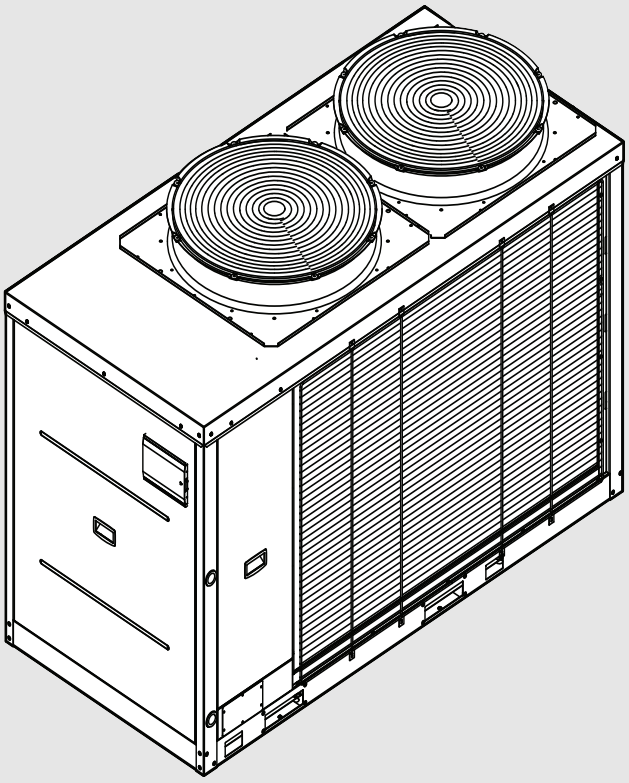
BOSCH

CS 3000 AWP



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1 Explanation of symbols and safety instructions

1.1 Explanation of symbols

Warnings

In warnings, signal words at the beginning of a warning are used to indicate the type and seriousness of the ensuing risk if measures for minimizing danger are not taken.

The following signal words are defined and can be used in this document:

DANGER

DANGER indicates that severe or life-threatening personal injury will occur.

WARNING

WARNING indicates that severe to life-threatening personal injury may occur.

CAUTION

CAUTION indicates that minor to medium personal injury may occur.

NOTICE

NOTICE indicates that material damage may occur.

Important information

The info symbol indicates important information where there is no risk to people or property.

1.2 General safety instructions

⚠ General safety instructions

This manual provides the correct procedures for installation, use and maintenance of the unit.It is mandatory to read the manual carefully so it will save time during operations and avoid causing damages to things and injuring people.

CAUTION

Pay particular attention to warnings, prohibitions and danger signs that indicate important operations or information; operations that cannot be done, that compromise the functionality of the unit or which may cause damage to things or persons.

⚠ Safety

- The units have been designed and created to prevent injuries to people.
- To carry out the operations use protection equipment: gloves, goggles, helmet, headphones, protective pads.
- All operations must be carried out by professional and authorized contractors, trained on possible risks of general nature, electrical and deriving from operating with equipment under pressure.
- Only professional and authorized contractors can operate on the unit, as required by the current regulations.

Fig. 55

⚠ Warning/ risk situations

- The units have been designed and created to prevent injuries to people.
- During designing it is not possible to plan and operate on all risky situations.
- Installation, starting, maintenance and repair requires specific knowledge; if these processes are carried out by inexperienced personnel, they may cause damages to things and injuries to people.
- The manufacturer accepts no responsibility if the equipment is used for any purpose other than the intended use.
- Use the unit only:
  - to cool or heat water or a glycol water mix for heating and air-conditioning.
  - to keep the limits foreseen in the technical schedule and in this manual.

⚠ Outdoor installation

- In compliance with the recent local regulations, the positioning, hydraulic system, refrigerating, electrics and the ducting of the air must be determined by the system designer.
- Follow the local safety regulations.
- Verify if the electrical line characteristics are in compliance with data quotes on the type plate of the unit.

⚠ Maintenance

- Plan periodic inspection and maintenance to avoid or reduce repairing costs.
- Turn the unit off before any operation.

⚠ Modification

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

⚠ Breakdown/malfunction

- In case of breakdown or malfunction, disable the unit immediately and contact a certified service agent.
- Use original spare parts only.
- Using the unit in case of breakdown or malfunction:
  - voids the warranty;
  - it may compromise the safety of the unit;
  - it may increase time and repair costs.

⚠ Unit identification

The type plate of the unit 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 type plate must never be removed. The unit contains fluorinated greenhouse gases.

⚠ Serial number
It identifies uniquely each unit. Must be quoted when ordering spare parts.

⚠ 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.

⚠ User training
The installer must train the user on the following tasks
- start-up/shutdown;
- set points change;
- standby mode;
- maintenance;
- what to do / what not to do in case of breakdown.

⚠ Assistance request
In case of breakdown or malfunction :
- immediately deactivate the unit;
- contact a service centre authorized by the manufacturer.

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

⚠ Data update
Product improvements may occur and will imply manual data changes. Visit manufacturer web site for updated data.

1.2.1 Information on refrigerant gas

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

Refrigerant type: R32

The refrigerant quantity is indicated on the type plate.

Quantity factory-load refrigerant and equivalent CO_2 tons:

Size	Refrigerant (kg)	Equivalent tons of CO_2
CS AWP 16 -24	7,9	5,533
CS AWP 31 -41	14	9,45
CS AWP 53 -59	17,5	11,8

Table 40

Physical characteristics of the R32 refrigerant	
Safety class (ISO 817)	A2L
GWP	675
Low flammability limit (LFL)	14,4% v/v (Ta 23 ºC - Patm)
Boiling point	-52 ºC

Table 41

2 Product Information

2.1 Declaration of Conformity

The design and operating characteristics of this product comply with the British, European and supplementary national requirements.

The UKCA and CE markings declare that the product complies with all the applicable British and European legislation, which is stipulated by attaching these markings.

You can request the complete text of the Declaration of Conformity from the UK address indicated in this document.

2.2 Regulations

In order to ensure installation and operation of the product in accordance with the regulations, please observe all the applicable national and regional regulations as well as all technical rules and guidelines.

You can find a list of the most relevant British and European directives and regulations in the table below.

EU legislation	UK legislation
Electromagnetic Compatibility - Directive 2014/30/EU	Electromagnetic Compatibility Regulations 2016
Low Voltage Directive 2014/35	Electrical Equipment (Safety) Regulations 2016
Radio Equipment - Directive 2014/53/EU	Radio Equipment Regulations 2017
Pressure Equipment - Directive 2014/68/EU	Pressure Equipment (Safety) Regulations 2016
Gas Appliances - Regulation (EU) 2016/426	Regulation 2016/426 on gas appliances as brought into UK law and amended
Machinery Directive 2006/42/EC	Supply of Machinery (Safety) Regulations 2008
Ecodesign Directive 2009/125/EC	The Ecodesign for Energy-Related Products Regulations 2010
Energy Labelling Regulation (EU) 2017/1369	Energy Labelling Regulation (EU) 2017/1369 (as retained in UK law and amended)
Restriction of the Use of certain Hazardous Substances in Eletrical and Electronic Equipment (RoHS) - Directive 2002/95/EC	The Restriction of the Use of Certain Hazardous Substances in Eletrical and Electronic Equipment Regulations 2012
European Directive 2012/19/EC on old electronic and electrical appliances	(UK) Waste Electrical and Electronic Equipment Regulations 2013 (as amended)

Table 42 k

2.3 Scope of delivery

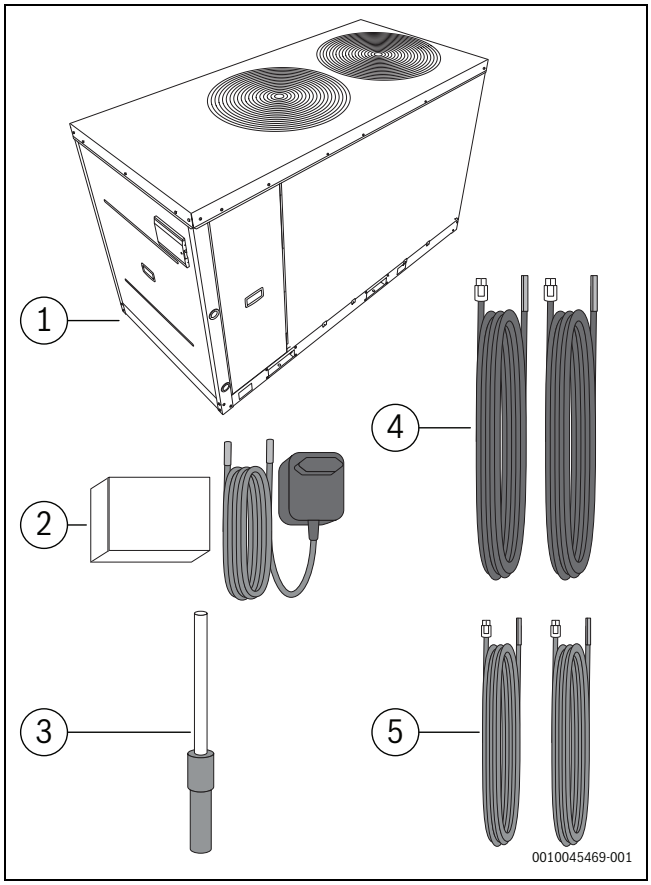

Fig. 56 Scope of delivery

[1] Unit CS3000 AWP
[2] Power transformer for HMI
[3] Temperature probe
[4] Additional probe trap (15m)
[5] Probe Taf1 (10m)

3 Pre-installation

3.1 Moving and storage

Reception

It is important to check before accepting the delivery:

- If the unit hasn't been damaged during the transport;
- If 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 identified:

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

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

Storage

Respect the indications on the outside of the packaging, in particular:

- Minimum ambient temperature: - 30ºC (possible components damages);
- Maximum ambient temperature: +48ºC (possible safety valve opening);
- Maximum relative humidity: 95% (possible damages to electrical components).

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

Removal of packaging

When removing the packaging, be careful not to damage the unit.

Recycle and dispose the packaging material in compliance with local regulations.

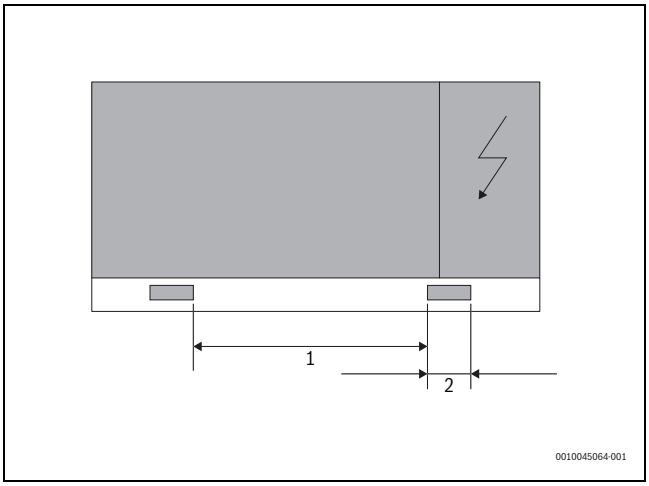

Fig. 57 Use of the forklift

	CS AWP 16-24	CS AWP 31-41
1	630	640
2	200	200

Table 43 Dimensions in mm- use of the forklift

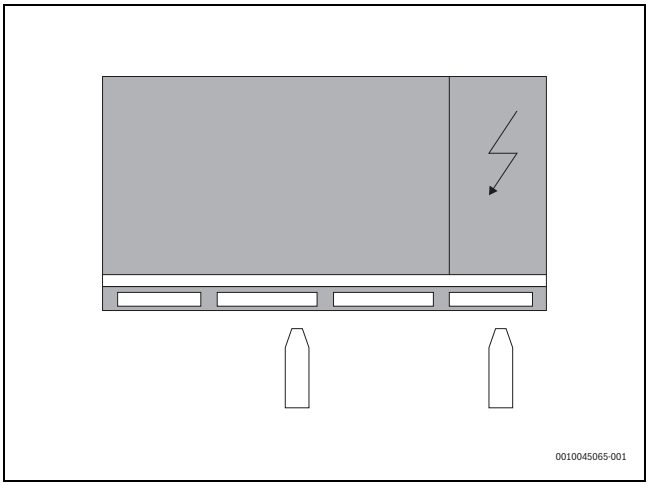

Fig. 58

CS AWP 53-59
unit on pallet

Table 44

Handling

- ▶ Check if all the handling equipment complies with local safety regulations (cran, forklifts, ropes, hooks, etc.);
- ▶ Provide personnel with individual protective equipment suitable for the situation, such as the helmet, gloves, accident-prevention shoes, etc.;
- ▶ Observe all safety procedures in order to guarantee the safety of the personnel present and of the material.

Lifting

1. Verify the unit weight and the handling equipment lifting capacity;
2. Identify critical points during handling (disconnected routes, flights, steps, doors);
3. Protect the unit properly to prevent damage;
4. Lifting with balance;
5. Lifting with spacer bar;
6. 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.

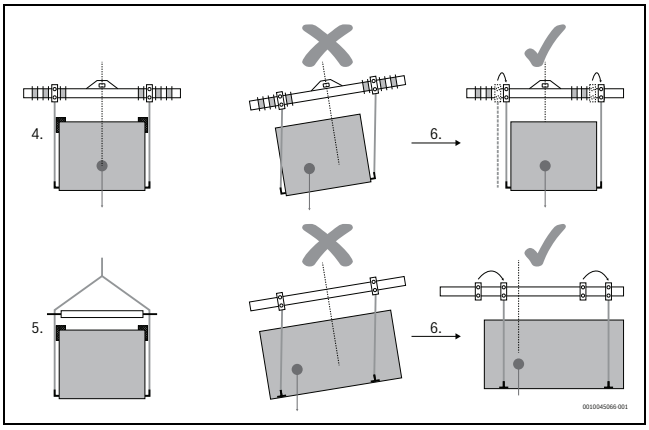

Fig. 59 Lifting of the unit

4 Installation location

4.1 Requirements for installation area

General information

During positioning consider the following elements:

- Customer approval
- Unit weight and bearing point capacity
- Safe accessible position
- Functional spaces
- Spaces for the air intake/exhaust
- Electrical connections
- Max. distance allowed by the electrical connections
- Water connections

Functional spaces

Functional spaces are designed to:

- Guarantee good unit operation;
- Carry out maintenance operation;
- Protect authorized operators and exposed people.

Positioning

The units are designed to be installed externally and in fixed positions:

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

Installation standards:

- Install the unit raised from the ground;
- Bearing point aligned and levelled;
- Discharged condensation water must not cause harm/danger to people and property;
- The accumulation of snow must not cause clogging of the coils;
- Avoid installations in places subject to flooding.

Limit vibration transmission:

- Use anti-vibration devices or neoprene strips on the unit support points;
- Install flexible joints on the hydraulic connections.

Protect the unit with a suitable fence, if necessary, in order to avoid access to unauthorised personnel.

A correct circulation of the air is mandatory to guarantee the good unit operation.

Avoid therefore:

- Obstacles to the airflow;
- Exchange difficulties;
- Foreign objects that can obstruct the exchange batteries;
- 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);
- Positioning below the level of the threshold, close to very high walls, attics or in angles that could give rise to stratification or recirculation phenomenons.

Ignoring the previous indications could:

- Decrease the energy efficiency;
- Start an alarm lockout due to high pressure (in summer) or low pressure (in winter).

4.2 Safety instructions

Prevent the accumulation of snow

If the unit is installed where it might snow:

- Do not install the unit under trees or roofs that may accumulate snow;
- Anticipate a base of a suitable height for possible accumulation of snow.

Always keep coils and fans free from obstructions, otherwise the accumulated snow will block the airflow and may cause problems to the equipment.

CAUTION

During the operation, the heat pump produces a considerable amount of water, due to the defrosting cycles of the external coil.

- ▶ The condensate must be disposed to prevent ice building in front and under the unit, which could be dangerous for people or damage things.

Pressure relief valve gas side

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

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

4.3 Accessories

Installation of the anti-vibration coupling

Place the anti-vibration coupling between the unit and the base.

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

If the anti-seismic spring couplings are installed, the total height of the unit increases.

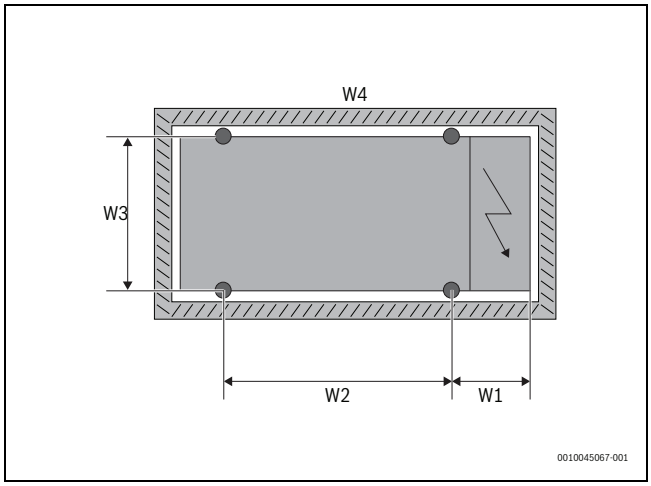

Fig. 60 W1 to W4: load points of the unit

	CS AWP 16-24	CS AWP 31-41	CS AWP 53-59
A	518	425	253
B	825	840	2715
C	930	995	1029
D	Condensate collection channel		

Table 45 Distance in mm for the installation of the anti-vibration coupling

5 Water systems and pipework

5.1 Water quality

The water quality should be checked by qualified personnel.

Water with inadequate characteristics can cause:

- Increasing of pressure drop;
- Decreasing of energy efficiency;
- Increasing of symptoms of corrosion.

Water features must be:

- Within the limits indicated by the graphic;
- Comply with VDI 2035 requirements.

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

NOTICE

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.

The following graphic can be used to decide whether a filling water treatment is necessary. In the case of ambivalent systems, the highest requirements of the heat generators used in the overall system apply.

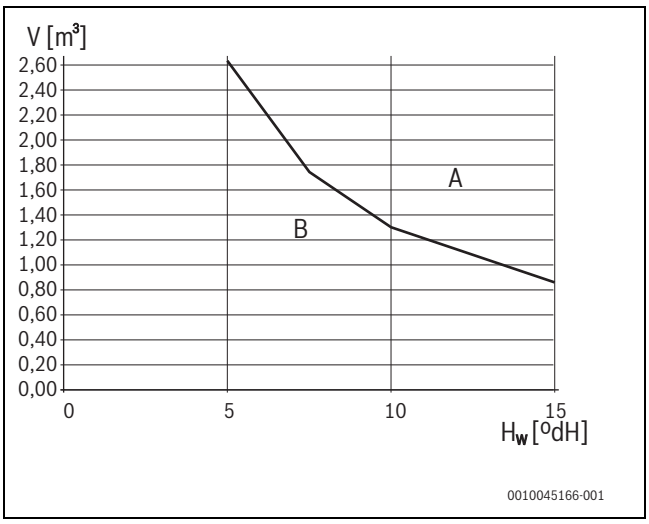

Fig. 61 Requirements for filling and make-up water volume for heat pumps <= 100 kW

[1] A - Above the curve, use fully demineralised filling water with an electrical conductivity of <=10 microsiemens / cm
[2] B - Below the curve use untreated tap-water. Fill in compliance with drinking water regulations
[3] H_w- Water hardness
[4] V - Total water volume: filling and make-up water volume of the heating system during the service life of the heat pump

CAUTION

With fully demineralised water, it is important to ensure that the permissible pH value of 7.5 - 9 (permissible value for copper) is complied with.

Failure to comply with this value can result in the heat pump being destroyed.

▶ In the case of bivalent systems, check whether other heat generators have different requirements.

Cleaning

Before connecting the water to the unit, clean the system thoroughly with specific and effective products to remove residues or impurities that may affect functioning.

Existing systems must be free from sludge and contaminants and protected against build-ups.

New systems

In case of new installation, make sure to wash it entirely before commissioning the central installation (certifies that the circulator is uninstalled). This removes residues of the installation process (welding, waste, joint products, etc.).

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

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.

Each section must then be washed separately.

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

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

Risk of freeze

If the unit or the relative water connections can be subject to temperatures close to 0ºC:

- Mix water with ethylene glycol, or;
- Safeguard the pipes with heating cables placed under the insulation, or;
- Empty the system completely in case of long non-use.

Be aware that the unit must always be protected from freeze. Otherwise, irreversible damage may occur.

Anti-freeze solutions

Have in consideration that the use of an anti-freeze solution determines an increase in a pressure drop.

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

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

Be aware that most of the glycol types are corrosive under 20%. Mix the water glycol mix proper before filling it in the system, otherwise the unit can be damaged.

%Ethylene glycol by weight	0%	20%	30%	35%	40%	50%
Correction factor for unit cooling capacity	1	0,973	0,965	0,963	0,96	0,95
Correction factor for flow rate	1	1,051	1,092	1,119	1,145	1,2
Correction factor for system pressure drop	1	1,268	1,482	1,6365	1,791	2,1

Table 46 Correction factors for glycol use

% Ethylene	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%
Freezing temperature (ºC)	-2	-3.9	-6.5	-8.9	-11.8	-15.6	-19.0	-23.4	-27.8	-32.7
Safety temperature (ºC)	3	1	-1	-4	-6	-10	-14	-19	-23.8	-29.4

Table 47 Typical values for ethylen glycol (other glycol type values can be different).

The correction factors shown refer to water and ethylene glycol mixes, used to prevent the formation of frost on the exchangers in the water circuit during inactivity, in winter.

5.2 Dirt trap

- The water filter must be installed immediately in the water inlet of the unit, in a position that it will be easily accessible for cleaning;
- Removing the filter will end the guaranty.

The filter must have an adequate mesh to prevent the entry of particles grater that 0,5mm (30 mesh).

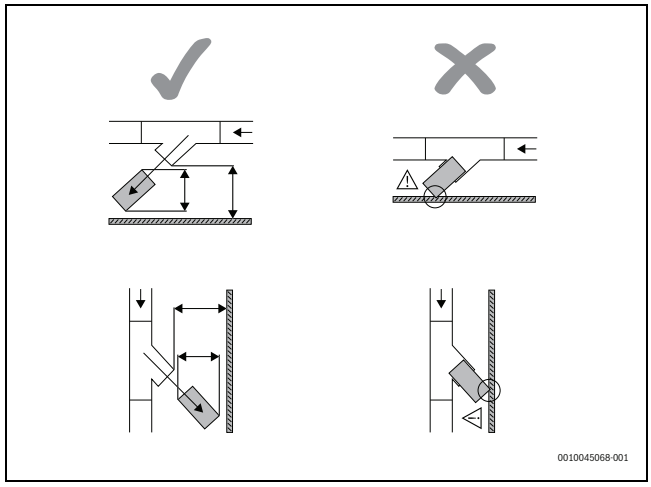

Fig. 62

Water flow-rate

The design water flow-rate must be:

- inside the exchanger operating limits (see the Technical data chapter);
- 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 following diagram.

