

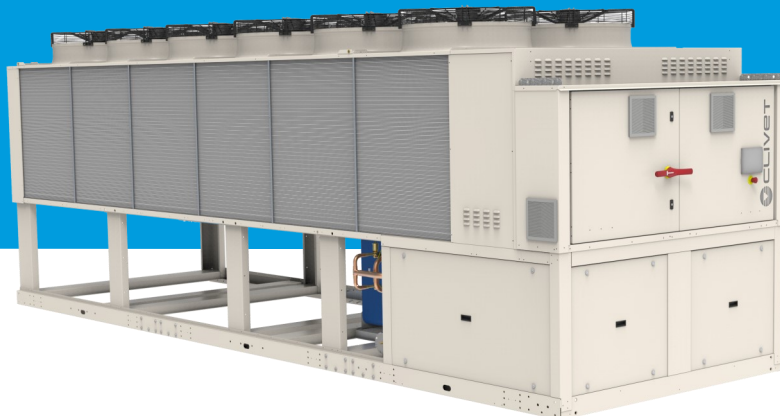


# WSAN-YSC4

80.3 - 240.6

## MANUAL

FOR INSTALLATION,  
USE AND MAINTENANCE



MON400002-01 07-2024

R32

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Dear Customer,

We congratulate you on choosing these product

Clivet has been working for years to offer systems able to assure the maximum comfort for a long time with highly-reliable, efficient, high-quality and safe solutions. The target of the company is to offer advanced systems, that assure the best comfort and reduce energy consumption as well as the installation and maintenance costs for the entire life-cycle of the system.

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

Best regards and have a good read.

CLIVET Spa

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## 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.

## 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.

## Risk situations

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

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

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

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

## Intended use

Use the unit only:

- 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.

## 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.

## Maintenance

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

Turn the unit off before any operation.



## Pay particular attention to:

⇒ warnings / prohibitions / danger indicating particularly important operations or information, operations that cannot be done, which compromise the functionality of the unit or which may cause damage to things or persons.

## Before any work read:

⇒ *Chapter. MAINTENANCE SAFETY WARNINGS FOR OPERATIONS ON UNITS CONTAINING R32*



## Outdoor installation

### Modification

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

### Breakdown/Malfunction

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
- it may increase time and repair costs

### 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.

### Data update

Continual product improvements may imply manual data changes.

Visit manufacturer web site for updated data.

### 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.

### In case of breakdown or malfunction

- Immediately deactivate the unit
- Contact a service centre authorized by the manufacturer

### 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

## Unit identification

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

It contains fluorinated greenhouse gases.

## Serial number

It identifies uniquely each unit.

Must be quoted when ordering spare parts.

## 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.

Series
Size
Serial number
Year of manufacture
Number of electrical wiring diagram

Physical characteristics of the R32 refrigerant		
Safety class (ISO 817)	A2L	
GWP	675	
LFL Low flammability limit	0.307	kg/m <sup>3</sup> @T>30°C
BV Burning velocity	6,7	cm/s
Boiling point	-52	°C
GWP	675	100 yr ITH
GWP	677	AR5 - 100 yr ITH
Self-ignition temperature	648	°C

## 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.

### NOTE

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

## Storage

Respect the indications on the outside of the pack.

In particular:

- ⇒ minimum ambient temperature  $-15^{\circ}\text{C}$   
(possible components damages)
- ⇒ maximum ambient temperature  $+49,5^{\circ}\text{C}$   
(possible safety valve opening)
- ⇒ maximum relative humidity 95%  
(possible damages to electrical components)

### NOTE

⇒ The unit may not be tilted more than  $15^{\circ}$  during transport.

### NOTE

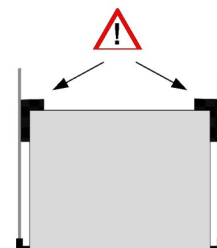
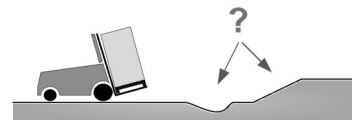
## Removal of packaging

Be careful not to damage the unit.

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

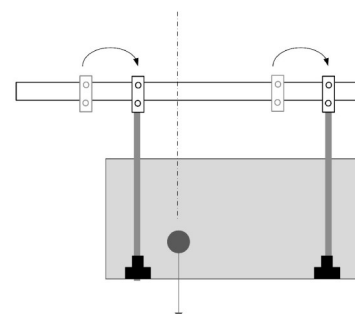
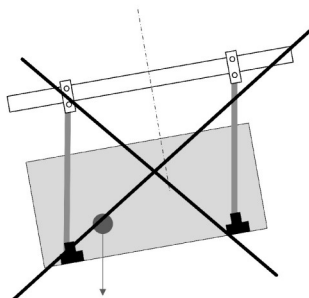
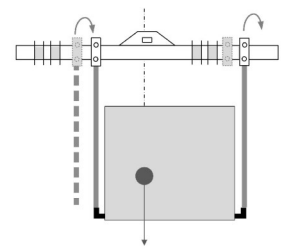
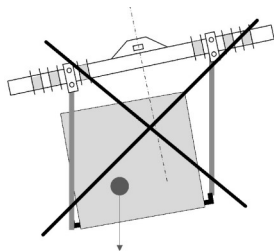
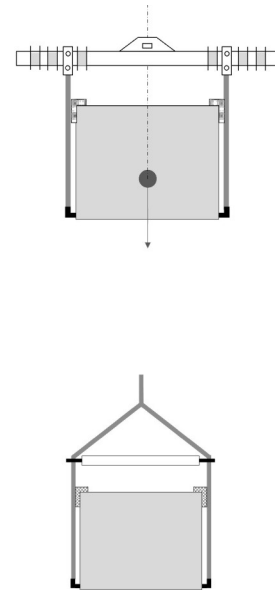
## Before any work read:

⇒ Chapter. MAINTENANCE SAFETY WARNINGS FOR OPERATIONS ON UNITS CONTAINING R32



## Handling

- ⇒ Check that all handling equipment complies with local safety regulations (cran, forklifts, ropes, hooks, etc.).
- ⇒ Provide personnel with personal protective equipment suitable for the situation, such as helmet, gloves, accident-prevention 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.
- Identify critical points during handling (disconnected routes, flights, steps, doors).
- Suitably protect the unit to prevent damage.
- Lifting with balance
- Lifting with spacer bar
- 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.





## Positioning

⇒ *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

## Functional spaces

Functional spaces are designed to:

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

⇒ *Respect all functional spaces indicated in the TECHNICAL INFORMATION section.*

## Positioning

Units are designed to be installed:

- EXTERNAL
- in fixed positions

⇒ *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.).*

Installation standards:

- 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
- avoid installations in places subject to flooding

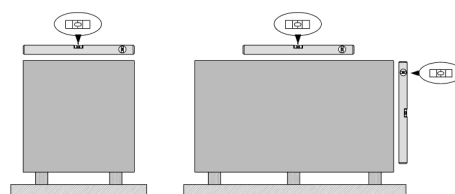
Limit vibration transmission:

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

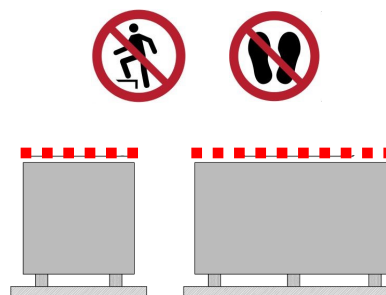
Protect the unit with suitable fence in order to avoid access to unauthorised personnel (children, vandals, etc.)

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

**The unit must be level.**



**Do not go up to the surface**



Avoid therefore:

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

Ignoring the previous indications could:

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

### Pressure relief valve gas side

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

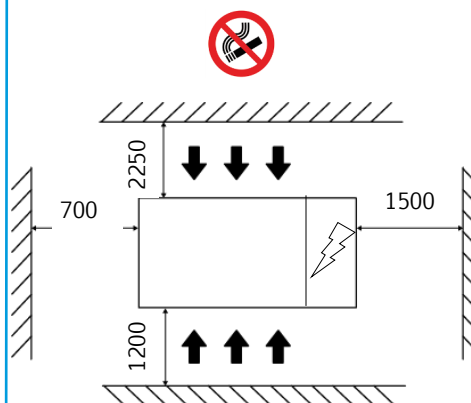
If ducted, the valves must be sized according to EN13136

### Condensate

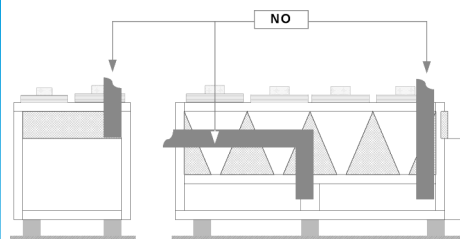
When a heat pump is in operation it produces a considerable amount of water due to the defrosting cycles of the external coil. The condensate must be disposed of in order to avoid damaging people and things..

## Functional spaces Safety Zone

**Do not smoke or use open flames  
within this area**



**The air flow must not be obstructed**



### Hydraulic system

The pipes must be designed and manufactured to limit pressure drops as much as possible, i.e. optimise performance of the system. Keep the following to a minimum:

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

If the unit is to replace an existing unit, clean the system thoroughly: see Sequence of operations on the following pages

### Water quality

The water quality can be checked by qualified personnel.

Water with inadequate characteristics can cause:

- pressure drop increase
- energy efficiency decrease
- corrosive symptom increase

Water features:

- within the limits indicated by table

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

### 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.

### 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.

### Existing systems

If a new unit is installed on an existing system, the system must be rinsed to avoid the presence of particles, sludge and waste. The system must be drained before installing the new unit. Dirt can be removed only with a suitable water flow. Each section must then be washed separately. Particular attention must also be paid to “blind spots” where a lot of dirt can accumulate due to the reduced water flow. The system must then be filled with clean high-quality tap water. If, after rinsing, the quality of the water is still unsuitable, a few measures must be taken to avoid problems. An option to remove pollutants is to install a filter.

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	7,5 ÷ 9,0	
SO <sub>4</sub> <sup>2-</sup>	< 100	
HCO <sub>3</sub> <sup>-</sup> / SO <sub>4</sub> <sup>2-</sup>	> 1	
Total Hardness	8 ÷ 15	°f
Cl <sup>-</sup>	< 50	ppm
PO <sub>4</sub> <sup>3-</sup>	< 2,0	ppm
NH <sub>3</sub>	< 0,5	ppm
Free Chlorine	< 0,5	ppm
Fe <sub>3</sub> <sup>+</sup>	< 0,5	ppm
Mn <sup>2+</sup>	< 0,05	ppm
CO <sub>2</sub>	< 50	ppm
H <sub>2</sub> S	< 50	ppb
Temperature	< 65	°C
Oxygen content	< 0,1	ppm
Sand	10 mg/L 0.1 to 0.7mm max diameter	
Ferrite hydroxide Fe <sub>3</sub> O <sub>4</sub> (black)	Dose < 7.5 mg/L 50% of mass with diameter < 10 µm	
Iron oxide Fe <sub>2</sub> O <sub>3</sub> (red)	Dose < 7.5mg/L Diameter < 1 µm	

### Risk of freeze

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

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

### Anti-freeze solutions

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

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

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

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

% ETHYLENE / PROPYLENE GLYCOL 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

### Water filter

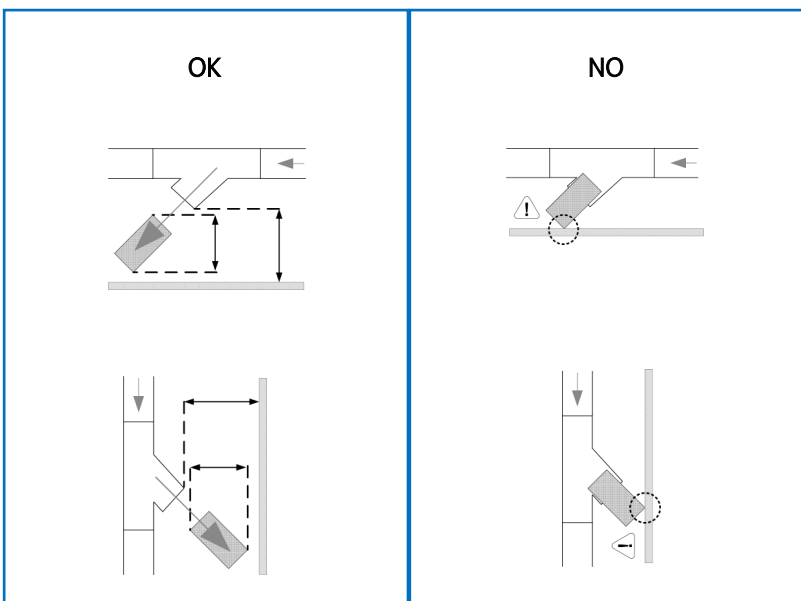
⇒ Must be installed immediately in the water input of the unit, in a position that is easily accessible for cleaning.

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

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

**1,6 mm - plate exchanger**

**0,87 mm - shell and tube evaporator**



### Water flow-rate

The design water flow-rate must be:

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

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

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

### Minimum system water content

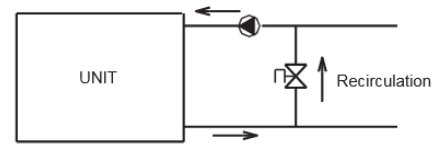
Minimum system water volumes are described within chapter TECHNICAL DATA and they have to be satisfied for a proper functioning of the unit.

### Flow Switch

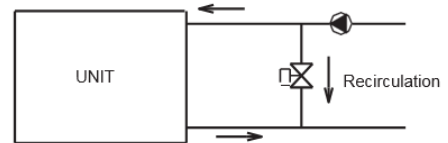
The flow switch must be present to ensure shutdown of the unit if water is not circulating.

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

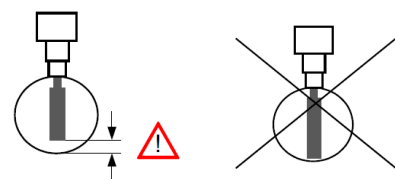
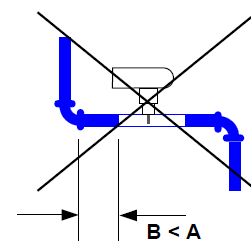
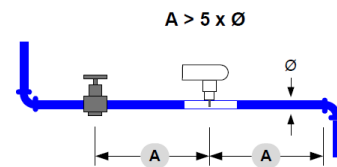
### Minimum water flow



### Maximum water flow



### Flow Switch



## Non-return valve

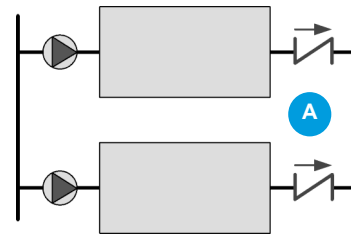
Provide for the installation of non-return valves (A) in the case of several units connected in parallel.

## Operations sequence

Before starting the unit pump:

- 1 Close all vents in the high points of the unit's water circuit.
  - 2 Close all drain shut-off valves in the low points of the unit's water circuit
    - Exchangers
    - Pumps
    - collectors
    - storage tanks
  3. Thoroughly wash the system with clean water: use the bypass to exclude the exchanger from the flow (diagram on previous page) fill and drain the system several times.
  4. Apply additives to prevent corrosion, fouling, formation of mud and algae.
  5. Fill the system  
do not use the unit pump
  6. Conduct a leak test.
  7. Isolate the pipes to avoid heat dispersions and formation of condensate.
  8. Leave various service points free (wells, vents, etc).
- ⇒ *Neglecting to wash will lead to the filter having to be cleaned many times and at worst may damage the exchangers and compressors.*

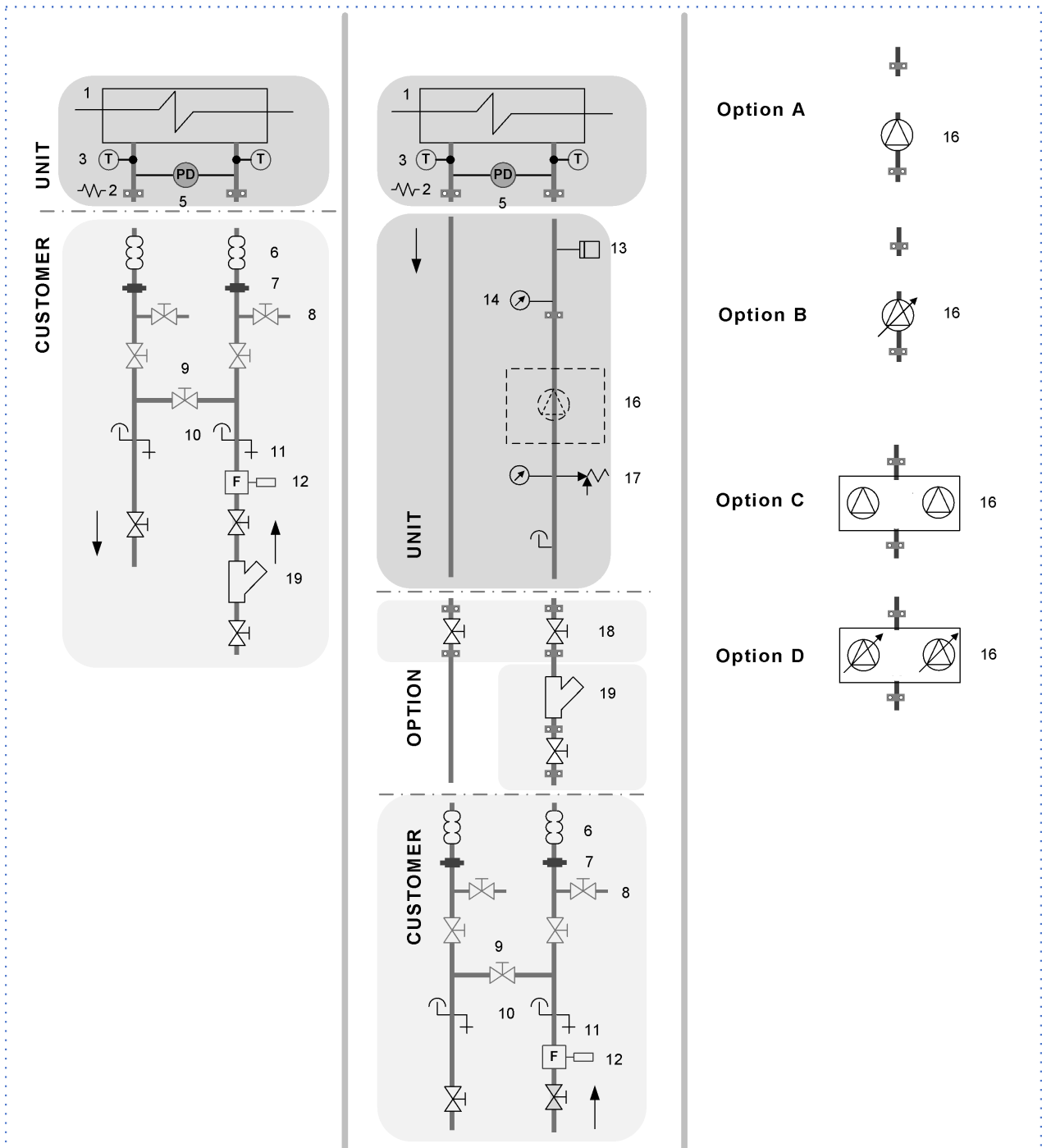
## Non-return valve



Standard unit

Unit + pump

Unit + inverter pump



- 1 exchanger
- 2 antifreeze heater
- 3 water temperature probes
- 4 -
- 5 differential pressur switch
- 6 flexible couplings
- 7 piping supports

- 8 exchanger chemical cleaning bypass
- 9 system cleaning bypass (interlock closed during operation)
- 10 vent
- 11 drain
- 12 water flow switch
- 13 system loading safety pressure switch

- 14 pressure gauge
- 15 -
- 16 pump
- 17 safety valve
- 18 shut-off valves
- 19 filter

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

The protection devices of the unit power line must be able to stop the presumed short circuit current, whose value must be determined in function of system features.

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

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

Operate in compliance with safety regulations in force.

### 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.

Refer to the electrical data report on the serial number label:

- Tensione
- F.L.A.: full load ampere, absorbed current at maximum admitted conditions
- F.L.I.: full load input, full load power input at max. admissible condition
- Electrical wiring diagram Nr

### Connections

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

verify that the network has characteristics conforming to the data shown on the serial number label.

Before starting work, verify that the sectioning device at the start of the unit power line is open, blocked and equipped with cartel warning.

Primarily you have to realize the earthing connection.

Shelter the cables using adequate measure fairleads.

