

Air heat pump - ductable water for indoor installation

WSN-XIN 21-141



Dear Customer,

We congratulate you on choosing this product

For many years Clivet has been offering systems that provide maximum comfort, together with high reliability, efficiency, quality and safety.

The aim of the company is to offer advanced systems, that assure the best comfort, reduce energy consumption and the installation and maintenance cost for the life cycle of the system.

The purpose of this manual is to provide you with information that is useful from reception of the equipment, through installation, operational usage and finally disposal so that this advanced system offers the best solution.

Yours faithfully.

CLIVET Spa

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

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Index of contents

		4
1	Installation quick guide	5
2	General description	6
3	Reception	8
4	Positioning	10
5	Water connections	14
6	Electrical connections	16
7	Start-up	23
8	Control	31
9	Maintenance	45
10	Accessories	49
11	Decommissioning	62
12	Residual risks	63
13	Dimensional drawings	64
14	Technical information	68

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2 General description

2.1 Manual

The manual provides correct unit installation, use and maintenance.

Pay particular attention to:



Warning, identifies particularly important operations or information.



Prohibited operations that must not be carried out, that compromise the operating of the unit or may cause damage to persons or things.

- 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.

2.2 Preliminaries

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

2.3 Risk situations



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

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

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

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

2.4 Intended use

Use the unit only:

- for cooling/heating water or a water and glycol mix for air-conditioning only
- 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.

2.5 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.

2.6 Maintenance

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



Turn the unit off before any operation.

2.7 Modification



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

2.8 Breakdown/Malfuction

Disable the unit immediately in case of breakdown or malfunction.

Contact a certified service agent.

Use original spares parts only.

Using the unit in case of breakdown or malfunction:

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

2.9 User training



The installer has to train the user on:

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

2.10 Data update

Continual product improvements may imply manual data changes.

Visit manufacturer web site for updated data.

2.11 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

2.12 Unit identification

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



The matriculation plate must never be removed.

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
- manufacturer logo and address

2.13 Serial number

It identifies uniquely each unit.

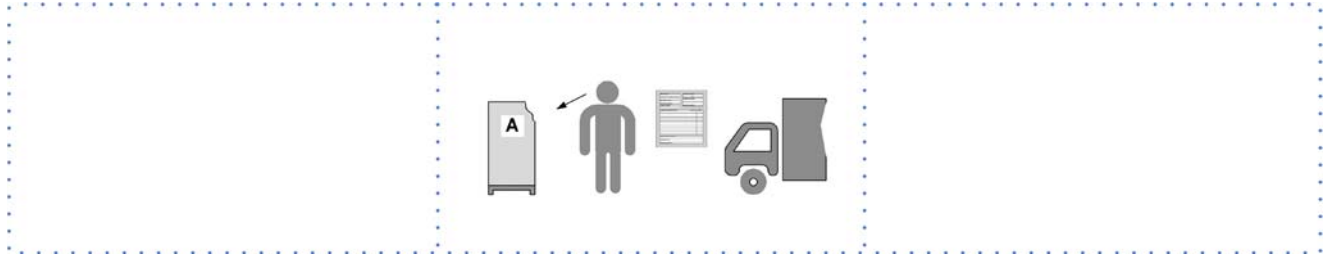
Must be quoted when ordering spare parts.

2.14 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
Electrical wiring diagram

3 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.



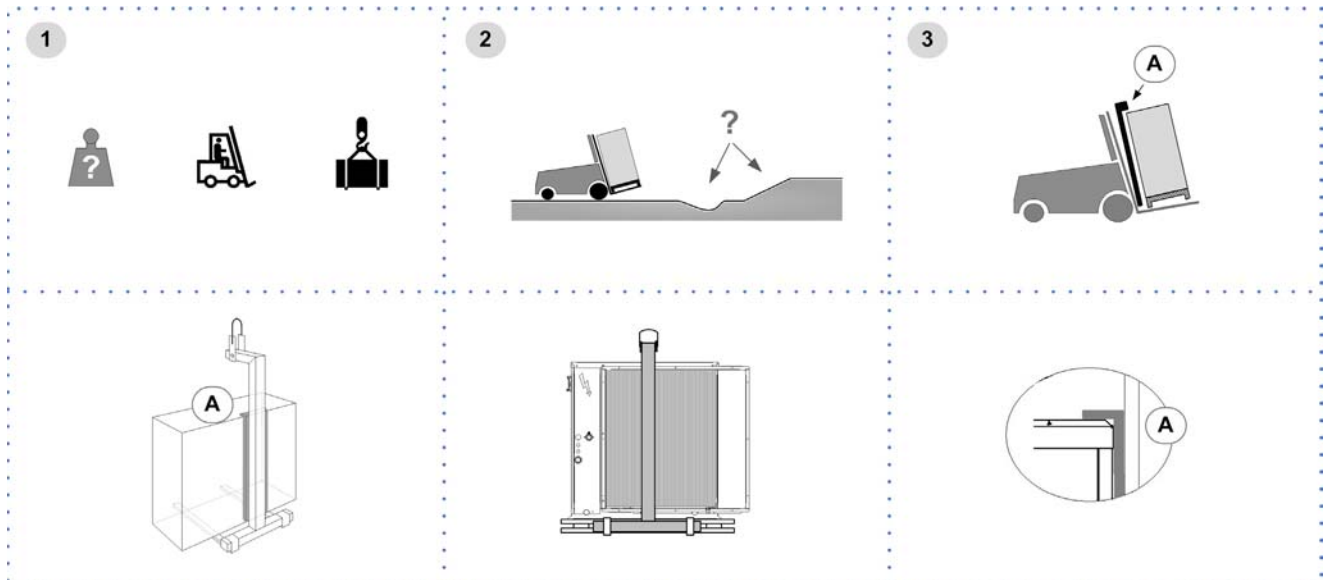
Any disputes must be made within 8 days from the date of the delivery. Complaints after this period are invalid.

3.1 Storage

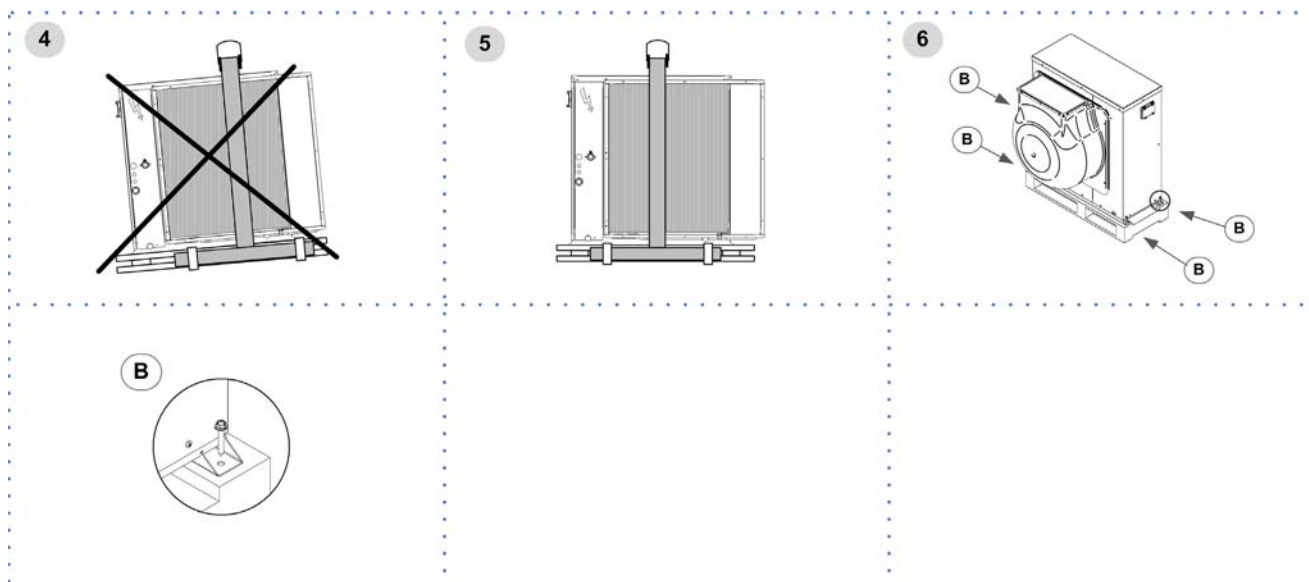
Observe external packaging instructions.

3.2 Handling

1. Verify unit weight and handling equipment lifting capacity.
2. Identify critical points during handling (disconnected routes, flights, steps, doors).
3. Suitably protect the unit to prevent damage.
4. Before starting the handling, make sure that the unit is stable.
5. Start hoisting the unit.
6. Remove screws



A - Protections



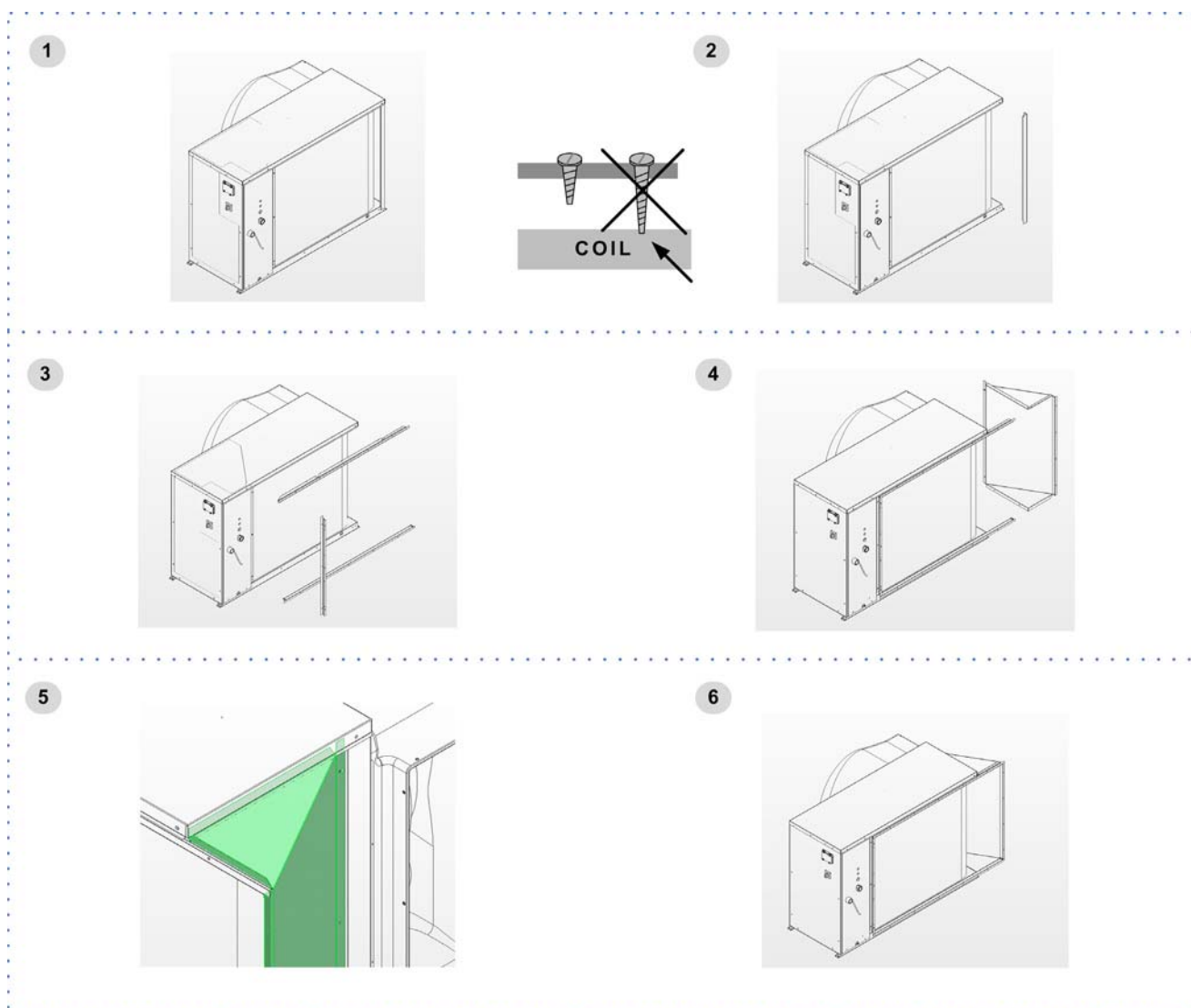
B - Screws

3.3 Packaging removing

Be careful not to damage the unit.

Keep packing material out of children's reach it may be dangerous.

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



4 Positioning

During positioning consider these elements:

- Technical spaces requested by the unit
- Electrical connections
- Water connections
- Spaces for air exhaust and intake

4.1 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 DIMENSIONS section.

Double all functional spaces if two or more unit are aligned.

4.2 Positioning



Units are designed to be installed:

- INTERNAL
- in fixed positions

Limit vibration transmission:

- use antivibration devices on unit bearing points
- install flexible joints on the hydraulic connections

Choose the installation place according to the following criteria:

- Customer approval
- safe accessible position
- technical spaces requested by the unit
- spaces for the air intake/exhaust
- Avoid installations in places subject to flooding
- verify unit weight and bearing point capacity
- verify that all bearing points are aligned and leveled
- install the unit raised from the ground
- max. distance allowed by the electrical connections

Prefer places where the unit doesn't disturb the neighbours.



Avoid installations next to bedrooms or windows.



Avoid snow accumulations on batteries.

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

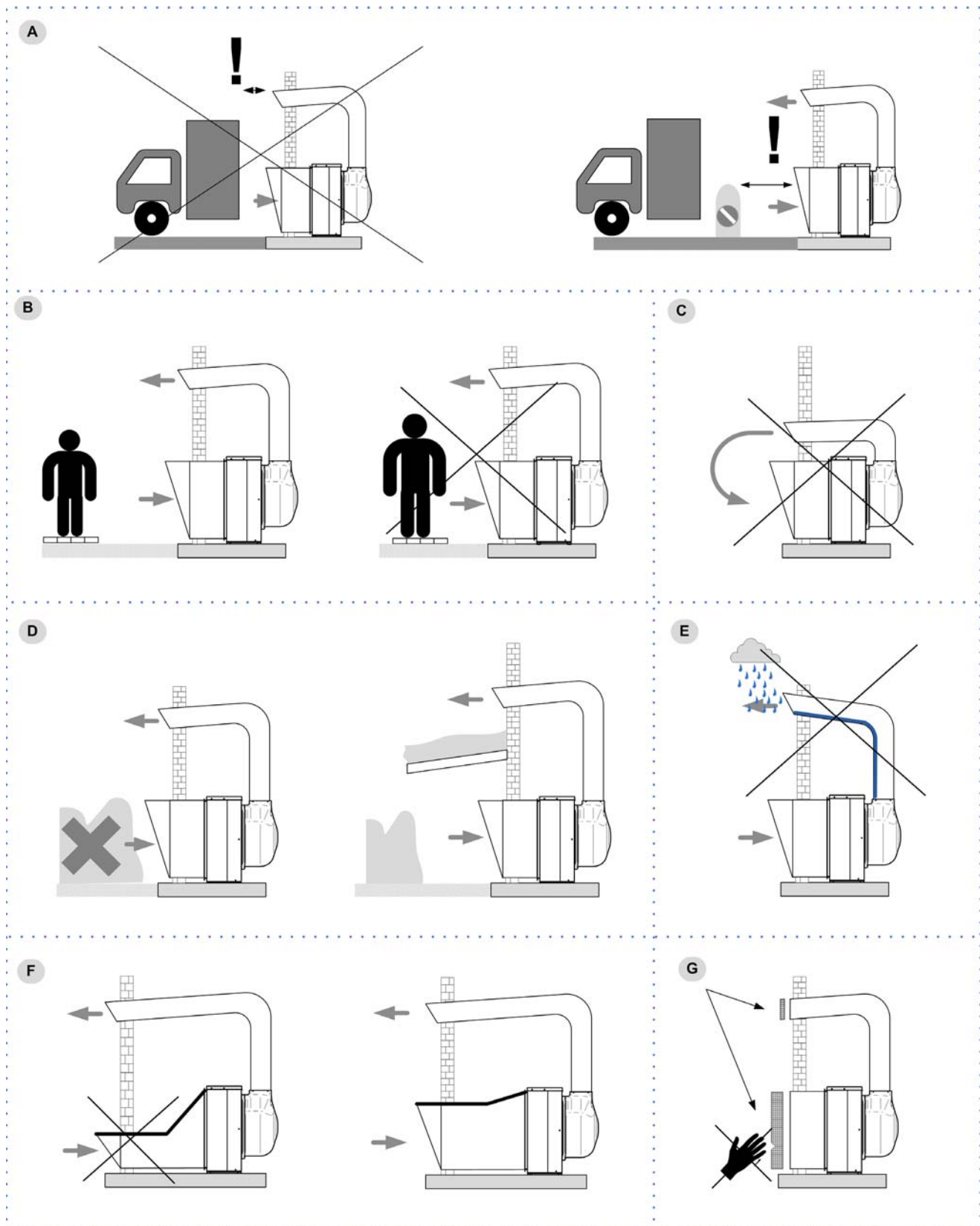


Avoid therefore:

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

Ignoring the previous indications could:

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



- A. Obstacles or barriers which avoid the air inflow to the unit coil
- B. Keep the min. distances from the pedestrian areas.
- C. Avoid the by-pass between the two air flows
- D. Avoid snow accumulations on batteries.
- E. Avoid the rain input
- F. Avoid the angle curves and narrowings
- G. Safety and anti-intrusion for small animals grille (provided by the Customer)

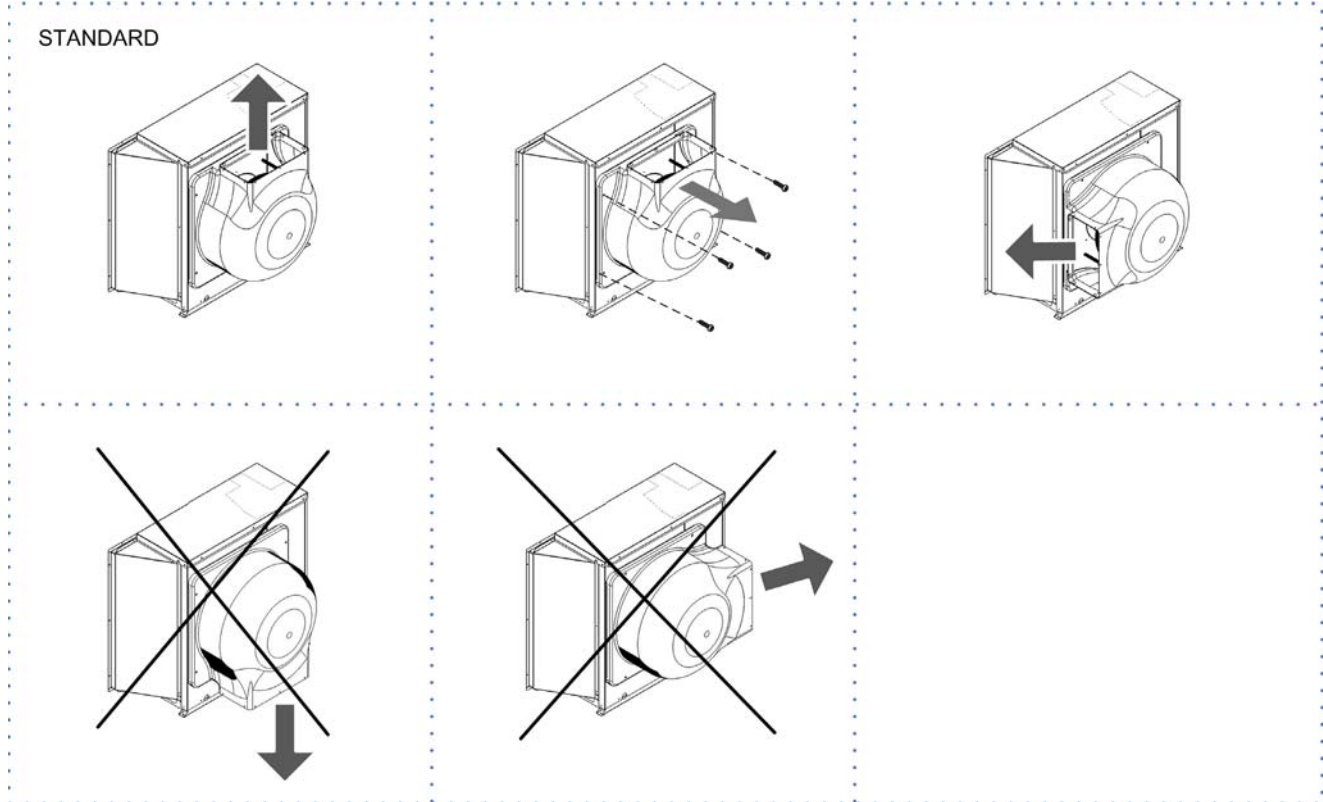
4.3 Direction of air supply

The unit is delivered with the air supply upward.

The air supply may be directed depending on the installation location.

To adjust the direction:

- Unscrew the fixing bolts on the fan cap.(4 for size 21-71, 10 for size 81-141).
- Remove the cap and rotate.
- Fix the cap using the bolts previously removed.

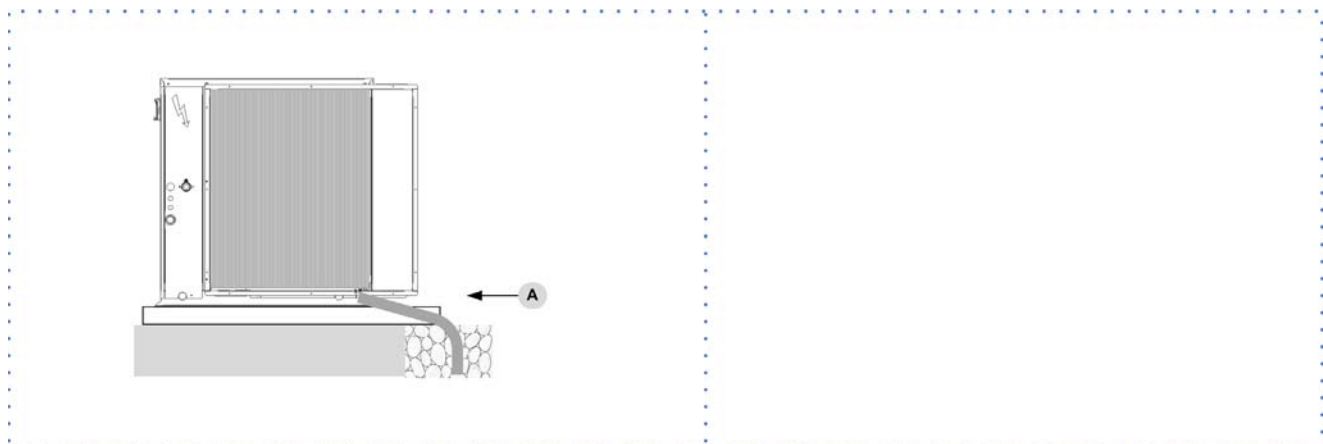


4.4 Condensate water

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

The condensation must be eliminated in a manner to avoid wetting pedestrian areas.

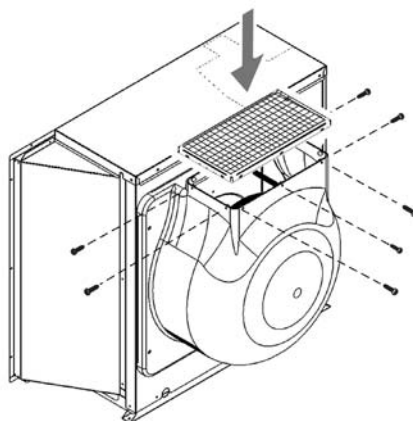
With extensive very cold outdoor temperatures, condensation could freeze outside the unit blocking the flow and causing a slow build-up of ice; therefore special attention must be paid to eliminating condensation, raising the unit off the ground and evaluating whether antifreeze elements should be installed.