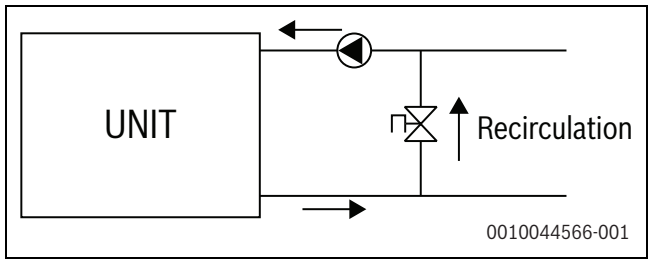

Fig. 63

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

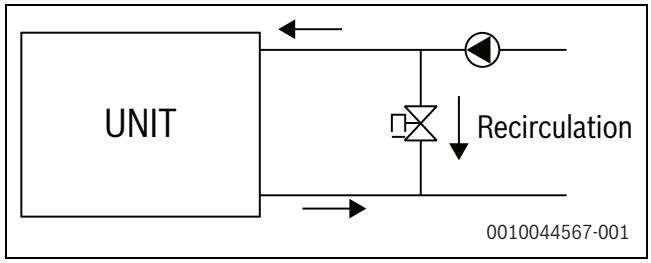

Fig. 64

Non-return valve

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

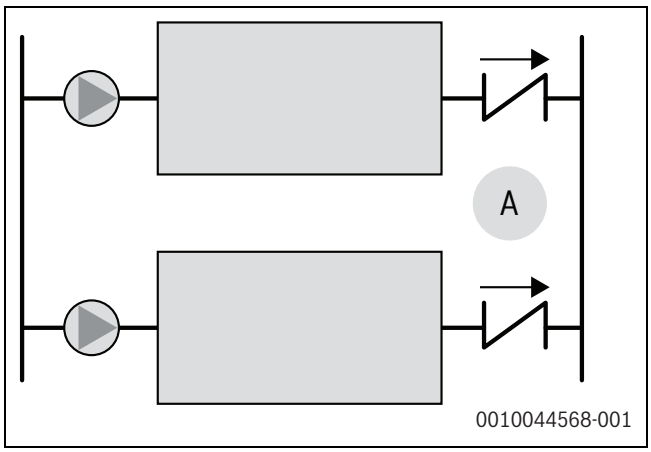

Fig. 65 Non-return valve

5.3 Hydraulic schemes

Fig (→Graphic 379, Standard unit)

Fig (→ Graphic 380, Unit + pump)

1. Exchanger
2. Antifreeze heater (optional)
3. Water temperature probe
4. Drain
5. Water flow switch
6. Vent
7. System loading safety pressure switch
8. Pump
9. Safety valve
10. N.D.
11. Shut-off valves
12. Filter
13. Flexible couplings
14. Piping supports
15. Exchanger chemical cleaning bypass
16. System cleaning bypass
17. N.D

Fig (→ Graphic 381, Unit + storage tank)

1. Exchanger
2. Antifreeze heater
3. Water temperature probe
4. Drain
5. Water flow switch
6. Vent
7. System loading safety pressure switch
8. Pump
9. Safety valve
10. Storage tank
11. Shut-off valves
12. Filter
13. Flexible couplings
14. Piping supports
15. Exchanger chemical cleaning bypass
16. System cleaning bypass
17. Domestic hot water valve (AWP16 - AWP24 and AWP31 - AWP41)

Fig (→ Graphic 382, Unit + 3 way valve for domestic hot water)

17B. Domestic hot water valve (AWP53 - AWP59)

5.4 Victaulic connections

- ▶ Remove the supplied connection union by acting on the connection joint;
- ▶ Weld the union to the installation pipe;
- ▶ Perform the connection between the installation pipe and the evaporator, using the joint.

Do not weld the system pipe with the victaulic connection joint. The rubber gasket might be irreparably damaged.

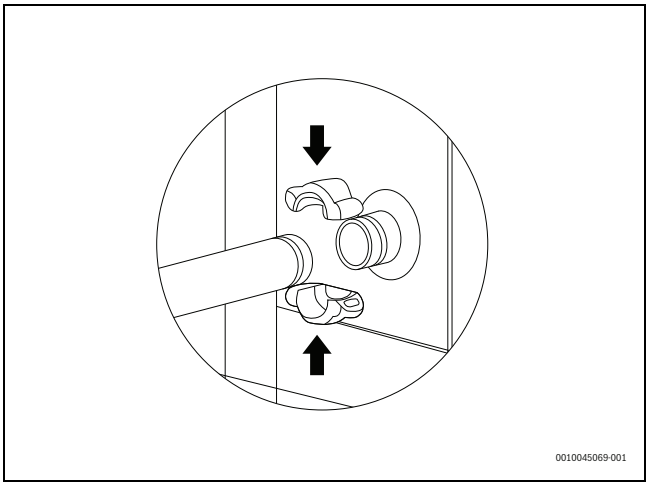

Fig. 66 Victaulic connection with: connection union, joint and connection joint (parts from left to right)

Operation sequence

Before starting the unit pump, consider the following steps:

- ▶ Close all vents in the high points of the water circuit of the unit;
- ▶ Close all drain shut-off valves in the low points of the water circuit of the units:
  - Exchangers
  - Pumps
  - Collectors
  - Storage tanks
- ▶ Carefully wash the system with clean water: use the bypass to exclude the exchanger from the flow (see diagram on Domestic hot water Topic) fill and drain the system several times;
- ▶ Apply additives to prevent corrosion, fouling, formation of mud and algae;
- ▶ Fill the system (do not use the unit pump);
- ▶ Conduct a leak test;
- ▶ Isolate the pipes to avoid heat dispersion and formation of condensation;
- ▶ Leave various service points free (wells, vents, etc.).

Neglecting to wash the filter, will lead to a more frequent cleaning process, and it may damage the exchangers and compressors.

5.5 Hydraulic system

The pipes 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
- Changes of direction

6 Electrical connections

The characteristics of the electrical lines must be determined by specialized 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 the presumed short circuit current, whose value must be determined in function of 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 requirements by the regulations in force, and being informed about the risks relevant to these activities.

Operate in compliance with safety regulations in force.

6.1 Electrical data

The type plate reports the unit specific electrical data. The label it is included in any electrical accessories.

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

Refer to the electrical data report on the type plate:

- Tension;
- F.L.A.: full load ampere, absorbed current at maximum admitted conditions;
- F.L.I.: full load input, full load power input at maximum admissible condition;

Connections

- ▶ Refer to the unit electrical diagram;
- ▶ Verify that the network has characteristics conforming to the data shown on the type plate;
- ▶ Before starting work, verify if the sectioning device at the start of the unit power line is open, blocked and equipped with cartel warning;
- ▶ First, it is necessary to realize the earthing connections;
- ▶ Shelter the cables using adequate measure fairleads;
- ▶ Prevent dust, insects or rodents from entering the electrical panel as they can damage components and cables;
- ▶ 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;
- ▶ Secure the cables: if left unattached they can be stripped;
- ▶ The cables must not touch the compressors or the refrigerant piping (they reach high temperatures);
- ▶ Do not drill holes in the electrical panel. Alternatively, restore the IP rating with watertight systems;
- ▶ Before power the unit, make sure that all the protections that were removed during the electrical connection work have been restored.

Power supply cables

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

Lay the cables far from power cables or cables having a different tension 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°.

In case of parallel power supply and signal cables, use separate metal ducts. Minimum distance between power supply and signal cables:

- 300 mm for absorption up to 10A;
- 500 mm for absorption up to 50A;

Connect the screen to the ground, only if there aren't disturbances.

Guarantee the continuity of the screen during the entire extension of the cable.

Respect imminence, capacity and attenuation of the indications.

	CS AWP 16 - 24	CS AWP 31 - 41	CS AWP 53 - 59
Max. cable section Cu (mm^2)	16	25	25

Table 48 Power supply cables section

Power supply netwok requirments

- The short circuit capacity of the line must be less than 15 kA;
- The units can only be connected to TN, TT distribution systems;
- Voltage 400-3-50 +/-10%;
- Phase unbalance < 2%;
- Harmonic distortion less than 12% (THDv<12%);
- Voltage interruptions lasting no longer than 3ms and with at least 1 s between each one;
- 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;
- Earth cable as specified in the table:

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

Table 49

Remote control board

Fig. (→Graphic 383, APC board XT1 power connection terminal and XT2 low voltage terminal for CS 3000 AWP - AWP16AWP19 and AWP24)

- ALARM - Cumulative fault signal
- KM1 - System auxiliary heater control relay
- KM2 - Auxiliary heater control relay
- HL1 - Compressor status signal lamp
- SV1 - DHW 3-way valve
- KMU - Pump control contactor provided by the costumer
- TAF1 - Anti-freeze sensor on water on DHW side
- TW - Total probe to the outlet water collector
- T5 - Domestic hot water storage temperature probe
- BUS - BUS for cascade units
- SPA2 - System charge control pressure switch
- COOL/HEAT - Remote winter/summer selector
- ON/OFF - Remote ON/OFF selector
- TEMP-SW - Remote selector for set-point change
- RB1/RB2 - Resistance of the anti-condensation pan

Fig. (→Graphic 384, APC board XT1 power connection terminal and XT2 low voltage terminal for CS 3000 AWP - AWP31, AWP36, AWP41, AWP53 and AWP59)

- ALARM - Cumulative fault signal
- KM1 - System auxiliary heater control relay
- KM2 - Auxiliary heater control relay
- HL1 - Compressor status signal lamp
- SV1 - DHW 3-way valve
- KMU - Pump control contactor provided by the costumer
- TAF1 - Anti-freeze sensor on water on DHW side
- TW - Total probe to the outlet water collector
- T5 - Domestic hot water storage temperature probe
- BUS - BUS for cascade units
- SPA2 - System charge control pressure switch

- COOL/HEAT - Remote winter/summer selector
- ON/OFF - Remote ON/OFF selector
- TEMP-SW - Remote selector for set-point change
- RB1/RB2 - Resistance of the anti-condensation pan

Fig. (→ Graphic 385, Connections by the customer - Additional board (APR board for CS 3000 AWPCS 3000 AWP - AWP16AWP59)

- SA4 - Remote ON/OFF selector
- SA5 - Remote “heating/cooling” selector
- SA6 - Sanitary water cycle selector
- SA7 - Second set-point enabling switch
- SA8 - Silent mode enabling selector
- SA21- EVU enabling selector
- SA22 - Smart Grid enabling selector
- REMAU BMS- BMS/ Modbus RTU communication system

Fig. (→ Graphic 386, Overview placement APC-, APR board XT1 and XT2 terminal for CS 3000 AWP AWP16 - AWP24)

Fig. (→Graphic 387, Overview placement APC-, APR board XT1 and XT2 terminal for CS 3000 AWPAWP31AWP59)

SA4	Remote ON/OFF selector
SA5	Remote heating/cooling selector
SA6	Sanitary water cycle selector
SA7	Second set-point enabling switch
SA8	Silent mode enabling selector
SA21	EVU enabling selector
SA22	Smart Grid enabling selector
ALARM	Cumulative fault signal
KM1	System auxiliary heater control relay
KM2	Auxiliary heater control relay
HL1	Compressor status signal lamp
COOL/HEAT	Remote winter/summer selector
ON/OFF	Remote ON/OFF selector
TEMP-SW	Remote selector for set-point change
KMU	Pump control contractor provided y the costumer
SPA2	System charge control pressure switch
TW	Total probe to the outlet water collector
T5	Domestic hot water storage temperature probe
TAF1	Anti-freeze sensor on water on DHW side
BUS	BUS for cascade units
REMAU BMS	BMS / Modbus RTU communication system

Table 50 Legend of the electric scheme

- Alarm signal - ALARM
  - Closed contact with alarmed unit.
  - Contact on APC-board: CN24_1-2.
- Functioning compressor signal - HL1
  - Connect the signal lamp as shown in the diagram.
  - Contact on APC-board: CN33_COMP-STATE.
- External pump control - PUMP-N
  - In case of a unit supplied with no circulation pump, control the external pump as shown in the diagram. Use an auxiliary relay.
  - Contact on APC-board: CN25_PUMP-N.
- Auxiliary heaters controls
  - Contact on APC-board: CN26_HEAT1-KM1.
  - The Heat1 output can be connected to an electrical heater to prevent the water in the pipes from freezing at low temperature. The main control for Heat1 only provides on/off signals: the specific sizing of the heater depends on the installation needs.
  - Contact on APC-board: CN26_HEAT2-KM2.
  - The Heat2 output can be connected to an electrical heater on the DHW tank, to a gas boiler on the DHW tank or to a gas oiler on the heating system.
  - The Heat2 auxiliary heater can provide the following functions:
    a) If the heat pump is not able to reach the set point for a certain time (standard time: 90 minutes) the Heat2 signal will be activated;
    b) If the compressor is not available for alarm or for ambient conditions out of the operating range the Heat2 signal will be activated;
    c) Anti legionella function for DHW application;
    d) Water set point extension;
    e) The main control for Heat2 only provides on/off signals
- Modbus
  - Connect on the back of the controller.Modular unit: connect the Modbus to the MASTER unit port.
  - Contact on API board: - H1 to + H2

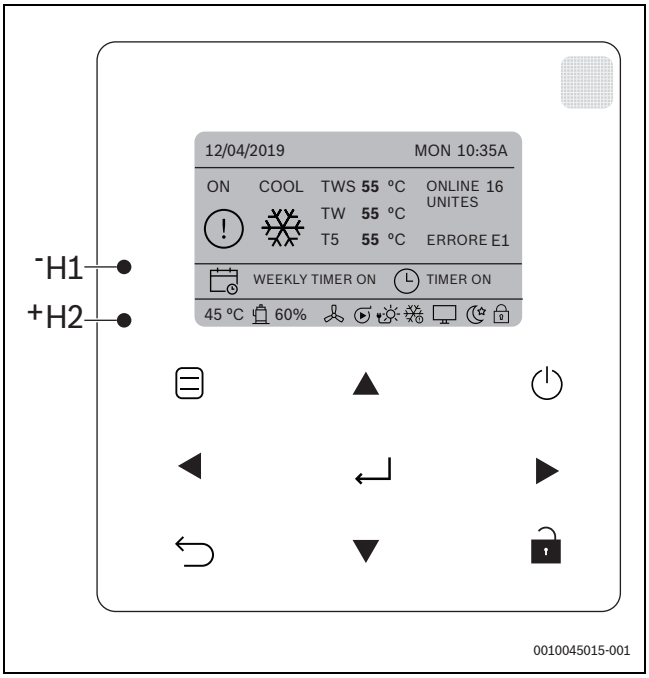

Fig. 67

- TW probe
  - The probe of the total system supply water control is installed on the supply pipe in the fan compartment.With the unit in modular configuration, the master unit's TW probe must be reinstalled on the system's common supply line, as far away as possible.Use the additional probe trap in the electrical panel.Keep the connection to the electrical panel, just remove the sensor that is inserted in the water supply pipe inside the trap. The probe is physically clamped by a cable gland.
  - Contact on XT2-board: 1-2.
- Taf1 probe
  - The domestic hot water antifreeze protection probe is located inside the electrical panel in a plastic bag with a 10m long cable.
  - To remotely control the Taf1 probe, electrically disconnect the one in the electrical panel (only 3m long) and connect the one in the bag labelled Taf1 to the same connector. Install the probe at the outlet pipe from the hot water buffer tank.
  - Contact on APC-board: 7-8.
- T5 probe
  - The temperature probe that switches from system to domestic hot water is located inside the electrical panel in a plastic bag with a 10m long cable. Connect it to the free connector labelled "T5" in the electrical panel.
  - Contact on XT2-board: 3-4.
- Keypad remote connections
  - The keypad is wired on the unit. It can be disassembled and installed remotely.

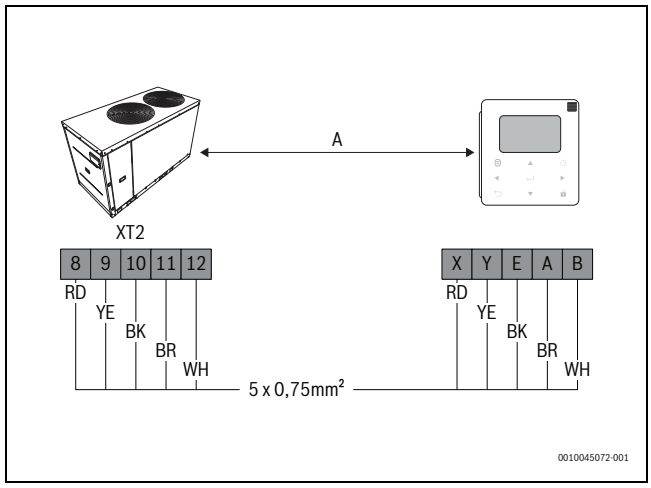

Fig. 68 Maximum distance 40m. Power supplied by the unit.

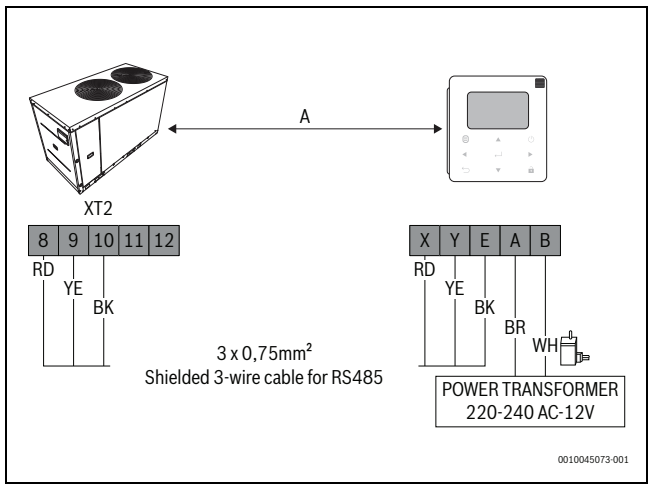

Fig. 69 Maximum distance 300m. Separate power supply - power supply provided with the unit.

6.2 Advanced remote control board

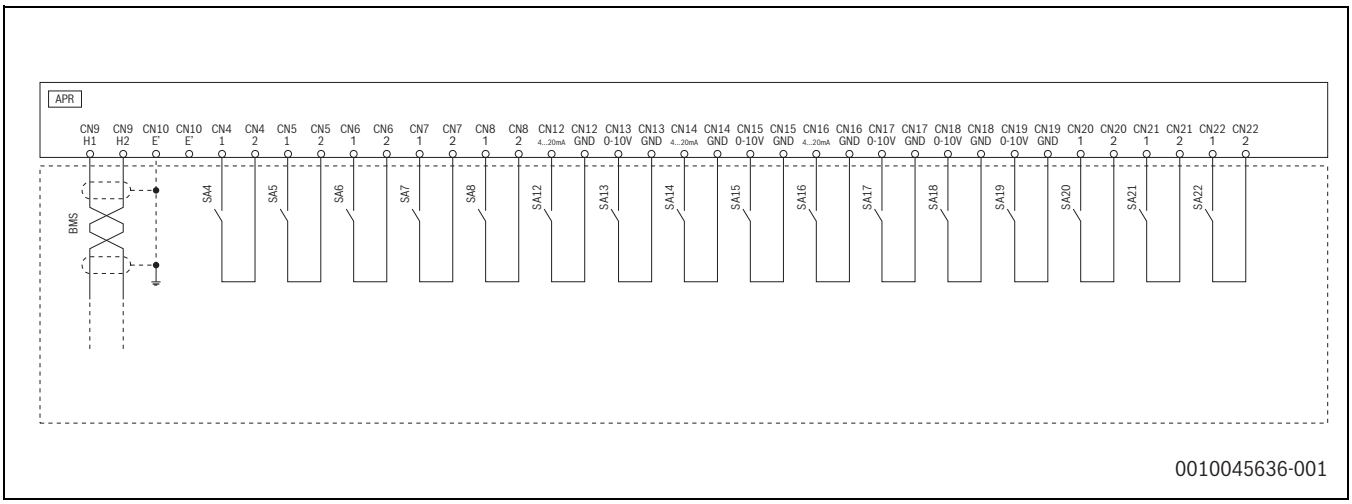

Fig. 70 Advanced remote control board

SA4	ON/OFF
SA5	C/H
SA6	DHW
SA7	D-S-P
SA8	SILENT
SA12	DHW 4...20mA
SA13	DH 0 - 10V
SA14	Heat-Set 0 - 10V
SA15	Heat-Set 4...20mA
SA16	Cool-Set 4...20mA
SA17	Cool-Set 0 -10V
SA18	DL 4...20mA
SA19	DL 0 -10V
SA20	E_Gas Boiler
SA21	EVU
SA22	S-G
BMS	Customer BMS

Table 51

6.3 Domestic hot water

Domestic hot water management is of priority compared to the system.

In DHW production mode, the compressors start only if the DHW storage temperature is above a minimum threshold.

The maximum supply temperature threshold of the system is variable based on the outdoor temperature.

To prevent it from falling below the minimum temperature, it is advisable to install a backup electric heater on the DHW storage.

Outdoor temperature t0	T5 DHW storage tanks	Compr.	Backup heater
24ºC < to <= 30ºC	<15ºC	OFF	ON
24ºC < to <= 30ºC	>=15ºC	ON	OFF
to > 30ºC	<20ºC	OFF	ON
to > 30ºC	>=20ºC	ON	OFF

Table 52 Outdoor temperature t0

The following components are required:

- 3-way valve SV1
- Temperature probe Taf1 antifreeze protection for domestic hot water
- Temperature probe T5 regulation and switching between system and DHW production

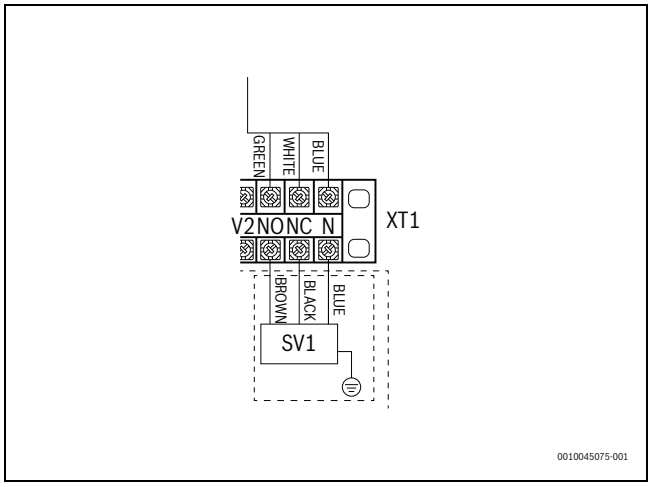

Fig. 71

Operations sequence:

1. Disconnect the probe Taf1 supplied and connected as standard on the unit (main board-CN69).
2. Connect the probe Taf1 supplied as spare part with the 10mt cable (main board-CN69).
3. After connecting the cable put the probe on the domestic hot water line.
4. Connect T5 connector and put the T5 probe on the domestic hot water storage.