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

### Power supply network requirements

- 1 The short circuit capacity of the line must be less than 15 kA
- 2 The units can only be connected to TN, TT distribution systems
- 3 Voltage 400-3-50 +/-10%
- 4 Phase unbalance < 2%
- 5 Harmonic distortion less than 12% (THDv<12%)
- 6 Voltage interruptions lasting no longer than 3ms and with at least 1 s between each one
- 7 Voltage dips not exceeding 20% of the RMS value, lasting no longer than a single period (50Hz) and with at least 1 s between each dip.
- 8 Earth cable as specified in the table:

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



### Signals / data lines

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

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

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

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

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

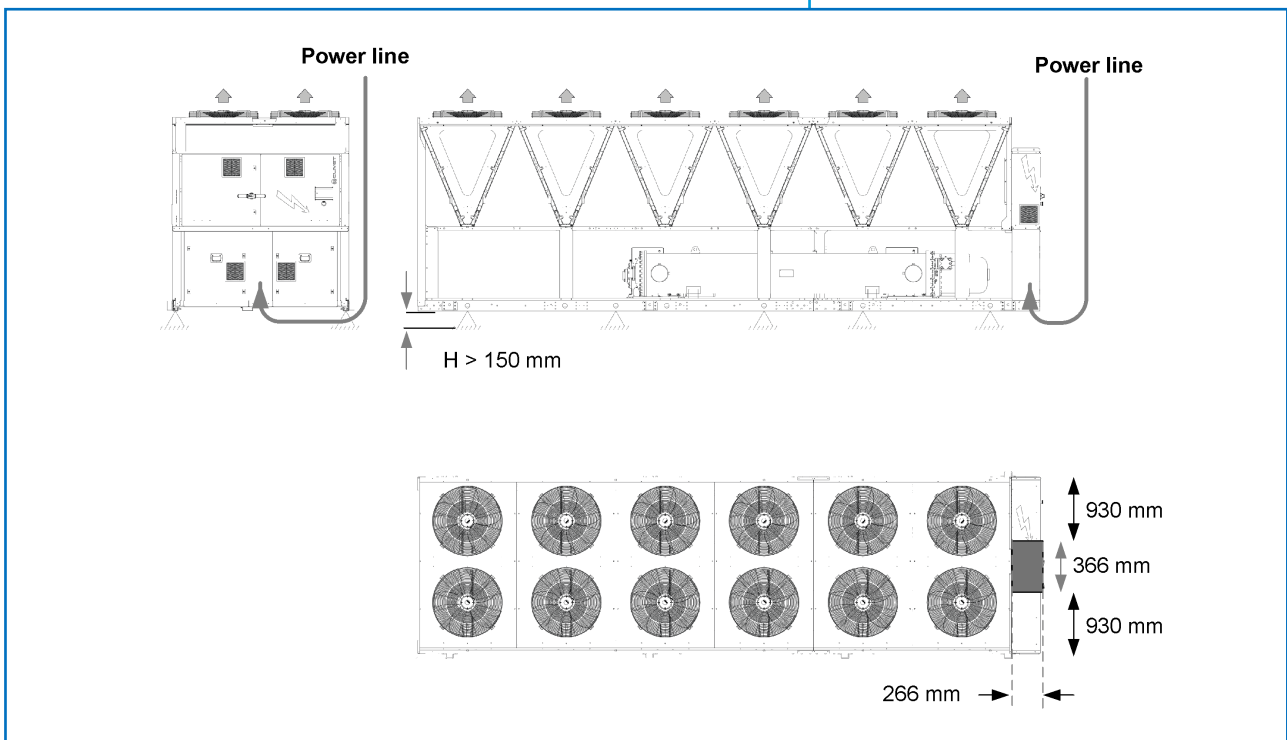
Guarantee the continuity of the screen during the entire extension of the cable.

Respect impedance, capacity and attenuation indications.

### Power input

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

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



### Remote ON-OFF

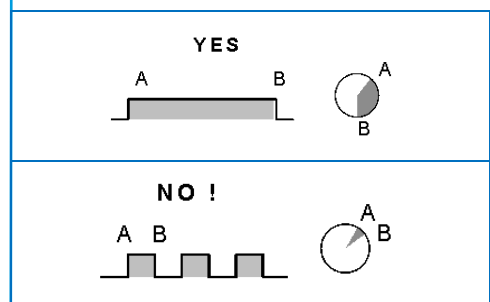
Do not perform short On Off cycles

Do not use the remote On Off with thermoregulation function.

### Electrical cabinet

Do not drill the electrical panel.

Alternatively, restore the IP degree of protection with watertight systems.





## Power supply cables section

## Premium version

	<b>90.3</b>	<b>100.3</b>	<b>110.4</b>	<b>120.4</b>	<b>130.4</b>	<b>145.4</b>
Min. cable section Cu (mm <sup>2</sup> )	1 x 95	1 x 95	1 x 95	1 x 95	1 x 150	1 x 150
Max. cable section Cu (mm <sup>2</sup> )	1 x 150	1 x 185	1 x 185	1 x 185	1 x 240	1 x 240
Min. bar Cu section (mm <sup>2</sup> )	nd	nd	nd	nd	nd	nd
Max. bar Cu width (mm)	32	32	32	32	32	32
Tightening torque (Nm)	20	20	20	20	20	20
	<b>160.4</b>	<b>185.5</b>	<b>210.6</b>	<b>225.6</b>	<b>240.6</b>	
Min. cable section Cu (mm <sup>2</sup> )	1 x 240	1 x 240	2 x 150	2 x 150	2 x 150	
Max. cable section Cu (mm <sup>2</sup> )	1 x 240	1 x 240	2 x 300	2 x 300	2 x 300	
Min. bar Cu section (mm <sup>2</sup> )	nd	nd	2 x 30 x5	2 x 30 x5	2 x 30 x5	
Max. bar Cu width (mm)	40	40	50	50	50	
Tightening torque (Nm)	20	20	20	20	20	

## Excellence version

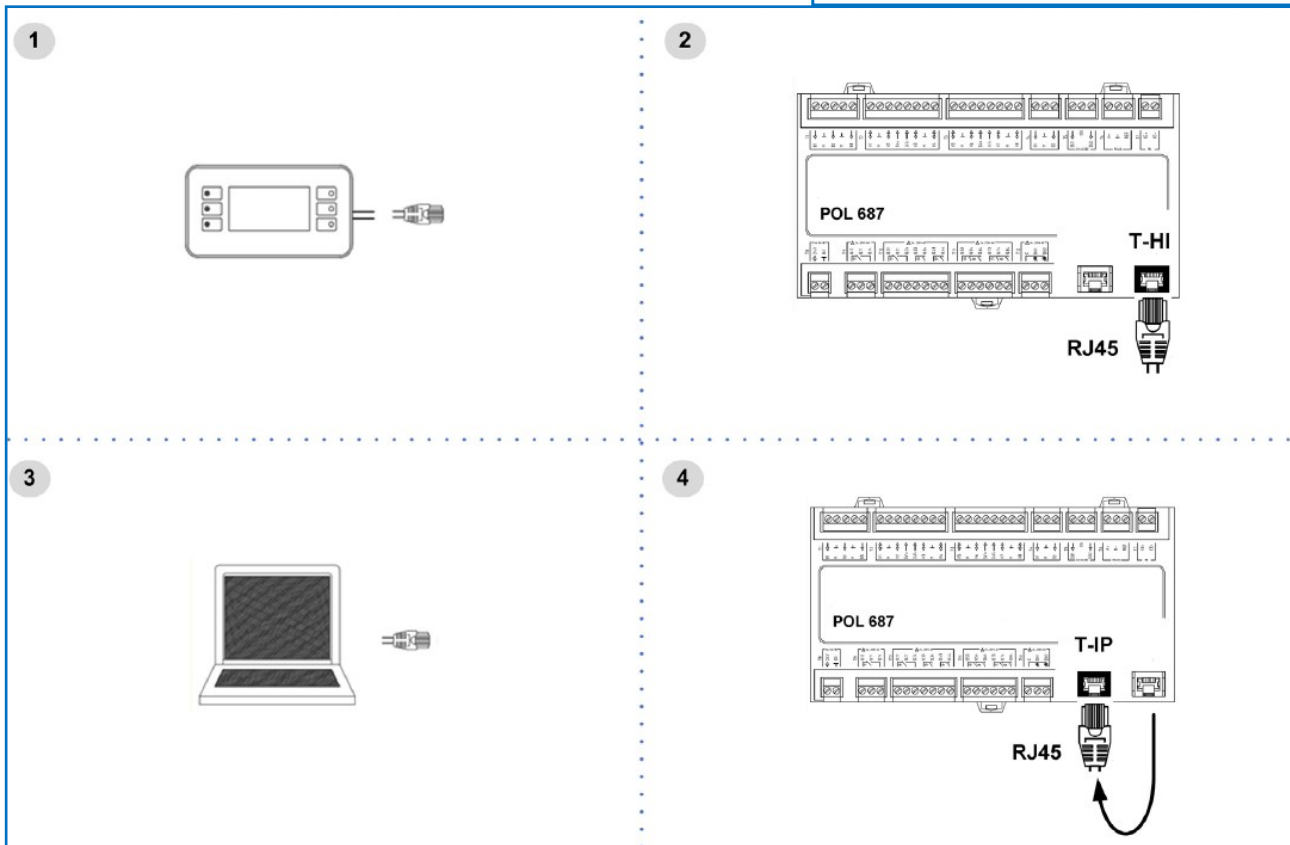
	<b>80.3</b>	<b>90.4</b>	<b>100.4</b>	<b>110.4</b>	<b>120.4</b>	<b>130.4</b>
Min. cable section Cu (mm <sup>2</sup> )	1 x 95	1 x 95	1 x 95	1 x 95	1 x 95	1 x 150
Max. cable section Cu (mm <sup>2</sup> )	1 x 150	1 x 150	1 x 185	1 x 185	1 x 185	1 x 240
Min. bar Cu section (mm <sup>2</sup> )	nd	nd	nd	nd	nd	nd
Max. bar Cu width (mm)	32	32	32	32	32	32
Tightening torque (Nm)	20	20	20	20	20	20
	<b>145.4</b>	<b>160.4</b>	<b>185.5</b>	<b>210.6</b>	<b>225.6</b>	<b>240.6</b>
Min. cable section Cu (mm <sup>2</sup> )	1 x 150	1 x 240	1 x 240	2 x 150	2 x 150	2 x 150
Max. cable section Cu (mm <sup>2</sup> )	1 x 240	1 x 240	1 x 240	2 x 300	2 x 300	2 x 300
Min. bar Cu section (mm <sup>2</sup> )	nd	nd	nd	2 x 30 x5	2 x 30 x5	2 x 30 x5
Max. bar Cu width (mm)	32	40	40	50	50	50
Tightening torque (Nm)	20	20	20	20	20	20

## Computer connection

### Configure P.C.

- 1 connect P.C. and main module with LAN cable
- 2 check in the taskbar that the connection is active
- 3 open Control Panel and select Network and sharing center
- 4 select Modify board setting
- 5 select Local area connection (LAN)
- 6 select Internet protocol version 4 (TPC) IPV4 and enter Property
- 7 set the IP address 192.168.1.100
- 8 set Subnet mask as 255.255.255.0
- 9 confirm (OK)
- 10 enter Start (Windows button)
- 11 write the command cmd and enter/do it
- 12 write and run the command Ping 192.168.1.42
- 13 the message, connection is OK, will appear when successful
- 14 enter the browser (Chrome, Firefox ecc)
- 15 write and run the command http://192.168.1.42
- 16 Userid = WEB
- 17 Password = SBTAdmin!

- 1 Service keypad
- 2 RJ45: standard connection
- 3 P.C.-not supplied
- 4 P.C. connection, shift RJ45 from T-HI to T-IP



## Remote Control

### Option

- 1 Distance up to 350 mt
- 2 Distance up to 700 mt

A User interface

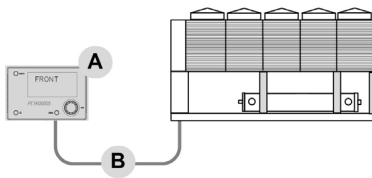
B=B1 KNX bus, max 350 mt  
twisted pair with shield,  $\varnothing$  0,8 mm  
EIB/KNX cable marking recommended

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

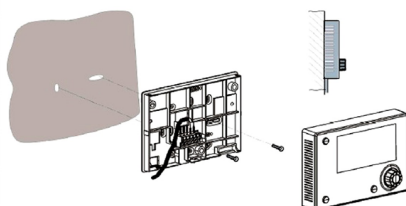
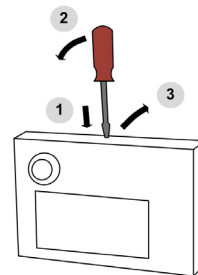
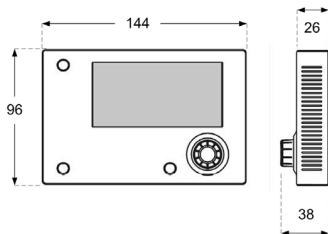
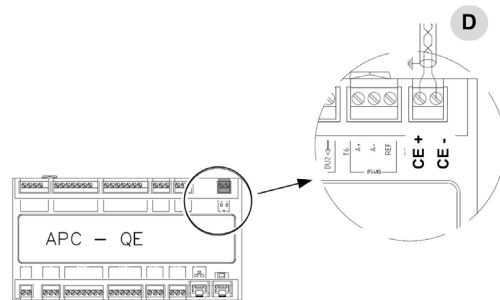
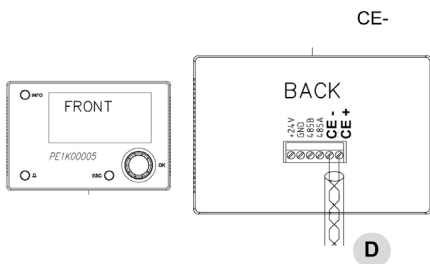
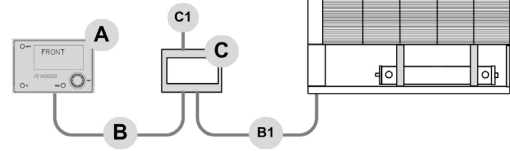
C1 AC 120...230V, 50...60Hz

D KNX bus, max 350 mt

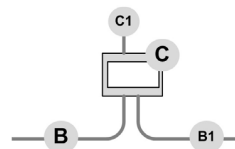
1



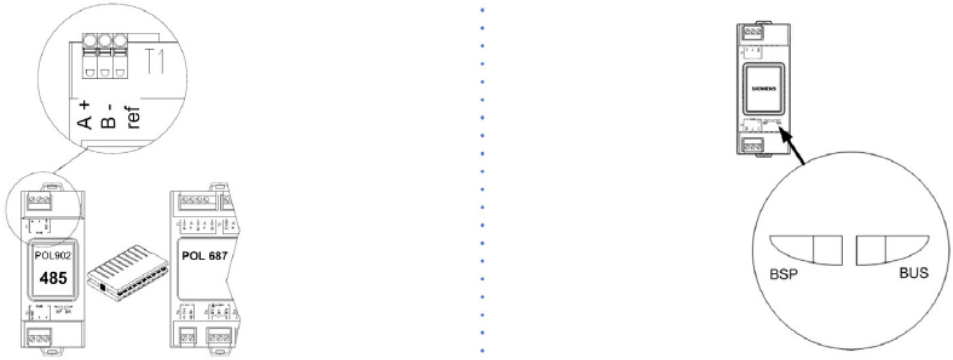
2



PSX - type : N125/11 5WG1 125-1AB11



**Modbus - RS485**  
Option

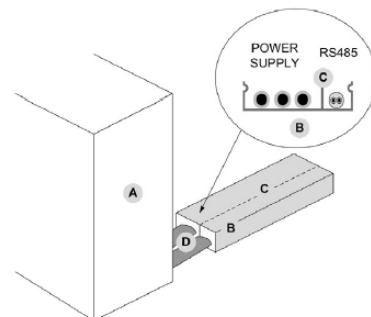
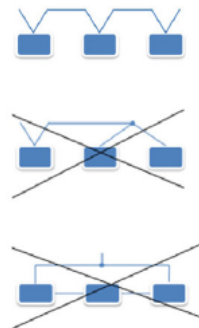


LED BSP	communication with AP1 module	LED BUS	communication with Modbus
green	communication ok	green	communication ok
yellow	software ok but communication with AP1 down	yellow	startup / channel not communicating
red	flashing: software error fixed: hardware error	red	communication down

**Modbus / LonWorks / Cable requirements**

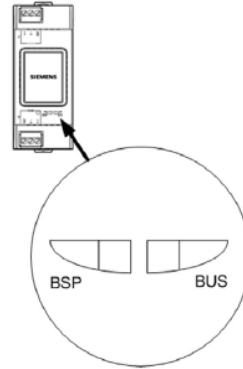
Couple of conductors twisted and shielded  
 Section of conductor 0,22mm<sup>2</sup>...0,35mm<sup>2</sup>  
 Rated power between conductors <math>\leq 50 \text{ pF/m}</math>  
 Nominal impedance 120  $\Omega$   
 Recommended cable BELDEN 3106A

- very RS485 serial line must be set up using the 'In/Out' bus system.
- Other types of networks are not allowed, such as Star or Ring networks.
- 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 located 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, dip switch or link.
- The cable must have insulation features and non-flame propagation in accordance with applicable regulations.
- The RS485 serial line must be kept as far away as possible from sources of electromagnetic interference.



- A. Unit
- B. Metal conduit
- C. Metal septums
- D. Metal-lined sheath (sleeve)

## LonWorks - Option



LED BSP	communication with AP1 module	LED BUS	communication with LonWorks
Green	communication ok	Green	ready for communication
Yellow	software ok but communication with AP1 down	Yellow	startup
Red	flashing: software error fixed: hardware error	Red	flashing: communicating not possible communication ok

### LONWORK CABLE TYPE

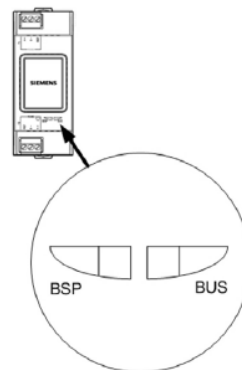
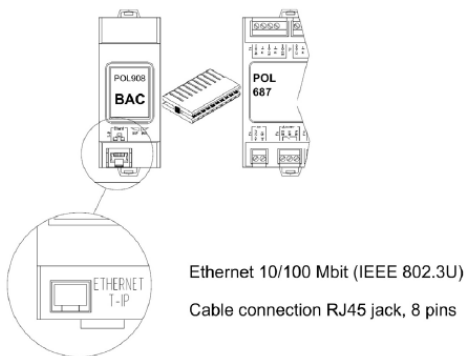
Echelon allows three cable types for channel type TP/FT-10, including the Category 5 network cable used commonly in building automation and control (TIA 568A Cat-5).

### CAT-5 SPECIFICATIONS

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

- Cross-sectional area min  $\varnothing 0,5\text{mm}^2$
- operating capacity between two wires of a pair < 46 nF/km
- DC loop resistance < 168  $\Omega$
- impedance 100 +/- 15% @ f > 1 MHz
- capacity pair to ground, asymmetric. < 3,3 nF/km

## BACnet IP - Option



LED BSP	communication with AP1 module	LED BUS	communication with BACnet
Green	communication ok	Green	ready for communication
Yellow	software ok but communication with AP1 down	Yellow	startup
Red	flashing: software error fixed: hardware error	Red	BACnet server down fixed: hardware error restart after 3 sec

## Ecoshare

### Option

Control of the network is entrusted to the Master unit (identified by the parameter LNAddress = 1).

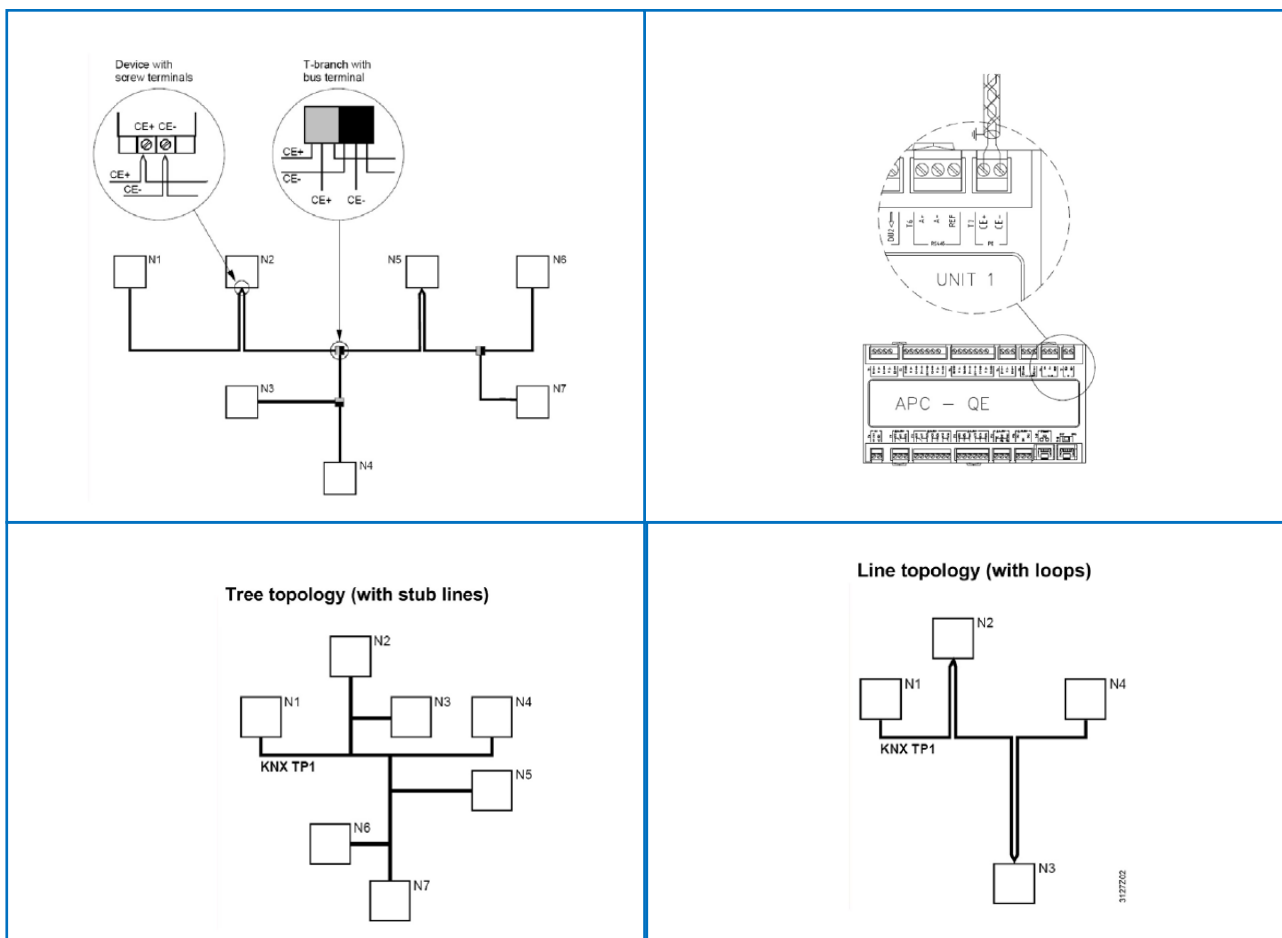
The network can be extended up to a maximum of 8 units (1 master – 7 slaves).

