoder = 0

SLAVE 1 : address = 1 encoder = 1

SLAVE 15 : address = 15 encoder = F

The address of the unit is shown on display "DSP1" on the main board.



### 15.8.2 Addressing controls

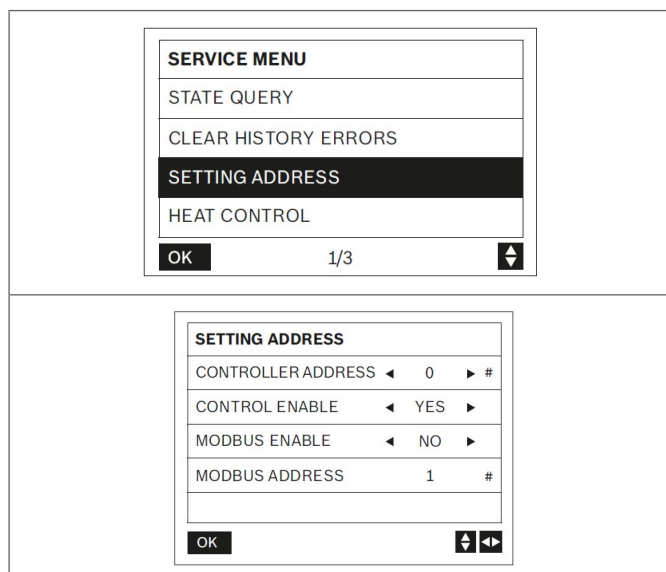
Up to 16 controls can be addressed, from 0 to 15; for example:

- 16 units with relative controller on board, one of which is the master
- 15 units with relative controller on board + a remote controller as the master

Press ▼▲ to select SETTING ADDRESS.

Press ◀▶ to set the address

Press OK to confirm



### 15.9 Remote ON-OFF

With the units in modular configuration, remote control

must be applied to the master unit, which transmits it to the slave units.

### 15.10 Start-up

Complete system management is carried out by the master unit, identified by address 0.

Thermoregulation takes place on the supply temperature of the entire system ( $T_w$ ).

At switch-on, when a load is requested, the units are switched on in sequence based on their address, in numerical order.

When the load decreases, the units are switched off following the same sequence.

Example in cooling mode:

If  $T_w \geq \text{set point} + 10^\circ\text{C}$

- the control activates 50% of the resources in sequence based on the set address.
- after a time interval (default: 240 seconds)
- if the load increases, additional resources are activated
- if the load decreases, the units are switched off following the same sequence (first start, first stop).

If  $T_w < \text{set point} + 10^\circ\text{C}$  (in cooling mode)

- the control activates only the master unit.
- after a time interval (default: 240 seconds)
- if the load increases, additional resources are activated based on the set address
- if the load decreases, the master unit switches off.

### 15.11 Alarms

In the event of an alarm on one of the system units, there could be different outcomes:

- in the event of an alarm on a slave unit, the other system units will continue to operate
- in the event of a communication or common sensor alarm on the master unit, the entire system will stop.

## 16. Modbus

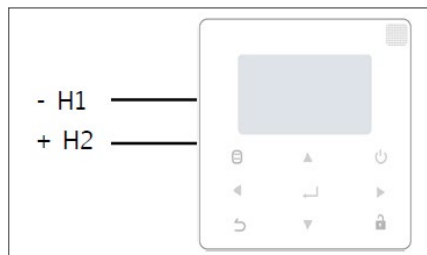
### 16.1 Communication specifications: RS - 485

Protocol	ModbusRTU: 9600, 8, N,1
Transmission speed	9600pbs
Data bit	8 data bits
Parity bit	None parity
Stop bit	1 stop bit

#### Connections

Connect on the back of the controller.

Modular unit: connect the Modbus to the master unit port.



#### Enabling

SERVICE MENU → SETTING ADDRESS → Modbus enable → YES

Available data is in English

Reg	Data Type	R/W	Name	Description
0	S16	R&W	Running mode	<b>Range:</b> HP: 1-Cool, 2-Heat, 4-DHW, 8-OFF FC/CO: 1-Cool, 8-OFF <b>Default:</b> 8-OFF <b>Unit of measurement:</b> - <b>Notes:</b> DHW mode setting is NOT valid for slave units of multi pump system which uses dedicated item at address 207
1	S16	R&W	Double setpoint temperature Tws 1	<b>Range:</b> CO/FC cooling mode: -8 ~ 20 HP cooling mode: 0 ~ 20 HP heating mode: 25 ~ 60 <b>Default:</b> CO/FC: 7 HP cooling mode: 7 HP heating mode: 35 <b>Unit of measurement:</b> [°C] <b>Notes:</b>
2	S16	R&W	Double setpoint temperature Tws 2	<b>Range:</b> CO/FC cooling mode: -8 ~ 20 HP cooling mode: 0 ~ 20 HP heating mode: 25 ~ 60 <b>Default:</b> CO/FC 10 HP cooling mode: 10 HP heating mode: 30 <b>Unit of measurement:</b> [°C] <b>Notes:</b>
3	S16	R&W	Offset temperature (OFFSET-C/ OFFSET-H)	<b>Range:</b> Cooling mode 0 ~ 15 Heating mode: 0 ~ 30In <b>Default:</b> Cooling mode: 10 Heating mode: 10 <b>Unit of measurement:</b> [°C] <b>Notes:</b>
4	S16	R&W	DHW set temperature - T5S	<b>Range:</b> 30 ~ 70 <b>Default:</b> 50 <b>Notes:</b> Available only for HP <b>Unit of measurement:</b> [°C]"
5	S16	R&W	Reserved	
6	S16	R&W	Clear lock errors	<b>Range:</b> 0-Invalid, 1-Clear all the lock errors <b>Default:</b> 0-Invalid <b>Unit of measurement:</b> - <b>Notes:"</b>
7	S16	R&W	Snow blowing function	<b>Range:</b> 0 - OFF, 1 - ON <b>Default:</b> 1 - ON <b>Unit of measurement:</b> - <b>Notes:</b>

Reg	Data Type	R/W	Name	Description
8	S16	R&W	Out pressure switch setting	Static pressure setting <b>Range:</b> 0 - static pressure, 1 - low static pressure, 2 - medium static pressure, 3 - high static pressure <b>Default:</b> 0 - static pressure <b>Unit of measurement:</b> - <b>Notes:</b>
9	S16	R&W	Smart grid	Smart grid function enable <b>Range:</b> 0 - All function disabled, 1 - SG enable, 2 - EVU enable, 3 - SG and EVU enable <b>Default:</b> 0 - All functions disabled <b>Unit of measurement:</b> - <b>Notes:"</b>
10 ~ 99			RESERVED	
100	S16	R&W	Silent mode	<b>Range:</b> 1 - Standard, 2 - Silent mode, 3 - Night silent mode, 7 - Super silent mode <b>Default:</b> 1 - Standard <b>Unit of measurement:</b> - <b>Notes:</b>
101	S16	R&W	Double setpoint	<b>Range:</b> 0 - Disable, 1 - Enable <b>Default:</b> 0 - Disable <b>Unit of measurement:</b> - <b>Notes:</b>
102	S16	R&W	Double setpoint temperature Tws 1 in cooling mode	<b>Range:</b> CO/FC : -8 ~ 20 HP: 0 ~ 20 <b>Default:</b> 7 <b>Unit of measurement:</b> [°C] <b>Notes:</b>
103	S16	R&W	Double setpoint temperature Tws 2 in cooling mode	<b>Range:</b> CO/FC : -8 ~ 20 HP: 0 ~ 20 <b>Default:</b> 10 <b>Unit of measurement:</b> [°C] <b>Notes:"</b>
104	S16	R&W	Double setpoint temperature Tws 1 in heating mode	<b>Range:</b> HP : 25 ~ 60 <b>Default:</b> 35 <b>Unit of measurement:</b> [°C] <b>Notes:</b>
105	S16	R&W	Double setpoint temperature Tws 2 in heating mode	<b>Range:</b> HP: 25 ~ 60 <b>Default:</b> 30 <b>Unit of measurement:</b> [°C] <b>Notes:</b>
106	S16	R&W	Temperature compensation enable in cooling mode	<b>Range:</b> 0 - Disable, 1 - Enable <b>Default:</b> 0 - Disable <b>Unit of measurement:</b> - <b>Notes:"</b>
107	S16	R&W	T4 COOL 1	Temperature compensation point 1 in cooling mode <b>Range:</b> 15 ~ 30 <b>Default:</b> 25 <b>Unit of measurement:</b> [°C] <b>Notes:"</b>
108	S16	R&W	T4 COOL 2	Temperature compensation point 2 in cooling mode <b>Range:</b> 40 ~ 45 <b>Default:</b> 40 <b>Unit of measurement:</b> [°C] <b>Notes:</b>
109	S16	R&W	OFFSET-C	Temperature compensation offset in cooling mode <b>Range:</b> 0 ~ 15 <b>Default:</b> 10 <b>Unit of measurement:</b> [°C] <b>Notes:"</b>
110	S16	R&W	Temperature compensation enable in heating mode	<b>Range:</b> 0 - Disable, 1 - Enable <b>Default:</b> 0 - Disable <b>Unit of measurement:</b> - <b>Notes:</b>
111	S16	R&W	T4 HEAT 1	Temperature compensation point 1 in heating mode <b>Range:</b> -15 ~ -10 <b>Default:</b> -10 <b>Unit of measurement:</b> [°C] <b>Notes:</b>
112	S16	R&W	T4 HEAT 2	Temperature compensation point 2 in cooling mode <b>Range:</b> 15 ~ 30 <b>Default:</b> 15 <b>Unit of measurement:</b> [°C] <b>Notes:</b>
113	S16	R&W	OFFSET-H	Temperature compensation offset in cooling mode <b>Range:</b> 0 ~ 30 <b>Default:</b> 10 <b>Unit of measurement:</b> [°C] <b>Notes:</b>
114	S16	R&W	Heat 2 force on	<b>Range:</b> 0 - No, 1 - Yes <b>Default:</b> 0 - No <b>Unit of measurement:</b> -lnl <b>Notes:</b> Only valid for single pump system"
115	S16	R&W	DHW enable	<b>Range:</b> 0 - Disable, 1 - Enable <b>Default:</b> 0 - Disable <b>Unit of measurement:</b> - <b>Notes:</b> Only valid for single pump system"
116	S16	R&W	T_Cool_Diff	Differential temperature in cooling mode <b>Range:</b> 1 ~ 5lnl <b>Default:</b> 2 <b>Unit of measurement:</b> [°C] <b>Notes:</b>
117	S16	R&W	T_Heat_Diff	Differential temperature in heating mode <b>Range:</b> 1 ~ 5lnl <b>Default:</b> 2 <b>Unit of measurement:</b> [°C] <b>Notes:"</b>
118	S16	R&W	dT5_ON	Return hot water temperature difference <b>Range:</b> 2 ~ 10lnl <b>Default:</b> 8 <b>Unit of measurement:</b> [°C] <b>Notes:"</b>
119	U16	R&W	T_Heat1_Delay	Heat1 start time delay <b>Range:</b> 60 ~ 240 <b>Default:</b> 90 <b>Unit of measurement:</b> [min] <b>Notes:</b> Valid only for HP models"

