WiSAN-YEE1 PL

20.2-85.4

Manual for installation, use and maintenance

en

M0V400002-00 01-2025

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

Dear Customer,

We congratulate you on choosing these product

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

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

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

Best regards and have a good read.

CLIVET Spa

The original instructions are written in Italian.

All other languages are translations of the original instructions.

The data contained in this manual is not binding and may be changed by the manufacturer without prior notice. Reproduction, even is part, is FORBIDDEN

Summary

1. Safety considerations

1.1 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.

1.2 Manual

The manual provides correct unit installation, use and maintenance.

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

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

The manual must be delivered to the User.

1.3 Risk situations

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

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

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

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

1.4 Intended use

Use the unit only:

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

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

1.5 Installation

▶ **Outdoor installation**

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

Follow local safety regulations.

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

1.6 Maintenance

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

Turn the unit off before any operation.

1.7 Modification

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

1.8 Breakdown/Malfuction

Disable the unit immediately in case of breakdown or malfunction.

Contact a certified service agent.

1.9 User training

The installer has to train the user on:

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

1.10 Data update

Continual product improvements may imply manual data changes.

Visit manufacturer web site for updated data.

1.11 Original instructions

The original instructions are written in Italian.

All other languages are translations of the original instructions.

2. Indications for the User

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

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

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

2.1 Breakdown/Malfuction

Disable the unit immediately in case of breakdown or malfunction.

Contact a certified service agent.

Use original spares parts only.

Using the unit in case of breakdown or malfunction:

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

2.2 The installer must train the user, particularly on:

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

2.3 Unit indentification

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

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

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

The matriculation plate must never be removed.

2.4 Serial number

It identifies uniquely each unit.

Must be quoted when ordering spare parts.

2.5 Assistance request

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

Range
Size
Serial number
Year of production
Wiring diagram number

3. Information on refrigerant gas

WARNING

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

Refrigerant characteristics

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

NOTE

- **The refrigerant quantity is indicated on the unit plate**

4. Before installation

4.1 Reception

You have to check before accepting the delivery:

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

In case of damage or anomaly:

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

WARNING

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

4.2 Storage

Observe external packaging instructions.

In particolar:

minimum ambient temperature	(A)	-20°C
maximum ambient temperature	(B)	+49°C
maximum relative humidity	(C)	95%

Failure to comply with the above conditions can lead to:

A possible components damages

B possible safety valve opening

C possible damages to electrical components

WARNING

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

4.3 Packaging removing

Be careful not to damage the unit.

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

4.4 Handling

ATTENTION

▶ **Check that all handling equipment complies with local safety regulations (cran, forklifts, ropes, hooks, etc.).**

▶ **Provide personnel with personal protective equipment appropriate for the situation, such as hard hat, gloves, safety shoes, etc.**

▶ **Observe all safety procedures in order to guarantee the safety of the personnel present and the of material.**

▶ **Verify unit weight and handling equipment lifting capacity.**

1 Identify critical points during handling (disconnected routes, flights, steps, doors

2 Protect the unit properly to prevent damage

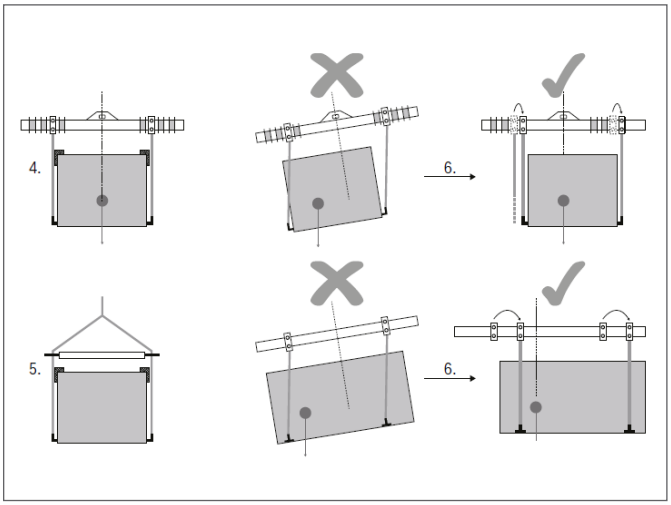
3 Lifting with balance

4 Lifting with spacer bar

5 Align the barycenter to the lifting point

Gradually bring the lifting belts under tension, making sure they are positioned correctly

Before starting the handling, make sure that the unit is stable.



5. Selecting the installation site

5.1 General

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

During positioning consider these 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

5.2 Maximum altitude of the installation

ATTENTION

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

5.3 Electromagnetic compatibility (EMC)

The units fulfil the emission and immunity requirements of the harmonised generic standards EN 61000-6-4:2007/ A11:2007 and EN 61000-6-2:2005/AC:2005 for industrial environments.

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

5.4 Functional spaces

Functional spaces are designed to:

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

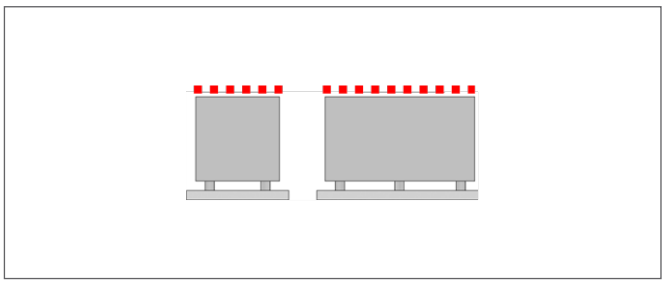
ATTENTION

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

5.5 Positioning

ATTENTION

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



Units are designed to be installed:

- in fixed positions
- level

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

Choose the installation place according to the following criteria:

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

Limit vibration transmission:

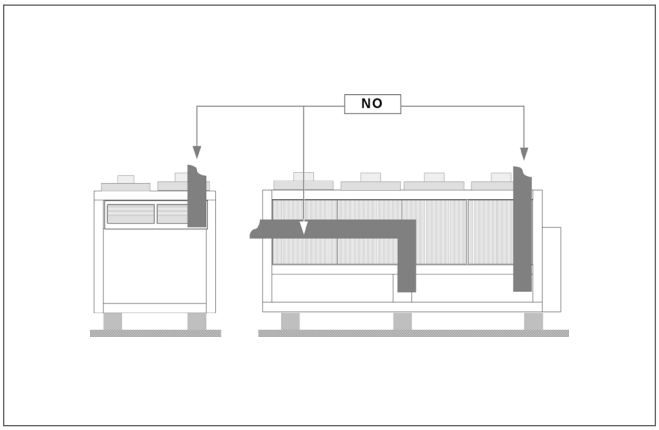
- use anti-vibration devices or neoprene strips on the unit support points
- install flexible joints on the hydraulic and aeraulic connections

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

5.6 Air flow-rate on the coils

ATTENTION

- ▶ **The air flow must not be obstructed**



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

Avoid therefore:

- obstacles to the airflow
- difficulty of exchange
- leaves or other foreign bodies that can obstruct the air coil
- winds that hinder or favour the airflow
- heat or pollution sources close to the unit (chimneys, extractors etc..)

- stratification (cold air that stagnates at the bottom)
- recirculation (expelled air that is sucked in again)
- incorrect positioning, close to very high walls, attics or in angles that could give rise to stratification or recirculation phenomenons

Ignoring the previous indications could:

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

5.7 Saftey valve gas side

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

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

5.8 Drain pan

Option.

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

The drain pans are fitted with antifreeze electric heaters.

Drain pan connection diameters:

1”1/2 GAS - Male

6. Water connections

6.1 Hydraulic system

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

Keep the following parameters to a minimum:

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

6.2 Water quality

The water quality must be checked by qualified personnel.

Water with inadequate characteristics can cause:

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

Water features:

- within the limits indicated by table

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

6.3 Cleanliness

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

6.4 New systems

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

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

6.5 Existing systems

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

The system must be drained before installing the new unit.

Dirt can be removed only with a suitable water flow.

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

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

An option to remove pollutants is to install a filter.

ATTENTION

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

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

6.6 Risk of freezing

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

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

6.7 Anti-freeze solution

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

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

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

ATTENTION

▶ **The unit must always be protected from freeze. Otherwise irreversible damage may occur.**

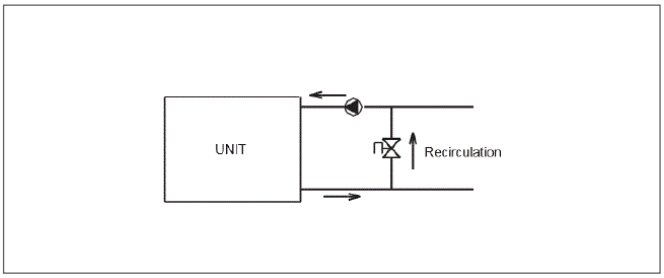
% GLYCOL ETHYLENE / PROPYLENE BY WEIGHT		5%	10%	15%	20%	25%	30%	35%	40%	45%	50%
Freezing temperature	°C	-2	-3.9	-6.5	-8.9	-11.8	-15.6	-19.0	-23.4	-27.8	-32.7
Safety temperature	°C	3	1	-1	-4	-6	-10	-14	-19	-23.8	-29.4

6.8 Water flow-rate

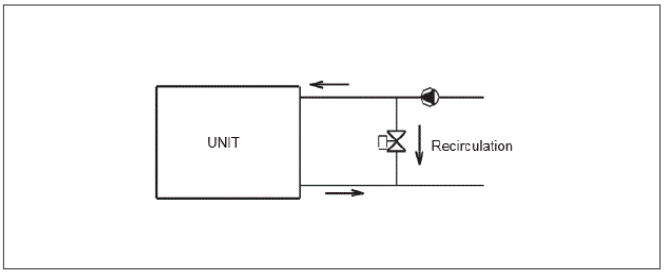
The project water-flow must be:

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

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



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



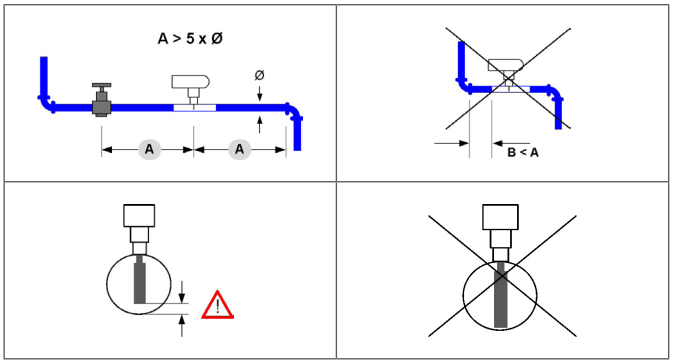
6.9 Minimum system water content

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

6.10 Flow Switch

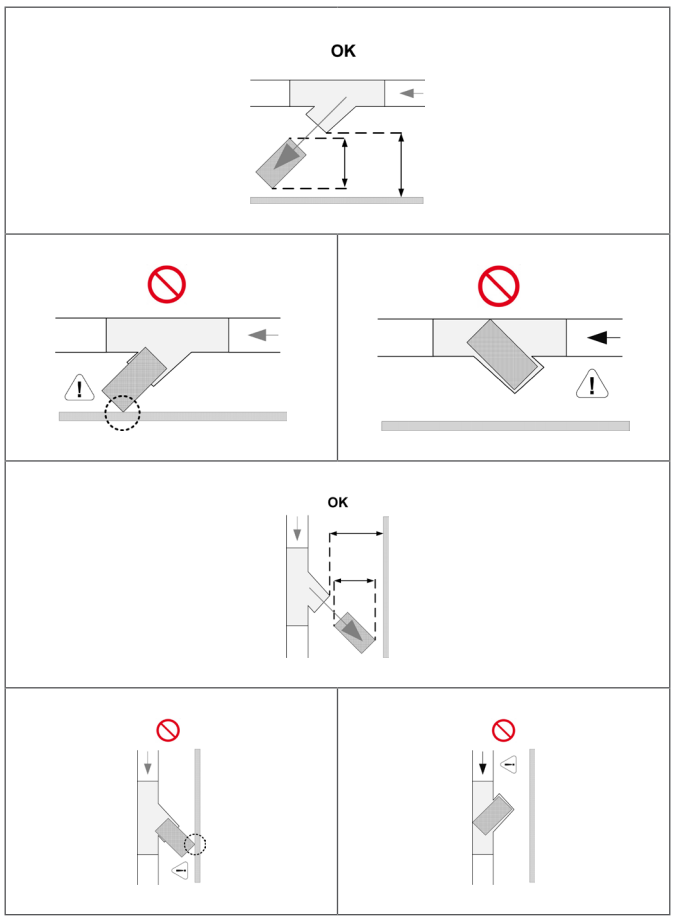
The flow switch must be present to ensure shutdown of the unit if water is not circulating.

It has to be installed in a duct rectilinear part, not in proximity of curves that cause turbulences.



6.11 Water filter

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



The filter must have an adequate mesh to prevent the entry of particles grater that:

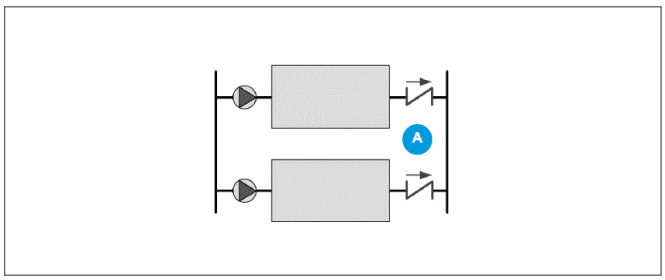
plate exchanger (mm)	0.9

ATTENTION

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

6.12 Non-return valve

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



6.13 Operation sequence

Before starting the unit pump:

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

ATTENTION

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

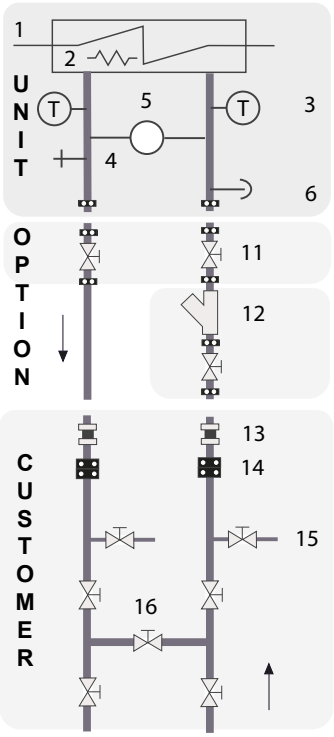
6.14 Hydronic units and connection diagrams recommended

The installer must define:

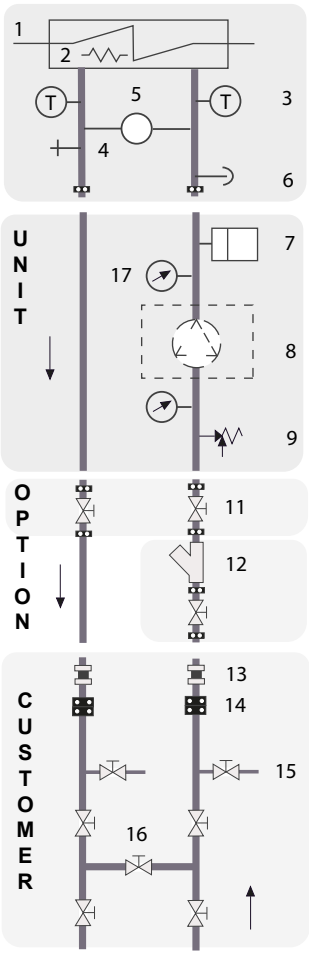
- type of components
- position in the system

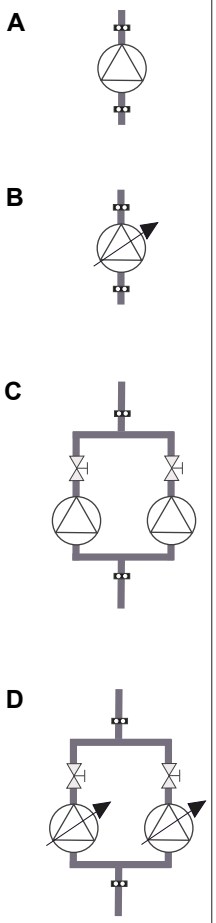
See diagrams on the next pages.

6.15 Standard unit



6.16 Unit + pump





1 Exchanger
2 Antifreeze heater
3 Water temperature probe
4 Drain
5 differential pressure switch
6 vent
7 system load safety pressure switch
8 pump
9 safety valve
10 inertial tank
11 shut-off valves
12 filter
13 flexible couplings
14 piping supports
15 Exchanger chemical cleaning bypass
16 system washing bypass (interlock closed during operation)
17 pressure gauge

7, 9, 17	Components on board the unit only if the unit is equipped with pumps; otherwise the supply of these is the responsibility of the Customer.

7. Electrical connections

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

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

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

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

Operate in compliance with safety regulations in force.

7.1 Electrical data

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

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

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

Voltage

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

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

Electrical wiringdiagram Nr.

7.2 Connections

1 Refer to the unit electrical diagram (the number of the diagram is shown on the serial number label).

2 Verify that the electrical supply has characteristics conforming to the data shown on the serial number label.

3 Before starting work, ensure the unit is isolated, unable to be turned on and a safety sign used.

4 Ensure correct earth connection.

5 Ensure cables are suitably protected.

6 Prevent dust, insects or rodents from entering the electrical panel as they can damage components and cables.

7 Prevent noise from escaping from the compressor compartment; seal any openings made.

8 Fix the cables: if vacated, they may be subject to tearing.

9 The cables must not touch the compressor and the refrigerant piping (they reach high temperatures).

10 Do not drill holes in the electrical panel.

11 Alternatively, restore the IP rating with watertight systems.

12 Before power the unit, make sure that all the protections that were removed during the electrical connection work have been restored.

7.3 Power supply network requirements

1 The short circuit capacity of the line must be less than 10 kA

2 The units can only be connected to TN, TT distribution systems - protect the unit adequately depending on whether the power supply system is TN or TT

3 Voltage 400-3-50 +/-10% - Power supply voltage interrupted or reset for no more than 3 ms, at any moment of the power supply cycle with more than 1 s between two successive interruptions

4 50Hz ± 0.01 power supply frequency

5 Phase unbalance < 2%

6 Harmonic distortion less than 12% (THDv<12%)

7 Voltage interruptions lasting no longer than 3ms and with at least 1 s between each one

8 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.

9 the unit has an earth leakage current of more than 10 mA and the unit fulfils clause 8.2.6 of EN 60204-1:2018

10 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

7.4 Signals / data lines

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

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

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

A 3-pole shielded bus cable is required.

