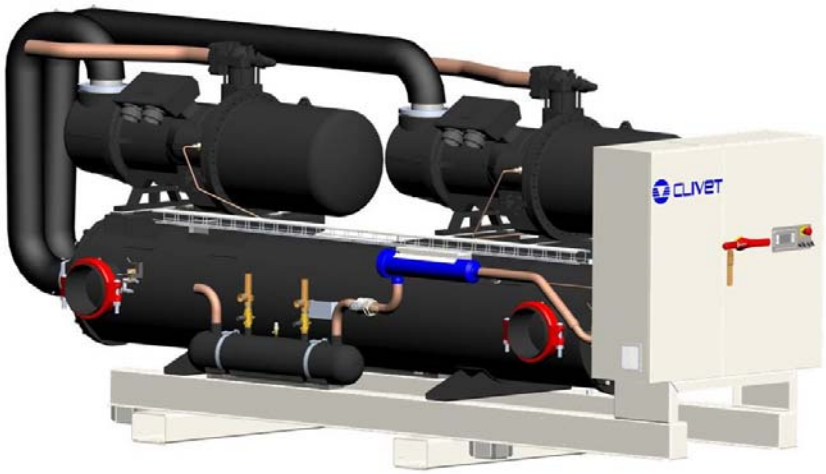
Installation and operating manual

Water chiller with remote condenser

MDE-SL3 220.2-580.2



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 beat solution.

Yours faithfully.

CLIVET Spa

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1 General description

1.1 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.

1.2 Preliminaries

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

1.3 Risk situations

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

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

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

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

1.4 Intended use

Use the unit only:

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

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

1.5 Installation

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

Follow local safety regulations.

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

1.6 Maintenance

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

⚠ Turn the unit off before any operation.

1.7 Modification

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

1.8 Breakdown/Malfuction

⚠ Disable the unit immediately in case of breakdown or malfunction.

Contact a certified service agent.

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

1.9 User training

⚠ The installer has to train the user on:

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

1.10 Data update

Continual product improvements may imply manual data changes.

Visit manufacturer web site for updated data.

1.11 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

1.12 Unit indentification

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

1.13 Serial number

It identifies uniquely each unit.

Must be quoted when ordering spare parts.

1.14 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 wiringdiagram

2 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.

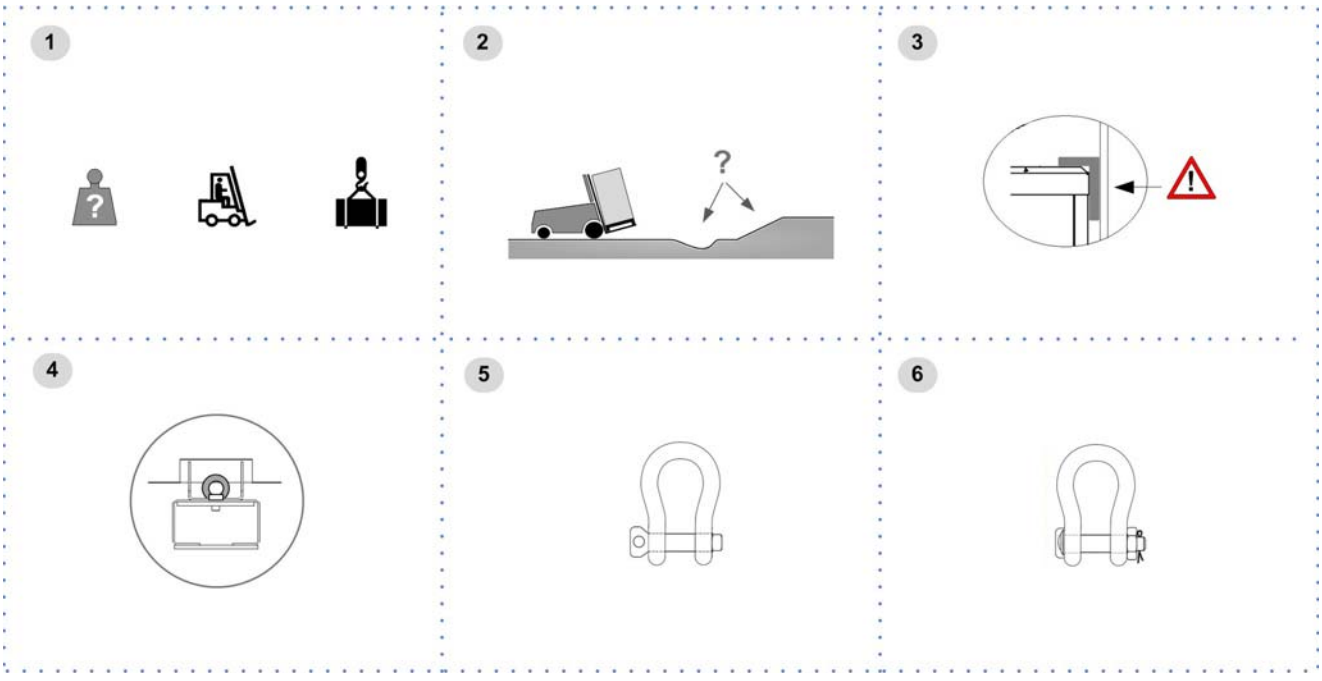
⚠ Any disputes must be made within 8 days from the date of the delivery. Complaints after this period are invalid.

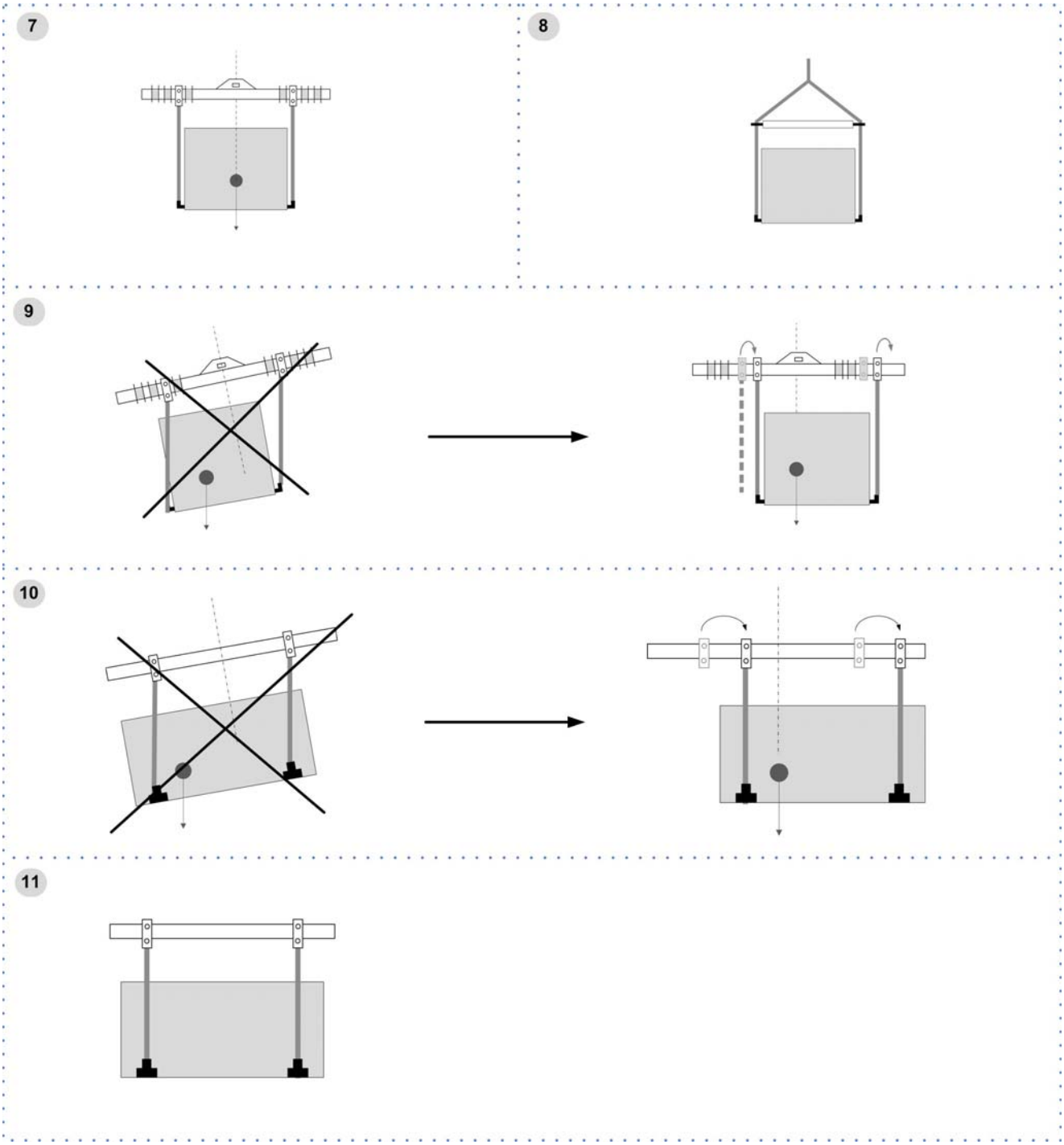
2.1 Storage

Observe external packaging instructions.

2.2 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. Lifting eyebolt
5. Screw pin shackle.
6. Safety pin shackle.
7. Lifting with balance
8. Lifting with spacer bar
9. Align the barycenter to the lifting point
10. Gradually bring the lifting belts under tension, making sure they are positioned correctly.
11. Before starting the handling, make sure that the unit is stable.





2.3 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.

3 Positioning

During positioning consider these elements:

- Technical spaces requested by the unit
- Electrical connections
- Water connections

3.1 Functional spaces

During positioning consider these elements:

- Technical spaces requested by the unit
- Electrical connections
- Water connections

3.2 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:

- safe accessible position
- Standard unit operating range at full load
- verify unit weight and bearing point capacity
- verify that all bearing points are aligned and leveled
- install the unit raised from the ground

3.3 Saftey valve gas side

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

4 Refrigeranting connections

⚠ The sizing of the refrigerating connection lines is of extreme importance for the system operating and reliability.

⚠ The diameter of the connection between the two units is function of distances, differences in level and curve number; it has so to be calculated by a qualified technician.

⚠ Incorrect sizing may damage the compressor or affect cooling capacity.

the operations must be performed by an expert refrigerator technician

use only a copper pipe for chiller operating

pipes must not to be too much long and with too much curves

for a good efficiency do not perform curves with a radium too much short and avoid the pipe crushing

to allow the vacuum and charge operations install service fittings on pipes (if the unit is not fitted with taps with service fittings)

pipes must be perfectly clean (perform a cleaning with nitrogen or dry air before connecting the pipes to the two units) and without humidity to allow a good vacuum operation

⚠ The installation of the pipes may affect the level of noise in the system:

- install flexible joints between the unit and the pipes
- the pipe weight has not to weigh on units but it has to be sustained by anchorage brackets
- brackets must allow the pipe thermal expansion
- install antivibration material between the brackets and the pipes so as to prevent the transmission of vibrations

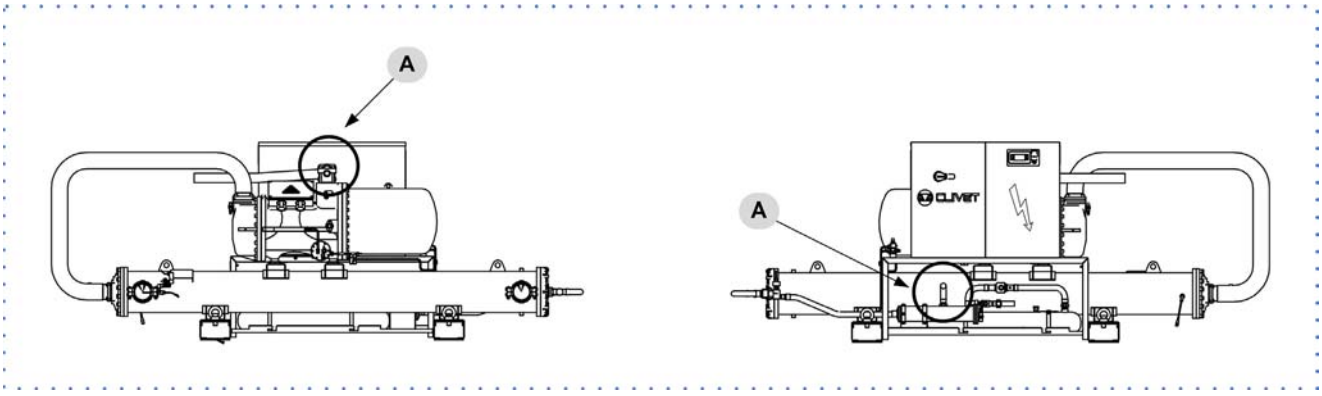
4.1 Pressure Equipment Directive

This unit is a subset: to operate it has to be combined to another unit.