A. Condensate discharge connection

4.5 GMX - Supply grille

Accessory



Fix the grille with the screws

5 Water connections

5.1 Water quality

The water quality must be checked by qualified personnel.

Water with inadequate characteristics can cause:

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

Acceptable water quality values:

PH	7,5 ÷ 9,0	
SO ₄ ²⁻	< 100	ppm
HCO ₃ ⁻ /SO ₄ ²⁻	> 1	
Total Hardness	4,5 ÷ 8,5	dH
Cl ⁻	< 50	ppm
PO ₄ ³⁻	< 2,0	ppm
NH ₃	< 0,5	ppm

Free Chlorine	< 0,5	ppm
Fe ₃ ⁺	< 0,5	ppm
Mn ⁺⁺	< 0,05	ppm
CO ₂	< 50	ppm
H ₂ S	< 50	ppb
Temperature	< 65	°C
Oxygen content	< 0,1	ppm

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

5.2 Risk of freezing

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

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

5.3 Anti-freeze solution

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



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



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

5.4 Water flow-rate

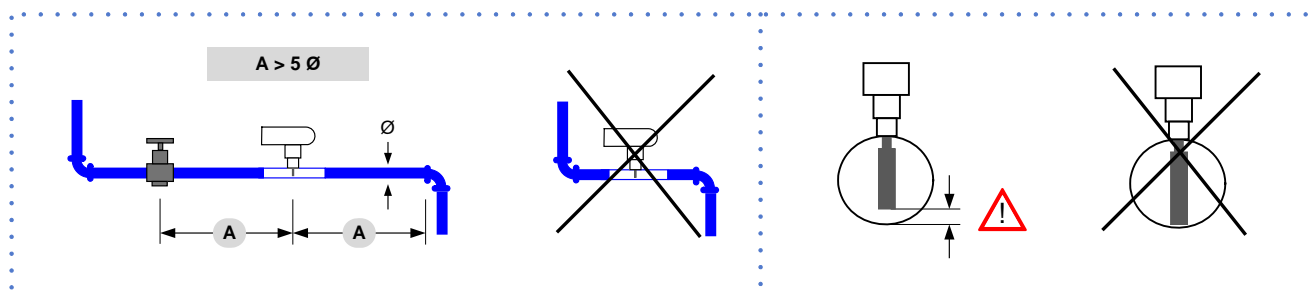
The project water-flow must be:

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

5.5 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.



A. minimum distance

5.6 Operation sequence

Close all vent valves in the high points of the unit hydraulic circuit

Close all drain valves in the low points of the unit hydraulic circuit:

- Heat exchangers
 - Pumps
 - collectors
 - storage tank
1. Carefully wash the system with clean water: fill and drain the system several times.
 2. Apply additives to prevent corrosion, fouling, formation of mud and algae.
 3. Fill the plant
 4. Vent the system
 5. Execute leakage test.
 6. Isolate the pipes to avoid heat dispersions and formation of condensate.
 7. Leave various point of service free (wells, vent-holes etc).



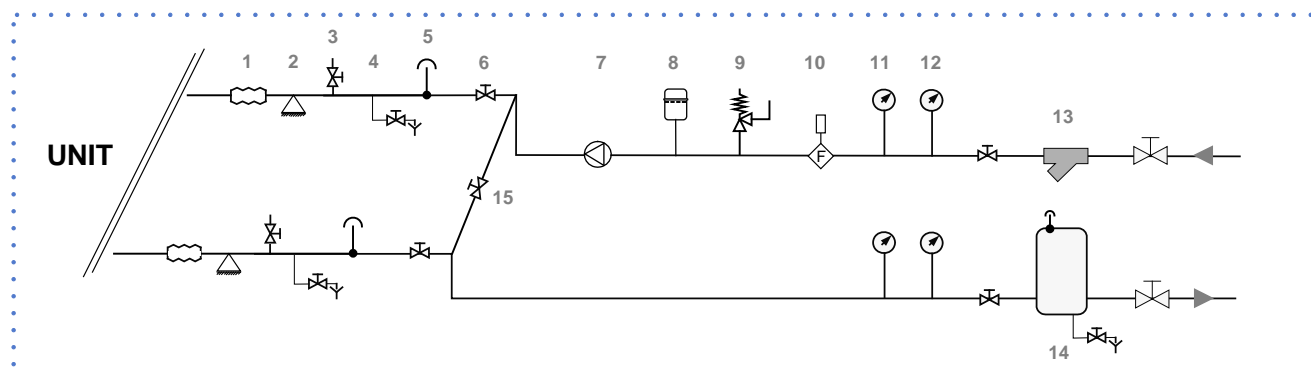
Neglecting the washing will lead to several filter cleaning interventions and at worst cases can cause damages to the exchangers and the other parts.

5.7 Recommended connection



The installer must define:

- component type
- position in system



- | | |
|--------------------------------------|---------------------------|
| 1 antivibration joints | 9 safety valve |
| 2 piping support | 10 Flow Switch |
| 3 exchanger chemical cleaning bypass | 11 pressure gauge |
| 4 drain valve | 12 thermometer |
| 5 vent | 13 filter |
| 6 shut-off valve | 14 Internal storage tank |
| 7 Pump / circulating pump | 15 Cleaning system bypass |
| 8 expansion vessel | |

5.8 Water filter



It 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.

5.9 Domestic hot water module

10 Accessories p. 49

5.10 Domestic hot water with solar energy

10 Accessories p. 49

5.11 Boiler management

10 Accessories p. 49

6 Electrical connections

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

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

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

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

Operate in compliance with safety regulations in force.

6.1 Electrical data

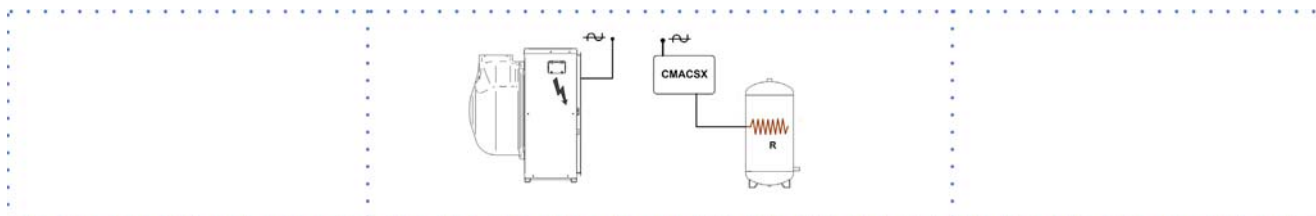


The serial number label reports the unit specific electrical data, included any electrical accessories.

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

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

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



If the DHW module is present, consider the electric resistance absorption in the power supply line dimensioning.

6.2 Connections

1. Refer to the unit electrical diagram (the number of the diagram is shown on the serial number label).
2. Verify that the electrical supply has characteristics conforming to the data shown on the serial number label.
3. Before starting work, ensure the unit is isolated, unable to be turned on and a safety sign used.
4. Ensure correct earth connection.
5. Ensure cables are suitably protected.
6. Before powering up the unit, make sure that all the protections that were removed during the electrical connection work have been restored.

6.3 Signals / data lines

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

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

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

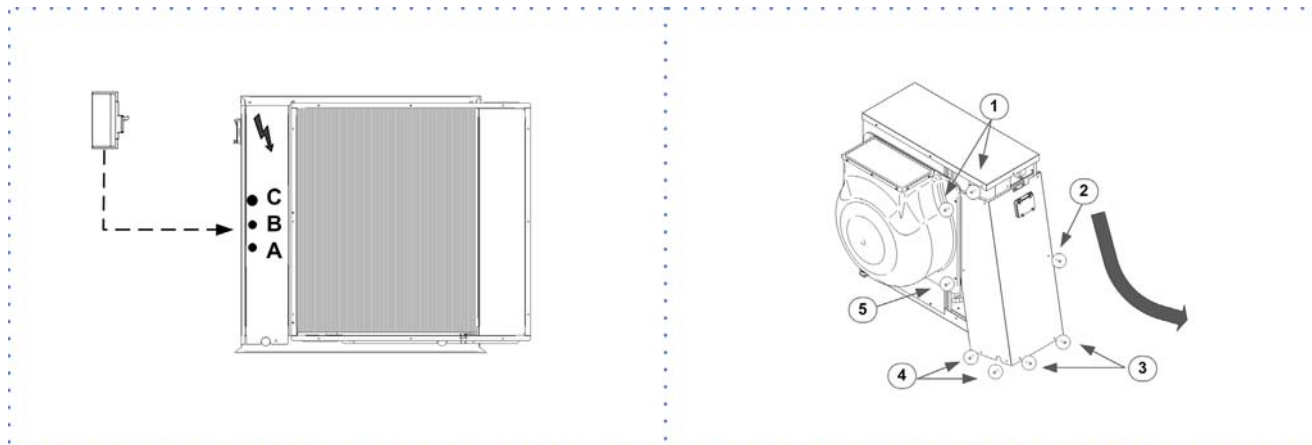
Do not lay the cables parallel to other cables, cable crossings are possible, only if laid at 90°.

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 impendancy, capacity and attenuation indications.

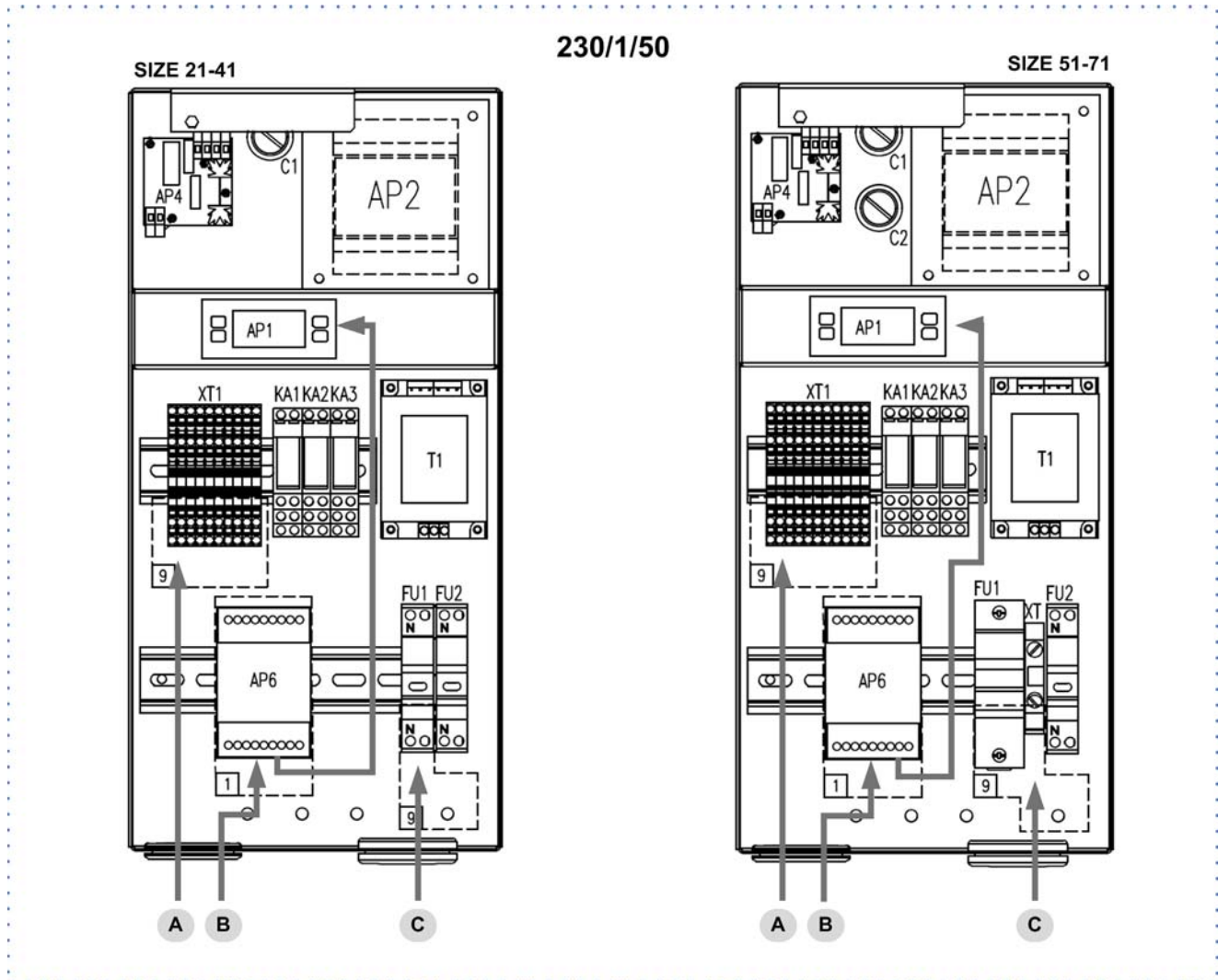
6.4 Power input



- A Ø mm 22
- B Ø mm 22
- C Ø mm 34

-  Install the isolator switch near the unit.
-  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).

6.5 Electrical panel



A Signals

B RS485

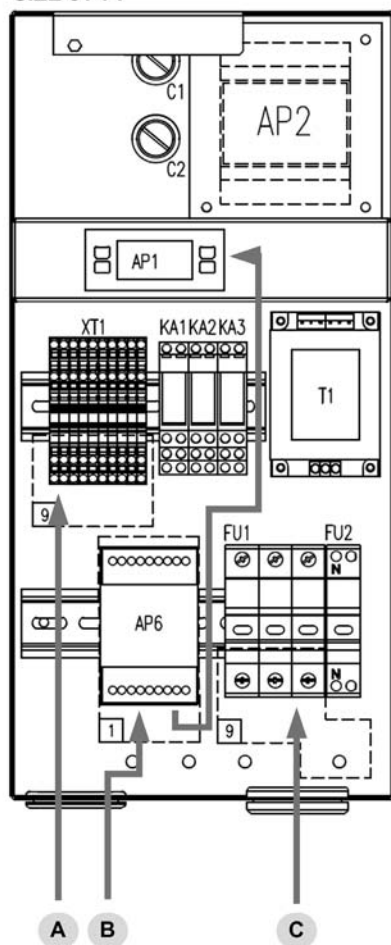
C Power supply

AP1 Main control module
 AP2 Electronic thermostatic management
 AP4 Fan control module
 AP6 RS 485 module (OPTIONAL)
 C1 Fan capacitor
 T1 Transformer

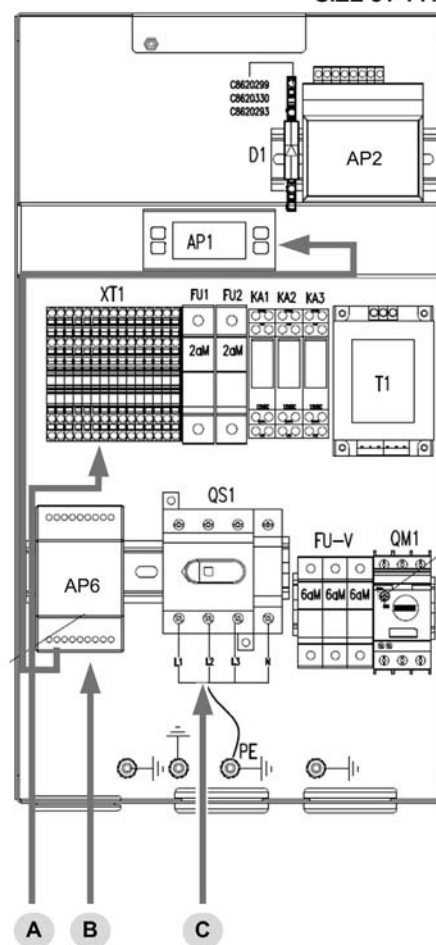
FU1 Fuse
 FU2 230V aux. circuit fuse
 KA1 Inverter alarm auxiliary relay
 KA2 Compressor control relay
 KA3 Circulation pump control relay
 XT1 Terminal block of the customer connections

400/3/50+N

SIZE 51-71



SIZE 81-141



A Signals

B RS485

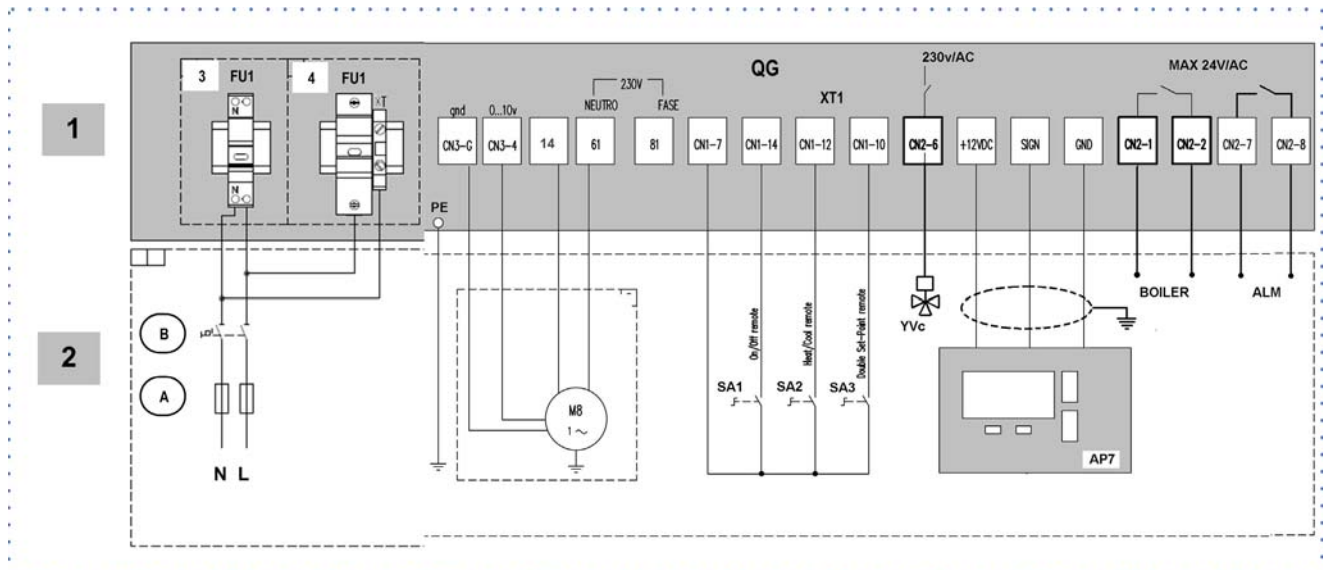
C Power supply

AP1	Main control module
AP2	Electronic thermostatic management
AP6	RS 485 module (OPTIONAL)
T1	Transformer
FU1	compressor overload protection and timer Size 51-71
FU2	230V aux. circuit fuse Size 51-71

FU-V	Fan fuse
FU1	230V aux. circuit fuse
FU2	compressor overload protection and timer
QS1	Main isolator switch
QM1	Compressor line protection
KA1	Inverter alarm auxiliary relay
KA2	Compressor control relay
KA3	Circulation pump control relay
XT1	Terminal block of the customer connections

6.6 Connections performer by customer

Electrical panel
sizes 21÷71 - 230/1/50



- 1 Unit
- 2 Connections performer by customer
- 3 Only for sizes 21-41
- 4 Only for sizes 51-71



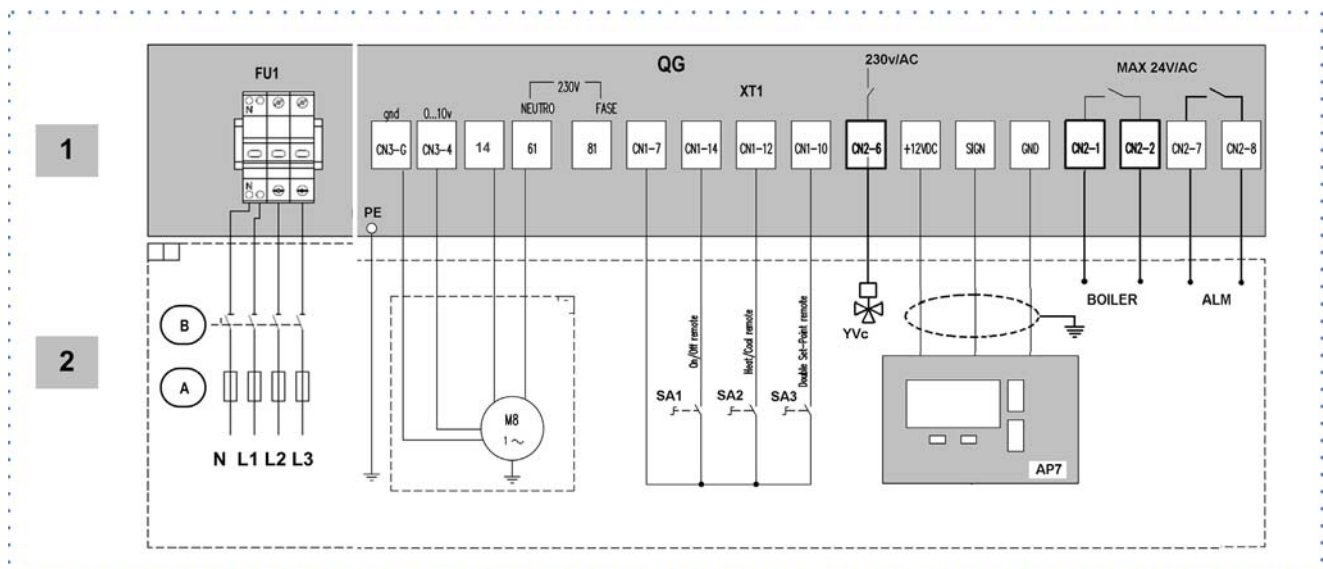
A Fuses
Provided by the customer



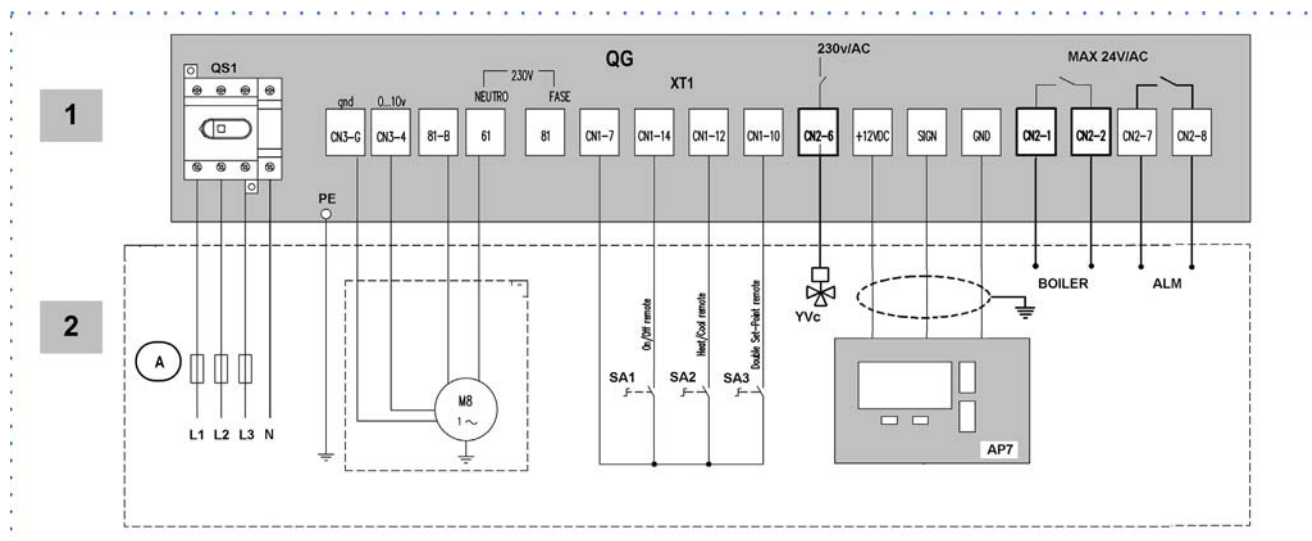
B Isolating switch
Provided by the customer

FU1 Fuse
QG Electrical panel
AP7 Room keypad

- SA1 Remote ON-OFF
6.7 SA1 = On-Off / Standby remote p. 21
- SA2 Remote summer/winter
6.8 SA2 = Summer - Winter remote p. 22
- SA3 Second setpoint enabling
[Ref] p.
- M8 Pump use
Provided by the customer
- XT1 Terminal block of the customer connections
- Boiler Boiler control, max 24v/AC
- ALM Cumulative fault signal, max 24v/AC
- YVc 3-way Boiler valve



Electrical panel
sizes 81÷141 - 400/3/50



- 1 Unit
2 Connections per former by customer
A Fuses
Provided by the customer
QS1 Isolating switch
QG Electrical panel
SA1 Remote ON-OFF
SA2 Remote summer/winter

- SA3 Second setpoint enabling
AP7 Room keypad
M8 Pump use
Provided by the customer
XT1 Terminal block of the customer connections
Boiler Boiler control, max 24v/AC
ALM Cumulative fault signal, max 24v/AC
YVc 3-way Boiler valve

6.7 SA1 = On-Off / Standby remote

Set parameter CL43:

Keys Esc + Set ☒ Menu PAr ☒ Menu CL

CL43	ON/OFF	Standby	Time bands	only DHW
-2	SA1 = ON-OFF remote	from keypad: key DOWN	YES	from Menu: Operating mode
-1	from Menu: Fnc - St	SA1 = remote standby	NO	from Menu: Operating mode
0	from Menu: Fnc - St	from keypad: key DOWN	YES	from Menu: Operating mode
-28	from Menu: Fnc - St	from keypad: key DOWN	YES	SA1 = only Domestic Hot Water remote*

OFF: emergency stop, not active the antifreeze safeties etc.