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

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

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

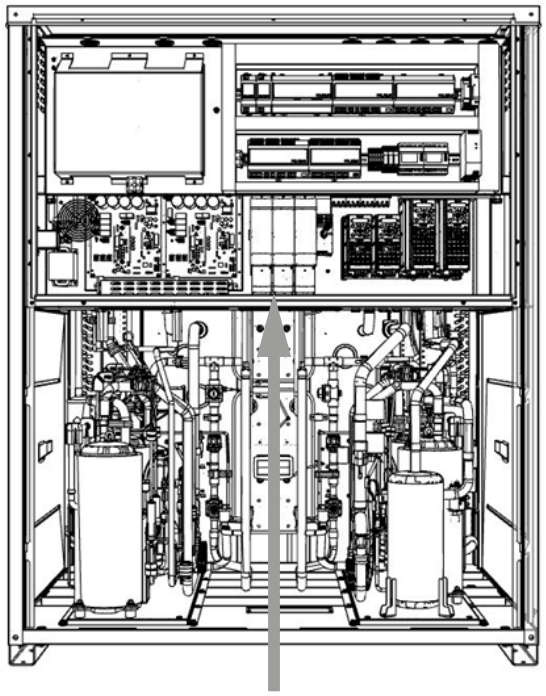
In order to ensure correct communication, the earth connection of the shield can also be configured differently depending on the area and the types of interference.

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

Other types such as “ring” or “star” are not allowed.

Do not use cable lugs on the communication bus.

7.5 Power line inlet.



7.6 Maximum allowed cable cross-section in the disconnector switch (mm²)

	20.2	25.2	30.2	35.2	40.2	45.2	50.2
Cu cable cross-section (mm²)	95	95	95	95	95	95	95
Max. bar width Cu (mm²)	20	20	20	20	20	20	20
Tightening torque (Nm)	9	9	9	9	9	9	9
	55.4	**60.4**	**65.4**	**70.4**	**75.4**	**80.4**	**85.4**
Min. cable section Cu (mm²)	240	240	240	240	240	240	240
Max. bar width Cu (mm²)	32	32	32	32	32	32	32
Tightening torque (Nm)	20	20	20	20	20	20	20

▶ **For cable cross-sections larger than the maximum allowed by the disconnector switch, use a reducer (copper rod) suitable for the characteristics of the copper pole.**

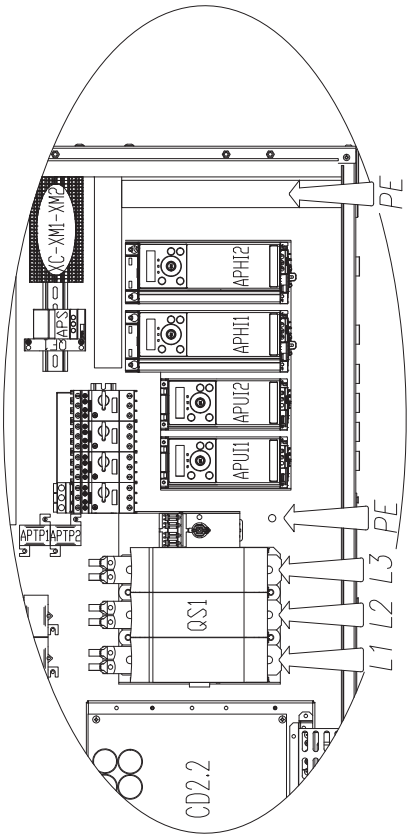
7.7 Remote ON-OFF

Do not perform short On-Off cycles.

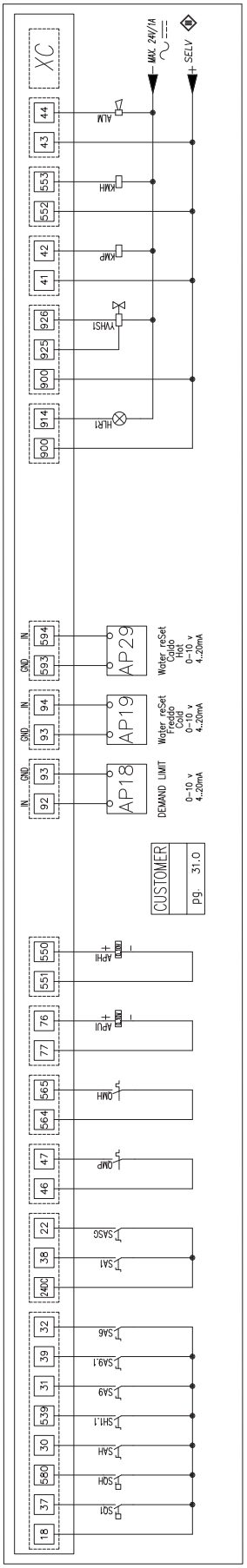
Do not use the remote On-Off with a thermoregulation function.

7.8 Connections performed by Customer

collegamenti a cura del cliente
connections performed by customer
raccordements à la charge du client
Kundenseitige Anschlüsse
conexiones a cargo del cliente



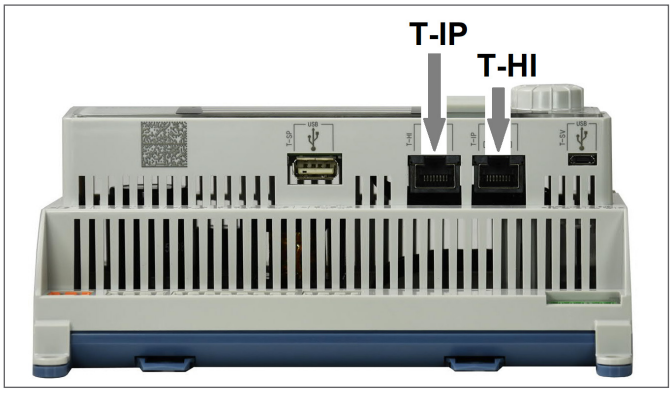
ALM	segnalazione blocco cumulativo cumulative fault signal Signalisation collective señalización bloqueo cumulativo		SASG	Selettore abilitazione Smart Greed Smart Greed enabling switch Sélecteur de validation Smart Greed Schalter zur Aktivierung Smart Greed Selector de activación de Smart Greed
HLR1	Lampada di segnalazione allarme resistenze quadro elettrico Alarm signal lamp resistance electrical panel Signal d'alarme de résistance lampe du cabinet Alarm-Signallampe Widerstand Schaltschrank Señal de alarma de la lámpara de resistencia del gabinete	RAQE1 475_53 pg 29.5	SA6	selettore richiesta acqua sanitaria sanitary water cycle selector sélecteur demande eau sanitaire Wahlschalter Brauchwasser selector solicitud agua sanitaria
KMP	Contattore pompa acqua utilizzo freddo Cold use water pump contactor Contacteur pompe à eau utilisation froide Schütz Wasserpumpe, Verbraucher kalt Contactor bomba agua uso frio	-/- 483_1 pg 28.0	SA9	termostato di richiesta raffreddamento cooling thermostat thermostat de demande refroidissement Thermostat Kühlbetrieb Termostato de solicitud refrigeración
KMH	Contattore pompa acqua utilizzo caldo Hot use water pump contactor Contacteur pompe à eau utilisation chaude Schütz Wasserpumpe, Verbraucher warm Contactor bomba agua uso caliente	-//- 484_1 pg 28.0	SA9.1	Selettore secondo Set Point su utilizzo freddo Second Set Point selector switch on cold use Sélecteur selon Point de Consigne sur utilisation froide Wahlschalter zweiter Sollwert auf Verbraucher kalt Selector según Punto de Consigna en uso frío
YWHS1	valvola sanitaria sanitary valve soupape sanitaire Brauchventil válvula sanitario		SAH	Selettore di richiesta riscaldamento Heating request selector switch Sélecteur de demande chauffage Wahlschalter Heizanforderung Selector de solicitud de calentamiento
APUI	Inverter gruppo pompe utilizzo freddo Cold use pump unit inverter Inverseur groupe pompes utilisation froide Inverter Pumpengruppe Verbraucher kalt Inversor grupo bombas uso frío	-/- 483_1 pg 28.0	SH1.1	Selettore secondo Set Point su utilizzo caldo Second Set Point selector switch on hot use Sélecteur selon Point de Consigne sur utilisation chaude Wahlschalter zweiter Sollwert auf Verbraucher warm Selector según Punto de Consigna en uso caliente
APHI	Inverter gruppo pompe utilizzo caldo Hot use pump unit inverter Inverseur groupe pompes utilisation chaude Inverter Pumpengruppe Verbraucher warm Inversor grupo bombas uso caliente	-//- 484_1 pg 28.0	SQ1	Flussostato su utilizzo Freddo Flow switch on cold use Fluxostat sur utilisation froide Strömungswächter auf Verbraucher kalt Flujostato en uso frío
AP18	demand-limit		SQH	Flussostato su utilizzo caldo Flow switch on hot use Fluxostat sur utilisation chaude Strömungswächter auf Verbraucher warm Flujostato en uso caliente
AP19	Water reset utilizzo freddo Cold use water reset Reset eau utilisation froide Water Reset, Verbraucher kalt Water reset uso frío		QMP	Salvamotore pompa acqua utilizzo freddo Cold use water pump motor circuit breaker Disconnecteur pompe à eau utilisation froide Motorschutz Wasserpumpe, Verbraucher kalt Guardamotor bomba de agua uso frío
AP29	Water reset utilizzo caldo Hot use water reset Reset eau utilisation chaude Water Reset, Verbraucher warm Water reset uso caliente		QMH	Salvamotore inverter pompa acqua utilizzo caldo Hot use water pump inverter motor circuit breaker Disconnecteur inverseur pompe eau utilisation chaude Motorschutz Inverter Wasserpumpe, Verbraucher warm Guardamotor inversor bomba de agua uso caliente
SA1	selettore on/off remoto remote on/off selector Sélecteur marche/arrêt déporté Fernwahlschalter Ein/Aus selector on/off remoto			



7.9 Computer connection

Configure PC

1 connect PC to electronic module with LAN cable
2 check in the taskbar that the connection is active
3 open Control Panel and select Network and sharing centre
4 select Modify board setting
5 select Local area network (LAN) connection
6 select Internet protocol version 4 (TPC/IPV4) and press the Property button
7 set IP address 192.168.1.100
8 set Subnet mask as 255.255.255.0
9 confirm (OK)
10 press Windows START button
11 write cmd
12 write Ping 192.168.1.42
13 check that a response string is given
14 open a browser (Chrome, Firefox, etc.)
15 write http:/192.168.1.42
16 Userid = WEB
17 Password = SBTAdmin!



1 Standard keypad
2 RJ45: standard connection
3 PC-not supplied
4 PC connection, shift RJ45 from T-HI to T-IP

7.10 Remote control

Option

1 Distance up to 350 m

2 Distance up to 700 m

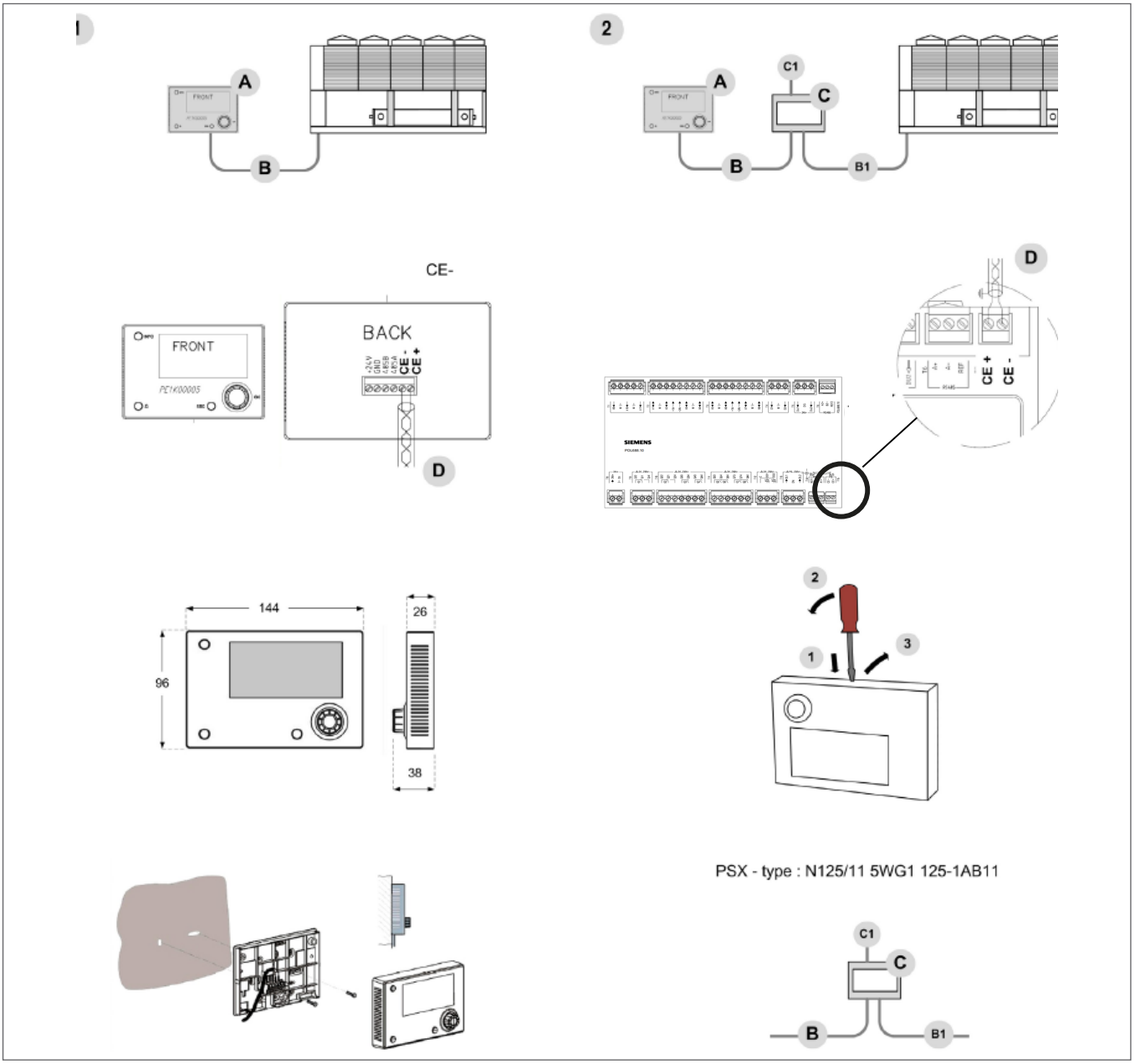
A User interface

B=B1 KNX bus, max 350 m
shielded twisted pair ø 0.8 mm
use an EIB/KNX marked cable

C PSX - Mains power output
power output N125/11 5WG1 125-1AB11

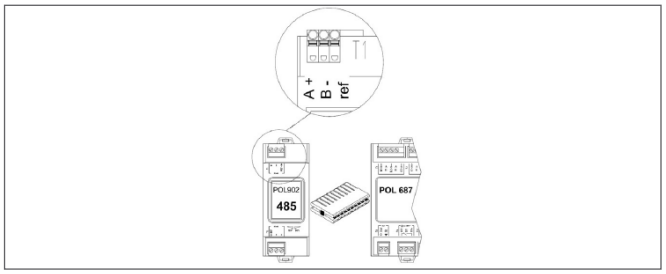
C1 AC 120...230V, 50...60Hz

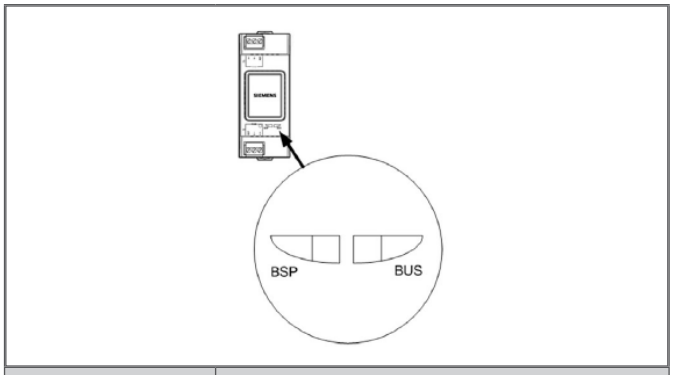
D KNX bus, max 350 m



7.11 Modbus - RS485

Option





BSP LED	communication with AP1 module
green	communication ok
yellow	software ok but communication with AP1 down
red	flashing: software error steady: hardware error
BUS LED	**Modbus communication**
green	communication ok
yellow	startup / 1 canal not communicating
red	communication down

7.11.1 Modbus / LonWorks / cable requirements

Pair of twisted and shielded conductors

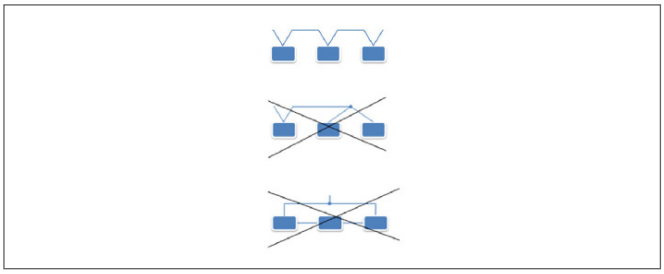
Conductor cross-section 0,22mm2...0,35mm2

Rated power between conductors < 50 pF/m

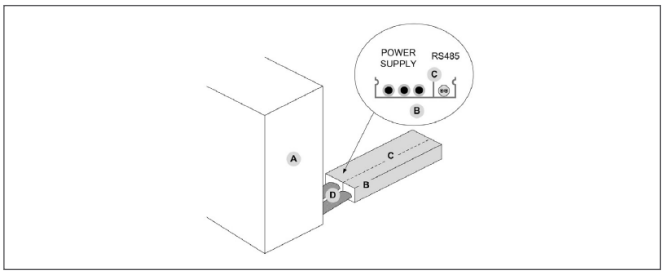
Nominal impedance 120 Ω

Recommended cable BELDEN 3106A

- Every RS485 serial line must be set up using the 'In/ Out' bus system.
- Other types are not allowed.



- The difference in potential between the earth of the two RS485 devices that the cable shielding needs to be connected to must be lower than 7 V
- There must be suitable arresters to protect the serial lines from the effects of atmospheric discharges
- A 120 ohm resistance must be fitted on the end of the serial line. Alternatively, when the last serial board is equipped with an internal terminator, it must be enabled using the specific jumper or dip switch.
- The cable must have insulation features and non-flame propagation in compliance with national regulation.
- The RS485 serial line must be kept as far away as possible from sources of electromagnetic interference.