It is an installer responsability:

- follow the PED Directive and to the national regulations of PED Directive realization
- consider the insertion of any additional security devices
- check the safety device operation
- write on the serial label number the amount of total refrigerant
- issue the Declaration of conformity
- inform the user of the need to carry out regular checks

4.2 Shut-off valves

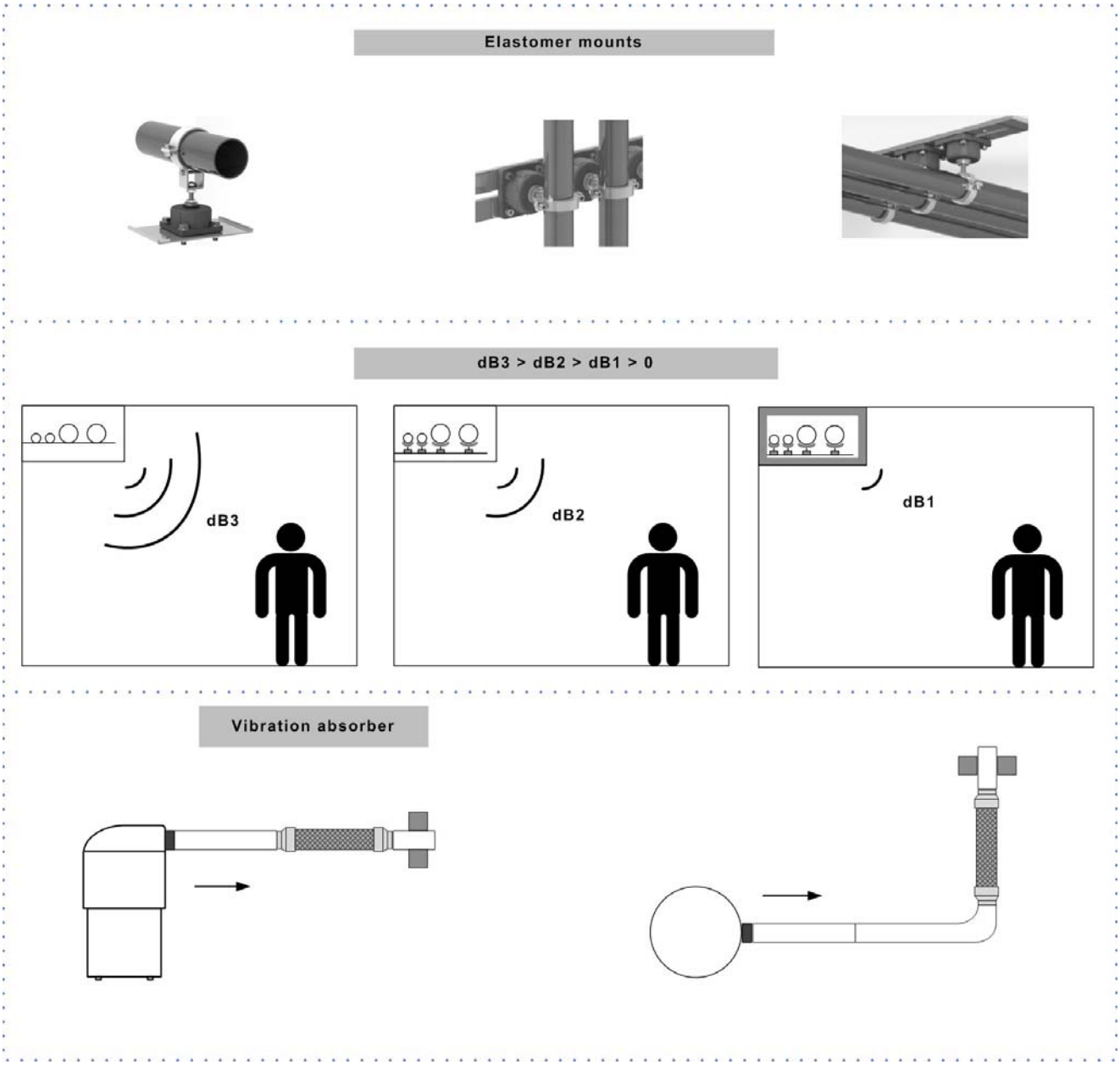


A. Shut-off valves

4.3 Vibrations / Noise

⚠ The installation of the pipes may affect the level of noise in the system:

- install flexible joints between the unit and the pipes
- install antivibration material between the brackets and the pipes so as to prevent the transmission of vibrations
- avoid the passage in particularly silent environments



4.4 Risk of explosion

⚠ When you install cut-off devices (solenoid valves, cocks, etc.), be aware that they may cause traps for refrigerant in the form of closed zones upstream and downstream where the refrigerant cannot freely expand.

⚠ In this situation, if there is an increase in temperature (due to exposure to the sun, proximity of pipes or sources of heat), the expansion of the trapped gas may cause the refrigeration pipes to explode.

⚠ Evaluate whether safety valves can be installed, especially in the liquid pipes that are most exposed to this risk.

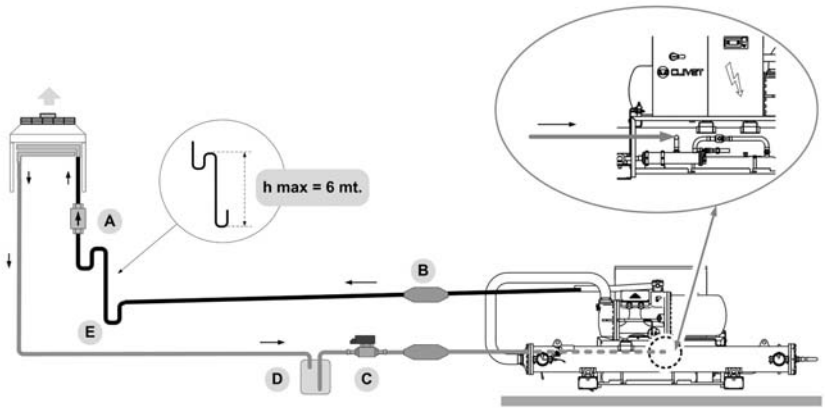
4.5 Supply line

In horizontal sections Inclination with the gas flow to aid the movement of the oil. (0.5% inclination).

WARNING the discharge temperature can reach values of 80/100°C. Appropriate insulation is required if there is contact with the exterior.This is to avoid accidental contacts by unqualified personnel.

When the condenser is installed above the compressor the discharge line must have a trap at the compressor level which drops to the floor. This will reduce the risk of condensed liquid refrigerant returning up the compressor line during shutdowns.

For vertical rises, as well as well the socket also fit an oil collection trap every 6 metres.



A. check valve
B. antivibration mount
C. solenoid valve
D. liquid receiver
E. siphon

4.6 Liquid receiver

The liquid receiver installation is always recommended, above all when:

- the connecting pipes are longer than 10 metres
- the installation operates in variable climatic conditions (for example fresh air temperature with ranges day/night, summer/winter).

The receiver must have a capacity adequate to the installation and it must be positioned near the evaporating unit.

If the distance is greater than 15 metres and the compressor is located in the lower part of the system, position the receiver near the unit with the compressor.

The liquid receiver can absolve the above described functions:

- it avoids the presence of gaseous freon in the expansion device
- it compensates for the charge variations in the installation when changing the operating conditions
- it avoids an excessive condenser flooding with consequent condensing temperature/pressure raising if the installation charge is performed in anomalous climatic conditions.

Along with the previously mentioned aspects, the liquid recipient compensates for the various volumes of the exchangers as their function changes (evaporator/condenser and vice versa).

Make very sure that the return and supply points are placed at the bottom.

4.7 Checking for leaks

1 Check carefully that the evaporator unit taps are closed.
2 Connect the pressure gauges with the service fittings (on the taps or on the connection pipes).
3 Pressurise the system with nitrogen:
mode 1: up to PS (see the label) and wait few hours
mode 2: up to PS x 1,43 law (as according to UNI-EN 378-2)

⚠ **CAUTION: EXPLOSION DANGER**

4 Spray using a leak detector spray cocks and pipes and check if bubbles are present (gas leaks).
5 Discharge the nitrogen from the unit.

4.8 Vacuum operations

Make sure that all the service outlets are closed with proper caps; if caps are not present a leak of refrigerant can be possible.

With the cocks of the motor condenser closed, drain the system.

Using a gauge group, connect the vacuum pump on both connections of the cocks, make sure that the solenoid valve or any intermediate cocks are open, proceed with the vacuum.

Stop the pump at a pressure of about 100 Pa and leave it under vacuum for a few hours; a slight initial rise of pressure is normal, followed by stabilization.

If the pressure continues to rise, it means there are either small leaks or humidity is present. In the first case, repeat the operations in the paragraph on checking for leaks in the manual for the refrigerant pipes.

In the second case, recharge the system with refrigerant gas up to 100KPa and re-create the vacuum as described above.

Once the pressure is permanently stable, move on to the next phase, which is charging.

4.9 Refrigerant charge

⚠ Check the type of refrigerant on the serial number label

The refrigerant charge must to be completed during the start-up phase, based on the type of indoor unit and on the pipe development.

With the system under vacuum, close the cocks of the gauge group and disconnect the vacuum pump.

Connect the refrigerant gas tank, venting the air out of the hose for connection to the gauge group.

Open the cock of the liquid line.

Open the cocks of the gauge group and let liquid-state refrigerant enter using an appropriate pump.

Once charging is complete, open the gas cock so that the unit is ready to be started.

4.10 Adding oil

Consider adding oil if the connection pipes are particularly long.

Check the oil level of the compressor in the indicator or in the Schrader plug.

4.11 Weight of refrigerant fluid

This table provides an estimate of that makes it possible to determine in advance how much gas will be needed.

The optimal refrigerant charge must be determined with the unit at normal operating power, in conditions that are near design conditions, measuring and adjusting excessive heating or cooling.

It is necessary to add to the indicated quantities the amounts required for the two units and for the gas pipes.

	mm	42	54	54	54	54	64	64	64	64
R-134a refrigerant for each line meter	Kg/m	1,64	2,52	2,52	2,62	2,62	3,61	3,61	3,61	3,61

5 Water connections

5.1 Water quality

Water features

- confirming to local regulations
- total hardness < 14°fr
- within the limits indicated by table

The water quality must be checked by qualified personnel.

Water with inadequate characteristics can cause:

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

Water component for corrosion limit on Copper		
PH	7,5 ÷ 9,0	
SO_4^{--}	< 100	ppm
HCO_3^- / SO_4^{--}	> 1	
Total Hardness	4,5 ÷ 8,5	dH
Cl-	< 50	ppm
PO_4^{---}	< 2,0	ppm
NH3	< 0,5	ppm
Free Chlorine	< 0,5	ppm
Fe_2^{++}	< 0,5	ppm
Mn^{++}	< 0,05	ppm
CO_2	< 50	ppm
H_2S	< 50	ppb
Temperature	< 65	°C
Oxygen content	< 0,1	ppm

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

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

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 glicol 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 Operation sequence

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

- Heat exchangers
- Pumps
- collectors
- storage tank
- free-cooling coil

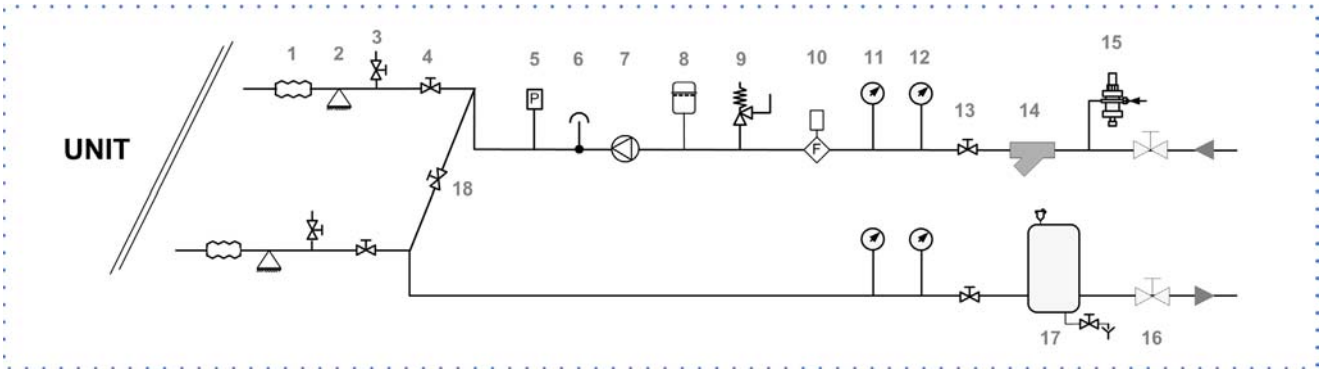
1. Carefully wash the system with clean water: fill and drain the system several times.
2. Apply additives to prevent corrosion, fouling, formation of mud and algae.
3. Fill the plant
4. Execute leakage test.
5. Isolate the pipes to avoid heat dispersions and formation of condensate.
6. Leave various 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.

5.6 Recommended connection

⚠ The installer must define:

- component type
- position in system



1	antivibration joints	10	Flow Switch
2	piping support	11	pressure gauge
3	exchanger chemical cleaning bypass	12	thermometer
4	shut-off valve	13	shut-off valve
5	pressure switch of the charged system	14	filter
6	vent	15	filling valve
7	Pump / circulating pump	16	shut-off valve
8	expansion vessel	17	Internal storage tank
9	safety valve	18	Cleaning system bypass

5.7 Hydraulic connections

- take away the supplied connection union by acting on the connection joint
- weld the union to the installation pipe
- perform the connection between the installation pipe and the evaporator, using the joint

⊘ Retirer le joint de connexion avant de souder le tuyau de l'installation.

⚠ The rubber gasket might be irreparably damaged.