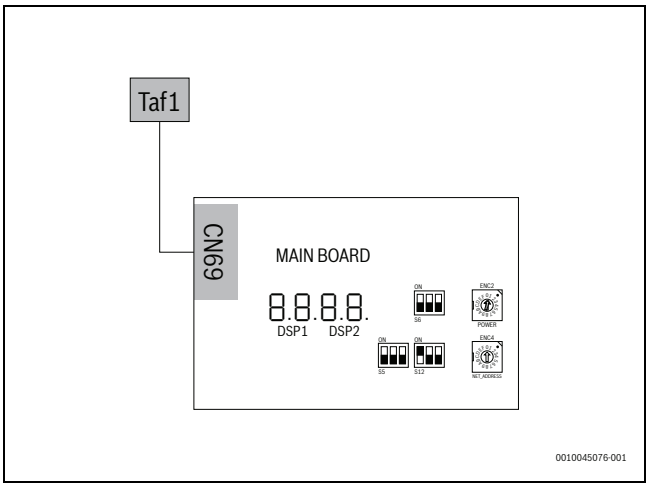

Fig. 72

7 Start-up

General

The indicated operations should be done by qualified technician with specific training on the product.

The electrical, water connections and the other system works are performed by the installer.

Upon request, the service centres performing the start-up. Please agree with the service centres, in advance, the start-up data.

For details, refer to the various chapters in the manual.

Before checking, please verify the following:

- the unit should be installed properly and in conformity with this manual;
- the electrical external isolation device should be sectioned at the beginning;
- the line sectionalizing device is open, locked and equipped with the suitable warning;
- make sure no tension is present.

CAUTION

After turning off the power wait at least 10 minutes before accessing to the electrical panel or any other electrical component.

- ▶ Before accessing check with a multimeter that there are no residual stresses.
- ▶ Do not power the unit with empty water side exchangers. It could cause possible damages to the anti-freeze electric heaters.

Preliminary checks
Unit power supply OFF

		YES	NO
1	Safe access		
2	Suitable frame to withstand unit weight + people weight		
3	Functional clearances		
4	Air flow: correct return and supply (no bypass, no stratification)		
5	Condensation drain		
6	Considered level to be reachable by snow		
7	Considered main winds		
8	Lack of chimneys/corrosive atmospheres/pollutants		
9	Structure integrity		
10	Fans run freely		
11	Unit on vibration isolators		
12	Unit levelled		
13	Unit input water filter + shut-off valves for cleaning		
14	Vibration dampeners on hydraulic connections		
15	Expansion tank (recommended volume = 10% system content)		
16	Minimum system water content		
17	Clean system		
18	Loaded system + possible glycol solution + corrosion inhibitor		
19	System under pressure + vented		
20	Refrigerant circuit visual check		
21	Earthing connection		
22	Power supply features		
23	Connections performed by Customer: electrical connected, configuration		

Table 53

Start-up sequence
Unit power supply ON

		YES	NO
1	Compressor crankcase heater operating at least since 8 hours		
2	Off-load voltage measure		
3	Phase sequence check		
4	Pump manual start-up and flow check		
5	Refrigeration circuit shut-off valves opening (if applicable)		
6	Unit ON		
7	Load voltage measure		
8	If remote On-Off: set dip-switch S5-3 on ON		
9	If units in modular configuration: set dip-switch S12-2 on ON set unit address via ENC4		
10	Verify the lack of bubbles in the liquid light (if applicable)		
11	Check of all fan operating		
12	Measure of return and supply water temperature		
13	Super-heating and sub-cooling measure		
14	Check no anomalous vibrations are present		
15	Set-point personalization		
16	Scheduling customisation		
17	Complete and available unit documentation		

Table 54

7.1 Refrigerant circuit

- ▶ Visually inspect the refrigerant circuit: the presence of oil stains can be a symptom of leakage (caused e.g. by transportation, handling or other);
- ▶ Check if the refrigerant circuit is under pressure. Please use the unit manometers, if present, or service manometers;
- ▶ Make sure that all the service outlets are closed with proper caps; if caps are not present a leak of the refrigerant can be possible;
- ▶ Open all of the refrigeration circuit shut-off valves (if applicable).

7.2 Hydraulic circuit

- ▶ Before connecting the unit to the hydraulic system, make sure that the hydraulic system has been washed and that the water has been drained;
- ▶ Check that the hydraulic circuit has been filled and pressurized;
- ▶ Check that the shut-off valves in the circuit are in the “OPEN” position;
- ▶ Check that there is no air inside the circuit, and bleed it through the vent valves in the high points of the system if necessary;
- ▶ When using antifreeze solutions, make sure the glycol percentage is suitable for the type of use envisaged.

Neglecting the washing phase will lead to several filter cleaning interventions; at worst it can cause damage to the exchangers and other parts.

7.3 Electric circuit

- ▶ Check if the unit is connected to the earthing system;
- ▶ Check if the conductors are tightened as the vibrations caused by handling and transport might cause these to come loose;
- ▶ Power the unit by closing the external isolation device but leave the main switch OFF;
- ▶ Check the values for network frequency (+/-6%) and voltage (which must be within the limits: 380-415V 3N~ 50Hz);
- ▶ Check and adjust the phase balance as necessary: it must be lower than 2%. Example:
  - 400 - 6% = 376
  - 400 + 6% = 424

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

Compressor crankcase resistances

Connect the compressor oil heating resistances, at least, 8 hours before starting the compressor:

- at the first unit start-up;
- after each prolonged period of inactivity.

- ▶ Power the heaters: isolator switch on 1 / ON.;
- ▶ Check the power consumption of the resistances to make sure that they are functioning;
- ▶ Start-up the compressor only if the crankcase temperature, on the lower side, is higher than the outside temperature by at least 10°C;
- ▶ Do not start the compressor with the crankcase oil below operating temperature.

Voltage

- ▶ Check that the air and water temperatures are within in the operating limits.
- ▶ Start-up the unit.

While the unit is operative, i.e. in stable conditions nearing operating ones, check:

- Power supply voltage;
- Total consumption of the unit;
- Consumption of the single electric loads.

7.4 Remote controls

Check if the remote controls (ON-OFF etc.) are connected and, if necessary, enabled with the respective parameters as indicated in the “electrical connections” section.

Check that probes and optional components are connected and enabled with the respective parameters (“electrical connections” section).

Scroll compressor (only CS3000 AWP 53 and 59)

Scroll compressors have only one rotation direction. In the case it is reversed, the compressor is not immediately damaged but it will become more noisy, and pumping will be jeopardized.

After a few minutes, the compressor shuts down due to the thermal protection trip. In this case, disconnect the power supply and invert 2 phases on the machine power supply.

Do not let the compressor work for a long time with opposite rotation: more than 2-3 of these abnormal start-ups can damage it.

To ensure the rotation direction is correct, measure the condensation and suction pressure.

The pressures must differ significantly: upon start-up, the suction pressure decreases while the condensation one increases.

7.5 Directive 2014/68 EU PED

Directive 2014/68EU PED also sets out the regulations for unit installers, users and maintenance operators.

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);
- Commissioning declaration:
  - for all units;
- Periodical checks:
  - to be executed with the frequency indicated by the Manufacturer (see the “maintenance inspections” paragraph).

8 Control unit

8.1 HMI overview

Keys of the HMI

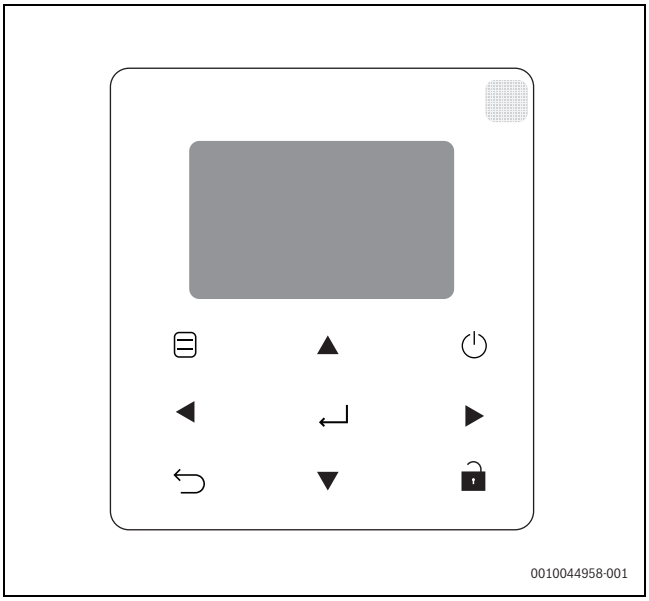

Fig. 73

Key	Function
	To lockout / unlock
∧ ∨	To modify current set point
MENU	To open the various menus from the HOME screen
	To move the cursor, change the selection or change the set value. The parameter can be quickly changed with a long press.
OK	To confirm an operation
ON/OFF	To set the ON/OFF function
BACK	To return to the previous level. Press to exit the current pages and return to the previous page. Long press to return straight to the home screen.

Table 55 Keys of the HMI

NOTICE

Units in modular configuration

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

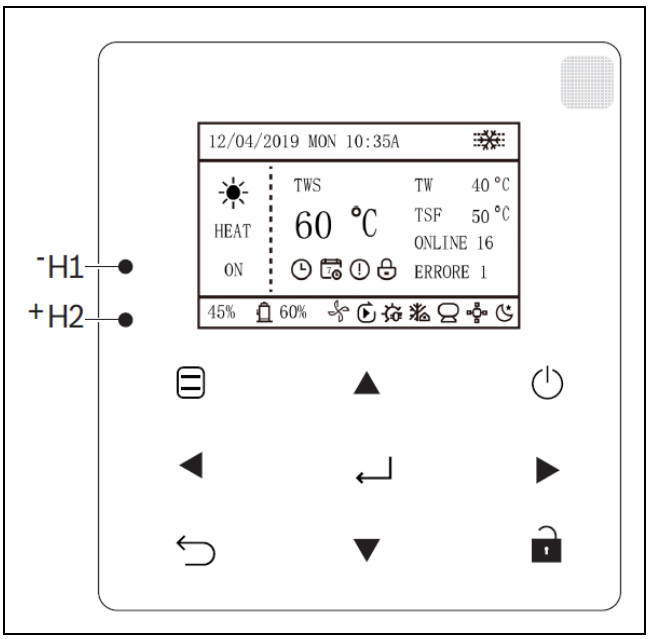

Fig. 74

Symbol	Explanation
Display of main operating modes	
	Mode: indicate respectively heating, cooling, domestic hot water
OFF	Controller off
	Weekly timer active
45%	Compressor work load
	Compressor in operation
60%	Fan work load
	Fan in operation
	Pump in operation
	Auxiliary 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 switch
	Safe temperature (antifreeze temperature)
	Silent mode
	Key lock
	Timer on
	Alarm: indicator on when there is a fault or a protection is tripped
ERRORE 1	Current error
ONLINE 16	Number of units connected in modular configuration
TSF 50 °C	Set point
TW 40 °C	Total outlet water temperature

Table 56 Symbols in the display of the HMI controller

NOTICE

Units in modular configuration

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

8.2 Menu structure

MENU
- Mode
- User menu
- Project menu
- Service menu

MODE
- Heat
- Cool
- DHW

USER MENU
- Query
- Timer
- General setting
- Double setting
- Snow-blowing switch
- Silent switch
- DHW switch

QUERY
- State query
  - Select address
  - Operation state
  - Running mode
  - Current silent mode
- Temp query
  - Select address
  - Inlet water temp
  - Outlet water temp
  - Total outlet water temp
  - Ambient temp
- History errors query
  - Select address

TIMER
- Daily timer
- Weekly timer

GENERAL SETTING
- Year
- Month
- Day
- 12-24 hour
- Minute
- AM/PM
- Language
- Backlight off delay
- Super silent mode

DOUBLE SETPOINT
- Double setpoint
- Set point cool_1
- Set point cool_2
- Set point heat_1
- Set point heat_2

SNOW-BLOWING SWITCH
- Yes/No

SILENT MODE
- Select silent
- Current silent

DHW SWITCH
- Select address
- Hot water switch
- Hot water priority
- Yes/No

SERVICE MENU (reserved for service centres)
- State query
- Clear history errors
- Setting address
- Heat control
- Temperature compensation
- Pump control
- Manual defrost
- Low outlet water control
- Low pressure switch
- Energy saving switch
- DHW enable
- Factory data reset

PROJECT MENU (reserved for service centres)
- Set unit air-conditioning
- Set parallel unit
- Set unit protection
- Set defrosting
- Set DHW time
- Set E9 time
- Inv pump ratio
- Check parts
- Percent of glycol

8.3 Menu settings

Unlock / lock

To unlock the screen, press UNLOCK for 3 seconds.

Switch ON/OFF

Press ON/OFF to switch ON/OFF.

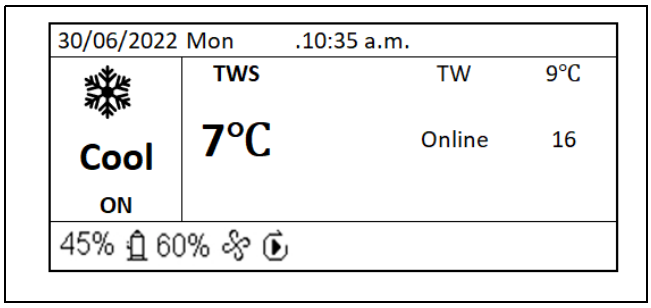

Fig. 75

Units in modular configuration

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

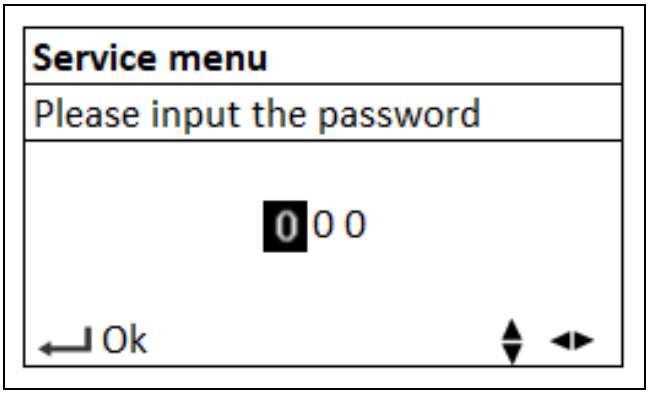

Fig. 76

Set MODE and TEMPERATURE
- Press MENU
  - Press ▲ or ▼ to select MODE
  - Press OK
  - Press ◀ or ▶ to select the MODE or the TEMPERATURE
  - Press ▲or ▼ to adjust the mode and temperature
  - Press OK to confirm.

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

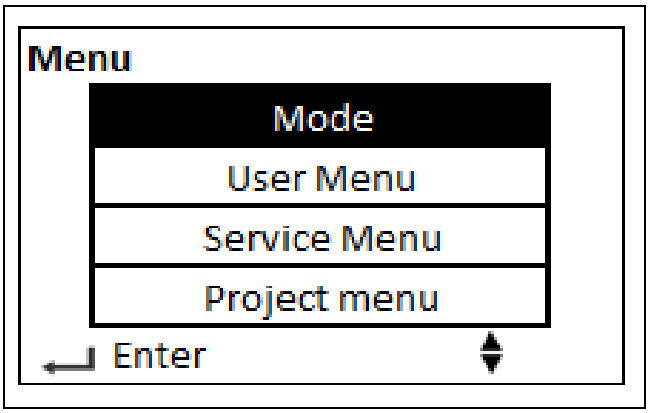

Fig. 77

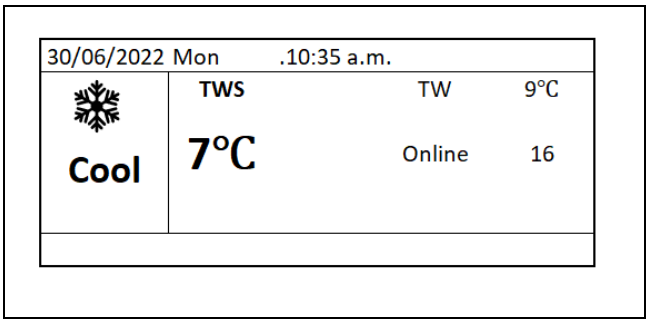

Fig. 78

During cooling with T ext < 10°C, the set point is forced to 10°C (ref. Functioning limits)

Domestic hot water

The ACS, if present and enabled, must be activated.

- Press MENU
  - Press ▲ or ▼ to select MODE
  - Press OK
  - Press ◀ or ▶ to select the DHW mode
  - Press ON/OFF
  - Press OK to confirm

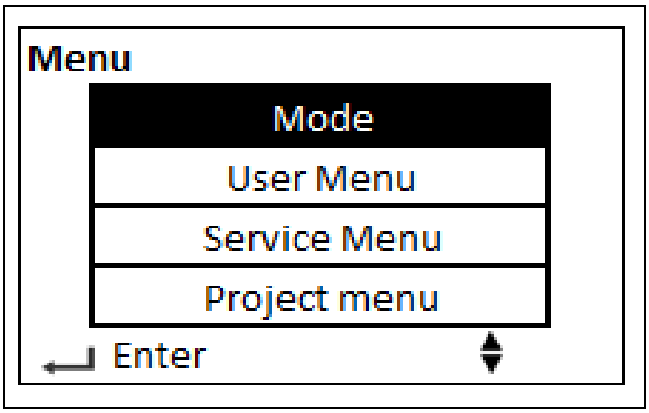

Fig. 79

User Menu

- Press MENU

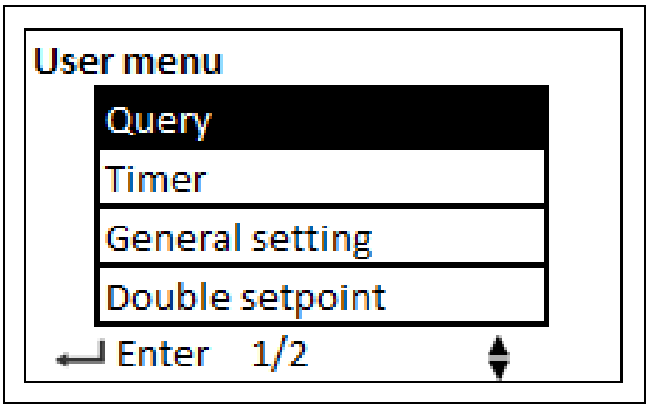

Fig. 80

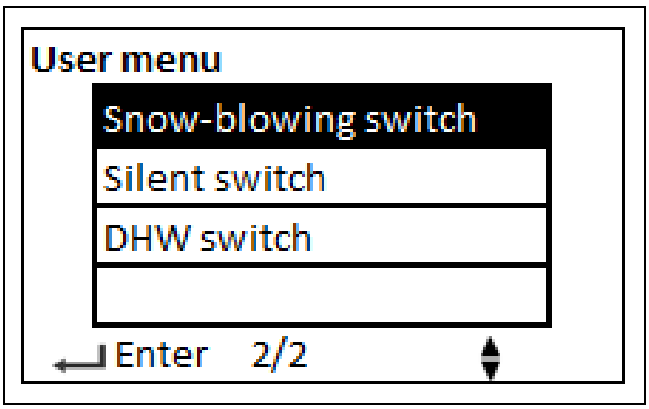

Fig. 81

User Menu query

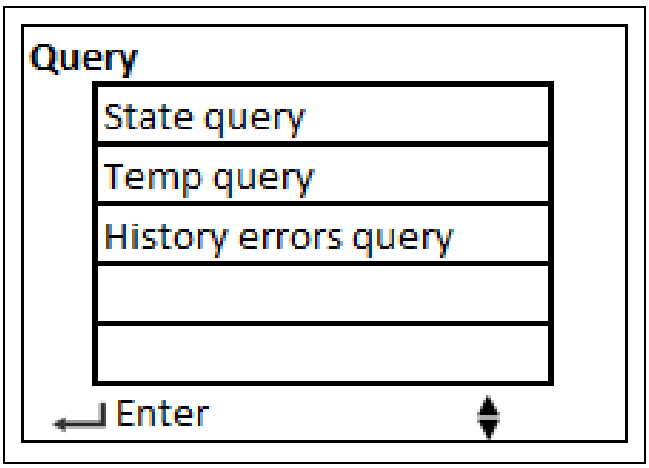

Fig. 82

To display data only if multiple units are connected to the network:

If State Query is selected:

- Press ◀ or ▶ to select the unit's address and shown related informations (only for units in modular configuration)

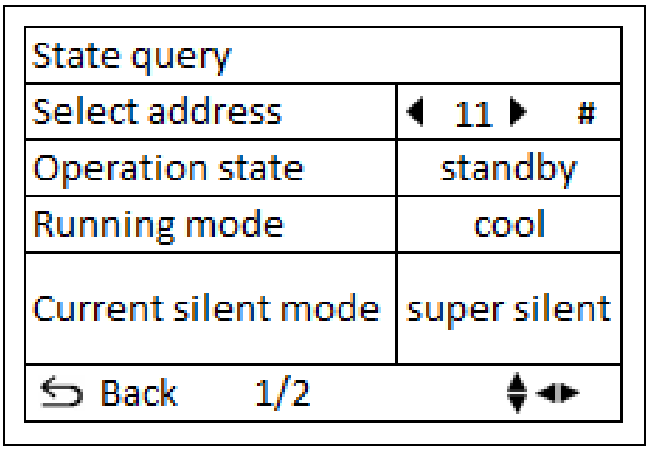

Fig. 83

- If TEMP QUERY is selected

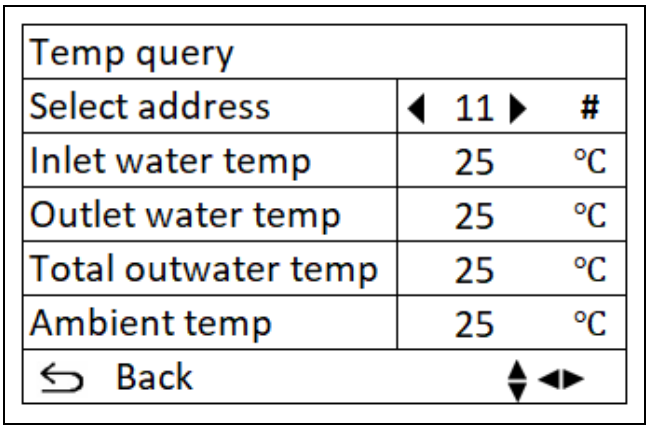

Fig. 84

User menu - TIMER

- Press Menu
- Press Timer
- Select one of the 3 categories presented:
  - If DAILY TIMER is selected the WEEKLY SCHEDULE cannot be activated and vice versa
  - If the unit is controlled via a remote ON/OFF or Modbus, DAILY and WEEKLY timers are disabled