A Unit

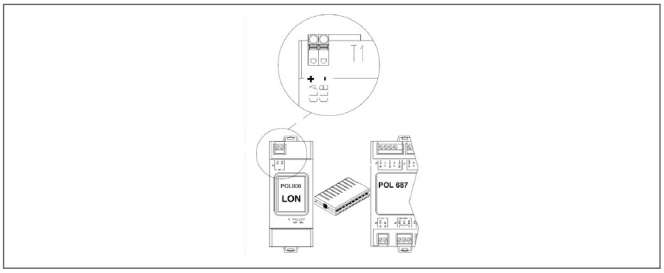
B Metal conduit

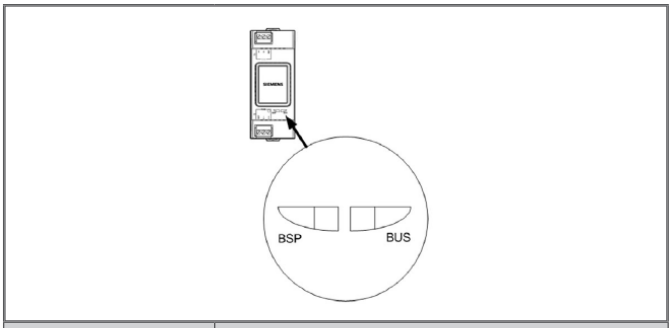
C Metal septum

D Metal-lined sheath (sleeve)

7.12 LonWorks

Option





BSP LED	communication with AP1 module
green	communication ok
yellow	software ok but communication with AP1 down
red	flashing: software error steady: hardware error
BUS LED	**LonWorks communication**
green	ready to communicate
yellow	startup
red	flashing: communication not possible communication down

LONWORK CABLE TYPE

Echelon allows three cable types for channel type TP/FT-10, including the Category 5 network cable used commonly in building automation and control (TIA 568A Cat-5).

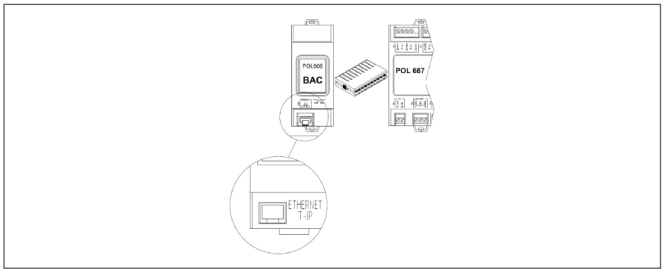
CAT-5 SPECIFICATIONS

Unshielded cable, twisted pair with at least 18 beats per metre:

- cross-sectional area min ø 0.5mm2 - impedance 100 +/- 15% @ f > 1 MHz
- operating capacity between two wires of a pair < 46 nf/km
- capacity pair to ground, asymmetric < 3.3 nF/km
- DC loop resistance < 168 Ω

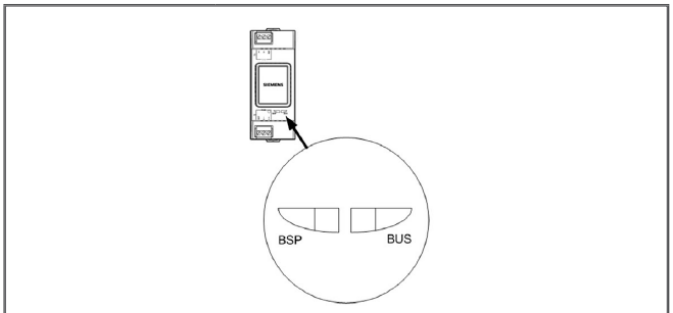
7.13 BACnet IP

Option



Ethernet 10/100 Mbit(IEEE 8025.3U)

RJ45, 8 pins



BSP LED	communication with AP1 module
green	communication ok
yellow	software ok but communication with AP1 down
red	flashing: software error steady: hardware error
BUS LED	**BACnet communication**
green	ready to communicate
yellow	startup
red	BACnet server down restart after 3 sec

7.14 Ecoshare

Option

The Master unit (identified by the LNAddress parameter = 1) controls the network.

The network can be extended to a maximum of 7 units (1 master – 6 slaves).

The network addresses must be in sequence and set to values from 1 to 7.

The Master's address must be 1, the n Slave devices configured on the network must have addresses ranging from 2 to 7.

The master manages connected units in order to obtain:

- The coordination of operation (Mode, status, setpoint and signal commands of the DemandLimit function are transmitted from the Master unit to the Slave units).
- The rotation of unit operating priorities based on their wear (total number of hours of operation).
- The management of one or more units on standby. The units put on standby are always the ones showing more wear. The units on standby are rotated with daily frequency or when an alarm is triggered on the units in operation.

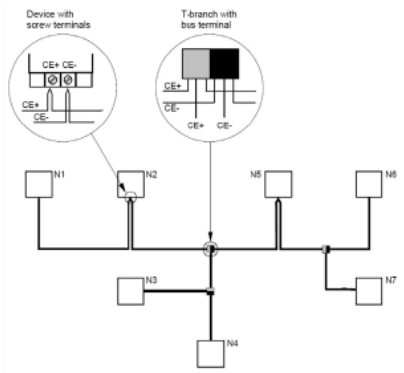
A different user side setpoint is set in each unit; this value is calculated starting from the setpoint set in the master unit, adding/removing, depending on the operating mode (cold/hot), an offset that can be parameterised.

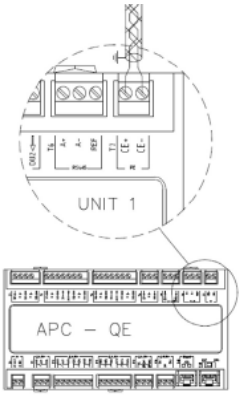
Example

- Master Mode = Cold
- Setpoint set in the Master = 7.0 °C
- Offset = 0.5 °C
- Slave 2 (less wear): Setpoint = 7.0 °C
- Slave 3 (wear less than Slave 2): SetPoint = 7.5 °C
- Master (wear less than Slave 3): Setpoint = 8.0 °C
- Slave 1 (more wear): Setpoint = 8.5 °C
- Status and mode of the Slave units are controlled by the Master
- Heat load: Each unit works independently on both the user side and the recovery side to fulfil the heat load based on the Setpoint and RecoverySetpoint assigned to it by the Master.

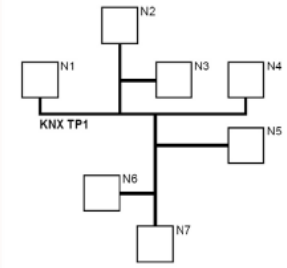
Connection requirements

- Maximum length of the bus line: 700 m
- Maximum distance between 2 units: 300 m
- Type of cable: shielded twisted pair, Ø 0,8 mm, use an EIB/KNX marked cable
- Possible connections: Tree, star, in/out bus, mixed
- It is not possible to use a loop connection
- No end-of-line resistance or terminator required
- There must be suitable arresters to protect the serial lines from the effects of atmospheric discharges
- The data line must be kept separate from the power conductors or powered at different voltages and away from possible sources of electrical interference

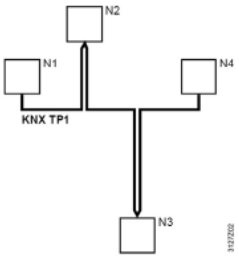




Tree topology (with stub lines)



Line topology (with loops)



Path: Main menu / Unit settings / Ecoshare		
Parameters	**Short description**	**Description**
P0191	Indirizzo Unita	Modbus address of unit in Ecoshare network (1 – 7; 1 = MASTER)
P0193	N.Unita in Rete	Number of units in Ecoshare network (1 – 7)
P0194	Unita in StandBy	Number of units on standby in Ecoshare network (1 – 6)
P0195	Offset SetPoint	Setpoint offset

8. Start-up

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

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

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

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

Before checking, please verify the following:

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

Attention

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

8.1 Start-up sequence

For details refer to the different manual sections.

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

Preliminary checks - Unit power supply ON		✓
1	compressor crankcase heaters operating at least since 8 hours	
2	off-load voltage measure	
3	phase sequence check	
4	pump manual start-up and flow check	
5	shut-off valve refrigerant circuit open	
6	unit ON	
7	load voltage measure	
8	verify the lack of bubbles in the liquid light (if applicable)	
9	check of all fan operating: no abnormal noises or vibrations	
10	measure return and supply water temperature	
11	measure super-heating and sub-cooling	
12	run tests in both heat and cool mode (only for heat pump units)	
13	check no anomalous vibrations are present	
14	climatic curve personalization	
15	scheduling customisation	
16	check that all panels are closed and fastened properly	
17	complete and available unit documentation	

8.2 Refrigeration circuit

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

8.3 Electric Circuit

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

Attention

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

8.4 Options

Menu accessible only after having entered the password.

Access reserved only to specifically trained personnel.

Changing the parameters can cause irreversible damage.

8.5 Reduced load operation

The units are equipped with capacity steps and so can operate with reduced loads.

However, a constant and long reduced load operation with frequent compressor(s) stops and start-ups can cause irreparable damage due to the absence of oil return.

The above-described operating conditions must be considered outside the operating limits.

If the compressor breaks down due to operating in the above-mentioned conditions, the warranty shall no longer be valid and CLIVET spa shall not accept any liability.

Periodically check the average operating times and frequency of compressor start-ups: indicatively the minimum heat load must be such as to require a compressor to operate for at least ten minutes.

If average times are close to this limit, take appropriate corrective actions, e.g. increase the water content of the system, which is not sufficient in this application.

8.6 Checking the water flow-rate.

Check that the difference between the exchanger inlet and outlet water temperature corresponds to the power according to this formula:

- unit power (kW) x 860 = Dt (°C) x flow-rate (L/h)

Check for water side exchanger pressure drops:

- determine the water flow-rate
- measure the difference in pressure between exchanger inlet and outlet and compare it with the graph on WATER SIDE EXCHANGER PRESSURE DROPS

The measurement of pressure will be easier if pressure gauges are installed as indicated in the RECOMMENDED WATER CONNECTION DIAGRAM.

8.7 Start-up report

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

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

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

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

8.8 2014/68/UE PED directive

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

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

Compulsory verification of the first installation:

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

Certification of setting in service:

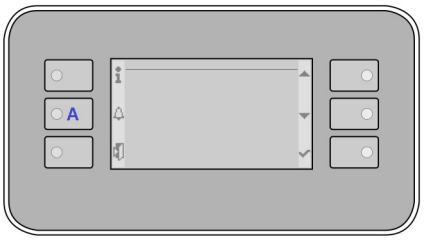
- for all the units

Periodical verifications:

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

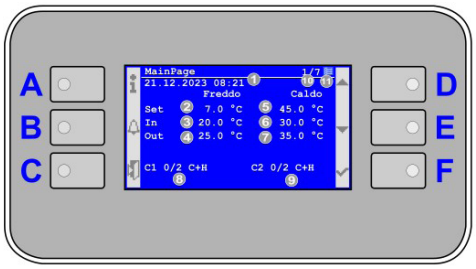
9. Control

9.1 LED



A	Flashing / Steady = alarm present

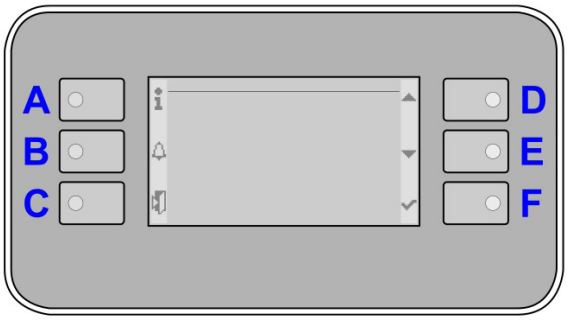
9.2 Display and buttons



Ref.	description
1	Date - Time
2	Cool setpoint
3	Cold side water inlet temperature
4	Cold side water outlet temperature
5	Heat setpoint
6	Hot side water inlet temperature
7	Hot side water outlet temperature
8	Capacity and circuit 1 diagram
9	Capacity and circuit 2 diagram
10	Line index
11	Password level entered

Ref.	Name	description
A	Info	Main menu
B	Alarm	Displays alarms
C	Cancel	Exit, Previous level, Keypad settings
D	Up	Increases value
E	Down	Decreases value
F	Enter	Confirm, Password

9.3 Menu

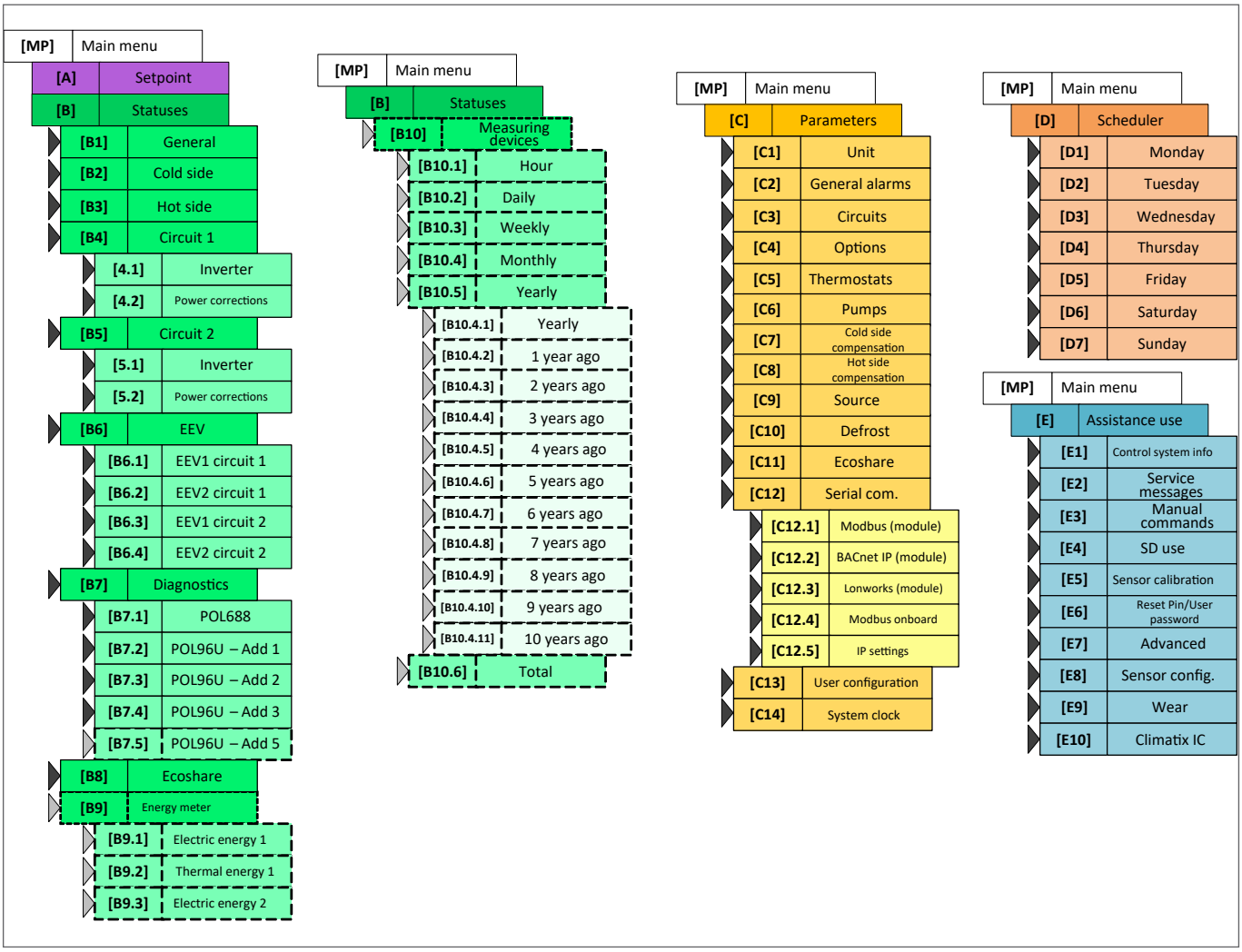


The various settings and status display menus can be accessed.

Depending on the password level entered, the entries accessible from that particular user level will be displayed.

Press button A on the home page to open the settings menu. Press buttons D and E to move from line to line and press button F to open the selected entry.

Navigation map



9.4 Change unit status

9.4.1 Definition

The unit status controls, their meanings and their possible operation priority are defined below.

The status change is the main unit function that interacts with all the system elements in relation to the selected control.

OFF	ON	ECO	PmpON
The OFF status prevents the unit from being powered, but ensures the antifreeze protections are active on the user side	The ON status allows the unit to start to produce water at the setpoint value set	The ECO status allows the unit to start to produce water at the eco setpoint value, through periodical operation on the system pumps	The ECO status allows the unit to start to produce water at the eco setpoint value, through periodical operation on the system pumps

The status can be set in C0001:Unit Control or from the BMS in C0003:BMS Unit Control.

The current status can be seen in: S0033:Unit status.

9.4.2 Status control

The unit status can be set:

- from the HMI, entering a user-level password
- from the WEB Browser, after establishing web communication, set a new status in the selection box

9.5 Change mode

9.5.1 Definition

The mode controls (Heat/Cool), their meanings and their possible operation priority are defined below.

The mode can be set in C0002:Mode Control or from the BMS in C0004:BMS Mode Control.

The current status can be seen in: S0034:Unit mode.

9.5.2 Mode control

The unit status can be set:

- from the HMI, entering a user-level password
- from the WEB Browser, after establishing web communication, set a new status in the selection box

9.6 Change setpoint

9.6.1 Definition

The setpoint defines the water temperature value to be produced by the unit, according to the operating mode selected and the type of unit.

ID	Description
C000A:SetPointCool	Setpoint setting - User side - Cool
C0010:SetPointRec	Setpoint setting - Recovery/Hot side

The water temperature values that can be assigned are limited by a maximum and minimum value that can be set in parameters MaxSetPoint, MinSetPoint according to the operating mode set.

	Minimum	Maximum
Recovery/ Hot side	P0005:MinSetPoint Rec	P0006:MaxSetPoint Rec

9.6.2 Change setpoint mode

The operating setpoint can be changed in different ways:

- from the HMI, entering a user-level password and opening the setpoint screen
- from the WEB Browser, after establishing web communication, set a new setpoint in the relevant field
- from a dry contact: if this option is enabled in parameter En2SetPoint, a 2nd setpoint can be assigned which is activated by closing the relevant dry contact [DI].

	Enabling	Second setpoint
User side - Cool	P025F: En 2SetPoint cool	C000B: Second setpoint cool
Recovery/ Hot side	P0263: En 2SetPoint Heat	C0011: 2SetPointRec

Depending on the type of unit, there will be a user side setpoint (heat or cool) and possibly a recovery side setpoint as well. The change modes apply similarly to all setpoints, each with its own limits and enabling options.

9.6.3 ECO mode operation

If the unit is controlled in ECO mode, the setpoint used is:

ID	Description
C000C:SetpointECO Cool	User side - Cool
C0012:SetpointECO Rec	Recovery/ Hot side

9.6.4 Change setpoint from climatic curve on outdoor air

The compensation of the SetPoint in relation to the external air value defines a linear variation curve of the unit SetPoint in relation to the selected operating mode, unit configuration and 4 parameter values.