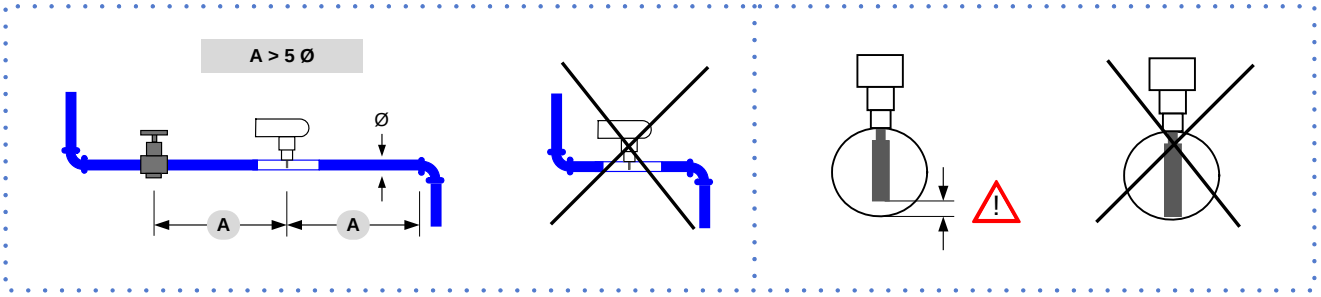
5.8 Water filter

⚠ 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 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

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 wiringdiagram Nr.

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 impendency, capacity and attenuation indications.

6.4 Power input

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

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

QS1: main isolator switch

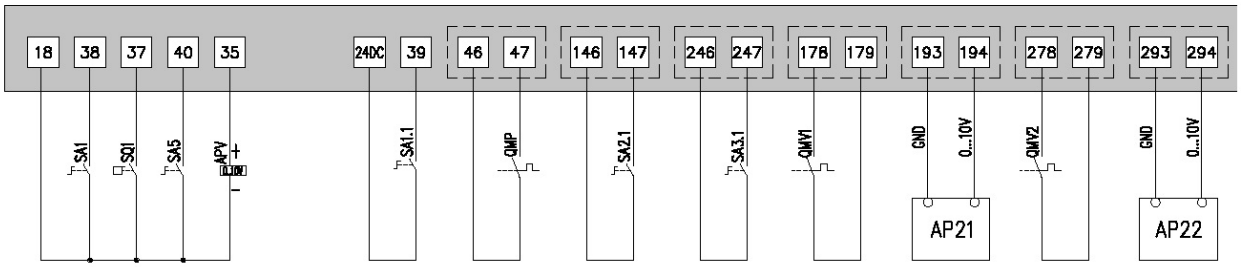
XC: Customer connections

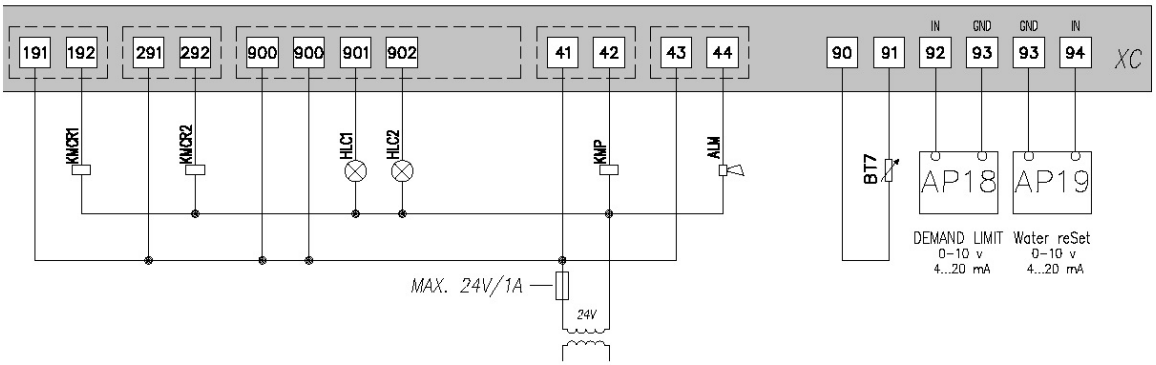
6.5 Power supply cables section

Size	220.2	240.2	260.2	280.2	300.3	320.2	340.2
Min. cable section Cu (mm^2)	1x240	1x240	1x240	2x150	2x150	2x150	2x150
Max. cable section Cu (mm^2)	1x240	1x240	1x240	2x300	2x300	2x300	2x300
Max. bar Cu width (mm)	40	40	40	50	50	50	50
Tightening torque (Nm)	20	20	20	20	20	20	20

Size	360.2	400.2	440.2	470.2	500.2	540.2	580.2
Min. cable section Cu (mm^2)	2x185	2x185	2x240	2x240	2x240	2x240	-
Max. cable section Cu (mm^2)	2x300	2x300	4x185	4x185	4x185	4x185	4x185
Max. bar Cu width (mm)	63	63	63	63	63	63	63
Tightening torque (Nm)	-	-	-	-	-	-	-

6.6 Connections performer by customer



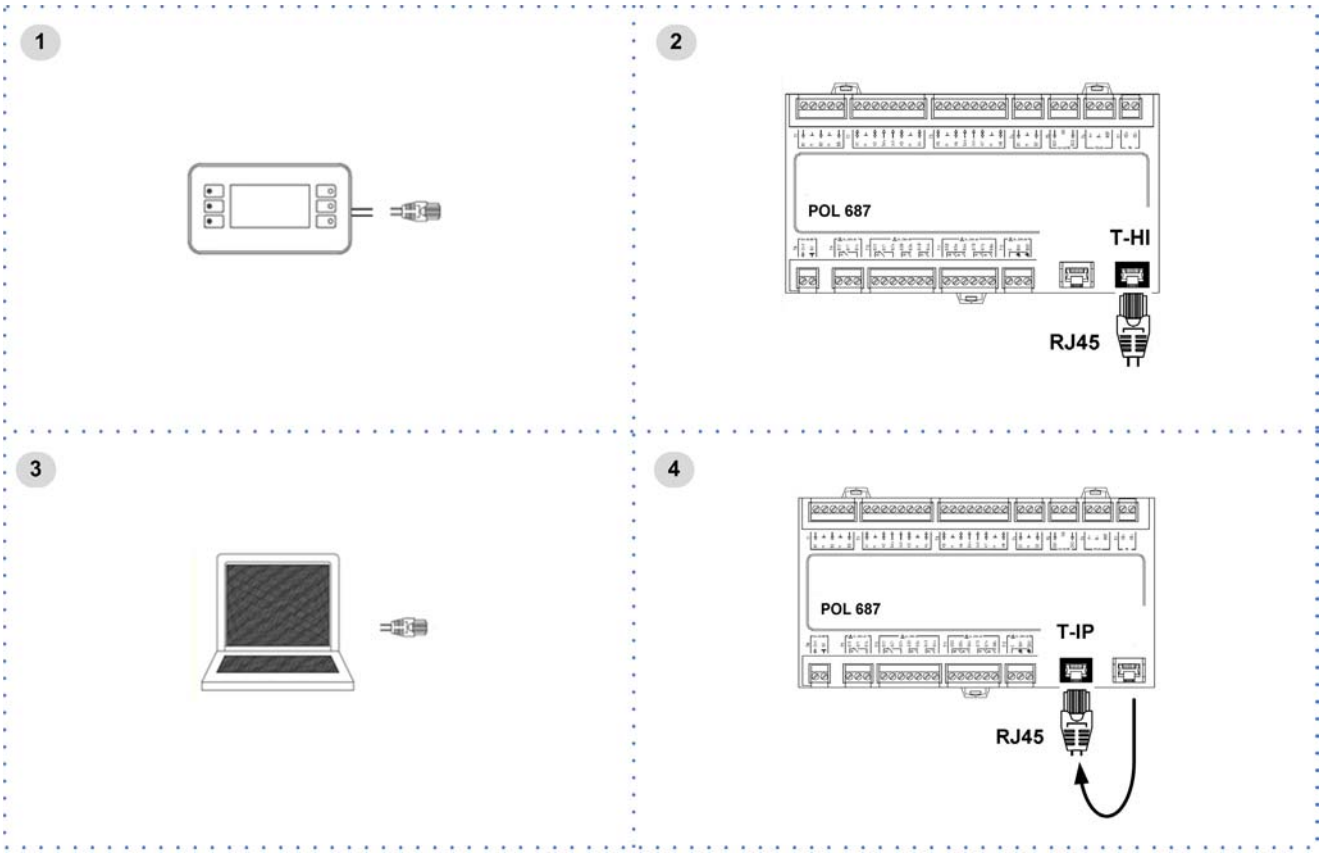


DWG Nr. : 4J2411

HLC1-HLC2	*lampada di segnalazione stato compressore* *compressor status signal lamp* *lampe de signalisation état compresseur* *Signallampe Verdichterzustand* *lámpara de señalización estado compresor*
ALM	*segnalazione blocco cumulativo* *cumulative fault signal* *signalisation alarme* *Sammelstörmeldung* *señalización bloqueo cumulativo*
SA1	*selettore on/off remoto* *remote on/off selector* *sélecteur ON/OFF déporté* *Fernwahlschalter Ein/Aus* *selector on/off remoto*
SA1.1	*selettore abilitazione secondo set-point* *second set-point enabling switch* *sélecteur validation deuxième consigne* *Wahlschalter 2.Sollwert* *selector habilitación segundo set-point*
SA2.1	*selettore remoto di abilitazione compressore* *remote compressor enabling selector* *sélecteur déporté de validation compresseur* *Fernwahlschalter Verdichterbetrieb* *selector remoto de habilitación compresor*
SA3.1	*selettore remoto di abilitazione compressore* *remote compressor enabling selector* *sélecteur déporté de validation compresseur* *Fernwahlschalter Verdichterbetrieb* *selector remoto de habilitación compresor*
SA5	*selettore remoto "estate/inverno"* *remote winter/summer selector* *sélecteur déporté "été/hiver"* *Fernwahlschalter Winter/Sommer* *selector remoto "verano/invierno"*
SQ1	*flussostato* *flow switch* *contrôleur de débit* *Strömungswächter* *flujostato*
QMV1	*protezione termica ventilatore* fan thermal overload protection thermique ventilateur Schutzschalter Ventilator protección térmica ventilador
QMV2	*protezione termica ventilatore* fan thermal overload protection thermique ventilateur Schutzschalter Ventilator protección térmica ventilador

QMP	*interruttore automatico a protezione pompa ricircolo* *recirculation pump protection automatic device* *interrupteur automatique de protection pompe recirculation* *automatischer Schalterschutz der Umluftpumpe* *interruptor automático de protección bomba recirculación*
KMP	*contattore pompa di circolazione evaporatore* *evaporator pump contactor* *contacteur pompe de circulation évaporateur* *Schütz Kaltwasserpumpe* *contactor bomba de circulación evaporador*
KMCR1	*contattore linea ventilatore* fan "line" contactor contacteur "ligne" ventilateur Leitungsschütz Ventilator contactor "línea" ventilador
KMCR2	*contattore linea ventilatore* fan "line" contactor contacteur "ligne" ventilateur Leitungsschütz Ventilator contactor "línea" ventilador
BT7	*sonda di temperatura aria esterna* *outside air temperature probe* *sonde de température air extérieur* *Außenlufttemperaturfühler* *sonda de temperatura aire externo*
APV	*uscita analogica 0..10V da elettronica per gestione valvola/ventilazione Free Cooling* *0..10V analogical output from electronics for valve/FREE-COOLING ventilation management* *Sortie analogique 0..10V de électronique pour gestion soupape/ventilation FREE-COOLING* *Analogausgang 0..10V der Elektronik zur Steuerung des Ventils/Gebläse Free Cooling* *Salida analógica 0..10V de electrónica para gestión válvula/ventilación FREE-COOLING*
AP18	*demand-limit* *demand-limit* *demand-limit* *demand-limit* *demand-limit*
AP19	*Water reSet* *Water reSet* *Water reSet* *Water reSet* *Water reSet*
AP21	*Comando modulante condensatore remoto* Modulating control remote condenser Régulation modulante condenseur extérieure Modulierende Regelung externe Verflüssiger Modulación de control condensador remoto
AP22	*Comando modulante condensatore remoto* Modulating control remote condenser Régulation modulante condenseur extérieure Modulierende Regelung externe Verflüssiger Modulación de control condensador remoto

6.7 Computer connection



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

Configure P.C.

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

6.8 Ecoshare

For details see:

11.6 ECS - ECOSHARE function for the automatic management of a group of units p. 42

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 star-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. structure integrity
4. unit on vibration isolators
5. refrigerant line section
6. length of the refrigerant lines
7. siphon on the gas line every 6 meter back up
8. vacuum and additional charge
9. visual check for oil / leaks
10. unit input water filter + shut-off valves for cleaning
11. vibration isolators on water connections
12. expansion tank (indicative volume = 5% system content)
13. Close all drain valves in the low points of the unit hydraulic circuit:
14. cleaned system
15. loaded system + possible glycol solution + corrosion inhibitor
16. system under pressure
17. vented system
18. fresh air probe
19. refrigerant circuit visual check
20. earthing connection
21. power supply features
22. 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
4. pump manual start-up and flow check
5. shut-off valve refrigerant circuit open
6. unit ON
7. load voltage measure and absorptions
8. check all fan operating (remote condenser)
9. liquid sight glass check (no bubbles)
10. measure return and supply water temperature
11. measure super-heating and sub-cooling
12. check no anomalous vibrations are present
13. climatic curve personalization
14. climatic curve personalization
15. scheduling personalization
16. complete and available unit documentation

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.
5. When using antifreeze solutions, make sure the glycol percentage is suitable for the type of use envisaged.