Reg	Data Type	R/W	Name	Description
120	S16	R&W	dTw_Heat1_Off	<b>Range:</b> 2 ~ 10 <b>Default:</b> 5 <b>Unit of measurement:</b> [°C] <b>Notes:</b> Valid only for HP models
121	S16	R&W	Tw differential temperature (TW_COOL_DIFF/TW_HEAT_DIFF)	<b>Range:</b> 1 ~ 5 <b>Default:</b> 2 <b>Unit of measurement:</b> [°C] <b>Notes:</b>
122	S16	R&W	Ratio_Cool_First	Initial turn on ratio of cascade system in cooling mode <b>Range:</b> 5 ~ 100 <b>Default:</b> 50 <b>Unit of measurement:</b> [%] <b>Notes:</b> 5% step
123	S16	R&W	Ratio_Heat_First	Initial turn on ratio of cascade system in heating mode <b>Range:</b> 5 ~ 100 <b>Default:</b> 50 <b>Unit of measurement:</b> [%] <b>Notes:</b> 5% step"
124	S16	R&W	T_diff_pro	Inlet and outlet water temperature difference protection <b>Range:</b> 5 ~ 100 <b>Default:</b> 50 <b>Unit of measurement:</b> [%] <b>Notes:</b> 5% step"
125	S16	R&W	T_Frost	Defrost cycle time <b>Range:</b> 20 ~ 180 <b>Default:</b> 45 <b>Unit of measurement:</b> [min] <b>Notes:</b>
126	S16	R&W	T_Defrost_in	Defrost entry temperature <b>Range:</b> -5 ~ 5 <b>Default:</b> -2 <b>Unit of measurement:</b> [°C] <b>Notes:</b>
127	S16	R&W	T_Defrost_out	Defrost exit temperature <b>Range:</b> -10 ~ 10 <b>Default:</b> 0 <b>Unit of measurement:</b> [°C] <b>Notes:</b>
128	S16	R&W	Heat 1 enable	<b>Range:</b> 0 - Disable, 1 - Enable <b>Default:</b> 0 - Disable <b>Unit of measurement:</b> - <b>Notes:</b>
129	S16	R&W	T4_Heat1_On	<b>Range:</b> -5 ~ 20 <b>Default:</b> 5 <b>Unit of measurement:</b> [°C] <b>Notes:</b>
130	S16	R&W	Tw_Heat1_On	<b>Range:</b> -5 ~ 20 <b>Default:</b> 5 <b>Unit of measurement:</b> [°C] <b>Notes:</b> Valid only for FC/CO models"
131	S16	R&W	Tw_Heat1_Off	<b>Range:</b> -5 ~ 20 <b>Default:</b> 5 <b>Unit of measurement:</b> [°C] <b>Notes:</b> Valid only for FC/CO models"
132	S16	R&W	Heat 2 enable	<b>Range:</b> 0 - Disable, 1 - Enable <b>Default:</b> 0 - Disable <b>Unit of measurement:</b> - <b>Notes:</b> Only valid for single pump system with DHW function"
133	S16	R&W	T_Heat2_delay	Heat 2 turn on delay <b>Range:</b> 60 ~ 240 <b>Default:</b> 90 <b>Unit of measurement:</b> [min] <b>Notes:</b> 5 min step. Only valid for single pump system with DHW function"
134	S16	R&W	dT5_Heat2_Off	<b>Range:</b> 2 ~ 10 <b>Default:</b> 5 <b>Unit of measurement:</b> [min] <b>Notes:</b> Only valid for single pump system with DHW function"
135	S16	R&W	T4_Heat2_On	<b>Range:</b> -5 ~ 20 <b>Default:</b> 5 <b>Unit of measurement:</b> [°C] <b>Notes:</b> Only valid for single pump system with DHW function"
136	S16	R&W	Inverter pump enable	<b>Range:</b> 0 - Disable, 1 - Enable <b>Default:</b> 0 - Disable <b>Unit of measurement:</b> - <b>Notes:</b> Valid only for single pump system"
137	S16	R&W	Inverter pump running speed	<b>Range:</b> 30 ~ 100 <b>Default:</b> 100 <b>Unit of measurement:</b> [%] <b>Notes:</b> 5% step. Only valid if register 136 is enabled "
138	S16	R&W	Modbus control enable	<b>Range:</b> 0 - Disable, 1 - Enable <b>Default:</b> 0 - Disable <b>Unit of measurement:</b> - <b>Notes:</b> Enable this item bofer writing other Modbus registers"
139	S16	R&W	Glycol type	<b>Range:</b> 0 - Ethylene, 1 - Propylene <b>Default:</b> 0 - Ethylene <b>Unit of measurement:</b> - <b>Notes:</b> "
140	S16	R&W	Glycol percentage	<b>Range:</b> 0 ~ 50 <b>Default:</b> 0 <b>Unit of measurement:</b> [%] <b>Notes:</b> 5% step"
141	S16	R&W	Paf offset	Protection pressure compensation <b>Range:</b> 0 ~ 20 <b>Default:</b> 0 <b>Unit of measurement:</b> 0.01Mpa <b>Notes:</b> step of 5 "

Reg	Data Type	R/W	Name	Description
142	S16	R&W	Water coil control	<b>Range:</b> 0 - Automatic, 1 - Manual1 (through), 2 - Manual2 (bypass) <b>Default:</b> 0 - Automatic <b>Unit of measurement:</b> - <b>Notes:</b> Valid only on FC units"
143	S16	R&W	DtTws	Tws rising value after entering mix <b>Range:</b> 1 ~ 3 <b>Default:</b> 1 <b>Unit of measurement:</b> [°C] <b>Notes:</b> Only valid for FC/CO unit"
144	S16	R&W	Dtmix	Enter mix hysteresis <b>Range:</b> 1 ~ 3 <b>Default:</b> 2 <b>Unit of measurement:</b> [%] <b>Notes:</b> Only valid for FC/CO unit"
145	S16	R&W	FC Offset	FC enter offset <b>Range:</b> 1 ~ 15 <b>Default:</b> 3 <b>Unit of measurement:</b> [°C] <b>Notes:</b> Only valid for FC/CO unit"
146	S16	R&W	FC Hyster	FC enter hysteresis <b>Range:</b> 1 ~ 3 <b>Default:</b> 1 <b>Unit of measurement:</b> [°C] <b>Notes:</b> Only valid for FC/CO unit"
147	S16	R&W	TWI_O ABNORMAL	Abnormal differ between inlet and outlet water temperature <b>Range:</b> 1 ~ 5 <b>Default:</b> 2 <b>Unit of measurement:</b> [°C] <b>Notes:</b>
148	S16	R&W	Low outlet water control	<b>Range:</b> 0 ~ 20 <b>Default:</b> 7 <b>Unit of measurement:</b> [°C] <b>Notes:</b>
149	S16	R&W	Power limit	Energy saving level <b>Range:</b> 40 ~ 100 <b>Default:</b> 40 <b>Unit of measurement:</b> [%] <b>Notes:</b> 10% step"
150	S16	R&W	E9 protection time	Water flow switch protection time <b>Range:</b> 2 ~ 20 <b>Default:</b> 5 <b>Unit of measurement:</b> [s] <b>Notes:</b>
151	S16	R&W	E9 detection method	<b>Range:</b> 0 - Water flow detected before the pump is turned on, 1 - Water flow switch is detected after the pump is turned on <b>Default:</b> 0 <b>Unit of measurement:</b> - <b>Notes:</b>
152	S16	R&W	Inverter pump MIN speed	<b>Range:</b> 40 ~ Max(100, Inverter pump MAX speed) <b>Default:</b> 75 <b>Unit of measurement:</b> [%] <b>Notes:</b> 5% step. Only valid for multiple pump system"
153	S16	R&W	Inverter pump MAX speed	<b>Range:</b> MIN(70, Inverter pump MIN speed) ~ 100 <b>Default:</b> 75 <b>Unit of measurement:</b> [%] <b>Notes:</b> 5% step. Only valid for multiple pump system"
154	S16	R&W	Pump turn on time	<b>Range:</b> 5 ~ 60 <b>Default:</b> 5 <b>Unit of measurement:</b> [min] <b>Notes:</b> 5 min step"
155	S16	R&W	Pump turn off time	<b>Range:</b> 0 ~ 60 <b>Default:</b> 0 <b>Unit of measurement:</b> [%] <b>Notes:</b> 5 min step"
156	S16	R&W	TW_COOL_DIFF	Differential temperature Tw in cooling mode <b>Range:</b> 1 ~ 5 <b>Default:</b> 2 <b>Unit of measurement:</b> [°C] <b>Notes:</b>
157	S16	R&W	TW_HEAT_DIFF	Differential temperature Tw in heating mode <b>Range:</b> 1 ~ 5 <b>Default:</b> 2 <b>Unit of measurement:</b> [°C] <b>Notes:</b> "
158	U16	R&W	Heat1Forceon	
158 ~ 199			RESERVED	
200+(Unit Address)*100	S16	R&W	RESERVED	
201+(Unit Address)*100	S16	R&W	Heat 2 enable	<b>Range:</b> 0 - Disable, 1 - Enable <b>Default:</b> 0 - Disable <b>Unit of measurement:</b> - <b>Notes:</b> Only valid for multi pump systems with DHW function"
202+(Unit Address)*100	S16	R&W	Heat 2 force on	<b>Range:</b> 0 - OFF, 1 - ON <b>Default:</b> 0 - OFF <b>Unit of measurement:</b> - <b>Notes:</b> Only valid for multi pump systems with DHW function"
203+(Unit Address)*100	S16	R&W	T-HEAT2-DELAY	Heat 2 opening delay <b>Range:</b> 60 ~ 240 <b>Default:</b> 90 <b>Unit of measurement:</b> [min] <b>Notes:</b> Only valid for multi pump systems with DHW function"
204+(Unit Address)*100	S16	R&W	DT-HEAT2-OFF	Heat2 turn off delta temperature <b>Range:</b> 2 ~ 10 <b>Default:</b> 5 <b>Unit of measurement:</b> [°C] <b>Notes:</b> Only valid for multi pump systems with DHW function"