The function can be enabled either on the user side with parameter P0260:EnClimatica or on the recovery side/hot side with parameter P0259:EnClimaticaRec.

The climatic function is always on when enabled, it is cancelled in ECO operation.

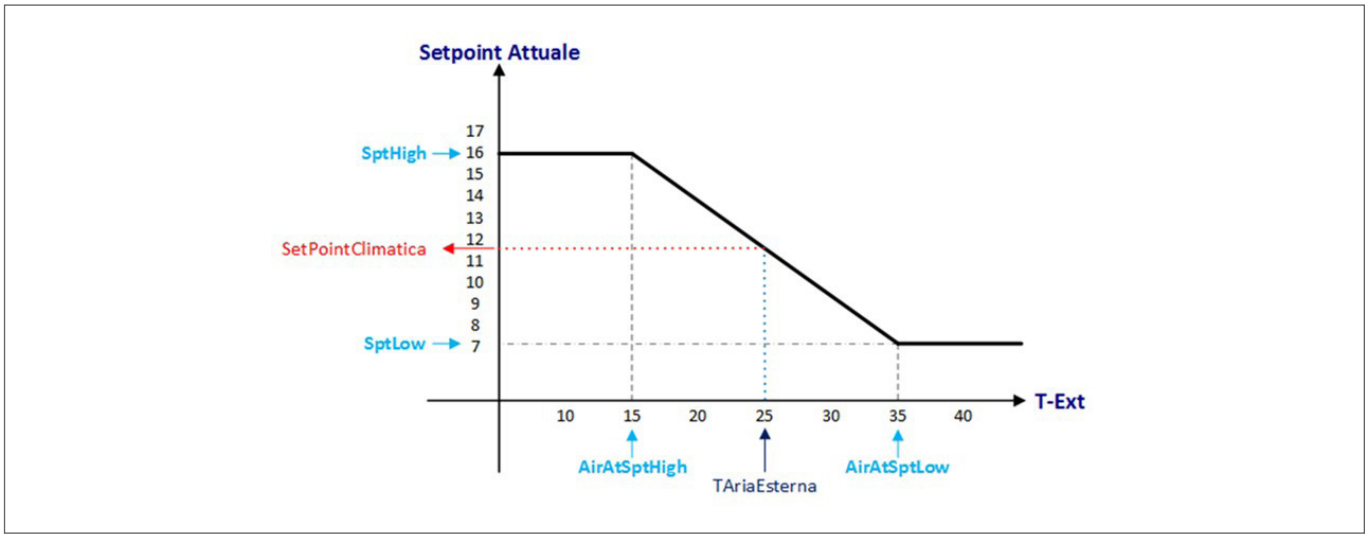
The setpoint change function given the outdoor air temperature involves calculating the current setpoint value again given two outdoor air values and two temperature setpoint values that can be set in the relevant parameters:

- SptHigh = maximum setpoint value that can be set
- SptLow = minimum setpoint value that can be set
- AirSptHigh = outdoor air temperature value at which the maximum setpoint is assigned
- AirSptLow = outdoor air temperature value at which the minimum setpoint is assigned

In the range between AirSptHigh and AirSptLow, a linear curve is defined from which the value to be assigned to the unit setpoint is calculated.

Depending on the configuration and type of unit, these values are set in parameters:

	SptLow	SptHight	AirSptLow	AirSptHigh
User side - Cool	P0323:CSptLow	P0324:CSptHigh	P0325:AirAtSptLowC	P0326:AirAtSptHigC
Recovery/ Hot side	P032B:SptLow lato caldo	P032C:SptHigh lato caldo	P032D:AirAtSptLow lato caldo	P032E:AirAtSptHigh lato caldo



9.6.5 Change setpoint from Water Reset analogue signal

The Water Reset function is used to recalculate the setpoint value according to an external analogue signal (0-10Vcc or 4-20mA).

The type of analogue signal used is defined by parameters: P0266:TypeWR for the user side and P0267:TypeWR Recovery for the recovery side.

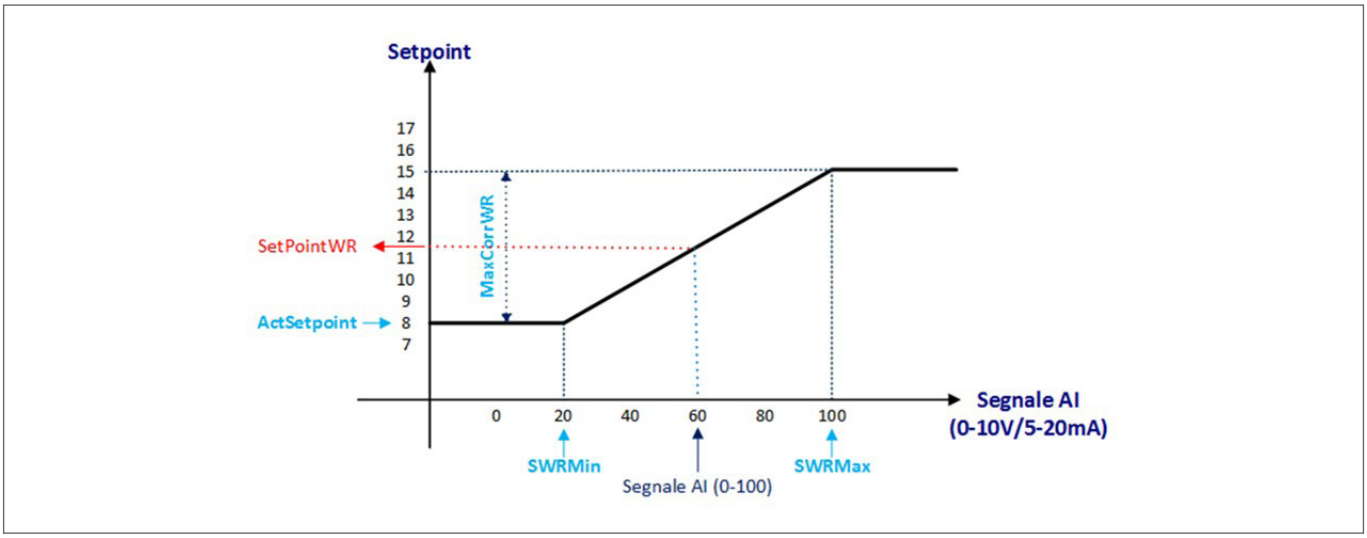
It can be enabled either on the user side with parameter P025E:EnWaterReset or on the recovery side with parameter P025AEnWaterResetRec.

The water reset function is always on when enabled, it is cancelled in ECO operation.

The reference parameters for the signal are:

	Minimum signal SWRMin	**Maximum signal SWRMax**	**Maximum signal MaxCWRC**
User side - Cool	P032F:SWRMinC	P0330:SWRMaxC	P0331:MaxCWRC
Recovery/ Hot side	P0335:SWRMinRec	P0336:SWRMaxRec	P0337:MaxCWRRec

The setpoint value is recalculated by adding a correction deriving from a linear curve that takes an external analogue signal as a reference:



9.7 Alarms

- **Before resetting an alarm, identify and remove its cause.**
- **Repeated resets can cause irreversible damage or malfunction to the system.**

Example:

+ eE001 Phase monitor: Fault = active alarm

- EE002 Pump 1 cold side: Ok = alarm reset

9.8 General list of alarms

The alarm code consists of 2 characters followed by 4 alphanumerical digits.

The two initial characters define the type of alarm and the type of reset.

The next 4 characters form a unique index made up as follows:

1°	2°	3°	4°
Area it belongs to: 0: general 1: circuit 1 2: circuit 2 etc.	Hexadecimal number: unique alarm identifier		

Code	Meaning
a	Aeraulic
e	Electrical
f	Refrigerant circuit
l	Hydraulic

Code	Alarm type
ee, ff, ii	Automatic reset
eE, fF, iI	Automatic reset; after N activations, the alarm becomes manual reset
EE, FF, II	Manual reset

Examples:

ee025B	Outdoor Air T. probe failure
ee	Automatic reset
0	general category
25B	Alarm ID

fF1048	High source coil temp.
fF	Refrigerant alarm with automatic reset; after N interventions the alarm becomes manual reset
1	Circuit 1 alarm
048	Alarm ID

The last column of the alarms table shows whether or not the alarms are cumulative.

✓	belonging to cumulative alarms	X	not belonging to cumulative alarms

Code	Description	Cause	C
eE0001	Phase monitor	Phase monitor input open (off)	✓
EE0002	Cold side pump 1	Pump protection input open (off)	✓
EE0003	Cold side pump 2	Pump protection input open (off)	✓
ee0005	Cold side pump 1 inverter alarm	Inverter alarm input open (off)	✓
ee0006	Cold side pump 1 inverter alarm	Inverter alarm input open (off)	✓
EE0007	Hot side pump 1	Pump protection input open (off)	✓
EE0008	Hot side pump 2	Pump protection input open (off)	✓
ee0010	Hot side pump 1 inverter alarm	Inverter alarm input open (off)	✓
ee0011	Hot side pump 2 inverter alarm	Inverter alarm input open (off)	✓
ee0020	Crankcase heater fault	No crankcase heater operation feedback	✓
ee0021	Main electrical measuring device offline	Communication error with main electric energy measuring device modbus slave	x
ee0022	Secondary electrical measuring device offline	Communication error with main electric energy measuring device modbus slave	x
ee0100	I/O module Offline [Addr.1]	Communication error with the I/O peripheral device	✓
ee0101	I/O module Offline [Addr.2]	Communication error with the I/O peripheral device	✓
ee0102	I/O module Offline [Addr.3]	Communication error with the I/O peripheral device	✓
ee0104	I/O module Offline [Addr.5]	Communication error with the I/O peripheral device	✓
ee0211	Master Offline	No communication with the Master unit in the Ecoshare network	1
ee0202	Unit 2 alarm	Unit with address 2 with generic alarm	1
ee0212	Unit 2 Offline	No communication with the unit with address 2 in the Ecoshare network	1
ee0203	Unit 3 alarm	Unit with address 3 with generic alarm	1
ee0213	Unit 3 Offline	No communication with the unit with address 3 in the Ecoshare network	1
ee0204	Unit 4 in alarm	Unit with address 4 with generic alarm	1
ee0214	Unit 4 Offline	No communication with the unit with address 4 in the Ecoshare network	1
ee0205	Unit 5 in alarm	Unit with address 5 with generic alarm	1
ee0215	Unit 5 Offline	No communication with the unit with address 5 in the Ecoshare network	1
ee0206	Unit 6 in alarm	Unit with address 6 with generic alarm	1
ee0216	Unit 6 Offline	No communication with the unit with address 6 in the Ecoshare network	1
ee0207	Unit 7 in alarm	Unit with address 7 with generic alarm	1
ee0217	Unit 7 Offline	No communication with the unit with address 7 in the Ecoshare network	1
ee025C	Cold side Inlet T.	Cold side inlet water temperature probe damaged or disconnected	✓

Code	Description	Cause	C
ee025D	Cold side Outlet T.	Cold side outlet water temperature probe damaged or disconnected.	✓
ee025E	Hot side Inlet T.	Hot side inlet water temperature probe damaged or disconnected.	✓
ee025F	Hot side Outlet T.	Hot side outlet water temperature probe damaged or disconnected.	✓
ee025B	Outdoor Air T.	Outdoor air temperature probe damaged or disconnected.	✓
ee0262	Pump Electrical Panel T.	Pump electrical panel temperature probe damaged or disconnected	✓
ee0266	Electrical Panel T.	Electrical panel temperature probe damaged or disconnected	✓
ee0268	DemandLimit	Demand Limit analogue input damaged or disconnected	✓
ee0269	Cold side WaterReset	Cold side Water Reset analogue input damaged or disconnected	✓
ee0279	Cold side Diff.P.	User side differential pressure transducer damaged or disconnected	✓
ee027A	Hot side Diff.P.	User side differential pressure transducer damaged or disconnected	✓
ee027B	Cold side flow-rate signal	Measuring device flow-rate signal input disconnected or damaged	✓
ee027C	Hot side flow-rate signal	Measuring device flow-rate signal input disconnected or damaged	✓
ee027D	Hot side WaterReset	Hot side Water Reset analogue input damaged or disconnected	✓
ee1005	EEV 1 error	Electronic expansion valve or valve driver failure	✓
ee1007	EEV 2 error	Electronic expansion valve or valve driver failure	✓
eE 1006	Source fan protection	Source ventilation protection input open (off)	1
ee1008	EEV 3 error	Electronic expansion valve or valve driver failure	✓
ee13ED	Comp. 1 discharge T.	Circuit suction temperature probe damaged or disconnected	✓
ee13EE	Comp. 2 discharge T.	Circuit suction temperature probe damaged or disconnected	✓
ee13E9	Suction 1 T.	Circuit suction temperature probe damaged or disconnected	✓
ee13EA	Suction 2 T.	Circuit suction temperature probe damaged or disconnected	✓
ee13EB	Suction 3 T.	Circuit suction temperature probe damaged or disconnected	✓
ee13F1	Discharge P.	Discharge pressure transducer damaged or disconnected	✓
ee13F2	Suction P.	Suction pressure transducer damaged or disconnected	✓
ee13F3	Source Suction P.	Suction pressure transducer damaged or disconnected	✓
ee2005	EEV 1 error	Electronic expansion valve or valve driver failure	✓
ee2007	EEV 2 error	Electronic expansion valve or valve driver failure	✓
EE2006	Source fan protection	Source ventilation protection input open (off)	✓
ee2008	EEV 3 error	Electronic expansion valve or valve driver failure	✓
ee23ED	Comp. 1 discharge T.	Circuit suction temperature probe damaged or disconnected	✓
ee23EE	Comp. 2 discharge T.	Circuit suction temperature probe damaged or disconnected	✓
ee23EF	Comp. 3 discharge T.	Circuit suction temperature probe damaged or disconnected	✓
ee23E9	Suction 1 T.	Circuit suction temperature probe damaged or disconnected	✓
ee23EA	Suction 2 T.	Circuit suction temperature probe damaged or disconnected	✓

Code	Description	Cause	C
ee23EB	Suction 3 T.	Circuit suction temperature probe damaged or disconnected	✓
ee23F1	Discharge P.	Discharge pressure transducer damaged or disconnected	✓
ee23F2	Suction P.	Suction pressure transducer damaged or disconnected	✓
ee23F3	Source Suction P.	Suction pressure transducer damaged or disconnected	✓
FF0001	Refrigerant leak	Refrigerant leak detector input open (off)	✓
ff0002	Low Outdoor Temp.	Outdoor air temperature lower than the value set in the parameter	x
ff1005	Minimum SH EEV1	Overheating value calculated by the EEV driver lower than the value set in the parameter	x
ff1006	Minimum SH EEV2	Overheating value calculated by the EEV driver lower than the value set in the parameter	x
ff1007	Minimum SH EEV3	Overheating value calculated by the EEV driver lower than the value set in the parameter	x
fF1013	[DI] High pressure	High pressure switch input open (off)	✓
FF1015	[AI] High pressure	High pressure value higher than the value set in the parameter	✓
fF1017	Minimum compression ratio	Calculated compression ratio value higher than the value given by the parameter	✓
fF1009	[AI] Low pressure	Low pressure value lower than the value set in the parameter	✓
FF1019	Maximum compression ratio	Compression ratio value higher than the value given by the parameter	✓
FF1034	Empty circuit	Low pressure value lower than the value set in the parameter	✓
FF1046	Low pressure limit	Low pressure value lower than the value given by the parameter	✓
fF1047	Out of envelope	Out of compressor's safe operating area	✓
FF1030	Low Defrost temp	Defrost. Cold side water temperature between two values defined by the parameter	x
ff2005	Minimum SH EEV1	Overheating value calculated by the EEV driver lower than the value set in the parameter	✓
ff2006	Minimum SH EEV2	Overheating value calculated by the EEV driver lower than the value set in the parameter	✓
ff2007	Minimum SH EEV3	Overheating value calculated by the EEV driver lower than the value set in the parameter	✓
fF2013	[DI] High pressure	High pressure switch input open (off)	✓
FF2015	[AI] High pressure	High pressure value higher than the value set in the parameter	✓
fF2017	Minimum compression ratio	Calculated compression ratio value higher than the value given by the parameter	✓
fF2009	[AI] Low pressure	Low pressure value lower than the value set in the parameter	✓
FF2019	Maximum compression ratio	Compression ratio value higher than the value given by the parameter	✓
FF2034	Empty circuit	Low pressure value lower than the value given by the parameter	✓
FF2046	Low Pressure limit	Low pressure value lower than the value given by the parameter	✓
fF2047	Out of envelope	Out of compressor's safe operating area	✓
il0001	Cold side Water Press.	Hydraulic system pressure switch input open (off)	✓
il0002	Cold side flow	User side flow switch input open (off)	✓

Code	Description	Cause	C
II0003	Cold side Inlet frost	Minimum value between the exchanger inlet and outlet temperature lower than the value set in the parameter	✓
ii0004	Max. cold side pump temp.	Maximum value between the exchanger inlet and outlet temperature higher than the value given by the parameter	✓
fF1021	Low compressor 1 oil level	Oil level check of compressor enabled in the parameter	✓
fF1022	Low compressor 2 oil level	Oil level check of compressor enabled in the parameter	✓
fF1023	Low compressor 3 oil level	Oil level check of compressor enabled in the parameter	✓
fF1048	High source coil temp.	Source ventilation protection input open (off)	✓
fF2048	High source coil temp.	Source ventilation protection input open (off)	✓
iI0006	Hot side Water Press.	Hot side hydraulic system pressure switch input open (off)	✓
iI0007	Hot side flow	Hot side flow switch input open (off)	✓
II0008	Hot side frost	Minimum value between the exchanger inlet and outlet temperature lower than the value given by the parameter	✓
ii0009	Max. hot side pump temp.	Maximum value between the exchanger inlet and outlet temperature higher than the value given by the parameter	✓

1 Configurable on request

	Decimal value	Meaning
[LSB] Bit 0	1	Generic driver error
Bit 1	2	EEV driver hardware error
Bit 2	4	UPS present but not available
Bit 3	8	Motor disconnected or incorrect connection
Bit 4	16	EEV driver overheating
Bit 5	32	Failsafe position not reached
Bit 6	64	Software configuration error
Bit 7	128	UPS does not charge
Bit 8	256	BSP version of expansion module not in accordance
Bit 9	512	Specific hardware errors for POL94x module
Bit 10	1024	Suction pressure less than 1 bar

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 issuitable ventilation.

9.9 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.