The master arranges for managing connected units in order to obtain:

- The coordination of the operation (Mode commands, status, setpoint and signal of the DemanLimit function are propagated from the Master unit to the Slaves).
- The rotation of the operating priorities of the machines based on their wear (total number of hours of operation).
- The management of one or more units in 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 .

### Connection requirements

- Maximum length of the bus line: 700 m.
- Maximum distance between 2 units: 300 m.
- Type of cable: shielded twisted pair cable Ø 0,8 mm. use an EIB/KNX cable
- Possible connections: Tree, star, in/out bus, mixed
- It is not possible to use a ring connection
- No end-of-line resistor 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 voltage values and away from possible sources of electrical interference





**Type A configuration**

Paramer P0658:TypeRegMS = 0 e P0702:KRegMS=0

**The pumps of all units are active.**

**On each unit a different setpoint is set for the utility side:**

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**

**Recovery side**

Each unit works independently for to meet the thermal load based on the setpoint assigned to it by the Master.

**Type B configuration**

Paramter P0658:TypeRegMS = 1 e P0702:KRegMS=0

**The pumps of all units are active.**

**On each unit a different setpoint is set for the utility side:**

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**

**Recovery side**

The thermal load is distributed by the Master on all the units, thus meeting the optimal step of each unit prior to activating the next one.

The activation sequence is calculated based on considerations on the optimal distribution of the utility + recovery load and on the wear of the units (Less wear = unit with priority).

PLEASE NOTE: the distribution of the steps on the circuits of each individual unit is carried out by the device that manages the internal distribution of the individual unit (this ensures an optimal distribution for each unit on the various circuits).

### Type C configuration

Parameter P0658:TypeRegMS = 2 e P0702:KRegMS=0

**Only the pumps of the units called to operate are activated.**

**Slave units mode controlled by the Master**

**The units are controlled only if they have to deliver power.**

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

### Recovery side

The thermal load is distributed by the Master on all the units, thus meeting the optimal step of each unit prior to activating the next one.

The activation sequence is calculated based on considerations on the optimal distribution of the utility + recovery load and on the wear of the units (Less wear = unit with priority).

PLEASE NOTE: the distribution of the steps on the circuits of each individual unit is carried out by the device that manages the internal distribution of the individual unit (this ensures an optimal distribution for each unit on the various circuits).

Path: Main Menu / Unit parameters / Ecoshare		
Parameters	Short description	Description
P0655	LNInstalledUnits	Number of units installed/connected in Ecoshare 1 - 8
P0656	LNStandByUnits	Number of units on standby 0 - 6
P0657	LNOffset	Temperature Offset to be added to the unit setpoint
P0658	TypeRegMS	Ecoshare adjustment type 0 - 2
P0659	LNAddress	Unit address 1 - 8 ( 1 = MASTER)
P0664	LNOffsetRec	Offset for setpoint shift recovery side 0 - 15 °C
P0702	KRegMS	Activates eco share new mode (1 solo su unità multifunzione)

## General

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

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

Agree upon in advance the start-up data with the service centre.

Agree upon in advance the star-up data with the service centre.

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

Before checking, please verify the following:

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

### WARNING

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

⇒ *Before accessing check with a multimeter that there are no residual stresses*

⇒ *Do not power the unit with empty water side exchangers. Possible damage to anti-freeze electric heaters.*

## Preliminary checks

### Unit OFF power supply

		Yes / No
1	safe access	
2	suitable frame to withstand unit weight + people weight	
3	functional clearances	
4	air flow: correct return and supply (no bypass, no stratification)	
5	considered level to be reachable by snow	
6	considered main winds	
7	lack of chimneys/corrosive atmospheres/pollutants	
8	structure integrity	
9	fans run freely	
10	unit on vibration isolators	
11	The unit must be level.	
12	unit input water filter + shut-off valves for cleaning	
13	vibration dampeners on hydraulic connections	
14	expansion tank (recommended volume = 10% system content)	
15	minimum system water content	
16	clean system	
17	loaded system + possible glycol solution + corrosion inhibitor	
18	system under pressure + vented	
19	refrigerant circuit visual check	
20	earthing connection	
21	power supply features	
22	remote On-Off	

## Start-up sequence

### Unit power supply ON



Before powering the unit carry out a leak test with suitable instrumentation

		Yes / No
1	compressor carter resistances operating at least since 8 hours	
2	off-load voltage measure	
3	phase sequence check	
4	pump manual start-up and flow check	
5	refrigeration circuit shut-off valves opening (if applicable)	
6	unit ON	
7	load voltage measure	
8	verify the lack of bubbles in the liquid light (if applicable)	
9	check of all fan operating	
10	measure of return and supply water temperature	
11	super-heating and sub-cooling measure	
12	check no anomalous vibrations are present	
13	set-point personalization	
14	scheduling customisation	
15	complete and available unit documentation	

## Cooling circuit

- 1 Visually inspect the refrigerating circuit: the presence of oil stains can be a symptom of leakage (caused e.g. by transportation, handling 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 all of the refrigeration circuit shut-off valves (if applicable).

## Hydraulic circuit

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

### NOTE

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

## Electric circuit

Check the unit is connected to the earthing system.

Check the conductors are tightened as: the vibrations caused by handling and transport might cause these to come loose.

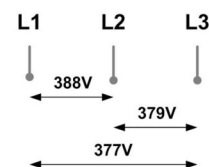
Power the unit by closing the isolation device but leave in OFF.

Check the network frequency and voltage values, which must be within the limits: 400-3-50 +/-10%

Check and adjust the phase balance as necessary: it must be lower than 2%

### NOTE

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



$$1) \frac{388 + 379 + 377}{3} = 381 \text{ (A)}$$

$$2) \text{MAX} - A = 388 - 381 = 7$$

$$3) S = \frac{7}{A} \times 100 = 1,83 \text{ OK}$$

## Compressor casing resistances

Connect the compressor oil heating resistances at least 8 hours before the compressor is to be started:

- at the first unit start-up
  - after each prolonged period of inactivity
- 1 Power the heaters: isolator switch on 1 / ON.
  - 2 Check the power consumption of the resistances to make sure that they are functioning.
  - 3 Start-up the compressor only if the crank-case temperature on the lower side is be higher than the outside temperature by at least 10°C .
  - 4 Do not start the compressor with the crankcase oil below operating temperature.

## Voltage

Check that the air and water temperatures are within in the operating limits.

Start-up the unit.

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

- Power supply voltage
- Total absorption of the unit
- Absorption of the single electric loads

## Options

Menu accessible only after having entered the password. Access reserved only to specifically trained personnel.

The parameter modification can cause irreversible damages.

Path: Main menu / Unit parameters / Options

Parameters	Short description	Description
P0002	En DemandLimit	Enabling Demand Limit: 0 = disabled, 1 = analogic input, 2 = parameter
P0003	En WaterReset	Enabling Water reset: 0 = Off, 1 = Cool, 2 = Heat, 3 = Cool and Heat
P0036	En CompExt	Enabling Climatic TExt: 0 = Off, 1 = Cool, 2 = Heat, 3 = Cool and Heat
P0050	En 2SetPoint	Enabling 2SetPoint: 0 = Off, 1 = On
P0051	PrioritaCmd	Status and machine mode priority: Local [0] = Priority to local commands, BMS [1] priority to commands from plant supervisor
P0053	En DIOn-Off	Enabling remote ON-OFF: 0 = Off, 1 = On
P0090	TypeDL	Inlet signal type: 0 = 0-10V; 1 = 4-20mA
P0091	TypeWR	Inlet signal type: 0 = 0-10V; 1 = 4-20mA

## Demand limit

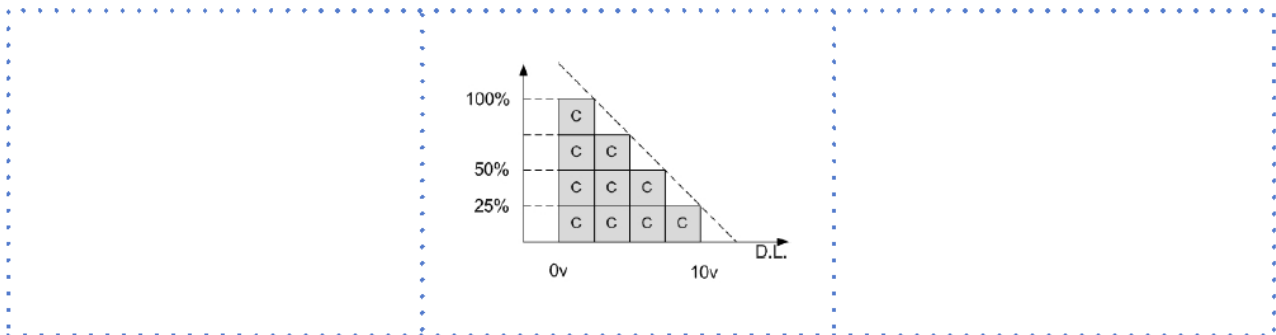
Menu accessible only after having entered the password.

⇒ Access reserved only to specifically trained personnel.

⇒ The parameter modification can cause irreversible damages.

It is possible to limit the absorbed electric power with an external signal 0-10 Vcc or 4-20mA. The higher the signal is, the lower the number of compressors available to meet the thermal need. Only if P0002 En DemandLimit ≠ 0

Path: Main menu / Unit parameters / Options



Step	Action	Menu - Variable	Keys		Display
1	Press 3 sec.		√		Password
2	Set	Password	▲	√	
3	Press		i		Main Menu
4	Select	Unit parameters	▼	√	Unit parameters
5	Select	Setpoint	▼	√	Setpoint
6	Select	Demand limit	▼	√	
7	Set	Demand limit	▲	▼	
8	Confirm		√		
9	Press 3 sec.		⏏		
10	Select	Local connections	√		

Path: Main menu / Unit parameters / Options		
Parameters	Short description	Description
P0090	TypeDL	Inlet signal type: 0=0-10V; 1=4-20mA
Path: Main Menu / Unit parameters / Setpoint		
P0200	set demand limit	Parameter setting of the value % of demand limit



## Climatica TExt

Menu accessible only after having entered the password.

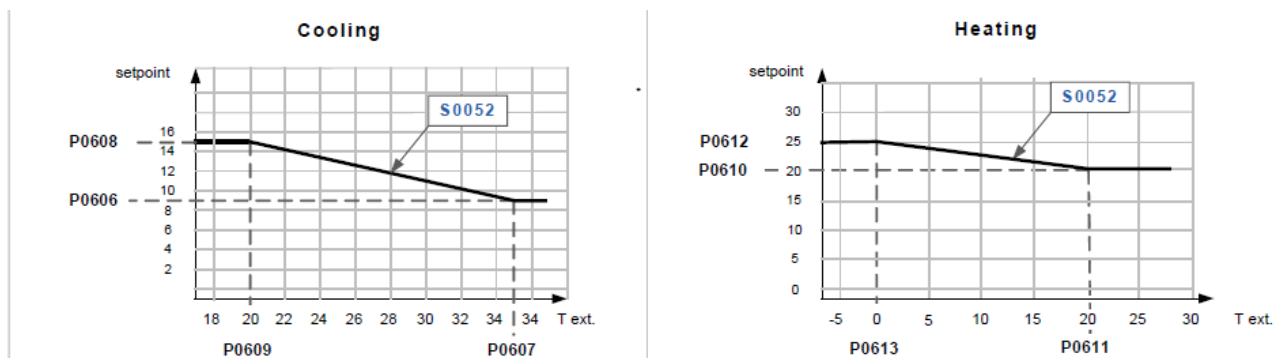
⇒ Access reserved only to specifically trained personnel.

⇒ The parameter modification can cause irreversible damages.

The setpoint based on the climatic curve and the Water Reset is displayed on the display

Only if P0036: En Climatica = 1

Path: Main menu / Unit parameters / Options



Step	Action	Menu - Variable	Keys		Display
1	Premere 3 sec.		√		Password
2	Set	Password	▲	√	
3	Press		i		Main menu
4	Select	Unit parameters	▼	√	Unit parameters
5	Select	Climatic TExt	▼	√	Climatic TExt (pwd)
6	Select	Parameter	▼	√	
7	Set		▼	▲	
8	Confirm		√		
9	Press 3 sec.		⏏		
10	Select	Local connections	▼	√	

Path: Main menu / Unit parameters / Climatic TExt

Parameters	Short description	Description
P0606	CSptLow	value of set Cool for outdoor air greater than P0607
P0607	AirAtSetPointLowC	value of outdoor air for set Cool equal to the parameter P0606
P0608	CSptHigh	value of set Cool for outdoor air lower than P0268
P0609	AirAtSetPointHighC	value of outdoor air for set Cool equal to the parameter P0609
P0610	HSptLow	value of set Heat for outdoor air greater than P0612
P0611	AirAtSetPointLowH	value of outdoor air for set Heat equal to the parameter P0610
P0612	HSptHigh	value of set Heat for outdoor air lower than P0614
P0613	AirAtSetPointHighH	value of outdoor air for set Heat equal to the parameter P0613

## Water reset

Menu accessible only after having entered the password.

⇒ Access reserved only to specifically trained personnel.

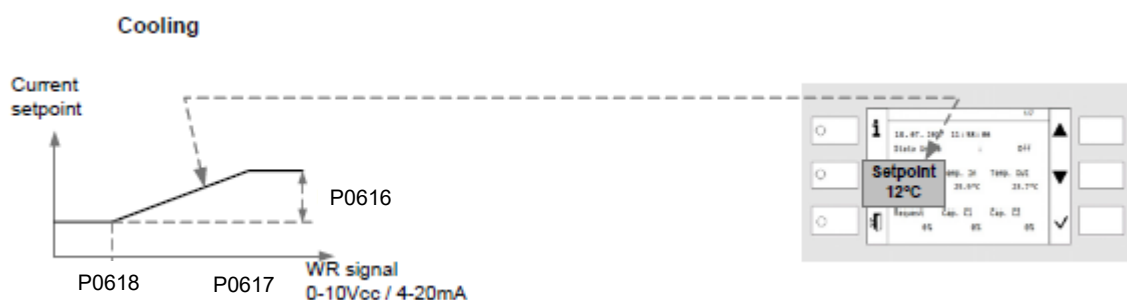
⇒ The parameter modification can cause irreversible damages.

It is possible to limit the absorbed electric power with an external signal 0-10 Vcc or 4-20mA.

The setpoint based on the climatic curve and the Water Reset is displayed on the display

Only if P0003: En WaterReset = 1

Path: Main menu / Unit parameters / Options



Step	Action	Menu - Variable	Keys		Display
1	Press 3 sec.		√		Password
2	Set	Password	▼	√	
3	Press		i		Main menu
4	Select	Unit parameters	▼	√	Unit parameters
5	Select	Water Reset	▼	√	Water Reset
6	Select	Parameters	▼	√	
7	Set		▼	▲	
8	Confirm		√		
9	Press 3 sec.		⏏		
10	Select	Local connections	√		

Path: Main menu / Unit parameters / Options

Parameters	Short despt	Description
P0091	TypeWR	Inlet signal type: 0=0-10V; 1=4-20mA
Path: Main Menu / Unit parameters / Water reset		
P0616	MaxCWRC	Maximum correction to be applied to the setpoint Cool
P0617	SWRMaxC	Value of the WR control signal corresponding to the correction of the set COOL equal to max
P0618	SWRMinC	Value of the WR control signal corresponding to the correction of the set COOL equal to 0
P0615	MaxCWRH	Maximum correction to be applied to the setpoint Heat
P0619	SWRMaxH	Value of the WR control signal corresponding to the correction of the set HEAT equal to max
P0620	SWRMinH	Value of the WR control signal corresponding to the correction of the set HEAT equal to 0

## Reduced load operation

The units are equipped with partialisation steps and can therefore operate with reduced loads.

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

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

In the event of a compressor breakdown due to operating in the above-mentioned conditions, the warranty shall not be valid and Clivet spa declines any responsibility.

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

If the average times are close to this limit, take the proper corrective actions, for example, increasing the water content of the system is not enough in this application.

## Check the water flow-rate of the evaporator

Check that the difference between the temperature of the exchanger's input and output water corresponds to the potential according to this formula:

- $\text{unit cooling power (kw)} \times 860 = \text{Dt (}^\circ\text{C)} \times \text{flow rate (L/h)}$

The cooling power is shown in the GENERAL TECHNICAL DATA chart included in this manual, referred to specific conditions, or in the COOLING PERFORMANCE charts in the TECHNICAL BULLETIN referred to various conditions of use.

Check for water side exchanger pressure drops:

- determine the water flow-rate
- measure the difference in pressure between the exchanger's input and output water and compare it with the WATER-SIDE EXCHANGER PRESSURE DROPS chart

Measuring the pressure is easier if pressure gauges are installed as indicated in the DIAGRAM OF SUGGESTED WATER CONNECTIONS.

## Start-up report

To detect the objective operational 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
- temperatures and pressures in the feature points of the cooling circuit (compressor, liquid, suction drain/unload)

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

## Directive 2014/68EU PED

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

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

Compulsory verification of the first installation:

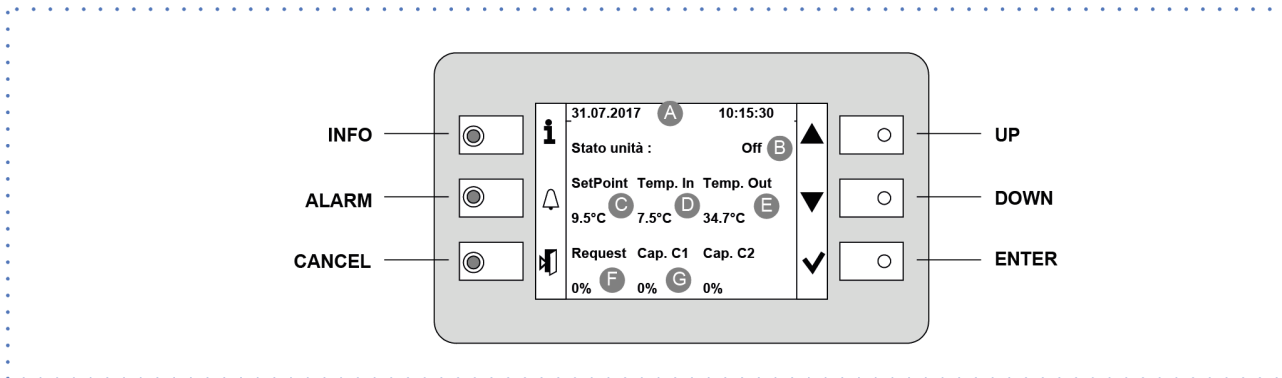
- only for units assembled on the installer's building site (for ex. condensing circuit + direct expansion unit)

Commissioning declaration:

- for all units

Periodical checks:

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



### Led

INFO	Not used
ALARM	Blink / fixed = alarm present
CANCEL	not used currently

### Display

Ref.	Variable	description
A		Date - Time
B	Current state	On / off / eco / pmp On
C	SetPoint	Adjustment temperature
D	Temp. IN	Water inlet temperature utility side
E	Temp. OUT	Water outlet temperature utility side
F	Request	Power requested by thermoregulator (including any limitation from Demand Limit)
G	Cap. C1	Power capacity delivered by the compressor 1
	Cap. C2	Power capacity delivered by the compressor 2

### Keys

Symbol	Name	description
	Info	Main menu
	Alarm	Alarm display
	Cancel	Exit Previous level Keyboard settings
	Up	Increases value
	Down	Decreases value
	Enter	Confirm Password

## Change unit state

Step	Action	Menu - Variable	Keys		Display
1	Press				Main menu
2	Select	Cmd local state			
3	Set	OFF - ECO - ON - Pump ON			
4	Confirm				
5	Exit				
<b>ON</b>	Compressors enabled				
<b>OFF</b>	Compressors disabled - Antifreeze protections user side active				
<b>ECO</b>	Compressors enabled - Pumps activated periodically - Setpoint = Setpoint EcoCool				
<b>PMP_ON</b>	Compressors disabled - Pumps running				

## Mode change







Step	Display	Action	Menu - Variable	Keys	
1	Main Menu	Press			
2		Select	Cmd Local Mode		
3		Set	Cool - Heat		
4		Confirm			
5		Exit			

## Setpoint change

Step	Action	Menu - Variable	Keys		Display
1	Press				Main Menu
2	Select	Unit parameters			Unit parameters
3	Confirm	Setpoint			
4	Select	Setpoint			
5	Set	Setpoint			
6	Confirm				
7	Exit				

















Parameters	Short description	Description
583	SetPointCooling	Setpoint Cool
584	2SetPointCooling	2° Setpoint Cool - enable by remote switch
585	SetPointECOCooling	Economic Cool setpoint
577	SetPointHeating	Setpoint Heat
578	2SetPointHeating	2° Setpoint Heat - enable by remote switch
579	SetPointECOHeating	Economic Heat setpoint

## Display the status














Step	Action	Menu - Variable	Keys		Display
1	Press				Main menu
2	Select	Unit State			
3	Select	General, circuit, etc			
4	Exit				

## Scheduler

It is possible to set 6 events (Off, Eco, On, Recirculating) for each week day.