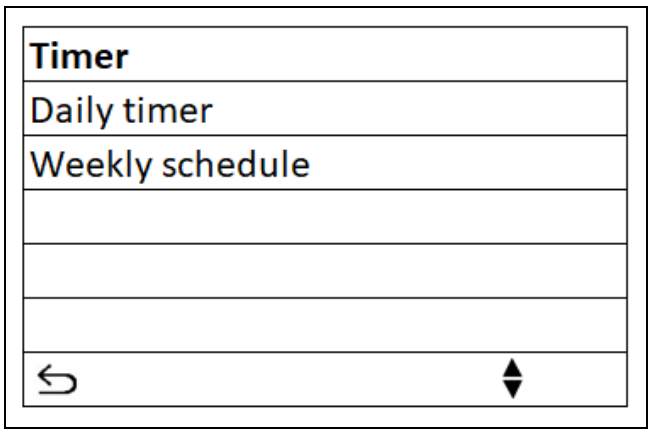

Fig. 85

TIMER menu - DAILY TIMER

- Press ◀ or ▶ to select timer 1 or timer 2
- When the cursor is over ACT press ◀ or ▶ to select ON/OFF
- Select the start time, end time, mode, temperature to be set by press ▲ or ▼
- Press ◀ or ▶ to adjust the time, as well as the mode, and the temperature value
- When the cursor is over SILENT MODE press ◀ or ▶ to set the silent, standard, night silent or super silent modes
- Press OK to confirm or BACK to cancel
- The ⏲ timer on symbol appears on the main screen

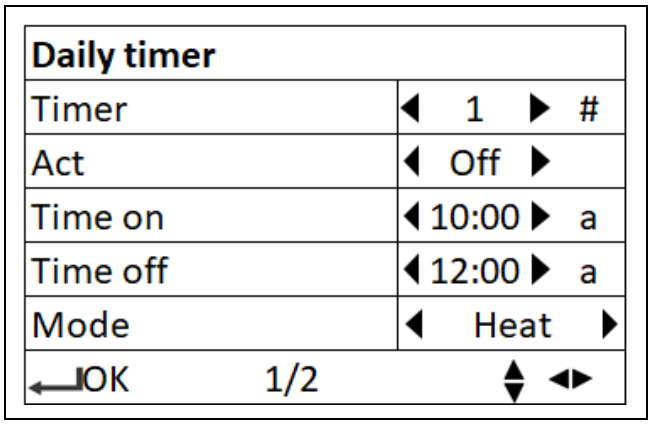

Fig. 86

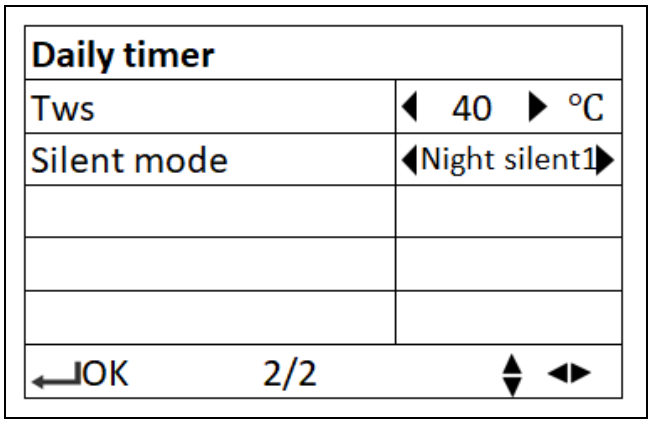

Fig. 87

If two time slots overlap, the last one on the lists is activated (in figure below - OFF)

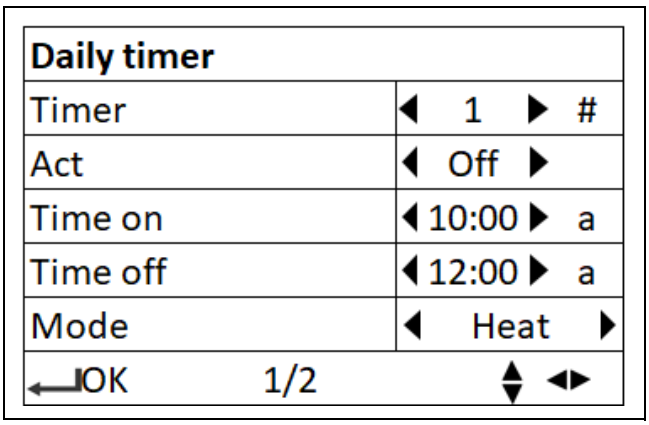

Fig. 88

TIMER menu - WEEKLY TIMER

- The weekly timing and the weekly timing switch can be selected by ▲ and ▼, and Monday to Sunday can be selected by ◀ and ▶

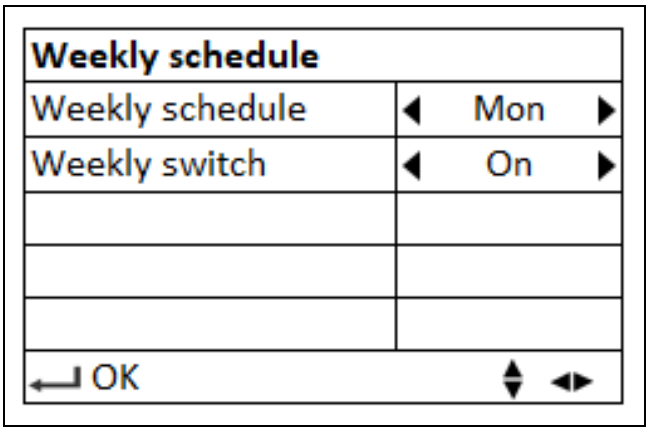

Fig. 89

- Select WEEKLY SCHEDULE by ▲ and ▼, select the day to be set by ◀ and ▶; press ENTER to enter Sunday timing
- Use ▲ and ▼ to switch the cursor to DAILY TIMER, ACT, TIME ON; TIME OFF, MODE, TWS, SILENT MODE
- When the cursor is at DAILY TIMER, use ◀ and ▶ to select Timer 1 or Timer 2 to be set
- When the cursor is at ACT use the ON/OFF key to select ON or OFF
- Use ▲ and ▼ to select the start time, end time, mode, and temperature to be set, and the use ◀ and ▶ to adjust the time, mode, and temperature values
- When the cursor is in SILENT MODE, select different silent modes through ▲ and ▼
- After setting, press ENTER to confirm and save, press BACK to cancel the setting and return to previous page
- The WEEKLY TIMER ON symbol appears on the main screen

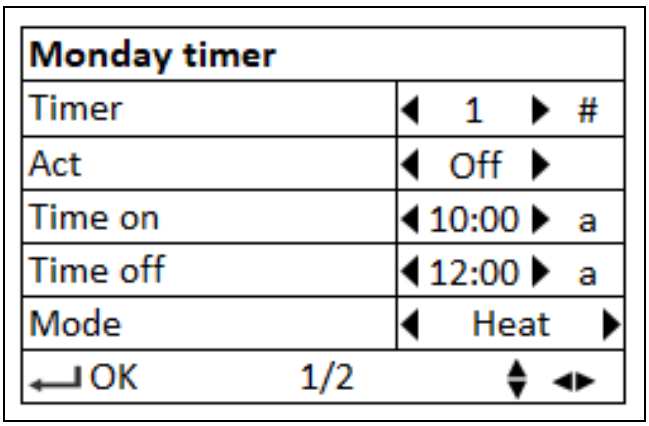

Fig. 90

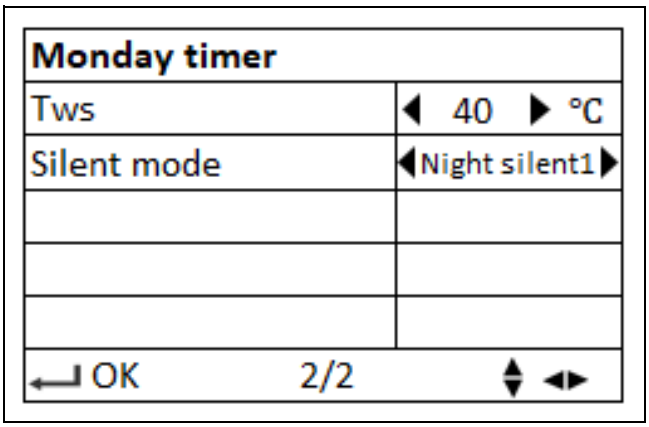

Fig. 91

USER menu - SILENT MODE switch

- Press ◀ or ▶ to select the mode STANDARD, SILENT, SUPER SILENT
- Press OK to save the settings

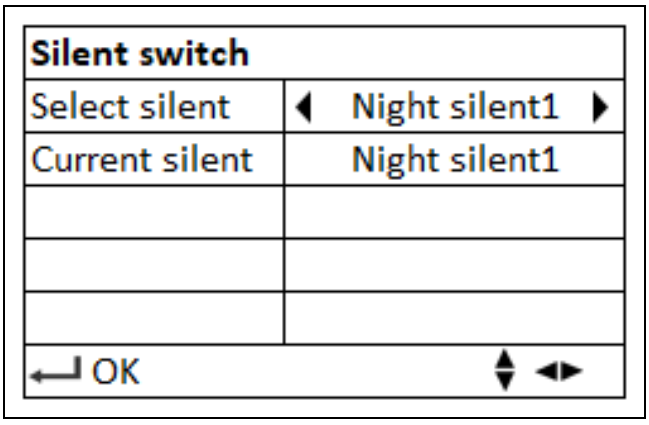

Fig. 92

USER menu - DOUBLE SET POINT

- Press ▲ or ▼ to select DOUBLE SETPOINT, the first set temperature for cooling and heating, and the second set temperature for cooling and heating; through the ◀ or ▶ keys
- The DOUBLE SETPOINT function is available /unavailable

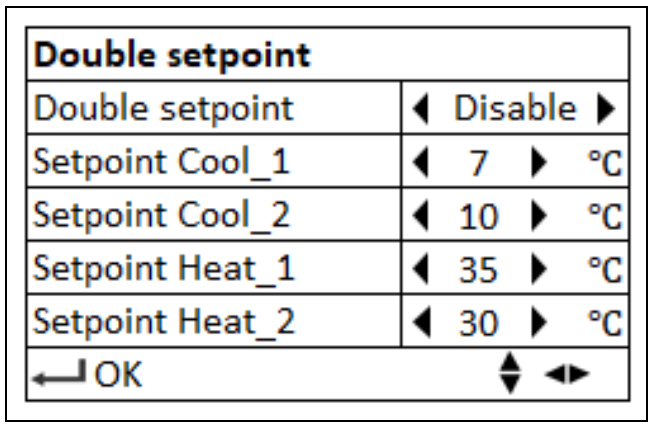

Fig. 93

USER menu - SNOW-BLOWING switch

- If enabled, the function activates the fans in order to avoid the accumulation of snow
- The fans start for 2 minutes every 30 minutes. With T air < 3ºC and unit stopped
- Press ▲ or ▼ to select YES or NO

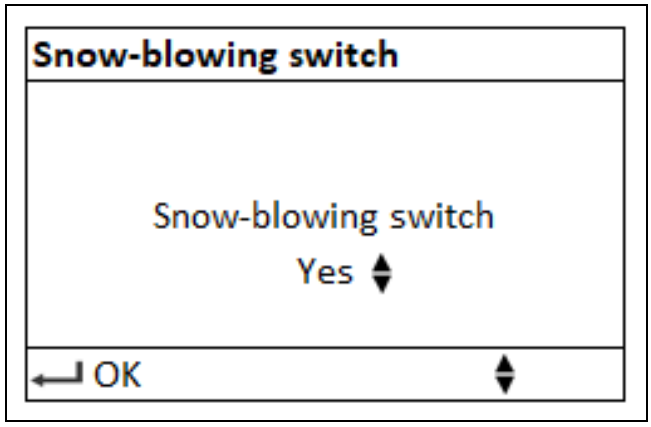

Fig. 94

Units in modular configuration

- Select SELECT ADDRESS, DHW SWITC, DHW FIRST by ▲ or ▼, select address, DHW SWITCH and DHW FIRST by ◀ or ▶, press ENTER to confirm, only when DHW SWITCH
- When 'YES' is selected, the following settings can be made
- When DHW SWITCH is selected as 'YES', then the serial number of the address is white on a black background, otherwise it is black on a white background
- The default setting of DHW SWITCH is 'NO', and the default setting of DHW FIRST is 'NO'
- When there is no hot water function (can be set in the service menu), this content is not displayed

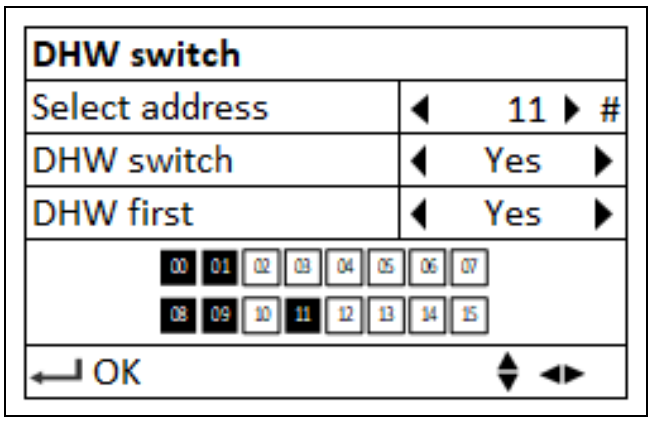

Fig. 95

9 Troubleshooting

Display Status

If the keyboard is remote, it is possible to read the unit statuses also from the display on the main board.

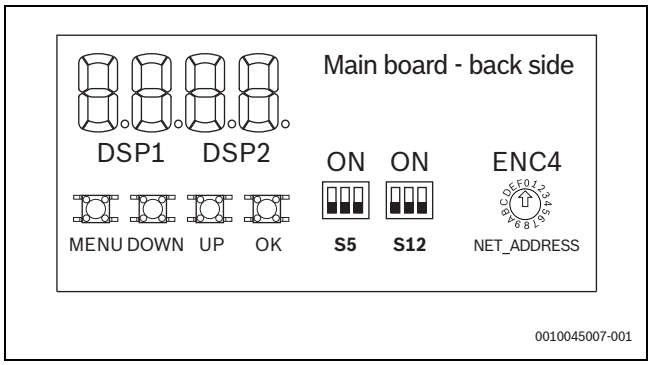

Fig. 96

	Standby: unit address (88 to the left) + online number (88 to the right) On: frequency defrosting: dFdF
0.xx	Unit address
1.xx	Capacity
2.xx	Number of units
3.xx	T4 correction
4.xx	Mode (8: Off; 0: Standby; 1: Cooling; 2: Heating, 4: hot water)
5.xx	Fan speed 1
6.xx	Fan speed 2
7.xx	T3: coil temperature
8.xx	T4: outside temperature
9.xx	T5: DHW temperature
10.xx	Taf1: Water side pipeline antifreeze
11.xx	Taf2: exchanger outlet temperature, antifreeze protection
12.xx	Tw: common outlet water temperature, after the last unit
13.xx	Two inlet water
14.xx	Two outlet water
15.xx	Tz total outlet water
16.xx	THeatR recovery
17.xx	Discharge temperature 1 (Tp1)
18.xx	Discharge temperature 2 (Tp2)
19.xx	Compressor 1 driver heat sink temperature
20.xx	Compressor 2 driver heat sink temperature
21.xx	Saturated discharge temperature
22.xx	Compressor current A
23.xx	Compressor current B
24.xx	---
25.xx	Electronic expansion valve opening A (actual valve/20)
26.xx	Electronic expansion valve opening B (actual valve/20)
27.xx	Electronic expansion valve opening C (actual valve/4)
28.xx	High pressure (heating mode) HP
29.xx	Low pressure (cooling mode) LP
30.xx	Suction superheat Tssh
31.xx	Suction temperature TH
32.xx	Silent
33.xx	Static pressure
34.xx	DC voltage A (reserved)
35.xx	DC voltage B (reserved)
36.xx	Frequency limit reason (BIT0: T4 frequency limit; BIT1: discharge temperature limit frequency; BIT2: Total cooling output frequency limiter; BIT3: Module temperature limit frequency; BIT4: Limit frequency of cooling outlet water temperature; BIT5: Heating high pressure frequency limiting; BIT6: Current limiting frequency; BIT7: Voltage limit frequency; BIT8: DC bus current limit; BIT9: Refrigeration low pressure frequency limit; BIT10: Limit frequency of heating water temperature; BIT11: Reduced frequency of heating exhaust superheat; BIT12: Power curtailment, not mode 1)
37.xx	Defrosting process status (the first digit: T4 selection plan; the second digit: the interval in the plan; the third and fourth digits together represent the defrosting timing)
38.xx	EPROM error: 1: Error; 0: No error
39.xx	Defrosting
40.xx	Initial frequency
41.xx	Tc: Saturation temperature corresponding to high pressure in heating mode
42.xx	Te: Saturation temperature corresponding to low pressure in cooling mode
43.xx	T6a: eco exchanger inlet temperature
44.xx	T6b: eco exchanger outlet temperature
45.xx	Software version
46.xx	Last error
47.xx	---

Table 57

Alarm reset: turn the unit OFF and ON again.

Before resetting an alarm, identify and remove the cause that it is generating the error. Repeated resets can cause irreversible damage.

Master unit

If the power supply of the Master unit is disconnected, all the units of the group stop.

The unit is protected under the following conditions:

- High pressure or protection due to drain temperature;
- Low voltage;
- Compressor current protection;
- Frequency protection of the inverter compressor;

- Condenser high temperature;
- High temperature difference between the input and output water;
- Antifreeze protection;
- Drain temperature sensor malfunction;
- Low evaporator temperature;
- Frequency protection by voltage;
- Compressor inverter malfunction;
- Fan motor protection;
- Water return high temperature, in cooling;
- Low pressure antifreeze protection;
- High temperature of inverter compressor module.

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

When the master unit is in protection, only the master unit stops and the other units carry on working.

When a slave unit is in protection, this unit stops and the other units are not involved.

If the master unit fails, the slave units also stop working.

Temperature sensors

All 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 restored.

Error code	Description
1E5	Condenser temperature probe T3A fault
1Eb	Antifreeze probe Taf1 fault
1Ed	Compressor discharge temperature probe A
1EE	Refrigerant temperature probe T6A
1F0	IPM module communication error
1F3	Fan A communication error
1F4	Protection L0 or L1 intervention 3 times in 60 minutes
1F6	Circuit A bus voltage (PTC)
1F9	Faulty probe Tfin1
1FF	Fan A motor failure
1H9	Compressor driver A - configuration error
1HE	Valve A error
1Pb	Winter anti-freeze protection, insufficient electric heating reminder
1PP	IPM module error, circuit A
1PU	Fan A module
2E0	EEPROM error - inverter A module
2E5	Condenser temperature probe T3B fault
2E9	Water pressure detection failure
2Eb	Antifreeze probe Taf2 fault
2Ed	Compressor discharge temperature probe B
2EE	Refrigerant temperature probe T6B
2F0	IPM module communication error.
2F3	Fan B communication error
2F4	Protection L0 or L1 intervention 3 times in 60 minutes
2F6	Circuit B bus voltage (PTC)
2F9	Faulty probe Tfin2
2FF	Fan B motor failure
2H9	Compressor driver B - configuration error
2HE	Valve B error
2Pb	Winter anti-freeze protection electric heating is seriously insufficient reminder
2PP	IPM module error, circuit B
2PU	Fan B module
3E0	EEPROM error - inverter B module
3F3	Fan C communication error
3FF	Fan C motor failure
3HE	Valve C error
3PU	Fan C module
C7	3 times PL
dF	Defrosting
E0	EEPROM error - main board
E1	Phases sequence - control from main board
E2	Communication error between main board and keyboard / communication error between master and slave (slave displays E2)
E3	“Total” outlet water temperature probe Tw fault (only for master unit)
E4	Outlet water temperature probe Two fault
E6	Storage temperature probe T5 fault
E7	Room temperature probe T4 fault
E8	Phases sequence
E9	Water flow detection failure
EC	Slave unit module reduction
EF	Return water temperature probe
EH	Auto-test error
EP	Drain temperature probe
EU	Condenser total temperature probe Tz
F2	Low DSH (discharge super-heating)
Fb	Faulty pressure sensor
Fd	Faulty suction temperature probe (Refrigerant side)
FP	DIP switch for modular unit configuration error
H5	High / low voltage
L0	Module protection
L1	Low voltage
L2	High voltage
L4	MCE error
L5	Compressor speed error
L7	No phase
L8	Variation of frequency higher than 15Hz
L9	Difference of phase frequency higher than 15Hz
P0	High pressure / drain temperature
P1	Low pressure
P2	Total condenser output high temperature Tz
P4	Compressor A in protection
P5	Compressor B in protection
P6	Module error
P7	Condenser high temperature
P8	Reserved
P9	Inlet / outlet water temperature difference
PA	Reserved
Pb	Winter antifreeze
PC	Evaporator low pressure in cooling
PE	Antifreeze protection evaporator low temperature in cooling
PF	Circuit board lock - controller lock/unlock error
PH	High room temperature probe T4
PL	Tfin module, high temperature

Table 58

10 Gas safety warnings (R32)

Area checks

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

Work procedures

In order to reduce the risk of flammable gases or vapours developing, operations must be performed following a controlled procedure.

Check the presence of refrigerant

The area must be monitored, before and during operations, 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.

Work procedures

Regarding the nature of the intervention, all the personnel in charge with maintenance operations and other operators working in the local area, must be instructed and monitored.

Avoid working in tight spaces and make sure the area surrounding the working space is cordoned off. Also secure the area by monitoring the flammable material.

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 CO2 extinguisher near the working area.

No ignition source

It is absolutely forbidden to use ignition sources that may lead to fire or explosion during operations on the refrigerant 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.

Ventilated area

Before intervening on the system or performing any repairs with flames or ignition sources, make sure to be in an outdoor or suitably ventilated area.

Be sure to maintain the ventilation during the operations. Ventilation must disperse the released refrigerant safely, preferably outdoors in the atmosphere.

Refrigerant equipment checks

If a replacement is 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 preformed on systems containing flammable refrigerants:

- The machine and ventilation intake, function correctly and are not obstructed;
- If an indirect refrigerant 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; 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.

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 confirm:

- That electrical condensors are empty. Wait at least 10 minutes after disconnect the main power. 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.

Repairing sealed components

- During the operations of reparation 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, place a leak detection device 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 the impede the entry of flammable environments. Spare parts must comply with manufacturer specifications.

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.

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.

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 tine or the continuous vibration caused e.g. by compressors or fans.

Detection of flammable refrigerants

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

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

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 shut off valve) 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.

Removal and evacuation

When intervening on the refrigerant 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.