Reg	Data Type	R/W	Name	Description
205+(Unit Address)*100	S16	R&W	T4-HEAT2-ON	<b>Range:</b> -5 ~ 20 <b>Default:</b> 5 <b>Unit of measurement:</b> [°C] <b>Notes:</b> Only valid for multi pump systems with DHW function"
206+(Unit Address)*100	S16	R&W	DHW enable	<b>Range:</b> 0 - Disable, 1 - Enable <b>Default:</b> 0 - Disable <b>Unit of measurement:</b> - <b>Notes:</b> Only valid for multi pump systems "
207+(Unit Address)*100	S16	R&W	DHW turn on	<b>Range:</b> 0 - OFF, 1 - ON <b>Default:</b> 0 - OFF <b>Unit of measurement:</b> - <b>Notes:</b> Only valid for multi pump systems "
208+(Unit Address)*100	S16	R&W	DHW priority	<b>Range:</b> 0 - OFF, 1 - ON <b>Default:</b> 0 - OFF <b>Unit of measurement:</b> - <b>Notes:</b> Only valid for multi pump systems "
209+(Unit Address)*100	S16	R&W	DHW cooling MAX running time	<b>Range:</b> 1 ~ 48 <b>Default:</b> 16 <b>Unit of measurement:</b> [min] <b>Notes:</b> Only valid for multi pump systems with DHW function
210+(Unit Address)*100	S16	R&W	DHW cooling MIN running time	<b>Range:</b> 1 ~ 48 <b>Default:</b> 1 <b>Unit of measurement:</b> [min] <b>Notes:</b> Only valid for multi pump systems with DHW function"
211+(Unit Address)*100	S16	R&W	DHW heating MAX running time	<b>Range:</b> 1 ~ 48 <b>Default:</b> 16 <b>Unit of measurement:</b> [min] <b>Notes:</b> Only valid for multi pump systems with DHW function
212+(Unit Address)*100	S16	R&W	DHW heating MIN running time	<b>Range:</b> 1 ~ 48 <b>Default:</b> 1 <b>Unit of measurement:</b> [min] <b>Notes:</b> Only valid for multi pump systems with DHW function
213+(Unit Address)*100	S16	R&W	DHW MAX running time in DHW mode	<b>Range:</b> 1 ~ 48 <b>Default:</b> 4 <b>Unit of measurement:</b> [min] <b>Notes:</b> Only valid for multi pump systems with DHW function"
214+(Unit Address)*100	S16	R&W	DHW MIN running time in DHW mode	<b>Range:</b> 1 ~ 48 <b>Default:</b> 1 <b>Unit of measurement:</b> [min] <b>Notes:</b> Only valid for multi pump systems with DHW function"
215+(Unit Address)*100	S16	R&W	Inverter pump enable	<b>Range:</b> 0 - Disable, 1 - Enable <b>Default:</b> 0 - Disable <b>Unit of measurement:</b> - <b>Notes:</b> Only valid for multi pump systems
216+(Unit Address)*100	S16	R&W	Inverter pump running speed	<b>Range:</b> 30 ~ 100 <b>Default:</b> 100 <b>Unit of measurement:</b> [%] <b>Notes:</b> 5% step. Only valid for multi pump systems
217+(Unit Address)*100	S16	R&W	T5S	Water tank setpoint <b>Range:</b> 30 ~ 60 <b>Default:</b> 50 <b>Unit of measurement:</b> [°C] <b>Notes:</b> Only valid for multi pump systems with DHW function
218+(Unit Address)*100	U16	R&W	DHW Disinfect Enable	<b>Range:</b> 0 - Disable, 1 - Enable <b>Default:</b> 0 - Disable <b>Unit of measurement:</b> <b>Notes:</b>
219+(Unit Address)*100	U16	R&W	DHW Disinfect Days Set	<b>Range:</b> <b>Default:</b> <b>Unit of measurement:</b> <b>Notes:</b>
220+(Unit Address)*100	U16	R&W	DHW Disinfect time	<b>Range:</b> 00:00~24:00 <b>Default:</b> 24:00 <b>Unit of measurement:</b> [min] <b>Notes:</b>
221+(Unit Address)*100	U16	R&W	DHW Disinfect Maxtime	<b>Range:</b> 00:00~24:00 <b>Default:</b> 24:00 <b>Unit of measurement:</b> [min] <b>Notes:</b>
(2 ~ 229)+(Unit Address)*100			RESERVED	
230+(Unit Address)*100		RO	RESERVED	
231+(Unit Address)*100		RO	RESERVED	
232+(Unit Address)*100	U16	RO	Current capacity	Real time capacity <b>Range:</b> 0 ~ 65535 <b>Default:</b> - <b>Unit of measurement:</b> [kW] <b>Notes:</b>
233+(Unit Address)*100	U16	RO	Current power	Real time power consumption <b>Range:</b> 0 ~ 65535 <b>Default:</b> - <b>Unit of measurement:</b> [kW] <b>Notes:</b>
234+(Unit Address)*100	U16	RO	Current efficiency	(Current capacity / Current power)*10 <b>Range:</b> <b>Default:</b> - <b>Unit of measurement:</b> - <b>Unit:</b>
235+(Unit Address)*100	U16	RO	Total capacity	<b>Range:</b> 0 ~ 65535 <b>Default:</b> - <b>Unit of measurement:</b> [MWh] <b>Notes:</b>
236+(Unit Address)*100	U16	RO	Total power	Total power consumption <b>Range:</b> 0 ~ 65535 <b>Default:</b> - <b>Unit of measurement:</b> [MWh] <b>Notes:</b>
(237 ~ 239)+(Unit Address)*100			RESERVED	

Reg	Data Type	R/W	Name	Description
240+(Unit Address)*100	S16	RO	ODU running mode	<b>Range:</b> 1 - Off, 2 - Cooling, 3 - Heating, 4 - DHW <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b>
241+(Unit Address)*100	S16	RO	Silent mode	<b>Range:</b> 1 - Standard, 2 - Silent, 3 - Night silent, 7 - Super silent <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b>
242+(Unit Address)*100	S16	RO	T5S	Water tank setpoint <b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [°C] <b>Notes:</b> Invalid value 0x8000
243+(Unit Address)*100	S16	RO	RESERVED	
244+(Unit Address)*100	S16	RO	TwI	Inlet water temperature , <b>Range:</b> -32768 ~ 32767 , <b>Default:</b> - , <b>Unit of measurement:</b> [°C] , <b>Notes:</b> Invalid value 0x8000
245+(Unit Address)*100	S16	RO	Two	Outlet water temperature <b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [°C] <b>Notes:</b> Invalid value 0x8000"
246+(Unit Address)*100	S16	RO	Tw	Water temperature <b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [°C] <b>Notes:</b> Invalid value 0x8000
247+(Unit Address)*100	S16	RO	T4	Ambient temperature <b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [°C] <b>Notes:</b> Invalid value 0x8000
248+(Unit Address)*100	S16	RO	Compressor frequency	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [Hz] <b>Notes:</b>
249+(Unit Address)*100	S16	RO	Cmpressor 1 current	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [A] <b>Notes:</b> Invalid value 0x8000"
250+(Unit Address)*100	S16	RO	Fan 1 speed	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [rpm] <b>Notes:</b>
251+(Unit Address)*100	S16	RO	Fan 2 speed	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [rpm] <b>Notes:</b>
252+(Unit Address)*100	S16	RO	Fan 3 speed	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [rpm] <b>Notes:</b>
253+(Unit Address)*100	U16	RO	EXVA	EXV A current opening degree <b>Range:</b> 0 ~ 65535 <b>Default:</b> - <b>Unit of measurement:</b> [steps] <b>Notes:</b>
254+(Unit Address)*100	U16	RO	EXVB	EXV B current opening degree <b>Range:</b> 0 ~ 65535 <b>Default:</b> - <b>Unit of measurement:</b> [steps] <b>Notes:</b>
255+(Unit Address)*100	U16	RO	EXVC	EXV C current opening degree <b>Range:</b> 0 ~ 65535 <b>Default:</b> - <b>Unit of measurement:</b> [steps] <b>Notes:</b>
256+(Unit Address)*100	S16	RO	SV4	<b>Range:</b> 0 - OFF, 1 - ON <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b>
257+(Unit Address)*100	S16	RO	SV5	<b>Range:</b> 0 - OFF, 1 - ON <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b>
258+(Unit Address)*100	S16	RO	SV8A	<b>Range:</b> 0 - OFF, 1 - ON <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b>
259+(Unit Address)*100	S16	RO	SV8B	<b>Range:</b> 0 - OFF, 1 - ON <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b>
260+(Unit Address)*100	S16	RO	4 way valve	<b>Range:</b> 0 - OFF, 1 - ON <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b>
261+(Unit Address)*100	S16	RO	Fix pump state	<b>Range:</b> 0 - OFF, 1 - ON <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b>
262+(Unit Address)*100	S16	RO	SV1 state	<b>Range:</b> 0 - OFF, 1 - ON <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b>
263+(Unit Address)*100	S16	RO	SV2 state	<b>Range:</b> 0 - OFF, 1 - ON <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b>

Reg	Data Type	R/W	Name	Description
264+(Unit Address)*100	S16	RO	Heat 1 state	<b>Range:</b> 0 - OFF, 1 - ON <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b>
265+(Unit Address)*100	S16	RO	Heat 2 state	<b>Range:</b> 0 - OFF, 1 - ON <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b>
266+(Unit Address)*100	S16	RO	Tp1	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [°C] <b>Notes:</b> Invalid value 0x8000
267+(Unit Address)*100	S16	RO	Th	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [°C] <b>Notes:</b> Invalid value 0x8000
268+(Unit Address)*100	S16	RO	T3	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [°C] <b>Notes:</b> Invalid value 0x8000
269+(Unit Address)*100	S16	RO	Tz	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [°C] <b>Notes:</b> Invalid value 0x8000
270+(Unit Address)*100	S16	RO	T5	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [°C] <b>Notes:</b> Invalid value 0x8000
271+(Unit Address)*100	S16	RO	Pressure	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> heating/DHW [0.01MPa], cooling [0.1MPa] <b>Notes:</b> Low pressure in cooling mode, high pressure in heating mode. Invalid value 0x8000
272+(Unit Address)*100	U16	RO	Error Code	<b>Range:</b> 0-65535 [0-No Error] <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b> refer to sheet error code define.
273+(Unit Address)*100	U16	RO	Last error code of the error history	<b>Range:</b> 0-65535 [0-No Error] <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b> refer to sheet error code define.
274+(Unit Address)*100	U16	RO	HMI software version	Version number <b>Range:</b> 0 ~ 65535 <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b>
275+(Unit Address)*100	S16	RO	Tp2	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [°C] <b>Notes:</b> Invalid value 0x8000
276+(Unit Address)*100	S16	RO	T5s min	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [°C] <b>Notes:</b> Invalid value 0x8000
277+(Unit Address)*100	S16	RO	T6A	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [°C] <b>Notes:</b> Invalid value 0x8000
278+(Unit Address)*100	U16	RO	HMI error code	<b>Range:</b> 0/1/2 <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b> 0: No error, 1: XYE communication lost, 2: number of online unit reduced
279+(Unit Address)*100	S16	RO	SV6 state	<b>Range:</b> 0 - OFF, 1 - ON <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b>
280+(Unit Address)*100	S16	RO	Compressor 2 current	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [A] <b>Notes:</b> Invalid value 0x8000
281+(Unit Address)*100	U16	RO	Unit Capacity	Unit size <b>Range:</b> 0 ~ 65535 <b>Default:</b> - <b>Unit of measurement:</b> [kW] <b>Notes:</b>
282+(Unit Address)*100	S16	RO	Defrost status	<b>Range:</b> 0 - OFF, 1 - ON <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b>
283+(Unit Address)*100	S16	RO	Anti-freezing electric heater	<b>Range:</b> 0 - OFF, 1 - ON <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b>
284+(Unit Address)*100	S16	RO	Remote control	<b>Range:</b> 0 - OFF, 1 - ON <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b> Only the master unit provides this value
285+(Unit Address)*100	S16	RO	FCT status	<b>Range:</b> 0 - OFF, 1 - ON <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b> Only the master unit provides this value

Reg	Data Type	R/W	Name	Description
286+(Unit Address)*100	S16	RO	Pump system status	<b>Range:</b> 0 - Single pump, 1 - Multi pump <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b>
287+(Unit Address)*100	S16	RO	Unit type	<b>Range:</b> 0 - HP, 1 - CO, 2 - FC <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b>
(288)+(Unit Address)*100			RESERVED	
289+(Unit Address)*100	S16	RO	Tsafe	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [°C] <b>Notes:</b> Invalid value 0x8000
290+(Unit Address)*100	S16	RO	PAF	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [kPa] <b>Notes:</b> Invalid value 0x8000
291+(Unit Address)*100	S16	RO	Taf1	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [°C] <b>Notes:</b> Invalid value 0x8000
292+(Unit Address)*100	U16	RO	Mainboard software version	Version number <b>Range:</b> 0 ~ 65535 <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b>
293+(Unit Address)*100	U16	RO	Mainboard software version date	Version date <b>Range:</b> 0 ~ 65535 <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b> bit[0-4]: Day 1~31 bit[5:8]: Month 1~12 bit[9:15]: Year 0~127 (2000~2127)"
294+(Unit Address)*100	S16	RO	FCT STEPS	<b>Range:</b> 0 ~ 65535 <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b> BIT0:C1, BIT1:C2, BIT2:C3, BIT3:C4, BIT4:C5, BIT5:C6, BIT6:C7
295+(Unit Address)*100	S16	RO	T6B	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [°C] <b>Notes:</b> Invalid value 0x8000
296+(Unit Address)*100	S16	RO	Taf2	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [°C] <b>Notes:</b> Invalid value 0x8000
297+(Unit Address)*100	S16	RO	Tfin1	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [°C] <b>Notes:</b> Invalid value 0x8000
298+(Unit Address)*100	S16	RO	Tfin2	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [°C] <b>Notes:</b> Invalid value 0x8000
299+(Unit Address)*100	S16	RO	Tfin3	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [°C] <b>Notes:</b> Invalid value 0x8000
1800 ~ 2299			RESERVED	
2300+(Unit Address)*200	S16	RO	TDSH	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [°C] <b>Notes:</b> Invalid value 0x8000
2301+(Unit Address)*200	S16	RO	TSSH	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [°C] <b>Notes:</b> Invalid value 0x8000
2302+(Unit Address)*200	S16	RO	TCSH	<b>Range:</b> -32768 ~ 32767 <b>Default:</b> - <b>Unit of measurement:</b> [°C] <b>Notes:</b> Invalid value 0x8000
2303+(Unit Address)*200	U16	RO	Inverter pump running speed	<b>Range:</b> 0-100 <b>Default:</b> - <b>Unit of measurement:</b> [%] <b>Notes:</b> Invalid value 0x8000"
2304+(Unit Address)*200	U16	RO	ErrTypeGet	<b>Range:</b> 0-65535 [0-No Error] <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b>
2305+(Unit Address)*200	U16	RO	ErrCodeGet	<b>Range:</b> 0-65535 [0-No Error] <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b>
2306+(Unit Address)*200	U16	RO	LastErrTypeGet	<b>Range:</b> 0-65535 [0-No Error] <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b>
2307+(Unit Address)*200	U16	RO	LastErrCodeGet	<b>Range:</b> 0-65535 [0-No Error] <b>Default:</b> - <b>Unit of measurement:</b> - <b>Notes:</b>
(2308 ~ 2399)+(Unit Address)*200			RESERVED	