Standby: assisted stop, are active the antifreeze safeties etc.

* CL43= -28

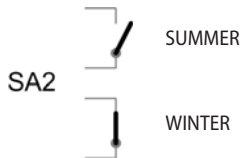
Domestic hot water production even with OFF room thermostats

6.8 SA2 = Summer - Winter remote

Set parameter CL44:

Keys Esc + Set ☒ Menu PAr ☒ Menu CL

CL44	change Summer/Winter	
0	from keypad	SA2 = disabled
-3	by SA2	change from keyboard disabled



6.9 SA3 Second setpoint enabling switch

For details see:

7.10 SA3: 2° set point p. 25

6.10 Remote control

For details see:

10 Accessories p. 49

6.11 Domestic hot water module

For details see:

10 Accessories p. 49

6.12 Serial communication module with RS485 serial converter kit

For details see:

10 Accessories p. 49

6.13 Cascade units

For details see:

10.6 Cascade units p. 59

7 Start-up

7.1 General description

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

Upon request, the service centres performing the start-up.

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.

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 isolated at the beginning
- the unit isolator is open, locked and equipped with the suitable warning
- make sure no tension is present



After turning off the power, wait at least 5 minutes before accessing to the electrical panel or any other electrical component.



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

7.2 Preliminary checks

For details refer to the different manual sections.

Unit OFF power supply

1. safety access
2. functional spaces
3. air flow: correct return and supply (no bypass, no stratification)
4. structure integrity
5. fans run freely
6. unit on vibration isolators
7. unit input water filter + shut-off valves for cleaning
8. vibration isolators on water connections
9. expansion tank (indicative volume = 5% system content)
10. cleaned system
11. loaded system + possible glycol solution + corrosion inhibitor
12. system under pressure
13. vented system
14. refrigerant circuit visual check
15. earthing connection
16. power supply features
17. electrical connections provided by the customer

7.3 Start-up sequence

For details refer to the different manual sections.

Unit ON power supply

1. compressor crankcase heaters operating at least since 8 hours
2. off-load voltage measure
3. phase sequence check (unit only 400/3/50)
4. unit ON
5. load voltage measure and absorptions
6. Max fan speed setting
7. measure of return and supply water temperature and flow valuation
8. super-heating and sub-cooling measure and discharge temperature
9. check no anomalous vibrations are present
10. climatic curve personalization
11. set date and time
12. personalise scheduling
13. personalise DHW *
14. climatic curve personalization
15. set remote control *
16. complete and available unit documentation

*If present

7.4 Refrigeration circuit

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

7.5 Water circuit

1. Before realizing the unit connection make sure that the hydraulic system has been cleaned up and the cleaning water has been drained.
2. Check that the water 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 isn't air in the circuit, if required, evacuate it using the air bleed valve placed in the system high points.

When using antifreeze solutions:

- make sure the glycol percentage is suitable for the type of use envisaged

Weight of glycol (%)	10	20	30	40
Freezing temperature (°C)	-3.9	-8.9	-15.6	-23.4
Safety temperature (°C)	-1	-4	-10	-19

Modify the following parameters:

- 1 SetPoint Cool
key Set ► Menu SP ► Cool
- 2 Min Setpoint Cool
Keys Esc + Set ► Menu PAr ► Menu TR ► tr11
tr11 < SetPoint Cool
- 3 Antifreeze alarm setpoint
Keys Esc + Set ► Menu PAr ► Menu AL ► AL51
- 4 Pump start setpoint for antifreeze
Keys Esc + Set ► Menu PAr ► Menu PI ► PI51
- 5 Antifreeze Heater Set Point
Keys Esc + Set ► Menu PAr ► Menu Hi ► Hi12
(PI51 = Hi12) > AL51
For example: AL51 = 0°C Hi12 = +1°C PI51 = +1°C

7.6 Electric Circuit



Verify that the unit is connected to the ground plant.

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

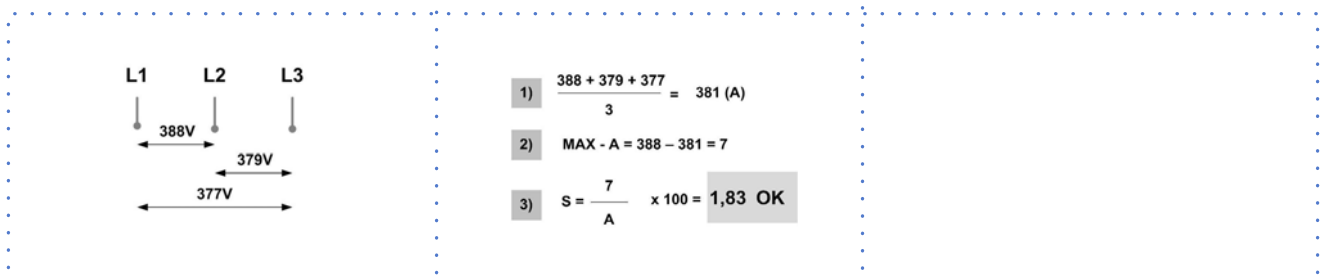
Connect the unit by closing the sectioning device, but leave it on OFF.

Controllare i valori di tensione e frequenza di rete, che devono essere entro i limiti:

- 400/3/50 +/-10%
- 230/1/50 +/-10%

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

Example:



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

7.7 Compressor crankcase heaters

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

- at the first unit start-up
 - after each prolonged period of inactivity
1. Supply the resistances switching off the unit isolator switch.
 2. To make sure that heaters are working, check the power input.
 3. At start-up the compressor crank-case temperature on the lower side must be higher at least of 10°C than the outside temperature.

⊘ Do not start the compressor with the crankcase oil below operating temperature.

7.8 Voltages

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

Start-up the unit.

With unit operating in stable conditions, check:

- Voltage
- Total absorption of the unit
- Absorption of the single electric loads

7.9 Remote controls

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

Check that probes and optional components are connected and enabled with the respective parameters ("electrical connections" section and following pages).

7.10 SA3: 2° set point

Enable SA3

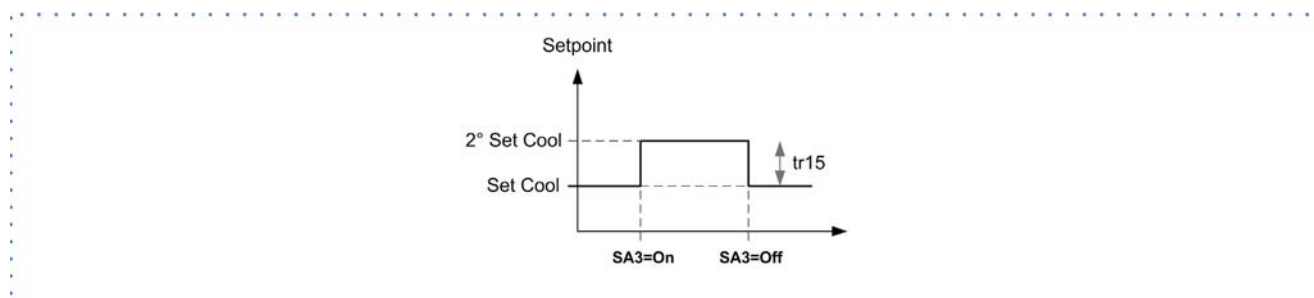
Parameter modification	Keys	Esc	+	Set	▶	Menu	CL	▶	CL45=22
------------------------	------	-----	---	-----	---	------	----	---	---------

Example:

Set Cool = 12 °C

tr15 = 1°C

2° set Cool = 13°C



Parameter modification:

Parameter modification	Keys	Esc	+	Set	▶	Menu	tr	▶	Tr15
------------------------	------	-----	---	-----	---	------	----	---	------

Tr15 Differential SetCool

Tr25 Differential SetHeat

7.11 Water set point compensation with external temperature

It is possible to automatically change the set-point according to the outside temperature.

Parameter modification	Keys	Esc	+	Set	☒	Menu	dS	☒
------------------------	------	-----	---	-----	---	------	----	---

Enable the function:

Par: dS00 set-point compensation of the outside temp.

0 = Disabled

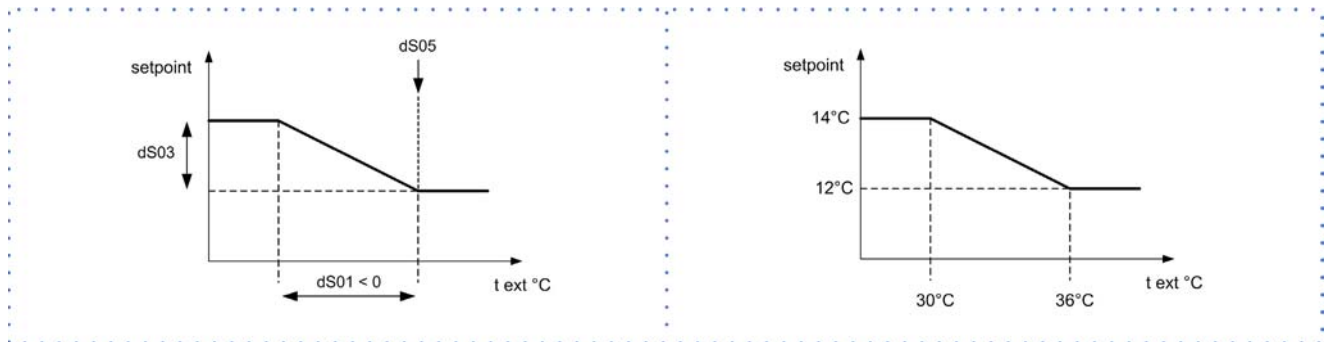
1 = Proportional

2 = Fixed (by step)

Cooling

With low ext. temperature the refrigerant requirements are reduced.

The internal comfort can also be obtained with a set-point higher than standard.



Example:

setpoint = 10°C

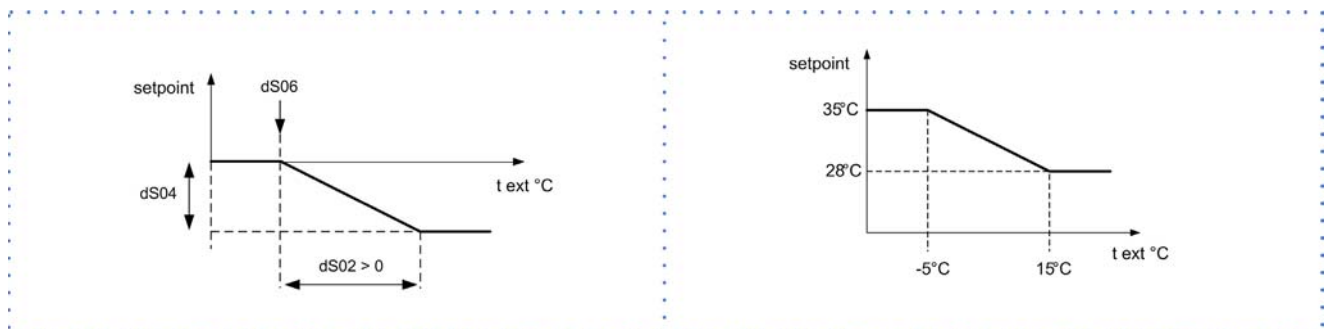
compensated setpoint = 14°C

Cool	Description	Example
dS01	Temperature controller dynamic differential proportional band in Cool	dS01 = -6°C
dS03	Maximum temperature controller dynamic differential in Cool	dS03 = 4°C
dS05	Temperature controller dynamic differential setpoint in Cool	dS05 = 36°C

Heating

With outside mild temperatures the thermal requirements are reduced.

The internal comfort can also be obtained with a lower setpoint.



Example:

setpoint = 35°C

compensated setpoint = 28°C

Heat	Description	Example
dS02	Temperature controller dynamic differential proportional band in Heat	dS02 = 20°C
dS04	Maximum temperature controller dynamic differential in Heat	dS04 = -7°C
dS06	Set point dynamic differential of external air	dS06 = -5°C

7.12 Water set point compensation with ambient temperature

Only with ambient keyboard option.

Function and parameters are the same of paragraph "Water set point compensation with external temperature"

On the ambient keyboard set parameter Cr 30 = 10

It is possible enable ambient compensation OR external compensation, not ambient AND external compensation.

7.13 Minimum pump speed setting

Only for units fitted with an EC circulator.

The flow switch must not be tripped with the circulator at minimum speed and the system under the maximum pressure drop conditions.

Inspection and setting procedure:

Parameter modification	Keys	Esc	+	Set	☒	Menu	dS	☒	Menu	PI
------------------------	------	-----	---	-----	---	------	----	---	------	----

1. note down the PI31 value
2. set par. PI31=PI30
3. note down the PI41 value
4. set par. PI41=PI40
5. if the E020 alarm appears, proceed from section 8
6. if the E020 alarm does not appear, proceed from section 10
7. reset the alarm
8. increase PI30 and PI31 by the same value
9. repeat the step on PI40 and PI41 with the unit in heating mode
10. set PI31 back to the initial value
11. set PI41 back to the initial value

On systems with low pressure drops, the default settings of PI30 and PI40 can be decreased

PI30 Minimum water pump speed in Cool mode

PI31 Maximum water pump speed in Cool mode

PI40 Minimum water pump speed in Heat mode

PI41 Maximum water pump speed in Heat mode

1.

7.14 Max fan speed setting

Depending on the installation conditions, it is possible to change the speed of the fan.

To decrease maximum speed:

SUMMER

- 1 decrease Fe32
- 2 Set Fe31 = Fe32

WINTER

- 1 decrease Fe52
- 2 Set Fe51 = Fe52

Main menu ☒ Parameters ☒ Fe

7.15 Circulating pump: energy saving mode

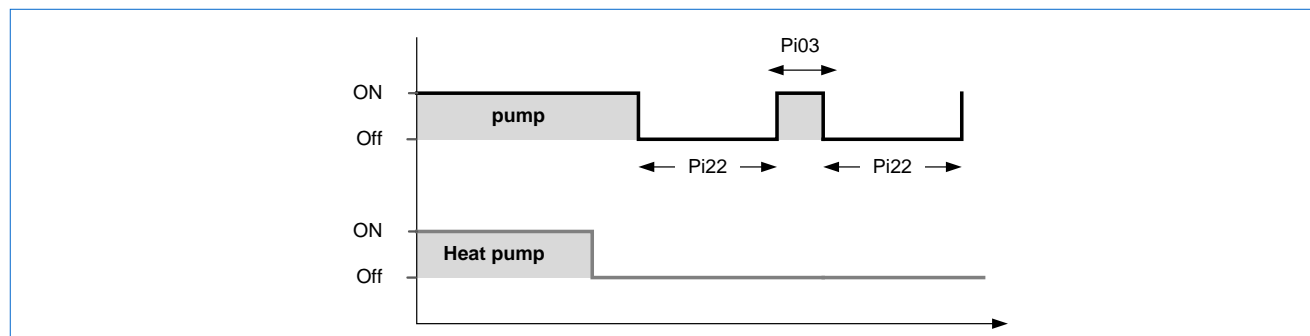
Parameter modification	Keys	Esc	+	Set	☒	Menu	dS	☒	Menu	PI
------------------------	------	-----	---	-----	---	------	----	---	------	----

PI22 switch-off time of the circulating pump, with installation in temperature.

PI03 switch-on time of the circulating pump, with installation in temperature.

The function is enabled by default

To deactivate the function: PI22 = 0



7.16 Circulating pump: anti-lock function

The function prevents mechanical locks of the circulation pump caused by prolonged inactivity.

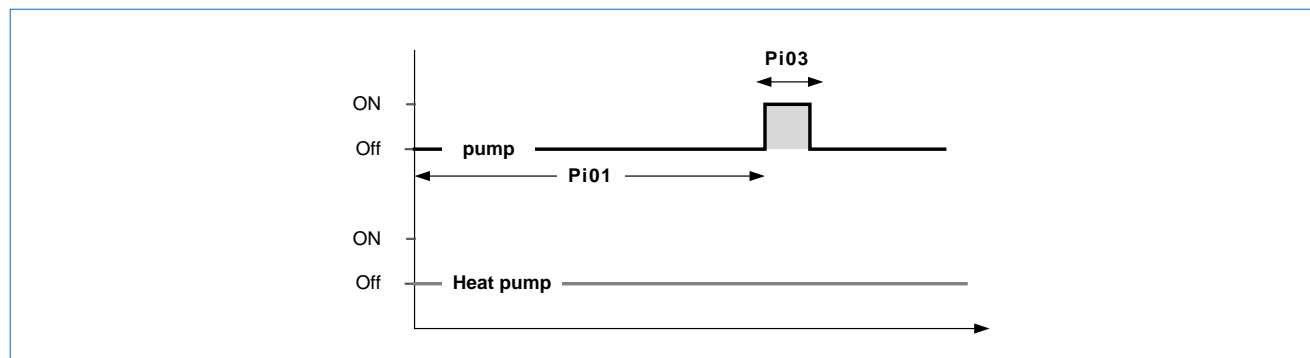
Parameter modification	Keys	Esc	+	Set	☒	Menu	dS	☒	Menu	PI
------------------------	------	-----	---	-----	---	------	----	---	------	----

PI01 max. switch-off time of the circulating pump.

PI03 switch-on time of the circulating pump

The function is enabled by default

To deactivate the function: PI01 = 0



7.17 Antifreeze function with circulating pump

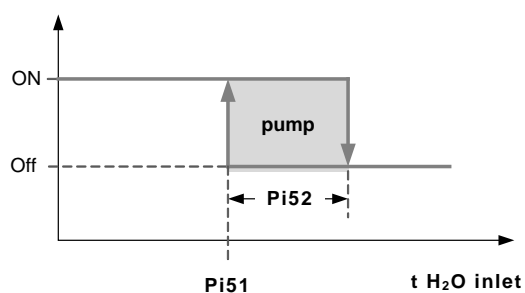
Parameter modification	Keys	Esc	+	Set	☒	Menu	dS	☒	Menu	PI
------------------------	------	-----	---	-----	---	------	----	---	------	----

PI51 switch-on setpoint of the circulating pump for antifreeze (5°C)

PI52 hysteresis (2°C)

The function is enabled by default

To deactivate the function: PI50 = 0.



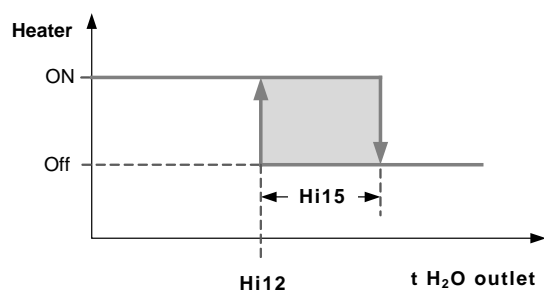
7.18 Antifreeze function with heater

HI12 heater switch-on setpoint for antifreeze (4°C)

HI15 hysteresis (0,5°C)

The function is enabled by default

To deactivate the function: HI00 = 0



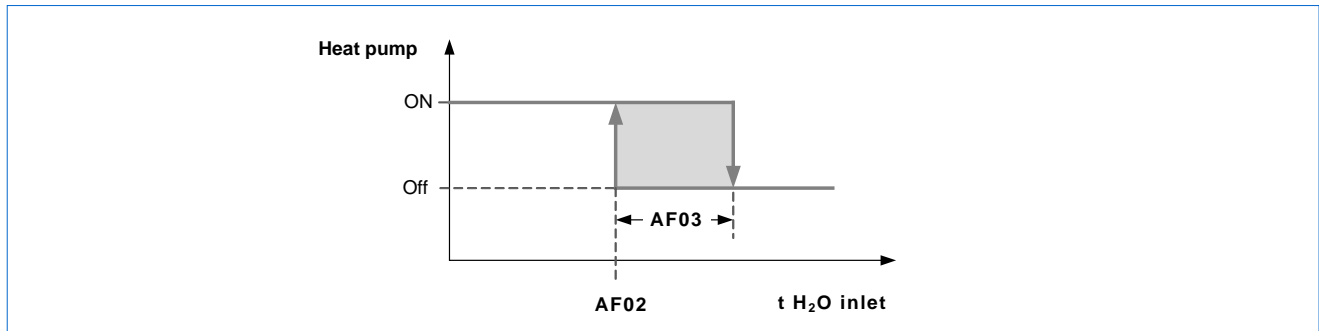
7.19 Antifreeze function with heat pump

AF02 switch-off setpoint of the heat pump for antifreeze (5°C)

AF03 hysteresis (3°C)

The function is not enabled by default

To activate the function: AF00 = 1



7.20 Start-up report

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

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

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

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

7.21 2014/68/UE PED directive

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

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

Compulsory verification of the first installation:

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

Certification of setting in service:

- for all the units

Periodical verifications:

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

8 Control



8.1 Display


Icon	Fixed on	Flashing	Icon	
	Alarm on progress	Silenced alarm		Compressor
	Heating mode	Antifreeze with active heat pump, remote heating mode		Ventilation
	Cooling mode	Remote cooling mode	LAMP TEST	At the start-up is performed a board automatic test: all the led flash for some seconds
	Standby from keypad	Remote standby		Primary circuit water pump
	Clock Active scheduling	Clock setting Scheduling		Remote control Display shows Clock (not related to scheduling)
	Defrosting Automatic	Manual defrosting activated	③	ON: Domestic hot water Flashing: D.H.W. mode - standby
①	not used currently		④	Boiler activation request
②	Heater ON - D.H.W.			Water set point compensation active


8.2 Keys


Symbol	Name	Action	Function (3 sec.)	
	Up	Increases the value Next voice		Silenced alarm
	Down	Decreases the value Previous voice		On / Off *
	Esc	Esc WITHOUT SAVING MODIFICATIONS Previous level	mode	Heat / cool / stdby / as
	Set	Confirm Esc WITH MODIFICATION SAVING Go to the next level STATA menu		Inputs / clock / active alarms / setpoint
		Activate / disactivate the time bands		
		Access to the SETTING menu		Parameters / function / password / alarms

* Unit in OFF the antifreeze function is not active.