The refrigerant charge must be collected in suitable recovery tanks. To make the unit safe, flushing with Oxygen-Free-Nitrogen (OFN) 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.

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.

Dismantling

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

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

Before performing the operation, take a sample of oil and refrigerant and analyse it, before reusing the regenerated refrigerant. Also it is important to check the availability of electricity.

Before attempting the procedure:

- Become familiar with the equipment and how it functions;
- Electrically isolate the system;
- 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 refrigerant 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 refrigerant system unless it has been cleaned and checked.

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.

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 calibrates 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, or doubt, please contact the manufacturer;
- 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, so 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.

Transport, mark and storage

- Transport of equipment containing flammable refrigerants. Compliance with transport regulations;
- Marking of equipment with symbols. Compliance with local regulations;
- Disposal of equipment employing flammable refrigerants. Compliance with national regulations;
- Storage of equipment/devices.The equipment must be stored in compliance with the instructions provided by the manufacturer;
- 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.

11 Maintenance

11.1 Maintenance - Safety

Operate in compliance with safety regulations in force.

To carry out the operations use protection devices: gloves, goggles, helmet, headphones, 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.

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General

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

The maintenance allows to:

- Maintaining the unit efficiently;
- Reduce the deterioration speed all the equipment is subject to over time;
- Collect information and data to understand the efficiency state of the unit and prevent possible faults;

Before checking, please verify the following:

- The electrical power supply line should be isolated at the beginning;
- The line isolator device is open, locked and equipped with the suitable warning sign;
- Make sure no tension is present;
- After switching the power off, wait at least 10 minutes before accessing to the electrical panel or any other electrical component;
- Before accessing check with a multimeter that there are no residual stresses.

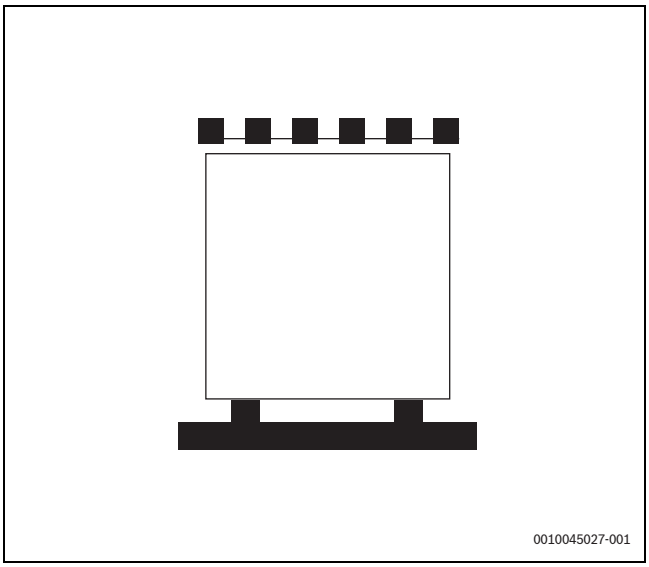
Frequency of interventions

Perform an inspection every 6 months, however frequency depends on the type of use.

Pan inspections should take place at close intervals in the event of:

- Frequent use (continuous or very intermittent use, near the operating limits, etc.);
- Critical use (service necessary).

Before any work please read the chapter: “Safety Warnings for operations on units containing R32”.



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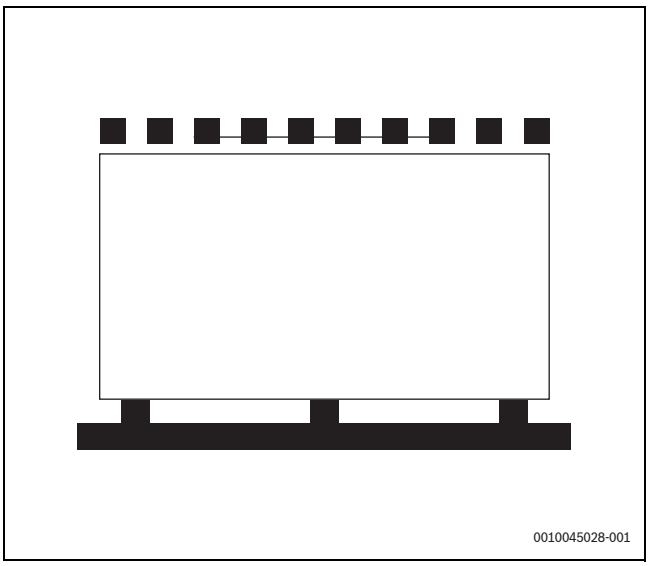


Fig. 97 Do not step on the surface of the appliance

		6	12
1	Sign of corrosion		x
2	Panel fixing		x
3	Fan fixing	x	
4	Coil cleaning	x	
5	Water filter cleaning	x	
6	Water: quality, pH, glycol concentration	x	
7	Check exchanger efficiency		x
8	Circulation Pump	x	
9	Check of the fixing an the insulation of the power lead		x
10	Earth cable check		x
11	Electric panel cleaning		x
12	Power remote controls status		x
13	Clamp closure, cable isolation integrity		x
14	Voltage and phase unbalancing (no load and on-load)	x	
15	Absorptions of the single electrical loads	x	
16	Compressor casing heaters test	x	
17	Checking for leaks *		*
18	Cooling circuit work parameter detection	x	
19	Safety valve *		*
20	Protective device test: pressure switches, thermostats, flow switches, etc.		x
21	Control system test; set point, climatic compensations, capacity stepping, air flow-rate variations		x
22	Control device test: alarm signalling, thermometers, probes, pressure gauges, etc.		x

Table 59 Intervention frequency (months)

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

Standby mode

If foreseen a long period of inactivity; turn off the power, in order to prevent the risk of freezing (use glycol or empty the system). Also disconnect the voltage to avoid electric risks or damages following lightning.

With lower temperatures keep heaters turned on in the electrical panel (option).

It is recommended to have a qualified technician start the system after a period of inactivity, especially after seasonal stops or for seasonal switch-overs.

When starting, follow the instructions in the “start-up” section.

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

System drain

Avoid draining the system periodically because it can generates a corrosive phenomena. Drain the system only if necessary.

To drain the system, follow the steps:

- ▶ Empty the system;
- ▶ Empty the exchanger, use all shut-off valves and grub screws;
- ▶ Blow the exchanger with compressed air;
- ▶ Dry the exchanger with hot air; for greater safety, fill the exchanger with glycol solution;
- ▶ Protect the exchanger from air;
- ▶ Take the drain caps off the pumps;
- ▶ Be sure that no water is inside the pipes due to frost damages.

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

It is recommended to have a qualified technician start the system after a period of inactivity, especially after seasonal stop or for seasonal switch-overs.

Consider to wash the system before start-up.

When starting, follow the instructions in the “start-up” section.

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

Water side heat exchanger

The exchanger must be able to provide the maximum thermal exchange. Therefore it is essential for the inner surfaces to be clean of dirt and build-up.

Periodically check the difference between the temperature of the supply water and the condensation temperature: if the difference is greater than 8°C–10°C it is advisable to clean the exchanger.

The clearing must be performed:

- With the circulation opposite to the usual one;
- With a speed at least 1,5 times higher than the nominal one;
- With an appropriate product moderately acid (95% water + 5% phosphoric acid);
- After the cleaning rinse with water to inhibit the action of any residual product.

CAUTION

Dirt trap

- ▶ Check that no impurities prevent the correct passage of water.

Consider that the flow switch controls the operations and remove incrustations from the palette.

Unit booklet

Keep a unit schedule to keep trace of the interventions made on the unit.

It will become simple to adequately schedule the various interventions and facilitate any troubleshooting.

On the schedule keep track of:

- The date;
- The intervention description;
- The carried out measures.

11.2 Circulation pumps

Please check:

- If there is no leaks;
- Bearing status (anomalies are highlighted by abnormal noise and vibration);
- The closing of terminal covers and the correct positioning of the cable glands.

Insulations

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

Safety valve

The pressure relief valve must be replaced:

- If it has intervened;
- If there is oxidation;
- Based on the date of manufacture, in compliance with local regulations.

11.3 Air coil

CAUTION

Accidental contact with the exchanger fins.

Can cause serious cuts.

▶ Wear protective gloves

The coil must allow maximum thermal exchange, therefore, the surface must be clear from dirt and scaling. It is recommended a quarterly cleaning of the coils, as the minimum.

The cleaning frequency should be increased depending on the level of dirt/dust accumulation and the environment (e.g., coastal areas with chlorides and salts) or industrial areas with aggressive substances.

Shut down periods

During periods when the unit is not operated for longer than a week, the coil must be completely cleaned following the cleaning procedure.

Cleaning procedure

Relative to tube and fin heat exchangers, these coils tend to accumulate more dirt on the surface of the coil and less dirt inside the coil, making them easier to clean. Follow the steps below for proper cleaning:

- Remove surface debris
  - Remove surface dirt, leaves, fibres, etc. with a vacuum cleaner (preferably with a brush or other soft attachment rather than a metal tube), compressed air blown from the inside out, and/or a soft bristle (not wire!) brush. Do not impact or scrape the coil.
- Rinse only with water
  - Do not use any chemicals to clean heat exchangers, as they may cause corrosion.
  - Hose off gently, preferably from the inside-out and top to bottom, running the water through every fin passage until it comes out clean.
  - The fins are stronger than others coil fins but still need to be handled with care. Do not hit the coil with the hose.
  - It is not recommended using a pressure washer to clean the coil due to the possibility of damage. Warranty claims related to cleaning damage, especially from pressure washers, or corrosion resulting from chemical coil cleaners, will not be honoured.

12 Decommissioning

Disconnection

Before performing any operation, read the Maintenance chapter.

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, refrigerant and hydraulic circuits of the unit are intact and closed.

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 wheelie 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 cooling 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.

13 Warnings

13.1 Residual risks

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

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 beyond the safety valve with the consequent possible refrigerant eject 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 refrigerant system taps closed.

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.

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 regarding the packaging and in compliance with the local regulations in force.

Should the refrigerant leak please refer to the refrigerant “Safety sheet”.

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 infrequent leaks of inflammable 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.

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 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.

Moving parts

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

Prior to entering the inside of the unit open the isolator situated on the connection 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.

Refrigerant

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

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 and ignition source next to the refrigerant.

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

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 short-circuit the unit.

14 Modular configuration units

This feature allows up to 16 units to be connected.

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

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

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

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

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

An external pumping unit sized for the entire capacity of the modular system must be provided (by the Customer). The pumping unit will be managed by the Master unit through a potential-free contact and 0-10V signal.

The TW probe of the master unit must be reinstalled on the common supply line from all units, as far away as possible.

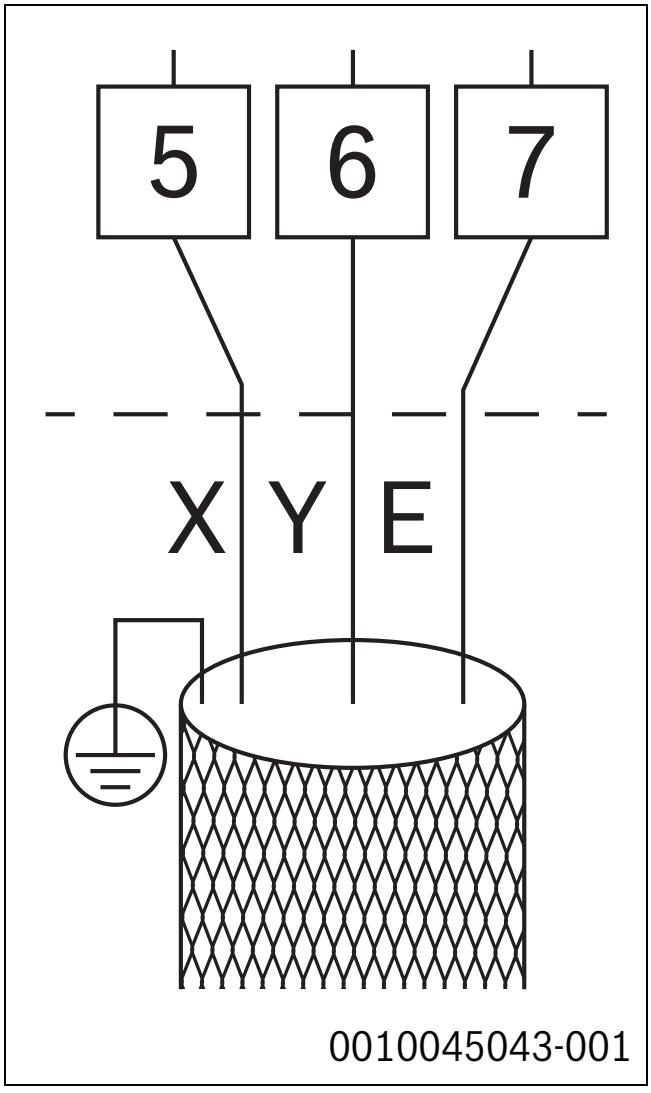


Fig. 98 Communication modular unit

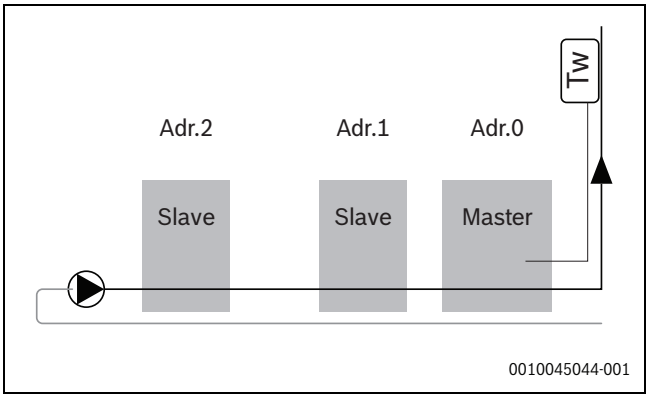


Fig. 99 TW probe

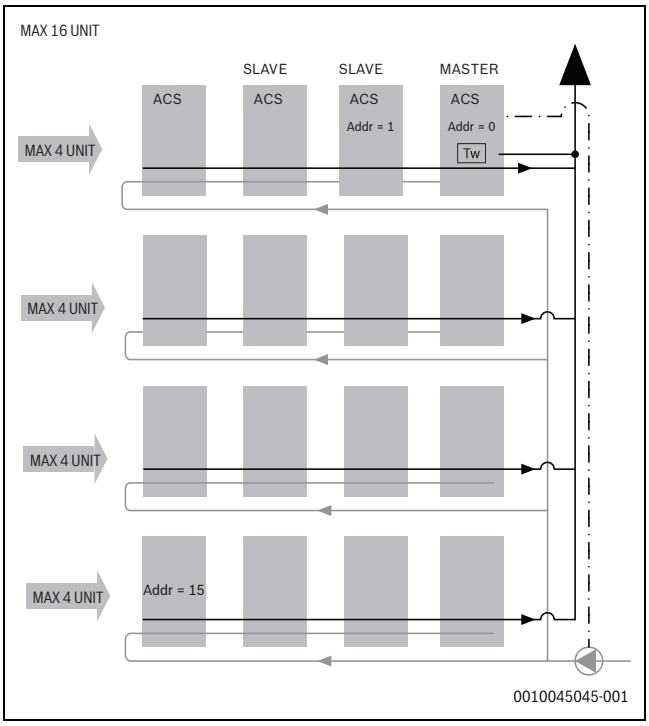


Fig. 100 System diagram with inverted return connection

Cooling (Kw)		Water pipe
Min	**Max**	**IN/OUT**
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

Table 60 Example dimensions for a standard system

14.1 Single/ multiple pump system

Set up the DIP S12-2 according to the system type.

Single water pump

The retaining valve is not necessary with this configuration.

The pump control is only activated on the master unit.

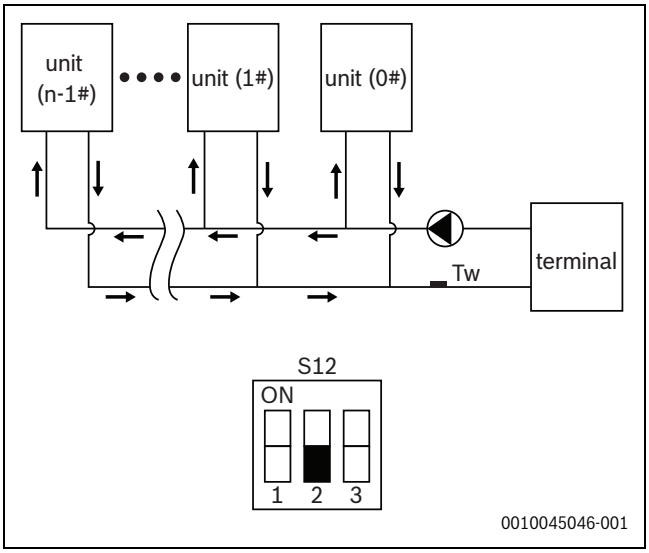


Fig. 101 Single water pumps

Multiple water pumps

A retaining valve for each unit is necessary with this configuration.

Pump control is activated on each unit.

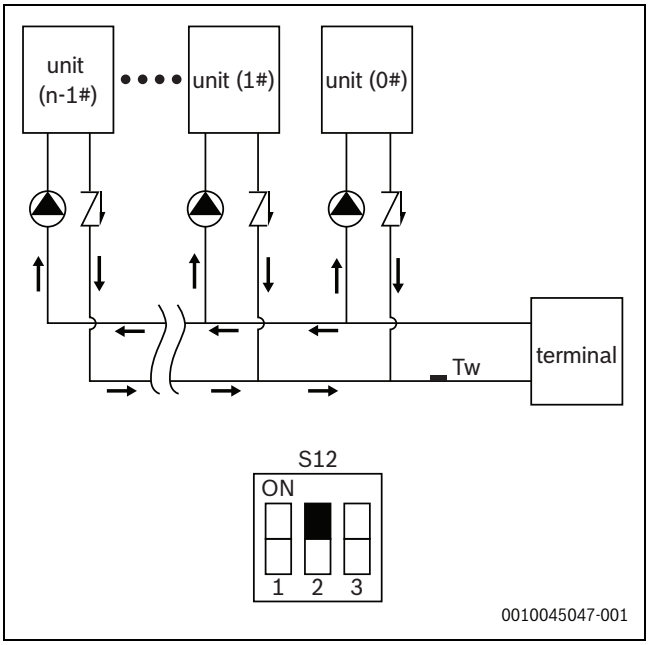


Fig. 102 Multiple water pumps

Set multiple configuration on the units

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

Set multiple configuration on each unit.

SW12-2: ON unit on modular configuration (or enabling DHW menu); OFF single unit.

The modular configuration is made up of two networks: the controller network and the unit network (main keypads).

Each network can have max.16 addresses (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 equipped with DHW option

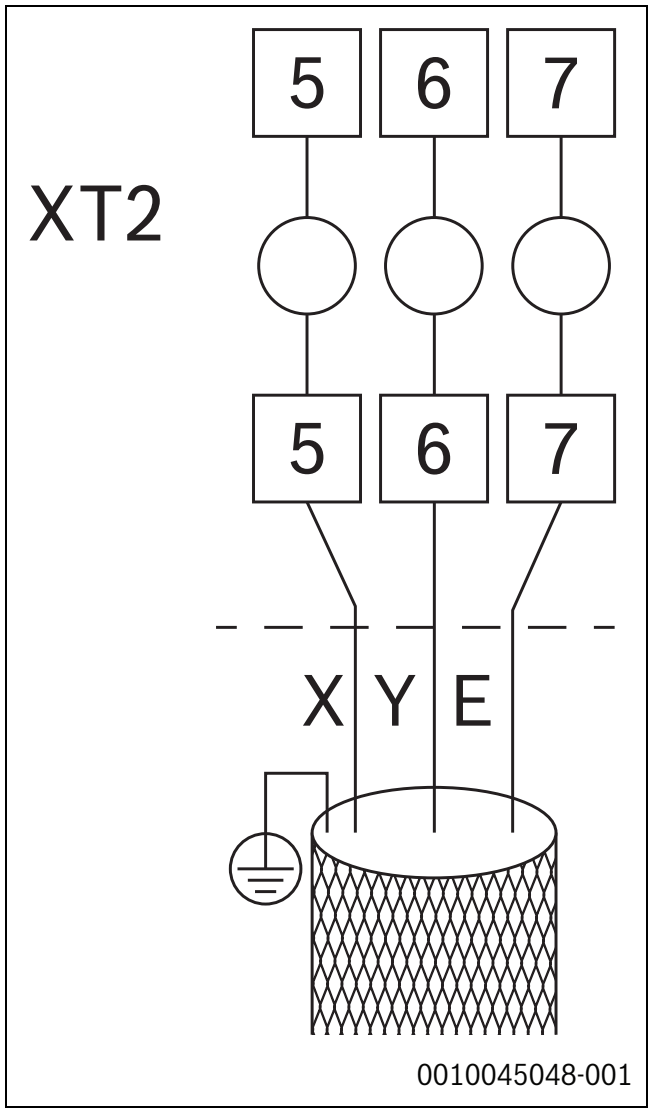


Fig. 103 Modular unit communication bus

Unit addressing

Addressing is carried out through encoder ENC4 on the back of the keypad.

The address corresponds to the number on the encoder and it is shown on the display DSP1.

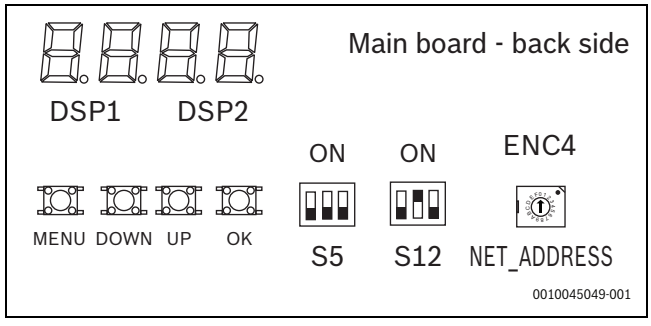


Fig. 104

Example:

- 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 keypad.

Addressing controls

A maximum of 16 controls can be addressed, with address from 0 to 15; so for example:

- 16 units with relative controller on board, the master with address 0, the slave, in read-only mode, with subsequent ones
- 5 units with relative controller on board + a remote controller as the master

Press ▲ or ▼ to select SETTING ADDRESS.

Press ◀ or ▶ to set the address.

Press OK to confirm.