## 16.2 Modbus alarms

Available data is in English

Error Code	Modbus Code	Description	Troubleshooting	
			Stop system	Stop unit
E2	3	XYE communication lost	✓ (master)	✓ (slave)
E3	4	Tw failure (the master is valid)	✓	
E4	5	Twout failure		✓
E5	262	1E5- T3A failure		✓
	518	2E5- T3B failure		✓
E6	7	T5 failure	✓ (single pump)	✓ (multi-pump)
E7	8	T4 failure		✓
E8	9	Power phase detector alarm		✓
E9	10	E9 Water flow detection failure	✓ (single pump)	✓ (multi-pump)
	522	2E9 Water pressure detection failure		
xEb	268	1Eb-Taf1 failure		✓
	524	2Eb- Taf2 failure		
EC	13	Slave module reduction	✓	✓
Ed	14	Both Tp of A system and Tp of B system are failure		✓
EE	271	1EE-T6A failure		✓
	527	2EE-T6B failure		
EF	16	TwI failure		✓
EP	19	Tp is too high		✓
EU	20	Tz failure		✓
P0	21	System high pressure protection or Tp protection		✓
P1	22	System low pressure protection		✓
P2	23	Tz is too high		✓
P3	24	T4 is out of cooling working range		✓
P4	25	System A Current Protection		✓
P5	26	System B Current protection		✓
P7	28	T3 is too high		✓
P9	30	The difference between TwI and TwO is too high		✓
PA	31	The difference between TwI and TwO is abnormal		✓
xPb	32	Pb- Anti-freeze reminder	✓	✓
	288	1Pb- electric heating insufficient reminder	✓	✓
	544	2Pb- electric heating is seriously insufficient reminder	✓	✓
PC	33	Evaporator pressure too low during cooling		✓
PE	35	Cooling evaporator low temperature antifreeze protection		✓
xPf	292	1PF - Water pump 1 failure	✓	✓
	548	2PF - Water pump 2 failure	✓	✓
PH	37	T4 is out of heating working range		✓
PL	38	Tfin is too high		✓
xPU	296	1PU-DC fan A module protection		✓
	552	2PU-DC fan B module protection		
	808	3PU-DC fan C module protection		
H5	46	Voltage is too high or too low		✓
xH9	306	1H9: A press drive model does not match		✓
	562	2H9: B press drive model does not match		

Error Code	Modbus Code	Description	Troubleshooting	
			Stop system	Stop unit
xHE	311	A valve is not inserted fault 1HE		✓
	567	B valve is not inserted fault 2HE		
	823	C valve is not inserted fault 3HE		
xF0	317	1F0: IPM module communication failure		✓
	573	2F0: IPM module communication failure		
F2	63	Insufficient exhaust superheat protection or exhaust temperature sensor falling off		✓
xF4	321	1F4: L0 or L1 protection occurs 3 times within 60 min		✓
	577	2F4: 3 occurrences of L0 or L1 protection within 60 min		
xF6	323	1F6 A system bus voltage fault (PTC)		✓
	579	2F6 B System bus voltage fault (PTC)		✓
Fb	72	Pressure sensor failure		✓
Fd	74	Return air temperature sensor failure		✓
xFF	332	1FF-DC fan A fault		✓
	588	2FF-DC fan B fault		
	844	3FF-DC fan B fault		
FP	79	Dial codes of multiple pumps are inconsistent		✓
C7	88	3 times PL report C7		✓
C0	81	Circuit model configuration error		✓
C2	83	The unit types of cascade system are not matched with each other	✓	
L0	101	L0 module protection		✓
L1	102	L1 low voltage protection		✓
L2	103	L2 high voltage protection		✓
L3	104	Reserved		✓
L4	105	L4MCE failure		✓
L5	106	L5 zero speed protection		✓
L6	107	Reserved		✓
L7	108	L7 phase loss		✓
L8	109	L8 frequency changes over 15Hz		✓
L9	110	L9 frequency difference 15Hz		✓
dF	136	Defrosting reminder	✓	✓
dU	140	Reaching the DHW max time without reaching T5s	X	X
xbH	413	1bH: Module 1 relay is stuck or 908 chip self-check failed		✓
	669	2bH: Module 2 relay is stuck or 908 chip self-check failed		✓

# 17. Technical information

## Performance - Excellence

### Acoustic configuration with compressor soundproofing (SC)

Sizes			10.1	12.1	14.1	16.2	18.2	22.2	30.2	35.2	43.2	45.2
<b>Radiant panels</b>												
<b>Heating</b>												
Heating capacity (EN 14511:2018)	1	kW	26,1	30,5	37,0	51,5	55,5	64,1	78,6	87,5	101	111
COP (EN 14511:2018)	2	-	4,48	4,33	4,22	4,54	4,33	4,15	4,31	3,95	4,15	4,10
ErP Space Heating Energy Class - AVERAGE Climate - W35	7	-	A+++	A+++	A+++	A+++	A+++	A++	A++	A++	-	-
SCOP - Clima MEDIO - W35	8	-	4,54	4,49	4,44	4,46	4,46	4,41	4,33	4,29	4,65	4,60
$\eta_{s,h}$ - Clima MEDIO - W35	9	%	179	177	175	175	175	173	170	169	183	181
<b>Cooling</b>												
Cooling capacity (EN 14511:2018)	4	kW	29,9	34,6	38,9	59,1	65,8	77,7	95,0	103,0	126	138
EER (EN 14511:2018)	5	-	4,31	3,97	3,63	4,11	3,68	3,35	4,03	3,61	3,80	3,65
Water flow-rate	4	l/s	1,43	1,66	1,87	2,83	3,15	3,73	4,55	4,94	6,03	6,58
User side exchanger pressure drops	4	kPa	44,6	56,8	69,3	43,3	51,6	67,9	55,6	64,4	42,4	50
<b>Terminal units</b>												
<b>Heating</b>												
Heating capacity (EN 14511:2018)	3	kW	24,3	28,8	34,2	50,5	54,7	63,4	74,9	85,2	98,2	107
COP (EN 14511:2018)	2	-	3,33	3,27	3,20	3,55	3,51	3,32	3,48	3,23	3,37	3,34
<b>Cooling</b>												
Cooling capacity (EN 14511:2018)	6	kW	24,1	26,6	30,3	43,8	49,7	56,8	70,1	80,2	94,6	107
EER (EN 14511:2018)	5	-	3,21	2,93	2,87	3,10	3,03	2,85	3,06	2,86	3,12	3,06
SEER	8	-	4,81	4,65	4,53	4,32	4,32	4,25	4,24	4,23	4,95	4,93
$\eta_{s,c}$	9	%	189	183	178	170	170	167	167	166	195	194,2
Water flow-rate	6	l/s	1,14	1,27	1,44	2,09	2,36	2,70	3,34	3,82	4,52	5,08
User side exchanger pressure drops	6	kPa	30,7	36,4	45,2	26,2	32,1	40,1	31,9	40,6	21,0	26,8
<b>Radiators</b>												
<b>Heating</b>												
Heating capacity (EN 14511:2018)	10	kW	23,0	27,7	32,6	46,5	51,9	56,7	75,7	86,1	96,2	105,0
COP (EN 14511:2018)	2	-	2,54	2,40	2,33	2,71	2,68	2,70	2,54	2,44	2,78	2,70
ErP Space Heating Energy Class - AVERAGE Climate - W55	7	-	A++	A++	A++	A++	A++	A++	A++	A+	-	-
SCOP - MEDIUM Climate - W55	8	-	3,24	3,23	3,19	3,24	3,21	3,19	3,20	3,19	3,42	3,38
$\eta_{s,h}$ - MEDIUM climate - W55	9	%	127	126	125	127	125	125	125	123	134	132

The Product is compliant with the ErP (Energy Related Products) European Directive. It includes the Commission delegated Regulation (EU) No 811/2013 (rated heat output  $\leq 70$  kW at specified reference conditions) and the Commission delegated Regulation (EU) No 813/2013 (rated heat output  $\leq 400$  kW at specified reference conditions)  
 Contains fluorinated greenhouse gases (GWP 675)

1. Entering/leaving water temperature user side 30/35 °C, Entering external exchanger air temperature 7 °C (R.H. = 85%)
2. COP (EN 14511:2018) Heating performance coefficient. Ratio between delivered heating capacity and power input in compliance with EN 14511:2018. The overall power absorbed is calculated by adding the power absorbed by the compressor + the power absorbed by the fan - the percentage value of the fan to overcome external pressure drop + the power absorbed by the pump - the percentage value of the pump to overcome pressure drop outside + the power absorbed by the auxiliary electrical circuit.
3. Entering/leaving water temperature user side 40/45 °C, Entering external exchanger air temperature 7 °C (R.H. = 85%)
4. Entering/leaving water temperature user side 23/18 °C, Entering external exchanger air temperature 35 °C
5. EER (EN 14511:2022) cooling performance coefficient. Ratio between delivered cooling capacity and power input in compliance with EN 14511:2022. The overall power absorbed is calculated by adding the power absorbed by the compressor + the power absorbed by the fan - the percentage value of the fan to overcome external pressure drop + the power absorbed by the pump - the percentage value of the pump to overcome pressure drop outside + the power absorbed by the auxiliary electrical circuit.
6. Entering/leaving water temperature user side 12/7 °C, Entering external exchanger air temperature 35 °C
7. Seasonal Space Heating Energy Efficiency Class according to Commission delegated Regulation (EU) No 811/2013. W = Water outlet temperature (°C)
8. Data calculated in compliance with EN 14825:2022.
9. Seasonal energy efficiency in heating EN 14825:2022.
10. Entering/leaving water temperature user side 50/55 °C, Entering external exchanger air temperature 7 °C (R.H. = 85%)