Step	Action	Menu - Variable	Keys		Display
1	Press				Main Menu
2	Select	Scheduler			Scheduler
3	Select	Day			
4	Select	Time			
5	Set	Event time			
6	Confirm				
7	Select	Value			
8	Set	On / Eco ...			
9	Confirm				
10	Exit				

## Enable scheduler

Step	Action	Menu - Variable	Keys		Display
1	Press 3 sec				Password
2	Set	Password			
3	Press				Main menu *
4	Select	Unit parameters			
5	Select	Unit Options			
6	Set	P0061 = 1			
7	Press 3 sec				
8	Select	Local connections			

\* Unit parameters menu is displayed

## Keyboard settings

Step	Action	Menu - Variable	Keys		Display
1	Press 3 sec				
2	Press				
3	Select				HMI Settings
4	Press				
5	Press				
6	Select	Local connections			

## Allarms

Before resetting an alarm identify and remove its cause.

Repeated resets can cause irreversible damage.

Display of alarms: step 1-3

Reset alarm: step 4-10

Example: + eE001 Phase monitor: Fault = active alarm

- EE003 P1 failure: Ok = resetted alarm

Step	Action	Menu - Variable	Keys		Display
1	Press				Alarm list detail
2	Press				Alarm list
3	Select	Alarm			Alarm list detail
4	Press 3 sec				Password
5	Set	Enter password			Alarm list detail
6	Press				Alarm list
7	Select	Alarm			
8	Select	Reset			
9	Press 3 sec				
10	Select	Logoff			

## General list of alarms

The alarm code identifies the concerned circuit.

Example: ee101 TimeOutModCirc = circuit 1

ee201 TimeOutModCirc = circuit 2

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



## Alarm list - 1

Code		Description
eE0001	Phase Monitor	Phase monitor input open (off)
ee0003	Pump 1 User-side	Pump protection input open (off)
ee0004	Pump 2 User-side	Pump protection input open (off)
ee0005	Pump 3 User-side	Pump protection input open (off)
eE0008	User-side Inverter Protection	Pump inverter protection input open (off)
EE0010	Maser Unit Offline	No communication with the Master unit in the Ecoshare network.
EE0011	Unit 2 in Alarm	Unit with address 2 with generic alarm
EE0012	Unit 2 Offline	No communication with the unit with address 2 in the Ecoshare network.
EE0013	Unit 3 in Alarm	Unit with address 3 with generic alarm
EE0014	Unit 3 Offline	No communication with the unit with address 3 in the Ecoshare network.
EE0015	Unit 4 in Alarm	Unit with address 4 with generic alarm
EE0016	Unit 4 Offline	No communication with the unit with address 4 in the Ecoshare network.
EE0017	Unit 5 in Alarm	Unit with address 5 with generic alarm
EE0018	Unit 5 Offline	No communication with the unit with address 5 in the Ecoshare network.
EE0019	Unit 6 in Alarm	Unit with address 6 with generic alarm
EE0020	Unit 6 Offline	No communication with the unit with address 6 in the Ecoshare network.
EE0021	Unit 7 in Alarm	Unit with address 7 with generic alarm
EE0022	Unit 7 Offline	No communication with the unit with address 7 in the Ecoshare network.
EE0023	Unit 8 in Alarm	Unit with address 8 with generic alarm
EE0024	Unit 8 Offline	No communication with the unit with address 8 in the Ecoshare network.
EE0025	Source In Temp. Probe	Electrical connection error with the temperature probe or disconnected cable.
EE0027	User-side In Temp. Probe	Electrical connection error with the temperature probe or disconnected cable.
EE0028	User-side Out Temp. Probe	Electrical connection error with the temperature probe or disconnected cable.
EE0029	External Temp. Probe	Electrical connection error with the temperature probe or disconnected cable.
EE0030	Demand Limit (AI V)	Electrical connection error on Demand Limit connection or disconnected cable and function enabled (0-10v).
EE0031	Water Reset (AI V)	Electrical connection error on Water Reset connection or disconnected cable and function enabled (0-10v).
EE0033	Cabinet Temp.	Electrical connection error with the temperature probe or disconnected cable.
EE0034	2nd Cabinet Temp.	Electrical connection error with the temperature probe or disconnected cable.
EE0050	User-side Diff. Press. Probe	Electrical connection error with the pressure switch or disconnected cable.
ee0054	Recovery Pump 1 Protection	Pump protection input open (off)
ee0055	Recovery Pump 2 Protection	Pump protection input open (off)
ee0056	Recovery Pump 3 Protection	Pump protection input open (off)
eE0057	Recovery Inverter Protection	Pump inverter protection input open (off)
ee0060	MaxT.QE	Electrical connection error with the temperature probe or disconnected cable.
EE0100	TimeOut POL98U_1	Communication error with the I/O peripheral device
EE0101	TimeOut POL98U_2	Communication error with the I/O peripheral device

## Alarm list - 2

Code		Description
EE0102	TimeOut POL96U	Communication error with the I/O peripheral device
EE0103	TimeOut POL96U_1	Communication error with the I/O peripheral device
EE0104	TimeOut POL965	Communication error with the I/O peripheral device
EE0105	TimeOutModPOL94U	Communication error with the I/O peripheral device
EE0106	TimeOutModPOL94U_2	Communication error with the I/O peripheral device
EE0107	TimeOutModPOL985	Communication error with the I/O peripheral device
EE0108	TimeOutModPOL985_2	Communication error with the I/O peripheral device
EE0109	TimeOut POL965_1	Communication error with the I/O peripheral device
EE0110	TimeOut POL98U_3	Communication error with the I/O peripheral device
EE0130	Demand Limit (AI mA)	Electrical connection error on Demand Limit connection or disconnected cable and function enabled (4-20 mA).
EE0131	Water Reset (AI mA)	Electrical connection error on Water Reset connection or disconnected cable and function enabled (4-20 mA).
EE1001	Gas Suction Temp. 3 (BT21.1)	Electrical connection error with the temperature probe or disconnected cable.
EE1002	Gas Suction Temp. 5 (BT22.1)	Electrical connection error with the temperature probe or disconnected cable.
EE1003	Suction Press. Heating (BP3.1)	Electrical connection error with the pressure switch or disconnected cable.
EE1004	EEV1 Blocked	Electronic thermostatic valve locking error.
EE1005	EEV2 Blocked	Electronic thermostatic valve locking error.
ee1006	Comp. 1.1 Protection	Compressor protection active.
ee1007	Comp. 2.1 Protection	Compressor protection active.
ee1008	Comp. 3.1 Protection	Compressor protection active.
EE1011	EEV3 Blocked	Electronic thermostatic valve locking error.
ee1018	Source Vent. 1.1 Protection	Electrical or thermal circuit fan error.
eE1019	HTTerm	High temperature thermostat digital input alarm.
EE1022	Discharge Temp. 1.1 (BT46.1)	Electrical connection error with the temperature probe or disconnected cable.
EE1023	Discharge Temp. 2.1 (BT47.1)	Electrical connection error with the temperature probe or disconnected cable.
EE1024	Discharge Temp. 3.1 (BT47.1)	Electrical connection error with the temperature probe or disconnected cable.
EE1027	Gas Suction Temp. Probe (BT11.1)	Electrical connection error with the temperature probe or disconnected cable.
EE1028	Discharge Press. Probe (BP1.1)	Electrical connection error with the pressure switch or disconnected cable.
EE1029	Suction Press. Probe (BP2.1)	Electrical connection error with the pressure switch or disconnected cable.
ee1047	Comp. 1.1 Envelope	Error generated by the compressor envelope output or if the compressor type is not enabled.
ee1048	Comp. 2.1 Envelope	Error generated by the compressor envelope output or if the compressor type is not enabled.
ee1049	Comp. 3.1 Envelope	Error generated by the compressor envelope output or if the compressor type is not enabled.
EE1070	ECV 1.1 (User-side)	Electronic thermostatic valve electrical locking or mechanical failure alarm.
EE1071	ECV 2.1 (Source-side)	Electronic thermostatic valve electrical locking or mechanical failure alarm.
EE1072	ECV 3.1 (Source-side)	Electronic thermostatic valve electrical locking or mechanical failure alarm.
EE2001	Gas Suction Temp. 3 (BT21.2)	Electrical connection error with the temperature probe or disconnected cable.
EE2002	Gas Suction Temp. 5 (BT22.2)	Electrical connection error with the temperature probe or disconnected cable.

## Alarm list - 3

Code		Description
EE2003	Suction Press. Heating (BP3.2)	Electrical connection error with the temperature probe or disconnected cable.
EE2004	EEV1 Blocked	Electronic thermostatic valve locking error.
EE2005	EEV2 Blocked	Electronic thermostatic valve locking error.
ee2006	Comp. 1.2 Protection	Compressor protection active.
ee2007	Comp. 2.2 Protection	Compressor protection active.
ee2008	Comp. 3.2 Protection	Compressor protection active.
EE2011	EEV3 Blocked	Electronic thermostatic valve locking error.
ee2018	Source Vent. 1.2 Protection	Electrical or thermal circuit fan error.
eE2019	HTTerm	High temperature thermostat digital input alarm.
EE2022	Discharge Temp. 1.2	Electrical connection error with the temperature probe or disconnected cable.
EE2023	Discharge Temp. 2.2	Electrical connection error with the temperature probe or disconnected cable.
EE2024	Discharge Temp. 3.2	Electrical connection error with the temperature probe or disconnected cable.
EE2027	Gas Suction Temp. Probe (BT12.2)	Electrical connection error with the temperature probe or disconnected cable.
EE2028	Discharge Press. Probe (BP1.2)	Electrical connection error with the pressure switch or disconnected cable.
EE2029	Suction Press. Probe (BP2.2)	Electrical connection error with the pressure switch or disconnected cable.
ee2047	Comp. 1.2 Envelope	Error generated by the compressor envelope output or if the compressor type is not enabled.
ee2048	Comp. 2.2 Envelope	Error generated by the compressor envelope output or if the compressor type is not enabled.
ee2049	Comp. 3.2 Envelope	Error generated by the compressor envelope output or if the compressor type is not enabled.
EE2070	ECV 1.2 (User-side)	Electronic thermostatic valve electrical locking or mechanical failure alarm.
EE2071	ECV 2.2 (Source-side)	Electronic thermostatic valve electrical locking or mechanical failure alarm.
EE2072	ECV 3.2 (Source-side)	Electronic thermostatic valve electrical locking or mechanical failure alarm.
FF0001	Refrigerant Leakage	Refrigerant leakage high level alarm.
FF0002	Low Ext. Temp.	Alarm generated if the temperature is lower than parameter .
FF1001	Static Defrost 1.1	Alarm generated if static defrost is activated.
FF1005	Min Overheating EEV1	Minimum overheating thermostatic valve refrigerant alarm. It is activated if the valve fails to reach the minimum overheating value set by parameter <b>P1219: SPMInSH</b> with the capacity used in the minimum time set by parameter <b>P1227: MinSHDlyAlm</b> .
FF1006	Min Overheating EEV2	Minimum overheating thermostatic valve refrigerant alarm. It is activated if the valve fails to reach the minimum overheating value set by parameter <b>P1318: SPMInSH</b> with the capacity used in the minimum time set by parameter <b>P1326: MinSHDlyAlm</b> .
FF1007	Min Overheating EEV3	Minimum overheating thermostatic valve refrigerant alarm. It is activated if the valve fails to reach the minimum overheating value set by parameter <b>P1318: SPMInSH</b> with the capacity used in the minimum time set by parameter <b>P1326: MinSHDlyAlm</b> .
FF1010	Warning LP Cool	Pre-alarm generated if the pressure in Cooling mode is lower than parameter .
FF1011	Warning LP Heat	Pre-alarm generated if the pressure in Heating mode is lower than parameter .
fF1012	Low Pressure Alarm Heat (Al)	It is generated if the low alarm bypass is not active and the suction pressure is lower than the setpoint, set by parameter <b>P0192: Set Allarme BP H</b> , then the alarm is generated, and it automatically resets when the pressure is higher than the setpoint plus the value in parameter <b>P0181: Ist.Allarme BP</b> .

## Alarm list - 4

Code		Description
ff1013	High Pressure (DI)	It is generated when there is an alarm signal from the digital input.
FF1014	Warning High Pressure	High pressure pre-alarm.
ff1015	High Pressure Alarm (AI)	It is generated when the discharge pressure is higher than the threshold set by parameter <b>P0190: Set Allarme AP</b> and it resets when the discharge pressure is lower than the difference between the threshold and the hysteresis set by parameter <b>P0196: Diff.All.AP</b> .
FF1016	Max RC Warning	Maximum compression ratio pre-alarm.
ff1017	Min RC Alarm	It is generated when the ratio of absolute discharge pressure to absolute suction pressure is lower than <b>P0200: Set Min RC</b> .
ff1018	Low Pressure Alarm Cool (AI)	It is generated if the low alarm bypass is not active and the suction pressure is lower than the setpoint, set by parameter <b>P0193: Set PreAl.BP H</b> , then the alarm is generated, and it automatically resets when the pressure is higher than the setpoint plus the value in parameter <b>P0181: Ist.Allarme BP</b> .
ff1019	Max RC Alarm	It is generated when the ratio of absolute discharge pressure to absolute suction pressure is higher than <b>P0191: Set Max RC</b> .
FF1034	Circuit Vacuum	It is generated if there is no power used and the suction pressure is lower than the threshold set by parameter <b>P0201: Set Circ Vacuum</b> . It resets when the suction pressure is higher than the threshold plus a constant of 0.5.
ff1046	Low Press. Limit 1.1	It is generated if there is power used and the suction pressure is lower than the threshold set by parameter <b>P0201: Set Circ Vacuum</b> for at least 5s.
ff1048	Low Defrost Water Temp. 1.1	Refrigerant alarm generated by the Defrost function when it is interrupted due to low water temperature, in any scheme other than 7.
FF1050	HpDisableStart	Refrigerant alarm generated by the Defrost function when it is interrupted due to low water temperature, only when in scheme 7.
FF1060:	MaxTS	Alarm generated when the compressor enters DLT and the discharge temperature exceeds parameter .
FF1061	MinTS	Alarm generated when the compressor enters DLT and the discharge temperature is lower than parameter .
FF2001	Static Defrost 1.2	Alarm generated if static defrost is activated.
FF2005	Min Overheating EEV1	Minimum overheating thermostatic valve refrigerant alarm. It is activated if the valve fails to reach the minimum overheating value set by parameter <b>P1219: SPMinSH</b> with the capacity used in the minimum time set by parameter <b>P1227: MinSHDlyAlm</b> .
FF2006	Min Overheating EEV2	Minimum overheating thermostatic valve refrigerant alarm. It is activated if the valve fails to reach the minimum overheating value set by parameter <b>P1318: SPMinSH</b> with the capacity used in the minimum time set by parameter <b>P1326: MinSHDlyAlm</b> .
FF2007	Min Overheating EEV3	Minimum overheating thermostatic valve refrigerant alarm. It is activated if the valve fails to reach the minimum overheating value set by parameter <b>P1318: SPMinSH</b> with the capacity used in the minimum time set by parameter <b>P1326: MinSHDlyAlm</b> .
FF2010	Warning LP Cool	Pre-alarm generated if the pressure in Cooling mode is lower than parameter .
FF2011	Warning LP Heat	Pre-alarm generated if the pressure in Heating mode is lower than parameter .
ff2012	Low Pressure Alarm Heat (AI)	It is generated if the low alarm bypass is not active and the suction pressure is lower than the setpoint, set by parameter <b>P0192: Set Allarme BP H</b> , then the alarm is generated, and it automatically resets when the pressure is higher than the setpoint plus the value in parameter <b>P0181: Ist.Allarme BP</b> .
ff2013	High Pressure (DI)	It is generated when there is an alarm signal from the digital input.
FF2014	Warning High Pressure	High pressure pre-alarm. It is generated when the discharge pressure is higher than the threshold set by parameter <b>P0190: Set Allarme AP</b> and it resets when the discharge pressure is lower than the difference between the threshold and the hysteresis set by parameter <b>P0196: Diff.All.AP</b> .
FF2016	Max RC Warning	Maximum compression ratio pre-alarm.
ff2017	Min RC Alarm	It is generated when the ratio of absolute discharge pressure to absolute suction pressure is lower than <b>P0200: Set Min RC</b> .

## Alarm list - 5

Code		Description
ff2018	Low Pressure Alarm Cool (AI)	It is generated if the low alarm bypass is not active and the suction pressure is lower than the setpoint, set by parameter <b>P0193: Set PreAl.BP H</b> , then the alarm is generated, and it automatically resets when the pressure is higher than the setpoint plus the value in parameter <b>P0181: Ist.Allarme BP</b> .
ff2019	Max RC Alarm	It is generated when the ratio of absolute discharge pressure to absolute suction pressure is higher than <b>P0191: Set Max RC</b> .
FF2034	Circuit Vacuum	It is generated if there is no power used and the suction pressure is lower than the threshold set by parameter <b>P0201: Set Circ Vacuum</b> . It resets when the suction pressure is higher than the threshold plus a constant of 0.5.
ff2046	Low Press. Limit 1.2	It is generated if there is power used and the suction pressure is lower than the threshold set by parameter <b>P0201: Set Circ Vacuum</b> for at least 5s.
ff2048	Low Defrost Water Temp. 1.2	Refrigerant alarm generated by the Defrost function when it is interrupted due to low water temperature, in any scheme other than 7.
FF2050	HpDisableStart	Refrigerant alarm generated by the Defrost function when it is interrupted due to low water temperature, only when in scheme 7.
FF2060	User-side Water Low Press.	Alarm generated when the compressor enters DLT and the discharge temperature exceeds parameter .
FF2061	Low User-side Flow	Alarm generated when the compressor enters DLT and the discharge temperature is lower than parameter .
ii0002	User-side Water Low Press.	High level hydraulic alarm, generated by low pressure in the hydraulic system by the digital pressure switch.
ii0006	Low User-side Flow	High level hydraulic alarm from the flow switch.
ii0007	Freeze on User-side	High level hydraulic alarm generated if the lowest temperature between return and supply is lower than the threshold set by parameter <b>P0215: Set All.Gelo</b> .
ii0008	Anti-freeze Pumps	High level hydraulic alarm generated if the hydraulic circuit heaters are switched on and the lowest temperature between the inlet and outlet water is lower than parameter <b>P0215: Set All.Gelo</b> added to parameter <b>P0218: DeltaT Antigelo</b> .
ii0009	Incongruous Delta-T	High level hydraulic alarm generated if the difference between the inlet and outlet temperature, on the hot side, or between the outlet and inlet temperature, on the cold side, is lower than 1 for 20s.
ii0010	Freeze on Rec-side	High level hydraulic alarm generated if the lowest temperature between return and supply is lower than the threshold set by parameter <b>P0228: Set All.GeloRec</b> .
ii0052	Low Recovery Flow	High level hydraulic alarm from the flow switch.
ii0053	Recovery Low Water Press.	High level hydraulic alarm, generated by low pressure in the hydraulic system by the digital pressure switch.
ii0062	Source Low Water Press.	High level hydraulic alarm, generated by low pressure in the hydraulic system by the digital pressure switch.
ii0063	Source Low Water Flow	High level hydraulic alarm from the flow switch.
ii1017	Source Low Water Press. 1.1	High level hydraulic alarm, generated by low pressure in the hydraulic system by the digital pressure switch.
ii1020	Source Low Water Flow 1.1	High level hydraulic alarm from the flow switch.
ii1021	Source Water Freeze 1.1	High level hydraulic alarm generated if the lowest temperature between return and supply is lower than the threshold set by parameter .
ii2017	Source Low Water Press. 1.2	High level hydraulic alarm, generated by low pressure in the hydraulic system by the digital pressure switch.
ii2020	Source Low Water Flow 1.2	High level hydraulic alarm from the flow switch.
ii2021	Source Water Freeze 1.2	High level hydraulic alarm generated if the lowest temperature between return and supply is lower than the threshold set by parameter .