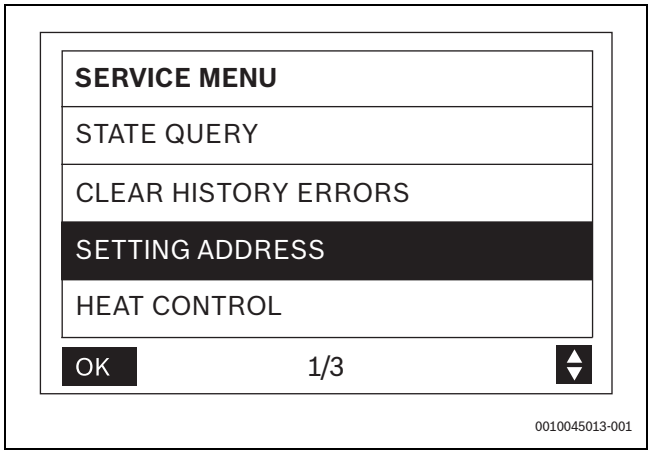
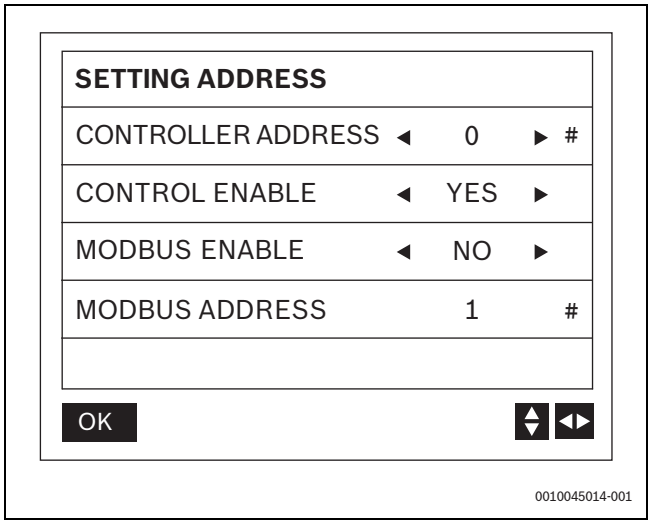


Fig. 105



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.

14.2 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 (Tw).

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

If Tw >= set point + 10°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 Tw < set point + 10°C (in cooling):

- 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 Modbus

15.1 Overview of service functions

Communication specification: RS - 485

Protocol	ModbusRTU: 9600, 8, N,1
Baud rate	9600bps
Data bits	8 Data bits
Parity bit	None parity
Stop bit	1 stop bit

Table 61

Function codes

01	Query
03	Reading
06	Single register writing
16	Multiple register writing

Table 62

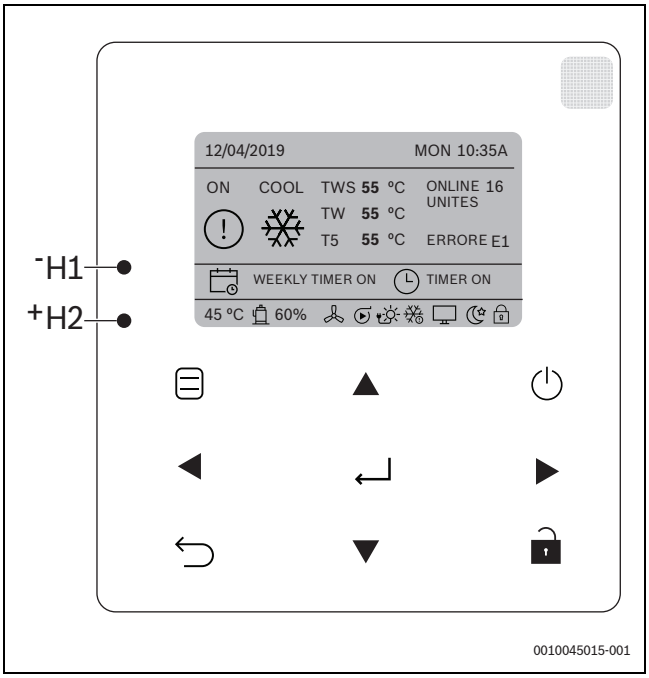


Fig. 106

Connections

Connect on the back of the controller.

Modular unit: connect the modbus to the MASTER unit port.

Enabling

Press Menu + ▶ for 3 seconds

or

Service Menu > Setting Address >Modbus enable > YES

Reading register, writing a single register, multiple register writing.

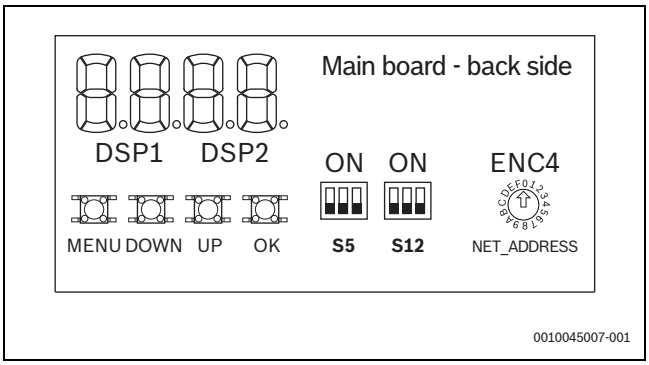


Fig. 107

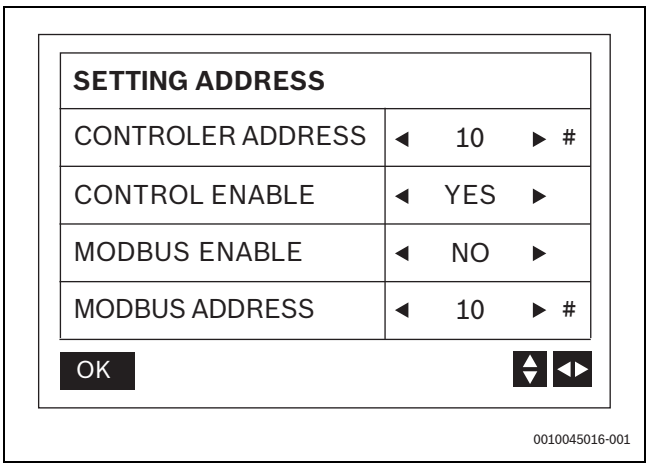


Fig. 108

Address	Function	Description
0	Mode	1 cooling 8 off
1	Temperature set point	from -8 °C (or Tsafe*) to 20 °C
2	Temperature set point B	from -8 °C (or Tsafe*) to 20 °C

Table 63

Reading and writing register, 100-109 read only, 110 reading and writing.

Address	Function	Description
101	Double set point	Enable/Disable 1/0
102	1st set point in cooling	5 °C ~20 °C
103	2nd set point in cooling	5 °C ~20 °C
104	not used	–
105	not used	–
106	Temperature compensation in cooling	Enable/Disable
107	Point 1 Temperature compensation in cooling	25 °C ~30 °C
108	Point 2 Temperature compensation in cooling	35 °C ~40 °C
109	Temperature compensation value in cooling	0 °C ~15 °C
110	not used	–
111	not used	–
112	not used	–
113	not used	–

Table 64

Addresses 0-15 are the addresses of the selected units. (Addresses)* 100 +240 - (Addresses)*100+229, are read only.

15.2 Module configuration

Reading logbook.

Code	Function	Description
240+(Address) *100	Operating mode	1 Shutdown 2 Cooling 3 not used
241 +(Address) *100	Silent mode	1 Standard 2 Silent 3 Super silent
242 +(Address) *100	not used	–
243 +(Address) *100	not used	–
244 +(Address) *100	Two unit Inlet water temperature	1 °C
245 +(Address) *100	Two unit outlet water temperature	1 °C
246 +(Address) *100	Tw total outlet water temperature	1 °C only for the master 0
247 +(Address) *100	Outside temperature	1 °C
248 +(Address) *100	Compressor speed	1 Hz
249 +(Address) *100	Compressor input	1A
250 +(Address) *100	Fan 1 speed	Current speed
251 +(Address) *100	Fan 2 speed	Current speed
252 +(Address) *100	Fan 3 speed	Current speed
253 +(Address) *100	EXVA	Current position
254 +(Address) *100	EXVB	Current position
255 +(Address) *100	EXVC	Current position

Code	Function	Description
256 +(Address) *100	SV4	0 = Off 1 = On
257 +(Address) *100	SV5	0 = Off 1 = ON
258 +(Address) *100	SV8A	0 = Off 1 = ON
259 +(Address) *100	SV8B	0 = Off 1 = On
260 +(Address) *100	4 Way valve	0 = Off 1 = Off
261 +(Address) *100	Circulation pump	0 = Off 1 = On
262 +(Address) *100	SV1	0 = Off 1 = On
263 +(Address) *100	SV2	0 = Off 1 = On
264 +(Address) *100	HEAT1	0 = Off 1 = On
265 +(Address) *100	HEAT2	0 = Off 1 = On
266 +(Address) *100	Discharge temperature	1 °C
267 +(Address) *100	Suction temperature	1 °C
268 +(Address) *100	Temperature T3A	1 °C
269 +(Address) *100	Temperature Tz	1 °C
270 +(Address) *100	Temperature T5	1 °C
271 +(Address) *100	P pressure	10 kPa
272 +(Address) *100	Error / Protection	See error codes table
273 +(Address) *100	Last error / Protection	See error codes table
274 +(Address) *100	Software version	HMI
275 +(Address) *100	Discharge temperature 2	1 °C
276 +(Address) *100	Temperature T3B	1 °C
277 +(Address) *100	Temperature T6A	1 °C
279 +(Address) *100	SV6 status	0 = Off 1 = On
280 +(Address) *100	Compressor 2 absorption	1A
281 +(Address) *100	Unit capacity	Kw
282 +(Address) *100	not used	–
283 +(Address) *100	Anti-freezing electric heater	0 = Off 1 = On
284 +(Address) *100	Remote control	0 = Off 1 = On
286 +(Address) *100	Pump control type	1 = multiple pumps 0 = single pump
287 +(Address) *100	Unit type	1
289 +(Address) *100	Safety temperature	1 °C
290 +(Address) *100	Minimum safety pressure	10 kPa
291 +(Address) *100	Taf1 IN-LET BPHE TEMP	1 °C
292 +(Address) *100	Board software version	–
293 +(Address) *100	EEPROM version	–

Table 65

Faults and errors

In the BMS reading register 272, 273 displays one of the following errors codes in decimal format, only considering the BYTE LOW. Only consider the last two alphanumeric digits of the code.

Faults code	E0	E1	E2	E3	E4	E5	E6	E7	E8	E9	EA	Eb	EC	Ed	EE
Fault number (dec)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fault code	EF	EH	EL	EP	EU	P0	P1	P2	P3	P4	P5	P6	P7	P8	P9
Fault number (dec)	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Fault code	PA	PB	PC	PD	PE	PF	PH	PL	PP	PU	H0	H1	H2	H3	H4
Fault number (dec)	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Fault code	H5	H6	H7	H8	H9	HA	HB	HC	HD	HE	HF	HH	HL	HP	HU
Fault number (dec)	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Fault code	F0	F1	F2	F3	F4	F5	F6	F7	F8	F9	FA	FB	FC	FD	FE
Fault number (dec)	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Fault code	FF	FH	FL	FP	FU	C0	C1	C2	C3	C4	C5	C6	C7	C8	C9
Fault number (dec)	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Fault code	CA	CB	CC	CD	CE	CF	CH	CL	CP	CU	L0	L1	L2	L3	L4
Fault number (dec)	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
Fault code	L5	L6	L7	L8	L9	LA	LB	LC	LD	LE	LF	LH	LL	LP	LU
Fault number (dec)	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Fault code	d0	d1	d2	d3	d4	d5	d6	d7	d8	d9	dA	dB	dC	dD	dE
Fault number (dec)	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135
Fault code	dF	dH	dL	dP	dU										
Fault number (dec)	136	137	138	139	140										

Table 66

16 Technical specifications and reports

16.1 Performance

SIZE			16	19	24	31	36	41	53	59
Radiant panels										
Heating										
Heating capacity (EN 14511:2018)	1,8	kW	25,3	28,2	32,0	48,6	54,0	62,0	77,5	86,0
COP (EN 14511:2018)	2		4,17	4,25	4,16	4,01	4,01	3,90	4,15	4,01
ErP Space Heating Energy Class - AVERAGE climate - W35	7		A++	A++	A++	A++	A++	A++	A++	A++
SCOP - MEDIUM climate - W35	9		4,30	4,25	4,24	3,91	3,90	3,87	4,07	4,06
ns,h - MEDIUM climate - W35	11	%	169	167	167	153	153	152	160	159
SCOP - COLD climate - W35	9		3,03	3,14	3,13	2,88	2,88	2,88	3,20	3,17
ns,h - COLD climate - W35	11	%	118	123	122	112	112	112	125	124
SCOP - HOT climate - W35	9		4,26	4,32	4,31	3,81	3,82	3,85	4,11	4,09
ns,h - HOT climate - W35	11	%	167	170	169	149	150	151	162	160
Cooling										
Cooling capacity (EN 14511:2018)	4,8	kW	29,9	34,6	38,9	57,7	66,0	75,6	95,4	112
EER (EN 14511:2018)	5		4,28	3,94	3,62	3,83	5,53	3,23	3,88	3,41
Water flow-rate	4	l/s	1,43	1,66	1,86	2,76	3,15	3,61	4,51	5,27
User side exchanger pressure drops	4	kPa	40	50	63	37	49	62	56,0	76,5
Terminal units										
Heating										

SIZE			16	19	24	31	36	41	53	59
Heating capacity (EN 14511:2018)	3	kW	24,3	27,1	31,4	48,6	54,0	62,0	73,4	84,0
COP (EN 14511:2018)	2		3,30	3,27	3,20	3,32	3,26	3,10	3,19	3,19
Cooling										
Cooling capacity (EN 14511:2018)	6	kW	22,3	25,8	29,0	42,0	48,0	55,0	68,9	79,8
EER (EN 14511:2018)	5		3,02	2,84	2,80	2,69	2,63	2,64	3,09	2,81
SEER	9		4,63	4,64	4,63	4,00	3,99	4,01	4,14	4,04
ns,c	12	%	182	183	182	157	157	157	163	159
SEPR	10		6,12	6,1	6,09	5,64	5,61	5,47	6,14	5,81
Water flow-rate	6	l/s	1,06	1,23	1,39	2,01	2,29	2,63	3,22	3,81
User side exchanger pressure drops	6	kPa	23	29	41	28	32	36	31,5	42,4

Table 67 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 ≤ 70 kW at specified reference conditions) and the Commission delegated Regulation (EU) No 813/2013 (rated heat output ≤ 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 14511:2018) cooling performance coefficient. Ratio between delivered cooling 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
6. User side entering/leaving water temperature 12/7 °C, external exchanger entering air 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 referred to unit operation with inverter frequency optimized for this application
9. Data calculated according to the EN 14825:2016 Regulation
10. Seasonal energy efficiency in heating EN 14825:2018
11. Seasonal energy efficiency in cooling EN 14825:2018

16.2 Construction

SIZE			AWP16	AWP19	AWP24	AWP31	AWP36	AWP41	AWP53	AWP59
Compressor										
Type of compressors			Rotary inverter						Scroll Inverter	
Refrigerant			R32							
No. of compressors		Nr	1			2				
Oil charge		l	2.3			4.6			6	
Refrigerant charge		kg	7.9			14			17.5	
No. of refrigerant circuits		Nr	1							
User side exchanger										
Type of internal exchanger	1)		PHE							
No. of internal exchanger		Nr	1							
Water content		l	2.44			5.17			7.8	
External exchanger										
Type of external exchanger	2)		CCHY							
No. of coils		Nr	2							
External Section Fans										
Type of fans			AX							
No. of fans		Nr	1			2			3	
Type of motor			Brushless DC							
Standard airflow - Standard mode		m^3/h	11520	13500	13500	23040	27000	27000	34560	40500
Standard airflow - Super silent mode		m^3/h	5400	8280	8280	10800	16560	16560	24840	24840

SIZE			AWP16	AWP19	AWP24	AWP31	AWP36	AWP41	AWP53	AWP59
Installed unit power		kW	0.9							
Heating system										
Connection type			Victaulic 1" 1/2	Victaulic 1" 1/2	Victaulic 1" 1/2	Victaulic 2"	Victaulic 2"	Victaulic 2"	Victaulic 2"	Victaulic 2"
Maximum water side pressure		kPa	600							
Minimum system volume for defrost		l	200			400			650	
Minimum circuit water volume in cooling		l	80			150			200	
Total internal water volume		l	5.44			10.3			15.6	
Power supply										
Standard power supply			400/3/50+N							
Electrical data										
Performance factor cos φ with maximum output		–	0.94						0.93	
Current absorbed at the maximum permitted conditions										
Total		A	18.5	19	20	37.5	38.5	40.5	57	59
Absorbed power at full load (at maximum permitted conditions)										
Total		kW	12.8	13.2	13.9	26.0	26.7	28.1	39.5	40.9
Current abosrbed at the maximum permitted conditions with integrated inverter heating pump										
Total		A	20.7	21.2	22.2	39.7	40.7	42.7	60	62
Absorbed power at full load (at maximum permitted conditions) with integrated inverter heating pump										
Total		kW	14.3	14.7	15.4	27.5	28.2	29.6	41.6	43.0
Recommended automatic circuit breaker/fuse 3										
Total		A	25			50			63	
Maximum starting current of the unit										
Value		A	10			20.25			28.5	29.5
Maximum starting current of the unit with integrated inverter heating pump										
Value		A	10.4	10.6	11.1	19.9	20.4	21.4	30	31

Table 68

16.3 Sound levels

Standard mode

SIZE		AWP16	AWP19	AWP24	AWP31	AWP36	AWP41	AWP53	AWP59
Sound pressure level	dB(A)	57	60	60	57	57	61	59	64
Sound power level	dB(A)	75	78	78	75	75	80	78	83

Table 69 Sound levels refer to units with full load under nominal test conditions. The sound pressure level refers to a distance of 1 meter from the outer surface of the unit operating in open field

Silent Mode

SIZE		AWP16	AWP19	AWP24	AWP31	AWP36	AWP41	AWP53	AWP59
Sound pressure level	dB(A)	56	61	61	57	57	62	59	62
Sound power level	dB(A)	72	77	77	74	74	79	77	80

Table 70 Sound levels refer to units with full load under nominal test conditions. The sound pressure level refers to a distance of 1 meter from the outer surface of the unit operating in open field

Super Silent Mode

SIZE		AWP16	AWP19	AWP24	AWP31	AWP36	AWP41	AWP53	AWP59
Sound pressure level	dB(A)	53.4	58.9	58.9	54.4	54.4	58.1	57.5	60.3
Sound power level	dB(A)	70	75	75	71	71	75	75	78

Table 71 Sound levels refer to units with maximum test conditions. For maximum capacity supplied in silent mode, a correction factor of 0,83 shall be used. The sound pressure level refers to a distance of 1 meter from the outer surface of the unit operating in open field.

Night Mode

SIZE		AWP16AWP24	AWP31 - AWP41	AWP53 - AWP59
Sound pressure level	dB(A)	51.9	50.7	53.6
Sound power level	dB(A)	66.1	67.4	71.2

Table 72 Sound levels refer to units with maximum test conditions. The sound pressure level refers to a distance of 1 meter from the outer surface of the unit operating in open field.

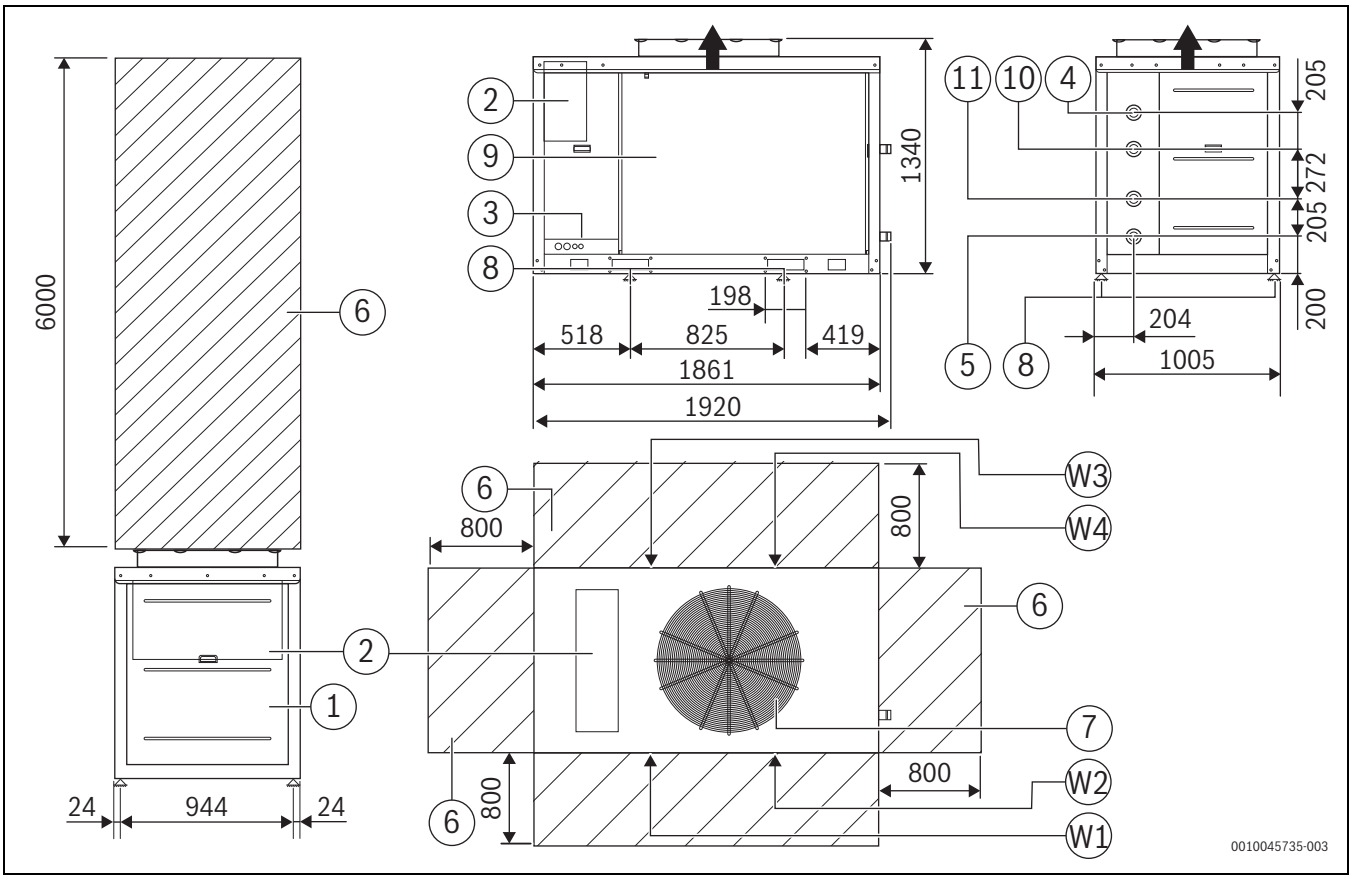
Data referred to the following conditions:

	Cooling	Heating
Internal exchanger water	12/7 ºC	30/35 ºC
Ambient temperature	35ºC	7ºC