## Performances - Premium

### Acoustic configuration with compressor soundproofing (SC)

Sizes			10.1	12.1	14.1	16.2	18.2	22.2	30.2	35.2	40.2	45.2	50.2	55.2
<b>Radiant panels</b>														
<b>Heating</b>														
Heating capacity (EN 14511:2018)	1	kW	27,9	32,3	38,0	54,4	58,7	67,1	84,8	94,2	101	119	131	139,0
COP (EN 14511:2018)	2	-	4,36	4,01	3,70	4,30	4,06	3,98	4,01	3,67	3,64	3,78	3,70	3,63
ErP Space Heating Energy Class - AVERA-GE Climate - W35	7	-	A++	A++	A++	A++	A++	A++	A++	A++	A++	-	-	-
SCOP - MEDIUM Climate - W35	8	-	4,29	4,23	4,11	4,22	4,19	4,17	4,12	4,08	4,13	4,11	4,07	4,04
$\eta_{s,h}$ - MEDIUM climate - W35	9	%	169	166	161	166	165	164	162	160	162	161	160	159
<b>Cooling</b>														
Cooling capacity (EN 14511:2018)	4	kW	33,2	37,2	41,9	63,7	70,0	79,8	98,4	111	117	125,0	131,0	137,0
EER (EN 14511:2018)	5	-	3,89	3,68	3,39	3,93	3,66	3,38	3,78	3,47	3,35	3,50	3,40	3,34
Water flow-rate	4	l/s	1,59	1,78	2,01	3,05	3,35	3,83	4,72	5,31	5,59	6,0	6,3	6,5
User side exchanger pressure drops	4	kPa	53,1	64,1	78,3	48,9	57,1	70,9	59,2	73,0	80,2	41,7	45,2	49,2
<b>Terminal units</b>														
<b>Heating</b>														
Heating capacity (EN 14511:2018)	3	kW	27,0	29,8	35,7	52,5	57,9	66,6	78,5	91,2	102	117	129	138
COP (EN 14511:2018)	2	-	3,21	3,20	3,15	3,33	3,29	3,14	3,34	3,05	2,88	3,21	3,18	3,15
<b>Cooling</b>														
Cooling capacity (EN 14511:2018)	6	kW	25,2	27,6	32,2	45,7	52,1	60,7	74,3	86,2	94,2	111	121	128
EER (EN 14511:2018)	5	-	3,03	2,75	2,74	2,96	2,88	2,75	2,91	2,73	2,63	2,71	2,61	2,51
SEER	8	-	4,50	4,40	4,24	4,04	4,09	4,07	3,96	3,91	3,87	4,67	4,54	4,42
$\eta_{s,c}$	10	%	177	173	167	159	161	160	155	153	152	-	-	-
Water flow-rate	6	l/s	1,20	1,32	1,53	2,17	2,48	2,89	3,54	4,10	4,49	5,28	5,78	6,13
User side exchanger pressure drops	6	kPa	33,3	38,7	50,0	28,0	34,8	44,7	35,4	46,2	54,2	32,8	38,7	43,2

The Product is compliant with the ErP (Energy Related Products) European Directive. It includes the Commission delegated Regulation (EU) No 811/2013 (rated heat output  $\leq$  70 kW at specified reference conditions) and the Commission delegated Regulation (EU) No 813/2013 (rated heat output  $\leq$  400 kW at specified reference conditions)  
Contains fluorinated greenhouse gases (GWP 675)

1. Entering/leaving water temperature user side 30/35 °C, Entering external exchanger air temperature 7 °C (R.H. = 85%)
2. COP (EN 14511:2018) Heating performance coefficient. Ratio between delivered heating capacity and power input in compliance with EN 14511:2018. The overall power absorbed is calculated by adding the power absorbed by the compressor + the power absorbed by the fan - the percentage value of the fan to overcome external pressure drop + the power absorbed by the pump - the percentage value of the pump to overcome pressure drop outside + the power absorbed by the auxiliary electrical circuit.
3. Entering/leaving water temperature user side 40/45 °C, Entering external exchanger air temperature 7 °C (R.H. = 85%)
4. Entering/leaving water temperature user side 23/18 °C, Entering external exchanger air temperature 35 °C
5. EER (EN 14511:2022) cooling performance coefficient. Ratio between delivered cooling capacity and power input in compliance with EN 14511:2022. The overall power absorbed is calculated by adding the power absorbed by the compressor + the power absorbed by the fan - the percentage value of the fan to overcome external pressure drop + the power absorbed by the pump - the percentage value of the pump to overcome pressure drop outside + the power absorbed by the auxiliary electrical circuit.
6. Entering/leaving water temperature user side 12/7 °C, Entering external exchanger air temperature 35 °C
7. Seasonal Space Heating Energy Efficiency Class according to Commission delegated Regulation (EU) No 811/2013. W = Water outlet temperature (°C)
8. Seasonal energy efficiency in heating EN 14825:2022.
9. Seasonal energy efficiency in cooling EN 14825:2022.

## Performance - Excellence

### Super Silenced acoustic configuration (EN)

Sizes			10.1	12.1	14.1	16.2	18.2	22.2	30.2	35.2	43.2	45.2
<b>Radiant panels</b>												
<b>Heating</b>												
Heating capacity (EN 14511:2018)	1	kW	21,5	24,3	26,9	44,8	48,7	53,4	65,4	72,7	92,9	98,4
COP (EN 14511:2018)	2	-	4,52	4,40	4,35	4,51	4,35	4,32	4,22	4,07	4,21	4,16
ErP Space Heating Energy Class - AVERAGE Climate - W35	7	-	A++	A++	A++	A++	A++	A++	A++	A++	-	-
SCOP - MEDIUM Climate - W35	8	-	4,41	4,38	4,35	4,34	4,33	4,30	4,24	4,20	4,66	4,59
$\eta_{s,h}$ - MEDIUM climate - W35	9	%	173	172	171	171	170	169	167	165	183	181
<b>Cooling</b>												
Cooling capacity (EN 14511:2018)	4	kW	24,7	28,5	31,3	51,5	56,8	64,7	78,6	84,0	121	126
EER (EN 14511:2018)	5	-	4,25	4,34	3,98	4,12	3,63	3,56	4,12	3,79	3,83	3,71
Water flow-rate	4	l/s	1,18	1,37	1,50	2,46	2,72	3,10	3,77	4,02	5,8	6,0
User side exchanger pressure drops	4	kPa	32,5	41,2	48,1	34,4	40,4	50,2	39,7	44,6	39	42
<b>Terminal units</b>												
<b>Heating</b>												
Heating capacity (EN 14511:2018)	3	kW	19,1	21,6	24,9	41,9	46,2	50,3	61,3	69,1	90,2	95,2
COP (EN 14511:2018)	2	-	3,33	3,25	3,25	3,51	3,55	3,59	3,79	3,68	3,44	3,41
<b>Cooling</b>												
Cooling capacity (EN 14511:2018)	6	kW	19,9	21,9	24,4	38,3	42,8	47,3	58,0	65,3	90,0	96,5
EER (EN 14511:2018)	5	-	3,18	3,21	3,15	3,14	3,00	3,02	3,12	3,00	3,06	3,05
SEER	8	-	4,70	4,55	4,50	4,21	4,21	4,15	4,18	4,13	4,84	4,82
$\eta_{s,c}$	10	%	185	179	177	165	165	163	164	162	191	190
Water flow-rate	6	l/s	0,95	1,04	1,16	1,82	2,04	2,25	2,76	3,11	4,3	4,6
User side exchanger pressure drops	6	kPa	22,3	26,2	31,3	20,9	25,2	29,7	22,8	28,1	22,5	25,6
<b>Radiators</b>												
<b>Heating</b>												
Heating capacity (EN 14511:2018)	11	kW	17,6	19,7	21,8	37,0	41,5	45,9	60,0	68,7	88,9	94,0
COP (EN 14511:2018)	2	-	2,62	2,56	2,64	2,79	2,72	2,75	2,71	2,65	2,80	2,73
ErP Space Heating Energy Class - AVERAGE Climate - W35	7	-	A++	A++	A++	A++	A++	A++	A++	A++	-	-
SCOP - MEDIUM Climate - W55	8	-	3,24	3,23	3,22	3,24	3,24	3,25	3,22	3,20	3,40	3,37
$\eta_{s,h}$ - MEDIUM climate - W55	9	%	127	126	126	127	127	127	126	125	133	132

The Product is compliant with the ErP (Energy Related Products) European Directive. It includes the Commission delegated Regulation (EU) No 811/2013 (rated heat output  $\leq 70$  kW at specified reference conditions) and the Commission delegated Regulation (EU) No 813/2013 (rated heat output  $\leq 400$  kW at specified reference conditions)  
Contains fluorinated greenhouse gases (GWP 675)

1. Entering/leaving water temperature user side 30/35 °C, Entering external exchanger air temperature 7 °C (R.H. = 85%)
2. COP (EN 14511:2018) Heating performance coefficient. Ratio between delivered heating capacity and power input in compliance with EN 14511:2018. The overall power absorbed is calculated by adding the power absorbed by the compressor + the power absorbed by the fan - the percentage value of the fan to overcome external pressure drop + the power absorbed by the pump - the percentage value of the pump to overcome pressure drop outside + the power absorbed by the auxiliary electrical circuit.
3. Entering/leaving water temperature user side 40/45 °C, Entering external exchanger air temperature 7 °C (R.H. = 85%)
4. Entering/leaving water temperature user side 23/18 °C, Entering external exchanger air temperature 35 °C
5. EER (EN 14511:2022) cooling performance coefficient. Ratio between delivered cooling capacity and power input in compliance with EN 14511:2022. The overall power absorbed is calculated by adding the power absorbed by the compressor + the power absorbed by the fan - the percentage value of the fan to overcome external pressure drop + the power absorbed by the pump - the percentage value of the pump to overcome pressure drop outside + the power absorbed by the auxiliary electrical circuit.
6. Entering/leaving water temperature user side 12/7 °C, Entering external exchanger air temperature 35 °C
7. Seasonal Space Heating Energy Efficiency Class according to Commission delegated Regulation (EU) No 811/2013. W = Water outlet temperature (°C)
8. Data calculated in compliance with EN 14825:2022.
9. Seasonal energy efficiency in heating EN 14825:2022.
10. Seasonal energy efficiency in cooling EN 14825:2022.
11. Entering/leaving water temperature user side 50/55 °C, Entering external exchanger air temperature 7 °C (R.H. = 85%)

## Performances - Premium

### Super Silenced acoustic configuration (EN)

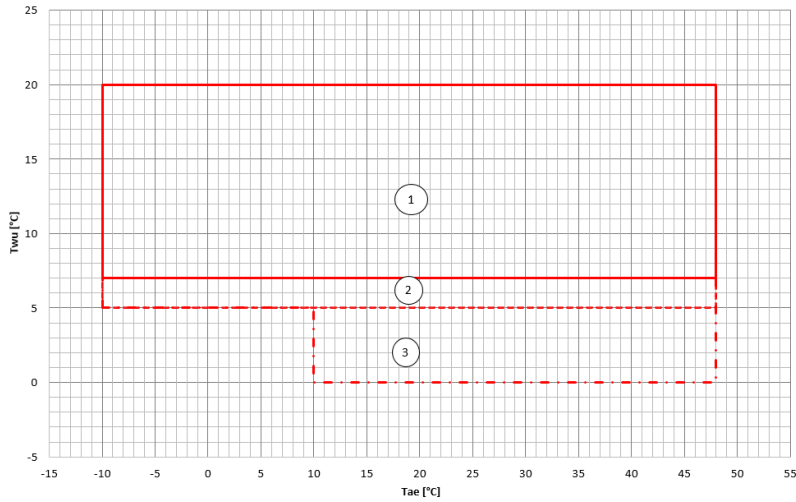
Sizes			10.1	12.1	14.1	16.2	18.2	22.2	30.2	35.2	40.2	45.2	50.2	55.2
<b>Radiant panels</b>														
<b>Heating</b>														
Heating capacity (EN 14511:2018)	1	kW	21,1	24,6	27,5	46,3	51,2	55,3	68,6	76,1	81,9	99,5	106	114,0
COP (EN 14511:2018)	2	-	4,35	4,24	4,22	4,41	4,31	4,25	4,16	4,01	4,04	3,82	3,77	3,74
ErP Space Heating Energy Class - AVERAGE Climate - W35	7	-	A++	A++	A++	A++	A++	A++	A++	A++	A++	-	-	-
SCOP - MEDIUM Climate - W35	8	-	4,18	4,12	4,05	4,15	4,11	4,10	4,10	4,06	4,05	4,07	4,02	4,01
$\eta_{s,h}$ - MEDIUM climate - W35	9	%	164	162	159	163	161	161	161	159	159	160	158	157
<b>Cooling</b>														
Cooling capacity (EN 14511:2018)	4	kW	29,1	32,6	34,4	54,3	60,5	64,6	79,0	89,5	93,8	106	109	112
EER (EN 14511:2018)	5	-	4,00	4,12	3,74	4,04	3,78	3,66	3,95	3,73	3,62	3,50	3,40	3,43
Water flow-rate	4	l/s	1,39	1,56	1,65	2,60	2,90	3,10	3,78	4,29	4,49	5,1	5,2	5,4
User side exchanger pressure drops	4	kPa	44,0	52,8	57,8	36,9	44,2	49,4	40,6	50,6	54,9	30,8	32,2	34,1
<b>Terminal units</b>														
<b>Heating</b>														
Heating capacity (EN 14511:2018)	3	kW	21,4	23,8	26,9	46,4	51,6	54,4	66,5	75,1	80,6	98,4	105	113
COP (EN 14511:2018)	2	-	3,22	3,15	3,11	3,42	3,35	3,35	3,54	3,46	3,47	3,24	3,21	3,18
<b>Cooling</b>														
Cooling capacity (EN 14511:2018)	6	kW	22,1	24,2	26,5	39,1	45,0	49,1	59,6	69,7	75,7	93,0	99,1	104,0
EER (EN 14511:2018)	5	-	3,11	3,09	3,04	3,06	2,97	2,97	3,03	2,94	2,85	2,71	2,63	2,55
SEER	8	-	4,60	4,52	4,36	4,20	4,20	4,15	4,10	4,00	3,95	4,49	4,47	4,44
$\eta_{s,c}$	10	%	181	178	171	165	165	163	161	157	155	176,6	175,8	175
Water flow-rate	6	l/s	1,05	1,15	1,26	1,86	2,14	2,34	2,84	3,32	3,61	4,4	4,7	5,0
User side exchanger pressure drops	6	kPa	27,9	32,3	37,6	21,2	26,7	30,9	24,5	32,3	37,3	23,9	26,8	29,3