## SAFETY WARNINGS FOR OPERATIONS ON UNITS CONTAINING R32

### 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.

### Work procedures

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

### 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.

### 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.

### 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.

### 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.

### 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.

### Cooling equipment checks

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

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

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

- the quantity of the charge must comply with the size of the room where the parts containing refrigerant are installed;
- the machine and ventilation intake function correctly and are not obstructed;
- If an indirect cooling circuit is used, the secondary circuits must be checked to verify the presence of refrigerants; the marking on the equipment remains visible and readable;

- Make sure markings and symbols are always readable; cooling pipes or components must be installed in a position that makes improbable their exposure to substances that may corrode the components containing refrigerant, unless they are manufactured with material intrinsically resistant to corrosion or suitably protected against corrosion.

### 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.

### 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.

### NOTE:

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

### Reparation of intrinsically safe components

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

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

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

### Wires

Make sure wires are not subjected to wear, corrosion, excessive pressure or vibration, that there are no sharp edges and that they do not produce other negative effects on the environment. The inspection must also keep into consideration the effects of time 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).

### 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.

### Removal and evacuation

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

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

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

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

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

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

### Charging operations

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

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

### Dismantling

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

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.

### Labelling

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

Labels must be dated and signed.

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

### Recovery

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

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

Make sure enough tanks are used.

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

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

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

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

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

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

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

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

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

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

### 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.

## 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.

## General

Maintenance must be performed by authorized centres or by qualified personnel

The maintenance allows to:

- maintaining the unit efficient
- reduce the deterioration speed all the equipment is subject to over time
- collect information and data to understand the efficiency state of the unit and prevent possible faults

### WARNING

⇒ *Before checking, please verify the following:*

⇒ *the electrical power supply line should be isolated at the beginning*

⇒ *the line isolator device is open, locked and equipped with the suitable warning sign*

⇒ *make sure no tension is present*

⇒ *After switching the power off, wait at least 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.*

## Frequency of interventions

Perform an inspection every 6 months.

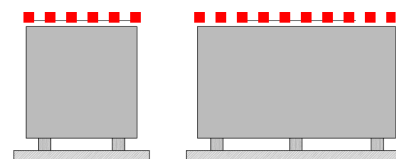
However, frequency depends on the type of use.

Pan inspections at close intervals in the event of:

- 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*



	intervention frequency (months)	1	6	12
1	Presence of corrosions			X
2	Panel fixing			X
3	Fan fixing		X	
4	coil cleaning		X	
5	Water filter cleaning		X	
6	water: quality, pH, glycol concentration		X	
7	check exchanger efficiency			X
8	circulation pump		X	
9	Check of the fixing and the insulation of the power lead			X
10	earth cable check			X
11	Electric panel cleaning			X
12	power remote controls status			X
13	clamp closure, cable isolation integrity			X
14	Voltage and phase unbalancing (no load and on-load)		X	
15	Absorptions of the single electrical loads		X	
16	compressor casing heaters test		X	
17	Checking for leaks *			*
18	cooling circuit work parameter detection		X	
19	safety valve *			*
20	protective device test: pressure switches, thermostats, flow switches etc..			X
21	control system test: setpoint, climatic compensations, capacity stepping, air flow-rate variations			X
22	Control device test: alarm signalling, thermometers, probes, pressure gauges etc			X

**NOTE**

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

## Unit booklet

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

In this way, it will be easier to adequately schedule the various interventions and facilitate any troubleshooting.

On the schedule note:

- date
- intervention description
- carried out measures etc.

## Standby mode

If foreseen a long period of inactivity:

- turn off the power
- Prevent the risk of freezing (use glycol or empty the system) disconnect voltage to avoid electric risks or damages following lightning

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

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

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

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

## System drain

The system must be drained only if necessary.

Avoid draining the system periodically; corrosive phenomena can be generated.

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

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

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

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

## Compressor casing heater

Check:

- closure
- Operation

## Water side heat exchanger

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

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

The clearing must be effected:

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

## Water filter

Check that no impurities prevent the correct passage of water.

## Flow switch

- controls the operations
- remove incrustations from the palette

## Circulation pumps

Check:

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

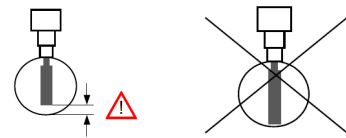
## Insulations

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

## Safety valve

The pressure relief valve must be replaced :

- if it has intervened
- if there is oxidation
- based on the date of manufacture, in compliance with local regulations.



## Air coil

⇒ *Accidental contact with the exchanger fins can cause cuts: wear protective gloves.*

The coil must allow maximum thermal exchange, therefore, the surface must be clear from dirt and scaling.

It is recommended a quarterly cleaning of the coils, as the minimum.

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

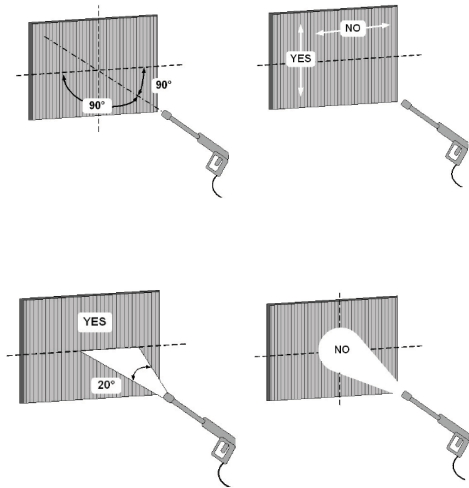
Clean the air inlet side.

Use a soft brush or aspirator or pressurised air jet or high-pressure water jet machine.

Keep the direction parallel to the flow of the flaps to avoid damages.

Check the aluminium flaps have not been damaged or folded, on the contrary contact an authorised after-sales assistance centre to "comb" the coil for excellent air flow.

Keep the direction parallel to the flow of the flaps to avoid damages.



## Electric fans

Check:

- the fans and the relative protection grids are well fixed
- the fan bearings (evident by noise and anomalous vibrations)
- the terminal protection covers are closed and the cable holders are properly positioned.

## Refrigerant leak detector

### Option present with compressor box

For specific information refer to the component manufacturer's manual.

### Maintenance

The inspection must be carried out by qualified service personnel.

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

The 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 sensor life and / or reduce sensitivity.*

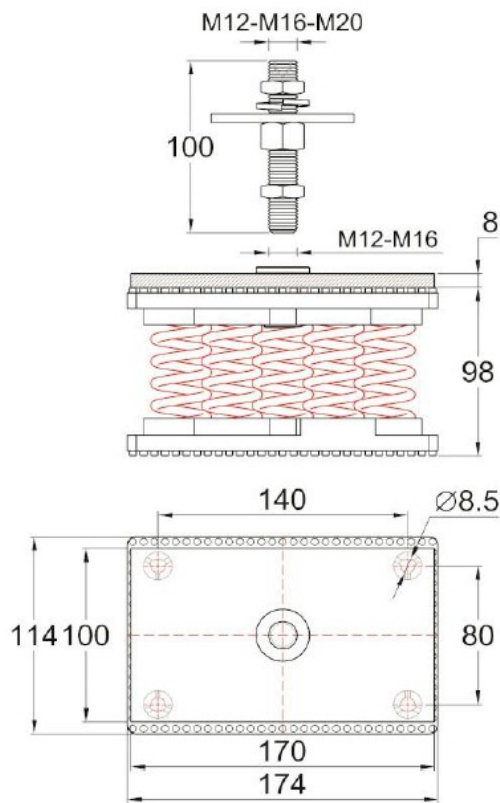
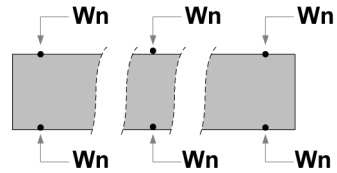


Anti-vibration mount support

PE code



W1 ... Wn: see dimensional drawings  
vedere dimensionali



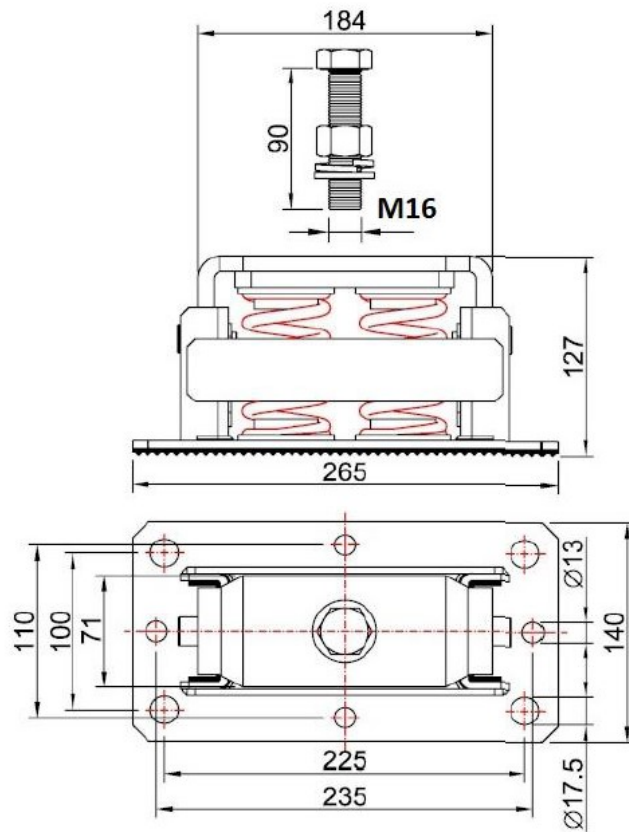
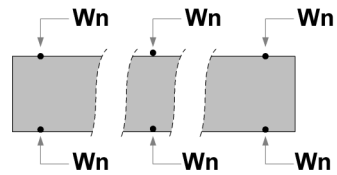
	W1	W2	W3	W4	W5	W6
<b>PEN400004</b>	RX703P	RX602-104Pr	RX703P	RX602-104Pr		
<b>PEN400005</b>	RX704P	RX603-104P	RX704P	RX603-104P		
<b>PEN400006</b>	RZ412-X304P	RX503-Z208Pr	RZ412-X304P	RX503-Z208Pr		
<b>PEN400007</b>	RX704P	RX504-201P	RX602-Z112Pr	RX704P	RX504-201P	RX602-Z112Pr
<b>PEN40008</b>	RZ520-X204P	RZ712P	RZ520-X204P	RZ712P		
<b>PEN40009</b>	RZ 412-X304P	RZ 412-X304P	RX 502-Z202Pr	RZ 412-X304P	RZ 412-X304P	RX 502-Z202Pr

Anti-seismic spring antivibration mounts

PE code



W1 ... Wn: see dimensional drawings  
vedere dimensionali



	W1	W2	W3	W4	W5	W6
<b>PEN400010</b>	LaLV 2501	LaLV 245	LaLV 2501	LaLV 245		
<b>PEN400011</b>	LaLV 245	LaLV 2301	LaLV 245	LaLV 2301		
<b>PEN400012</b>	LaLV 2501	LaLV 247	LaLV 2301	LaLV 2501	LaLV 247	LaLV 2301
<b>PEN400013</b>	LaLV 248	LaLV 233	LaLV 248	LaLV 233		
<b>PEN400014</b>	LaLV 251	LaLV 247	LaLV 251	LaLV 247		
<b>PEN400015</b>	LaLV 248	LaLV 248	LaLV 222	LaLV 248	LaLV 248	LaLV 222

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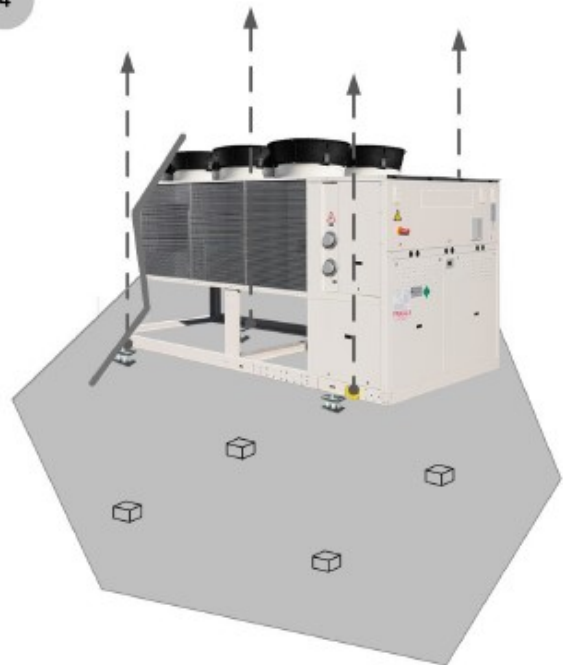
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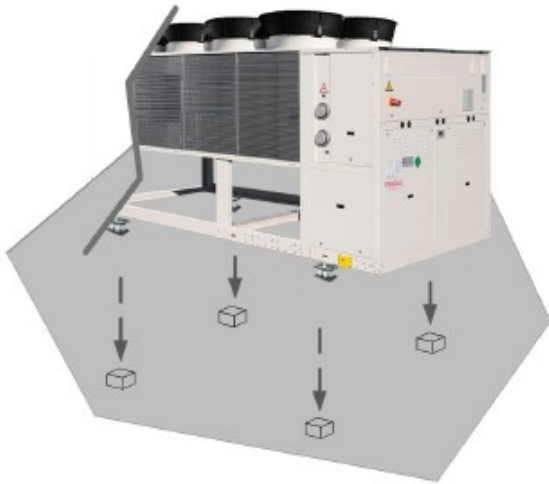
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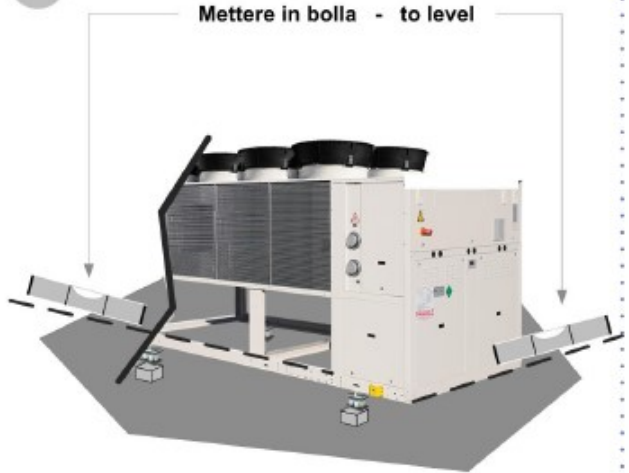
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10



## Disconnection

### WARNING

⇒ Before performing any operation, read the warnings found in the Maintenance chapter.

Avoid leak or spills into the environment.

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

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

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

### WEEE INFORMATION

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

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

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

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

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

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

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

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

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

This equipment may contain:

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

- lubrication oil contained in compressors and in the 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.



**Warning:**  
Fire hazard  
Flammable materials



### 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.

### Handling

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

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

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

### Installation

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

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

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

Carefully check the positioning of the unit.

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

Carefully check the positioning and the anchoring of the unit.

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

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

### General risks

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

Electrically isolate the unit (yellow-red isolator).

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

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

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

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

Always contact the qualified assistance centre.

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

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

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

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

### 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.

### Moving parts

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

Prior to entering the inside of the unit open the isolator situated on the connection line of the unit itself, padlock and display the appropriate warning sign.

Contact with the fans can cause injury.

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

### Refrigerant

The intervention of the safety valve and the consequent 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.

### 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.



# General technical data

## Performance - Excellence

### Acoustic configuration Compressor soundproofing (SC)

SIZE			80.3	90.4	100.4	110.4	120.4	130.4	145.4	160.4	185.5	210.6	225.6	240.6
<b>Cooling</b>														
Cooling capacity	1	[kW]	215	240	265	290	320	355	390	430	500	556	611	656
Compressor power input	1	[kW]	67,9	68,9	77,0	87,4	98,2	104	118	133	151	174	183	203
Total power input	2	[kW]	72,3	75,7	83,9	94,1	105	113	127	142	162	186	196	216
Partial recovery heating capacity	3	[kW]	73,6	80,3	88,9	98,1	109	119	132	146	169	190	206	223
EER	1	-	2,97	3,17	3,16	3,08	3,05	3,14	3,07	3,03	3,09	2,99	3,12	3,04
Water flow-rate (User Side)	1	[l/s]	10,2	11,4	12,6	13,8	15,2	16,9	18,5	20,4	23,7	26,4	29,0	31,2
Internal exchanger pressure drops	1	[kPa]	25	30	30	27	27	31	32	32	36	44	48	39
Cooling capacity (EN14511:2018)	4	[kW]	215	240	265	290	320	355	390	430	500	555	610	655
Total power input (EN14511:2018)	4	[kW]	72,9	76,4	84,7	94,9	106	114	128	143	163	188	198	218
EER (EN14511:2018)	4	-	2,95	3,14	3,13	3,05	3,02	3,11	3,04	3,00	3,06	2,96	3,08	3,01
SEER	6	-	4,45	4,79	4,74	4,81	4,84	4,86	4,78	4,72	4,88	4,84	4,89	4,86
SEPR	7	-	5,30	5,81	5,63	5,79	6,04	6,22	5,96	6,10	5,94	6,20	6,01	5,92
Cooling capacity (AHRI 550/590)	5	[kW]	213	238	262	288	317	352	386	426	495	550	609	654
Total power input (AHRI 550/590)	5	[kW]	72,1	75,5	83,7	93,8	105	113	126	141	161	185	196	216
COP <sub>r</sub>	5	-	2,96	3,15	3,14	3,06	3,03	3,12	3,05	3,01	3,07	2,97	3,11	3,03
IPLV	5	-	4,45	4,96	4,78	4,85	4,79	4,88	4,78	4,62	4,91	4,77	4,90	4,80
<b>Heating</b>														
Heating capacity	8	[kW]	225	255	280	310	335	375	415	455	530	584	639	684
Compressor power input	8	[kW]	64,5	70,7	77,5	87,0	94,8	103	115	126	146	164	181	194
Total power input	2	[kW]	69,2	78,0	84,7	94,3	102	113	124	136	158	176	196	209
COP	8	-	3,25	3,27	3,31	3,29	3,28	3,32	3,35	3,35	3,35	3,32	3,26	3,27
Water flow (user side)	8	[l/s]	10,9	12,3	13,5	15,0	16,2	18,1	20,1	22,0	25,6	28,2	30,9	33,1
Internal exchanger pressure drops	8	[kPa]	28	34	34	32	32	35	37	37	41	49	53	43
Heating capacity (EN14511:2018)	9	[kW]	225	255	280	310	335	375	415	455	530	585	640	685
Total power input (EN14511:2018)	9	[kW]	69,9	78,8	85,6	95,2	103	114	125	137	160	178	199	211
COP (EN14511:2018)	9	-	3,22	3,24	3,27	3,26	3,26	3,29	3,32	3,31	3,32	3,28	3,22	3,24
SCOP - MEDIUM Climate - W35	6	-	3,73	3,90	3,92	4,10	4,08	4,05	4,00	4,10	-	-	-	-

### Super-silenced acoustic configuration (EN)

SIZE			80.3	90.4	100.4	110.4	120.4	130.4	145.4	160.4	185.5	210.6	225.6	240.6
<b>Cooling</b>														
Cooling capacity	1	[kW]	210	235	260	285	310	345	380	415	485	540	591	635
Compressor power input	1	[kW]	72,5	72,8	82,1	92,6	105	109	125	143	161	187	193	216
Total power input	2	[kW]	74,6	75,9	85,2	95,7	108	113	129	147	166	193	199	222
Partial recovery heating capacity	3	[kW]	73,5	80,0	88,9	98,2	108	118	131	145	168	189	204	221
EER	1	-	2,82	3,10	3,05	2,98	2,87	3,05	2,95	2,82	2,92	2,80	2,97	2,86
Water flow-rate (User Side)	1	[l/s]	9,97	11,2	12,3	13,5	14,7	16,4	18,0	19,7	23,0	25,6	28,1	30,2
Internal exchanger pressure drops	1	[kPa]	24	29	29	26	25	29	31	30	35	42	45	37
Cooling capacity (EN14511:2018)	4	[kW]	210	235	260	285	310	345	380	415	485	540	590	635
Total power input (EN14511:2018)	4	[kW]	75,1	76,6	86,0	96,4	109	114	130	148	167	195	201	224
EER (EN14511:2018)	4	-	2,79	3,06	3,02	2,95	2,85	3,03	2,92	2,80	2,89	2,77	2,94	2,84
SEER	6	-	4,39	4,73	4,68	4,74	4,78	4,83	4,73	4,68	4,87	4,83	4,82	4,76
SEPR	7	-	5,11	5,77	5,57	5,62	5,83	6,11	5,82	5,91	5,77	6,00	5,87	5,73
Cooling capacity (AHRI 550/590)	5	[kW]	208	233	258	282	307	342	377	411	480	535	589	634
Total power input (AHRI 550/590)	5	[kW]	74,3	75,7	84,9	95,4	108	113	129	146	165	192	199	222
COP <sub>r</sub>	5	-	2,80	3,08	3,04	2,96	2,85	3,03	2,92	2,81	2,90	2,80	2,97	2,86
IPLV	5	-	4,26	4,96	4,75	4,78	4,65	4,82	4,64	4,34	4,84	4,65	4,81	4,67
<b>Heating</b>														
Heating capacity	8	[kW]	225	255	280	310	335	375	415	455	530	584	639	684
Compressor power input	8	[kW]	64,5	70,7	77,5	87,0	94,8	103	115	126	146	164	181	194
Total power input	2	[kW]	69,2	78,0	84,7	94,3	102	113	124	136	158	176	196	209
COP	8	-	3,25	3,27	3,31	3,29	3,28	3,32	3,35	3,35	3,35	3,32	3,26	3,27
Water flow (user side)	8	[l/s]	10,9	12,3	13,5	15,0	16,2	18,1	20,1	22,0	25,6	28,2	30,9	33,1
Internal exchanger pressure drops	8	[kPa]	28	34	34	32	32	35	37	37	41	49	53	43
Heating capacity (EN14511:2018)	9	[kW]	225	255	280	310	335	375	415	455	530	585	640	685
Total power input (EN14511:2018)	9	[kW]	69,9	78,8	85,6	95,2	103	114	125	137	160	178	199	211
COP (EN14511:2018)	9	-	3,22	3,24	3,27	3,26	3,26	3,29	3,32	3,31	3,32	3,28	3,22	3,24
SCOP - MEDIUM Climate - W35	6	-	3,73	3,90	3,92	4,10	4,08	4,05	4,00	4,10	-	-	-	-

The Product is compliant with the Erp (Energy Related Products) European Directive. It includes the Commission delegated Regulation (EU) No 2016/2281, also known as Ecodesign LOT21. Contains fluorinated greenhouse gases (GWP 675)

- Data referred to the following conditions: Internal exchanger water temperature = 12/7 °C. Entering external exchanger air temperature = 35 °C. Evaporator fouling factor =  $0.44 \times 10^{(-4)}$  m<sup>2</sup> K/W.
- 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.
- Recovery exchanger water = 40/45 °C
- Data compliant to Standard EN 14511:2018 referred to the following conditions: Internal exchanger water temperature = 12/7 °C. Entering external exchanger air temperature = 35 °C
- Data compliant to Standard AHRI 550/590 referred to the following conditions: Internal exchanger water temperature = 6,7 °C. Water flow-rate 0,043 l/s per kW. Entering external exchanger air temperature = 35 °C. Evaporator fouling factor =  $0.18 \times 10^{(-4)}$  m<sup>2</sup> K/W
- Data compliant to Standard EN 14825:2018
- Data compliant according to EU regulation 2016/2281
- Data referred to the following conditions: Internal exchanger water temperature = 40/45 °C. Entering external exchanger air temperature = 7 °C D.B./6 °C W.B. Evaporator fouling factor =  $0.44 \times 10^{(-4)}$  m<sup>2</sup> K/W
- Data compliant to Standard EN 14511:2018 referred to the following conditions: Internal exchanger water temperature = 40/45 °C. Entering external exchanger air temperature = 7 °C D.B./6 °C W.B.