Table 73

16.4 Dimensional drawings

AWP16, AWP19, AWP24



[1] Compressor enclosure
[2] Electrical panel
[3] Power input
[4] Inlet water connection 1" 1/2 victaulic
[5] Outlet water connection 1" 1/2 victaulic
[6] Functional spaces
[7] Electrical fan
[8] Unit fixing holes
[9] External exchanger
[10] DHW inlet (optional) 1 1/2" victaulic
[11] DHW outlet (optional) 1 1/2" victaulic

SIZE		AWP16	AWP19	AWP24
Lenght	mm	1920	1920	1920
Depth	mm	1005	1005	1005
Height	mm	1340	1340	1340
Operating weight[1)]	kg	323	323	323
Shipping weight[2)]	kg	333	333	333

Table 74

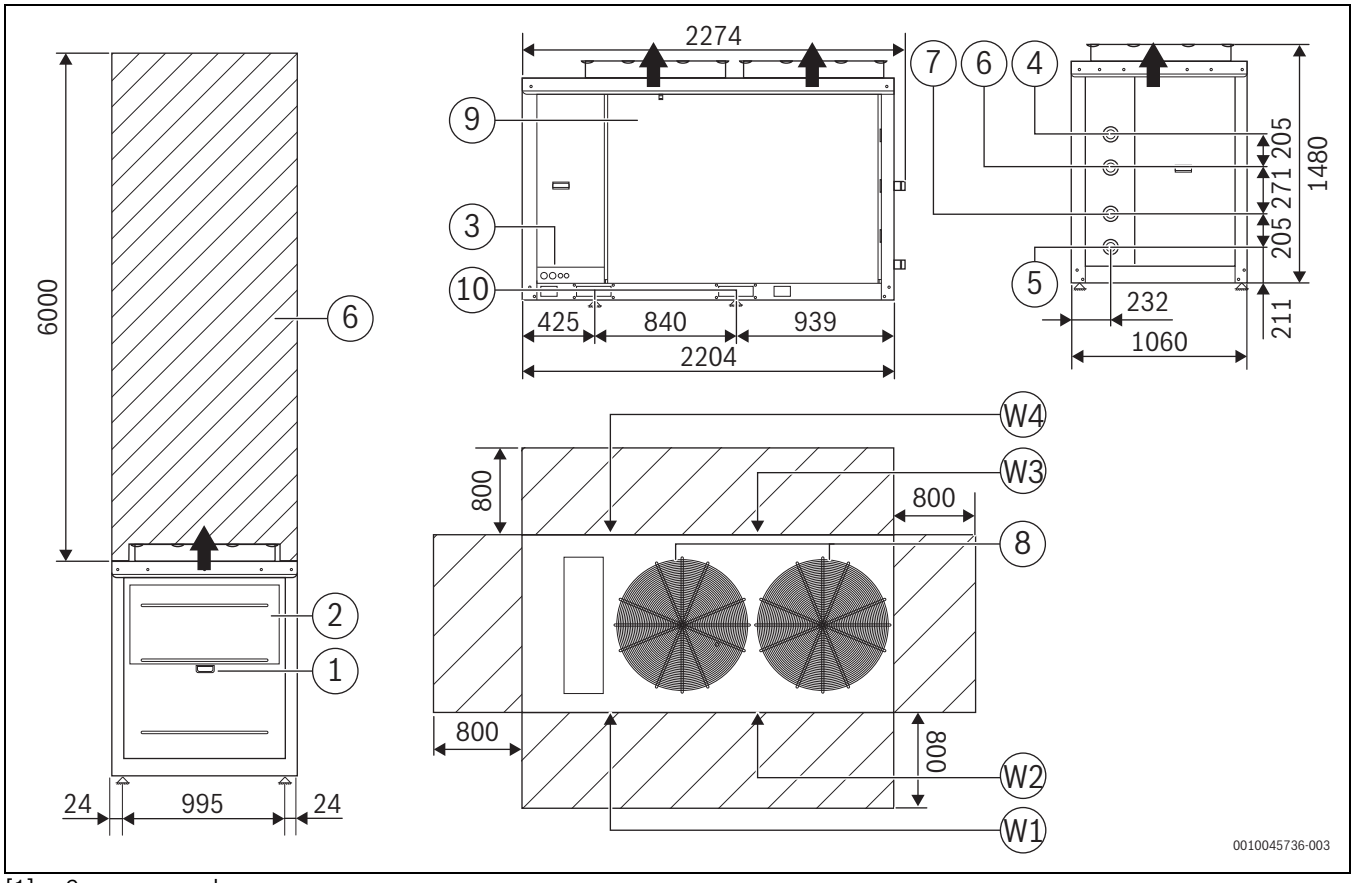
Series Size		BT/ BU STD AWP16 - AWP24	BT/ BU AWP16 - AWP24
Optional		STD	ACC+PUMP
W1 Support point	kg	98	135
W2 Support point	kg	78	118
W3 Support point	kg	98	149
W4 Support point	kg	78	132
Operation weight[1)]	kg	323	534
Shipping weight[2)]	kg	333	400

Table 75 Weight distribution

1)Includes the water capacity of a standard heat pump without heating pump.

2)Includes packaging materials and wooden pallet / Optional accessories may result in a substantial variation of the weight in the table.

AWP31, AWP36, AWP41



[1] Compressor enclosure
[2] Electrical panel
[3] Power input
[4] Inlet water connection 2” victaulic
[5] Outlet water connection 2” victaulic
[6] Inlet water connection 2” victaulic
[7] Outlet water connection 2” victaulic
[8] Electric fan
[9] External exchanger
[10] Unit fixing holes
[11] Functional spaces

SIZE		AWP31	AWP36	AWP41
Lenght	mm	2274	2274	2274
Depth	mm	1060	1060	1060
Height	mm	1480	1480	1480
Operating weight[1)]	kg	500	500	500
Shipping weight[2)]	kg	513	513	513

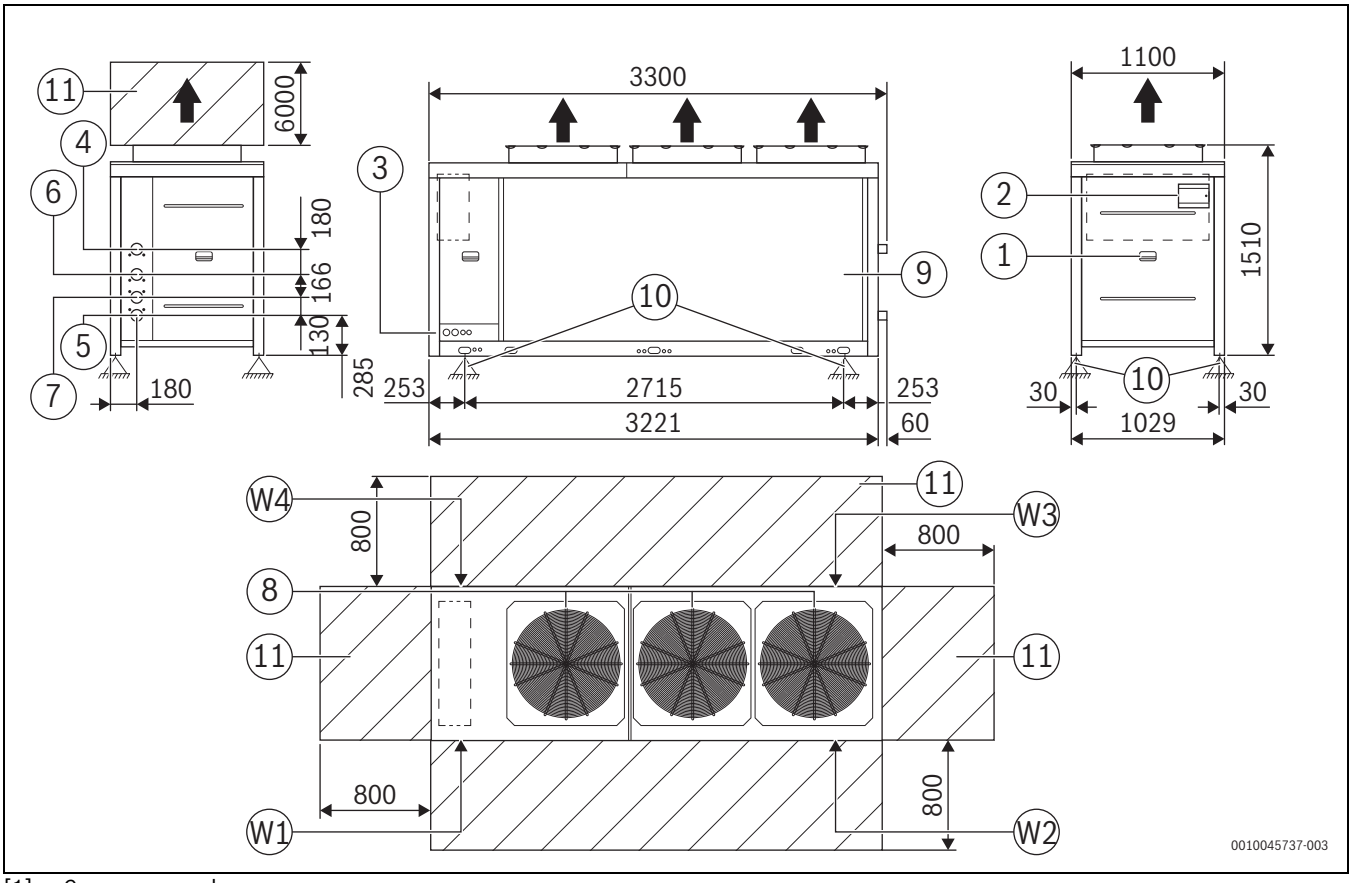
Table 76

Series Size		WSAN-YSE1B AWP31AWP41	WSAN-YSE1B AWP31AWP41
Optional		STD	ACC+PUMP
W1 Support point	kg	184	211
W2 Support point	kg	102	170
W3 Support point	kg	177	222
W4 Support point	kg	95	181
Operation weight[1)]	kg	500	752
Shipping weight[2)]	kg	513	695

Table 77 Weight distribution

1)Includes the water capacity of a standard heat pump without heating pump.
2)Includes packaging materials and wooden pallet / Optional accessories may result in a substantial variation of the weight in the table.

AWP53, AWP59



[1] Compressor enclosure
[2] Electrical panel
[3] Power input
[4] Inlet water connection 2” victaulic
[5] Outlet water connection 2” victaulic
[6] Inlet DHW connection 2” victaulic
[7] Outlet DHW connection 2” victaulic
[8] Electric fan
[9] External exchanger
[10] Unit fixing holes
[11] Functional spaces

SIZE		AWP53	AWP59
Lenght	mm	3300	3300
Depth	mm	1100	1100
Height	mm	1510	1510
Operating weight[1)]	kg	830	830
Shipping weight[2)]	kg	830	830

Table 78

Series Size		WSAT-YSi AWP53AWP59
Optional		STD
W1 Support point	kg	280
W2 Support point	kg	135
W3 Support point	kg	135
W4 Support point	kg	280
Operation weight[1)]	kg	830
Shipping weight	kg	830

Table 79 Weight distribution

1)Includes the water capacity of a standard heat pump without heating pump.
2)Includes packaging materials and wooden pallet / Optional accessories may result in a substantial variation of the weight in the table.

17 Environmental protection and disposal

Environmental protection is a fundamental corporate strategy of the Bosch Group.
The quality of our products, their economy and environmental safety are all of equal importance to us and all environmental protection legislation and regulations are strictly observed.
We use the best possible technology and materials for protecting the environment taking account of economic considerations.

Packaging

Where packaging is concerned, we participate in country-specific recycling processes that ensure optimum recycling.
All of our packaging materials are environmentally compatible and can be recycled.

Used appliances

Used appliances contain valuable materials that can be recycled.
The various assemblies can be easily dismantled. Synthetic materials are marked accordingly. Assemblies can therefore be sorted by composition and passed on for recycling or disposal.

Old electrical and electronic appliances

This symbol means that the product must not be disposed of with other waste, and instead must be taken to the waste collection points for treatment, collection, recycling and disposal.

The symbol is valid in countries where waste electrical and electronic equipment regulations apply, e.g. "(UK) Waste Electrical and Electronic Equipment Regulations 2013 (as amended)". These regulations define the framework for the return and recycling of old electronic appliances that apply in each country.

As electronic devices may contain hazardous substances, it needs to be recycled responsibly in order to minimize any potential harm to the environment and human health. Furthermore, recycling of electronic scrap helps preserve natural resources.

For additional information on the environmentally compatible disposal of old electrical and electronic appliances, please contact the relevant local authorities, your household waste disposal service or the retailer where you purchased the product.

You can find more information here:
www.weee.bosch-thermotechnology.com/

Batteries

Batteries must not be disposed together with your household waste.
Used batteries must be disposed of in local collection systems.