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

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

7.6 Electric Circuit

⚠ Verify that the unit is connected to the ground plant.

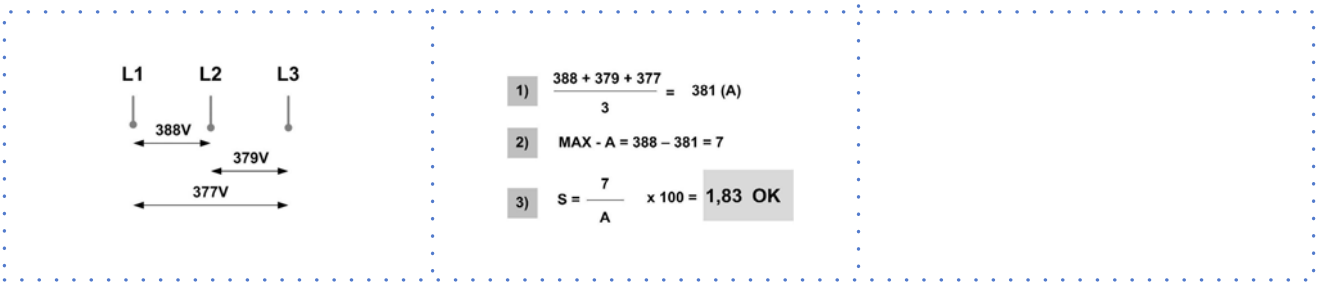
Check the conductors are tightened as: the vibrations caused by handling and transport might cause these to come loose.

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

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

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

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 starter:

- 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 Evaporator water flow-rate

Check that the difference between the temperature of exchanger return and supply water corresponds to power according to this formula:

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

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

Check for water side exchanger pressure drops:

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

The measurement of pressure will be easier if pressure gauges are installed as indicated in the DIAGRAM OF SUGGESTED WATER CONNECTIONS.

7.11 Operating at reduced load

The units are equipped with partialization steps and they can, therefore, operate with reduced loads.

However a constant and long operation with reduced load with frequent stop and start-up of the compressor/s can cause serious damages for the lack of oil return.

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

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

Check periodically the average operating times and the frequency of the compressors starts: approximately the minimum thermal load should be such as to need the operating of a compressor for at least ten minutes.

If the average times are close to this limit, take the proper corrective actions.

7.12 Demand limit

⚠ Menu accessible only after having entered the password.

⚠ Access reserved only to specifically trained personnel.

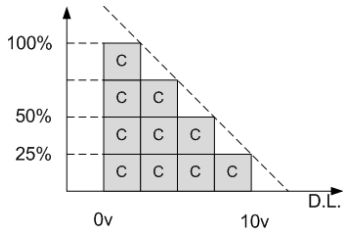
⚠ The parameter modification can cause irreversible damages.

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

The higher the signal is, the lower the number of compressors available to meet the thermal need.

If only P0002: EnDemandLimit ≠ 0

Path: Main Menu / Unit parameters / Demand limit



Step	Display	Action	Menu/Variable	Keys		Notes
1		Press 3 sec.		✓		
2	Password	Set	Password	▲	✓	
3		Press		i		
4	Main menu	Select	Unit parameters	▼	✓	
5	Unit parameters	Select	Set Point	▼	✓	
6	Set Point	Select	Demand limit	▼	✓	
7		Set	Demand limit	▲	▼	
8		Confirm		✓		
9		Press 3 sec.				
10		Select	Local connections	✓		

Path: Main Menu / Unit parameters / Demand limit

Parameters	Short description	Description
P0200	setpointdemandlimit	Parameter setting of the value % of demand limit

7.13 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.

7.14 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)

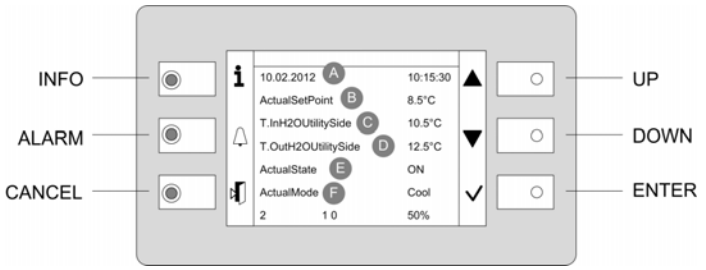
Certification of setting in service:

- 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 Led

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

8.2 Display

Ref.	Variable	Description
A		Date - Time
B	**ActualSetPoint**	Temperature setting
C	**T.InH2OUtilitySide**	Water inlet temperature utility side
D	**T.OutH2OUtilitySide**	Water outlet temperature utility side
E	**ActualState**	On / off / eco / pmp On
F	**ActualMode**	Cool: water cooling Heat: water heating (option)
	2	Installed compressors
	1 - 0	Compressors ON example: circuit 1 = 1 compr. On circuit 2 = 0 compr. On
	50%	Heating capacity

8.3 Keys

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

8.4 Change unit state

Step	Display	Action	Menu/Variable	Keys		Notes
1		Press				
2	Main menu	Select	Cmd Local state			
3		Set	OFF - ECO - ON - Pump On			*
4		Confirm				
6		Exit				

* Local state

ECO: recurrent pump ON-OFF; compressors keep water system at setpoint ECO

Pmp ON: pump ON, compressor OFF

8.5 Change the mode

Step	Display	Action	Menu/Variable	Keys		Notes
1		Press				
2	Main menu	Select	Cmd Local mode			
3		Set	Cool: water cooling Heat: water heating (option)			
4		Confirm				
5		Exit				

8.6 Modify setpoint

Step	Display	Action	Menu/Variable	Keys		Notes
1		Press				
2	Main menu	Select	Unit parameters			
3	Unit parameters	Confirm	Set Point			
4		Select	Set Point			
5		Set	Set Point			
6		Confirm				
7		Exit				

Parameters	Short description	Description	
P0583	SetPointCooling	Setpoint Cool	
P0584	2SetPointCooling	2° Setpoint Cool	Enable by remote switch
P0855	SetPointECOCooling	Economic summer SetPoint	
P0577	SetPointHeating	Setpoint Heat	
P0578	2SetPointHeating	2° Setpoint Heat	
P0579	SetPointECOHeating	Economic winter SetPoint	
P0640	SetPointRecover	Recovery Set Point	

8.7 Display the status

Step	Display	Action	Menu/Variable	Keys		Notes
1		Press				
2	Main menu	Select	Machine State			
3		Select	General, circuit, ecc..			
4		Exit				

For details see:
[Ref] p.

8.8 Scheduler

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

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

Enable Scheduler

Step	Display	Action	Menu/Variable	Keys		Notes
1		Press 3 sec.				
2	Password	Set	Password			
3		Press				*
4	Main menu	Select	Unit Parameters			
5		Select	Option config			
6		Set	P0061=1			
7		Press 3 sec.				
		Select	Local connections			

* Unit Parameters menu is displayed

8.9 Alarms

⚠ Before resetting an alarm identify and remove its cause.
Repeated resets can cause irreversible damage.
Example:
+ eE0001: Phase monitor: Fault = active alarm
- EE0003: Pum 1 faulty: Ok = resetted alarm
Display of alarm: step 1-3
Reset allarm: step 4-10

Step	Display	Action	Menu/Variable	Keys		Notes
1		Press				
2	Alarm list detail	Press				
3	Alarm list	Select	Alarm			
4	Alarm list detail	Press 3 sec.				
5	Password	Set	Enter password			
6	Alarm list detail	Press				
7	Alarm list	Select	Alarm			
8		Select	Reset Executed			
9		Press 3 sec.				
10	Password management	Select	Log off			

For details see:
8.9 Alarms p. 28

8.10 Keyboard settings

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

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)

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

* European regulation 303/2008

Refer to the local regulations; and ensure correct adherance. 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.

9.3 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 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

9.6 Water filter

Check that no impurities prevent the correct passage of water.

9.7 Circulating pumps

Check:

- no leaks
- bearing status (anomalies are highlighted by abnormal noise and vibration)
- the terminal protection covers are closed and the cable holders are properly positioned

9.8 Flow Switch

- controls the operations
- remove incrustations from the palette

9.9 System discharge

1. evacuate the system
2. open all drain valves in the low points of the unit hydraulic circuit
3. evacuate the exchanger, use all the cocks presents
4. use compressed air to blow the exchanger
5. dry completely the exchanger by an hot air jet; for greater safety fill the exchanger with glycoled solution
6. protect the exchanger from the air
7. remove the drain plugs to the pumps

⚠ Any anti-freeze liquid contained in the system should not be discharged freely as it is a pollutant.

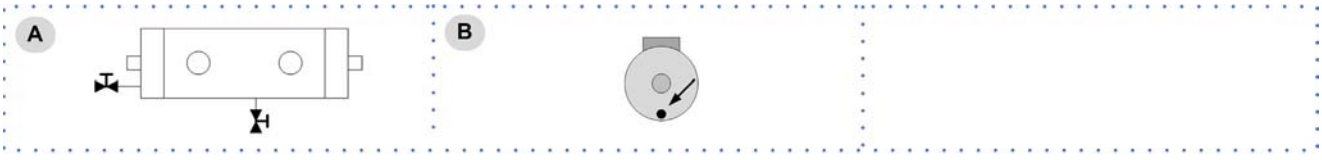
⚠ It must be collected and reused.

⚠ Before starting a washing the plant.

Example

A. emptying evaporator

B. emptying pump



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.

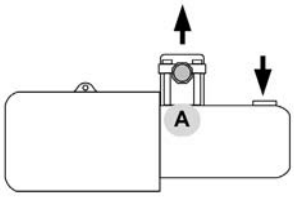
9.10 Screw compressors - Periodical checks

Operating hours	100	1000	5000	10000	15000	20000	25000	30000
Vibrations / Noise	C	C	C	C	C	C	C	C
Oil level	C	C	C	C	C	C	C	C/R
Oil filter	C		C		C		C	C/R
Filter the suction			C		C		C	C
Electric insulation		C	C	C	C	C	C	C
Bearings								C/R
check valve		C	C	C	C	C	C	C

C = CHECK

R = replace

9.11 Compressor supply line shut-off valve



Only if present

A. Supply line shut-off valve

⚠ CAUTION!

Do not remove the seal

Remove only if authorized by the manufacturer.

Please contact the maker for informations.

10 Alarms

ELECTRICAL CIRCUIT ALARMS

Num	Name	Description	Category
eE0001	Phase monitor	Phase monitor fault	Central
EE0003	Pump 1 faulty	User side pump 1 overload protection	GP Ut
EE0004	Pump 2 faulty	User side pump 2 overload protection	GP Ut
EE0005	Pump 3 faulty	User side pump 3 overload protection	GP Ut
eE0008	Utility Inverter Protection	User side inverter overload protection	GP Ut
ee0010	Master Offline	Master unit offline	MS
ee0011	Unit 2 in alarm	2nd slave unit fault	MS
ee0012	Unit 2 OffLine	2nd slave unit offline	MS
ee0013	Unit 3 in alarm	3rd slave unit fault	MS
ee0014	Unit 3 OffLine	3rd slave unit offline	MS
ee0015	Unit 4 in alarm	4th slave unit fault	MS
ee0016	Unit 4 OffLine	4th slave unit offline	MS
ee0017	Unit 5 in alarm	5th slave unit fault	MS
ee0018	Unit 5 OffLine	5th slave unit offline	MS
ee0019	Unit 6 in alarm	6th slave unit fault	MS
ee0020	Unit 6 OffLine	6th slave unit offline	MS
ee0021	Unit 7 in alarm	/th slave unit fault	MS
ee0022	Unit 7 OffLine	/th slave unit offline	MS
ee0027	Utility Water In temp Error	User side in water temperature probe fault	Central
ee0028	Utility Water Out temp Error	User side out water temperature probe fault	Central
ee0029	Temp Ext Sensor Error	External air temperature probe fault	HW
ee0030	DemandLimit	Demand limit fault	HW
ee0031	WaterReset	Water reset fault	HW
ee0032	External Humidity probe Error	Relative humidity probe fault	HW
ee0033	T.Quadro Ele	Electrical panel temperature probe fault	HW
ee0035	YV Cool Open	YV Cool opening fault	4P
ee0036	YV Heat Open	YV Heat opening fault	4P
ee0037	YV Cool Close	YV Cool closing fault	4P
ee0038	YV Heat Close	YV Heat closing fault	4P
ee0040	FCI Water Temp.	Freecoling water temperature probe fault	HW FCI
EE0044	Pump 1 Allarm	Freecooling pump 1 overload protection	FCI Circuit 1
EE0045	Pump 2 Allarm	Freecooling pump 2 overload protection	FCI Circuit 1
EE0046	Pump 3 Allarm	Freecooling pump 3 overload protection	FCI Circuit 1
ee0047	Pump Change for Utility Flow	Switching pump on user side for flow alarm	GP User side
ee0050	P.DifferenzialeUtil	User side differential pressure sensore fault	HW
EE0054	Recovery Pump 1 protection	Recovery side pump 1 overload protection	Recovery
EE0055	Recovery Pump 2 protection	Recovery side pump 2 overload protection	Recovery
EE0056	Recovery Pump 3 protection	Recovery side pump 3 overload protection	Recovery
eE0057	Recovery Inverter Protection	Recovery side inverter overload protection	Recovery