The Product is compliant with the ErP (Energy Related Products) European Directive. It includes the Commission delegated Regulation (EU) No 811/2013 (rated heat output  $\leq$  70 kW at specified reference conditions) and the Commission delegated Regulation (EU) No 813/2013 (rated heat output  $\leq$  400 kW at specified reference conditions)  
Contains fluorinated greenhouse gases (GWP 675)

1. Entering/leaving water temperature user side 30/35 °C, Entering external exchanger air temperature 7 °C (R.H. = 85%)
2. COP (EN 14511:2018) Heating performance coefficient. Ratio between delivered heating capacity and power input in compliance with EN 14511:2018. The overall power absorbed is calculated by adding the power absorbed by the compressor + the power absorbed by the fan - the percentage value of the fan to overcome external pressure drop + the power absorbed by the pump - the percentage value of the pump to overcome pressure drop outside + the power absorbed by the auxiliary electrical circuit.
3. Entering/leaving water temperature user side 40/45 °C, Entering external exchanger air temperature 7 °C (R.H. = 85%)
4. Entering/leaving water temperature user side 23/18 °C, Entering external exchanger air temperature 35 °C
5. EER (EN 14511:2022) cooling performance coefficient. Ratio between delivered cooling capacity and power input in compliance with EN 14511:2022. The overall power absorbed is calculated by adding the power absorbed by the compressor + the power absorbed by the fan - the percentage value of the fan to overcome external pressure drop + the power absorbed by the pump - the percentage value of the pump to overcome pressure drop outside + the power absorbed by the auxiliary electrical circuit.
6. Entering/leaving water temperature user side 12/7 °C, Entering external exchanger air temperature 35 °C
7. Seasonal Space Heating Energy Efficiency Class according to Commission delegated Regulation (EU) No 811/2013. W = Water outlet temperature (°C)
8. Data calculated in compliance with EN 14825:2022.
9. Seasonal energy efficiency in heating EN 14825:2022.
10. Seasonal energy efficiency in cooling EN 14825:2022.

## Operating range - Excellence - Premium

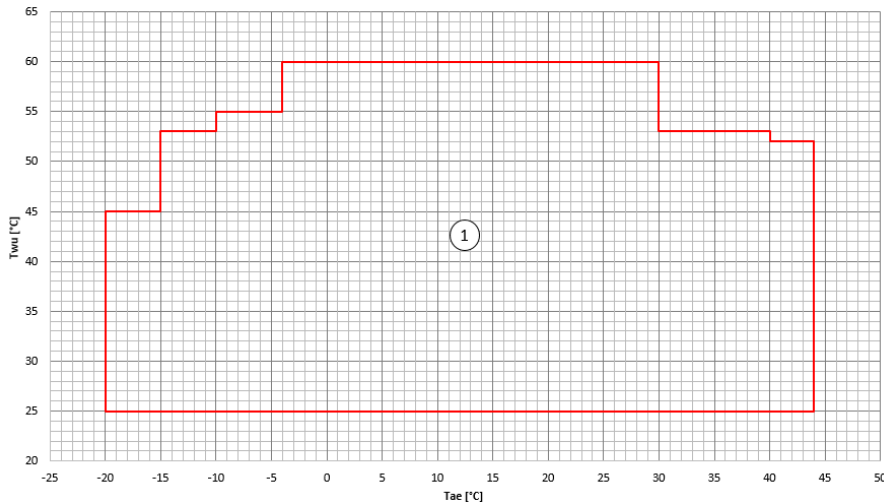
### Cooling



T<sub>wu</sub> [°C] = Leaving exchanger water temperature  
T<sub>ae</sub> [°C] = External exchanger inlet air temperature

1. Normal operating range.
2. Low water temperature operating range in which the use of only water as the operating fluid is allowed.
3. Low water temperature operating range where the use of ethylene or propylene glycol is mandatory, depending on the temperature of the leaving fluid from the user side exchanger to prevent ice formation.

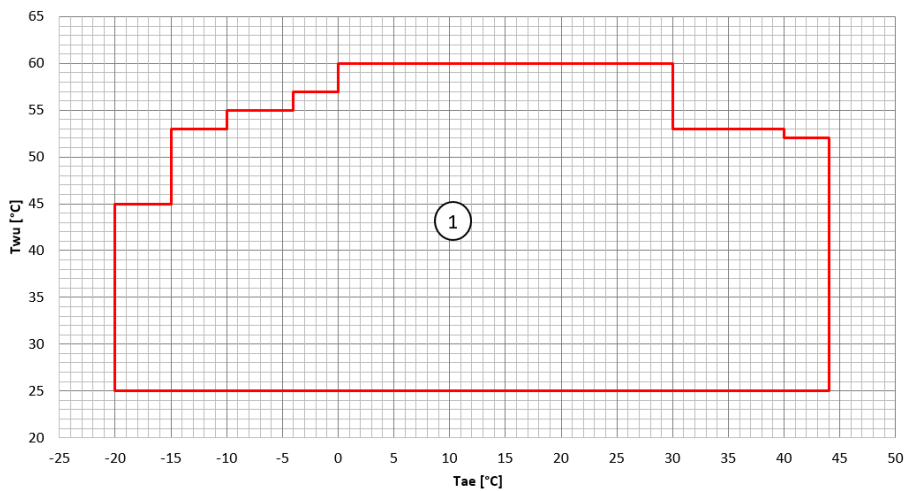
### Heating / DHW production size 10.1 ÷ 35.2 EXC



T<sub>wu</sub> [°C] = Leaving exchanger water temperature  
T<sub>ae</sub> [°C] = External exchanger inlet air temperature

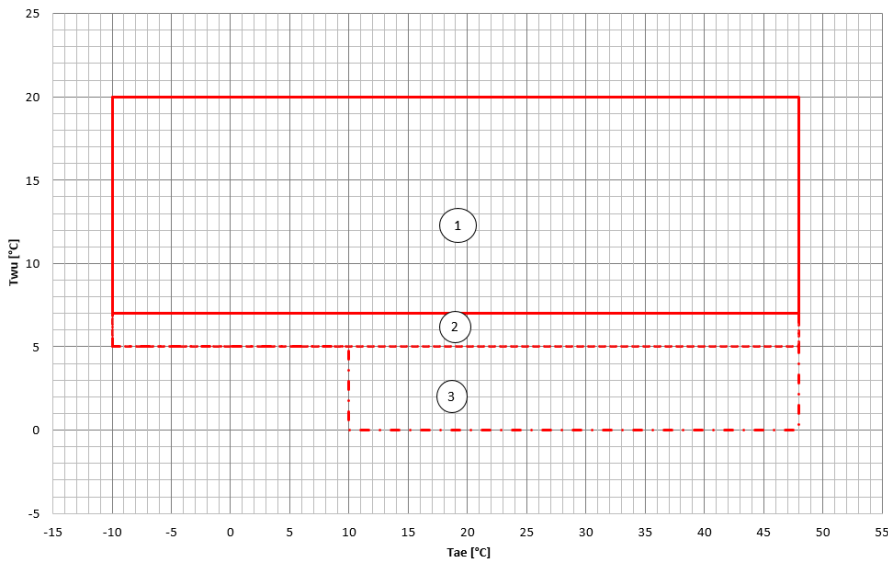
1. Normal operating range.

### Heating / DHW production size 43.2 ÷ 45.2 EXC



## Operating range - Premium

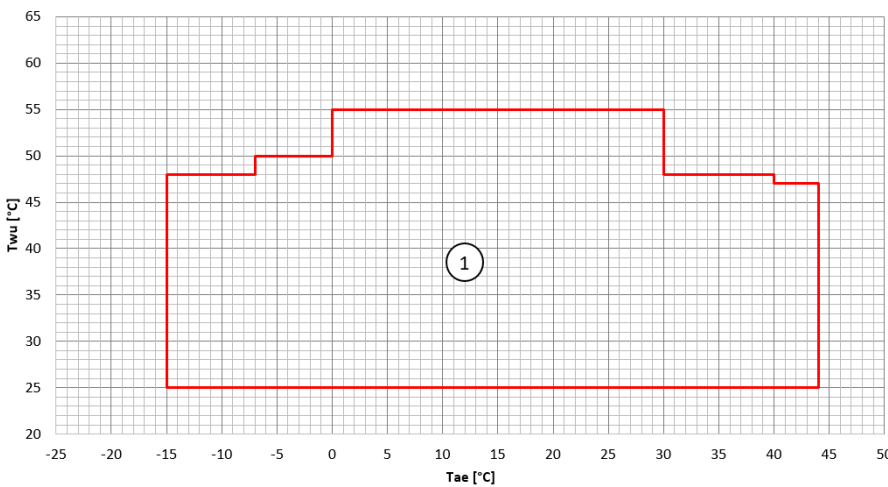
### Cooling



T<sub>wu</sub> [°C] = Leaving exchanger water temperature  
 T<sub>a,e</sub> [°C] = External exchanger inlet air temperature

1. Normal operating range
2. Low water temperature operating range in which the use of only water as the operating fluid is allowed.
3. Low water temperature operating range where the use of ethylene or propylene glycol is mandatory, depending on the temperature of the leaving fluid from the user side exchanger to prevent ice formation.