8.3 Navigation




 Press 2 sec.	OPERATING MODE	Heat	Heating
		Cool	Cooling
		StdBY	Standby - off
		AS	Domestic hot water The unit switches to ACS mode, only by Heat mode

	STATA	Ai	Analogical inputs
		AO	Analogical outputs
		of	Digital inputs
		dO	Digital outputs
		CL	Clock
		AL	Active alarms
		HR	Compressor operating hours
		Sr	Setpoint

	SCHEDULING	PAR - parameters	Configuration
		Fnc - functions	dEF - manual defrosting* tA - alarm reset St - on / off CC - copy card EUr - alarm log reset
		PASS - password	
		EU - alarms	Alarm log










*Manual defrosting: possible only under certain conditions.
Use for qualified technicians reserved.

8.4 Stand-by





Step	Display	Action	Keys		Menu/Variable	Notes
1	Main menu	Press 3 sec.			Stand-by	
2	Stand-by	Press 3 sec.			ON	

If CL44 = -1 key DOWN not enable

8.5 ON/OFF

Step	Display	Action	Keys		Menu/Variable	Notes
1	Main menu	Press			PAr	
2	PAr	Select			FnC	
3	FnC	Press			dEF	
4	dEF	Select			St	
5	St	Press				
6	ON/OFF	Press				
7		Press			Back to the previous menu	

8.6 Change the operating mode


Step	Display	Action	Keys		Menu/Variable	Notes
1	Main menu	Press 2 sec.			Cool	*
2	Cool	Select			Choose standby, off: STBY cool: COOL heat: HEAT DHW: AS	
3	Heat	Confirm				

* Off the unit is immediately stopped without respecting any timing.









Standby the antifreeze function is active (pump ON for water temperature < 4°C).

The circulator anti-blocking function is active (pump ON at predefined intervals).

8.7 Water setpoint modification

Step	Display	Action	Keys		Menu/Variable	Notes
1	Main menu	Press			Ai	
2	Ai	Select			SP	
3	SP	Access			Cool	
4	Cool	Select			Choose Cool Heat AS	
5	AS	Confirm			50	
6	50	Press			Set the value 55	
7	55	Confirm			55	
8		Press			Back to the previous menu	












8.8 Display of inputs - outputs

Step	Display	Action	Keys		Menu/Variable	Notes
1	Main menu	Press			Ai	
2	Ai	Choose menu			Ai: analogical inputs di: digital inputs AO: analogical outputs dO: digital outputs	
3	of	Access			diL1	
4	diL1	Scroll the list			Choose diL4	
5	diL4	Press to see the value			For digital inputs: 0 = input not active - open 1 = input active - closed	
6		Press			Back to the previous menu	


For details see:





8.23 Status p. 44

8.9 Clock setting

Step	Display	Action	Keys		Menu/Variable	Notes
1	Main menu	Press			Ai	
2	Ai	Select			CLOCK menu	
3	CL	Access			Hour	
4	Hour	Select			Choose hour: HOUR date: DATE year: YEAR	
5	YEAR	Press 3 sec.			Confirm ! Value flashing !	
6	! 2012 !	Press			Set the value	
7	! 2013 !	Confirm			2013	
8		Press			Back to step 4	








8.10 Silenced alarm

 Before resetting an alarm identify and remove its cause.
Repeated resets can cause irreversible damage.

Step	Display	Action	Keys		Menu/Variable	Notes
1	Er01				The alarm code is flashing	
2	13.5°C				Alternated to temperature	
3					Fixed ALARM led	
4		Press any button				
5	!  !				ALARM led is flashing	

For details see:
8.20 Alarms p. 43

8.11 Alarms

Step	Display	Action	Keys		Menu/Variable	Notes
1	Main menu	Press			Ai	
2	Ai	Select			ALARM menu Al	
3	Al	Press			Access 1° active alarm	
4	Er01	Scroll			Other active alarms	
5		Press			Back to the previous menu	

For details see:
8.20 Alarms p. 43

8.12 Alarm reset

⚠ Before resetting an alarm identify and remove its cause.
Repeated resets can cause irreversible damage.

Step	Display	Action	Keys		Menu/Variable	Notes
1	Main menu	Press	esc + set		PAr	
2	PAr	Select	⏮	⏭	FnC	
3	FnC	Press	set		dEF	
4	dEF	Select	⏮	⏭	tA	
5	tA	Press	set			
6		Press	esc		Back to the previous menu	

For details see:
8.20 Alarms p. 43

8.13 Alarm log

⚠ Before resetting an alarm identify and remove its cause.
Repeated resets can cause irreversible damage.

Step	Display	Action	Keys		Menu/Variable	Notes
1	Main menu	Press	esc + set		PAr	
2	PAr	Select	⏮	⏭	EU	
3	EU	Press	set		Last registered alarm EU00	
4	EU00	Press	set		Access to alarm code info Er01	
5	Er01	Select	⏮	⏭	Hour of the alarm 20:01	
6	20:01	Select	⏮	⏭	Date of the alarm 27.10	
7	27.10	Select	⏮	⏭	Alarm output hour Example: alarm still active --:--	
8	--:--	Select	⏮	⏭	Alarm output date Example: alarm still active --:--	
9	--:--	Select	⏮	⏭	Type of alarm: AUto (automatic) MAnu (manual)	
10	AUto	Press	set			
11		Press	esc		Back to the previous menu	









For details see:
8.20 Alarms p. 43

8.14 Alarms log reset



Before resetting an alarm identify and remove its cause.

Repeated resets can cause irreversible damage.

Step	Display	Action	Keys		Menu/Variable	Notes
1	Main menu	Press			PAr	
2	PAr	Select			FnC	
3	FnC	Press			dEF	
4	dEF	Select			EUr	
5	EUr	Press 3 sec.			YES	
6		Press			Back to the previous menu	

For details see:

8.20 Alarms p. 43

8.15 Setting menu

access to the configuration parameters

Keys Esc + Set  Menu PAr

SETTING menu - PAr (configuration parameters)		
Label	Acronym meaning (label)	Parameters of:
CL	Configuration Local	Local I/O Configuration
CE	Configuration Expansion	Expansion I/O Configuration
Cr	Configuration Remote terminal	Remote terminal I/O Configuration
CF	ConFIGuration	Configuration
Ui	User interface	User interface
tr	thermoregulation	Thermoregulation
St	Stati (Operating modes)	Operating stata
CP	ComPressori	Compressor
PI	Pump (Internal)	Primary circuit water pump
FI	Fan (Internal)	Not used
FE	Fan (External)	Fans (external) of the disposable exchanger
PE	Pump (External)	not used currently
Hi	Electric Heaters (Internal)	Electric heaters of the primary exchanger
HE	Electric Heaters (External)	Not used
HA	Auxiliary Output	not used currently
br	Boiler	Boiler
dF	deFrost	Defrosting
dS	dynamic Setpoint	Dynamic Setpoint
Ad	Adaptive	Adaptive (adaptive function)
AF	AntiFreeze	Anti-ice
AS	Domestic hot water, Anti-Legionella	Domestic hot water, Anti-Legionella
HP	Heat Pump	Heat pump block
PL	Power Limitation	Not used
tE	Time Events	Time bands
AL	ALarm	Alarms

8.16 Scheduling management

It is possible to set 3 different schedulings.

To each scheduling is possible to associate 4 events.

To each day of the week is possible to associate a scheduling.

To enable the hour scheduling set the parameters tE00 and CL43:

Par tE00 hour scheduling

0 = disabled, 1 = enabled

Par CL43 = -2

For details see:

6.7 SA1 = On-Off / Standby remote p. 21

Parameter modification:

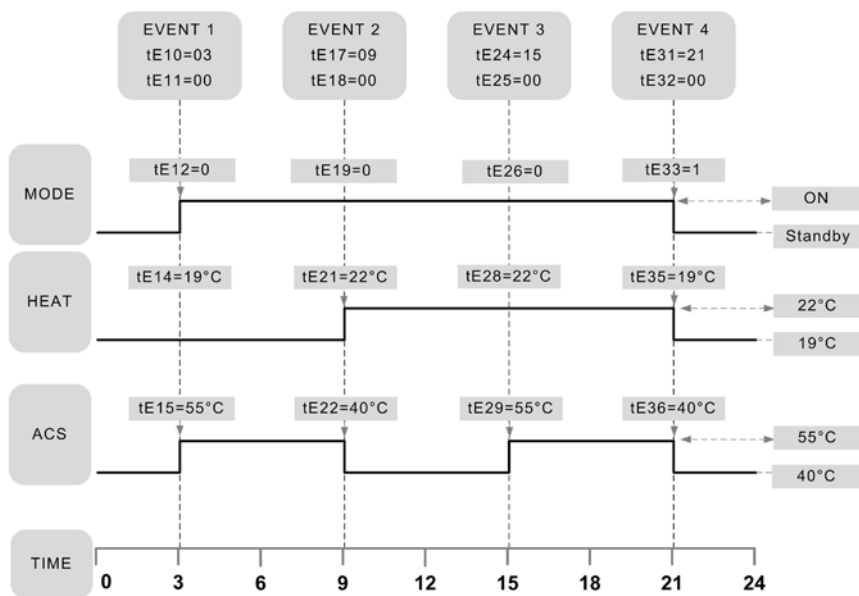
Keys Esc + Set Menu PAR Menu

Set the scheduling				
1	set the scheduling num.1	scheduling 1 parameters	scheduling 2 parameters	scheduling 3 parameters
1.1	set event 1	Event hour par. tE10 Event minutes par. tE11 Unit mode par. tE12 (0=On, 1=standby) Cooling temperature par. tE13 * Heating temperature par. tE14 * DHW temperature par. tE15	tE38 tE39 tE40 tE41 tE42 tE43	tE66 tE67 tE68 tE69 tE70 tE71
1.2	set event 2	Event hour par. tE17 Event minutes par. tE18 Unit mode par. tE19 (0=On, 1=standby) Cooling temperature par. tE20 * Heating temperature par. tE21 * DHW temperature par. tE22	tE45 tE46 tE47 tE48 tE49 tE50	tE73 tE74 tE75 tE76 tE77 tE78
1.3	set event 3	Event hour par. tE24 Event minutes par. tE25 Unit mode par. tE26 (0=On, 1=standby) Cooling temperature par. tE27 * Heating temperature par. tE28 * DHW temperature par. tE29	tE52 tE53 tE54 tE55 tE56 tE57	tE80 tE81 tE82 tE83 tE84 tE85
1.4	set event 4	Event hour par. tE31 Event minutes par. tE32 Unit mode par. tE33 (0=On, 1=standby) Cooling temperature par. tE34 * Heating temperature par. tE35 * DHW temperature par. tE36	tE59 tE60 tE61 tE62 tE63 tE64	tE87 tE88 tE89 tE90 tE91 tE92
2	set the scheduling num.2	column scheduling 2 parameters		
3	set the scheduling num.3	column scheduling 3 parameters		
4	assign the scheduling to monday	tE01 = 1 scheduling 1	= 2 scheduling 2	= 3 scheduling 3
5	assign the scheduling to tuesday	tE02 = 1 scheduling 1	= 2 scheduling 2	= 3 scheduling 3
6	assign the scheduling to wednesday	tE03 = 1 scheduling 1	= 2 scheduling 2	= 3 scheduling 3
7	assign the scheduling to thursday	tE04 = 1 scheduling 1	= 2 scheduling 2	= 3 scheduling 3
8	assign the scheduling to friday	tE05 = 1 scheduling 1	= 2 scheduling 2	= 3 scheduling 3
9	assign the scheduling to saturday	tE06 = 1 scheduling 1	= 2 scheduling 2	= 3 scheduling 3
10	assign the scheduling to sunday	tE07 = 1 scheduling 1	= 2 scheduling 2	= 3 scheduling 3

* If the unit is in Cooling is used the cooling temperature.

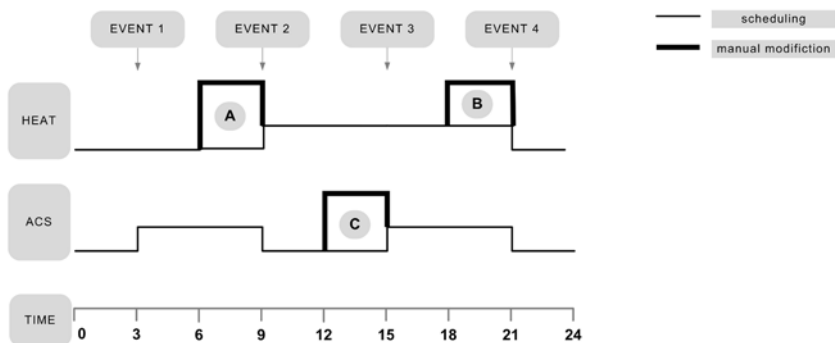
* If the unit is in Heating is used the heating temperature.

Example: scheduling 1



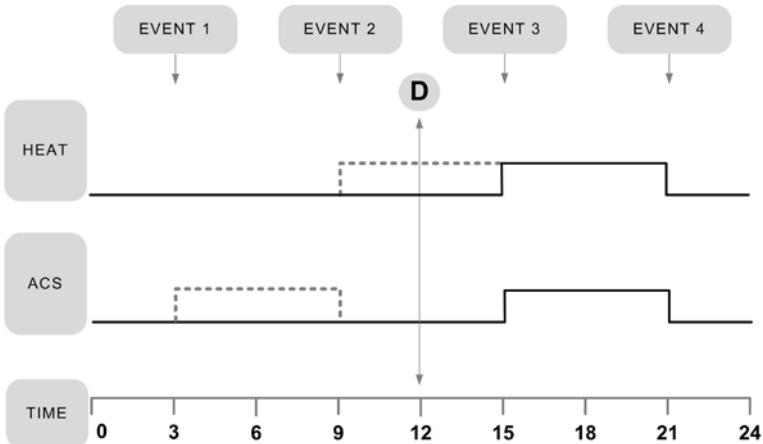
Example with active scheduling

- A manual modification of the heat setpoint: key Set ☒ SP menu ☒ Heat
- B manual modification of the heat setpoint: key Set ☒ SP menu ☒ Heat
- C manual modification of the DHW setpoint: key Set ☒ SP menu ☒ AS



Activation scheduling example

- D activation scheduling: Keys ☒ ☒



Events parameters

Event 1		Sched. 1 (par.)	Sched. 2 (par.)	Sched. 3 (par.)
	Time	tE10	tE38	tE66
	Minutes	tE11	tE39	tE67
	Mode 0= on 1= standby	tE12	tE40	tE68
	Cooling temperature	tE13	tE41	tE69
	Heating temperature	tE14	tE42	tE70
	DHW temperature	tE15	tE43	tE71

Event 2	Time	tE17	tE45	tE73
	Minutes	tE18	tE50	tE74
	Mode 0= on 1= standby	tE19	tE47	tE75
	Cooling temperature	tE20	tE48	tE76
	Heating temperature	tE21	tE49	tE77
	DHW temperature	tE22	tE50	tE78

Event 3	Time	tE24	tE52	tE80
	Minutes	tE25	tE53	tE81
	Mode 0= on 1= standby	tE26	tE54	tE82
	Cooling temperature	tE27	tE55	tE83
	Heating temperature	tE28	tE56	tE84
	DHW temperature	tE29	tE57	tE85

Event 4	Time	tE31	tE59	tE87
	Minutes	tE32	tE60	tE88
	Mode 0= on 1= standby	tE33	tE61	tE89
	Cooling temperature	tE34	tE62	tE90
	Heating temperature	tE35	tE63	tE91
	DHW temperature	tE36	tE64	tE92

8.17 Domestic hot water

To enable the DHW function:

Keys Esc + Set  Menu PAr  Menu AS

Par AS00 DHW operating

1 = Enable the heat pump for DHW + DHW 3-way valve

3 = Enable the heat pump for DHW + electric heater + DHW 3-way valve

Parameters to setting:

CE 00 = 2	CE 90 = 28	AS 00 = 1
CE 30 = 11	CE 91 = 9	AS 04 = 5
CE 50 = 0		AS 05 = 5
		AS 06 = 20

DHW scheduling

Keys Esc + Set  Menu PAr  Menu tE

To enable the hour scheduling:

Par tE00 hour scheduling

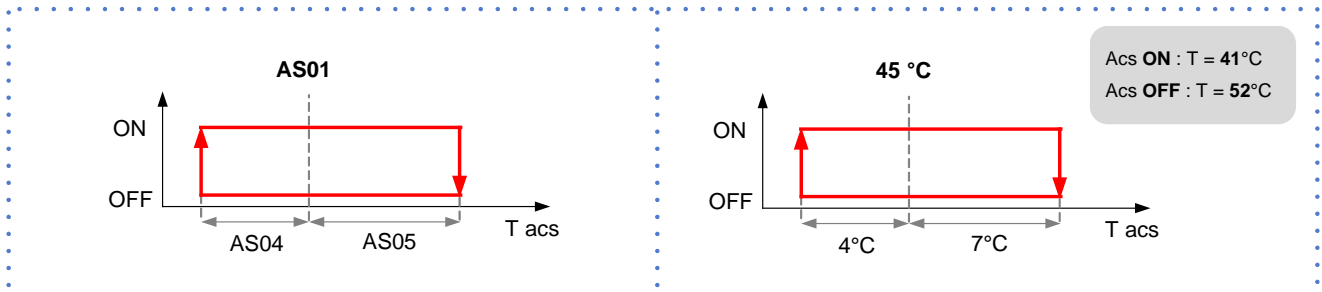
0 = Disabled

1 = Enabled

ACS setpoint

Keys Esc + Set ☒ Menu PAr ☒ Menu AS

Heat	Description	Example
AS01	setpoint DHW	45 °C
AS04	DHW hysteresis	7 °C
AS05	hysteresis disengaging DHW	4 °C



Setpoint HEAT < AS01 + AS05

Antilegionella scheduling

Parameters

AS20 antilegionella set-point

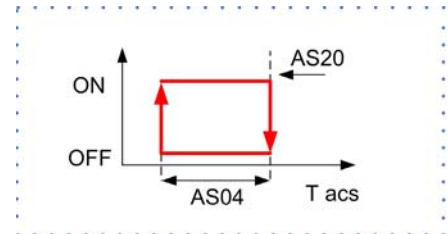
AS04 DHW hysteresis

The scheduling can be programmed for each day of the week.

In the following example the antilegionella cycle is scheduled:

Wednesday duration 1 starting at 23:00

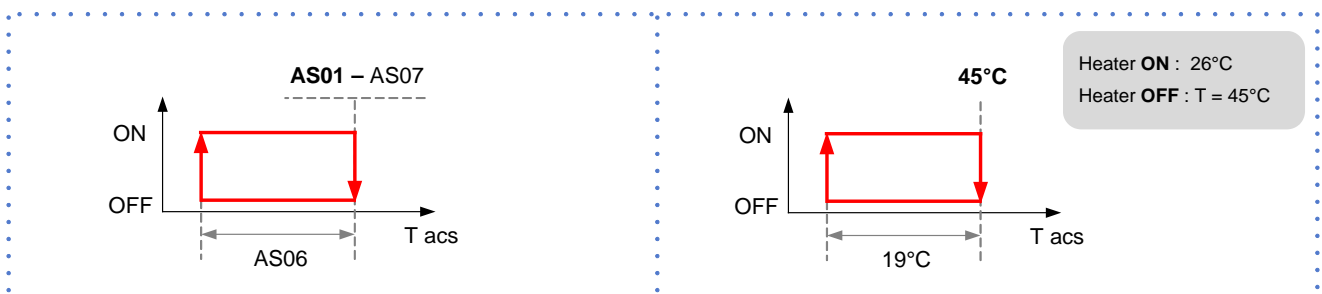
Sunday duration 2 starting at 22:30



Day	Cycle duration (0= OFF from 1 to 24 hours)	Time	Minutes
Monday	AS25 = 0	AS26	AS27
Tuesday	AS28 = 0	AS29	AS30
Wednesday	AS31 = 1	AS32 = 23	AS33 = 00
Thursday	AS34 = 0	AS35	AS36
Friday	AS37 = 0	AS38	AS39
Saturday	AS40 = 0	AS41	AS42
Sunday	AS43 = 2	AS44 = 22	AS45 = 30

DHW heater

Heat	Description	Example
AS01	setpoint DHW	45 °C
AS06	hysteresis DHW heater	19 °C
AS07	differential DHW heater	0 °C



8.18 Remote control - option

The keyboard repeats all the built-in control functions.

For details see:

8 Control p. 31



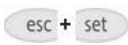











8.19 Ambient temperature display





It is possible to set the keypad to display the ambient temperature.

The probe is not used to perform the ambient thermoregulation.

Follow these steps:

Step	Display	Action	Keys		Menu/Variable	Notes
1	Main menu	Press	esc + set		PAr	
2	PAr	Press	set		PAr	
3	PAr	Select	↩	↪	Cr	
4	Cr	Press	set		Cr..	
5	Cr..	Select	↩	↪	Cr00 Anable ambient probe	
6	Cr00	Confirm	set		0	
7	0	Select	↩	↪	2	
8	2	Confirm	set		2	
9		Press	esc		Back to the previous menu	
10		Select	↩	↪	Cr30 Temperature display	
11	Cr30	Confirm	set		0	
12	0	Select	↩	↪	16	
13	16	Confirm	set			
14		Press	esc		Back to the previous menu	

Step	Display	Action	Keys		Menu/Variable	Notes
1	Main menu	Press			PAr	
2	PAr	Press			PAr	
3	PAr	Select			Ui	
4	Ui	Press			Ui..	
5	Ui..	Select			Ui22	
6	Ui22	Confirm			0	
7	0	Select			1	
8	1	Confirm			1	
9		Press			Back to the previous menu	

Step	Display	Action	Keys		Menu/Variable	Notes
1	Main menu	Press 3 sec.				
2		Select			Air1	
3	Air1	Press				

Is it possible to disable the ambient keyboard:


Cr00 = 0

Cr30 = 0

To enable water setpoint compensation with ambient temperature set:

Cr 30 = 10

8.20 Alarms

 Before resetting an alarm identify and remove its cause.
Repeated resets can cause irreversible damage.

Code	Description	Type
E000	General alarm	AUTO
E001	High pressure (digital) circuit	*
E003	High pressure (analogical) circuit	*
E007	Low pressure (analogical) circuit	*
E010	Inverter alarm	*
E020	Primary circuit flow switch	Time
E030	Primary circuit antifreeze	AUTO
E035	Primary circuit output high temperature	AUTO
E045	Faulty clock error	AUTO
E046	Error: Clock to set	AUTO
E047	Error of LAN communication between main module and electronic thermostatic module or ambient keyboard (if present) or DHW module (if present)	AUTO
E048	Anti-legionella	AUTO
E060	Faulty water temperature probe or primary exchanger input	AUTO
E061	Faulty water temperature probe or primary exchanger output	AUTO
E062	Faulty exchanger temperature probe	AUTO
E065	Faulty ambient keyboard temperature probe	AUTO
E066	Faulty DHW temperature probe	AUTO
E068	Faulty external temperature probe	AUTO
E069	Faulty high pressure input circuit	AUTO
E070	Faulty low pressure input circuit	
E071	Faulty compressor discharge temperature probe	AUTO
E080	Configuration error	AUTO
E081	Signalling of compressor operating hour exceeding	Manual
E085	Signalling of primary circuit pump operating hour exceeding	Manual
E090	Signalling of alarm log record exceeding	Manual

A = AUTOMATIC reset

M = MANUAL reset

* after some interventions is necessary the manual reset

8.21 Electronic thermostatic driver alarm

Code	Description	Type
E101	Faulty low pressure trasducer - 1Ai1	AUTO
E102	Faulty low pressure temperature probe - 1Ai2	AUTO
E103	Faulty discharge temperature probe - 1Ai3	AUTO
E106	Saturation output error	AUTO
E107	MOP alarm	AUTO
E108	Signalling of valve max opening	AUTO
E110	NO link alarm	AUTO
E111	Excessive current draw	* Manual
E112	Winding 1 disconnection	* Manual
E113	Winding 1 short circuit	* Manual
E114	Winding 2 disconnection	* Manual
E115	Winding 2 short circuit	* Manual

A = AUTOMATIC reset

* Switch on and off the electronic thermostatic driver

8.22 Led inverter

The access is reserved to the service centres.