Num	Name	Description	Category
ee0100	TimeOutModPOL98U	1st POL98U module disconnected	HW TimeOut
ee0101	TimeOutModPOL98U_2	2nd POL98U module disconnected	HW TimeOut
ee0102	TimeOutModPOL96U	POL96U module disconnected	HW TimeOut
ee0103	TimeOutModPOL945	POL945 module disconnected	HW TimeOut
ee0104	TimeOutModPOL965	POL965 module disconnected	HW TimeOut
ee0105	TimeOutModPOL94U	1st POL94U module disconnected	HW TimeOut
ee0106	TimeOutModPOL94U_2	2nd POL94U module disconnected	HW TimeOut
ee0107	TimeOutModPOL985	POL985 module disconnected	HW TimeOut
ee1001	T.Suction Gas	Gas temperature probe 3 fault	HW Circuit 1
ee1002	T.Suction Gas	Gas temperature probe 5 fault	HW Circuit 1
ee1003	P.Suction Heat	Pressure sensor fault, low pressure heating	HW Circuit 1
ee1004	EEV1 blocked	EEV 1 blocked	Circuit 1
ee1005	EEV1 blocked	EEV2 blocked	Circuit 1
EE1006	Comp 1 protections	Compressor 1 overload protection	Circuit 1
EE1007	Comp 2 protections	Compressor 2 overload protection	Circuit 1
EE1008	Comp 3 protections	Compressor 3 overload protection	Circuit 1
EE1009	Source Inverter Protection	Source side inverter overload protection	Source 1
ee1010	Pump Change for Source Flow	Switching pump on source side for flow alarm	Source 1
EE1013	Source Pump 1 protection	Source side pump 1 overload protection	Source 1
EE1014	Source Pump 2 protection	Source side pump 2 overload protection	Source 1
EE1015	Source Pump 3 protection	Source side pump 3 overload protection	Source 1
EE1018	Source side protection	Source side ventilation overload protection	Circuit 1
ee1022	T.Discharge C1.1	Compressor 1 discharge temperature probe fault	HW Circuit 1
ee1023	T.Discharge C2.1	Compressor 2 discharge temperature probe fault	HW Circuit 1
ee1024	T.Discharge C3.1	Compressor 3 discharge temperature probe fault	HW Circuit 1
ee1025	T.Source 1	Source 1 temperature probe fault	HW Circuit 1
ee1026	T.Source 2	Source 2 temperature probe fault	HW Circuit 1
ee1027	T.Suction Gas	Suction temperature probe fault	HW Circuit 1
ee1028	P.Discharge	High pressure probe fault	HW Circuit 1
ee1029	P.Suction	Low pressure probe fault	HW Circuit 1
ee1030	T.GasRecovery	Recovery exchanger gas temperature probe fault	HW Circuit 1
ee1031	P.GasRecovery	Recovery exchanger gas pressure probe fault	HW Circuit 1
ee1032	T.Ing Recovery	Recovery in temperature probe fault	HW Circuit 1
ee1033	T.Out Recovery	Recovery out temperature probe fault	HW Circuit 1
ee1037	Alarm Inverter 1	Inverter 1 in alarm	Inverter APY
ee1038	Alarm missing comunication inv1	Inverter 1 Modbus communication error	Inverter APY
ee1039	Timeout comunication inv1	Inverter 1 communication timeout	Inverter APY
ee1040	Alarm Inverter 2	Inverter 2 in alarm	Inverter APY
ee1041	Alarm missing comunication inv2	Inverter 2 Modbus communication error	Inverter APY
ee1042	Timeout comunication inv2	Inverter 2 communication timeout	Inverter APY
ee1043	Alarm Inverter 3	Inverter 3 in alarm	Inverter APY
ee1044	Alarm missing comunication inv3	Inverter 3 Modbus communication error	Inverter APY
ee1045	Timeout comunication inv3	Inverter 3 communication timeout	Inverter APY

Num	Name	Description	Category
EE1047	Alarm Envelop Comp1	Compressor 1 envelope alarm	Circuit 1
EE1048	Alarm Envelop Comp2	Compressor 2 envelope alarm	Circuit 1
EE1049	Alarm Envelop Comp3	Compressor 3 envelope alarm	Circuit 1
ee1055	Alarm Inverter 1	Inverter 1 in alarm	Inverter DFS
ee1056	Alarm missing comunication inv1	Inverter 1 communication error	Inverter DFS
ee1057	Timeout comunication inv1	Inverter 1 communication timeout	Inverter DFS
ee1058	Alarm Inverter 2	Inverter 2 in alarm	Inverter DFS
ee1059	Alarm missing comunication inv2	Inverter 2 communication error	Inverter DFS
ee1060	Timeout comunication inv2	Inverter 2 communication timeout	Inverter DFS
ee1061	Alarm Inverter 3	Inverter 3 in alarm	Inverter DFS
ee1062	Alarm missing comunication inv3	Inverter 3 communication error	Inverter DFS
ee1063	Timeout comunication inv3	Inverter 3 communication timeout	Inverter DFS
ee1070	User side ECV 1.1	User side ECV connection problem	HW Circuit 1
ee1071	Source ECV 1.1	Source side ECV 1 connection problem	HW Circuit 1
ee1072	Source ECV 2.1	Source side ECV 2 connection problem	HW Circuit 1
ee2001	T.Suction Gas	Gas temperature probe 4 fault	HW Circuit 2
ee2002	T.Suction Gas	Gas temperature probe 6 fault	HW Circuit 2
ee2003	P.Suction Heat	Pressure sensor fault, low pressure heating	HW Circuit 2
ee2004	EEV1 blocked	EEV1 blocked	Circuit 2
ee2005	EEV1 blocked	EEV2 blocked	Circuit 2
EE2006	Comp 1 protections	Compressor 1 overload protection	Circuit 2
EE2007	Comp 2 protections	Compressor 2 overload protection	Circuit 2
EE2008	Comp 3 protections	Compressor 3 overload protection	Circuit 2
EE2009	Source Inverter Protection	Source side inverter overload protection	Source 2
ee2010	Pump Change for Source Flow	Switching pump on source side for flow alarm	Source 2
EE2013	Source Pump 1 protection	Source side pump 1 overload protection	Source 2
EE2014	Source Pump 2 protection	Source side pump 2 overload protection	Source 2
EE2015	Source Pump 3 protection	Source side pump 3 overload protection	Source 2
EE2018	Source side protection	Source side ventilation overload protection	Circuit 2
ee2022	T.Discharge C1.1	Compressor 1 discharge temperature probe fault	HW Circuit 2
ee2023	T.Discharge C2.1	Compressor 2 discharge temperature probe fault	HW Circuit 2
ee2024	T.Discharge C3.1	Compressor 3 discharge temperature probe fault	HW Circuit 2
ee2025	T.Source 1	Source 1 temperature probe fault	HW Circuit 2
ee2026	T.Source 2	Source 2 temperature probe fault	HW Circuit 2
ee2027	T.Suction Gas	Suction gas temperature probe fault	HW Circuit 2
ee2028	P.Discharge	High pressure probe fault	HW Circuit 2
ee2029	P.Suction	Low pressure probe fault	HW Circuit 2
ee2030	T.GasRecovery	Recovery exchanger gas temperature probe fault	HW Circuit 2
ee2031	P.GasRecovery	Recovery exchanger gas pressure probe fault	HW Circuit 2
ee2032	T.Ing Recovery	Recovery IN temperature probe fault	HW Circuit 2
ee2033	T.Out Recovery	Recovery OUT temperature probe fault	HW Circuit 2
ee2037	Alarm Inverter 1	Inverter 1 in alarm	Inverter APY
ee2038	Alarm missing comunication inv1	Inverter 1 communication error	Inverter APY

Num	Name	Description	Category
ee2039	Timeout comunication inv1	Inverter 1 communication timeout	Inverter APY
ee2040	Alarm Inverter 2	Inverter 2 in alarm	Inverter APY
ee2041	Alarm missing comunication inv2	Inverter 2 communication error	Inverter APY
ee2042	Timeout comunication inv2	Inverter 2 communication timeout	Inverter APY
ee2043	Alarm Inverter 3	Inverter 3 in alarm	Inverter APY
ee2044	Alarm missing comunication inv3	Inverter 3 communication error	Inverter APY
ee2045	Timeout comunication inv3	Inverter 3 communication timeout	Inverter APY
EE2047	Alarm Envelop Comp1	Compressor 1 envelope alarm	Circuit 2
EE2048	Alarm Envelop Comp2	Compressor 2 envelope alarm	Circuit 2
EE2049	Alarm Envelop Comp3	Compressor 3 envelope alarm	Circuit 2
ee2055	Alarm Inverter 1	Inverter 1 in alarm	Inverter DFS
ee2056	Alarm missing comunication inv1	Inverter 1 communication error	Inverter DFS
ee2057	Timeout comunication inv1	Inverter 1 communication timeout	Inverter DFS
ee2058	Alarm Inverter 2	Inverter 2 in alarm	Inverter DFS
ee2059	Alarm missing comunication inv2	Inverter 2 communication error	Inverter DFS
ee2060	Timeout comunication inv2	Inverter 2 communication timeout	Inverter DFS
ee2061	Alarm Inverter 3	Inverter 3 in alarm	Inverter DFS
ee2062	Alarm missing comunication inv3	Inverter 3 communication error	Inverter DFS
ee2063	Timeout comunication inv3	Inverter 3 communication timeout	Inverter DFS
ee2070	User side ECV 1.1	User side ECV connection problem	HW Circuit 2
ee2071	Source ECV 1.1	Source side ECV 1 connection problem	HW Circuit 2
ee2072	Source ECV 2.1	Source side ECV 2 connection problem	HW Circuit 2

REFRIGERANT CIRCUIT ALARMS

Num	Name	Description	Category
ff1005	Min overheating EEV1	Value of refrigerant superheat too low EEV1 (user side)	Circuit 1
ff1006	Min overheating EEV2	Value of refrigerant superheat too low EEV1 (source)	Circuit 1
fF1009	Low Pressure Alarm (DI)	Low Pressure Alarm (DI)	Circuit 1
ff1010	Warning LP Cool	Low Pressure Pre Alarm in Cooling Mode	Circuit 1
ff1011	Warning LP Heat	Low Pressure Pre Alarm in Heating Mode	Circuit 1
fF1012	Low pressure Alarm Heat (AI)	Low Pressure in Heating Mode (AI)	Circuit 1
fF1013	High Pressure (DI)	High Pressure Alarm (DI)	Circuit 1
ff1014	Warning High Pressure	High Pressure Pre Alarm	Circuit 1
fF1015	High Pressure Alarm (AI)	High Pressure Alarm (AI)	Circuit 1
ff1016	Max RC Warning	Maximum Pressure Ratio Pre Alarm	Circuit 1
fF1017	Min RC Alarm	Minimum Pressure Ratio Alarm	Circuit 1
fF1018	Low Pressure Alarm Cool(AI)	Low Pressure Alarm in Cooling Mode	Circuit 1
FF1019	Max RC Alarm	Maximum Pressure Ratio	Circuit 1
FF1034	Vacuum Circuit	Vacuum Alarm	Circuit 1
FF1046	LimLp	Low pressure limit	Circuit 1
ff1047	DFRForced	Defrost Forced	Circuit 1
ff1048	DFRWaterTLow	Low water temperature for defrost operation	Circuit 1
ff1049	DFRTimeMax	Defrost Maximum Time	Circuit 1
ff2005	Min overheating EEV1	Min Superheat value (user side)	Circuit 2
ff2006	Min overheating EEV2	Min Superheat value (source)	Circuit 2
fF2009	Low Pressure Alarm (DI)	Low pressure Alarm (DI)	Circuit 2
ff2010	Warning LP Cool	Low pressure Pre Alarm CoolingMode	Circuit 2
ff2011	Warning LP Heat	Low pressure Pre Alarm HeatingMode	Circuit 2
fF2012	Low pressure Alarm Heat (AI)	Low pressure Alarm Heating Mode (AI)	Circuit 2
fF2013	High Pressure (DI)	High pressure Alarm (DI)	Circuit 2
ff2014	Warning High Pressure	High pressure Pre Alarm	Circuit 2
fF2015	High Pressure Alarm (AI)	High pressure Alarm (AI)	Circuit 2
ff2016	Max RC Warning	Maximum pressure Ratio Pre Alarm	Circuit 2
fF2017	Min RC Alarm	Minimum pressure Ratio Alarm	Circuit 2
fF2018	Low Pressure Alarm Cool(AI)	Low Pressure Alarm Cooling Mode	Circuit 2
FF2019	Max RC Alarm	Maximum Pressure Radio	Circuit 2
FF2034	Vacuum Circuit	Vacuum Alarm	Circuit 2
FF2046	LimLp	Low pressure limit	Circuit 2
ff2047	DFRForced	Defrost Forced	Circuit 2
ff2048	DFRWaterTLow	Low water temperature for defrost	Circuit 2
ff2049	DFRTimeMax	Defrost Time	Circuit 2