9.10 Dismantling

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

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

10. SAFETY WARNINGS FOR OPERATIONS ON UNITS CONTAINING R32

10.1 Area checks

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

10.2 Work procedures

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

10.3 General work area

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

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

10.4 Check the presence of refrigerant

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

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

10.5 Presence of the fire extinguisher

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

Keep a dry-powder or CO2 extinguisher near the loading area.

10.6 No ignition source

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

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

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

10.7 Ventilated area

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

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

10.8 Cooling equipment checks

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

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

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

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

10.9 Electrical device checks

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

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

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

Initial safety checks must include:

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

10.10 Repairing sealed components

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

Warning

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

10.11 Reparation of intrinsically safe components

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

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

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

10.12 Wires

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

Detection of flammable refrigerants

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

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

10.13 Leak detection methods

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

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

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

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

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

10.14 Removal and evacuation

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

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

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

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

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

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

10.15 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.

10.16 Dismantling

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

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

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

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

Before attempting the procedure, check that:

- The mechanical manipulation equipment is available, if necessary, to handle refrigerant tanks;
- All the personal protection equipment is available and employed correctly;
- The recovery procedure is monitored at all times by skilled personnel;
- The recovery equipment and tanks comply with suitable standards.
- If possible, pump the cooling system.
- If it is not possible to obtain a vacuum, make sure that a collector removes the refrigerant from various parts of the system.
- Before proceeding with the recovery, check that the tank is located on the scales.
- Start up the recovery machine and use it following the instructions by the manufacturer.
- Do not fill the tanks excessively. (Do not exceed 80% of the liquid volume).
- Do not exceed the tank's maximum operating pressure, not even momentarily.
- Once the tanks are filled correctly and the process is over, make sure that the tanks and equipment are immediately removed from the site and that all insulation valves on the equipment are closed.
- The refrigerant recovered must not be loaded into another cooling system unless it has been cleaned and checked.

10.17 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.

10.18 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. Please contact the manufacturer in case of doubt.

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

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

If it is necessary to remove compressors or compressor oils, make sure they are evacuated to an acceptable level to make sure no trace is left of the flammable refrigerant inside the lubricant. The evacuation process must be performed before taking the compressors back to the suppliers.

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

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

10.19 Transport, mark and storage

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

5 Storing packed (unsold) equipment.
Packing must be performed in such a way that mechanical damage to the equipment inside it does not cause refrigerant leaks. The maximum number of elements that can be stored together is determined by local regulations.

11. Maintenance

11.1 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.

11.2 General

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

The maintenance allows to:

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

Warning

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

11.3 Inspections frequency

Perform an inspection every 6 months minimum.

The frequency, however, depends on the use.

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

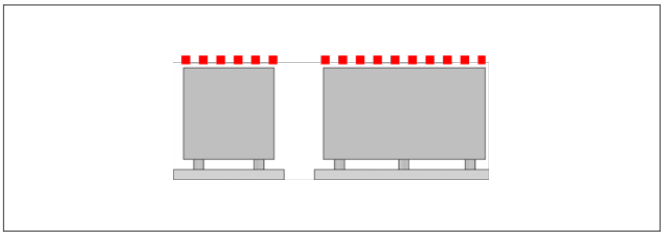
- frequent use (continuous or very intermittent use, near the operating limits, etc)
- critical use (service necessary)

Warning

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

ATTENTION

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



11.4 Unit booklet

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

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

Report on the booklet:

- date
- intervention description
- carried out measures etc.

11.5 Standby mode

If a long period of inactivity is foreseen:

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

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

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

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

11.6 Recommended periodical checks

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

* Refer to the local regulations. Companies and technicians that carry out installation, maintenance/fixing, leak control and recovery interventions must be CERTIFIED as required by local regulations

11.7 System drain

The system must be drained only if necessary.

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

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

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

Before start-up, wash the system.

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

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

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

11.8 Water side exchanger

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

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

It must be cleaned:

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

11.9 Water filter

Check that no impurities prevent the correct passage of water.

11.10 Flow Switch

- check operation
- remove incrustations from the blade

11.11 Circulation pumps

Check:

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

11.12 Air side exchanger

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

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

Clean at least every three months.

The cleaning frequency must be increased according to the build-up of dirt/dust and the environment (e.g. coastal areas with chlorides and salts or industrial areas with aggressive substances).

Clean the air inlet side.

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

Keep the direction parallel to the fins to avoid damage.

Check that the aluminium fins are not bent or damaged, if they are, contact an authorised service centre which will "comb" the coil to restore optimal air flow.

11.13 Insulations

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

11.14 Pressure relief valve

The pressure relief valve must be replaced:

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

11.15 Structure

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

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

  Do not use solvents or acid, alkaline, abrasive products.
- Check the condition of the parts making up the structure.

  Treat those parts of the unit subject to oxidation, with paints act at eliminating or reducing the oxidation phenomena.
- Check fastening of the unit external panelling.

Bad fastening give rise to anomalous noises and vibrations.

11.16 Electric fans

Check:

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

11.17 Compressor crankcase heater

Check:

- closing
- Operation

11.18 Refrigerant leak detector

Option

Refer to the component manufacturer's manual for specific information.

11.18.1 Maintenance

The inspection must be carried out by qualified servicing personnel.

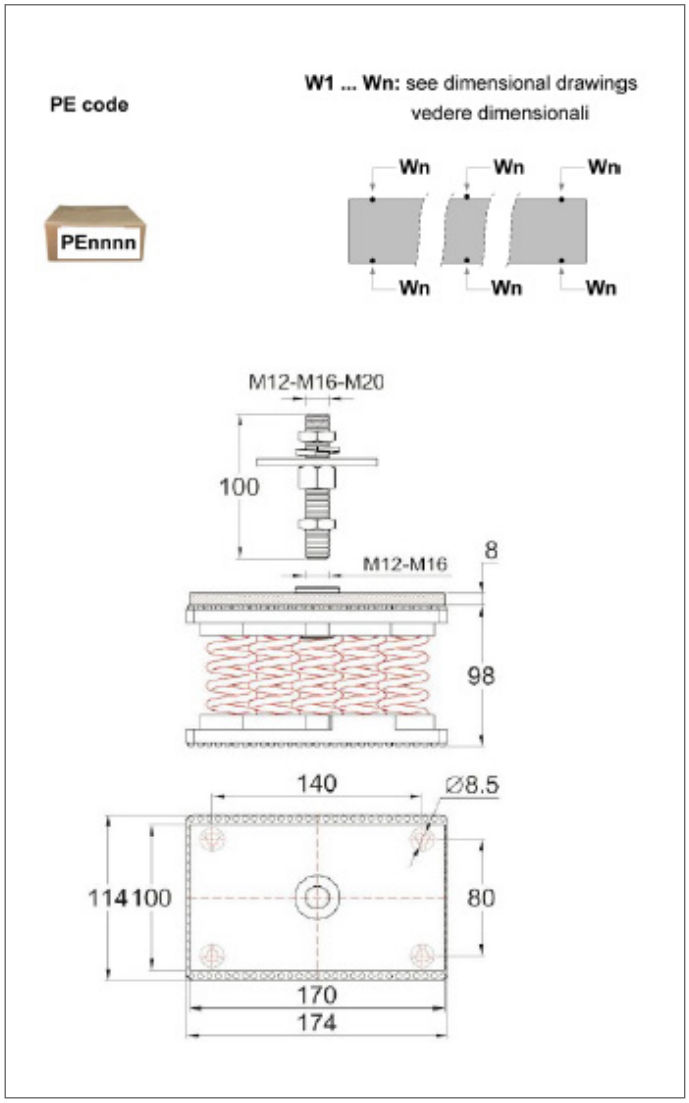
- Check correct operation of the LEDs.
- Check correct operation of the buzzer and relay.
- Check signal transmission to the BMS / central controller, if connected.
- Calibrate the sensor or contact the manufacturer to exchange the sensor with a factory-calibrated one.

Sensors have an average life of 2 to 5 years, depending on the type, after which they must be replaced.

▶ **Sensors must be checked after exposure to significant gas concentrations, which can reduce the duration of the sensor and/or reduce its sensitivity.**

12. Anti-vibration mounts

12.1 Anti-vibration mount support



	W1	W2	W3	W4	W5	W6
PEV400001	RX701	RZ708	RZ708	RX701	-	-
PEV400002	RZ602-X101Pr	RX703P	RX702Pr	RX702Pr	RX703P	RZ602-X101Pr

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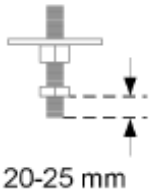

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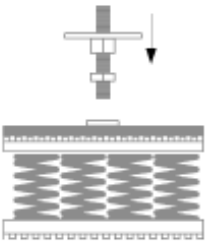

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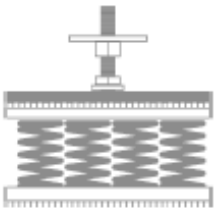

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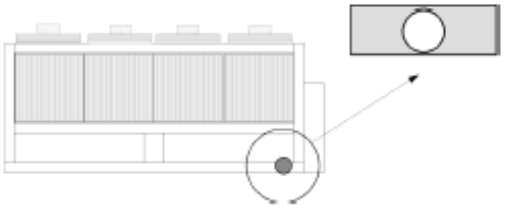

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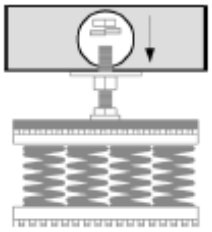

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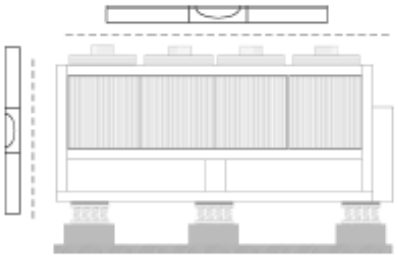

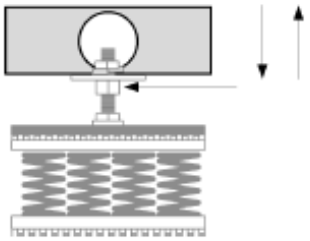

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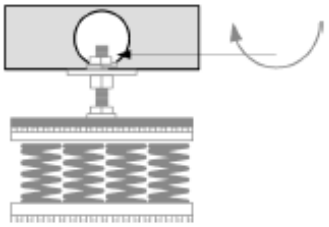
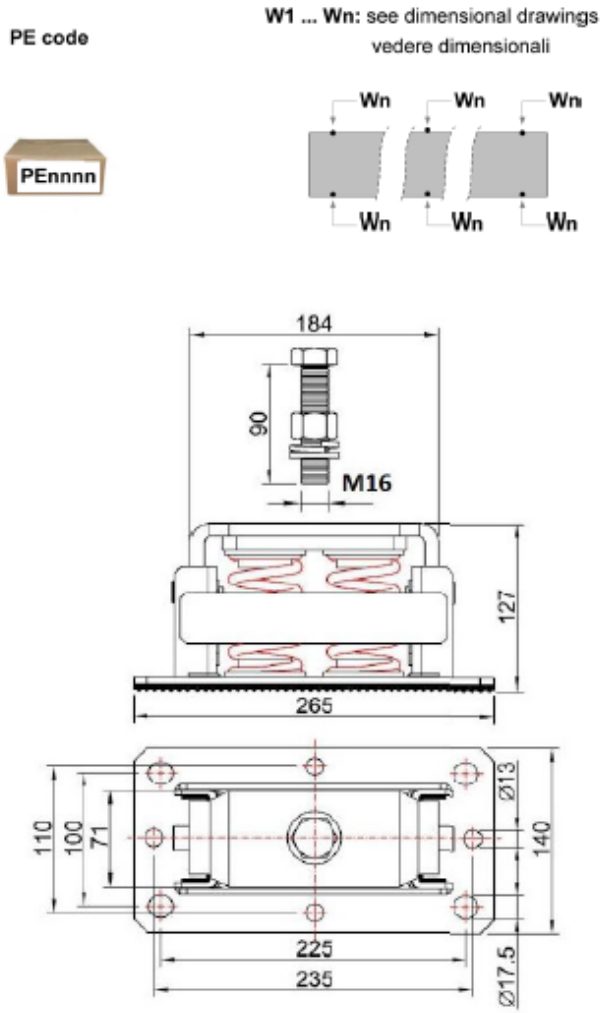
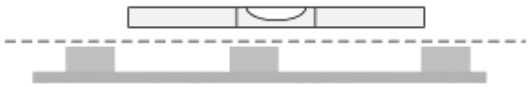


12.2 Anti-seismic anti-vibration mounts



	W1	W2	W3	W4	W5	W6
PEV400003	LaLV 33	LaLV 501	LaLV 501	LaLV 33	-	-
PEV400004	LaLV 22	LaLV 55	LaLV 47	LaLV 47	LaLV 55	LaLV 22

1



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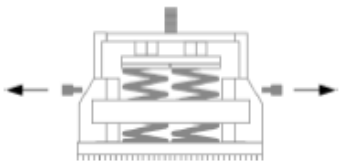

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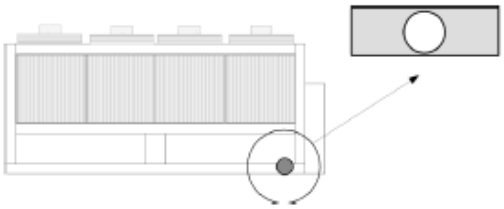

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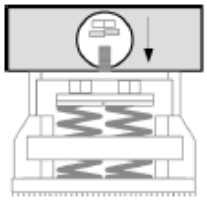

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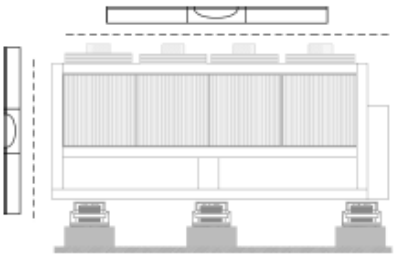

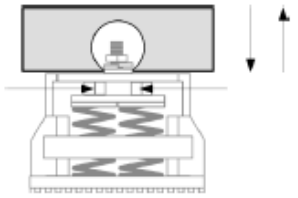

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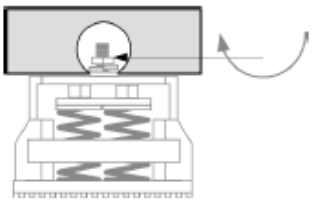

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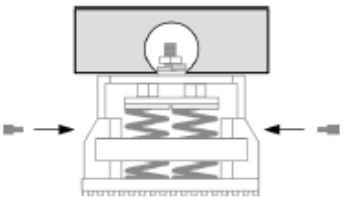


13. Decommissioning

13.1 Disconnection

Warning

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

Avoid leak or spills into the environment.

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

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

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

13.2 WEEE INFORMATION

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

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

Equipment bearing the crossed-out 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.

14. Residual risks

14.1 General

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

Danger zone

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

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

14.2 Handling

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

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

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

14.3 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 inflam-mable gas and the accumulation of this gas in the area surrounding the area occur could cause explosions or fires.

Carefully check the positioning of the unit.

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

Carefully check the positioning and the anchoring of the unit.

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

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

14.4 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 in-crease the pressure to beyond the safety valve with the consequent possible projection of the refrigerant itself or explosion of the circuit parts that remain isolated by the closure of the tap.

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

14.5 Electric parts

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

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

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

Always fix the unit cover properly.

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

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

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

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

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

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

14.6 Moving parts

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

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

Contact with the fans can cause injury.

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

14.7 Refrigerant

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

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

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

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

Do not place any heat source inside the danger zone.

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

14.8 Hydraulic parts

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

15. General technical specifications

Performance

Compressor soundproofing acoustic configuration (SC)

SIZE			20.2	25.2	30.2	35.2	40.2	45.2	50.2	55.4	60.4	65.4	70.4	75.4	80.4	85.4
Cooling 100% - Heating 0%																
Cooling capacity	1	kW	51,8	61,8	71,2	81,7	91,6	111	124	136	149	163	181	200	219	238
Compressor power input	1	kW	14,1	19,4	18,6	23,5	29,0	30,9	37,1	43,1	50,2	47,0	57,0	58,2	68,0	79,8
Total power input	2	kW	16,7	22,0	22,5	27,4	32,9	36,1	42,3	47,3	54,4	52,6	62,6	65,2	75,0	86,8
EER	1	-	3,10	2,81	3,16	2,98	2,78	3,07	2,93	2,89	2,74	3,09	2,89	3,06	2,92	2,74
Cold side water flow-rate	1	l/s	2,48	2,95	3,40	3,90	4,38	5,30	5,93	6,52	7,11	7,78	8,66	9,55	10,5	11,4
Cold side pressure drops	1	kPa	26,9	38,3	25,5	33,6	42,3	40,8	51,0	36,5	43,4	33,7	41,8	33,6	40,3	47,5
Cooling capacity (EN14511:2022)	3	kW	51,7	61,7	71,1	81,5	91,4	111	124	136	149	162	181	200	219	238
Total power input	3	kW	16,8	22,2	22,7	27,7	33,3	36,6	43,0	47,8	55,1	53,2	63,4	66,0	75,9	87,8
EER (EN14511:2022)	3	-	3,07	2,77	3,13	2,94	2,74	3,03	2,88	2,85	2,70	3,05	2,85	3,03	2,88	2,70
SEER	6	-	4,25	4,23	4,48	4,45	4,44	4,62	4,60	4,38	4,35	4,65	4,64	4,62	4,61	4,59
SEPR	6	-	5,32	5,29	5,60	5,56	5,55	5,77	5,74	5,47	5,43	5,81	5,80	5,78	5,77	5,74
Cooling capacity (AHRI 550/590)	4	kW	51,2	61,2	70,5	80,8	90,6	110	123	135	147	161	180	198	217	235
Total power input (AHRI 550/590)	4	kW	16,6	21,9	22,5	27,5	32,9	36,1	42,4	47,0	54,1	52,5	62,4	65,2	75,0	86,8
COPR	4	-	3,08	2,79	3,13	2,94	2,75	3,05	2,89	2,87	2,72	3,07	2,88	3,04	2,89	2,71
IPLV	4	-	4,04	3,98	4,25	4,20	4,19	4,36	4,35	4,14	4,13	4,42	4,40	4,39	4,34	4,34
Cooling 0% - Heating 100%																
Heating capacity	7	kW	64,4	72,6	80,3	92,1	104	120	136	154	173	191	211	231	253	280
Compressor power input	7	kW	17,8	21,2	19,8	24,2	28,7	31,2	36,3	43,1	50,7	52,1	59,8	61,3	70,3	81,9
Total power input	2	kW	20,4	23,8	23,7	28,1	32,6	36,4	41,5	47,3	54,9	57,7	65,4	68,3	77,3	88,9
COP	7	-	3,16	3,05	3,39	3,28	3,20	3,30	3,28	3,26	3,14	3,32	3,22	3,38	3,27	3,15
Hot side water flow-rate	7	l/s	3,08	3,47	3,84	4,40	4,97	5,74	6,51	7,36	8,24	9,14	10,1	11,0	12,1	13,4
Hot side pressure drops	7	kPa	41,5	52,8	32,5	42,7	54,5	47,8	61,5	46,6	58,4	46,7	56,8	44,8	53,7	65,6
Heating capacity	8	kW	64,5	72,8	80,5	92,3	104	120	137	154	173	192	211	231	253	280
Total power input	8	kW	20,7	24,2	24,0	28,5	33,2	37,0	42,4	48,0	55,8	58,5	66,5	69,3	78,5	90,4
COP (EN14511:2022)	8	-	3,12	3,00	3,36	3,24	3,15	3,25	3,22	3,22	3,10	3,27	3,18	3,34	3,23	3,10
SCOP - MEDIUM Climate - W35	5	-	4,16	4,15	4,17	4,12	4,10	4,16	4,14	4,08	4,06	4,13	4,12	4,08	4,06	4,04
SCOP - MEDIUM Climate - W55	6		2,95	3,06	3,04	3,08	3,17	3,07	3,18	3,07	3,12	3,17	3,19	3,01	3,11	3,27
Cooling 100% - Heating 100%																
Cooling capacity	9	kW	53,2	62,3	69,9	80,4	88,2	108	116	134	149	166	176	189	208	226
Heating capacity	9	kW	70,4	83,8	91,8	107	119	144	156	178	199	218	232	246	274	302
Total power input	9	kW	17,7	21,9	22,3	27,4	31,4	36,2	40,5	44,2	50,6	52,0	56,1	57,2	66,5	76,5
TER	10	-	6,96	6,66	7,24	6,84	6,61	6,95	6,72	7,06	6,89	7,39	7,28	7,60	7,25	6,92