Danger of electrocution.

Led:

ON: normal operating

Slow flashing (ON 1 sec., OFF 0.5 sec.): standby compressor stopped

Fast flashing (ON 0.2 sec., OFF 0.2 sec.): in alarm.

8.23 Status

Main menu \rightarrow SET \rightarrow Ai, di, AO, dO \rightarrow Ai L1

Menu	Code	Description
Ai	AiE1	DHW temperature
	Ai L1	Primary outlet temperature
	Ai L2	Primary inlet temperature
	Ai L3	Coil temperature
	Ai L4	High pressure transducer
	Ai L5	Outside temperature
	1Ai 1	Low pressure transducer (thermostatic sensor on the driver)
	1Ai 2	Return temperature (thermostatic sensor on the driver)
	1Ai 3	Discharge temperature (thermostatic sensor on the driver)
of	di L1	High pressure
	di L2	Compressor Alarm
	di L3	Flow user side
	di L4	Remote On-Off
	di L5	Remote Heat/Cool
AO	A0 L1	Primary pump (it is a digital 0/1)
	A0 L2	Fan signal (standard version)
	A0 L3	Compressor signal
	A0 L4	Primary pump signal (if in variable flow)
	A0 L5	Fan signal (High-efficiency version)
dO	d0E1	DHW heater (if present)
	d0 L1	DHW valve
	d0 L2	Reversing valve refrigerant circuit
	d0 L3	Frost Heater
	d0 L4	Auxiliary heater
	d0 L5	Compressor start
	d0 L6	Cumulative alarm
E1	1rE1	Superheating temperature
	1rE2	Condensing saturate temperature
	1rE5	Superheating
	1rE6	Gas pressure (=1Ai1)
	1rE7	Opening percentage electronic thermostatic valve
	1SP4	Superheating Setpoint
Sr		Actual Setpoint: setpoint with compensation / operating limit
Hr	CP01	Compressor 1 operating hours: x 10
	PU01	Hours utility pump: x 10

9 Maintenance

9.1 General description

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

The maintenance allows to:

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

Before checking, please verify the following:

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



After turning off the power, wait at least 5 minutes before accessing to the electrical panel or any other electrical component.



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

9.2 Inspections frequency

Perform an inspection every 6 months minimum.

The frequency, however, depends on the use.



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

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

9.3 Unit booklet

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

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

Report on the booklet:

- date
- type of intervention effected
- intervention description
- carried out measures etc.

9.4 Standby mode

If a long period of inactivity is foreseen:

- turn off the power
 - avoid the risk of frost (empty the system or add glycol)
- Turn off the power to avoid electrical risks or damages by lightning strikes.



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

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

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

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

9.5 Control check list

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

* Refer to the local regulations; and ensure correct adherence. Companies and technicians that effect interventions of installation, maintenance/repairs, leak control and recovery must be CERTIFIED as expected by the local regulations. The leak control must be effected with annual renewal.

9.6 Air coil

Contact with the exchanger fins can cause cuts: wear protective gloves to perform the above described operations.

It is extremely important that the battery gives the maximum thermal exchange; therefore, its surface must be cleaned from dust and deposits.

Remove all impurities from the surface.

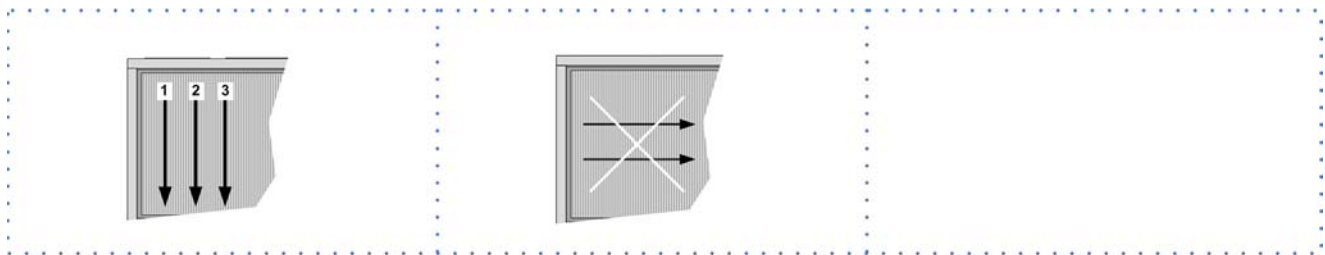
Using an air pressure gun, clean the aluminum surface of the battery; be careful to direct the air in the opposite direction of the fan air movement.

Hold the gun parallel to the fins to avoid damages.

As an alternative, vacuum cleaner can be used to suck impurities from the air input side.



Verify that the aluminum fins are not bent or damaged, in the event of damages contact the authorized assistance center and get the fins straightened in order to restore the initial condition for an optimal air flow.



9.7 Water side exchanger

It is very important for the exchanger to be able to provide the maximum thermal exchange, therefore it is essential for the inner surfaces to be clean of dirt and incrustations.

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

9.8 Water filter

Check that no impurities prevent the correct passage of water.

9.9 Flow Switch

- controls the operations
- remove incrustations from the palette

9.10 Circulating pumps

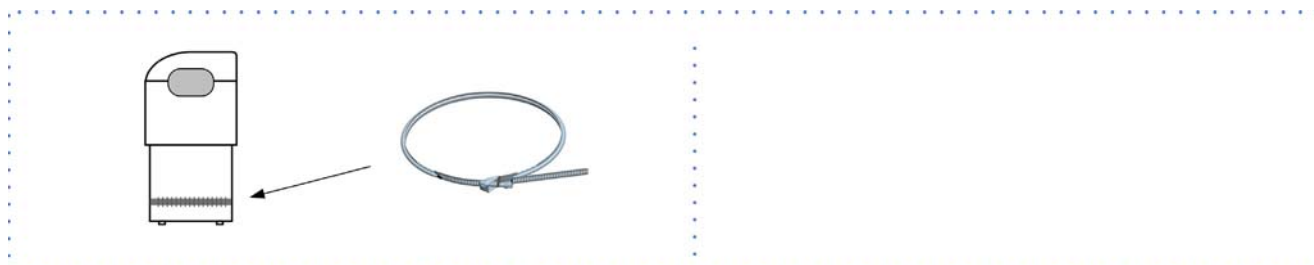
Check:

- 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

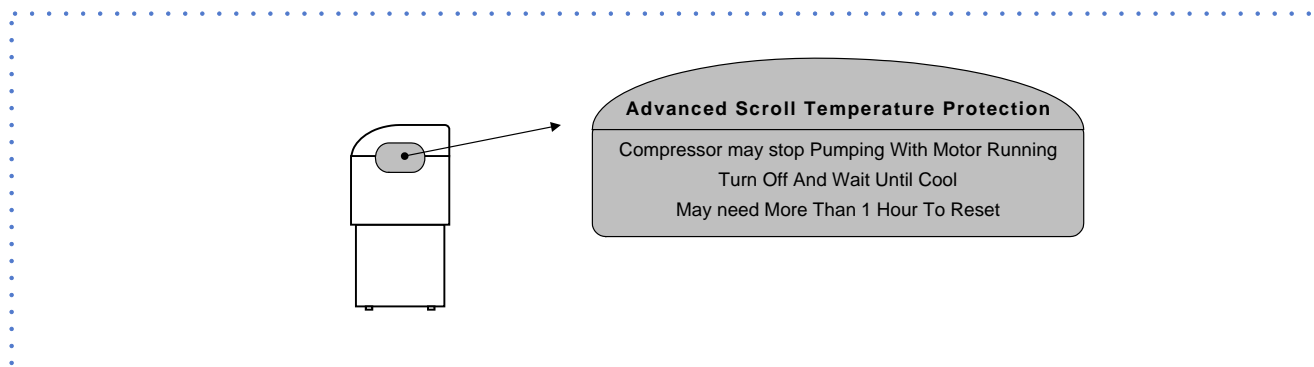
9.11 crankcase heater

Check:

- closure
- Operation



9.12 Copeland scroll compressor



9.13 Condensate drain

Dirt or scale can give rise to clogging.

Also, microorganisms and mould can flourish in the bowl.

Foresee periodical cleaning with suitable detergents and, eventually, disinfect with sanitising products.

Once cleaning is completed, pour water inside the bowl to check the regular outflow.

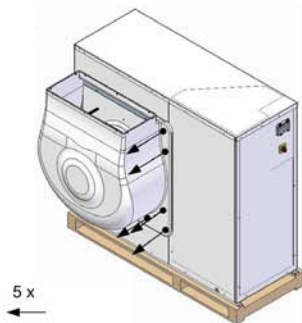
9.14 Centrifugal fan

Check:

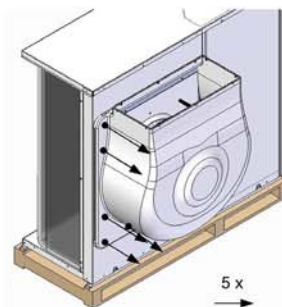
- the fans and the relative protection grids are well fixed
- the fan bearings (evident by noise and anomalous vibrations)
- the terminal protection covers are closed and the cable holders are properly positioned

Fan replacement

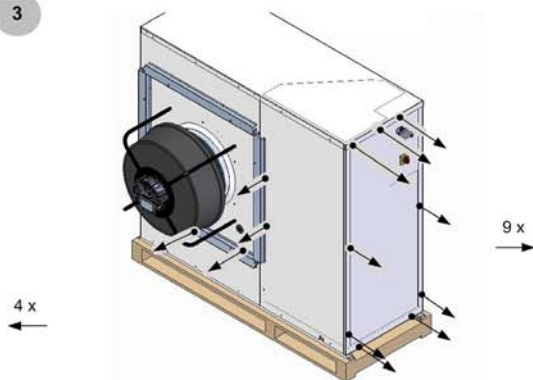
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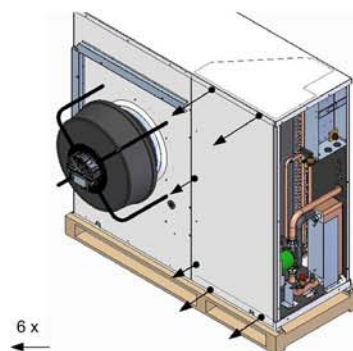
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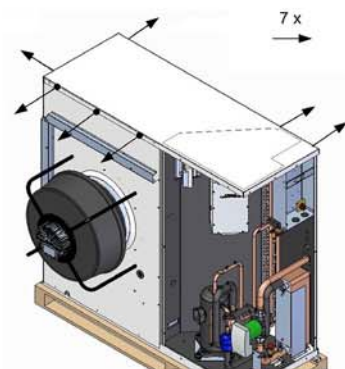
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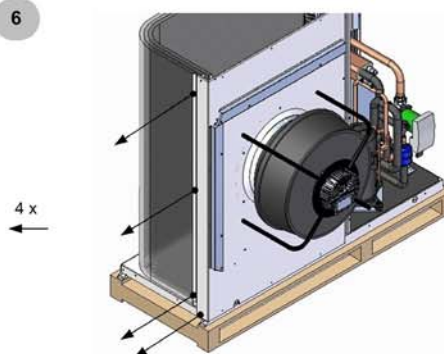
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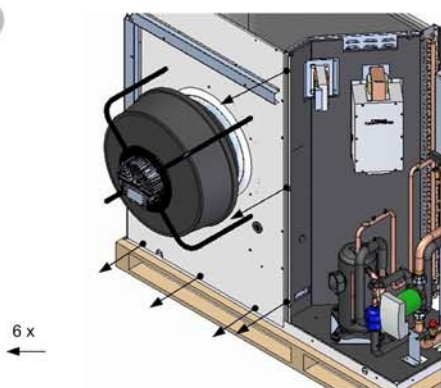
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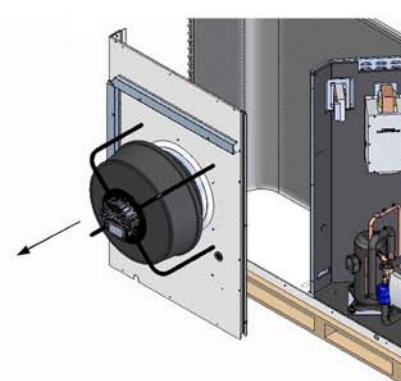
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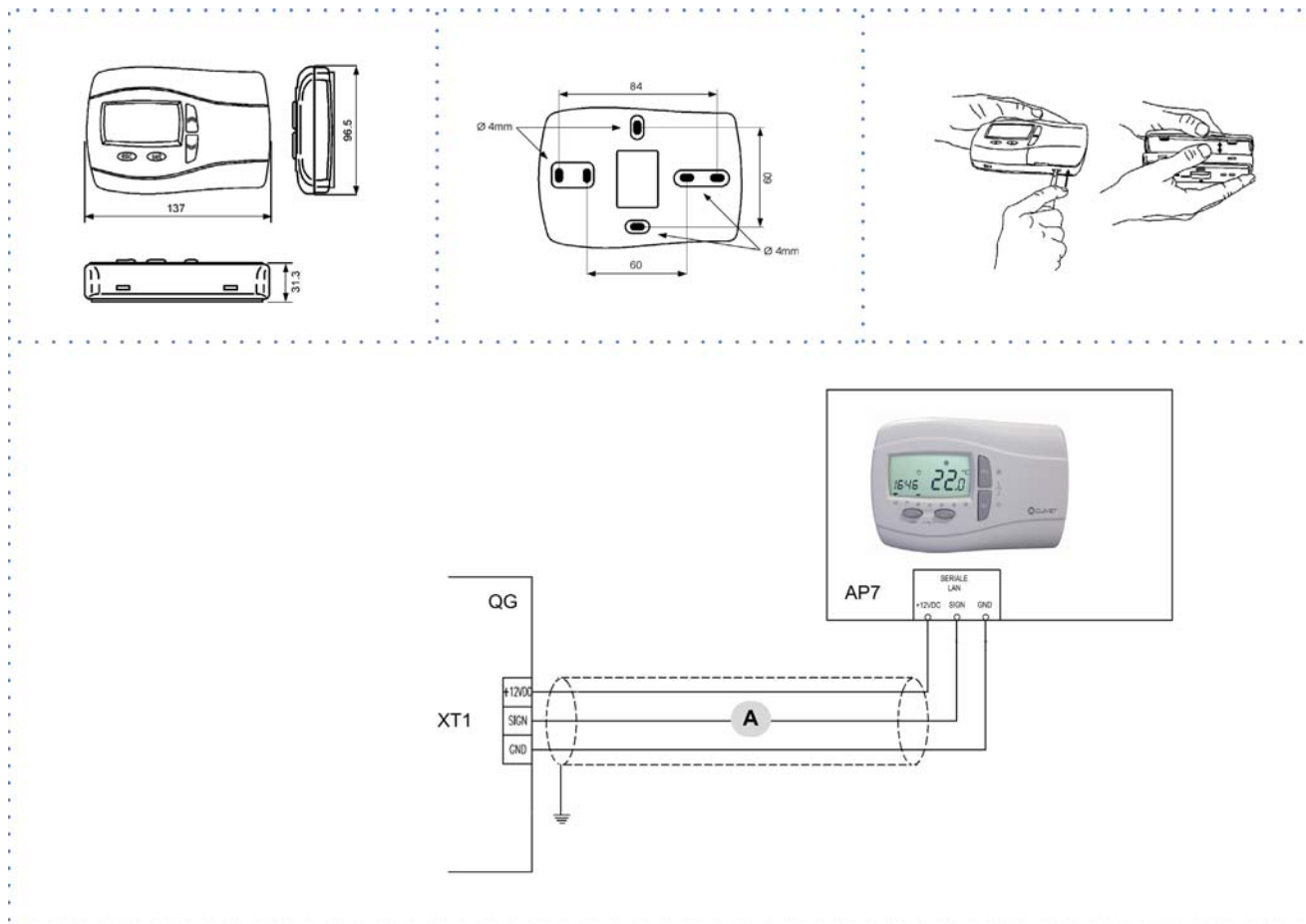


8



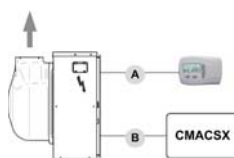
10 Accessories

10.1 Remote control

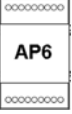



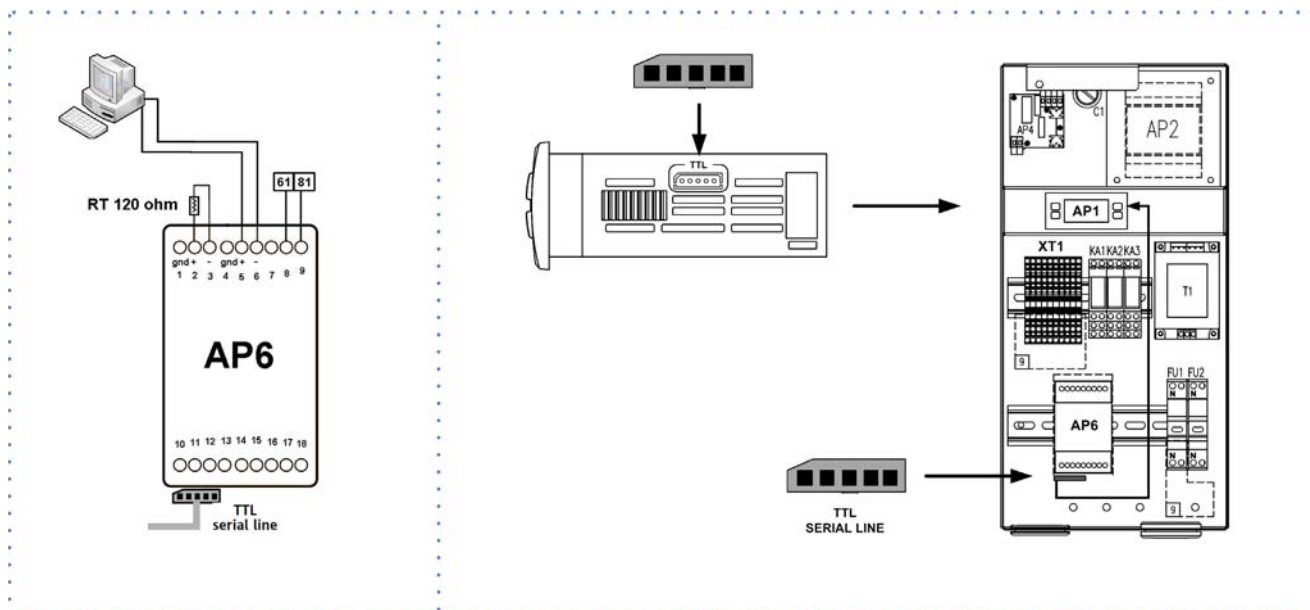
- QG** Electrical panel
- XT1** Terminal block of the customer connections
- AP7** Room keypad
- A** Max. = 100 mt.
Cable section:
Min. 0,35 Max.1 mm²

LAN net: A + B = 100 mt. Max
AMACSX - Domestic hot water module



10.2 CMSC2X - Serial communication module with RS485 serial converter kit

1	Install the AP6 converter	
2	Connect TTL serial	
3	Wire as indicated in the wiring diagram.	



Supervisory

The unit can be connected to an external supervisory system.

Enable the function:

Par: CF01 protocol selection

0 = Disabled

1 = Modbus

Parameter modification

Connection of 1"½ between the unit and the system.

Parameter	Description	Range
CF30	address Modbus	1....255
CF31	BaudRate	Baud Rate (0=1200 / 1=2400 / 2=4800 / 3=9600 / 4=19200) supervision serial

Cable characteristics

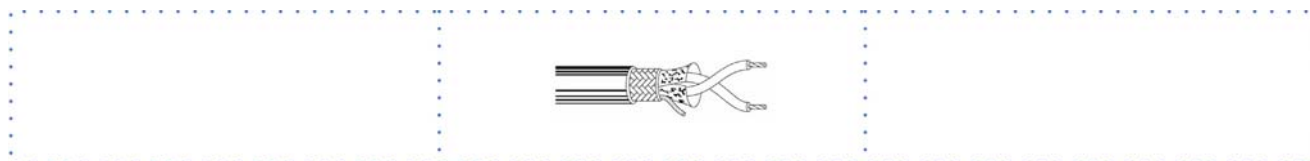
Couple of conductors twisted and shielded

Section of conductor 0,22mm²...0,35mm²

Nominal capacity between conductors < 50 pF/m

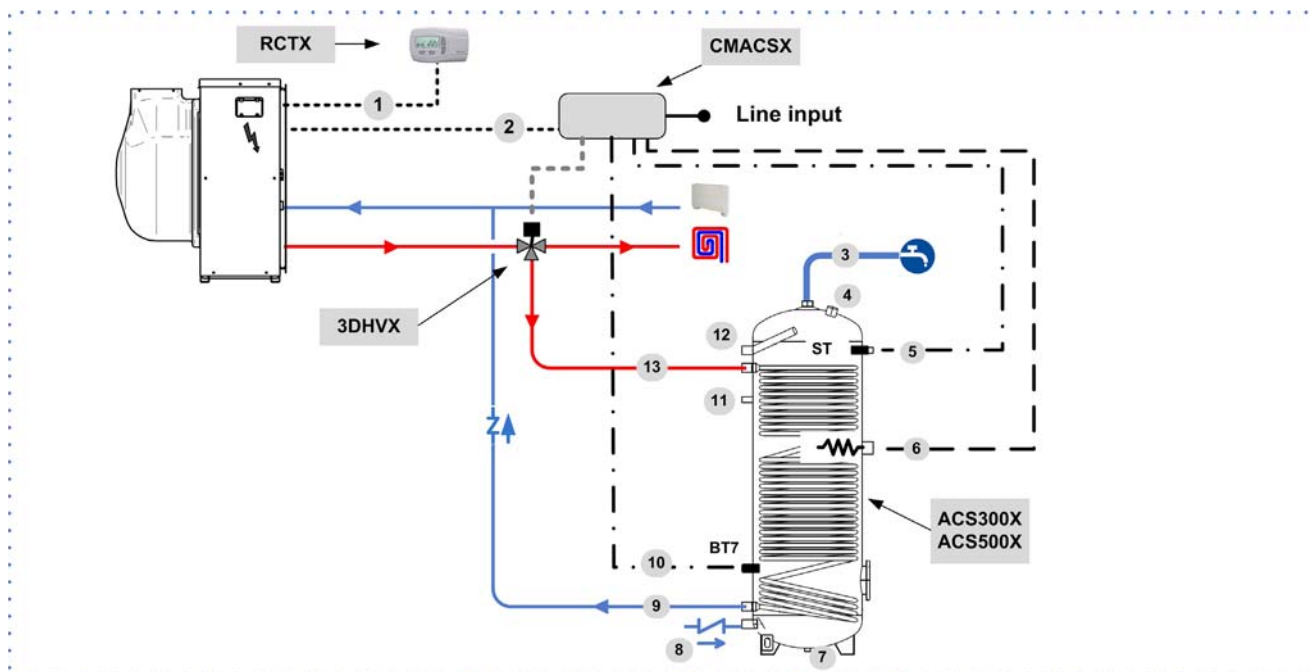
Nominal impedance 120 Ω

Recommended cable Belden 3105A or others with equal properties



10.3 AMACSX - Domestic hot water module

CMACSX	Domestic hot water module + BT7 probe (L. 5mt.)	L.300 x P.220 x H.120
ACS300X	300-litre domestic hot water storage tank	Dimensions D.600 x 1615 mm
ACS500X	500-litre domestic hot water storage tank	Dimensions D.750 x 1690 mm
3DHWX	Three-way valve for domestic hot water	Sizes 21-71= 1" Sizes 81-141= 1"1/4



Indicative diagram. The installer must define: component type, position in system. See wiring diagram.