# Performance - Premium

## Acoustic configuration Compressor soundproofing (SC)

SIZE			90.3	100.3	110.4	120.4	130.4	145.4	160.4	185.5	210.6	225.6	240.6
<b>Cooling</b>													
Cooling capacity	1	[kW]	235	255	275	300	335	370	405	480	530	586	630
Compressor power input	1	[kW]	78,5	88,9	97,0	110	111	129	147	161	189	194	213
Total power input	2	[kW]	83,0	93,3	101	115	118	135	154	170	198	205	225
Partial recovery heating capacity	3	[kW]	81,5	89,4	96,7	107	116	130	144	167	187	203	219
EER	1	-	2,83	2,73	2,72	2,61	2,84	2,74	2,63	2,82	2,68	2,86	2,80
Water flow-rate (User Side)	1	[l/s]	11,2	12,1	13,1	14,2	15,9	17,6	19,2	22,8	25,2	27,8	29,9
Internal exchanger pressure drops	1	[kPa]	29	33	32	29	37	33	34	39	46	48	48
Cooling capacity (EN14511:2018)	4	[kW]	235	255	275	300	335	370	405	480	530	585	630
Total power input (EN14511:2018)	4	[kW]	83,7	94,1	102	116	119	136	155	172	200	207	227
EER (EN14511:2018)	4	-	2,80	2,71	2,70	2,59	2,81	2,72	2,61	2,80	2,65	2,83	2,77
SEER	6	-	4,26	4,24	4,35	4,37	4,55	4,57	4,33	4,64	4,62	4,66	4,64
SEPR	7	-	5,27	5,30	5,07	5,19	5,63	5,34	5,50	5,56	5,62	5,67	5,65
Cooling capacity (AHRI 550/590)	5	[kW]	233	253	273	298	332	367	401	476	525	580	625
Total power input (AHRI 550/590)	5	[kW]	82,7	92,9	101	114	118	135	153	169	197	204	224
COP <sub>r</sub>	5	-	2,82	2,72	2,71	2,60	2,82	2,72	2,62	2,81	2,67	2,84	2,79
IPLV	5	-	4,37	4,38	4,22	4,25	4,50	4,44	4,14	4,67	4,53	4,68	4,59
<b>Heating</b>													
Heating capacity	8	[kW]	240	265	285	315	350	385	420	500	554	609	654
Compressor power input	8	[kW]	70,9	79,8	86,6	96,5	104	116	126	146	163	177	190
Total power input	2	[kW]	75,6	84,6	91,4	101	111	123	133	155	173	189	203
COP	8		3,17	3,13	3,12	3,12	3,15	3,13	3,16	3,23	3,20	3,22	3,22
Water flow (user side)	8	[l/s]	11,6	12,8	13,8	15,2	16,9	18,6	20,3	24,2	26,8	29,4	31,6
Internal exchanger pressure drops	8	[kPa]	31	36	35	34	43	37	38	43	51	53	53
Heating capacity (EN14511:2018)	9	[kW]	240	265	285	315	350	385	420	500	555	610	655
Total power input (EN14511:2018)	9	[kW]	76,4	85,5	92,3	102	112	124	134	157	175	191	206
COP (EN14511:2018)	9	-	3,15	3,10	3,09	3,09	3,12	3,10	3,13	3,19	3,17	3,18	3,18
SCOP - MEDIUM Climate - W35	6	-	3,47	3,64	3,83	3,87	3,80	3,64	3,82	3,91	-	-	-

## Super-silenced acoustic configuration (EN)

SIZE			90.3	100.3	110.4	120.4	130.4	145.4	160.4	185.5	210.6	225.6	240.6
<b>Cooling</b>													
Cooling capacity	1	[kW]	230	250	270	295	325	360	395	470	520	571	615
Compressor power input	1	[kW]	81,0	93,2	103	119	114	134	157	168	198	202	223
Total power input	2	[kW]	83,7	95,9	106	122	118	138	161	173	204	209	230
Partial recovery heating capacity	3	[kW]	80,9	89,2	97,0	108	114	128	144	166	187	201	218
EER	1	-	2,75	2,61	2,55	2,42	2,75	2,61	2,45	2,72	2,55	2,73	2,68
Water flow-rate (User Side)	1	[l/s]	10,9	11,9	12,8	14,0	15,4	17,1	18,8	22,3	24,7	27,1	29,2
Internal exchanger pressure drops	1	[kPa]	28	32	31	28	35	31	33	38	45	46	46
Cooling capacity (EN14511:2018)	4	[kW]	230	250	270	295	325	360	395	470	520	570	615
Total power input (EN14511:2018)	4	[kW]	84,4	96,7	107	123	119	139	162	174	206	211	232
EER (EN14511:2018)	4	-	2,72	2,58	2,52	2,40	2,73	2,59	2,43	2,69	2,53	2,70	2,65
SEER	6	-	4,22	4,17	4,31	4,28	4,47	4,51	4,25	4,60	4,58	4,60	4,58
SEPR	7	-	5,16	5,12	5,00	5,10	5,52	5,19	5,15	5,51	5,53	5,54	5,50
Cooling capacity (AHRI 550/590)	5	[kW]	228	248	268	293	322	357	391	466	516	566	610
Total power input (AHRI 550/590)	5	[kW]	83,4	95,5	105	121	118	137	160	172	203	208	229
COP <sub>r</sub>	5	-	2,74	2,60	2,54	2,41	2,74	2,60	2,44	2,70	2,54	2,72	2,66
IPLV	5	-	4,21	4,27	4,11	4,13	4,46	4,31	3,91	4,62	4,43	4,60	4,48
<b>Heating</b>													
Heating capacity	8	[kW]	240	265	285	315	350	385	420	500	554	609	654
Compressor power input	8	[kW]	70,9	79,8	86,6	96,5	104	116	126	146	163	177	190
Total power input	2	[kW]	75,6	84,6	91,4	101	111	123	133	155	173	189	203
COP	8		3,17	3,13	3,12	3,12	3,15	3,13	3,16	3,23	3,20	3,22	3,22
Water flow (user side)	8	[l/s]	11,6	12,8	13,8	15,2	16,9	18,6	20,3	24,2	26,8	29,4	31,6
Internal exchanger pressure drops	8	[kPa]	31	36	35	34	43	37	38	43	51	53	53
Heating capacity (EN14511:2018)	9	[kW]	240	265	285	315	350	385	420	500	555	610	655
Total power input (EN14511:2018)	9	[kW]	76,4	85,5	92,3	102	112	124	134	157	175	191	206
COP (EN14511:2018)	9	-	3,15	3,10	3,09	3,09	3,12	3,10	3,13	3,19	3,17	3,18	3,18
SCOP - MEDIUM Climate - W35	6	-	3,47	3,64	3,83	3,87	3,80	3,64	3,82	3,91	-	-	-

The Product is compliant with the Erp (Energy Related Products) European Directive. It includes the Commission delegated Regulation (EU) No 2016/2281, also known as Ecodesign LOT21. Contains fluorinated greenhouse gases (GWP 675)

- Data referred to the following conditions: Internal exchanger water temperature = 12/7 °C. Entering external exchanger air temperature = 35 °C. Evaporator fouling factor =  $0.44 \times 10^{(-4)}$  m<sup>2</sup> K/W.
- 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.
- Recovery exchanger water = 40/45 °C
- Data compliant to Standard EN 14511:2018 referred to the following conditions: Internal exchanger water temperature = 12/7 °C. Entering external exchanger air temperature = 35 °C
- Data compliant to Standard AHRI 550/590 referred to the following conditions: Internal exchanger water temperature = 6,7 °C. Water flow-rate 0,043 l/s per kW. Entering external exchanger air temperature = 35 °C. Evaporator fouling factor =  $0.18 \times 10^{(-4)}$  m<sup>2</sup> K/W
- Data compliant to Standard EN 14825:2018
- Data compliant according to EU regulation 2016/2281
- Data referred to the following conditions: Internal exchanger water temperature = 40/45 °C. Entering external exchanger air temperature = 7 °C D.B./6 °C W.B. Evaporator fouling factor =  $0.44 \times 10^{(-4)}$  m<sup>2</sup> K/W
- Data compliant to Standard EN 14511:2018 referred to the following conditions: Internal exchanger water temperature = 40/45 °C. Entering external exchanger air temperature = 7 °C D.B./6 °C W.B.

# Construction

## Excellence

SIZE		80.3	90.4	100.4	110.4	120.4	130.4	145.4	160.4	185.5	210.6	225.6	240.6
<b>Compressor</b>													
Type of compressors	1	SCROLL											
Refrigerant		R-32											
No. of compressors	[Nr]	3	4	4	4	4	4	4	4	5	6	6	6
Rated power (C1)	[HP]	40	40	50	50	60	65	65	80	80	105	105	120
Rated power (C2)	[HP]	40	50	50	60	60	65	80	80	105	105	120	120
Std Capacity control steps		4	6	4	6	6	6	6	4	6	8	8	6
Oil charge (C1)	[l]	16	16	12	12	17	17	17	18	18	27	27	38
Oil charge(C2)	[l]	8	12	12	17	17	17	18	18	27	27	38	38
Refrigerant charge (C1)	[Kg]	20	34	34	34	35	45	46	47	57	58	66	68
Refrigerant charge (C2)	[Kg]	19	33	33	34	35	44	45	48	57	57	67	69
Refrigeration circuits	[Nr]	2											
<b>Internal exchanger</b>													
Type of internal exchanger	2	PHE											
N. of internal exchanger	[Nr]	1											
Water content	[l]	19	19	20	24	28	32	36	48	57	57	49	60
Minimum system water content	[l]	1350	1500	2700	2700	2700	2150	2350	4350	3150	3450	3750	4500
<b>External exchanger</b>													
Type of external exchanger	3	CCHY											
Number of coils	[Nr]	4	4	4	4	4	4	4	4	4	4	4	4
<b>External Section Fans</b>													
Type of fans	4	AX											
Number of fans	[Nr]	4	6	6	6	6	8	8	8	10	10	12	12
Type of motor	5	EC											
Standard airflow (SC)	[l/s]	24000	36000	36000	36000	36000	48000	48000	48000	60000	60000	72000	72000
Standard airflow (EN)	[l/s]	17933	26900	26900	26900	26900	35867	35867	35867	44833	44833	53800	53800
<b>Connections</b>													
Water fittings		4"	4"	4"	4"	4"	5"	5"	5"	5"	5"	5"	5"
<b>Power supply</b>													
Standard power supply		400/3"/50											
<b>Electrical data</b>													
F.L.A. - Total	[A]	158,2	165,2	194,8	213,5	232,2	256,4	282,3	310,2	359,8	405,6	437,4	465,2
F.L.I. - Total	[kW]	96,3	98,1	117,9	130,7	143,5	158,5	175,6	194,0	224,1	251,7	272,6	291,0
M.I.C. - Value	[A]	566,2	406,9	436,5	547,9	566,6	590,7	616,6	718,2	694,2	740,0	771,7	799,6
M.I.C. - with soft start accessory	[A]	314,5	290,2	379,0	406,9	425,6	440,5	438,6	466,5	516,2	562,0	593,7	621,6

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

Unbalance between phase max 2 %

Voltage variation: max +/- 10%

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

# Construction

## Premium

SIZE		90.3	100.3	110.4	120.4	130.4	145.4	160.4	185.5	210.6	225.6	240.6	
<b>Compressor</b>													
Type of compressors	1							SCROLL					
Refrigerant		R-32											
No. of compressors	[Nr]	3	3	4	4	4	4	4	5	6	6	6	
Rated power (C1)	[HP]	40	40	50	60	65	65	80	80	105	105	120	
Rated power (C2)	[HP]	50	60	60	60	65	80	80	105	105	120	120	
Std Capacity control steps		4	4	6	6	6	6	4	6	8	8	6	
Oil charge (C1)	[l]	8	8	12	17	17	17	18	18	27	27	38	
Oil charge (C2)	[l]	12	17	17	17	17	18	18	27	27	38	38	
Refrigerant charge (C1)	[Kg]	20	20	24	25	36	37	38	47	48	58	59	
Refrigerant charge (C2)	[Kg]	19	24	24	25	35	36	38	47	47	59	60	
Refrigeration circuits	[Nr]	2											
<b>Internal exchanger</b>													
Type of internal exchanger	2							PHE					
N. of internal exchanger	[Nr]	1											
Water content	[l]	19	19	20	24	24	32	36	48	48	57	60	
Minimum system water content	[l]	2350	2100	1750	2050	2550	2350	4050	2950	3250	3550	5450	
<b>External exchanger</b>													
Type of external exchanger	3							CCS					
Number of coils	[Nr]	4	4	4	4	4	4	4	4	4	4	4	
<b>External Section Fans</b>													
Type of fans	4							AX					
Number of fans	[Nr]	4	4	4	4	6	6	6	8	8	10	10	
Type of motor	5							EC					
Standard airflow (SC)	[l/s]	24000	24000	24000	24000	36000	36000	36000	48000	48000	60000	60000	
Standard airflow (EN)	[l/s]	20444	20444	20444	20444	30667	30667	30667	40889	40889	51111	51111	
<b>Connections</b>													
Standard power supply		4"	4"	4"	4"	4"	5"	5"	5"	5"	5"	5"	
<b>Power supply</b>													
Standard power supply		400/3~/50											
<b>Electrical data</b>													
F.L.A. - Total	[A]	173,0	191,7	209,7	228,4	250,6	278,4	306,3	356,0	401,8	433,5	461,4	
F.L.I. - Total	[kW]	106,2	119,0	128,2	141,0	154,7	173,1	191,5	221,6	249,2	270,1	288,5	
M.I.C. - Value	6 [A]	414,7	526,1	544,0	562,7	584,9	612,8	640,6	690,3	736,1	767,8	795,7	
M.I.C. - with soft start accessory	6 [A]	357,2	311,1	403,0	421,7	434,8	434,8	462,6	512,3	558,1	589,8	617,7	

1. SCROLL = SCROLL Compressor
2. PHE = Plate exchanger
3. CCS = Copper / aluminium condenser coil
4. AX = Axial fan
5. EC = Asynchronous motor with permanent magnet commuted electronically.
6. M.I.C.=Maximum unit starting current. The M.I.C. value is obtained adding the max. compressor starting current of the highest size to the power input at max. admissible conditions (F.L.A.) of the remaining electric components.

Unbalance between phase max 2 %

Voltage variation: max +/- 10%

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

## Sound levels - Excellence

### Acoustic configuration with compressor soundproofing (SC)

SIZE	Sound power level (dB) - Octave band (Hz)								Sound pressure level	Sound power level
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
<b>80.3</b>	76	78	79	83	84	80	73	63	68	87
<b>90.4</b>	78	80	81	85	85	81	75	65	68	88
<b>100.4</b>	78	80	82	85	85	81	75	65	69	89
<b>110.4</b>	78	81	82	85	86	82	75	64	69	89
<b>120.4</b>	77	81	81	84	85	81	74	62	69	89
<b>130.4</b>	79	82	83	86	87	83	76	66	70	91
<b>145.4</b>	79	81	83	86	88	83	76	65	70	91
<b>160.4</b>	79	81	83	86	88	84	77	65	70	91
<b>185.5</b>	80	83	84	88	89	85	78	67	71	92
<b>210.6</b>	80	83	84	88	89	85	78	67	71	92
<b>225.6</b>	81	84	85	89	90	86	79	68	72	93
<b>240.6</b>	81	84	85	89	90	86	79	68	72	93

### Super-silenced acoustic configuration (EN)

SIZE	Sound power level (dB) - Octave band (Hz)								Sound pressure level	Sound power level
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
<b>80.3</b>	62	67	76	78	81	78	70	62	65	84
<b>90.4</b>	64	69	78	80	81	79	71	64	65	85
<b>100.4</b>	64	69	79	80	82	80	72	65	66	86
<b>110.4</b>	64	69	78	80	83	80	72	63	66	86
<b>120.4</b>	64	69	78	80	83	81	72	62	67	86
<b>130.4</b>	64	69	78	80	83	80	72	63	66	86
<b>145.4</b>	64	69	78	81	84	81	72	63	67	87
<b>160.4</b>	64	69	78	81	84	81	73	63	67	87
<b>185.5</b>	65	70	80	82	85	82	74	64	68	88
<b>210.6</b>	65	70	80	82	86	83	74	65	68	89
<b>225.6</b>	66	72	81	83	87	84	75	65	68	90
<b>240.6</b>	66	72	81	83	87	84	75	65	69	90

Sound levels refer to full load units, in test nominal conditions. The sound pressure level refers to 1 m. from the standard unit outer surface operating in open field. Measures according to UNI EN ISO 9614-2 regulations, with respect to the EUROVENT 8/1 certification, which provides for a tolerance of 3 dB(A).