The Product complies with the European ErP (Energy Related Products) Directive, which includes Commission Delegated Regulation (EU) No. 813/2013 (nominal heating capacity ≤400 kW under specified reference conditions) and Commission Delegated Regulation (EU) No. 2016/2281, also known as Ecodesign LOT21.
Contains fluorinated greenhouse gases (GWP 675)

1. Data referring to the following conditions: Cold side exchanger water temperature = 12/7°C. Temperature of air entering the external exchanger = 35°C. Evaporator fouling factor = 0.44 x 10^(-4) m2 K/W
2. The Total Power Input value does not take into account the part related to the pumps and required to overcome the pressure drops for the circulation of the solution inside the exchangers.
3. Data calculated in accordance with EN 14511:2022 under the following conditions: Cold side exchanger water temperature = 12/7°C. Temperature of air entering the external exchanger = 35°C
4. Data calculated in accordance with AHRI 550/590 under the following conditions: Water temperature to the cold side exchanger = 6.7°C. Water flow-rate 0.043 l/s per kW. Temperature of air entering the external exchanger = 35°C. Evaporator fouling factor = 0.18 x 10^(-4) m2 K/W
5. Data calculated in accordance with Regulation (EU) 813/2013
6. Data calculated in accordance with Regulation (EU) 2016/2281
7. Data referring to the following conditions: Hot side exchanger water temperature = 40/45°C. Temperature of air entering the external exchanger = 7°C D.B./6°C W.B. Evaporator fouling factor = 0.44 x 10^(-4) m^2 K/W
8. Data calculated in accordance with EN 14511:2022 under the following conditions: Cold side exchanger water temperature = 12/7°C. Temperature of air entering the external exchanger = 35°C
9. Data referring to the following conditions: Cold side exchanger water temperature = */7 °C. Hot side exchanger water temperature = */45 °C Exchanger fouling factor = 0.44 x 10^(-4) m^2 K/W
10. TER = (Cooling capacity + Thermal capacity) / Total power input

Super Silenced acoustic configuration (LN)

SIZE			20.2	25.2	30.2	35.2	40.2	45.2	50.2	55.4	60.4	65.4	70.4	75.4	80.4	85.4
Cooling 100% - Heating 0%																
Cooling capacity	1	kW	48,2	57,5	66,2	75,9	85,2	103	115	127	138	151	168	186	204	221
Compressor power input	1	kW	13,6	18,5	18,0	22,6	27,7	29,7	35,5	41,3	47,9	45,4	54,6	56,2	65,3	76,3
Total power input	2	kW	15,5	20,4	20,9	25,5	30,6	33,5	39,4	44,0	50,6	49,0	58,2	60,7	69,8	80,8
EER	1	-	3,10	2,81	3,16	2,98	2,78	3,07	2,93	2,89	2,74	3,09	2,89	3,06	2,92	2,74
Cold side water flow-rate	1	l/s	2,30	2,75	3,16	3,63	4,07	4,93	5,51	6,06	6,61	7,23	8,05	8,88	9,7	10,6
Cold side pressure drops	1	kPa	23,3	33,1	22,1	29,1	36,6	35,2	44,1	31,5	37,5	29,1	36,1	29,1	34,9	41,1
Cooling capacity (EN14511:2022)	3	kW	48,1	57,4	66,1	75,8	85,0	103	115	127	138	151	168	186	203	221
Total power input	3	kW	15,6	20,6	21,1	25,7	31,0	33,9	39,9	44,4	51,1	49,4	58,9	61,3	70,5	81,6
EER (EN14511:2022)	3	-	3,08	2,78	3,14	2,95	2,75	3,03	2,88	2,85	2,70	3,06	2,85	3,03	2,88	2,71
SEER	6	-	4,17	4,17	4,43	4,41	4,39	4,53	4,50	4,30	4,29	4,64	4,59	4,62	4,57	4,55
SEPR	6	-	5,22	5,22	5,53	5,51	5,49	5,66	5,63	5,37	5,36	5,80	5,73	5,77	5,71	5,69
Cooling capacity (AHRI 550/590)	4	kW	47,6	56,9	65,5	75,2	84,2	102	114	126	137	150	167	184	201	219
Total power input (AHRI 550/590)	4	kW	15,5	20,4	20,9	25,6	30,6	33,6	39,5	43,7	50,3	48,8	58,0	60,6	69,8	80,7
COPR	4	-	3,08	2,79	3,13	2,94	2,75	3,05	2,89	2,87	2,72	3,07	2,88	3,04	2,89	2,71
IPLV	4	-	3,95	3,94	4,18	4,18	4,15	4,26	4,24	4,05	4,05	4,37	4,32	4,35	4,30	4,28
Cooling 0% - Heating 100%																
Heating capacity	7	kW	59,9	67,5	74,7	85,6	96,8	112	127	143	160	178	196	215	235	260
Compressor power input	7	kW	17,0	20,3	19,1	23,2	27,4	30,0	34,8	41,2	48,3	50,0	57,3	59,0	67,4	78,2
Total power input	2	kW	18,9	22,2	22,0	26,1	30,3	33,8	38,6	43,9	51,0	53,6	60,9	63,5	71,9	82,7
COP	7	-	3,16	3,05	3,39	3,28	3,20	3,30	3,28	3,26	3,14	3,32	3,22	3,38	3,27	3,15
Hot side water flow-rate	7	l/s	2,86	3,23	3,57	4,09	4,62	5,33	6,05	6,85	7,67	8,50	9,38	10,3	11,2	12,4
Hot side pressure drops	7	kPa	35,9	45,7	28,1	36,9	47,1	41,3	53,2	40,3	50,5	40,3	49,1	38,8	46,5	56,8
Heating capacity	8	kW	60,0	67,7	74,8	85,8	97,1	112	127	144	161	178	197	215	236	261
Total power input	8	kW	19,2	22,5	22,2	26,5	30,8	34,3	39,3	44,6	51,8	54,4	61,8	64,4	72,9	84,0
COP (EN14511:2022)	8	-	3,13	3,01	3,36	3,24	3,15	3,26	3,23	3,22	3,10	3,28	3,18	3,34	3,23	3,11
SCOP - MEDIUM Climate - W35	5	-	4,08	4,09	4,12	4,08	4,05	4,08	4,06	4,00	4,00	4,12	4,07	4,08	4,02	4,01
SCOP - MEDIUM Climate - W55	5		2,89	3,02	3,00	3,05	3,14	3,01	3,12	3,01	3,08	3,16	3,15	3,00	3,08	3,24
Cooling 100% - Heating 100%																
Cooling capacity	9	kW	49,4	58,0	65,0	74,7	82,1	100	108	125	139	155	164	176	193	211
Heating capacity	9	kW	65,4	77,9	85,3	100	111	134	145	165	185	203	216	228	255	281
Total power input	9	kW	16,5	20,4	20,8	25,5	29,2	33,7	37,7	41,1	47,1	48,4	52,1	53,2	61,8	71,1
TER	10	-	6,96	6,66	7,24	6,84	6,61	6,95	6,72	7,06	6,89	7,39	7,28	7,60	7,25	6,92

The Product complies with the European ErP (Energy Related Products) Directive, which includes Commission Delegated Regulation (EU) No. 813/2013 (nominal heating capacity ≤400 kW under specified reference conditions) and Commission Delegated Regulation (EU) No. 2016/2281, also known as Ecodesign LOT21.
Contains fluorinated greenhouse gases (GWP 675)

1. Data referring to the following conditions: Cold side exchanger water temperature = 12/7°C. Temperature of air entering the external exchanger = 35°C. Evaporator fouling factor = 0.44 x 10^(-4) m2 K/W
2. The Total Power Input value does not take into account the part related to the pumps and required to overcome the pressure drops for the circulation of the solution inside the exchangers.
3. Data calculated in accordance with EN 14511:2022 under the following conditions: Cold side exchanger water temperature = 12/7°C. Temperature of air entering the external exchanger = 35°C
4. Data calculated in accordance with AHRI 550/590 under the following conditions: Water temperature to the cold side exchanger = 6.7°C. Water flow-rate 0.043 l/s per kW. Temperature of air entering the external exchanger = 35°C. Evaporator fouling factor = 0.18 x 10^(-4) m2 K/W
5. Data calculated in accordance with Regulation (EU) 813/2013
6. Data calculated in accordance with Regulation (EU) 2016/2281
7. Data referring to the following conditions: Hot side exchanger water temperature = 40/45°C. Temperature of air entering the external exchanger = 7°C D.B./6°C W.B. Evaporator fouling factor = 0.44 x 10^(-4) m^2 K/W
8. Data calculated in accordance with EN 14511:2022 under the following conditions: Cold side exchanger water temperature = 12/7°C. Temperature of air entering the external exchanger = 35°C
9. Data referring to the following conditions: Cold side exchanger water temperature = */7 °C. Hot side exchanger water temperature = */45 °C Exchanger fouling factor = 0.44 x 10^(-4) m^2 K/W
10. TER = (Cooling capacity + Thermal capacity) / Total power input

Compressor soundproofing acoustic configuration (EN)

SIZE			20.2	25.2	30.2	35.2	40.2	45.2	50.2	55.4	60.4	65.4	70.4	75.4	80.4	85.4
Cooling 100% - Heating 0%																
Cooling capacity	1	kW	44,6	53,2	61,2	70,2	78,8	95,4	107	117	128	140	156	172	188	205
Compressor power input	1	kW	13,0	17,6	17,4	21,6	26,3	28,4	33,8	39,2	45,3	43,3	51,9	53,6	62,0	72,2
Total power input	2	kW	14,4	18,9	19,4	23,5	28,3	31,0	36,4	40,7	46,8	45,3	53,9	56,1	64,5	74,7
EER	1	-	3,10	2,81	3,16	2,98	2,78	3,07	2,93	2,89	2,74	3,09	2,89	3,06	2,92	2,74
Cold side water flow-rate	1	l/s	2,13	2,54	2,93	3,36	3,77	4,56	5,10	5,60	6,11	6,69	7,44	8,21	8,99	9,78
Cold side pressure drops	1	kPa	19,9	28,3	18,9	24,9	31,3	30,1	37,7	26,9	32,1	24,8	30,8	24,9	29,9	35,2
Cooling capacity (EN14511:2022)	3	kW	44,5	53,1	61,2	70,1	78,7	95,2	106	117	128	140	156	172	188	204
Total power input	3	kW	14,4	19,1	19,5	23,7	28,6	31,3	36,8	41,0	47,2	45,7	54,4	56,6	65,1	75,4
EER (EN14511:2022)	3	-	3,08	2,78	3,14	2,95	2,75	3,04	2,89	2,86	2,70	3,06	2,86	3,03	2,88	2,71
SEER	6	-	4,14	4,13	4,40	4,38	4,35	4,52	4,50	4,29	4,26	4,62	4,58	4,60	4,54	4,54
SEPR	6	-	5,18	5,16	5,49	5,47	5,44	5,65	5,62	5,36	5,33	5,78	5,72	5,75	5,68	5,67
Cooling capacity (AHRI 550/590)	4	kW	44,1	52,6	60,6	69,5	77,9	95	106	116	127	139	154	170	186	202
Total power input (AHRI 550/590)	4	kW	14,3	18,9	19,3	23,7	28,3	31,0	36,5	40,4	46,5	45,2	53,6	56,1	64,5	74,6
COPR	4	-	3,08	2,79	3,13	2,94	2,75	3,05	2,89	2,87	2,72	3,07	2,88	3,04	2,89	2,71
IPLV	4	-	3,93	3,91	4,17	4,14	4,09	4,25	4,27	4,04	4,04	4,35	4,33	4,35	4,27	4,27
Cooling 0% - Heating 100%																
Heating capacity	7	kW	55,4	62,4	69,1	79,2	89,5	103	117	133	148	165	181	199	218	241
Compressor power input	7	kW	16,2	19,2	18,4	22,2	26,0	28,7	33,1	39,1	45,7	47,6	54,3	56,3	64,0	74,0
Total power input	2	kW	17,5	20,5	20,4	24,2	28,0	31,3	35,7	40,6	47,2	49,6	56,3	58,8	66,5	76,5
COP	7	-	3,16	3,05	3,39	3,28	3,20	3,30	3,28	3,26	3,14	3,32	3,22	3,38	3,27	3,15
Hot side water flow-rate	7	l/s	2,64	2,98	3,30	3,78	4,28	4,93	5,60	6,33	7,09	7,86	8,67	9,49	10,4	11,5
Hot side pressure drops	7	kPa	30,7	39,1	24,1	31,6	40,3	35,3	45,5	34,4	43,2	34,4	41,9	33,2	39,8	48,7
Heating capacity	8	kW	55,5	62,6	69,2	79,4	89,7	103	117	133	149	165	182	199	218	241
Total power input	8	kW	17,7	20,8	20,5	24,4	28,4	31,7	36,3	41,1	47,9	50,2	57,0	59,5	67,3	77,5
COP (EN14511:2022)	8	-	3,13	3,01	3,37	3,25	3,16	3,26	3,24	3,23	3,11	3,28	3,19	3,35	3,24	3,11
SCOP - MEDIUM Climate - W35	5	-	4,05	4,05	4,09	4,05	4,02	4,07	4,05	3,99	3,98	4,11	4,06	4,07	4,00	4,00
SCOP - MEDIUM Climate - W55	5		2,87	2,99	2,98	3,03	3,11	3,01	3,12	3,00	3,06	3,15	3,15	3,00	3,06	3,23
Cooling 100% - Heating 100%																
Cooling capacity	9	kW	45,7	53,6	60,2	69,1	75,9	92,9	100	115	128	143	152	162	179	195
Heating capacity	9	kW	60,5	72,0	78,9	92,2	102	124	134	153	171	187	199	211	236	260
Total power input	9	kW	15,2	18,9	19,2	23,6	27,0	31,2	34,8	38,0	43,5	44,7	48,2	49,2	57,1	65,7
TER	10	-	6,96	6,66	7,24	6,84	6,61	6,95	6,72	7,06	6,89	7,39	7,28	7,60	7,25	6,92

The Product complies with the European ErP (Energy Related Products) Directive, which includes Commission Delegated Regulation (EU) No. 813/2013 (nominal heating capacity ≤400 kW under specified reference conditions) and Commission Delegated Regulation (EU) No. 2016/2281, also known as Ecodesign LOT21.
Contains fluorinated greenhouse gases (GWP 675)

1. Data referring to the following conditions: Cold side exchanger water temperature = 12/7°C. Temperature of air entering the external exchanger = 35°C. Evaporator fouling factor = 0.44 x 10^(-4) m2 K/W
2. The Total Power Input value does not take into account the part related to the pumps and required to overcome the pressure drops for the circulation of the solution inside the exchangers.
3. Data calculated in accordance with EN 14511:2022 under the following conditions: Cold side exchanger water temperature = 12/7°C. Temperature of air entering the external exchanger = 35°C
4. Data calculated in accordance with AHRI 550/590 under the following conditions: Water temperature to the cold side exchanger = 6.7°C. Water flow-rate 0.043 l/s per kW. Temperature of air entering the external exchanger = 35°C. Evaporator fouling factor = 0.18 x 10^(-4) m2 K/W
5. Data calculated in accordance with Regulation (EU) 813/2013
6. Data calculated in accordance with Regulation (EU) 2016/2281
7. Data referring to the following conditions: Hot side exchanger water temperature = 40/45°C. Temperature of air entering the external exchanger = 7°C D.B./6°C W.B. Evaporator fouling factor = 0.44 x 10^(-4) m^2 K/W
8. Data calculated in accordance with EN 14511:2022 under the following conditions: Cold side exchanger water temperature = 12/7°C. Temperature of air entering the external exchanger = 35°C
9. Data referring to the following conditions: Cold side exchanger water temperature = */7 °C. Hot side exchanger water temperature = */45 °C Exchanger fouling factor = 0.44 x 10^(-4) m^2 K/W
10. TER = (Cooling capacity + Thermal capacity) / Total power input

Construction (SC-LN-EN)