1+2	Max. = 100 mt. Cable section: Min. 0,35 Max.1 mm2	8	waterworks water inlet	1"
3	DHW	9	Return	1"
4	Anode	10	BT7 probe	1/2"
5	Safety probe (provided by the Customer)	11	domestic hot water recirculation	1/2"
6	Electric heater provided by the customer	12	DHW	1"1/4
7	Blind connection for fasting	13	Supply	1"

Operation - CMACSX

The CMACSX module allows controlling the temperature of the Domestic Hot Water, by means of the temperature probe placed inside the storage tank.

The control allows the production of Domestic Hot Water to a specific set-point that can be defined in 4 daily intervals and 3 user profiles.

If the temperature of the Domestic Hot Water drops below a preset value (generally 40°C), the unit performs the "mode change" between system and Domestic Hot Water production, driving a diverter valve that switches the flow from the system to the storage tank.

The request of DHW production has always the priority over the system and ends if the configured set-point has been reached or the set time for the production of DHW has elapsed.

The Anti-legionella function allows removing the Legionella bacteria, which reside in the water storage tank.

These bacteria are removed if the water temperature exceeds 60°C for at least 30 consecutive minutes.

The anti-legionella function is managed by a different set-point, which is independent from that set for the Domestic Hot Water.

This function can be scheduled daily, weekly, at different time intervals.

Installation instructions, domestic hot water storage

1. Provide, where necessary, a pressure reducer for the entering water.
2. Be provided with a safety valve set according to what is reported on the "technical dates" label applied to the boiler.
3. Be provided with an expansion tank proportioned to the boiler's dimensions (you are advise to let the circulation be made by a thermo technician).
4. Before starting it you are invited to check the clamping of all the screws of the flange.
5. Each year an internal cleaning must be executed.
6. In order to avoid corrosion the anodes must be inspected after each 12 months; however, where the water is particularly aggressive the inspections must be reduced to each 6 months. If the anode is consumed it must be substituted.

The used materials can be subdued to deformations caused by temperature oscillations; we recommend you to store them in covered rooms and mild temperatures (15-20°C).

Storage tank type		ACS300X	ACS500X	-
Suitable for heat pump	Size	21 - 51	21 - 101	121 - 171
Pipe coil operating pressure	bar	6	6	-
Domestic hot water operating pressure	bar	10	10	-
Maximum temperature	°C	95	95	-
Empty weight	kg	160	220	-
Coil surface area	m2	4	6	-
Pipe coil water capacity	L	23	51.5	-
Pipe coil pressure drop	mbar	112	197	-

2/4kW Electric heater

The resistance R can operate simultaneously to the compressor.

For example:

- antilegionella scheduling
- BT7 < (setpoint ACS - 19°C)

Immersion heater

Regulating thermostat 30-70°C

Safety thermostat 90°C

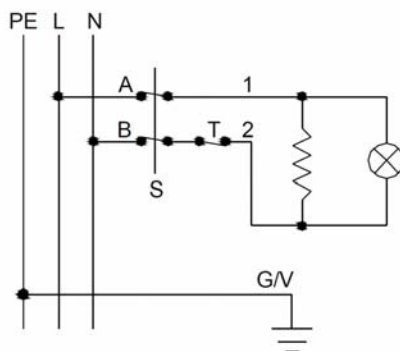
The heater should only be used to heat drinking water with a hardness between 7° f to 25° f in according to legislation.

In the case of higher water hardness it is advisable to install a water softener in the system.



The heater must not operate in open air but always completely submerged.

The manufacturer declines all responsibility for damages caused by the heater dry operating.



For details see:

Electrical diagram - Domestic hot water module - CMACSX Page 62

10.4 Domestic hot water with solar energy

CMACSX Domestic hot water module + BT7 probe (L. 5mt.)

ACS3SX 300-litre domestic hot water storage tank with solar coil

ACS5SX 500-litre domestic hot water storage tank with solar coil

3DHWX Three-way valve for domestic hot water

L.300 x P.220 x H.120

Dimensions

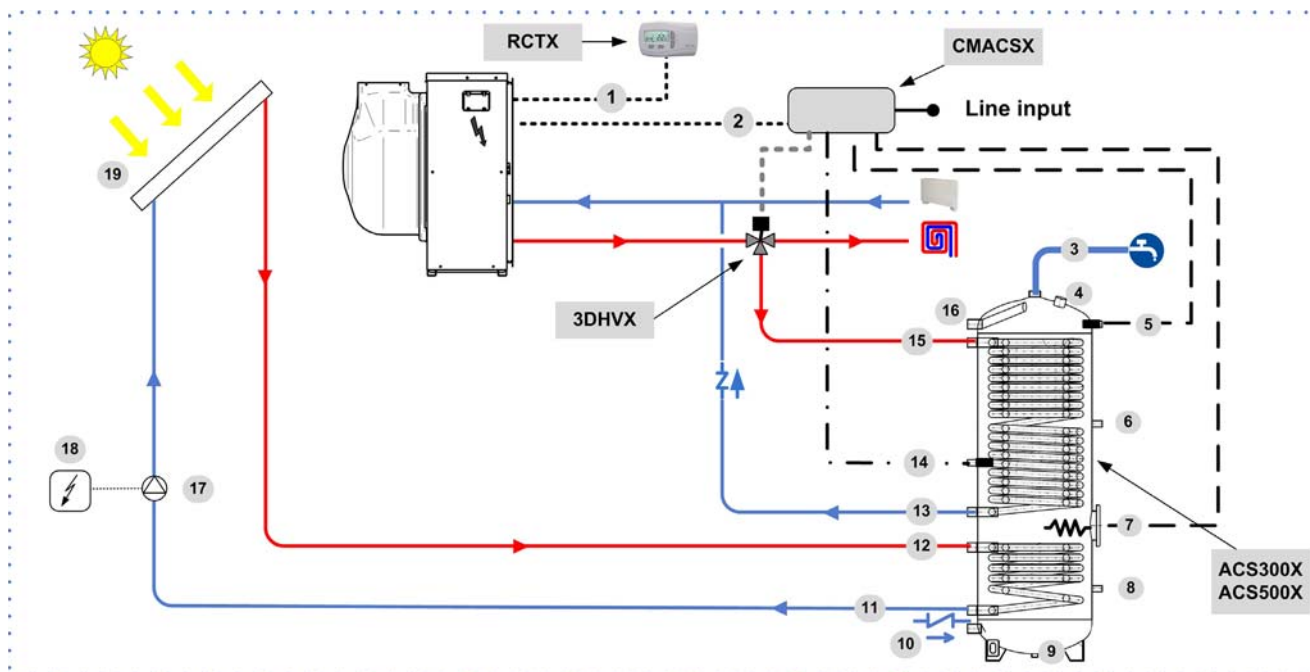
D.600 x 1615 mm

Dimensions

D.750 x 1690 mm

Sizes 21-71 = 1"

Sizes 81-141 = 1 1/4"



Indicative diagram. The installer must define: component type, position in system. See wiring diagram.

1+2 Max. = 100 mt.
Cable section:
Min. 0,35 Max.1 mm²

3	DHW	1"
4	Anode	1 1/4"
5	Safety probe (provided by the Customer)	1/2"
6	Well	1/2"
7	Electric heater provided by the customer	1 1/2"
8	Well	1/2"
9	Blind connection for fasting	1/2"
10	waterworks water inlet	1"

11 Solar supply 1"

12 Solar return 1"

13 Supply 1"

14 BT7 probe 1/2"

15 Return 1"

16 DHW 1 1/4"

17 Solar pump (Not Provided) 1/2"

18 Solar panels unit (not provided)

19 Solar panels (Not Provided)

Operation - CMACSX

The CMACSX module allows controlling the temperature of the Domestic Hot Water, by means of the temperature probe placed inside the storage tank.

The control allows the production of Domestic Hot Water to a specific set-point that can be defined in 4 daily intervals and 3 user profiles.

If the temperature of the Domestic Hot Water drops below a preset value (generally 40°C), the unit performs the "mode change" between system and Domestic Hot Water production, driving a diverter valve that switches the flow from the system to the storage tank.

The request of DHW production has always the priority over the system and ends if the configured set-point has been reached or the set time for the production of DHW has elapsed.

The Anti-legionella function allows removing the Legionella bacteria, which reside in the water storage tank.

These bacteria are removed if the water temperature exceeds 60°C for at least 30 consecutive minutes.

The anti-legionella function is managed by a different set-point, which is independent from that set for the Domestic Hot Water.

This function can be scheduled daily, weekly, at different time intervals.

Installation instructions, domestic hot water storage

1. Provide, where necessary, a pressure reducer for the entering water.
2. Be provided with a safety valve set according to what is reported on the "technical dates" label applied to the boiler.
3. Be provided with an expansion tank proportioned to the boiler's dimensions (you are advise to let the circulation be made by a thermo technician).
4. Before starting it you are invited to check the clamping of all the screws of the flange.
5. Each year an internal cleaning must be executed.
6. In order to avoid corrosion the anodes must be inspected after each 12 months; however, where the water is particularly aggressive the inspections must be reduced to each 6 months. If the anode is consumed it must be substituted.

The used materials can be subdued to deformations caused by temperature oscillations; we recommend you to store them in covered rooms and mild temperatures (15-20°C).

Storage tank type		ACS3SX	ACS5SX	-
Suitable for heat pump	Size	21 - 51	21 - 101	121 - 171
Upper and bottom coil operating pressure	bar	6	6	-
Domestic hot water operating pressure	bar	10	10	-
Maximum temperature upper and bottom coil	°C	110	110	-
Empty weight	kg	140	245	-
Upper pipe coil surface area	m ²	3.7	5.2	-
Upper pipe coil water capacity	L	18	31	-
Upper pipe coil pressure drop	mbar	31	37	-
Bottom pipe coil surface area	m ²	1.2	1.8	-
Bottom pipe coil water capacity	L	8	10	-
Bottom pipe coil pressure drop	mbar	17	21	-

2/4kW Electric heater

The resistance R can operate simultaneously to the compressor.

For example:

- antilegionella scheduling
- BT7 < (setpoint ACS - 19°C)

Immersion heater

Regulating thermostat 30-70°C

Safety thermostat 90°C

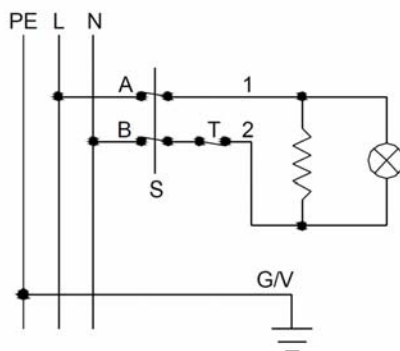
The heater should only be used to heat drinking water with a hardness between 7° f to 25° f in according to legislation.

In the case of higher water hardness it is advisable to install a water softener in the system.



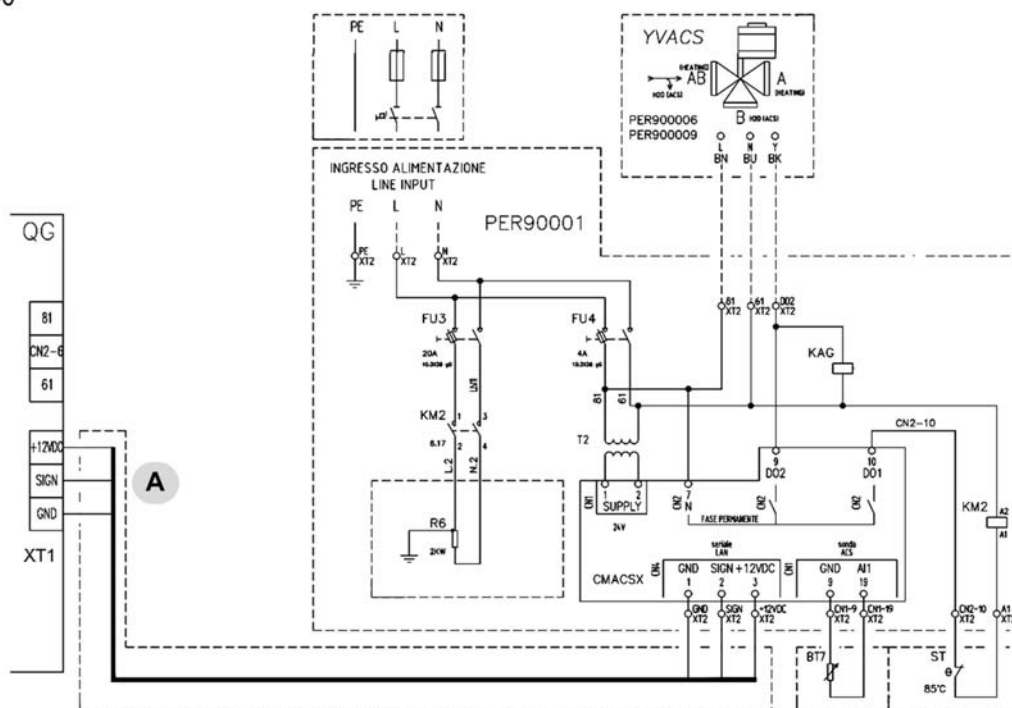
The heater must not operate in open air but always completely submerged.

The manufacturer declines all responsibility for damages caused by the heater dry operating.

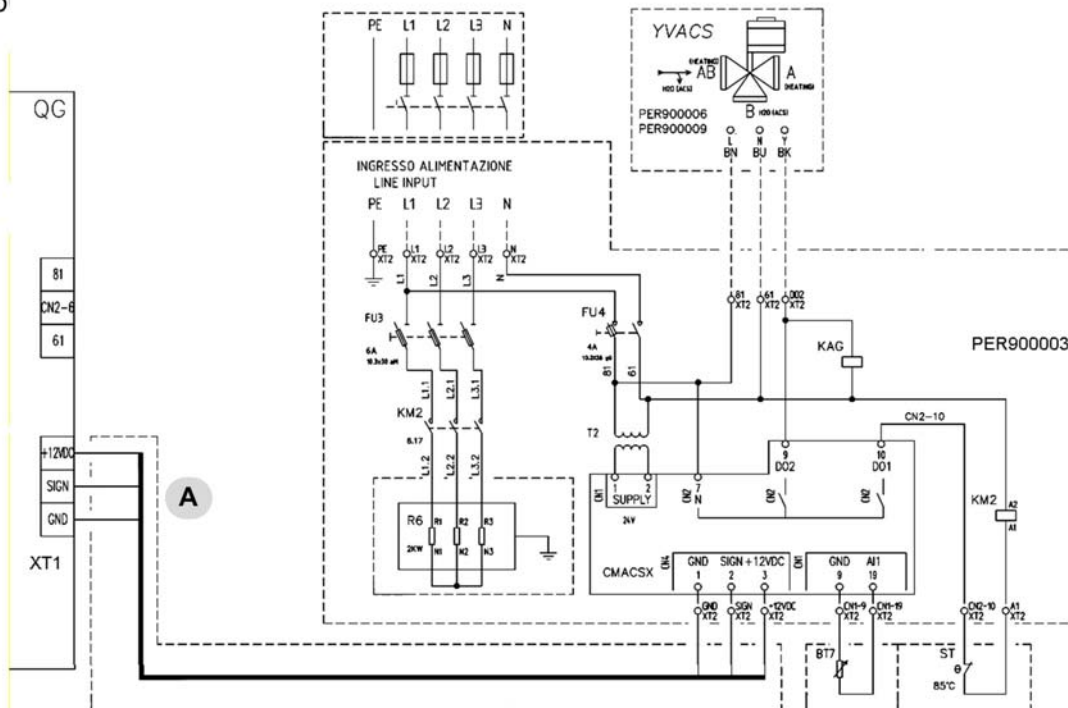


Electrical diagram - Domestic hot water module - CMACSX

230/1/50



400/3/5



QG Electrical panel
Heat pump

XT1 Terminal block of the customer connections

A LAN serial: L max = 100 mt
Cable section:
Min. 0,35 Max.1 mm2

YVACS DHW valve
(accessory 3DHWX)

BT7 DHW storage probe

R6 Electric heaters of the DHW storage
(provided by the Customer)

ST Storage high temperature safety thermostat
(provided by the Customer)

10.5 Boiler management

Boiler management only for installation production

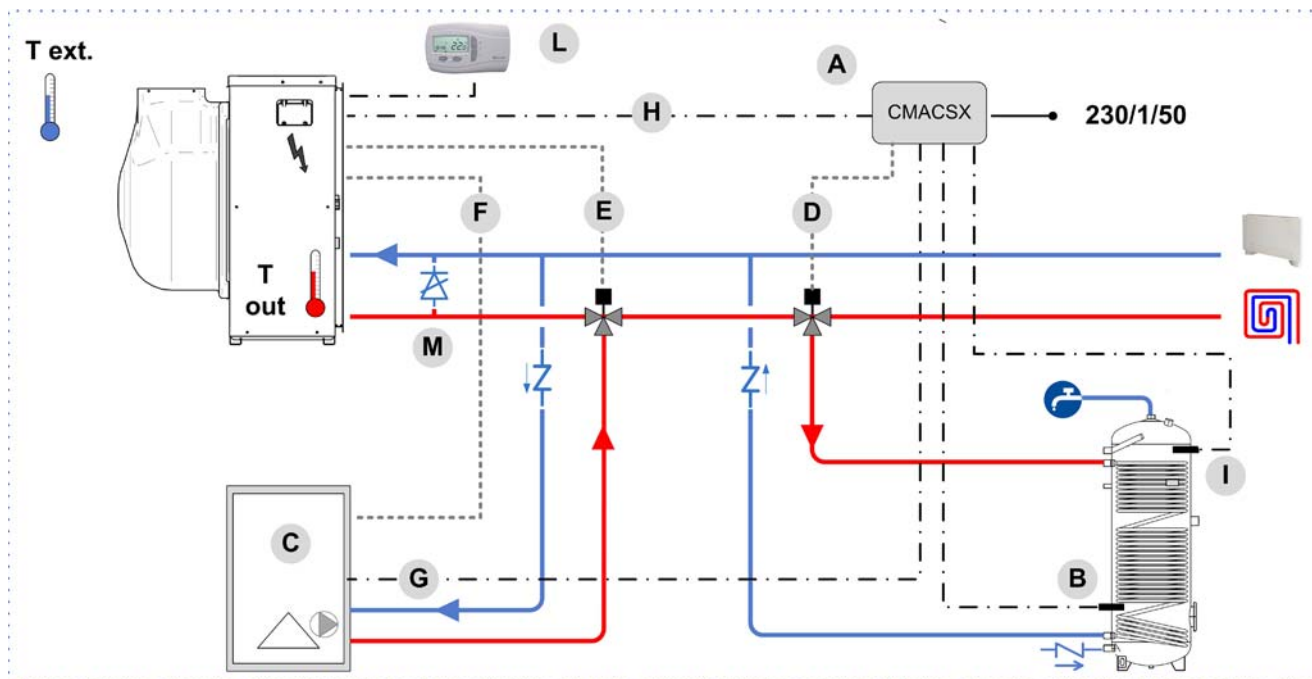
The configuration of the system involves 1 3-way diverting valve (E) between the heat pump and the auxiliary generator.

The heat pump acts as the main generator and is activated whenever there is a request from the system.

If the System set point has not been reached yet and the outdoor air temperature drops below the selected set point, the heat pump stops, switches the 3-way valve (E) and, after a 120-second delay, it activates the auxiliary generator with its own set point.

If the outdoor air temperature remains below the selected set point, the auxiliary generator operates until it reaches the System's set point.

If the air temperature rises above the selected set point, the control stops the auxiliary generator, switches the 3-way valve (E) and activates the heat pump until it reaches the System's set point.



Indicative diagram. The installer must define: component type, position in system. See wiring diagram.

A	Domestic hot water module	L.300 x P.220 x H.120
B	Temperature probe domestic hot water	cabble length 5 mt
C	Boiler	provided by the Customer
D	3-way DHW valve	accessory YVACS
E	3-way Boiler valve	accessory YVc
F	Setpoint control system	On-off (on = 1° setpoint, off = boiler off)
G	DHW Setpoint control	On-off (on = 2° setpoint)
H	max 100 mt	Min. 0,35 Max.1 mm2
I	Safety probe (provided by the Customer)	
L	Room keypad	
M	Bypass	

Boiler management for installation and DHW production

The system configuration consists of:

1 module to manage domestic hot water (CMACSX)

1 3-way diverting valve (E) between the heat pump and the auxiliary generator

1 3-way valve (D) to divert the flow towards the DHW storage tank

The heat pump acts as the main generator and is activated whenever there is a request from the system or a DHW request.

If the domestic hot water temperature drops below a set value, the CMACSX module sends the request to produce DHW to the heat pump and controls the switching of the 3-way valve (D), so that it diverts the flow from the system to the DHW storage tank.

The heat pump switches the set point from the system's value to the DHW value and produces DHW.

If the DHW set point has not been reached yet and the outdoor air temperature drops below the selected set point, the heat pump stops, switches the 3-way valve (E) and, after a 120-second delay, it activates the auxiliary generator to produce DHW.

Via the CMACSX module, the heat pump switches the set point of the auxiliary generator from System production to DHW production through a potential-free contact.

If the auxiliary generator is not designed to manage a double set point, set the DHW production value as a set point and provide for a downstream mixing system to reach the correct system supply temperature.

If the outdoor air temperature remains below the selected set point, the auxiliary generator operates until it reaches the DHW set point.

If the air temperature rises above the selected set point, the control stops the auxiliary generator, switches the 3-way valve (E) and activates the heat pump until it reaches the DHW set point.

In this system configuration, the anti-Legionella function is carried out by the auxiliary generator and not via the electric heater inside the storage tank.