HYDRAULIC CIRCUIT ALARMS

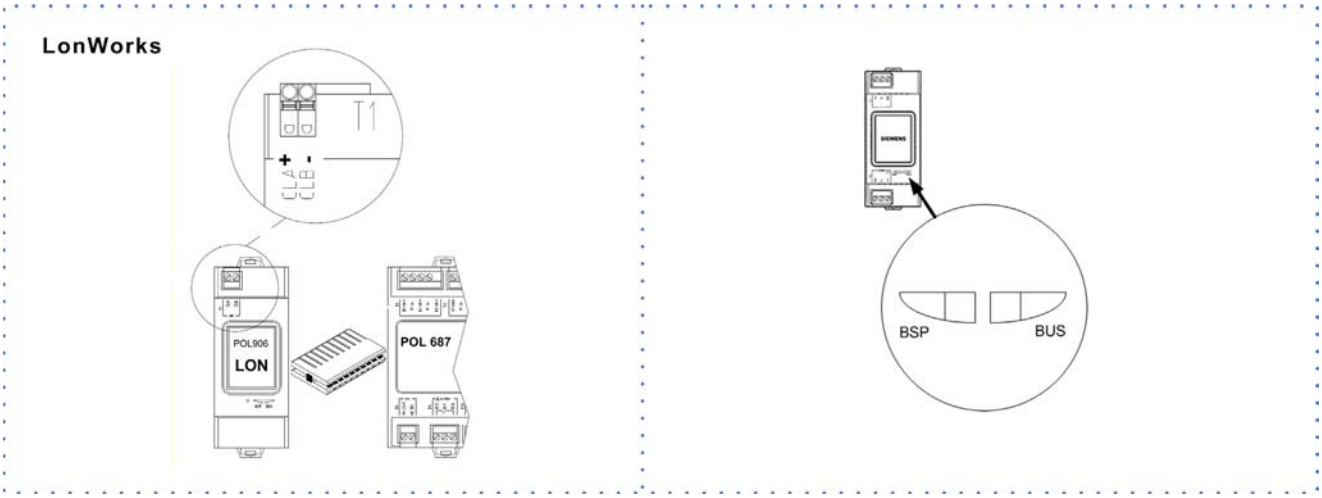
Num	Name	Description	Category
iI0002	Water pressure	User side low water pressure	GP Ut
iI0006	Flow switch utility side	User side low flow rate	GP Ut
II0007	Freeze alarm	User side Water Frost Protection	Centrale
ii0008	Pumps antifreeze alarm	Pump activation Water Frost Protection	Centrale
II0009	Inconsistent deltaT across the exchanger	Water outlet temperature, discordant with the current operation mode, user side	Centrale
II0042	Pressure allarm	Freecooling low water pressure	FCI Circuito 1
II0043	Freeze alarm	Freecooling water frost protection	FCI Circuito 1
ii0047	Flow switch allarm	Freecooling water low flow rate	FCI Circuito 1
iI0052	Recovery Low H2O Flow	Recovery water low flow rate	Recupero
iI0053	Recovery Low Pressure Plant	Recovery low water pressure	Recupero
iI1017	Source Low Pressure Plant	Source low water pressure	Sorgente 1
iI1020	Source Low H2O Flow	Source side low water flow	Sorgente 1
II1021	Source H2O Freeze Alarm	Source side water frost protection	Sorgente 1
iI2017	Source Low Pressure Plant	Source low water pressure	Sorgente 2
iI2020	Source Low H2O Flow	Source side low water flow	Sorgente 2
II2021	Source H2O Freeze Alarm	Source side water frost protection	Sorgente 2

11 Accessories

VERSIONS	
B	Water low temperature
ST	Standard acoustic configuration
EN	Extremely low noise acoustic configuration
SYSTEM ADMINISTRATORS	
CMSC10	Serial communication module for LonWorks supervisor
CMSC9	Serial communication module for Modbus supervisor
CMSC8	Serial communication module for BACnet-IP supervisor
ELECTRIC CIRCUIT	
RCMRX	Remote control via microprocessor control
CONTA2	energy meter
ECS	ECOSHARE function for the automatic management of a group of units
MF2	Multi-function phase monitor
-	device for compressor gradual start-up: not required
SFSTR2	progressive compressor start-up device (available only with options: CBS)
PFCP	power factor correction capacitors (cosfi > 0.9)
CBS	overload circuit breakers
SCP1	set point compensation with 4-20 mA signal
SCP2	set-point compensation with outdoor air temperature probe
SCP4	set-point compensation with 0-10 V signal
PSX	mains power supply (available only with options: RCMRX)
INSTALLATION	
AMRX	Rubber antivibration mounts

X - When the letter X is placed at the end, this means that the accessory is supplied separately. If there is no X in the code, the accessory is mounted in the factory.

11.1 LonWorks



LED BSP	communication with AP1 module
green	communication ok
yellow	software ok but communication with AP1 down
red	flashing: software error
	fixed: hardware error

LED BUS	communication with LonWorks
green	ready for communication
yellow	startup
red	flashing: communicating not possible
	communication down

LONWORK CABLE TYPES

Echelon allows three cable types for channel type TP/FT-10, including the

Category 5 network cable used commonly in building automation and control (TIA 568A Cat-5).

CAT-5 SPECIFICATIONS

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

Cross-sectional area Min. ø 0.5mm, AWG24, 0.22mm²

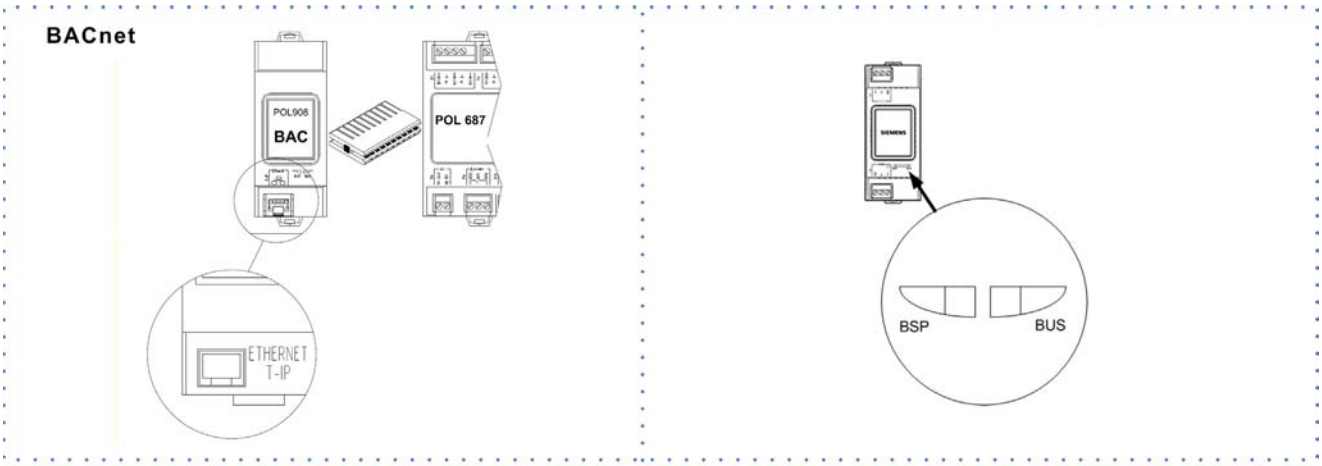
Impedance 100 Ω +/- 15 % @ f > 1 MHz

Operating capacity between two wires of a pair < 46 nF/km

Capacity pair to ground, asymmetric. < 3.3 nF/km

DC loop resistance < 168 Ω

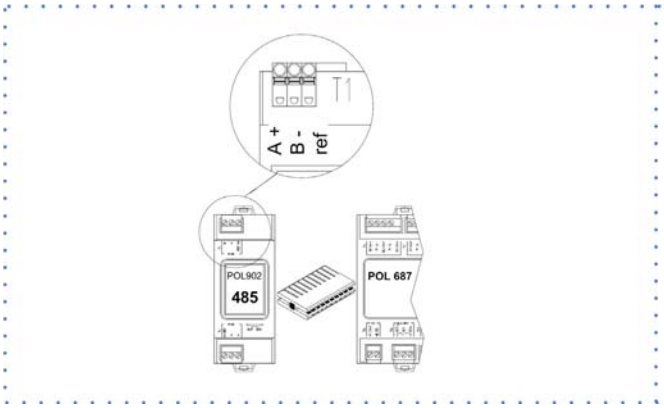
11.2 BACnet IP

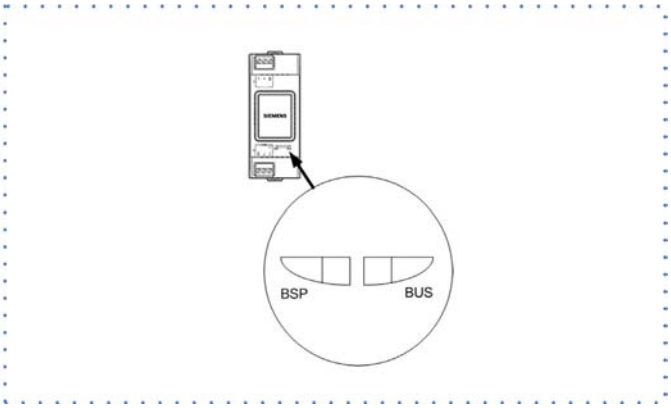


LED BSP	communication with AP1 module
green	communication ok
yellow	software ok but communication with AP1 down
red	flashing: software error
	fixed: hardware error

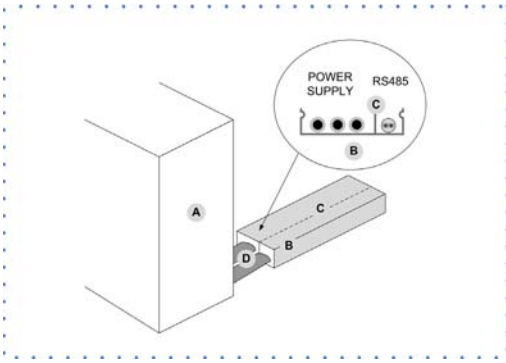
LED BUS	communication with BACnet
green	ready for communication
yellow	startup
red	BACnet server down
	restart after 3 sec

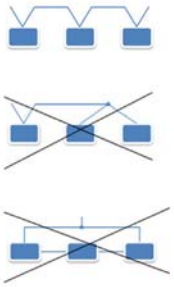
11.3 Modbus - RS485





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





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

Modbus Cable requirements

Conductors twisted and shielded

Section of conductor 0,22mm2…0,35mm2

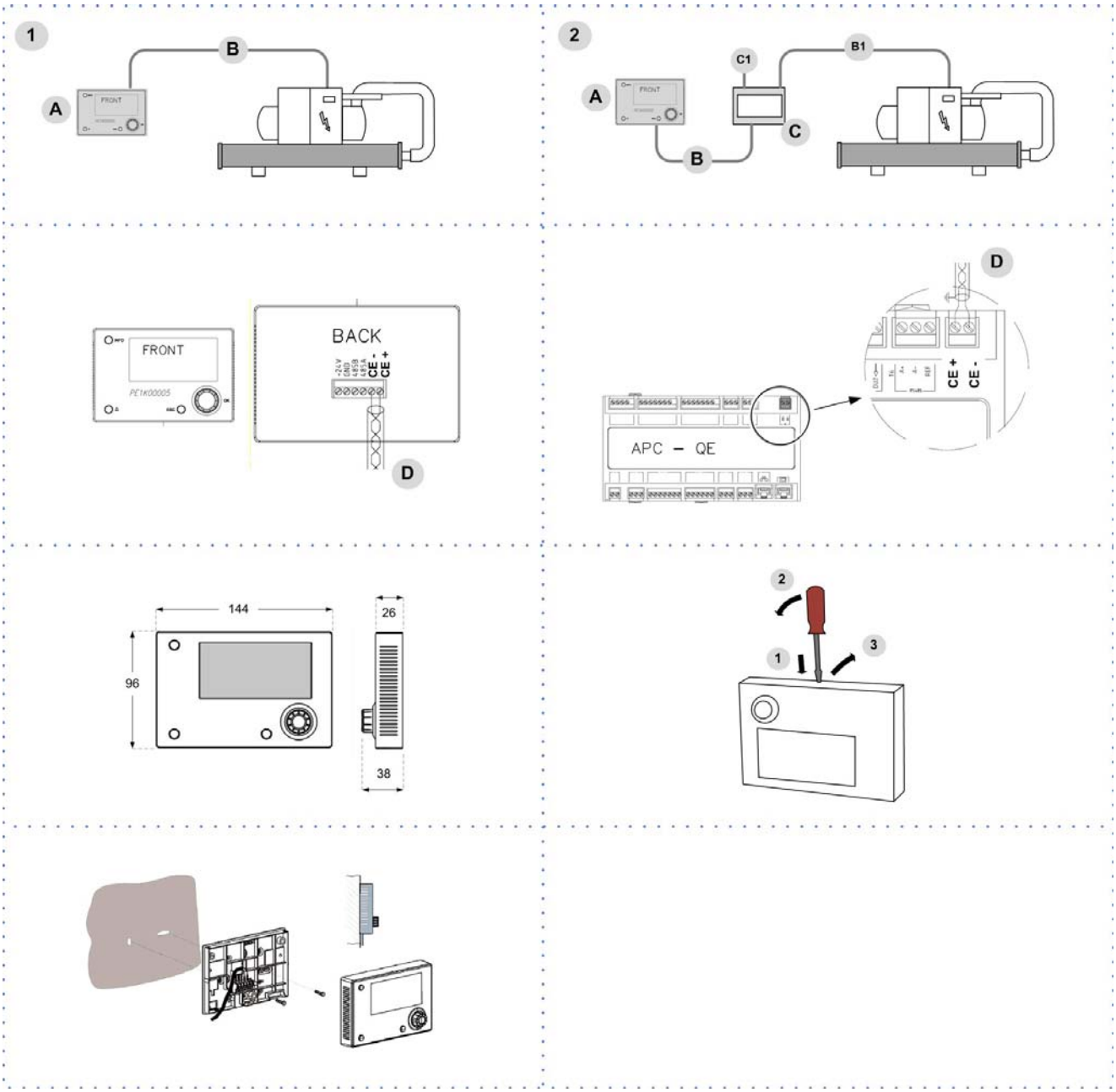
Nominal capacity between conductors < 50 pF/m

Nominal impedance 120 Ω

Recommended cable BELDEN 3106A

- Every RS485 serial line must be set up using the 'In/Out' bus system.
- Other types of networks are not allowed, such as Star or Ring networks.
- The difference in potential between the earth of the two RS485 devices that the cable shielding needs to be connected to must be lower than 7 V
- There must be suitable arresters to protect the serial lines from the effects of atmospheric discharges
- A 120 ohm resistance must be located on the end of the serial line. Alternatively, when the last serial board is equipped with an internal terminator, it must be enabled using the specific jumper, dip switch or link.
- The cable must have insulation features and non-flame propagation in accordance with applicable regulations.
- The RS485 serial line must be kept as far away as possible from sources of electromagnetic interference.