SIZE			20.2	25.2	30.2	35.2	40.2	45.2	50.2	55.4	60.4	65.4	70.4	75.4	80.4	85.4
Compressor																
Compressor type	1		Rotary Inverter							Scroll Inverter						
Refrigerant										R-32						
No. of compressors		Nr	2	2	2	2	2	2	2	4	4	4	4	4	4	4
Nominal power (C1)		HP	25	25	35	35	35	45	45	35	35	45	45	45	45	45
Nominal Power (C2)		HP	25	25	35	35	35	45	45	35	35	45	45	45	45	45
Std capacity control steps										STEPLESS						
Oil charge (C1)		l	2,3	2,3	3,1	3,1	3,1	3,8	3,8	6,2	6,2	7,6	7,6	7,6	7,6	7,6
Oil charge (C2)		l	2,3	2,3	3,1	3,1	3,1	3,8	3,8	6,2	6,2	7,6	7,6	7,6	7,6	7,6
Refrigerant charge (C1)		kg	12,0	12,0	15,0	15,0	15,0	18,0	18,0	19,0	19,0	21,0	21,0	27,0	27,0	27,0
Refrigerant charge (C2)		kg	12,0	12,0	15,0	15,0	15,0	18,0	18,0	19,0	19,0	21,0	21,0	27,0	27,0	27,0
Refrigerant circuits		Nr								2						
Cold side exchanger																
Type of internal exchanger	2									PHE						
No. of internal exchangers		Nr								1						
Water content		l	10,7	10,7	13,0	13,0	13,0	18,2	18,2	21,5	21,5	28,5	28,5	34,1	34,1	34,1
Minimum system water content		l	300	350	450	500	550	600	700	750	800	900	1000	1100	1200	1300
Hot side exchanger																
Type of internal exchanger	2									PHE						
No. of internal exchangers		Nr								1						
Water content		l	10,7	10,7	13,0	13,0	13,0	18,2	18,2	21,5	21,5	28,5	28,5	34,1	34,1	34,1
Minimum system water content		l	450	500	550	650	750	800	900	1000	1100	1250	1350	1500	1650	1800
External exchanger																
External exchanger type	3									CCHY						
Number of coils		Nr								2						
Number of coils																
Type of fans	4									AX						
Number of fans		Nr	4	4	6	6	6	8	8	6	6	8	8	10	10	10
Motor type	5									EC						
Standard airflow (SC)		l/s	36000	36000	36000	54000	54000	72000	72000	62400	62400	83200	83200	104000	104000	104000
Standard airflow (LN)		l/s	28800	28800	43200	43200	43200	57600	57600	49920	49920	66560	66560	83200	83200	83200
Standard airflow (EN)		l/s	25200	25200	37800	37800	37800	50400	50400	43680	43680	58240	58240	72800	72800	72800
Connections																
Water fittings			2"	2"	2"	2"	2"	2"1/2	2"1/2	2"1/2	2"1/2	2"1/2	2"1/2	3"	3"	3"
Power supply																
Power supply										400/3/50						
Electrical data																
F.L.A. - Total		[A]	64,9	67,8	74,9	77,9	79,0	96,6	98,9	140	147	171	176	179	184	188
F.L.I. - Total		[kW]	37,2	38,9	42,9	44,7	45,3	55,4	56,7	80,6	84,1	98,2	101	103	105	108
M.I.C. - Value	6	[A]	30,9	30,9	34,4	34,4	34,4	47,3	47,3	63,9	63,9	90,2	90,2	90,2	90,2	90,2

1. ROTARY / SCROLL = Compressor ROTARY / Compressor SCROLL
2. PHE = Plate exchanger
3. CCHY = Copper/aluminium hydrophilic condensing coil
4. AX = Axial fan
5. EC = Electronically commutated permanent magnet asynchronous motor.
6. M.I.C. = Unit maximum starting current. The M.I.C. is calculated by adding the maximum starting current of a compressor to the input currents at maximum permissible conditions (F.L.A.) of the remaining electrical components.
7. Voltage imbalance between phases: max 2%.
8. Voltage difference: max +/-10%.
9. Electrical data refer to standard units; data may vary slightly depending on the accessories installed.

Sound levels

Compressor soundproofing acoustic configuration (SC)

SIZE	Sound Power Level - Octave Bands (Hz)								Sound pressure level	Sound power level
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
20.2	93	85	83	80	79	73	66	60	65	83
25.2	93	85	83	80	79	73	66	60	65	83
30.2	95	87	85	82	81	75	68	62	67	85
35.2	95	87	85	82	81	75	68	62	67	85
40.2	95	87	85	82	81	75	68	62	67	85
45.2	97	89	87	84	83	77	70	64	68	87
50.2	97	89	87	84	83	77	70	64	68	87
55.4	98	90	88	85	84	78	71	65	69	88
60.4	98	90	88	85	84	78	71	65	69	88
65.4	99	91	89	86	85	79	72	66	70	89
70.4	99	91	89	86	85	79	72	66	70	89
75.4	101	93	91	88	87	81	74	68	72	91
80.4	101	93	91	88	87	81	74	68	72	91
85.4	101	93	91	88	87	81	74	68	72	91

Low noise acoustic configuration (LN)

SIZE	Sound Power Level - Octave Bands (Hz)								Sound pressure level	Sound power level
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
20.2	89	81	79	76	75	69	62	56	61	79
25.2	89	81	79	76	75	69	62	56	61	79
30.2	91	83	81	78	77	71	64	58	63	81
35.2	91	83	81	78	77	71	64	58	63	81
40.2	91	83	81	78	77	71	64	58	63	81
45.2	93	85	83	80	79	73	66	60	64	83
50.2	93	85	83	80	79	73	66	60	64	83
55.4	94	86	84	81	80	74	67	61	65	84
60.4	94	86	84	81	80	74	67	61	65	84
65.4	95	87	85	82	81	75	68	62	66	85
70.4	95	87	85	82	81	75	68	62	66	85
75.4	97	89	87	84	83	77	70	64	68	87
80.4	97	89	87	84	83	77	70	64	68	87
85.4	97	89	87	84	83	77	70	64	68	87

Super-silenced acoustic configuration (EN)

SIZE	Sound Power Level - Octave Bands (Hz)								Sound pressure level	Sound power level
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
20.2	85	77	75	72	71	65	58	52	57	75
25.2	85	77	75	72	71	65	58	52	57	75
30.2	87	79	77	74	73	67	60	54	59	77
35.2	87	79	77	74	73	67	60	54	59	77
40.2	87	79	77	74	73	67	60	54	59	77
45.2	89	81	79	76	75	69	62	56	60	79
50.2	89	81	79	76	75	69	62	56	60	79
55.4	90	82	80	77	76	70	63	57	61	80
60.4	90	82	80	77	76	70	63	57	61	80
65.4	91	83	81	78	77	71	64	58	62	81
70.4	91	83	81	78	77	71	64	58	62	81
75.4	93	85	83	80	79	73	66	60	64	83
80.4	93	85	83	80	79	73	66	60	64	83
85.4	93	85	83	80	79	73	66	60	64	83

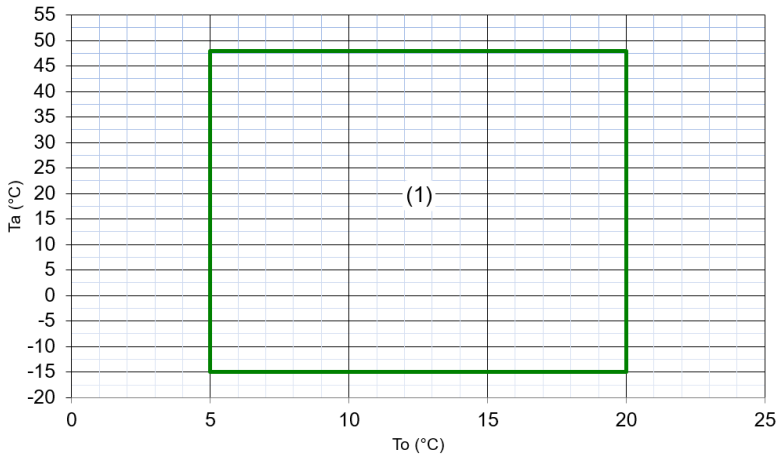
The sound levels refer to a unit at full load, under nominal test conditions. The sound pressure level refers to 1 m from a standard unit's outer surface operating in open field. Data referred to the following conditions:

COOLING
Internal exchanger water temperature = 12/7°C
Entering external exchanger air temperature = 35°C

HEATING
Internal exchanger water temperature = 40/45 °C
Entering eExternal exchanger air temperature = 7°C.

Fields of application

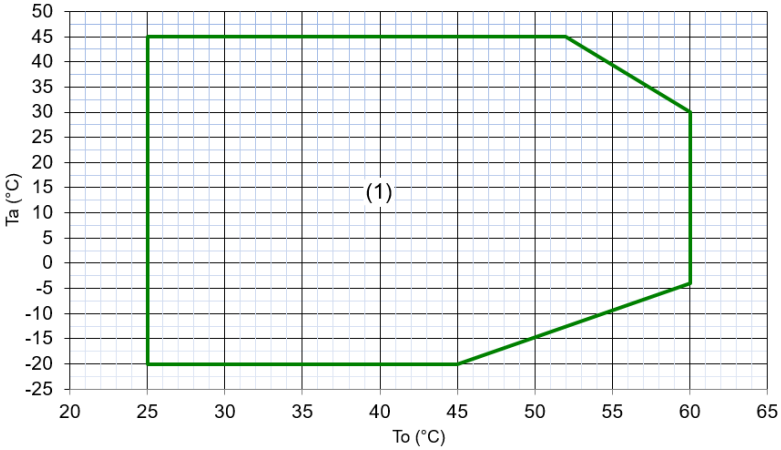
Cooling



Ta (°C) = Temperature of air entering the external exchanger (D.B.)
To (°C) = Outlet water temperature from cold side exchanger

1. Normal operating range

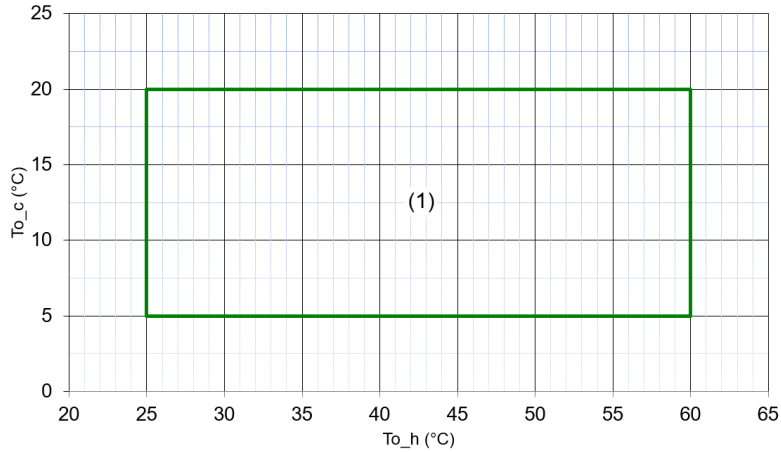
Heating



Ta (°C) = Temperature of air entering the external exchanger (D.B.)
To (°C) = Outlet water temperature from cold side exchanger

1. Normal operating range

Cooling 100% - Heating 100%

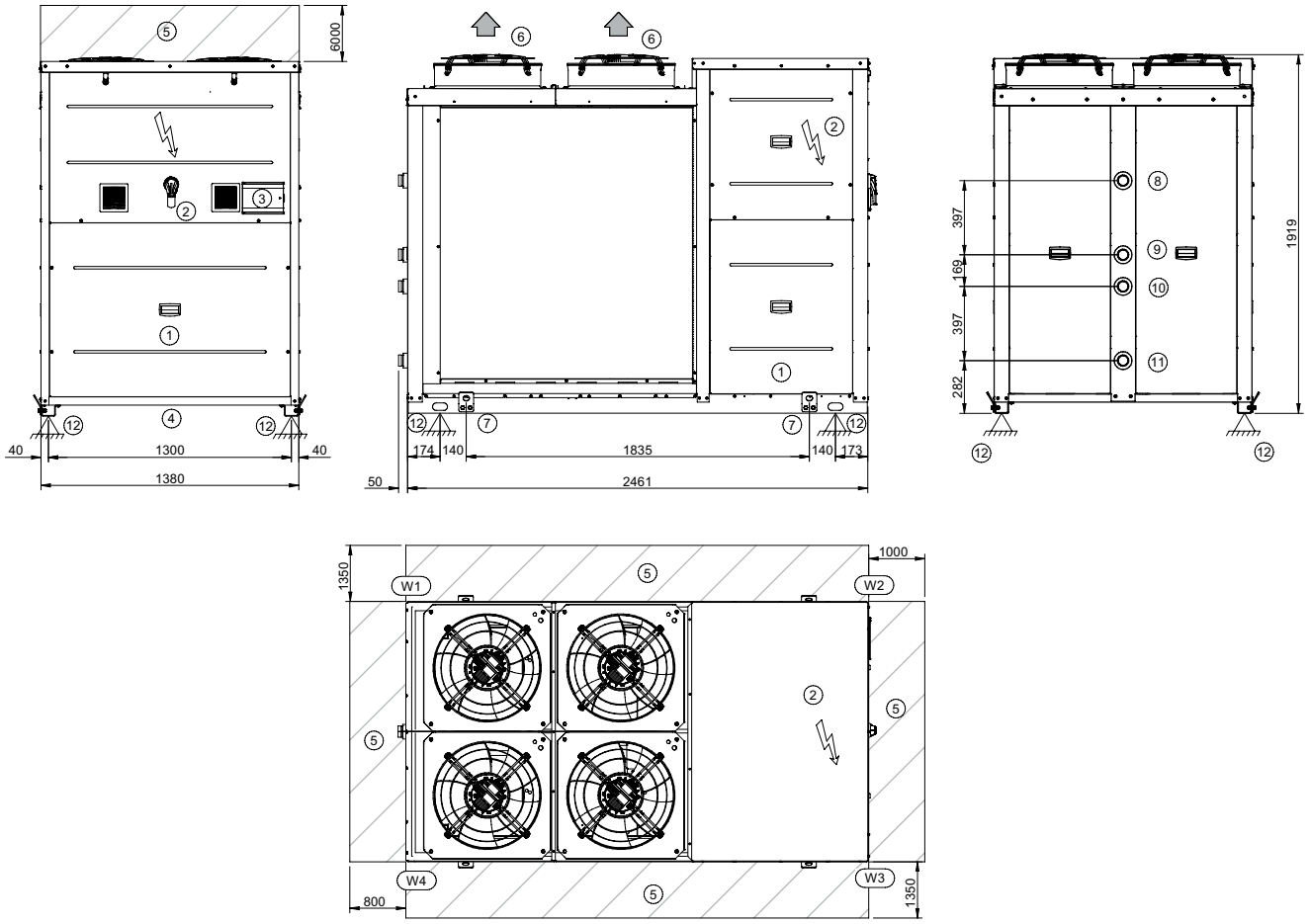


To_h = Entering eExternal exchanger air temperature (D.B.)
To_c = Outlet water temperature from cold side exchanger

1. Normal operating range

15.1 Dimensional drawings

Size 20.2 - 25.2

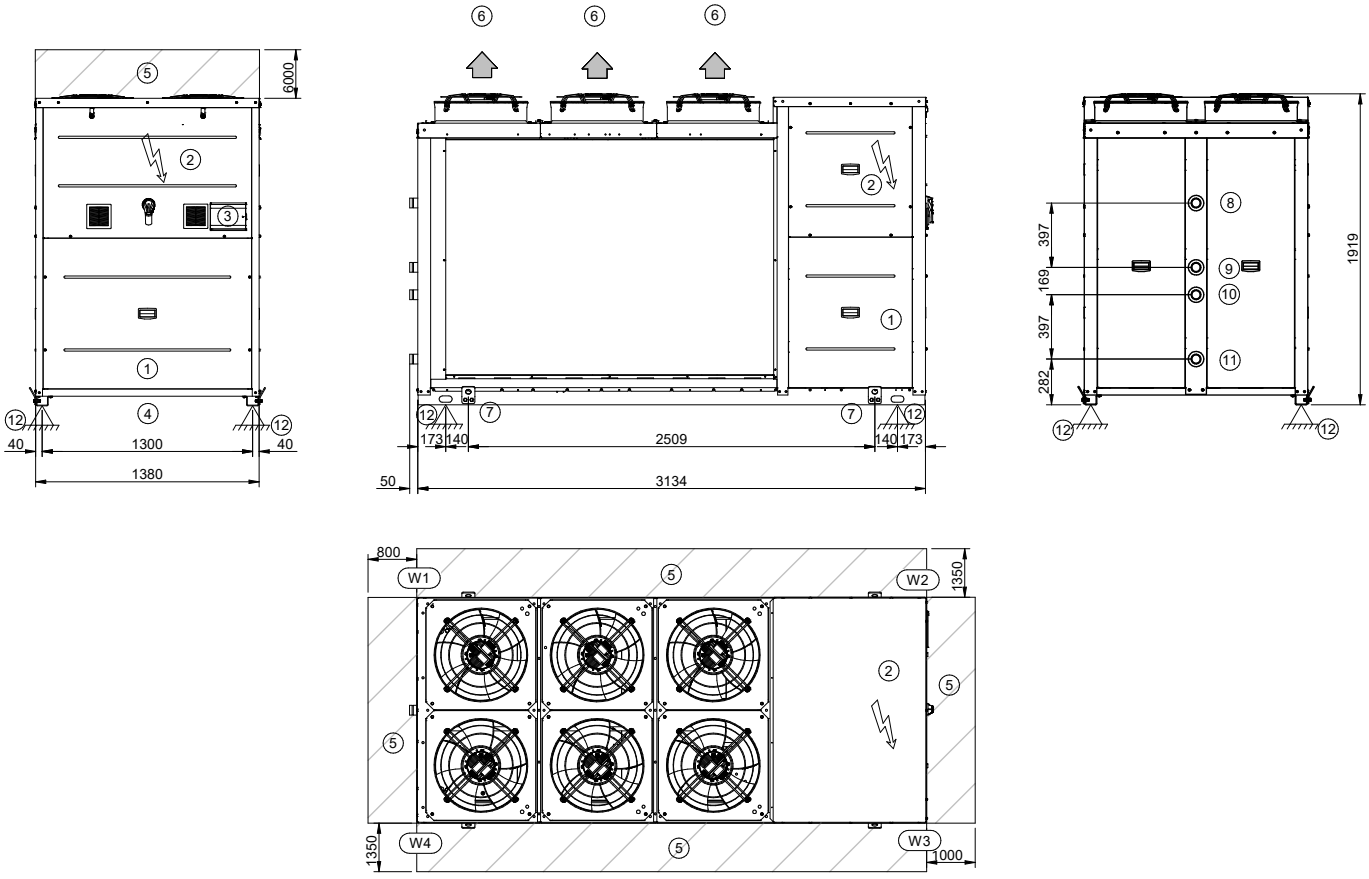


1. Compressor compartment
2. Electrical panel
3. Control keypad
4. Power input
5. Functional spaces
6. Fan (supply-air inlet)
7. Lifting brackets (removable)
8. Victaulic 2" hot water out connections
9. Victaulic 2" hot water in connections
10. Victaulic 2" cold water in connections
11. Victaulic 2" cold water out connections
12. Supporting points

SIZE			20.2	25.2
Supporting points	W1	Kg	173	173
Supporting points	W2	Kg	315	315
Supporting points	W3	Kg	315	315
Supporting points	W4	Kg	173	173
Length		mm	2461	2461
Depth		mm	1380	1380
Height		mm	1919	1919
Operation weight		Kg	975	975
Operating weight		Kg	997	997

The presence of optional accessories may result in a substantial variation of the weights shown in the table.