Parameters to setting:

Keys Esc + Set  Menu PAr 

CL90 = 30 valve control of circuit boiler/heat pump switching

CL93 = 38 boiler start-up control

pi11 = 1

br00 = 3

br02 = 70

br03 = 0.1

br05 = 5 (adjustable)

Setpoint < heat pump operation range

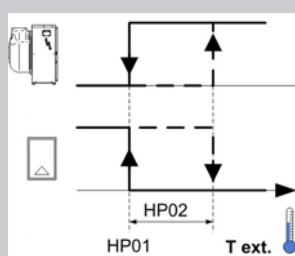
Boiler replacing the heat pump

Based on the outdoor air temperature

ESC+SET buttons  PAR menu  HP menu

Enable the function:

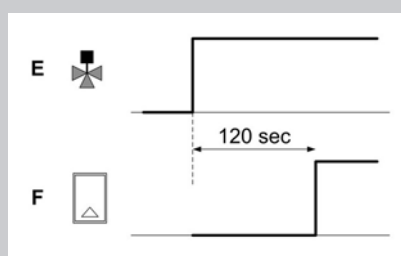
HP00=1



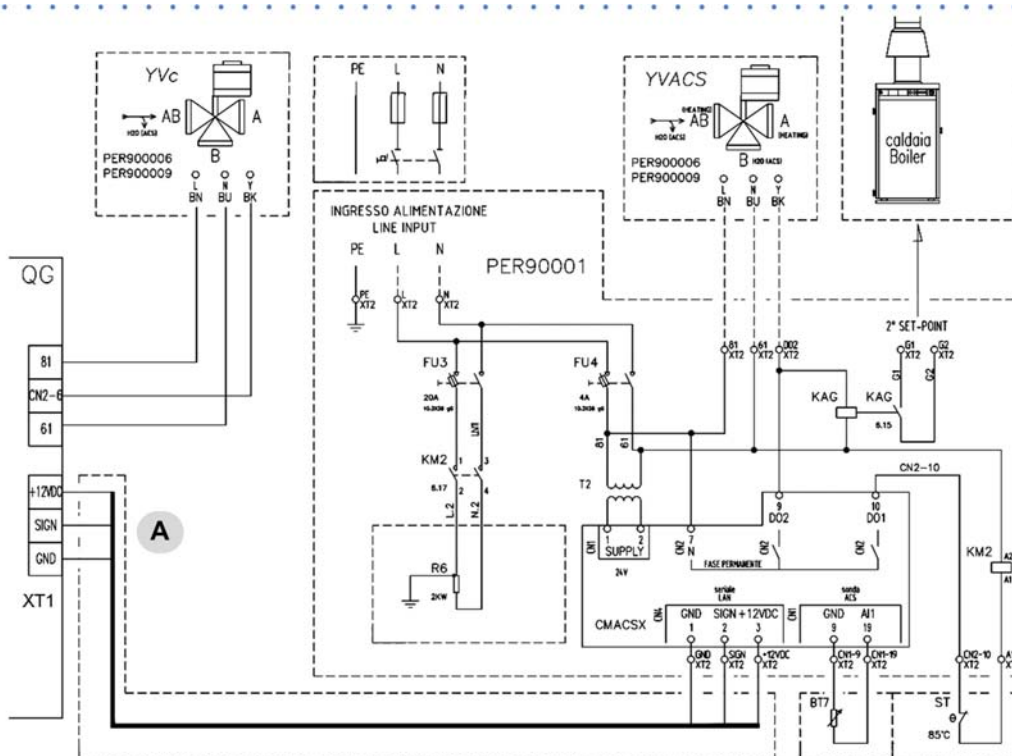
Boiler control and valve control

C Boiler

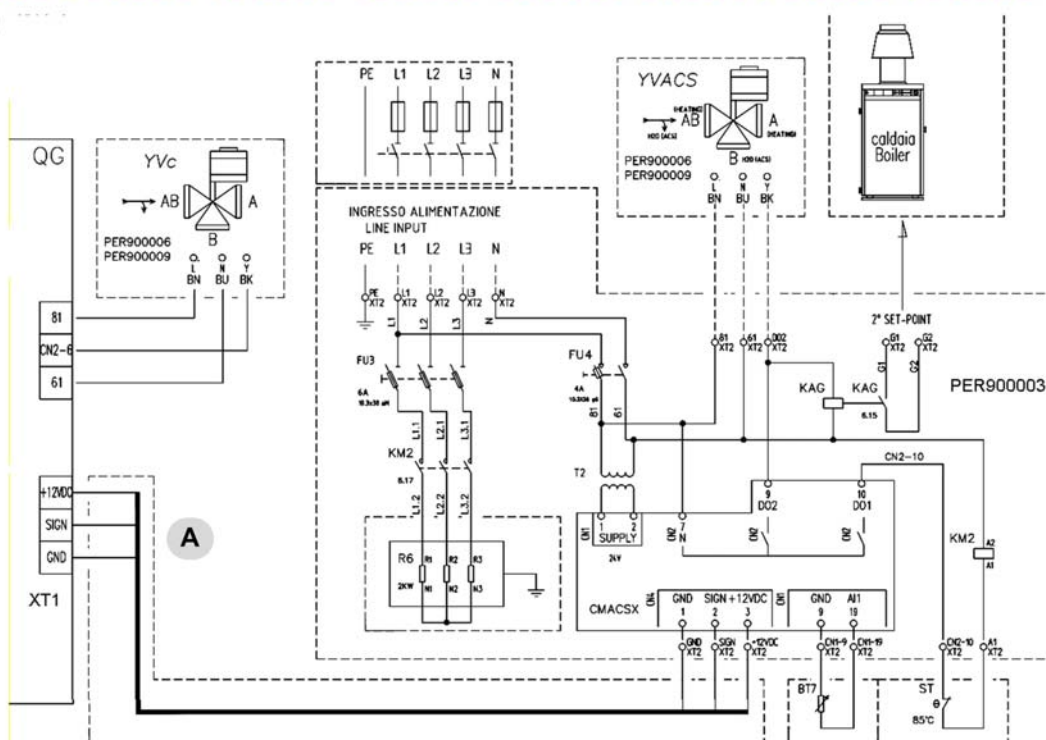
E 3-way Boiler valve



230/1/50



400/3/50



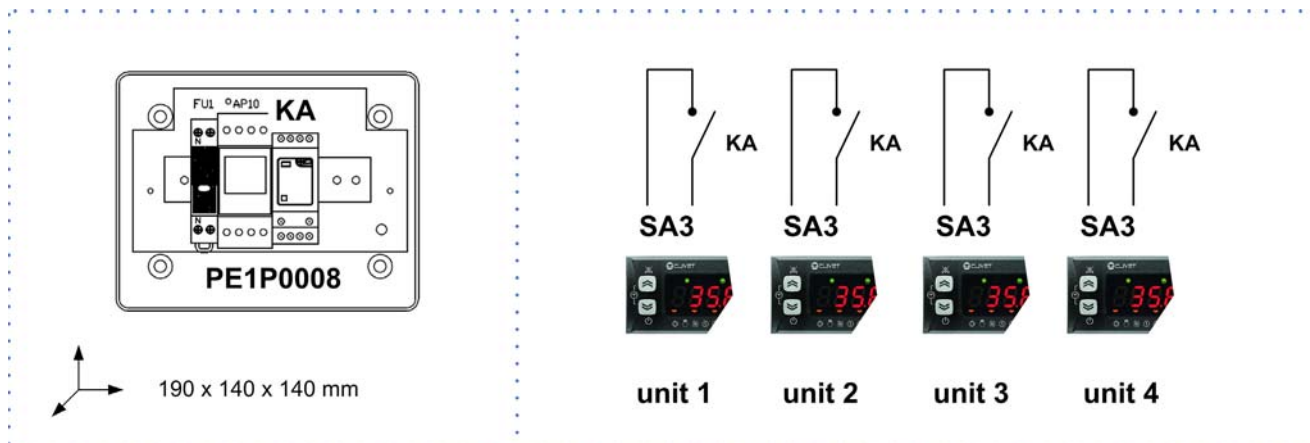
- QG** Electrical panel
Heat pump
- XT1** Terminal block of the customer connections
- A** LAN serial: L max = 100 mt
Cable section:
Min. 0,35 Max.1 mm²
- YVACS** 3DHWX - 3-way valve for domestic hot water
PER900006 - PER900009

- YVc** 3-way Boiler valve
PER900006 - PER900009
- BT7** DHW storage probe
- R6** Electric heaters of the DHW storage
(provided by the Customer)
- ST** Storage high temperature safety thermostat
(provided by the Customer)

10.6 Cascade units

Max 4 units

Automatic unit rotation



Connect PE1P0008 with SA3 unit 1, SA3 units 2, etc..

enable SA3 on unit 1, unit 2, etc.. (main menu \boxtimes Par \boxtimes CL \boxtimes CL45 = 22)

Set Tr15 and Tr16 on unit 1, unit 2, etc.. (main menu \boxtimes Par \boxtimes Tr \boxtimes Tr15)

example of Summer set point									
	2 units		3 units			4 units			
	unit 1	unit 2	unit 1	unit 2	unit 3	unit 1	unit 2	unit 3	unit 4
Summer set point (SPCool)	7	7,5	7	7,5	8	7	7,5	8	8,5
Tr15	0,5	-0,5	1	-0,5	-0,5	1,5	0,5	-0,5	-1,5
2° Summer set point (2°SPCool)	7,5	7	8	7	7,5	8,5	8	7,5	7

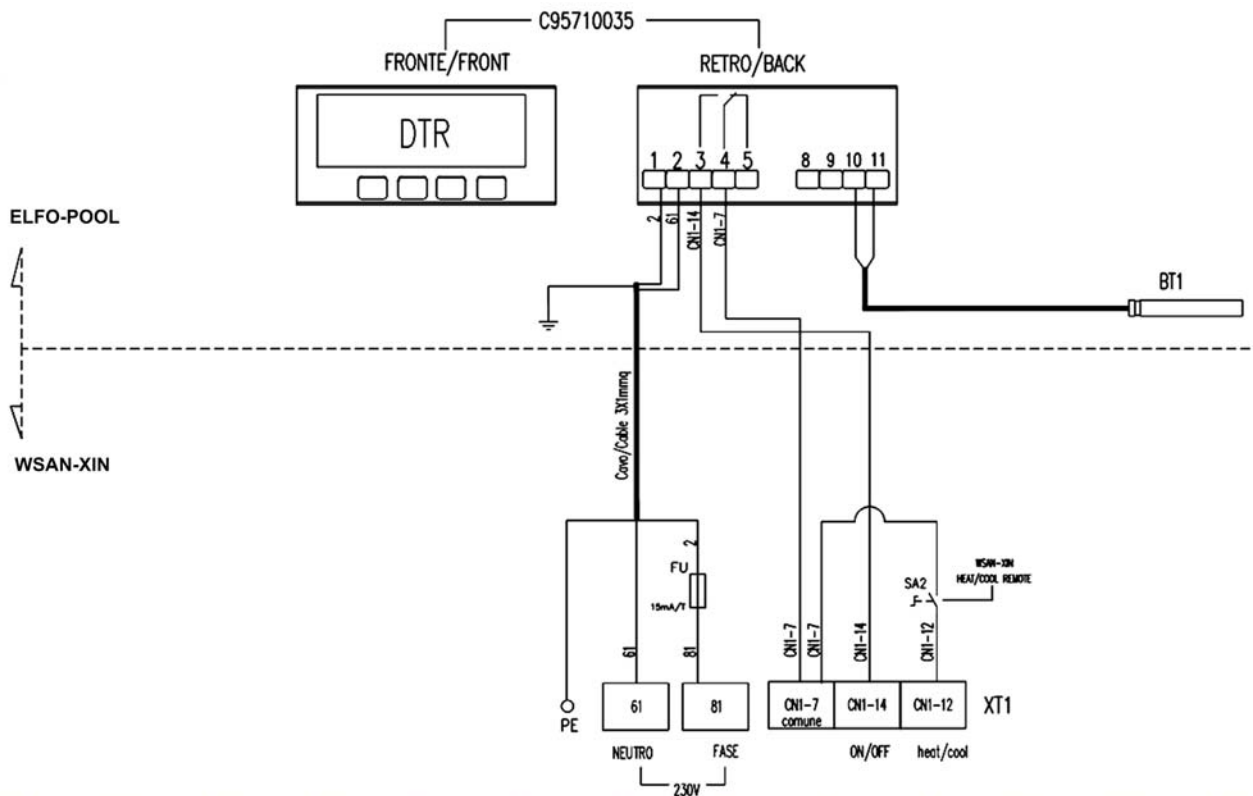
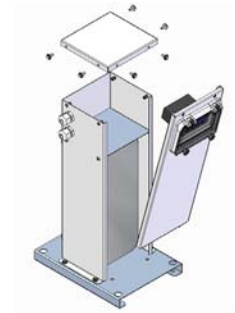
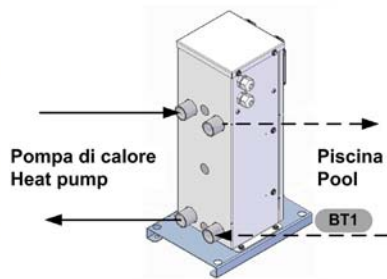
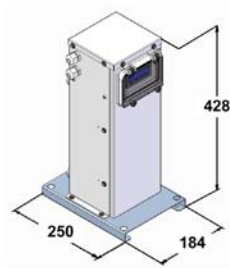
SCHEDULING EXAMPLE

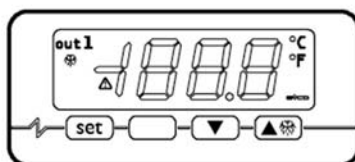
monday: KA = OFF \boxtimes Enabled set summer, tuesday KA = ON \boxtimes 2° Enabled set summer, wednesday KA = OFF \boxtimes Enabled set summer

example summer scheduling			
	Monday	Tuesday	Wednesday
unit 1	7 (SPCool)	8,5 (2°SPCool)	7 (SPCool)
unit 2	7,5 (SPCool)	8 (2°SPCool)	7,5 (SPCool)
unit 3	8 (SPCool)	7,5 (2°SPCool)	8 (SPCool)
unit 4	8,5 (SPCool)	7 (2°SPCool)	8,5 (SPCool)

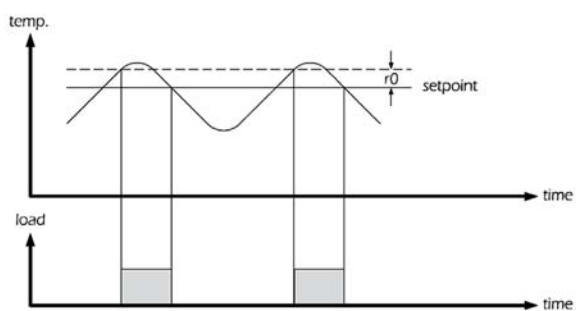
example of winter set point									
	2 units		3 units			4 units			
	unit 1	unit 2	unit 1	unit 2	unit 3	unit 1	unit 2	unit 3	unit 4
Winter set point	45	44,5	45	44,5	44	45	44,5	44	43,5
Tr16	-0,5	0,5	-1	0,5	0,5	-1,5	-0,5	0,5	1,5
2° Winter set point	44,5	45	44	45	44,5	43,5	44	44,5	45

10.7 Cabinet for Elfo-Pool

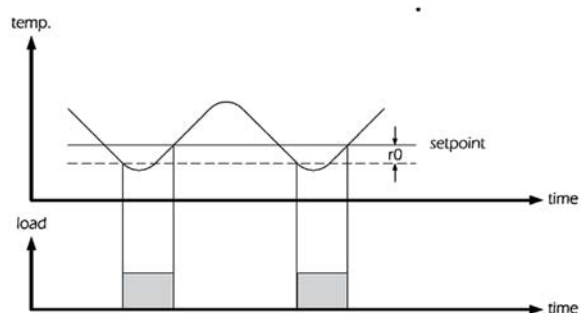




1



2



- | | | |
|---|----------------------------------|----------|
| 1 | Cooling operation with parameter | $r5 = 0$ |
| 2 | Heating operation with parameter | $r5 = 1$ |

11 Decommissioning

11.1 Disconnecting

Only authorised personnel must disconnect the unit.

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 water circuit

Awaiting dismantling and disposal, the unit can also be stored outdoors, if the electrical, cooling and water circuits of the unit have 100% integrity and are isolated, bad weather and rapid change in temperature will not result in any environmental impact.

11.2 Dismantling and disposal

The unit must always be sent to authorised centres for dismantling and disposal.

When dismantling the unit, the fan, the motor and the coil, if operating, may be recovered by the specialist centres for reuse.

All the materials must be recovered or disposed of in compliance with the corresponding national standards in force.

For further information on the decommissioning of the unit, contact the manufacturer.

11.3 Directive EC RAEE

The units covered by the legislation in question are marked with the symbol on the side.

With the aim of protecting the environment, all of our units are produced in compliance with Directive EC on waste electrical and electronic equipment (RAEE).

The potential effects on the environment and on human health due to the presence of hazardous substances are shown in the use and maintenance manual in the section on residual risks.

Information in addition to that indicated below, if required, can be obtained from the manufacturer/distributor/importer, who are responsible for the collection/handling of waste originating from equipment covered by EC-RAEE. This information is also available from the retailer who sold this appliance or from the local authorities who handle waste.

Directive EC-RAEE requires disposal and recycling of electrical and electronic equipment as described therein to be handled through appropriate collection, in suitable centres, separate from collection for the disposal of mixed urban waste.

The user must not dispose of the unit at the end of its life cycle as urban waste, it must instead be handed over to appropriate collection centres as set forth by current standards or as instructed by the distributor.



12 Residual risks

General description

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 regarding the packaging and in compliance with the local regulations in force. Should the refrigerant leak please refer to the refrigerant "Safety sheet".

Installation

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

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

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

Carefully check the positioning of the unit.

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

Carefully check the positioning and the anchoring of the unit.

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

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

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

Size			21	31	41	51	71	81	91	101	121	131	141
Radiant panels													
Heating													
Heating capacity	1	kW	5,41	6,81	8,70	11,9	14,3	16,5	18,4	19,6	23,8	26,4	30,3
Total power input	2	kW	1,39	1,78	2,29	3,83	4,50	4,38	4,99	5,32	6,58	7,62	9,11
COP (EN 14511:2013)	3		3,90	3,82	3,81	3,10	3,17	3,78	3,69	3,69	3,61	3,47	3,33
Financial COP	4		4,28	4,30	4,17	4,10	4,07	4,42	4,27	4,25	4,28	4,11	3,93
ErP Space Heating Energy Class - AVERAGE Climate - W35	15		A	A	A+	A	A	A+	A+	A	A	A	A+
Cooling													
Cooling capacity	7	kW	4,25	6,34	8,07	10,3	13,0	15,9	17,6	19,4	25,4	28,3	32,1
Total power input	2	kW	1,18	1,82	2,24	3,19	3,91	4,46	4,88	5,61	7,34	8,70	10,4
EER (EN 14511:2013)	8		3,59	3,49	3,60	3,24	3,33	3,57	3,62	3,46	3,46	3,26	3,08
Financial ESEER	9		4,04	3,94	3,96	3,80	3,84	4,16	4,20	3,95	4,02	3,78	3,61
ESEER	10		4,46	4,64	4,98	5,14	4,45	5,67	5,72	5,62	5,21	4,61	4,58
Water flow-rate	7	l/s	0,20	0,30	0,39	0,49	0,62	0,76	0,84	0,93	1,21	1,35	1,53
Useful pump discharge head	7	kPa	53	43	48	42	45	70	65	60	55	46	32
Terminal units													
Heating													
Heating capacity	5	kW	5,19	6,54	8,25	11,5	13,8	16,2	18,5	20,4	25,8	28,2	31,5
Total power input	2	kW	1,59	2,16	2,72	4,49	5,32	5,37	6,23	7,27	8,85	10,2	12,1
COP (EN 14511:2013)	3		3,06	3,03	3,03	2,55	2,60	3,02	2,97	2,81	2,92	2,75	2,59
Cooling													
Cooling capacity	11	kW	3,88	5,24	6,11	8,84	11,7	15,5	16,8	19,5	24,0	26,6	29,1
Total power input	2	kW	1,57	2,12	2,40	3,72	4,86	5,85	6,38	8,47	10,2	11,9	14,1
EER (EN 14511:2013)	8		2,48	2,47	2,54	2,37	2,41	2,65	2,64	2,30	2,35	2,24	2,06
ESEER	12		3,41	3,25	3,36	3,04	3,30	4,27	4,33	4,12	3,92	3,58	3,43
Water flow-rate	11	l/s	0,19	0,25	0,29	0,42	0,56	0,74	0,80	0,93	1,15	1,27	1,39
Useful pump discharge head	11	kPa	54	48	59	51	57	70	67	60	59	51	43
Radiators													
Heating													
Heating capacity	6	kW	5,05	6,39	8,03	11,0	13,3	15,2	17,7	19,9	24,0	26,6	29,9
Total power input	2	kW	2,04	2,58	3,32	5,27	6,28	6,49	7,57	8,93	11,0	12,2	14,5
COP (EN 14511:2013)	3		2,48	2,48	2,42	2,10	2,12	2,33	2,33	2,23	2,18	2,17	2,06
Water flow-rate	6	l/s	0,12	0,15	0,19	0,26	0,32	0,36	0,42	0,48	0,57	0,64	0,71
Useful pump discharge head	6	kPa	58	56	64	65	95	86	84	81	83	81	79
Compressor													
Type of compressors			ROTARY INVERTER DC				SCROLL INVERTER DC						
Refrigerant			R-410A	R-410A	R-410A	R-410A	R-410A	R-410A	R-410A	R-410A	R-410A	R-410A	R-410A
No. of compressors		No	1	1	1	1	1	1	1	1	1	1	1
Oil charge		l	0,35	0,35	0,87	1,70	1,70	1,90	1,90	1,90	1,90	1,90	1,90
Refrigeration circuits		No	1	1	1	1	1	1	1	1	1	1	1
Refrigerant charge		kg	2,0	2,1	2,0	3,4	4,6	6,0	6,0	6,0	8,7	8,7	8,7
User side exchanger													
Type of exchanger	13		PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE
No. of exchangers			1	1	1	1	1	1	1	1	1	1	1
Water content		l	0,56	0,64	0,64	1,14	1,8	2,37	2,37	2,37	3,13	3,13	3,13
External Section Fans													
Type of fans	14		RAD	RAD	RAD	RAD	RAD	RAD	RAD	RAD	RAD	RAD	RAD
No. of fans		No	1	1	1	1	1	1	1	1	1	1	1
Standard airflow		l/s	653	1028	1028	2056	1996	2222	2306	2444	2778	3056	3172
Installed unit power		kW	0,25	0,36	0,36	0,88	0,88	0,67	0,74	0,76	1,28	1,75	2,04
Max external static pressure		Pa	100	100	100	100	100	120	120	120	120	120	120
Water circuit													

Size			21	31	41	51	71	81	91	101	121	131	141
Maximum water side pressure		kPa	550	550	550	550	550	550	550	550	550	550	550
Safety valve calibration		kPa	600	600	600	600	600	600	600	600	600	600	600
Min. installation water contents		l	17	20	25	33	40	50	53	57	63	68	74
Power supply													
Standard power supply			230/1/50	230/1/50	230/1/50	400/3/50+N	400/3/50+N	400/3/50+N	400/3/50+N	400/3/50+N	400/3/50+N	400/3/50+N	400/3/50+N

The Product is compliant with the ErP (Energy Related Products) European Directive. It includes the Commission delegated Regulation (EU) No 811/2013 (rated heat output ≤ 70 kW at specified reference conditions) and the Commission delegated Regulation (EU) No 813/2013 (rated heat output ≤ 400 kW at specified reference conditions)

1. Entering/leaving water temperature user side 30/35°C, Entering external exchanger air temperature 7 °C (R.H. = 85%)
2. The overall power absorbed is calculated by adding the power absorbed by the compressor + the power absorbed by the fan - the percentage value of the fan to overcome external pressure drop + the power absorbed by the pump - the percentage value of the pump to overcome pressure drop outside + the power absorbed by the auxiliary electrical circuit
3. COP (EN 14511:2013) heating performance coefficient. Ratio between delivered heating capacity and power input in compliance with EN 14511:2013
4. COP Tax credit calculated according to EN14511:2008
5. Entering/leaving water temperature user side 40/45°C, Entering external exchanger air temperature 7 °C (R.H. = 85%)

6. Entering/leaving water temperature user side 45/55°C, Entering external exchanger air temperature 7°C (R.H. = 85%)
7. Entering/leaving water temperature user side 23/18°C, external exchanger entering air 35°C
8. EER (EN 14511:2013) cooling performance coefficient. Ratio between delivered cooling capacity and power input in compliance with EN 14511:2013
9. EER Tax credit calculated according to EN14511:2008
10. ESEER calculated by Clivet for radiant systems with water produced at 18°C by taking into account the load conditions and source water temperature as defined by EUROVENT for water at 7°C
11. User side entering/leaving water temperature 12/7 °C, external exchanger entering air 35°C
12. ESEER calculated by EUROVENT, for systems featuring terminal units with water produced at 7°C
13. PHE = plate exchanger
14. RAD = radial fan
15. Seasonal Space Heating Energy Efficiency Class according to Commission delegated Regulation (EU) No 811/2013. W = Water outlet temperature (°C)

The heads are intended as available at the unit connections
The pressure drops of the steel mesh strainer, supplied with the unit, have been already taken into consideration

Admissible water flow rates

Min. (Qmin) and max. (Qmax) water flow-rates admissibles for the correct unit operation.