11.4 RCMRX - Remote control via microprocessor remote control

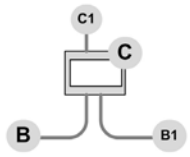


1 Distance up to 350 mt

2 Distance up to 700 mt

A	User interface
B = B1	KNX bus, max 350 mt twisted pair with shield, ø 0,8 mm EIB/KNX cable marking recommende
C	PSX - Mains power supply unit pwer supply unit N125/11 5WG1 125-1AB11
C1	AC 120...230V, 50...60Hz
D	KNX bus, max 350 mt

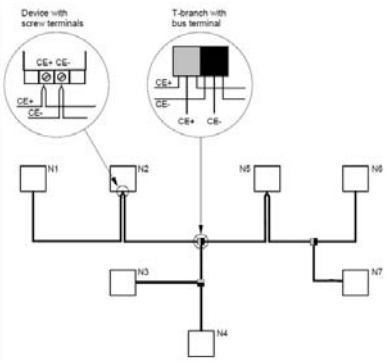
11.5 PSX - Mains power supply unit

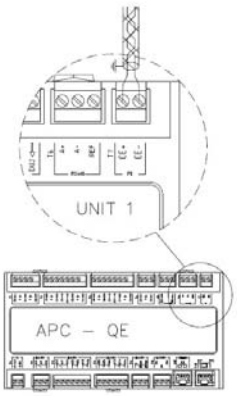


pwer supply unit N125/11 5WG1 125-1AB11

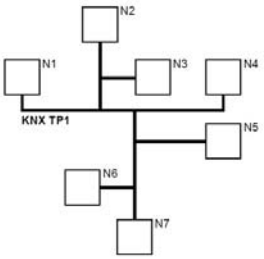
11.6 ECS - ECOSHARE function for the automatic management of a group of units

- Max 7 units
- Maximum length of the bus line: 700 m.
- Maximum distance between 2 units: 300 m
- Type of cable: shielded twisted pair cable Ø 0,8 mm. use an EIB/KNX cable
- Possible connections: Tree, star, in/out bus, mixed
- It is not possible to use a ring connection
- No end-of-line resistor or terminator required
- There must be suitable arresters to protect the serial lines from the effects of atmospheric discharges
- The data line must be kept separate from the power conductors or powered at different voltage values and away from possible sources of electrical interference

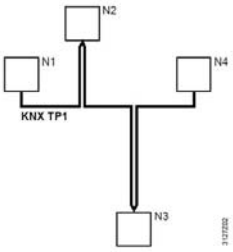


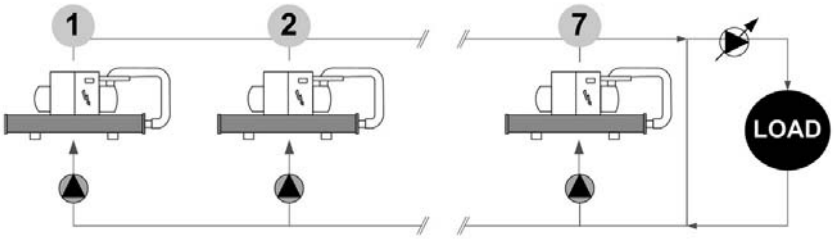


Tree topology (with stub lines)



Line topology (with loops)





If there are more units connected in a local network set the mode of operation.

MODE A

Every unit manages its own compressors according to the setpoint.

Every unit optimizes its refrigeration circuits.

Pumps always active, even with compressor stoped.

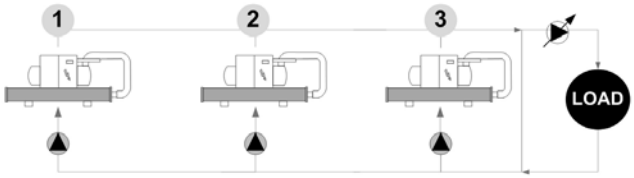
P0658 = 0

P0657 > 0 °C

setpoint1 > setpoint2 > setpoint3

or

setpoint1 < setpoint2 < setpoint3



MODE B

The master manages the single cooling.

The master optimizes individual refrigerant circuits.

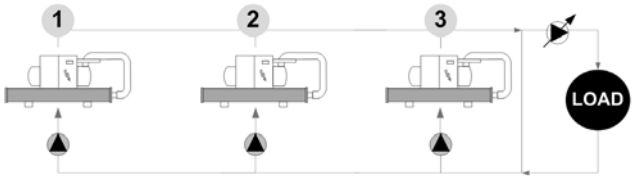
Pumps always active, even with compressor stoped.

P0658 = 1

P0657 = 0 °C

setpoint1 = setpoint2 = setpoint3

plus: optimal H2O temperature control



MODE C

The master manages the single cooling.

The master optimizes individual refrigerant circuits.

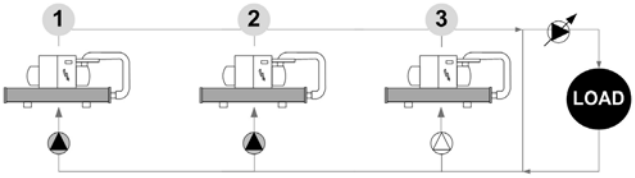
Active pumps only with active compressors.

P0658 = 2

P0657 = 0 °C

setpoint1 = setpoint2 = setpoint3

plus: minimum pumps consumption need balanced system (t1 = t2 = t3)



Path: Main Menu / Unit parameters / Master Slave

Parameters	Short description	Description
P0340:	Address unit	ProcessBus address unit
P0341:	Unit network	Number of network-connected units including the master
P0342:	Standby unit	Number of units kept in standby
P0343:	TypeRegMS	Operation mode: 0=mode A; 1=mode B; 2=mode C
P0344:	Offset Trm MS	Temperature Offset the master sum or subtract, depending on the way you set, in order of priority, to the set point of the slave

11.7 Climatic TExt

⚠ Menu accessible only after having entered the password.

⚠ Access reserved only to specifically trained personnel.

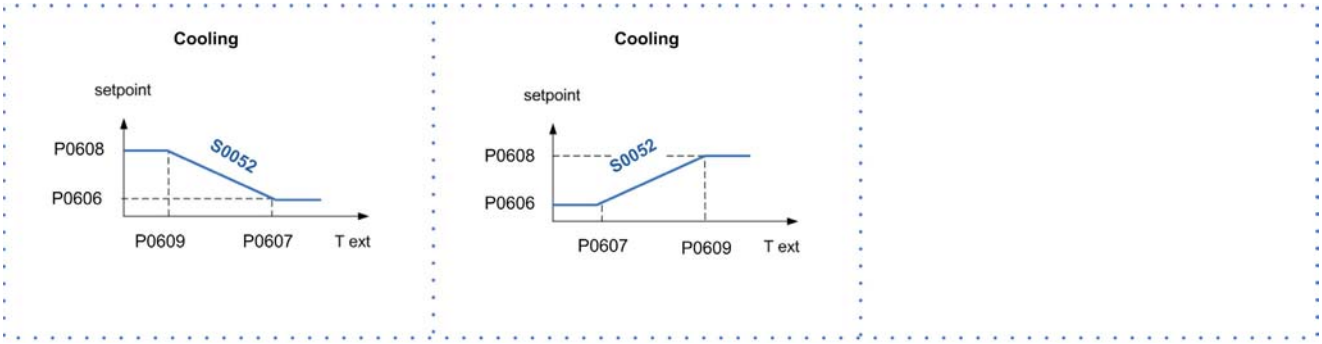
⚠ The parameter modification can cause irreversible damages.

The setpoint defined by the temperature curve is shown at status S0052: ActualUtSetp

Only if P0036: EnCompExt ≠ 0

Path: Main Menu / Unit parameters / TExt Correction config

Example



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

Path: Main Menu / Unit parameters / TExt Correction config

Parameters	Short description	Description
P0606	CSptLow	setpoint temperature value when the air temperature value is AirAtSptLowC
P0607	AirAtSetPointLowC	external air temperature value where the calculated setpoint takes on the value given by CSptLow
P0608	CSptHigh	setpoint temperature value when the air temperature value is AirAtSptHigC
P0609	AirAtSetPointHighC	external air temperature value where the calculated setpoint takes on the value given by CSptHigh
P0610	HSptLow	setpoint temperature value when the air temperature value is AirAtSptLowH
P0611	AirAtSptLowH	external air temperature value where the calculated setpoint takes on the value given by HSptLow
P0612	HSptHigh	setpoint temperature value when the air temperature value is AirAtSptHigH
P0613	AirAtSptHigH	external air temperature value where the calculated setpoint takes on the value given by HSptHigh

P0606 / P0609: Coooling
P0610 / P0613: Heating

11.8 Water reset

⚠ Menu accessible only after having entered the password.

⚠ Access reserved only to specifically trained personnel.

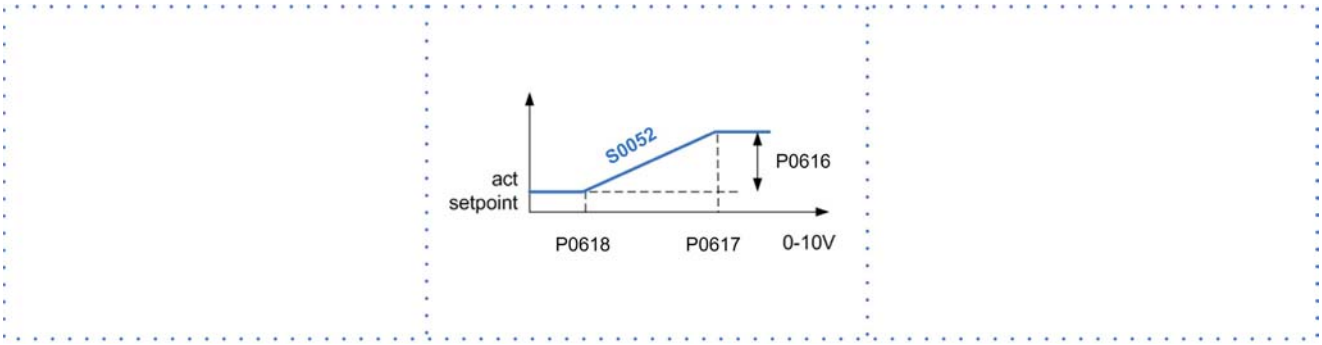
⚠ The parameter modification can cause irreversible damages.

The water reset correction affects the setpoint defined by the Climate curve TExt (actual setpoint).

The setpoint is shown at status S0052: ActualUtSetp

Only if P0003: En WaterReset ≠ 0

Path: Main menu / Unit parameters / Water reset config



Step	Display	Action	Menu/Variable	Keys		Notes
1		Press 3 sec.		✓		
2	Password	Set	Password	▼	✓	
3		Press		i		
4	Main menu	Select	Unit parameters	▼	✓	
5	Unit parameters	Select	Water reset	▼	✓	
6	Water reset	Select	Parameter	▼	✓	
7		Set		▼	▲	
8		Confirm		✓		
9		Press 3 sec.				
10		Select	Local connections	✓		

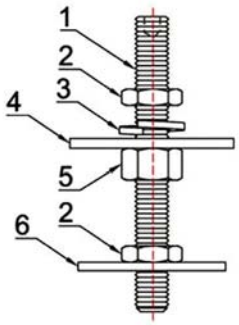
Path: Main Menu / Unit parameters / Water reset

Parameters	Short description	Description
P0616	MaxCWRC	Maximum correction to be applied to the setpoint Cooling
P0617	SWRMaxC	Value of the WR control signal corresponding to the correction of the set Cool equal to P0616
P0618	SWRMinC	Value of the WR control signal corresponding to the correction of the set COOL equal to 0
P0615	MaxCWRH	Maximum correction to be applied to the setpoint Heating
P0619	SWRMaxH	Value of the WR control signal corresponding to the correction of the set Heating equal to P0615
P0620	SWRMinH	Value of the WR control signal corresponding to the correction of the set Heating equal to 0

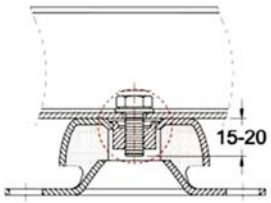
P0616 / P0618: Cooling
P0615, P0619, P0620: Heating

11.9 AMRX - Rubber antivibration mounts

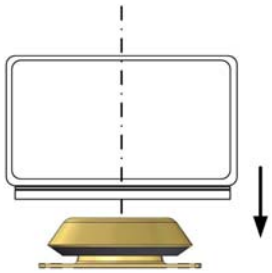
The rubber antivibration mounts reduce the vibrations of compressor during its operation and they are installed at the base toe.