### Heating / DHW production sizes 45.2-55.2 PRM



T<sub>wu</sub> [°C] = Leaving exchanger water temperature  
 T<sub>a,e</sub> [°C] = External exchanger inlet air temperature

1. Normal operating range.

## Construction - Excellence

Sizes		10.1	12.1	14.1	16.2	18.2	22.2	30.2	35.2	43.2	45.2
<b>Compressor</b>											
Type of compressors		Rotary Inverter					Scroll Inverter				
Refrigerant							R32				
No. of compressors	Nr	1					2				
Oil charge	l	2,3					4,6				
Refrigerant Charge	kg	7,9					14				
No. of circuits	Nr						1				
<b>User side exchanger</b>											
Type of internal exchanger	1						PHE				
N. of internal exchanger	Nr						1				
Water content	l	2,44					5,17				
<b>External exchanger</b>											
External exchanger	2						CCHY				
Type of internal exchanger	Nr						2				
<b>Number of coils</b>											
Type of fans	3						AX				
No. of fans	Nr	1					2				
Type of motor							Brushless DC				
Standard airflow EXC-SC	m <sup>3</sup> /h	12250	13500	13500	24500	27000	27000	36750	40500	65700	65700
Standard airflow EXC-EN	m <sup>3</sup> /h	8500	10250	10250	17000	20500	20500	30750	30750	44600	44600
Installed unit power	kW	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	1,5	1,5
<b>Water circuit</b>											
Water fittings		1" 1/2	1" 1/2	1" 1/2	2"	2"	2"	2"	2"	2 1/2"	2 1/2"
Maximum water side pressure	kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Minimum system water content in heating	l	200	200	200	400	400	400	650	650	850	850
Minimum system water content in cooling	l	80	80	80	150	150	150	200	200	300	300
Total internal water volume		5,44	5,44	5,44	10,3	10,3	10,3	15,6	15,6	28,8	28,8
<b>Power supply</b>											
Power supply							400/3/50+N				
<b>Electrical data</b>											
F.L.A. - Total	A	18,5	19,0	20,0	37,5	38,5	40,5	57,0	59,0	62,0	71,0
F.L.I. - Total	kW	12,0	12,4	13,0	24,4	25,1	26,4	37,1	38,4	39,0	46,0
M.I.C. - Value	4 A	10,0	10,0	10,0	20,3	20,3	20,3	31,0	31,0	43,8	43,8

1. PHE = Plate exchanger
2. CCHY = Copper / aluminium condenser coil with hydrophilic treatment
3. AX = Axial fan
4. M.I.C.=Maximum unit starting current. The M.I.C. value is obtained adding the max. compressor starting current of the highest size to the power input at max. admissible conditions (F.L.A.) of the remaining electric components

Voltage unbalance between phases: max 2 %

Voltage variation: max +/- 10%

Electrical data refer to standard units; according to the installed accessories, the data can suffer some variations

## Construction - Premium

Sizes		10.1	12.1	14.1	16.2	18.2	22.2	30.2	35.2	40.2	45.2	50.2	55.2
<b>Compressor</b>													
Type of compressors		Rotary Inverter						Scroll Inverter					
Refrigerant								R32					
No. of compressors	Nr	1						2					
Oil charge	l	2,3						4,6					
Refrigerant Charge	kg	7,9						14					
No. of circuits	Nr							1					
<b>User side exchanger</b>													
Type of internal exchanger	1							PHE					
N. of internal exchanger	Nr							1					
Water content	l	2,44						5,17					
<b>External exchanger</b>													
External exchanger	2							CCHY					
Type of internal exchanger	Nr							2					
<b>Number of coils</b>													
Type of fans	3							AX					
No. of fans	Nr	1						2					
Type of motor								Brushless DC					
Standard airflow EXC-SC	m <sup>3</sup> /h	13500	13500	14000	27000	27000	28000	40500	40500	42000	50000	50000	50000
Standard airflow EXC-EN	m <sup>3</sup> /h	10250	10250	12250	20500	20500	24500	30750	30750	36750	35100	35100	35100
Installed unit power	kW	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	1,5	1,5	1,5
<b>Water circuit</b>													
Water fittings		1" 1/2	1" 1/2	1" 1/2	2"	2"	2"	2"	2"	2 1/2"	2 1/2"	2 1/2"	2 1/2"
Maximum water side pressure	kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Minimum system water content in heating	l	200	200	200	400	400	400	650	650	650	850	850	850
Minimum system water content in cooling	l	80	80	80	150	150	150	200	200	200	300	300	300
Total internal water volume		5,44	5,44	5,44	10,3	10,3	10,3	15,6	15,6	15,6	22	22	22
<b>Power supply</b>													
Power supply		400/3/50+N											
<b>Electrical data</b>													
F.L.A. - Total	A	18,5	19,0	20,0	37,5	38,5	40,5	57,0	59,0	62,0	62,0	71,0	87,5
F.L.I. - Total	kW	12,0	12,4	13,0	24,4	25,1	26,4	37,1	38,4	40,4	51,0	58,0	64,0
M.I.C. - Value	4 A	10,0	10,0	10,0	20,3	20,3	20,3	31,0	31,0	31,0	50,0	50,0	50,0

1. PHE = Plate exchanger
2. CCHY = Copper / aluminium condenser coil with hydrophilic treatment
3. AX = Axial fan
4. M.I.C.=Maximum unit starting current. The M.I.C. value is obtained adding the max. compressor starting current of the highest size to the power input at max. admissible conditions (F.L.A.) of the remaining electric components

Voltage unbalance between phases: max 2 %

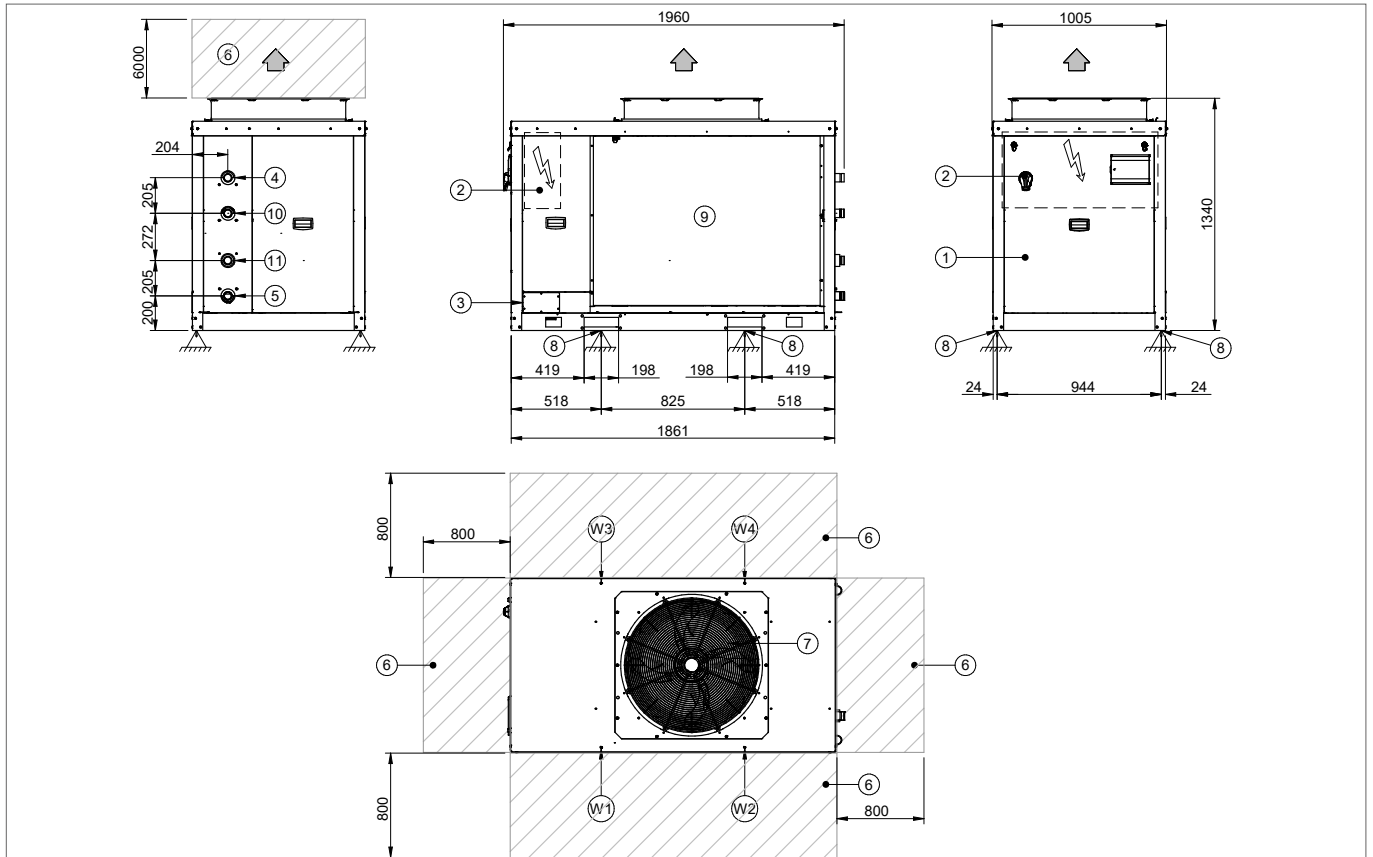
Voltage variation: max +/- 10%

Electrical data refer to standard units; according to the installed accessories, the data can suffer some variations

# 18. Dimensional drawings

DAABU0002\_10.1-14.1  
DATA/DATE 06/03/2023

## SIZE 10.1 ÷ 14.1



- 1. Compressor compartment
- 2. Electrical panel
- 3. Power input
- 4. Inlet water connection Victaulic 1" 1/2
- 5. Outlet water connection Victaulic 1" 1/2
- 6. Functional spaces
- 7. Fan
- 8. Unit fixing holes
- 9. External exchanger
- 10. DHW inlet (optional) Victaulic 1 1/2"
- 11. DHW outlet (optional) Victaulic 1 1/2"

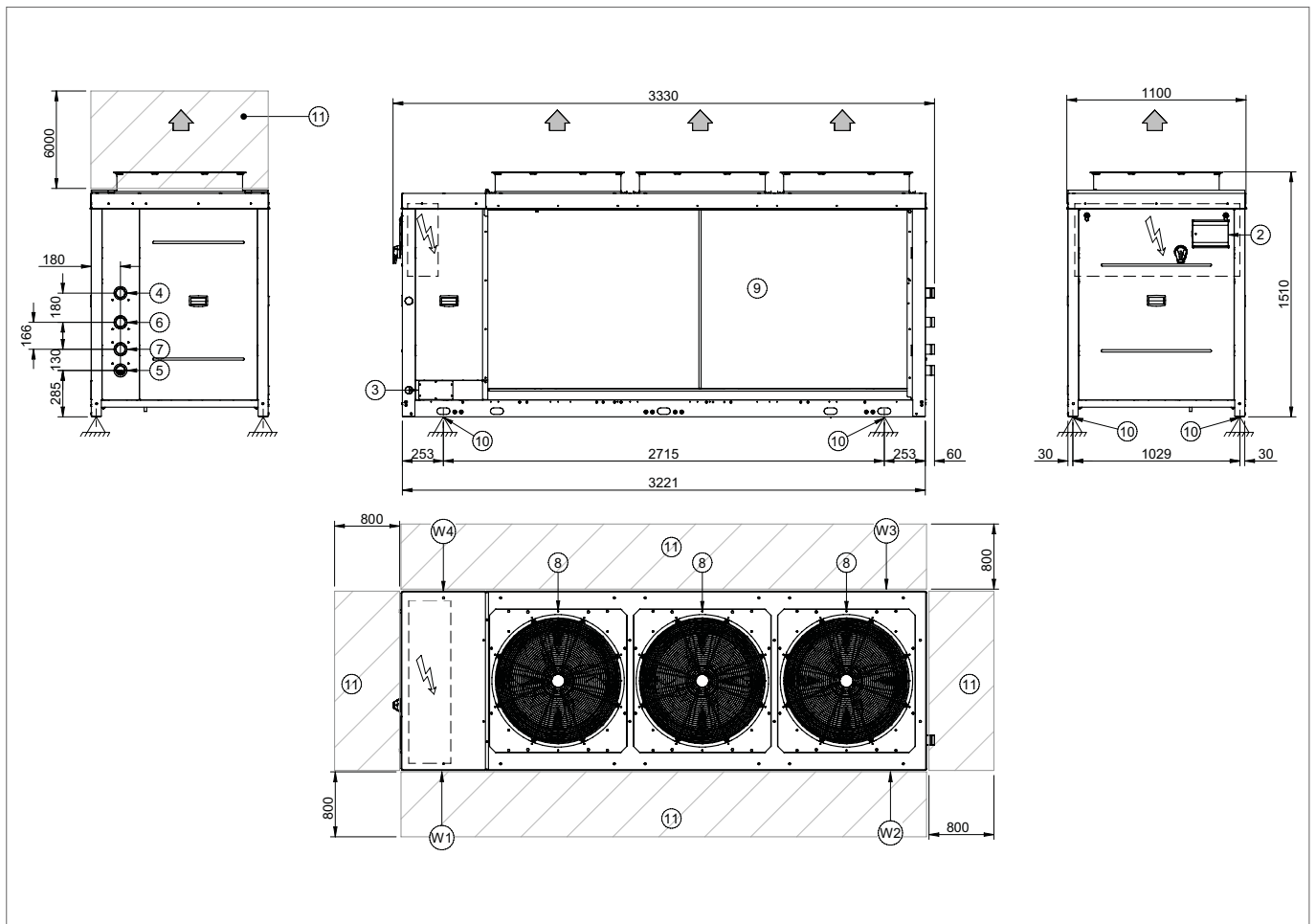
SIZE		10.1	12.1	14.1
Length	mm	1960	1960	1960
Depth	mm	1005	1005	1005
Height	mm	1340	1340	1340
W1 Support point	kg	90	90	90
W2 Support point	kg	71	71	71
W3 Support point	kg	91	91	91
W4 Support point	kg	71	71	71
Operation weight	kg	323	323	323
Operating weight	kg	333	333	333

Weights reported refer to units in standard configuration. Weights may vary considerably depending on the options configured on board the unit.