Size		21	31	41	51	71	81	91	101	121	131	141
Minimum flow	[l/s]	0,15	0,18	0,18	0,23	0,34	0,32	0,32	0,32	0,45	0,45	0,45
Maximum flow-rate	[l/s]	0,90	0,90	0,90	1,10	1,50	1,70	1,70	1,70	1,90	1,90	1,90

Unit sound levels

ΔP_{ut} [Pa]	Size	Sound pressure level dB(A)	Sound power level dB(A)
50	21	51	66
50	31	52	67
50	41	53	68
50	51	64	80
50	71	66	81
80	81	57	74
80	91	57	74
80	101	58	74
80	121	62	79
80	131	65	82
80	141	66	83

The noise levels refer to units at full load under nominal test conditions, with ducted supply and return and available pressure of 50Pa and 80Pa as indicated in the table.

The sound pressure level refers to a distance of 1m from the outer surface of the unit operating in an open field.

Noise levels are determined using the tensiometric method (UNI EN ISO 9614-2)

Data referred to the following conditions:

entering / leaving user side exchanger water T 12/7°C, source side air T 35°C

Supply sound levels

ΔPut [Pa]	Size	Sound power level								Sound pressure level	Sound power level
		Octave band (Hz)									
		63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
100	21	88	77	69	65	64	66	60	41	44	59
100	31	95	87	76	71	69	66	62	48	45	69
100	41	97	89	77	72	70	68	64	49	45	69
100	51	104	95	84	88	83	72	65	58	48	64
100	71	106	97	86	90	85	74	67	60	50	65
120	81	104	94	78	73	71	70	69	56	48	65
120	91	105	94	78	73	71	69	69	58	48	65
120	101	107	96	81	74	72	70	69	60	51	67
120	121	106	100	86	81	78	77	70	65	52	69
120	131	107	103	89	85	82	81	75	69	53	70
120	141	108	104	88	86	83	82	77	69	53	70

The noise levels refer to units at full load, under nominal test conditions with ducted supply.

The sound pressure level is measured on the outlet with 1 meter duct and available pressure of 100Pa and 120Pa as indicated in the table.

Noise levels are determined using the tensiometric method (UNI EN ISO 9614-2)

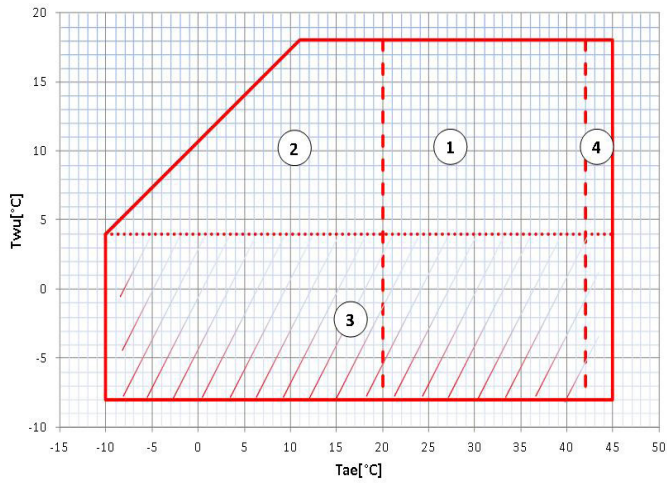
Data referred to the following conditions:

entering / leaving user side exchanger water T 12/7°C, source side air T 35°C

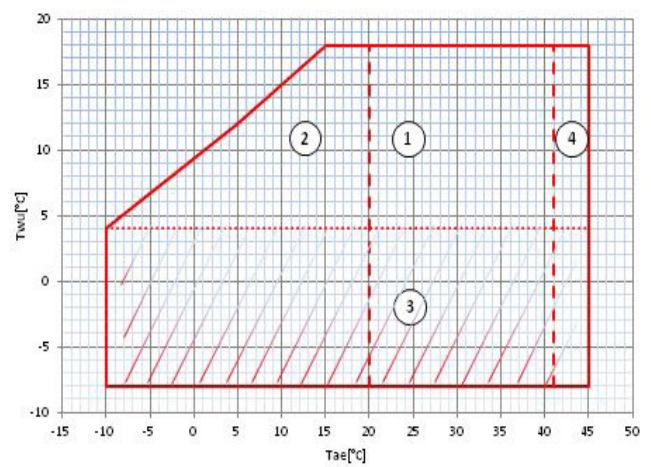
Operating range

Cooling

ELFOEnergy Duct Inverter 21 - 31 - 41



ELFOEnergy Duct Inverter 51-141



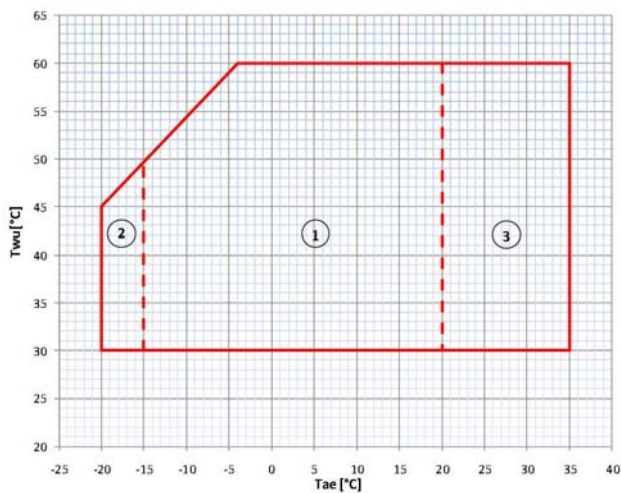
T_{wu} [°C] = leaving exchanger water temperature

T_{ae} [°C]: external exchanger inlet air temperature

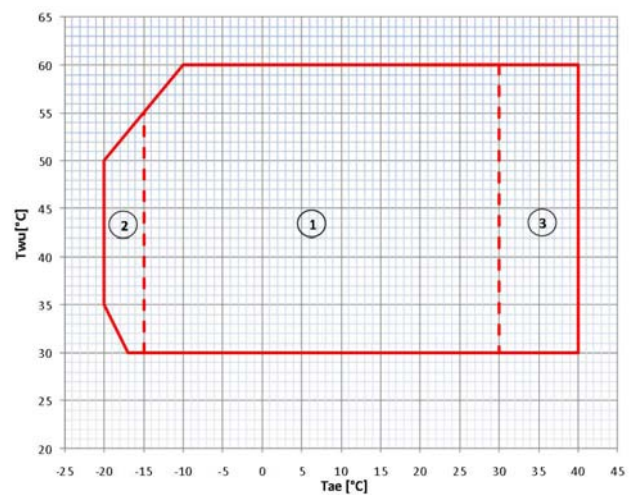
1. Normal operating range
2. Normal operating range, with modulating fans
3. Operating range where the use of ethylene glycol is mandatory in relation to the temperature of the water at the outlet of the user side exchanger
4. Operating range with modulating compressor

Heating

ELFOEnergy Duct Inverter 21 - 31 - 41



ELFOEnergy Duct Inverter 51-141



T_{wu} [°C] = leaving exchanger water temperature

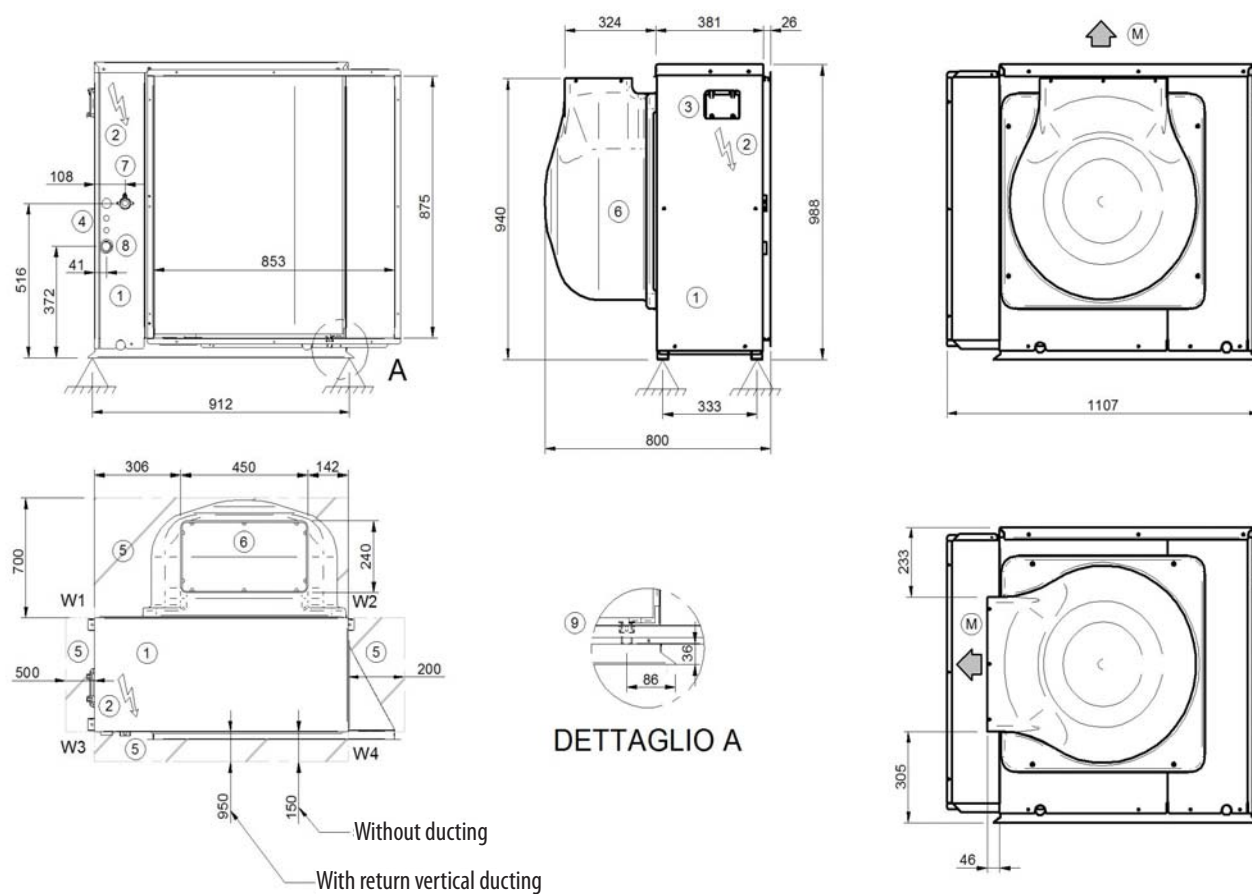
T_{ae} [°C]: external exchanger inlet air temperature

1. Normal operating range
2. Operating range with modulating compressor
3. Operation with fans and compressors in modulation

Dimensional drawings

Size 21-31-41

DAAV9-21-41_1 REV01
DATA 28/01/2016



1. Compressor compartment
2. Electrical panel
3. Unit control keypad
4. Power input
5. Functional spaces
6. Electric fan (Supply)
7. Internal exchanger water inlet (GAS F 1")
8. Internal exchanger water outlet (GAS F 1")
9. Condensate drain

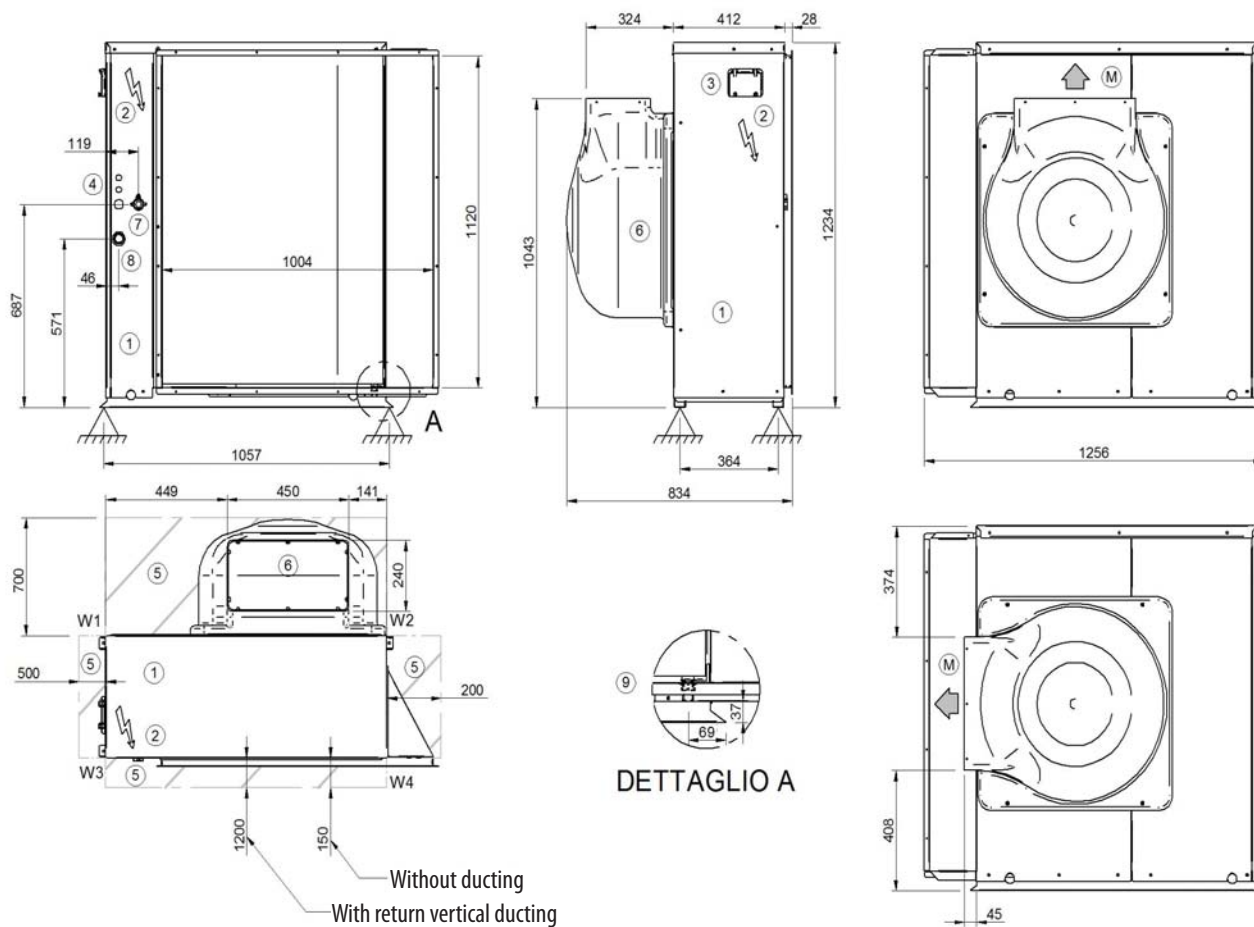
(M) Air supply

Size		21	31	41
Length	mm	1107	1107	1107
Depth	mm	800	800	800
Height	mm	988	988	988
W1	kg	35	35	35
W2	kg	39,2	39,2	39,2
W3	kg	40	40	40
W4	kg	24	24	24
Operating weight	kg	126	132	138
Shipping weight	kg	132	138	142

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

Size 51-71

DAAV9-51-71_1 REV01
DATA 28/01/2016



1. Compressor compartment
2. Electrical panel
3. Unit control keypad
4. Power input
5. Functional spaces
6. Electric fan (Supply)
7. Internal exchanger water inlet (GAS F 1")
8. Internal exchanger water outlet (GAS F 1")
9. Condensate drain

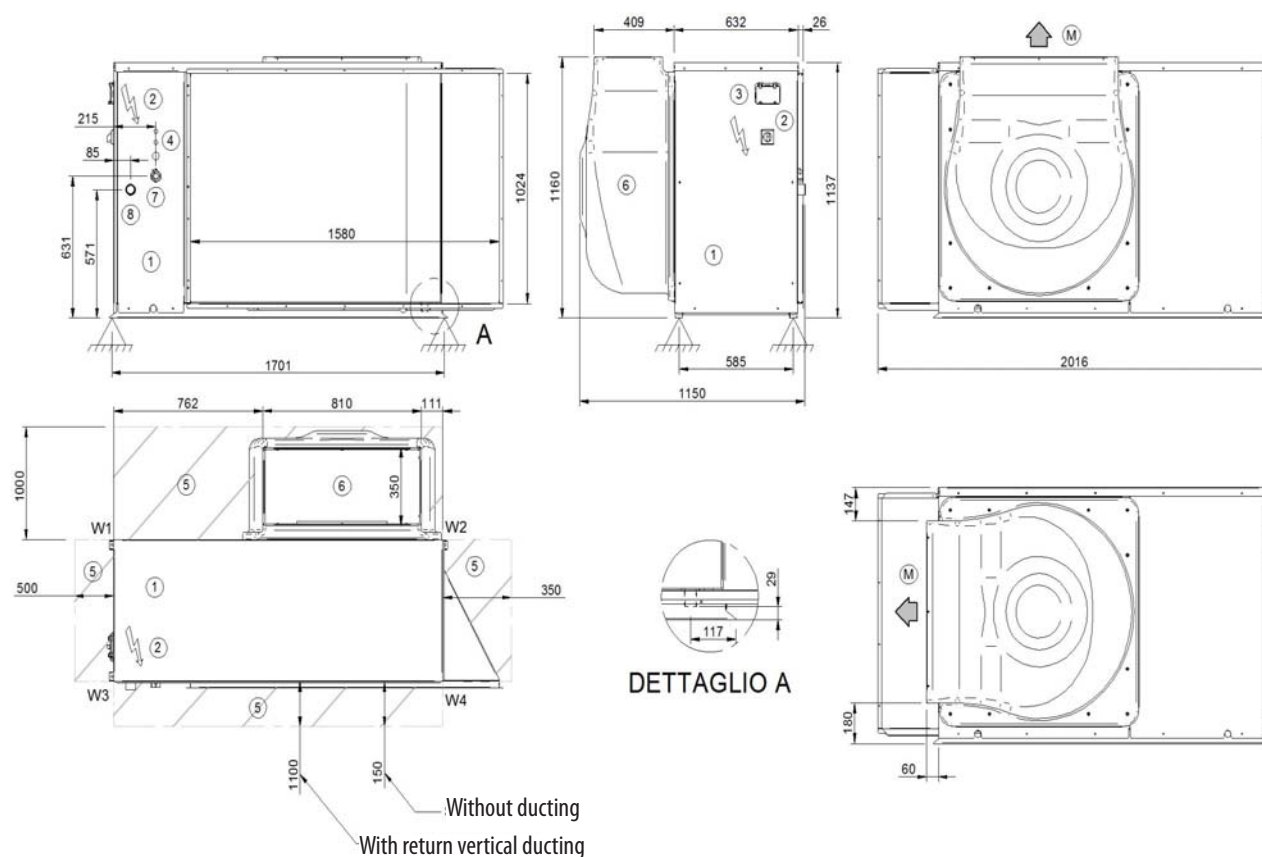
(M) Supply Air

Size		51	71
Length	mm	1256	1256
Depth	mm	834	834
Height	mm	1234	1234
W1	kg	51,5	53
W2	kg	45,9	47,4
W3	kg	54,5	55,5
W4	kg	29,5	30,5
Operating weight	kg	181	186
Shipping weight	kg	185	190

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

Sizes 81-91-101

DAAV9-81-101_1 REV01
DATA 19/05/2014



1. Compressor compartment
2. Electrical panel
3. Unit control keypad
4. Power input
5. Functional spaces
6. Electric fan (Supply)
7. Internal exchanger water inlet (GAS F 1"1/4)
8. Internal exchanger water outlet (GAS F 1"1/4)
9. Condensate drain

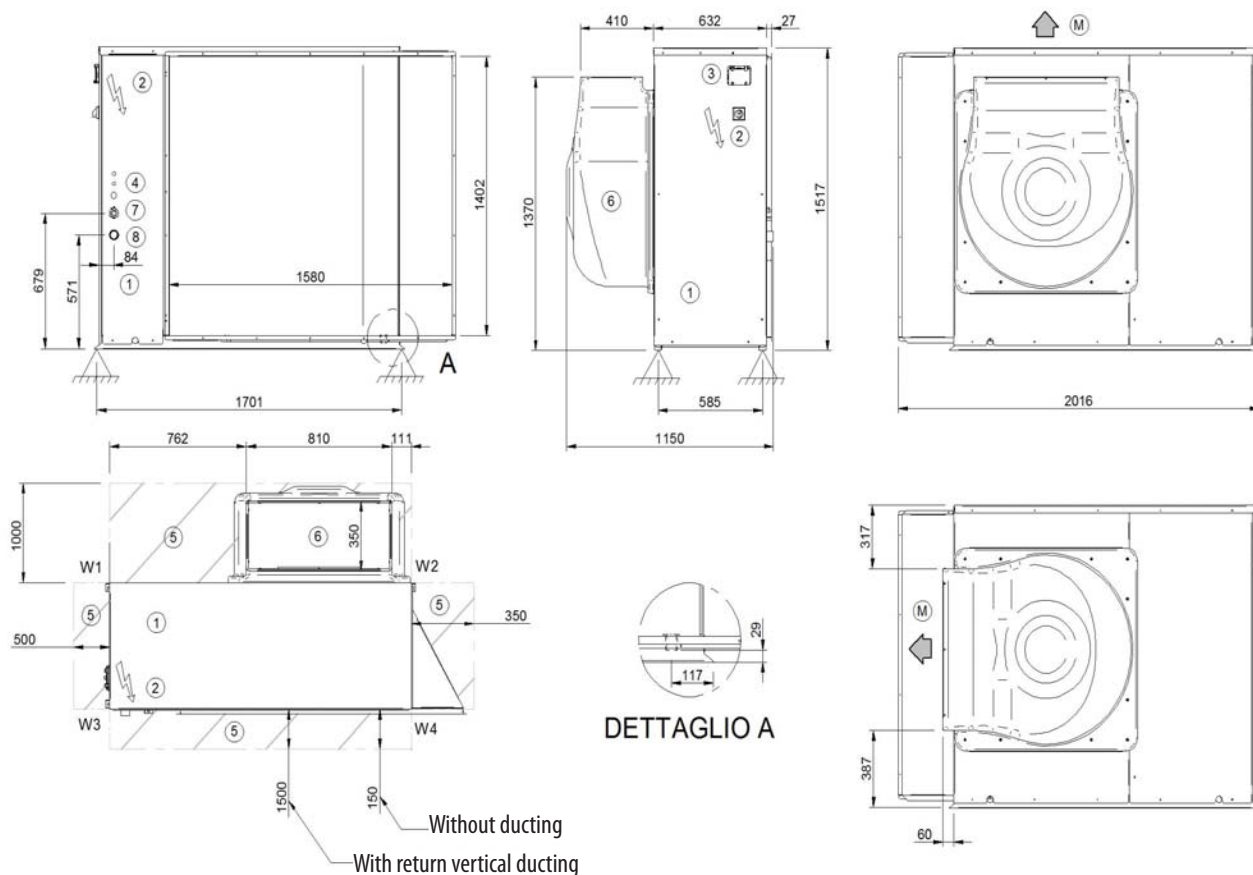
(M) Air supply

Size		81	91	101
Length	mm	2016	2016	2016
Depth	mm	1150	1150	1150
Height	mm	1137	1137	1137
W1	kg	80	80	80
W2	kg	71	71	71
W3	kg	70	70	70
W4	kg	40	40	40
Operating weight	kg	261	261	261
Shipping weight	kg	265	265	265

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

Sizes 121-131-141

DAAV9-121-141_1 REV01
DATA 19/05/2014



- 1. Compressor compartment
- 2. Electrical panel
- 3. Unit control keypad
- 4. Power input
- 5. Functional spaces
- 6. Electric fan (Supply)
- 7. Internal exchanger water inlet (GAS F 1"1/4)
- 8. Internal exchanger water outlet (GAS F 1"1/4)
- 9. Condensate drain

(M) Supply Air

Size		121	131	141
Length	mm	2016	2016	2016
Depth	mm	1150	1150	1150
Height	mm	1517	1517	1517
W1	kg	85	85	85
W2	kg	89	89	89
W3	kg	85	85	85
W4	kg	60	60	60
Operating weight	kg	319	319	319
Shipping weight	kg	325	325	325

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

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