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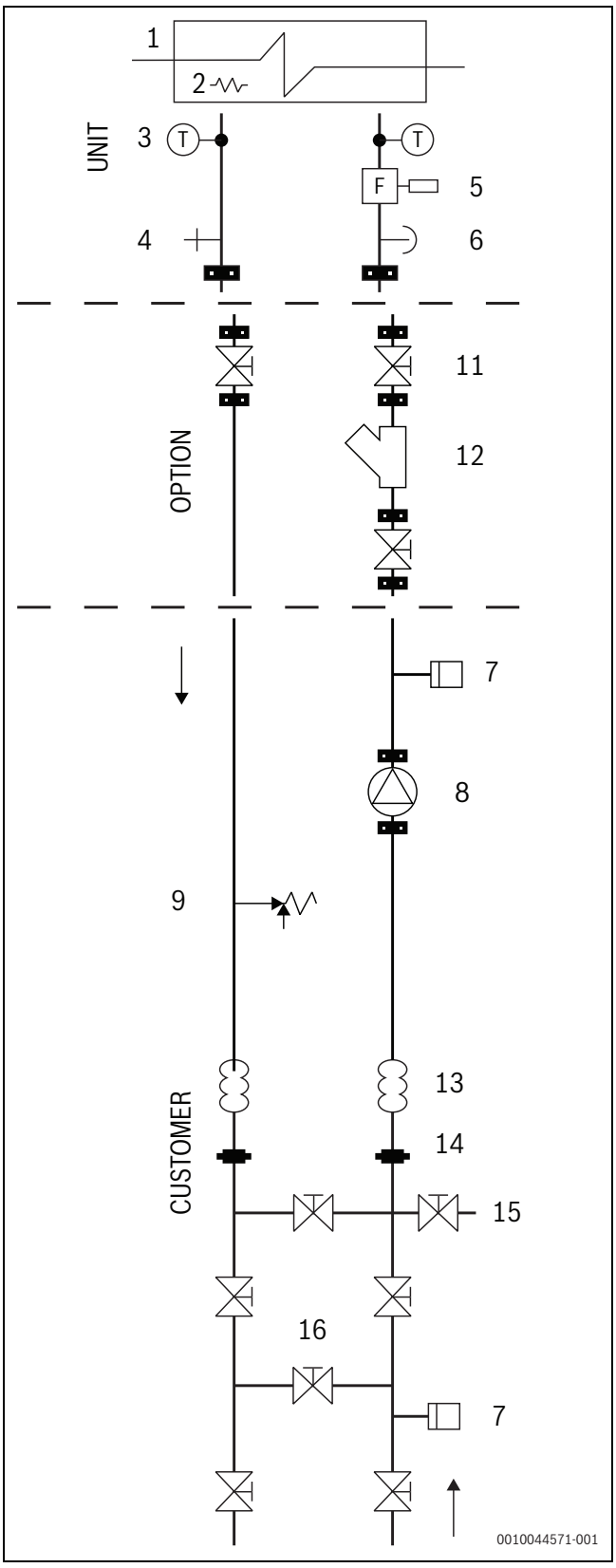
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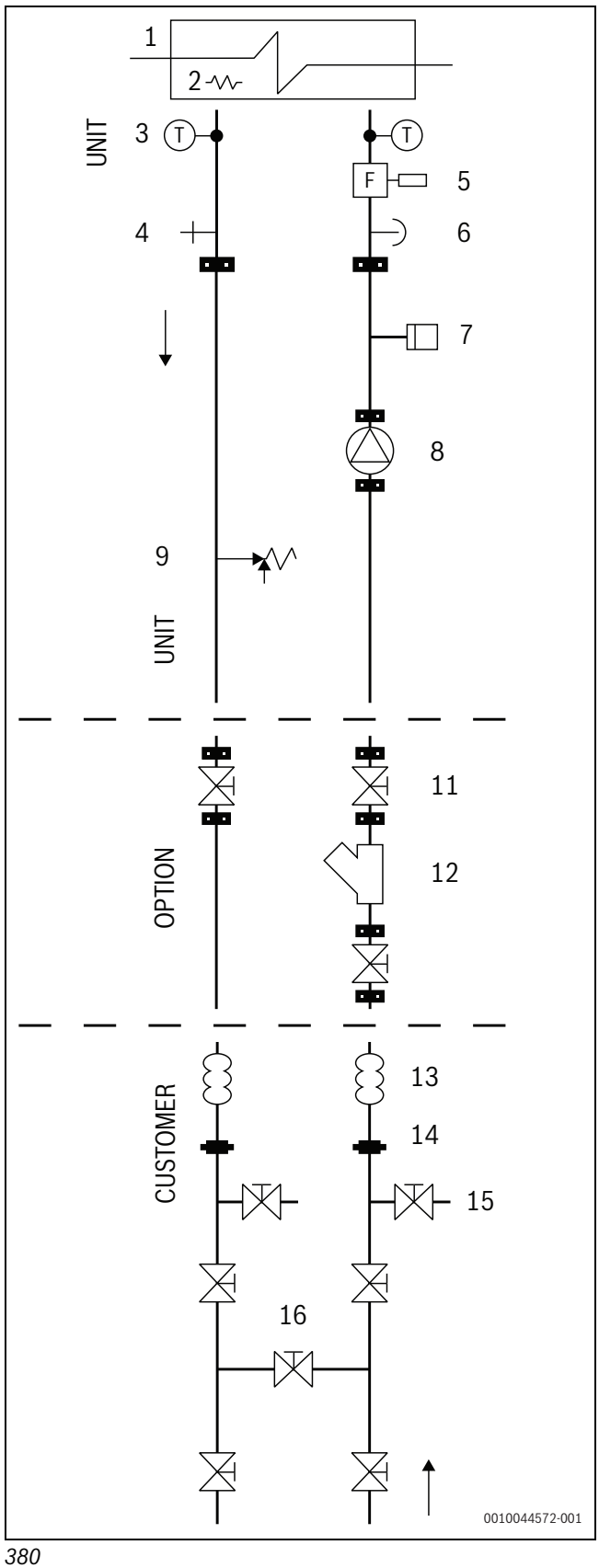
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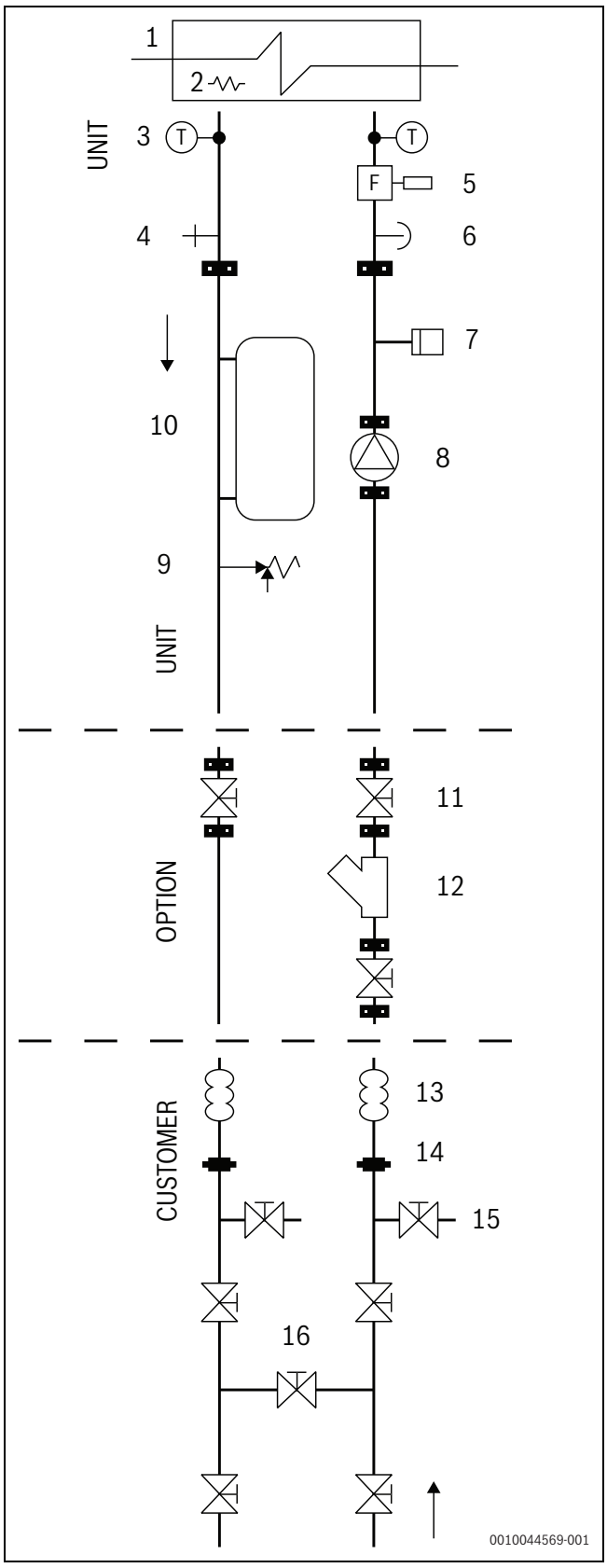
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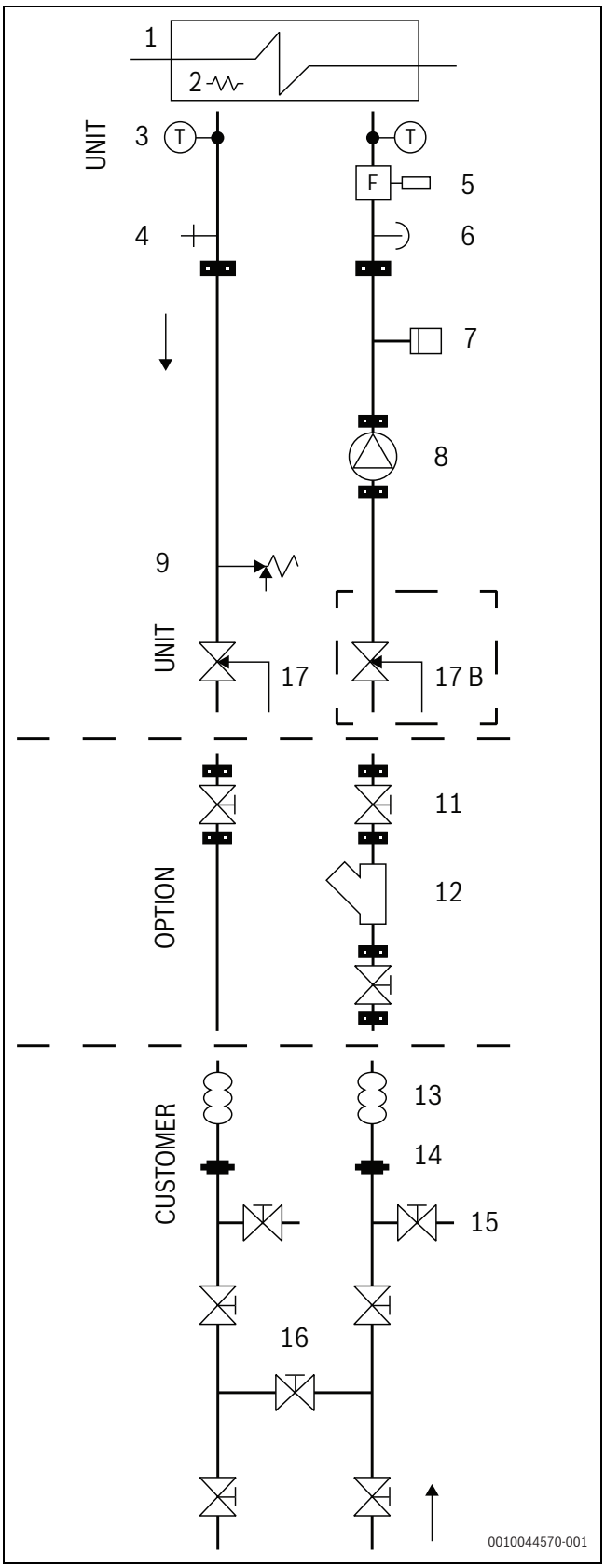
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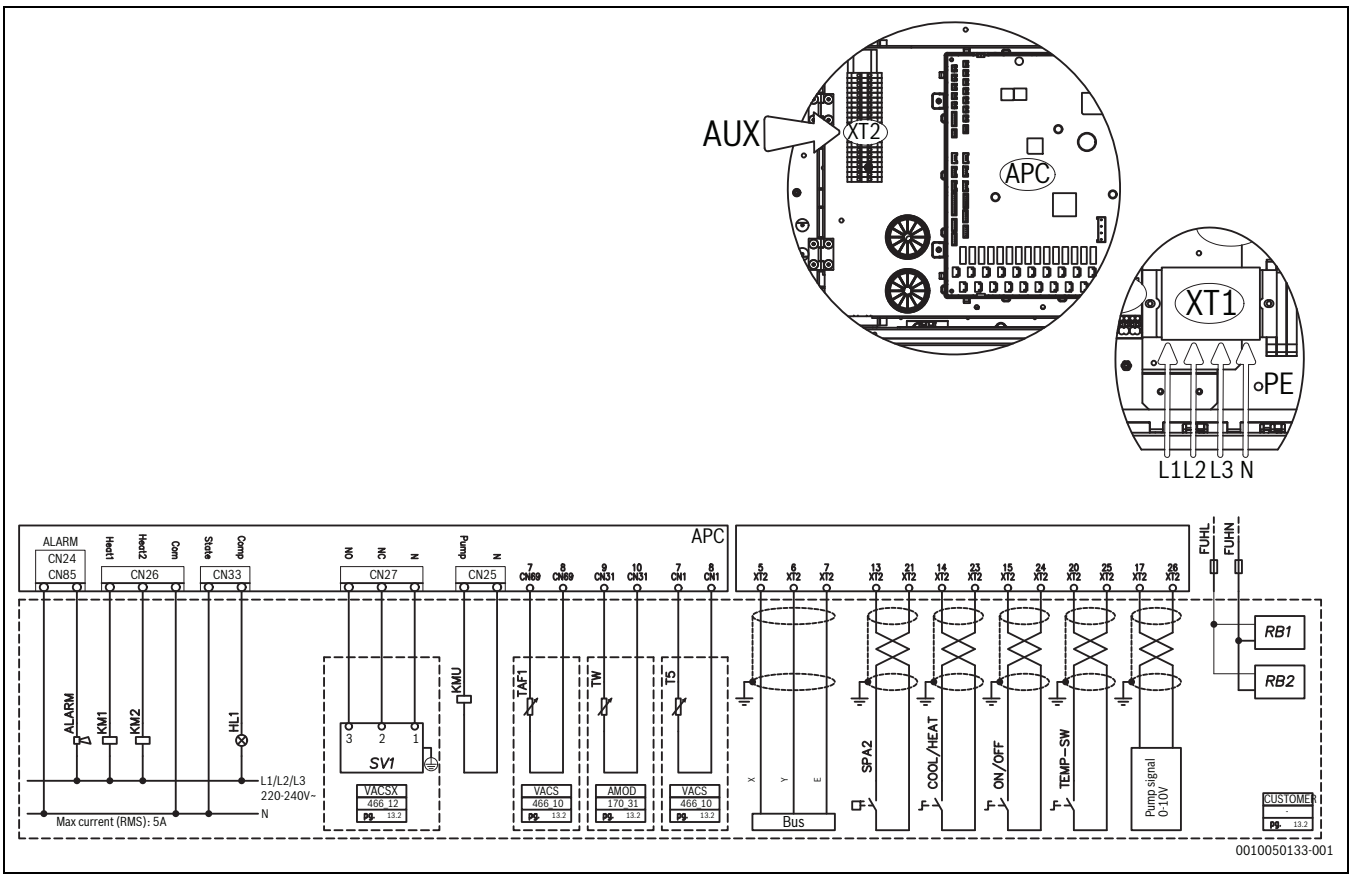
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APC
XT1
PE
L1L2L3 N
ALARM
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CN85
CN26
CN33
CN27
CN25
APC
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FUHN
RB1
RB2
ALARM
KM1
KM2
HL1
SV1
KMU
TAF1
TW
T5
SPA2
COOL/HEAT
ON/OFF
TEMP-SW
Pump signal
0-10V
Bus
CUSTOMER
L1/L2/L3
220-240V~
N
Max current (RMS): 5A
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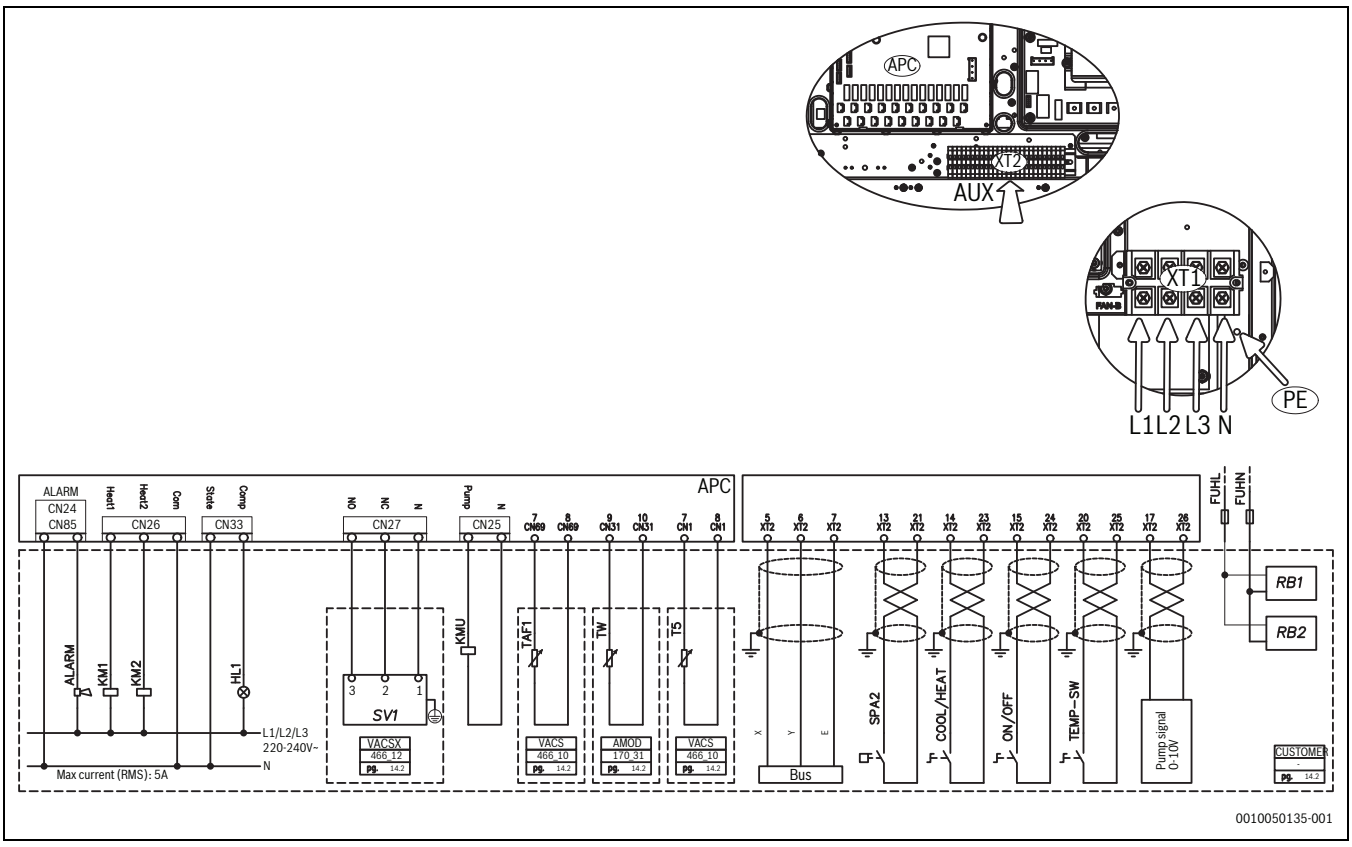
383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FUHN
RB1
RB2
ALARM
KM1
KM2
HL1
SV1
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TAF1
TW
T5
SPA2
COOL/HEAT
ON/OFF
TEMP-SW
Pump signal
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L1/L2/L3
220-240V~
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Max current (RMS): 5A
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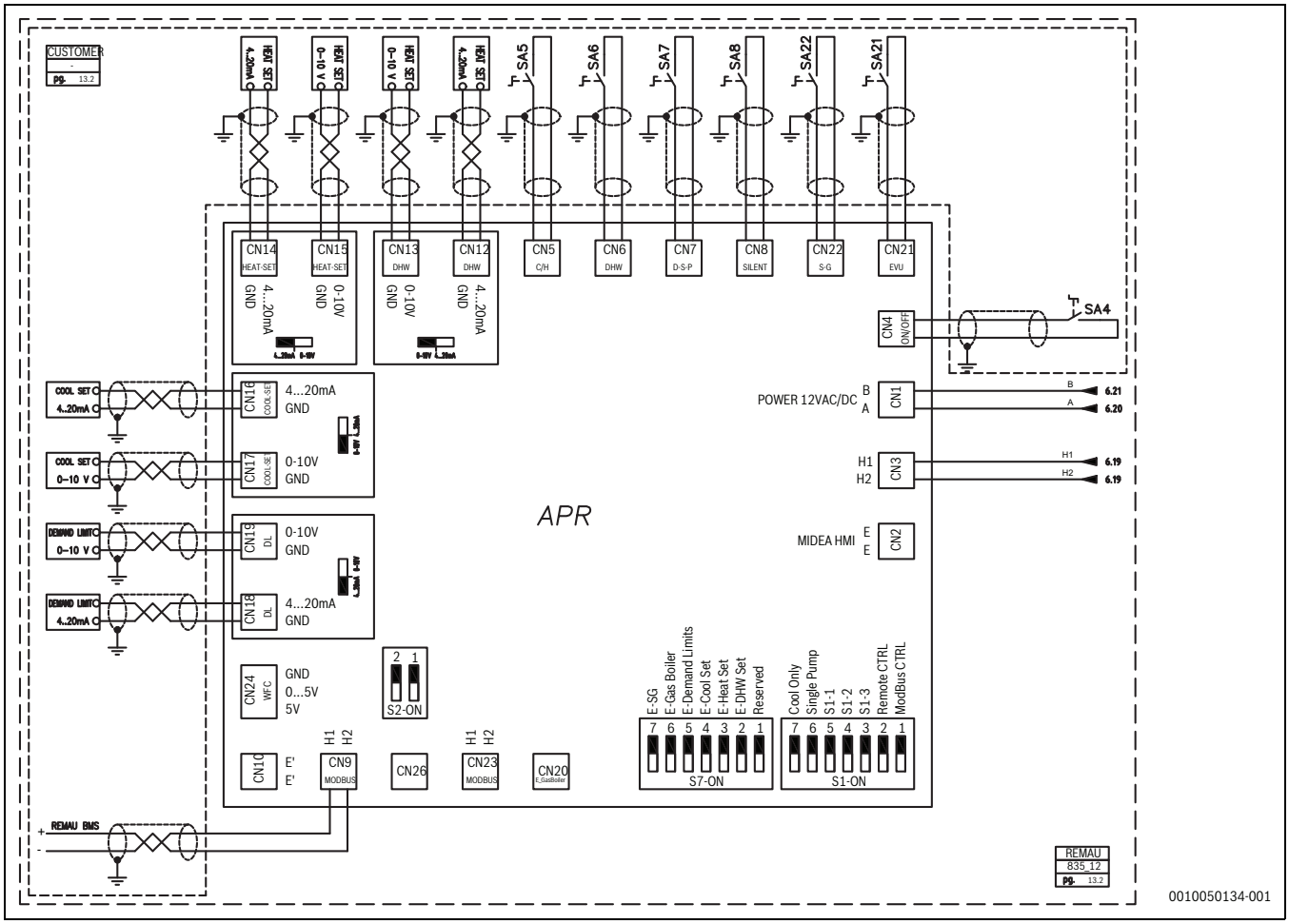
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SA5
SA6
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SA22
SA21
CN14 HEAT-SET GND 4...20mA
CN15 HEAT-SET GND 0-10V
CN13 DHW GND 0-10V
CN12 DHW GND 4...20mA
CN5 C/H
CN6 DHW
CN7 D-S-P
CN8 SILENT
CN22 S-G
CN21 EVU
CN4 ON/OFF
SA4
COOL SET 4..20mA
COOL SET 0–10 V
DEMAND LIMIT 0–10 V
DEMAND LIMIT 4..20mA
CN16 COOL-SET 4...20mA GND
CN17 COOL-SET 0-10V GND
CN19 DL 0-10V GND
CN18 DL 4...20mA GND
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6.20
H1
H2
CN3
6.19
6.19
MIDEA HMI
CN2
CN24 WFC GND 0...5V 5V
S2-ON
CN10
CN9 MODBUS
CN26
CN23 MODBUS
CN20 E.GasBoiler
E-SG
E-Gas Boiler
E-Demand Limits
E-Cool Set
E-Heat Set
E-DHW Set
Reserved
S7-ON
Cool Only
Single Pump
S1-1
S1-2
S1-3
Remote CTRL
ModBus CTRL
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REMAU BMS
REMAU 835_12 pg. 13.2
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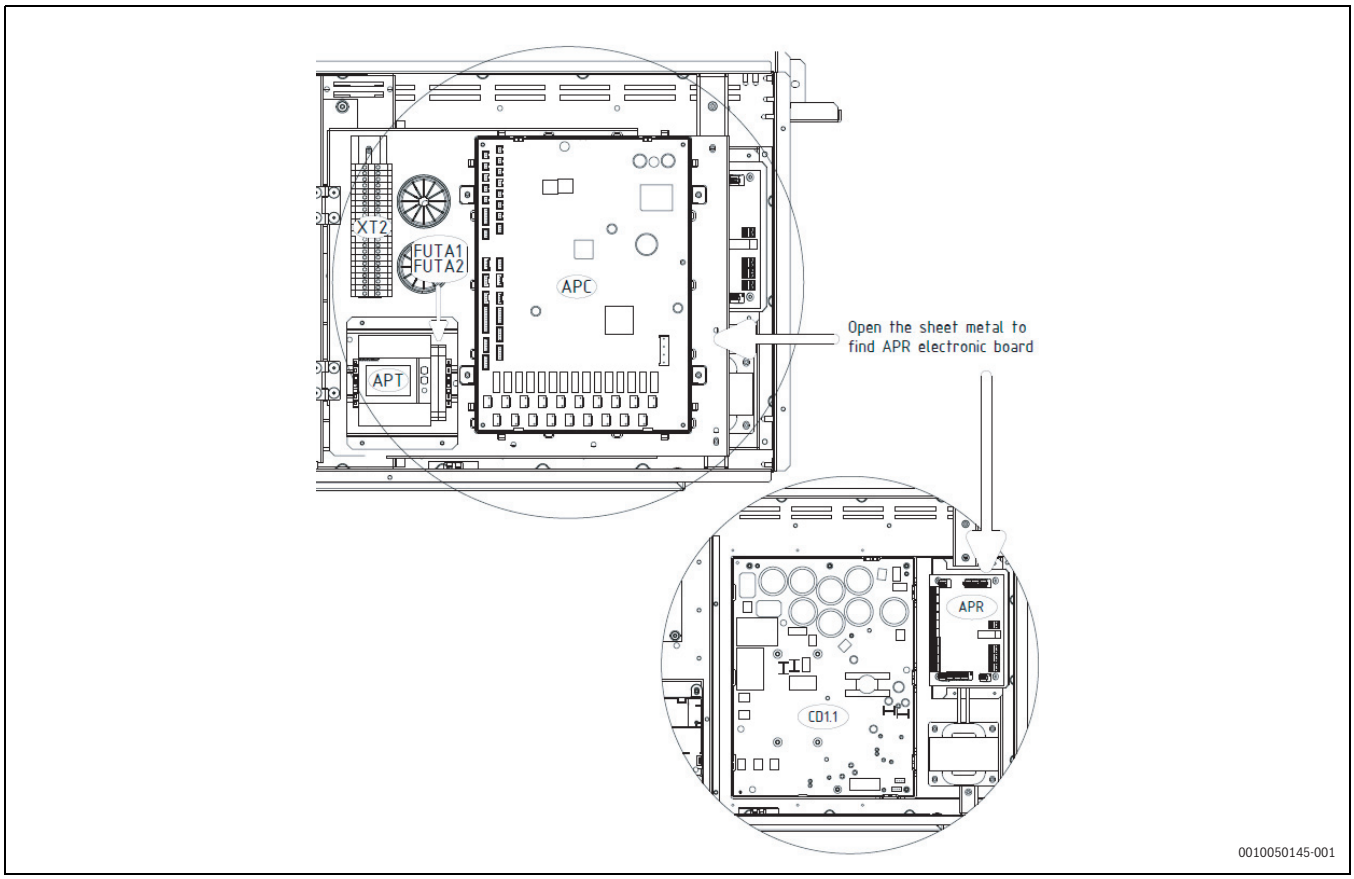
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FUTA1
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APC
APT
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APR
CD1.1
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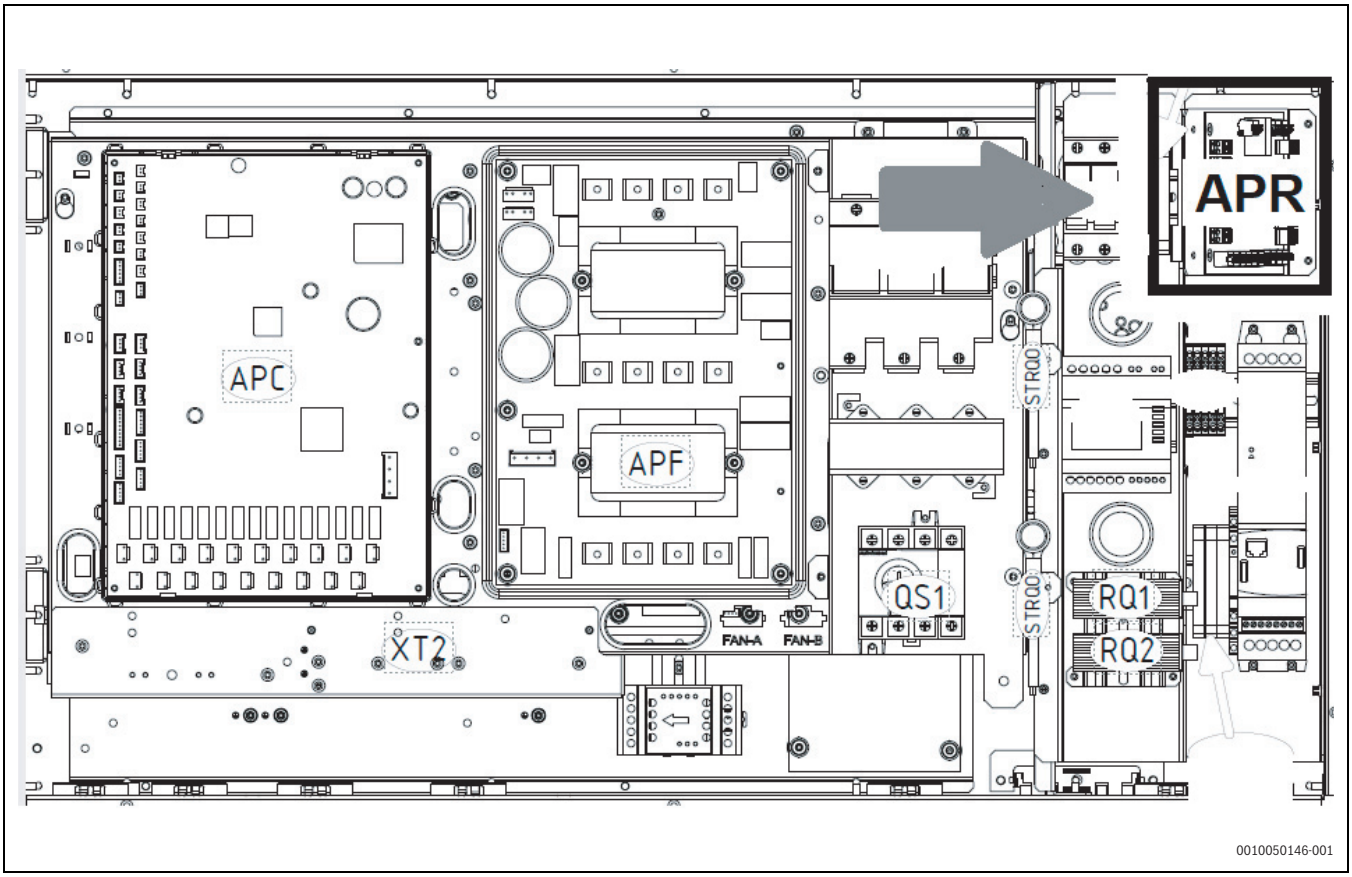
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RQ1
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Bosch Thermotechnik GmbH
Junkersstrasse 20-24
73249 Wernau, Germany

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