SIZE 30.2 ÷ 40.2

DAABU0001\_30.2-35.2  
DATA/DATE 26/07/2022



1. Compressor compartment
2. Electrical panel
3. Power input
4. Inlet water connection Victaulic 2"
5. Outlet water connection Victaulic 2"
6. Inlet DHW connection Victaulic 2"
7. Outlet DHW connection Victaulic 2"
8. Fan
9. External exchanger
10. Unit fixing holes
11. Functional spaces

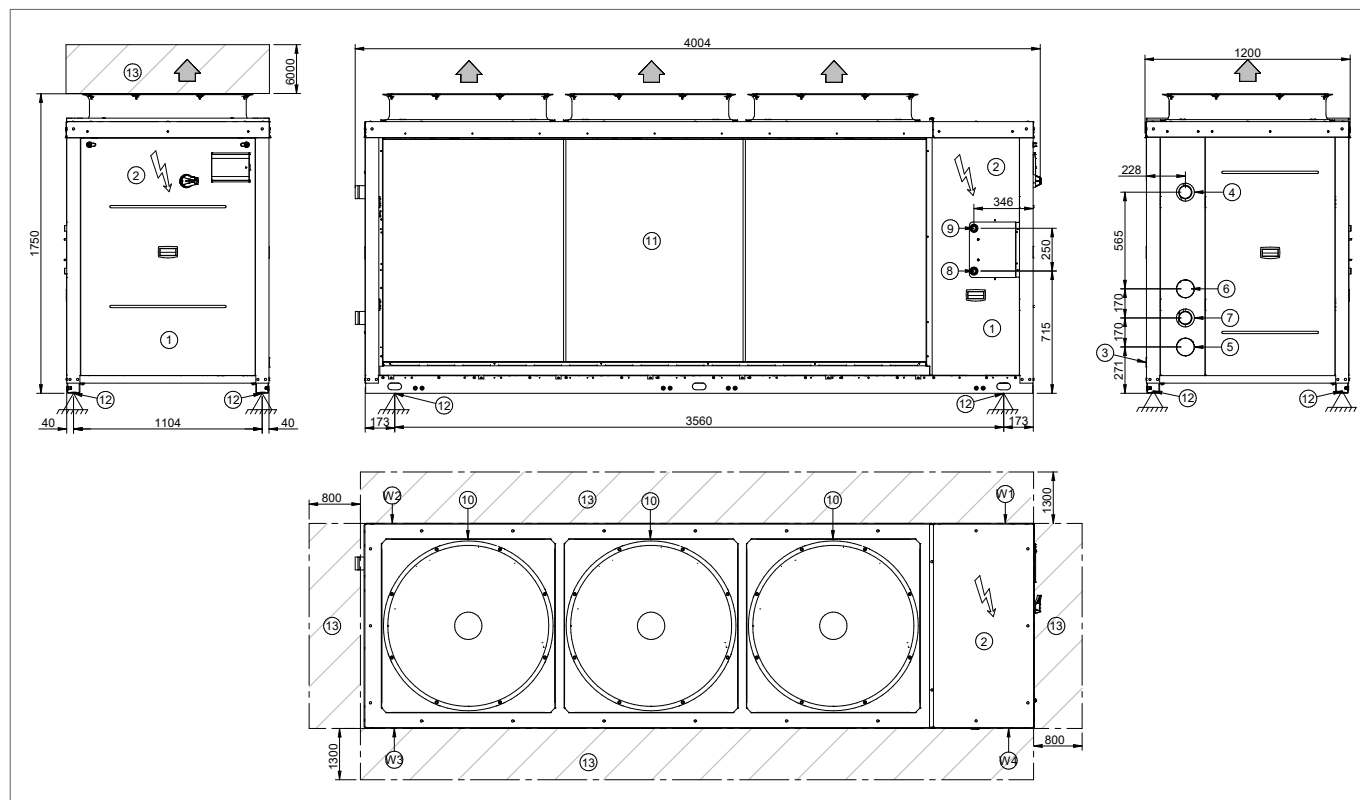
SIZE		30.2	35.2	40.2*
Length	mm	3330	3330	3330
Depth	mm	1100	1100	1100
Height	mm	1510	1510	1510
W1 Support point	kg	280	280	280
W2 Support point	kg	135	135	135
W3 Support point	kg	135	135	135
W4 Support point	kg	280	280	280
Operation weight	kg	830	830	830
Operating weight	kg	830	830	830

\*Size 40.2 available only in PRM version

Weights reported refer to units in standard configuration. Weights may vary considerably depending on the options configured on board the unit.

SIZE 43.2-45.2 EXC

DAABU0004\_00  
DATA/DATE 20/04/2023



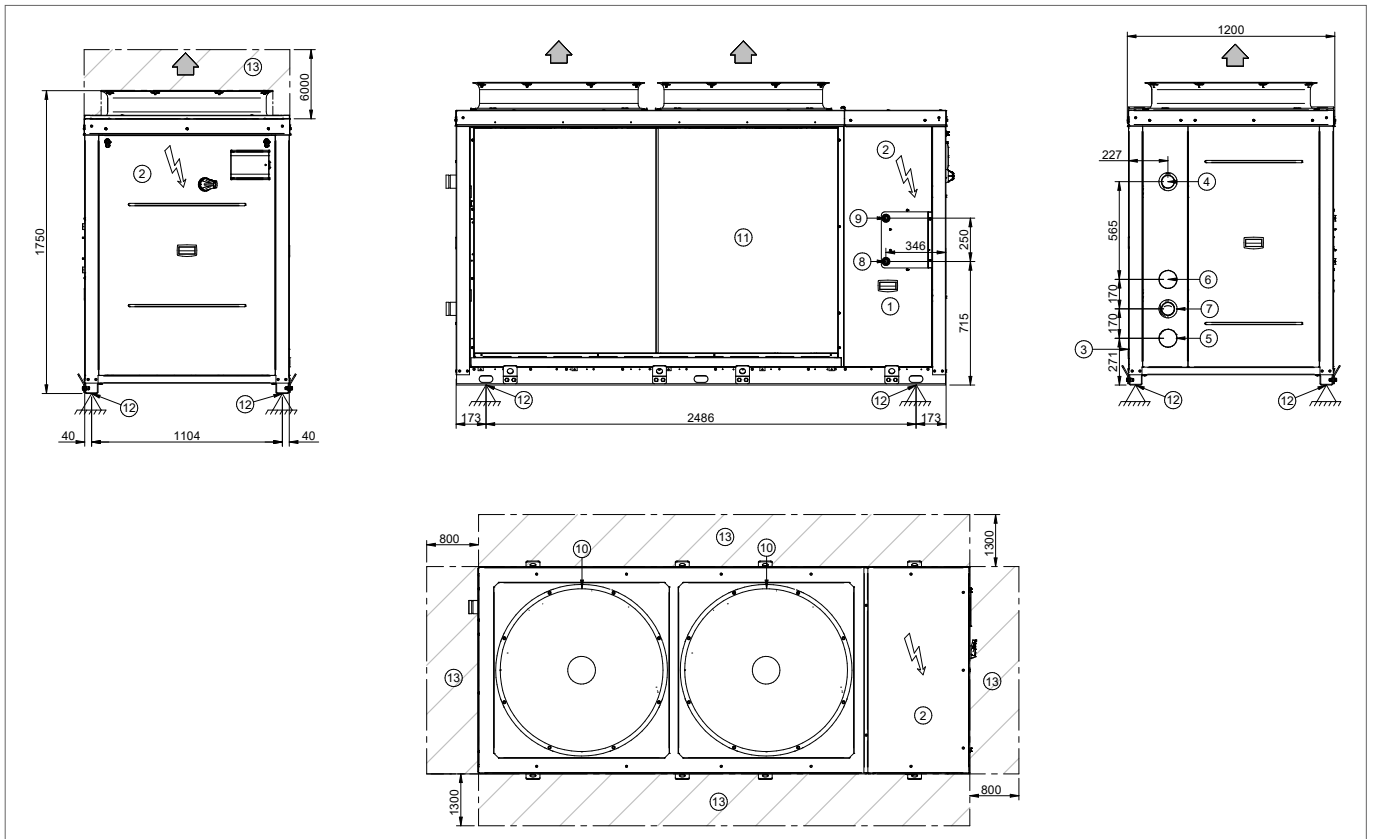
- 1. Compressor compartment
- 2. Electrical panel
- 3. Power input
- 4. Inlet water connection Victaulic 2" 1/2
- 5. Outlet water connection Victaulic 2" 1/2 (solo con valvola a 3 vie)
- 6. Inlet DHW connection Victaulic 2" 1/2 (only with 3-way valve)
- 7. Outlet DHW connection Victaulic 2" 1/2
- 8. Inlet desuperheater water connection 1"
- 9. Outlet desuperheater water connection 1"
- 10. Fan
- 11. Exchanger source
- 12. Unit fixing holes
- 13. Functional spaces

SIZE		43.2	45.2
Length	mm	3906	3906
Depth	mm	1184	1184
Height	mm	1750	1750
W1 Support point	kg	385	385
W2 Support point	kg	221	221
W3 Support point	kg	191	191
W4 Support point	kg	345	345
Operation weight	kg	1143	1143
Operating weight	kg	1165	1165

Weights reported refer to units in standard configuration. Weights may vary considerably depending on the options configured on board the unit.

SIZE 45.2-55.2 PRM

DAABU0005\_00  
DATA/DATE 20/04/2023



1. Compressor compartment
2. Electrical panel
3. Power input
4. Inlet water connection Victaulic 2" 1/2
5. Outlet water connection Victaulic 2" 1/2 (solo con valvola a 3 vie)
6. Inlet DHW connection Victaulic 2" 1/2 (only with 3-way valve)
7. Outlet DHW connection Victaulic 2" 1/2
8. Inlet desuperheater water connection 1"
9. Outlet desuperheater water connection 1"
10. Fan
11. Exchanger source
12. Unit fixing holes
13. Functional spaces

SIZE		45.2	50.2	55.2
Length	mm	2832	2832	2832
Depth	mm	1184	1184	1184
Height	mm	1750	1750	1750
W1 Support point	kg	271	271	271
W2 Support point	kg	187	187	187
W3 Support point	kg	162	162	162
W4 Support point	kg	242	242	242
Operation weight	kg	862	862	862
Operating weight	kg	877	877	877

Weights reported refer to units in standard configuration. Weights may vary considerably depending on the options configured on board the unit.

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