Data referred to the following conditions:  
 - internal exchanger water temperature = 12/7 °C  
 - ambient temperature = 35 °C

## Sound levels - Premium

### Acoustic configuration with compressor soundproofing (SC)

SIZE	Sound power level (dB) - Octave band (Hz)								Sound pressure level	Sound power level
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
<b>90.3</b>	76	79	80	83	84	81	74	64	68	87
<b>100.3</b>	76	79	81	84	85	81	74	62	69	88
<b>110.4</b>	76	80	82	84	85	82	74	64	69	88
<b>120.4</b>	75	80	81	84	85	81	74	62	68	88
<b>130.4</b>	78	80	82	85	86	83	75	65	70	90
<b>145.4</b>	78	80	82	85	87	83	76	65	70	90
<b>160.4</b>	78	80	82	86	87	83	76	65	70	90
<b>185.5</b>	79	81	83	87	88	84	77	66	71	91
<b>210.6</b>	79	82	84	87	88	84	77	67	71	91
<b>225.6</b>	80	83	85	88	89	85	78	67	72	92
<b>240.6</b>	80	82	84	88	89	86	78	67	72	92

### Super-silenced acoustic configuration (EN)

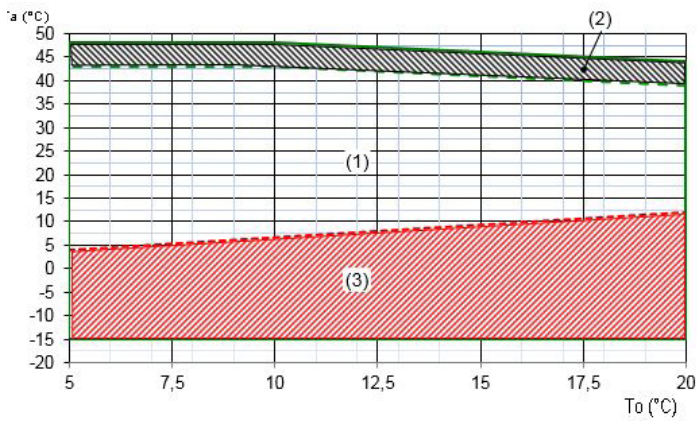
SIZE	Sound power level (dB) - Octave band (Hz)								Sound pressure level	Sound power level
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
<b>90.3</b>	64	69	78	80	82	79	71	63	66	85
<b>100.3</b>	64	69	78	80	83	80	71	61	66	86
<b>110.4</b>	65	70	79	81	83	80	72	63	67	86
<b>120.4</b>	64	70	79	81	83	80	72	62	67	86
<b>130.4</b>	65	70	78	81	83	80	72	63	66	86
<b>145.4</b>	65	70	79	81	84	81	72	63	67	87
<b>160.4</b>	65	70	79	81	84	81	73	63	67	87
<b>185.5</b>	66	72	80	83	85	82	74	64	68	88
<b>210.6</b>	66	72	81	83	86	83	74	65	68	89
<b>225.6</b>	68	73	82	84	87	84	75	65	69	90
<b>240.6</b>	68	73	82	84	87	84	75	65	69	90

Sound levels refer to full load units, in test nominal conditions. The sound pressure level refers to 1 m. from the standard unit outer surface operating in open field. Measures according to UNI EN ISO 9614-2 regulations, with respect to the EUROVENT 8/1 certification, which provides for a tolerance of 3 dB(A).

Data referred to the following conditions:  
 - internal exchanger water temperature = 12/7 °C  
 - ambient temperature = 35 °C

# Operating range - Cooling

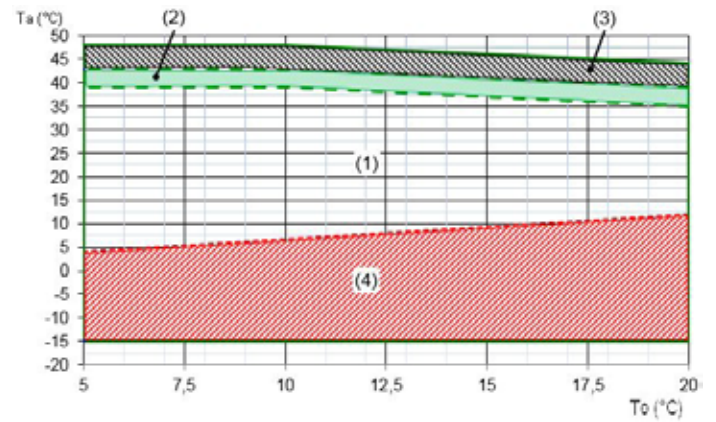
## Excellence SC



Ta (°C) = external exchanger inlet air temperature (D.B.)  
To (°C) = internal exchanger outlet water temperature

1. Standard unit operating range at full load
2. Unit operating range with automatic staging of the compressor capacity
3. Unit operating range with air flow automatic modulation

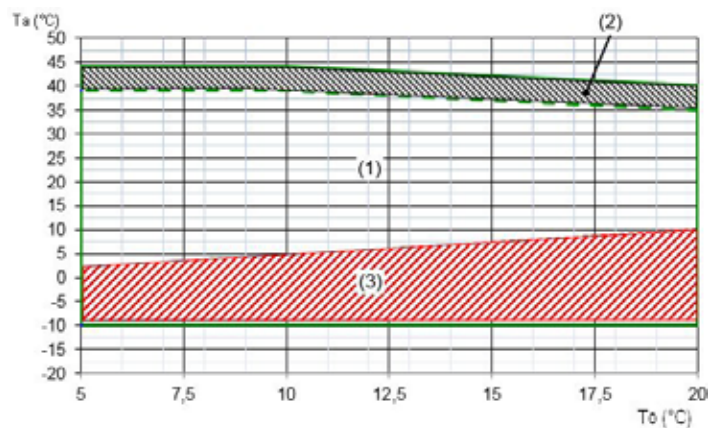
## Excellence EN



Ta (°C) = external exchanger inlet air temperature (D.B.)  
To (°C) = internal exchanger outlet water temperature

1. Standard unit operating range at full load
2. Extended operating range with air flow-rate automatic increasing. Inside this field the sound levels are the same of the 'compressor soundproofing (SC)' acoustic configuration
3. Unit operating range with automatic staging of the compressor capacity
4. Unit operating range with air flow-rate automatic modulation

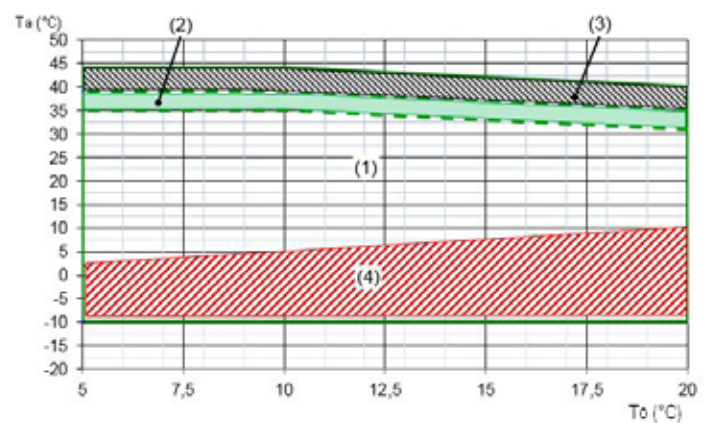
## Premium SC



Ta (°C) = external exchanger inlet air temperature (D.B.)  
To (°C) = internal exchanger outlet water temperature

1. Standard unit operating range at full load
2. Unit operating range with automatic staging of the compressor capacity
3. Unit operating range with air flow automatic modulation

## Premium EN

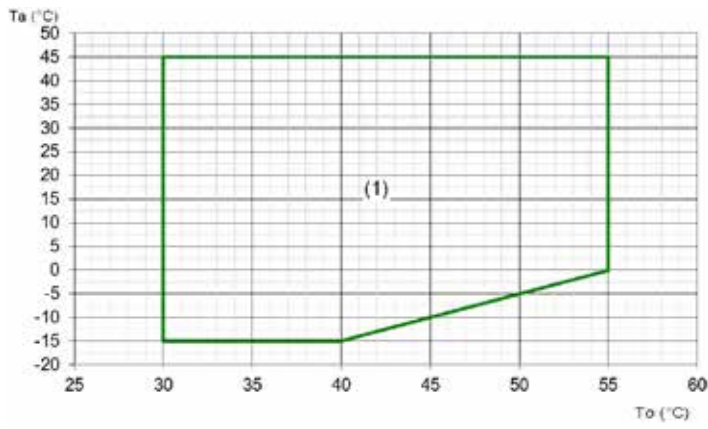


Ta (°C) = external exchanger inlet air temperature (D.B.)  
To (°C) = internal exchanger outlet water temperature

1. Standard unit operating range at full load
2. Extended operating range with air flow-rate automatic increasing. Inside this field the sound levels are the same of the 'compressor soundproofing (SC)' acoustic configuration
3. Unit operating range with automatic staging of the compressor capacity
4. Unit operating range with air flow automatic modulation

# Operating range - Heating

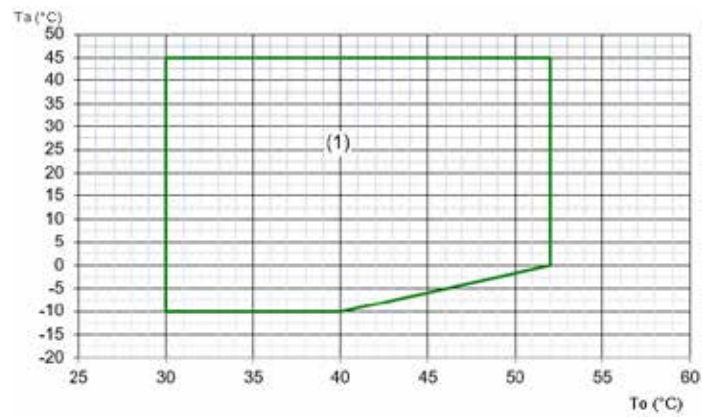
## Excellence SC/EN



Ta (°C) = external exchanger inlet air temperature (D.B.)  
To (°C) = internal exchanger outlet water temperature

1. Standard unit operating range at full load

## Premium SC/EN



Ta (°C) = external exchanger inlet air temperature (D.B.)  
To (°C) = internal exchanger outlet water temperature

1. Standard unit operating range at full load



## Correction factors for ethylene glycol use

% ETHYLENE GLYCOL 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
Cooling Capacity Factor	Nr	0,997	0,994	0,990	0,986	0,981	0,976	0,970	0,964	0,957	0,950
Compressor power input Factor	Nr	0,999	0,999	0,998	0,997	0,996	0,996	0,995	0,994	0,993	0,993
Internal exchanger pressure drop factor	Nr	1,016	1,035	1,056	1,080	1,106	1,135	1,166	1,200	1,236	1,275

## Correction factors for propylene glycol use

% PROPYLENE GLYCOL 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
Cooling Capacity Factor	Nr	0,995	0,990	0,983	0,976	0,968	0,960	0,950	0,939	0,928	0,916
Compressor power input Factor	Nr	0,999	0,997	0,995	0,993	0,991	0,988	0,986	0,983	0,980	0,977
Internal exchanger pressure drop factor	Nr	1,027	1,058	1,093	1,133	1,176	1,224	1,276	1,332	1,393	1,457

## Fouling Correction Factors

### INTERNAL EXCHANGER (EVAPORATOR)

M2 °C/W	F1	FK1
0,44 x 10 (-4)	1,0	1,0
0,88 x 10 (-4)	0,97	0,99
1,76 x 10 (-4)	0,94	0,98

F1 = Cooling capacity correction factors  
FK1 = Compressor power input correction factor

## Exchanger operating range

### INTERNAL EXCHANGER (EVAPORATOR)

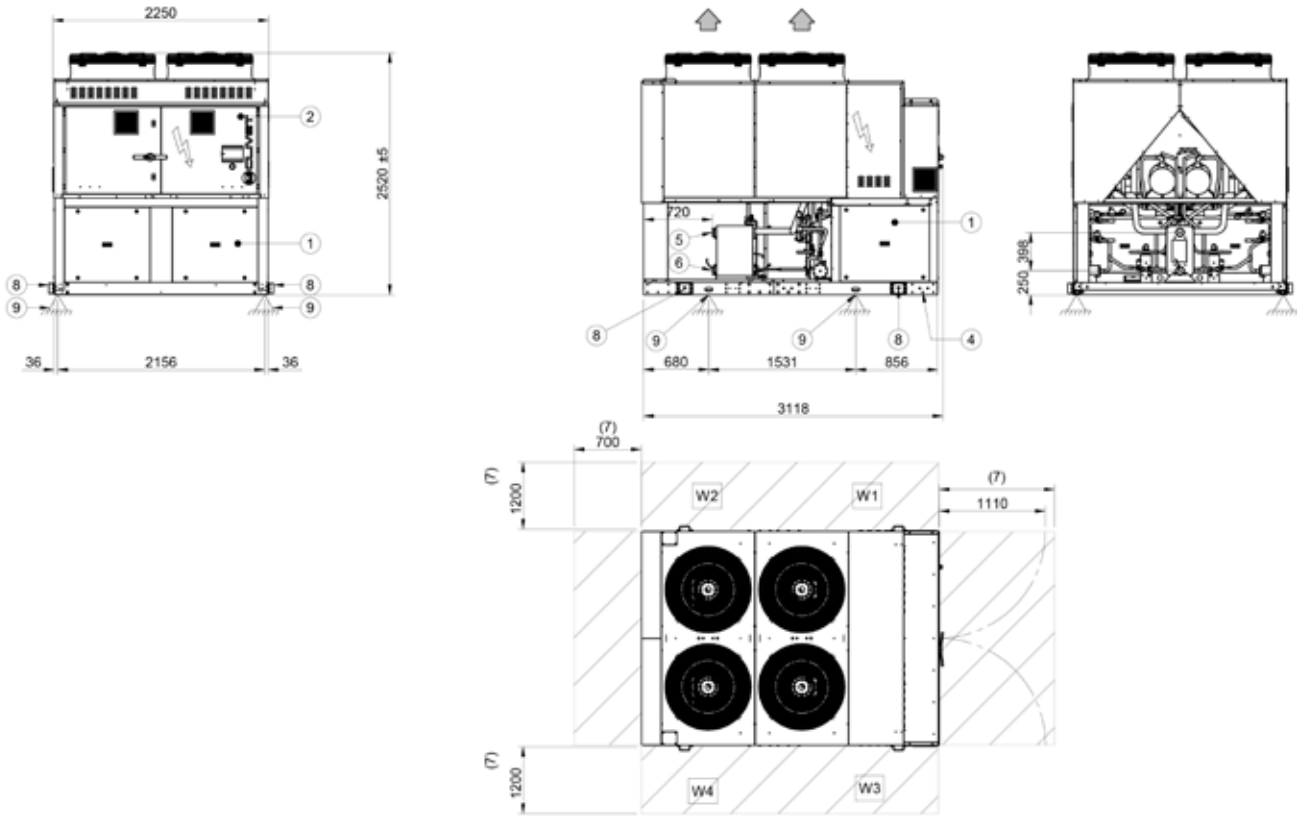
		DPR	DPW
Plate exchanger	PED (CE)	4500	1000
Shell and tube exchanger	PED (CE)	4500	1000

DPr = Maximum operating pressure on refrigerant side in kPa  
DPw = Maximum operating pressure on water side in kPa

## Overload and control device calibrations

		OPEN	CLOSE	VALUE
High pressure switch	kPa	4050		-
Antifreeze protection	°C	4	5,5	-
High pressure safety valve	kPa	-	-	4500
Low pressure safety valve	kPa	-	-	3000
Max no. of compressor starts per hour	n°	-	-	10
Discharge safety thermostat	°C	-	-	150

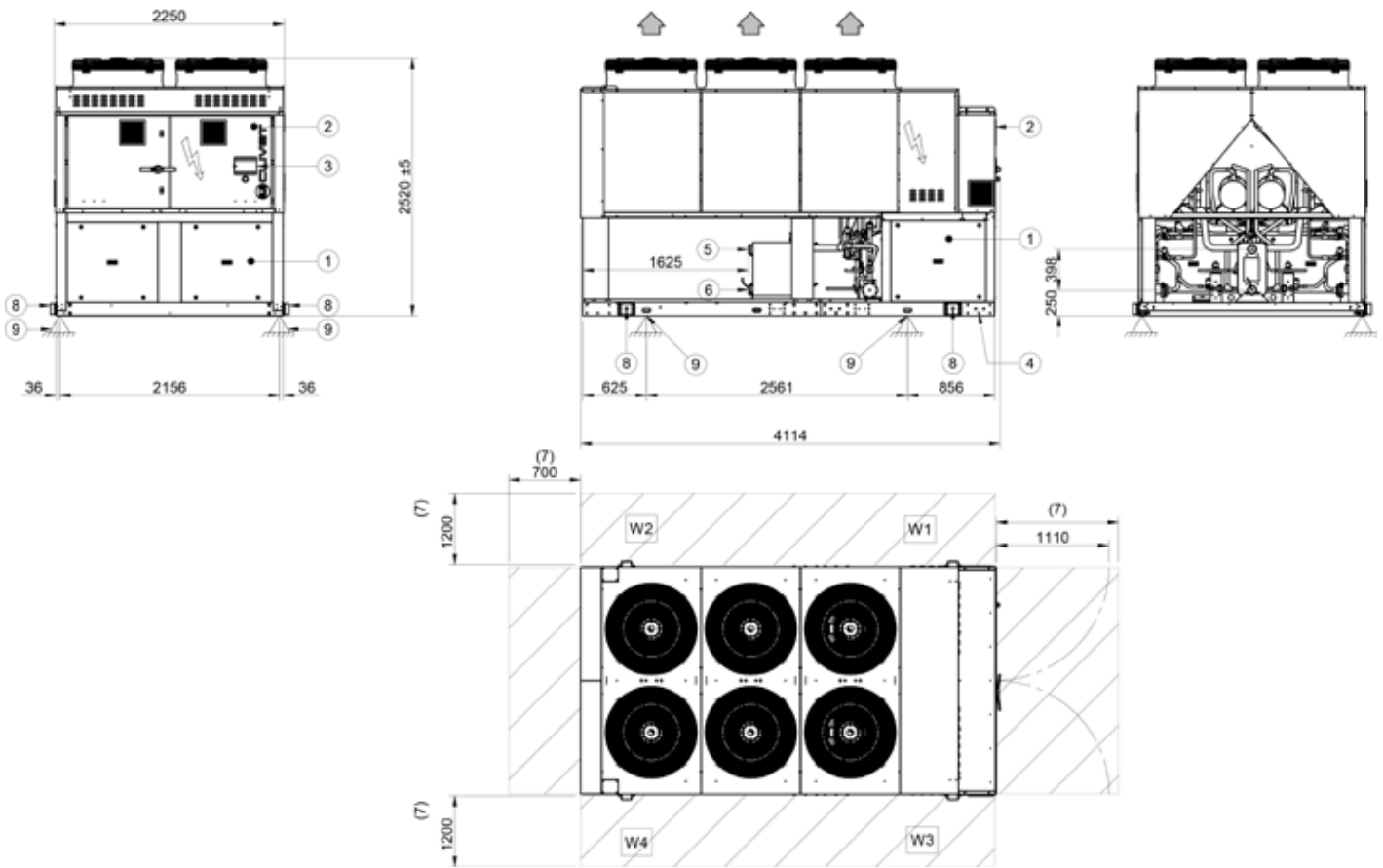




1. Compressor enclosure
2. Electrical panel
3. Control keypad
4. Power input
5. Water inlet 4" Victaulic
6. Water outlet 4" Victaulic
7. Functional spaces
8. Lifting bracket (removed)
9. Support points

SIZE		80.3 EXC	90.0 PRM	100.3 PRM	110.4 PRM	120.4 PRM
		SC/EN	SC/EN	SC/EN	SC/EN	SC/EN
Length	mm	3118	3118	3118	3118	3118
Depth	mm	2250	2250	2250	2250	2250
Height	mm	2520	2520	2520	2520	2523
W1 Supporting point	kg	668	673	721	712	753
W2 Supporting point	kg	490	488	521	526	532
W3 Supporting point	kg	660	672	701	691	749
W4 Supporting point	kg	482	487	502	505	528
Operating weight	kg	2300	2320	2445	2434	2562
Shipping weight	kg	2278	2298	2423	2413	2535

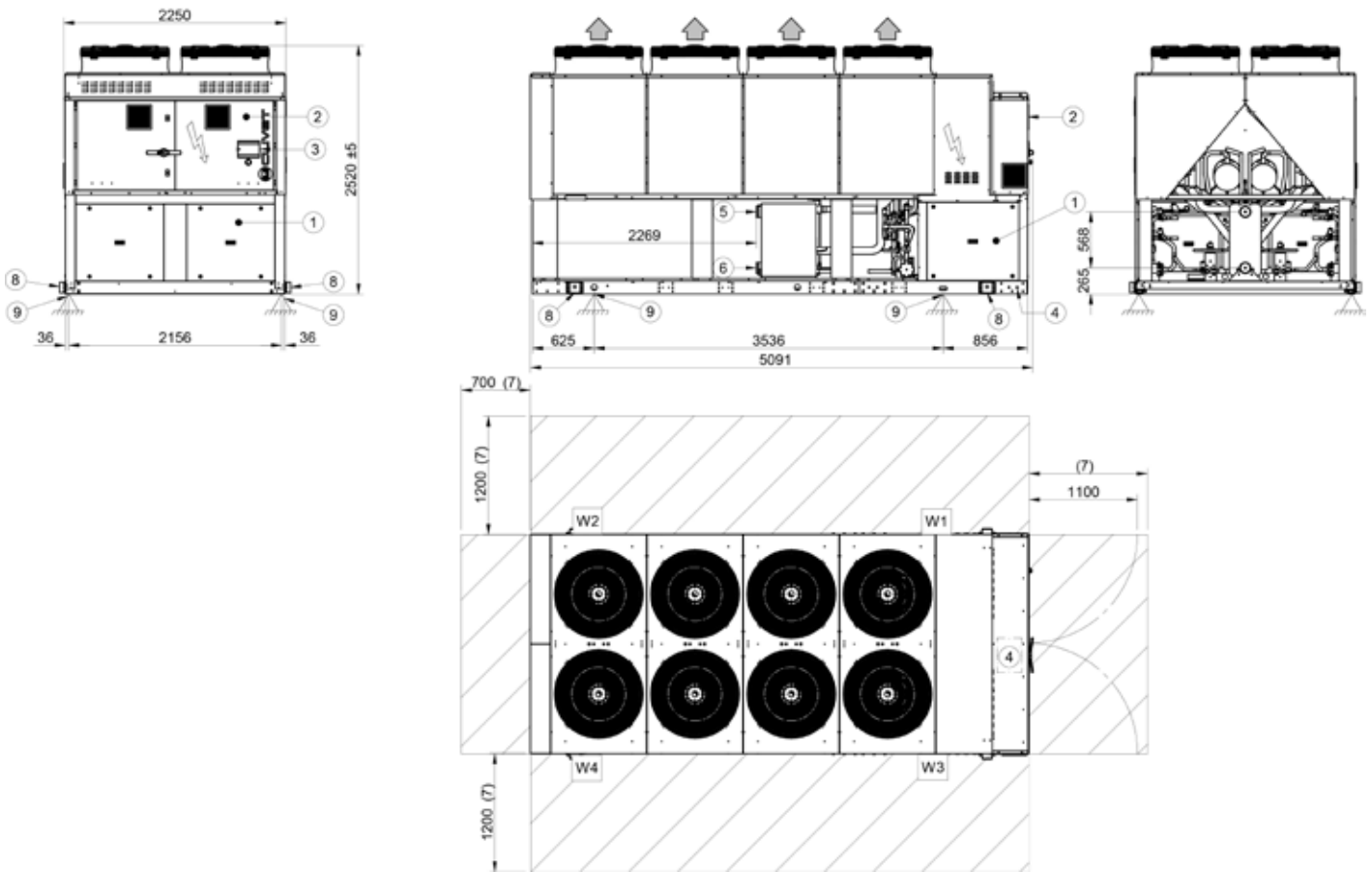
The presence of optional accessories may result in a substantial variation of the weights shown in the table.