Size 30.2 - 40.2

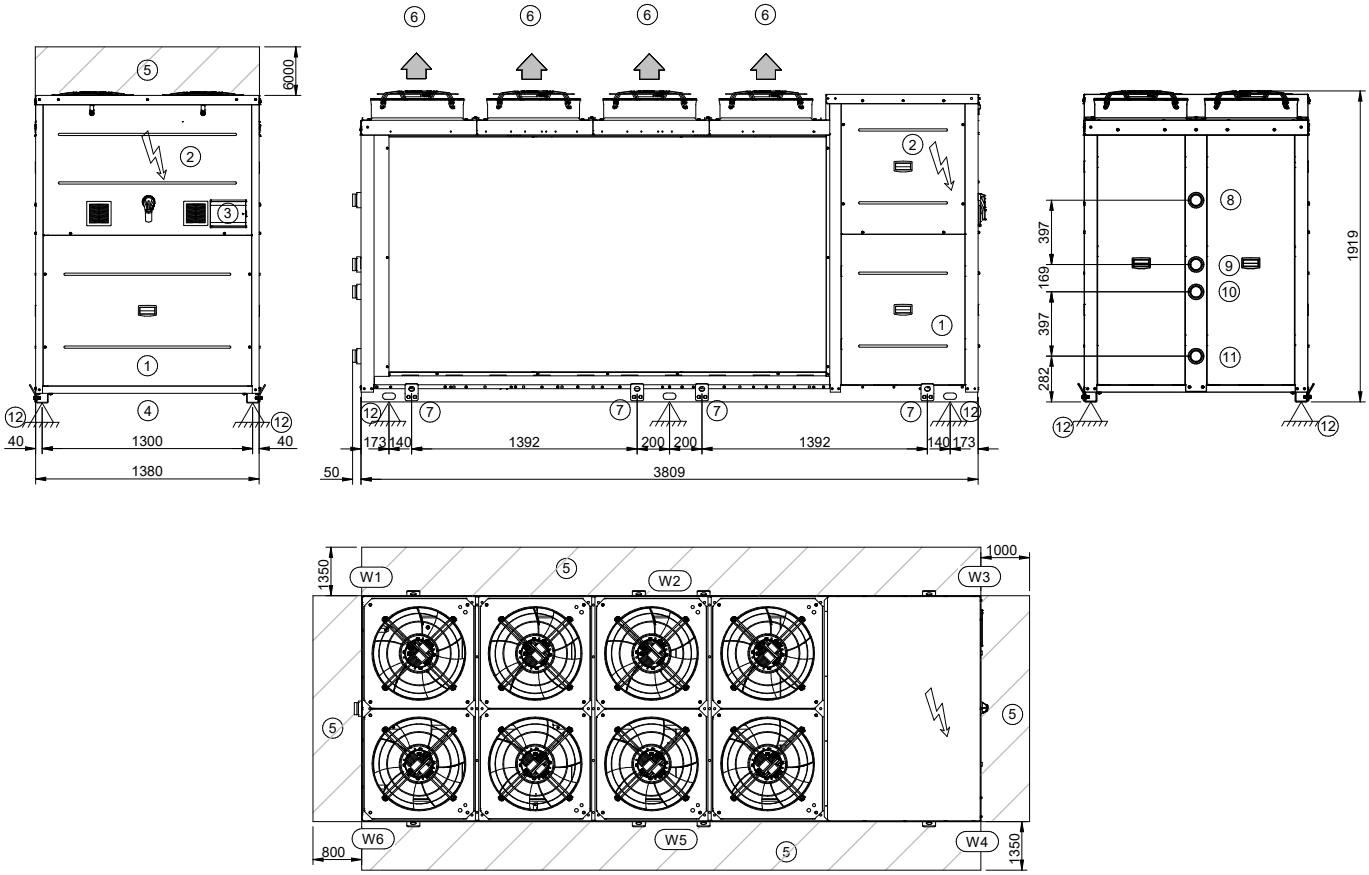


1. Compressor compartment
2. Electrical panel
3. Control keypad
4. Power input
5. Functional spaces
6. Fan (supply-air inlet)
7. Lifting brackets (removable)
8. Victaulic 2” hot water out connections
9. Victaulic 2” hot water in connections
10. Victaulic 2” cold water in connections
11. Victaulic 2” cold water out connections
12. Supporting points

SIZE			30.2	35.2	40.2
Supporting points	W1	Kg	233	233	233
Supporting points	W2	Kg	415	415	415
Supporting points	W3	Kg	415	415	415
Supporting points	W4	Kg	415	415	415
Length		mm	3134	3134	3134
Depth		mm	1380	1380	1380
Height		mm	1919	1919	1919
Operation weight		Kg	1297	1297	1297
Operating weight		Kg	1329	1329	1329

The presence of optional accessories may result in a substantial variation of the weights shown in the table.

Size 45.2 - 50.2

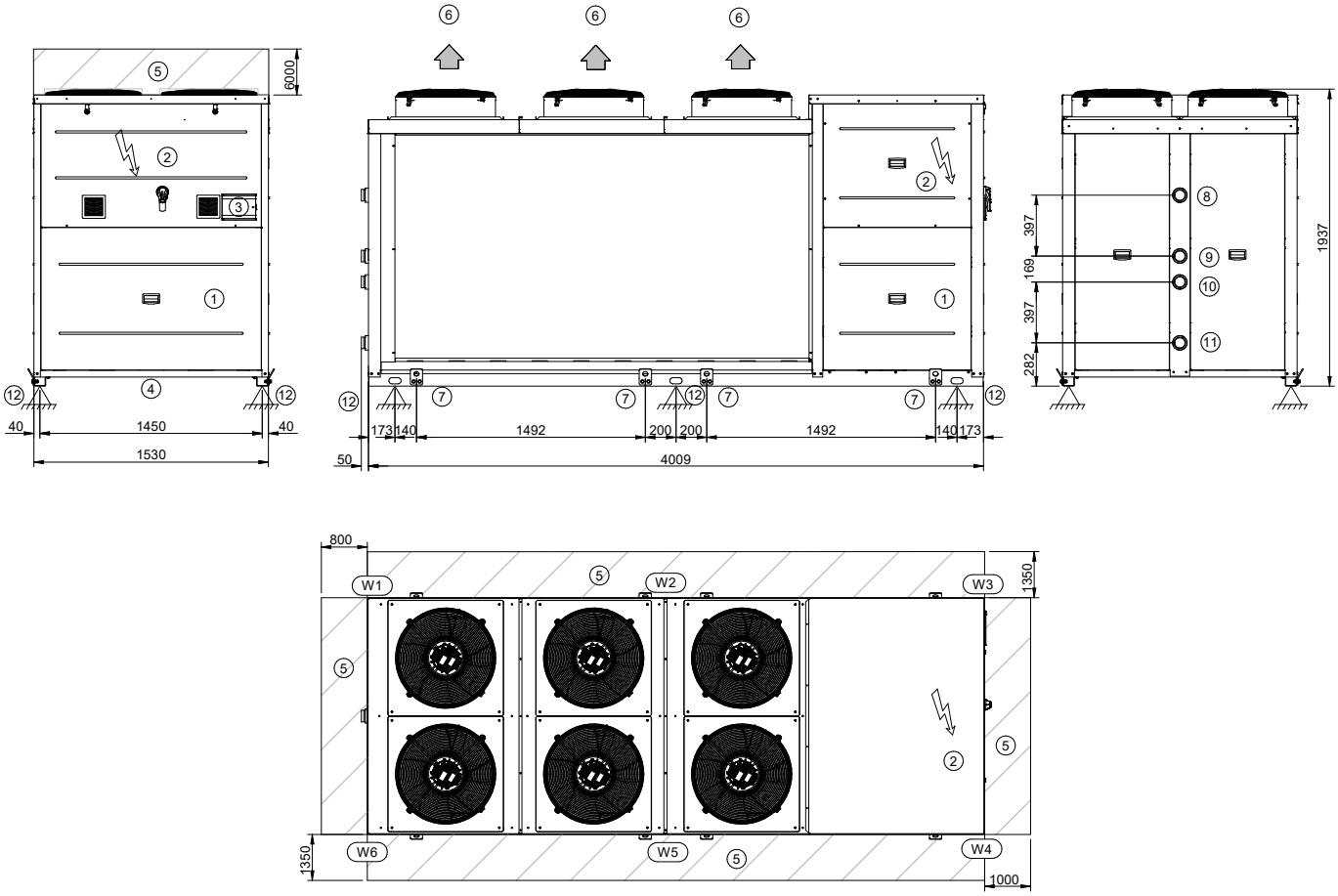


1. Compressor compartment
2. Electrical panel
3. Control keypad
4. Power input
5. Functional spaces
6. Fan (supply-air inlet)
7. Lifting brackets (removable)
8. Victaulic 2”1/2 hot water out connections
9. Victaulic 2”1/2 hot water in connections
10. Victaulic 2”1/2 cold water in connections
11. Victaulic 2”1/2 cold water out connections
12. Supporting points

SIZE			45.2	50.2
Supporting points	W1	Kg	58	58
Supporting points	W2	Kg	472	472
Supporting points	W3	Kg	220	220
Supporting points	W4	Kg	220	220
Supporting points	W5	Kg	472	472
Supporting points	W6	Kg	58	58
Length		mm	3809	3809
Depth		mm	1380	1380
Height		mm	1919	1919
Operation weight		Kg	1499	1499
Operating weight		Kg	1526	1526

The presence of optional accessories may result in a substantial variation of the weights shown in the table.

Size 55.4 - 60.4

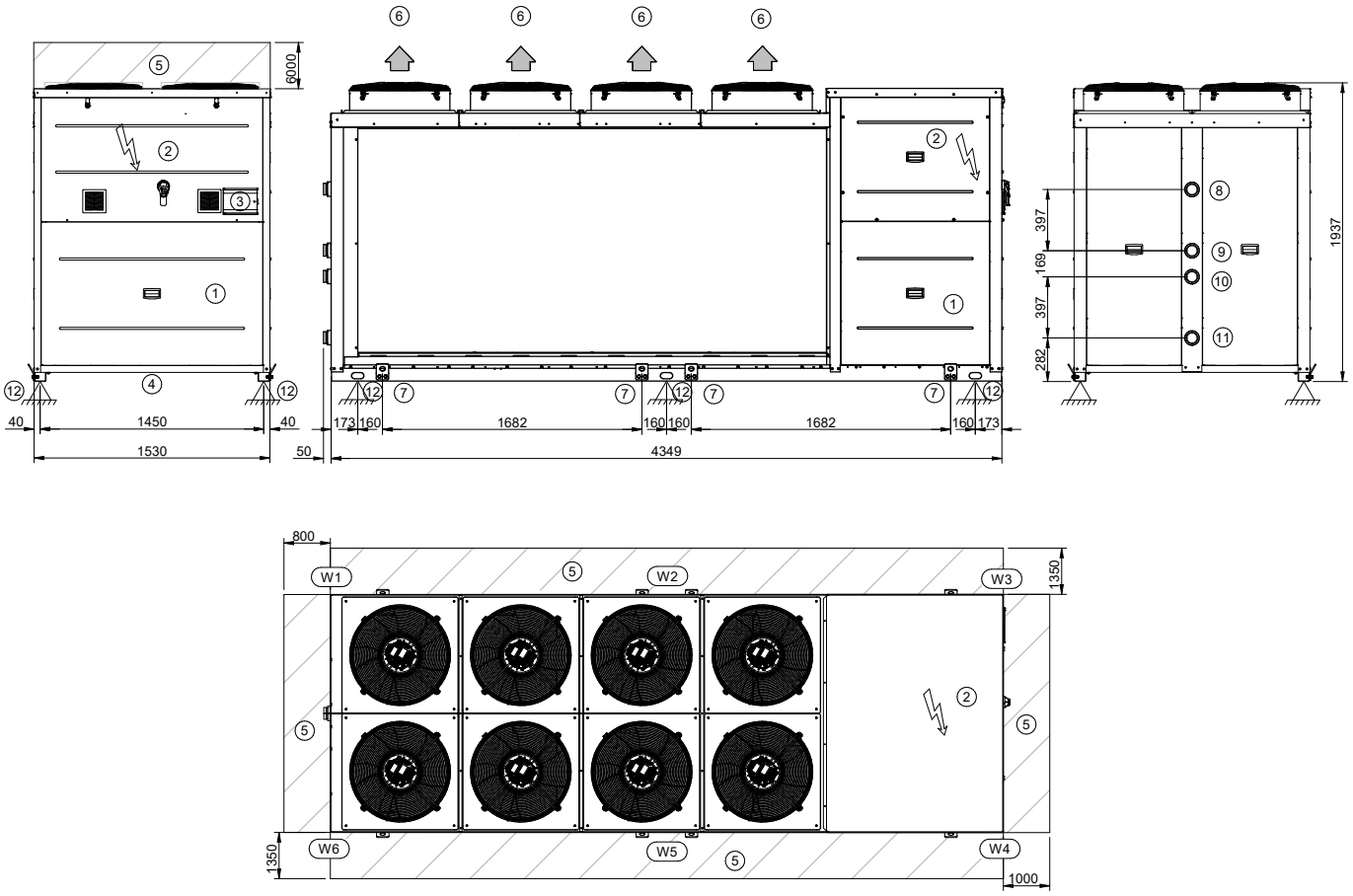


1. Compressor compartment
2. Electrical panel
3. Control keypad
4. Power input
5. Functional spaces
6. Fan (supply-air inlet)
7. Lifting brackets (removable)
8. Victaulic 2”1/2 hot water out connections
9. Victaulic 2”1/2 hot water in connections
10. Victaulic 2”1/2 cold water in connections
11. Victaulic 2”1/2 cold water out connections
12. Supporting points

SIZE			55.4	60.4
Supporting points	W1	Kg	48	48
Supporting points	W2	Kg	494	494
Supporting points	W3	Kg	255	255
Supporting points	W4	Kg	255	255
Supporting points	W5	Kg	494	494
Supporting points	W6	Kg	48	48
Length		mm	4009	4009
Depth		mm	1530	1530
Height		mm	1937	1937
Operation weight		Kg	1594	1594
Operating weight		Kg	1615	1615

The presence of optional accessories may result in a substantial variation of the weights shown in the table.

Size 65.4 - 70.4

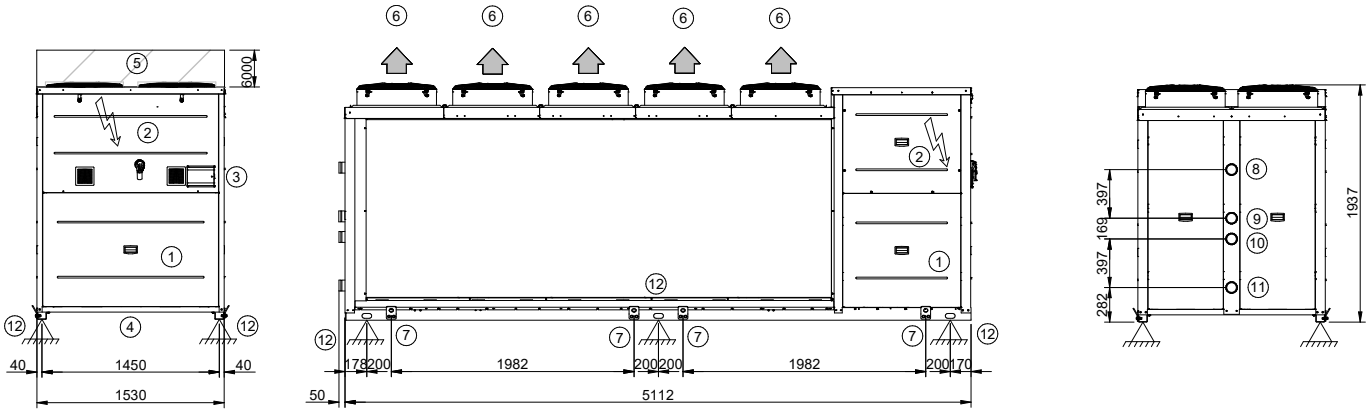


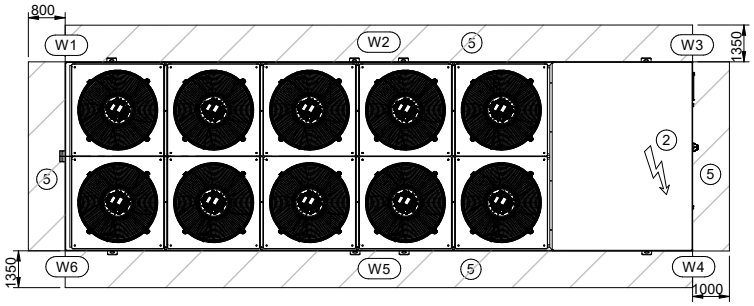
1. Compressor compartment
2. Electrical panel
3. Control keypad
4. Power input
5. Functional spaces
6. Fan (supply-air inlet)
7. Lifting brackets (removable)
8. Victaulic 2”1/2 hot water out connections
9. Victaulic 2”1/2 hot water in connections
10. Victaulic 2”1/2 cold water in connections
11. Victaulic 2”1/2 cold water out connections
12. Supporting points

SIZE			65.4	70.4
Supporting points	W1	Kg	61	61
Supporting points	W2	Kg	626	626
Supporting points	W3	Kg	323	323
Supporting points	W4	Kg	323	323
Supporting points	W5	Kg	626	626
Supporting points	W6	Kg	61	61
Length		mm	4349	4349
Depth		mm	1530	1530
Height		mm	1937	1937
Operation weight		Kg	2020	2020
Operating weight		Kg	2035	2035

The presence of optional accessories may result in a substantial variation of the weights shown in the table.

Size 75.4 - 85.4





1. Compressor compartment
2. Electrical panel
3. Control keypad
4. Power input
5. Functional spaces
6. Fan (supply-air inlet)
7. Lifting brackets (removable)
8. Victaulic 2”1/2 hot water out connections
9. Victaulic 2”1/2 hot water in connections
10. Victaulic 2”1/2 cold water in connections
11. Victaulic 2”1/2 cold water out connections
12. Supporting points

SIZE			75.4	80.4	85.4
Supporting points	W1	Kg	73	73	73
Supporting points	W2	Kg	677	677	677
Supporting points	W3	Kg	337	337	337
Supporting points	W4	Kg	337	337	337
Supporting points	W5	Kg	677	677	677
Supporting points	W6	Kg	73	73	73
Length		mm	5112	5112	5112
Depth		mm	1530	1530	1530
Height		mm	1937	1937	1937
Operation weight		Kg	2174	2174	2174
Operating weight		Kg	2180	2180	2180

The presence of optional accessories may result in a substantial variation of the weights shown in the table.

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