1. Compressor enclosure
2. Electrical panel
3. Control keypad
4. Power input
5. Water inlet 4" Victaulic
6. Water outlet 4" Victaulic
7. Functional spaces
8. Lifting bracket (removed)
9. Support points

SIZE		90.4 EXC	100.4 EXC	110.4 EXC	120.4 EXC	130.4 PRM
		SC/EN	SC/EN	SC/EN	SC/EN	SC/EN
Length	mm	4114	4114	4114	4114	4114
Depth	mm	2250	2250	2250	2250	2250
Height	mm	2520	2520	2520	2520	2520
W1 Supporting point	kg	751	756	807	844	845
W2 Supporting point	kg	564	566	594	598	598
W3 Supporting point	kg	752	760	792	847	848
W4 Supporting point	kg	565	570	579	601	601
Operating weight	kg	2631	2652	2772	2890	2893
Shipping weight	kg	2591	2612	2732	2850	2853

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



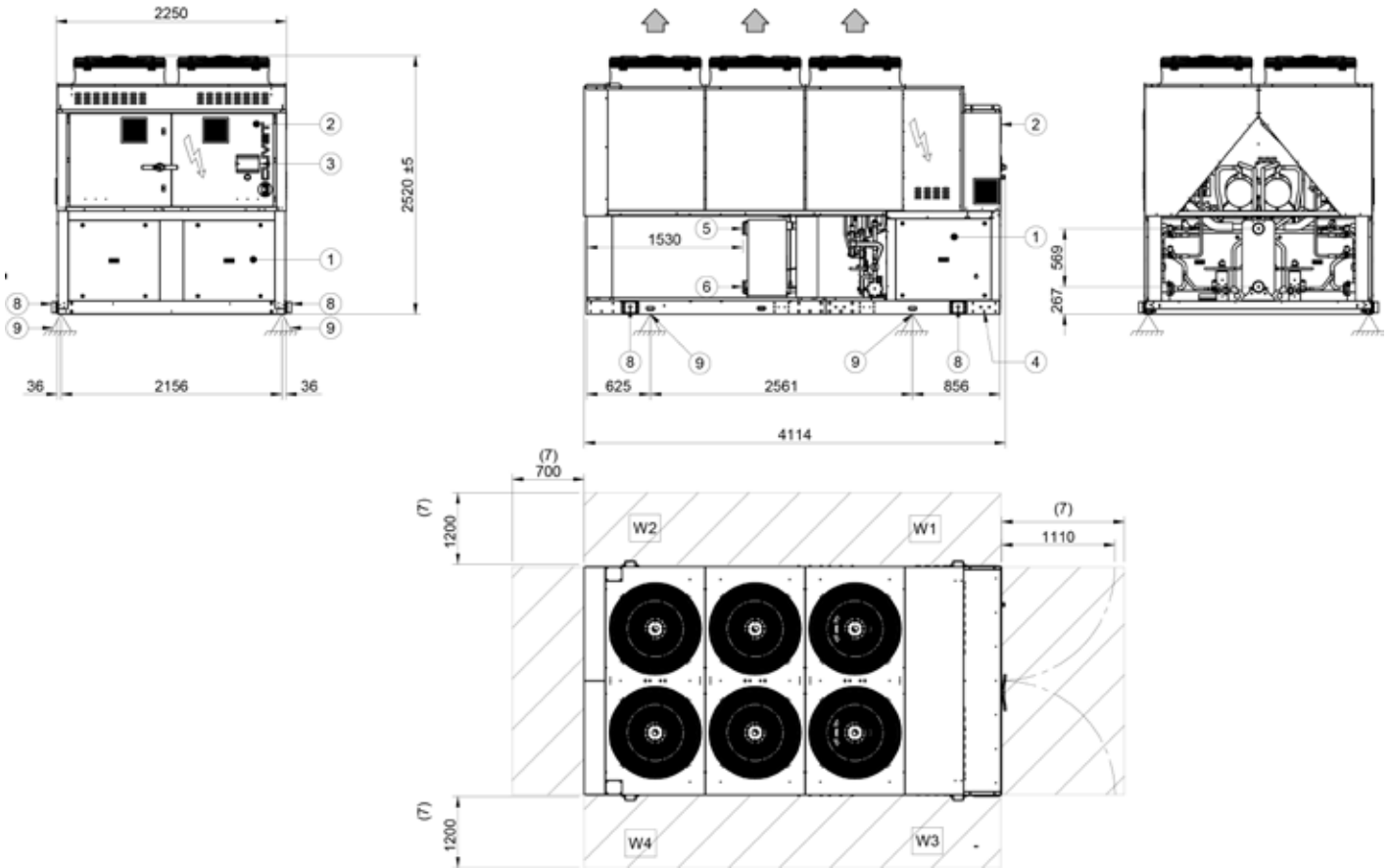
1. Compressor enclosure
2. Electrical panel
3. Control keypad
4. Power input
5. Water inlet 5" Victaulic
6. Water outlet 5" Victaulic
7. Functional spaces
8. Lifting bracket (removed)
9. Support points

SIZE		130.4 EXC	145.4 EXC	160.4 EXC
		SC/EN	SC/EN	SC/EN
Length	mm	5091	5091	5091
Depth	mm	2250	2250	2250
Height	mm	2520	2520	2520
W1 Supporting point	kg	954	1014	1057
W2 Supporting point	kg	694	724	741
W3 Supporting point	kg	954	995	1056
W4 Supporting point	kg	693	705	740
Operating weight	kg	3295	3438	3594
Shipping weight	kg	3279	3396	3538

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

SIZE 145.4 - 160.4 PRM

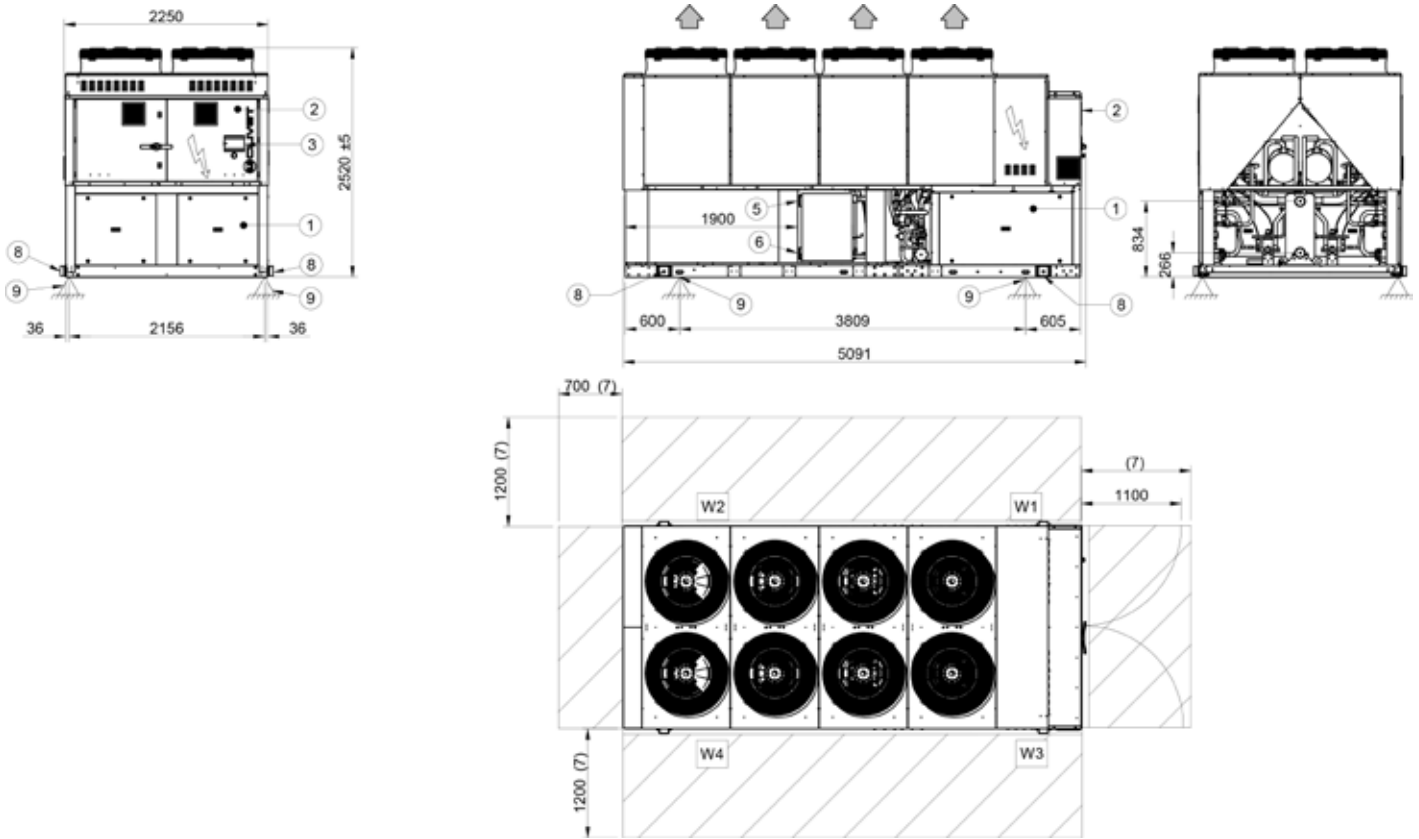
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DATA/DATE 12/02/2021



1. Compressor enclosure
2. Electrical panel
3. Control keypad
4. Power input
5. Water inlet 5" Victaulic
6. Water outlet 5" Victaulic
7. Functional spaces
8. Lifting bracket (removed)
9. Support points

SIZE		145.4 PRM	160.4 PRM
		SC/EN	SC/EN
Length	mm	4114	4114
Depth	mm	2250	2250
Height	mm	2520	2520
W1 Supporting point	kg	900	935
W2 Supporting point	kg	624	634
W3 Supporting point	kg	885	937
W4 Supporting point	kg	609	637
Operating weight	kg	3018	3143
Shipping weight	kg	2985	3105

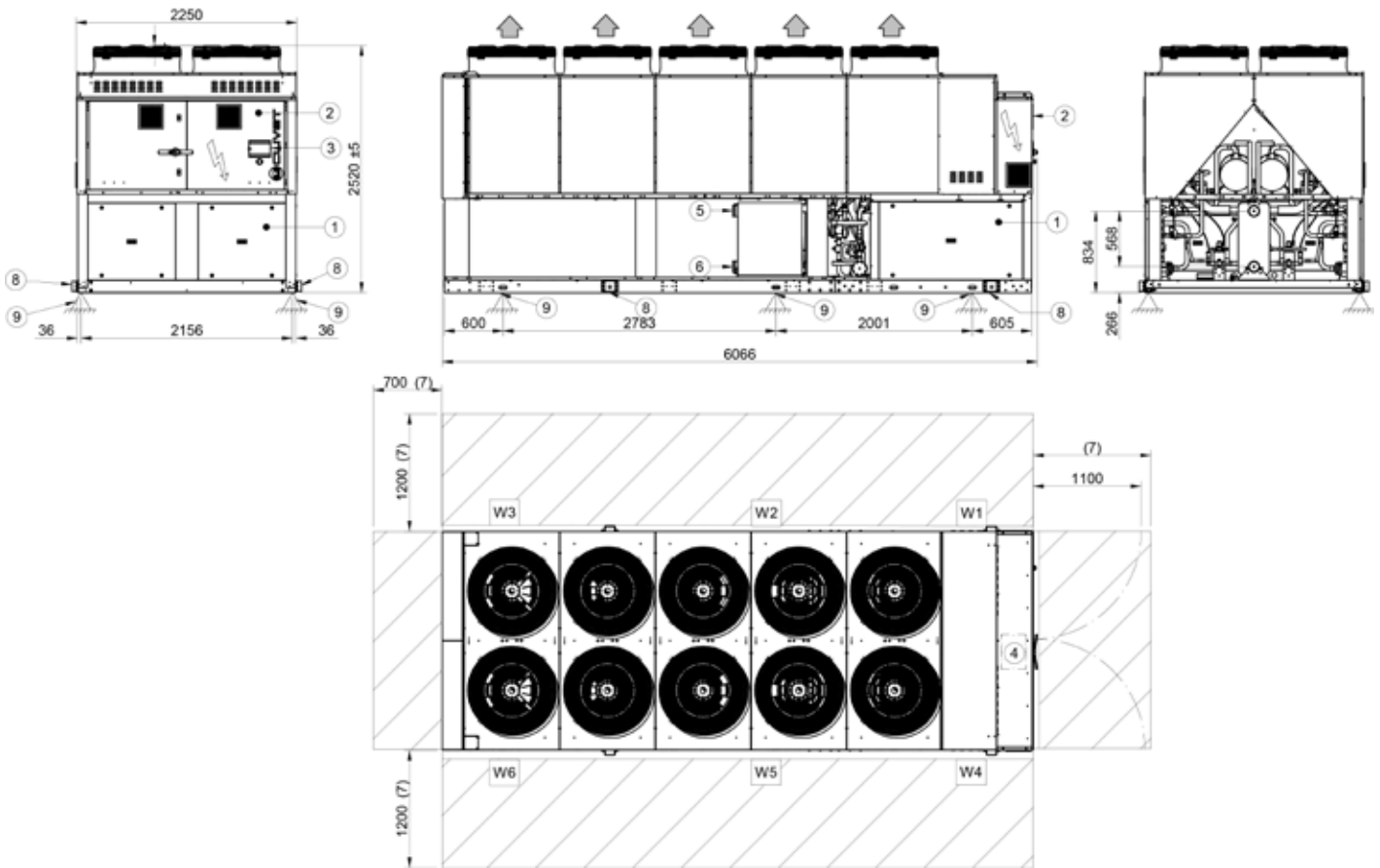
The presence of optional accessories may result in a substantial variation of the weights shown in the table.



1. Compressor enclosure
2. Electrical panel
3. Control keypad
4. Power input
5. Water inlet 5" Victaulic
6. Water outlet 5" Victaulic
7. Functional spaces
8. Lifting bracket (removed)
9. Support points

SIZE		185.5 PRM	210.6 PRM
		SC/EN	SC/EN
Length	mm	5091	5091
Depth	mm	2250	2250
Height	mm	2520	2520
W1 Supporting point	kg	1098	1115
W2 Supporting point	kg	806	817
W3 Supporting point	kg	1084	1116
W4 Supporting point	kg	791	819
Operating weight	kg	3779	3867
Shipping weight	kg	3724	3812

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



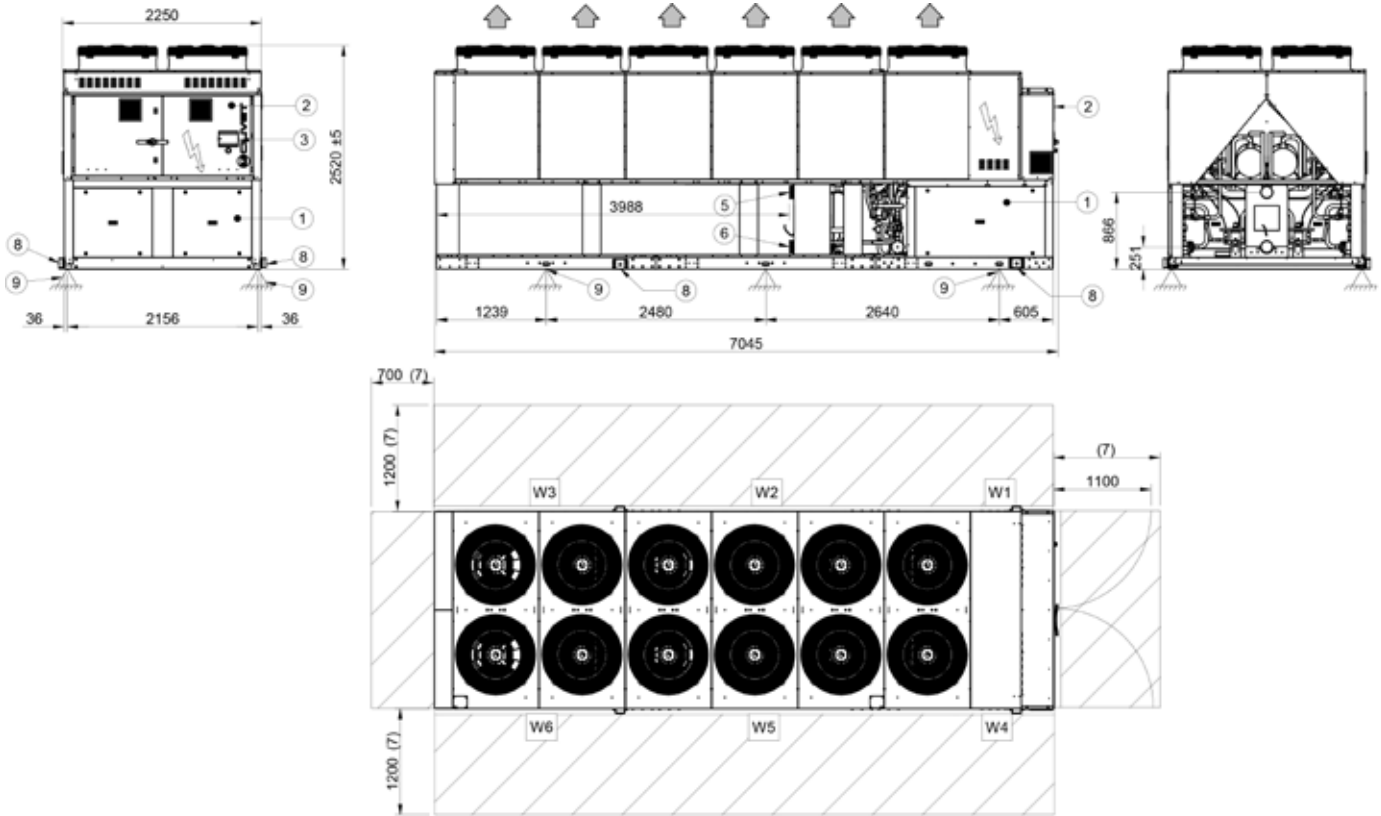
- 1. Compressor enclosure
- 2. Electrical panel
- 3. Control keypad
- 4. Power input
- 5. Water inlet 5" Victaulic
- 6. Water outlet 5" Victaulic
- 7. Functional spaces
- 8. Lifting bracket (removed)
- 9. Support points

SIZE		185.5 EXC	210.6 EXC	225.6 PRM	240.6 PRM
		SC/EN	SC/EN	SC/EN	SC/EN
Length	mm	6066	6066	6066	6066
Depth	mm	2250	2250	2250	2250
Height	mm	2520	2520	2520	2520
W1 Supporting point	kg	817	893	907	990
W2 Supporting point	kg	867	878	881	900
W3 Supporting point	kg	330	329	329	328
W4 Supporting point	kg	858	871	949	964
W5 Supporting point	kg	899	901	919	928
W6 Supporting point	kg	327	327	325	325
Operating weight	kg	4097	4199	4310	4435
Shipping weight	kg	4031	4133	4244	4365

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

SIZE 225.6 - 240.6 EXC

DAAN40004  
DATA/DATE 11/02/2021



- 1. Compressor enclosure
- 2. Electrical panel
- 3. Control keypad
- 4. Power input
- 5. Water inlet 5" Victaulic
- 6. Water outlet 5" Victaulic
- 7. Functional spaces
- 8. Lifting bracket (removed)
- 9. Support points

SIZE		225.6 EXC	240.6 EXC
		SC/EN	SC/EN
Length	mm	7045	7045
Depth	mm	2250	2250
Height	mm	2520	2520
W1 Supporting point	kg	1103	1117
W2 Supporting point	kg	868	870
W3 Supporting point	kg	444	444
W4 Supporting point	kg	1059	1137
W5 Supporting point	kg	836	845
W6 Supporting point	kg	450	449
Operating weight	kg	4761	4861
Shipping weight	kg	4701	4801

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

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