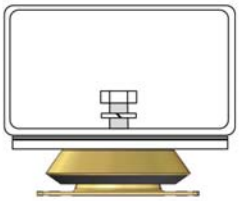
A



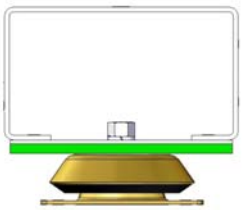
1a



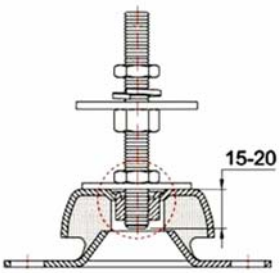
2a



3a



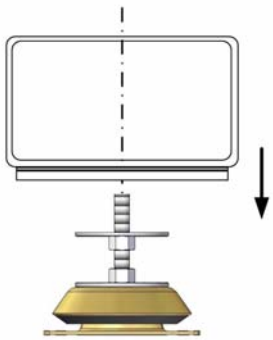
B



1b

2b

3b



4b

5b

12 Decommissioning

12.1 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.

12.2 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.

12.3 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.

13 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 necesssary and without due caution, may cause the drop or the tipping of the unit with the consequent damage, even serious, to persons, things or the unit itself.
Handle the unit following the instructions provided in the present manual 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 isolater 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.

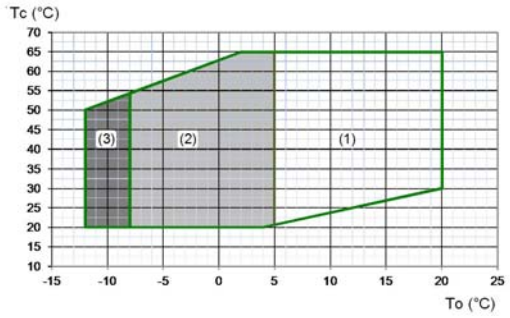
General technical data

Acoustic treatment: Standard (ST)- Super-silenced(EN)

Size			220.2	240.2	260.2	280.2	300.2	320.2	340.2	360.2	400.2	440.2	470.2	500.2	540.2	580.2
Cooling																
Cooling capacity	1	kW	550	585	642	720	757	794	848	899	997	1115	1159	1231	1344	1427
Compressor power input	1	kW	128,0	137,3	150,2	164,5	173,2	181,0	195,3	208,4	227,5	255,4	267,3	280,5	307,0	328,7
Total power input	1	kW	128,5	137,8	150,7	165,0	173,7	181,5	195,8	208,9	228,0	255,9	267,8	281,0	307,5	329,2
EER	2	-	4.30	4.26	4.27	4.38	4.37	4.39	4.34	4.31	4.38	4.37	4.34	4.39	4.38	4.34
Compressor																
Type of compressors	3	-	DSW	DSW	DSW	DSW	DSW	DSW	DSW	DSW	DSW	DSW	DSW	DSW	DSW	DSW
No. of compressors		Nr	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Rated power (C1)		HP	110	120	120	140	140	160	160	180	200	220	220	250	270	290
Nominal capacity (C2)		HP	110	120	140	140	160	160	180	180	200	220	250	250	270	290
Std Capacity control steps	4	Nr	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS
Oil charge (C1)		l	17.0	17.0	17.0	21.0	21.0	21.0	21.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Oil charge (C2)		l	17.0	17.0	21.0	21.0	21.0	21.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Refrigerant charge (C1)	5	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Refrigerant charge (C2)	5	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Refrigeration circuits		Nr	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Internal exchanger (evaporator)																
Type of internal exchanger	6	-	S&T	S&T	S&T	S&T	S&T	S&T	S&T	S&T	S&T	S&T	S&T	S&T	S&T	S&T
No. of internal exchangers		Nr	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Water flow rate	1	l/s	26.3	28.0	30.7	34.4	36.2	37.9	40.5	43.0	47.6	53.3	55.4	58.8	64.2	68.2
Internal exchanger pressure drops	1	kPa	32	36	42	45	50	54	35	39	41	50	53	41	48	54
Water content		l	307	307	307	280	280	280	481	481	514	514	514	917	917	917
Connections																
Gas connection		mm	76	76	76	76	76	76	76/89	89	89	89	89	89	89	89
Liquid connection		mm	42	42	42/54	54	54	54	54	54	54	64	64	64	64	64
Water connections	4	″	6″	6″	6″	6″	6″	6″	8″	8″	8″	8″	8″	10″	10″	10″
Power supply																
Standard power supply	-	V	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50

1. Data referred to the following conditions: internal exchanger water = 12/7 °C. condensing temperature= 45°C. The data do not consider the part related to the pumps, required to overcome the pressure drop for the solution circulation inside the exchangers. Evaporator fouling factor = 0.44 x 10^(-4) m2 K/W
2. EER referred only to compressors
3. DSW = double-screw compressor
4. Capacity control with continuous modulation (Stepless)
5. The units are shipped with a sealed charge of nitrogen.
6. S&T = shell and tube

Operating range (cooling)



Tc = condensing temperature (°C)
To (°C) = leaving internal exchanger water temperature (evaporator)

1. Standard unit operating range at full load
2. Unit operating range in 'B - Liquid low temperature' configuration(40% ethylene glycol)
3. Operation range extension (extremely low water temperature option available on request)

Admissible water flow rates

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

		220.2	240.2	260.2	280.2	300.2	320.2	340.2	360.2	400.2	440.2	470.2	500.2	540.2	580.2
Qmin	[l/s]	20,1	20,1	20,1	21,9	21,9	21,9	29,5	29,5	32,2	32,2	32,2	39,0	39,0	39,0
Qmax	[l/s]	45,7	45,7	45,7	53,2	53,2	53,2	66,1	66,1	73,0	73,0	73,0	90,9	90,9	90,9

Minimum system water content

For a proper functioning of the unit a minimum water content has to the provided to the system, using the formula:

Minimum water content [l] = 7 x kWf (air conditioning application)
= 14 x kWf (application with low outdoor temperature or low loads required))

kWf = Nominal cooling capacity unit

Volume calculated does not consider internal heat exchanger (evaporator) water content.

Sound levels

Standard acoustic configuration (ST)

Size	Sound power level (dB)								Sound power level	Sound pressure level
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
220.2	94	88	93	84	92	84	73	62	94	74
240.2	94	88	92	85	92	85	76	69	94	74
260.2	95	87	91	85	94	91	81	70	96	77
280.2	95	86	91	86	96	94	83	71	99	79
300.2	95	86	91	86	96	94	83	71	99	79
320.2	95	86	91	86	96	94	83	72	99	79
340.2	95	86	92	86	97	95	84	72	100	80
360.2	96	87	94	88	98	96	85	73	101	82
400.2	96	87	96	86	100	94	83	71	102	82
440.2	80	79	96	103	100	89	76	71	103	84
470.2	81	80	96	102	101	92	79	72	104	84
500.2	82	81	97	96	102	94	81	72	104	84
540.2	82	80	100	96	104	92	81	72	105	85
580.2	83	83	97	99	104	94	81	72	105	85

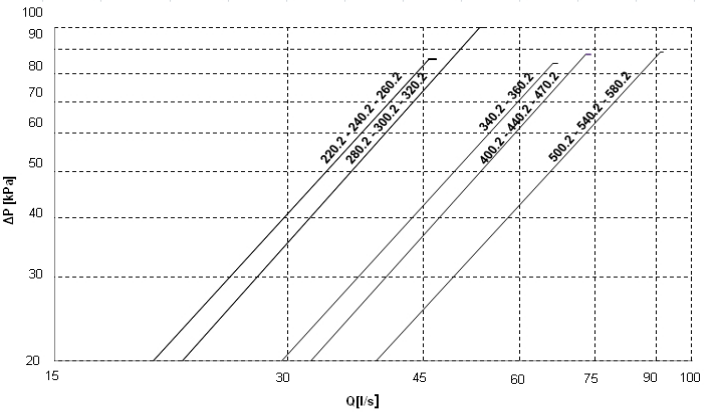
Acoustic configuration: Super-silenced (EN)

Size	Sound power level (dB)								Sound power level	Sound pressure level
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
220.2	90	83	88	79	86	78	67	55	88	69
240.2	90	83	87	80	86	79	70	62	88	69
260.2	91	82	86	80	88	85	75	63	91	71
280.2	91	81	86	81	90	88	77	64	93	73
300.2	91	81	86	81	90	88	77	64	93	73
320.2	91	81	86	81	90	88	77	65	93	74
340.2	91	81	87	81	91	89	78	65	94	74
360.2	92	82	89	83	92	90	79	66	95	76
400.2	92	82	91	81	94	88	77	64	96	76
440.2	76	74	91	98	94	83	71	64	98	78
470.2	78	76	92	97	96	86	73	65	98	79
500.2	78	76	92	91	97	88	75	65	98	78
540.2	78	75	96	91	98	86	75	65	99	79
580.2	79	78	92	94	98	88	75	65	99	79

Sound levels refer to full load units, in test nominal conditions. The sound pressure level refers to 1 m. from the unit outer surface operating in open field. Measurements are carried out according to the UNI EN ISO 9614-2 standard, in compliance with the EUROVENT 8/1 certification.

Data referred to the following conditions:
- internal exchanger water = 12/7°C
- external exchanger water = 30/35°C

Internal exchanger (evaporator) pressure drops



The pressure drops are calculated considering a water temperature of 7°C

Q = water flow rate[l/s]
DP = water side pressure drops (kPa)

The water flow rate must be calculated with the following formula

Q [l/s] = kWf / (4,186 x DT)

kWf = Cooling capacity in kW
DT = Temperature difference between inlet / outlet water

To the internal exchanger pressure drops must be added the pressure drops of the steel mesh mechanical filter (not supplied) that must be placed on the water input line. It is a device compulsory for the correct unit operation and it must be selected and installed by the Customer. It is forbidden the use of filters with the mesh pitch higher than 1,0 mm. Filters with higher mesh pitch can cause a bad unit operation and also its serious damaging.

Exchanger operating range

	Internal exchanger	
	DPr	DPw
PED (CE)	1650	1050

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

Overload and control device calibrations

		open	closed	value
High pressure switch	[kPa]	2100	1550	–
Antifreeze protection	[°C]	3	5.5	–
High pressure safety valve	[kPa]	–	–	2500
Low pressure safety valve	[kPa]	–	–	1650
Max no. of compressor starts per hour	[n°]	–	–	6
Discharge safety thermostat	[°C]	–	–	120

Refrigerant circuit specifications (for refrigerant line and remote condenser dimensioning)

Size		220.2		240.2		260.2		280.2		300.2		320.2		340.2		360.2		400.2		440.2		470.2		500.2		540.2		580.2	
Circuit	-	C1	C2	C1	C2	C1	C2	C1	C2	C1	C2	C1	C2	C1	C2	C1	C2	C1	C2	C1	C2	C1	C2	C1	C2	C1	C2	C1	C2
Capacity to be discharged	[kW]	339	339	361	361	366	427	442	442	434	496	488	488	491	552	554	554	612	612	685	685	668	759	756	756	826	826	878	878
Theoretic refrigerant charge	[kg]	40	40	40	40	40	40	44	44	44	59	59	59	63	63	63	63	67	67	67	67	67	67	75	75	75	75	75	75
Liquid receiver volume	[dm³]	25	25	25	25	25	25	25	25	25	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40

Data referred to the following conditions:
- internal exchanger water = 12/7 °C
- condensing temperature = 45°C
The refrigerant charge above indicated is referred only to the evaporator unit

Max equivalent lengths for pipes to remote condenser

Size		220.2	240.2	260.2	280.2	300.2	320.2	340.2	360.2	400.2	440.2	470.2	500.2	540.2	580.2
Difference in height	-	Max equivalent length of the supply and liquis pipes													
0	[m]	35	30	30	40	40	40	40	40	38	40	39	39	33	29
2,5	[m]	35	30	30	40	40	40	40	40	38	40	37	37	31	28
5	[m]	35	30	30	40	38	38	38	40	38	40	36	36	30	26
7,5	[m]	35	30	30	40	36	36	36	40	38	40	34	34	29	25
10	[m]	35	30	30	40	35	35	35	40	38	39	33	33	27	24
R-134a refrigerant for each line meter	[kg/m]	3,27	3,27	4,16	5,04	5,04	5,04	5,14	5,23	5,23	7,22	7,22	7,22	7,22	7,22

Values of the max. allowed equivalent length and refrigerant for each line meter considered for pipes with the same diameters indicated in the 'General technical data' table and in the Dimensional drawing section. These values are purely indicatives and, anyway, valid if pipes and their weld joints are correctly operating and realized, and if no leak is present. Data referred to the following conditions:
- internal exchanger water = 12/7 °C - condensing temperature = 45°C
The values indicated supply an equivalent pressure drop within the following max. values:

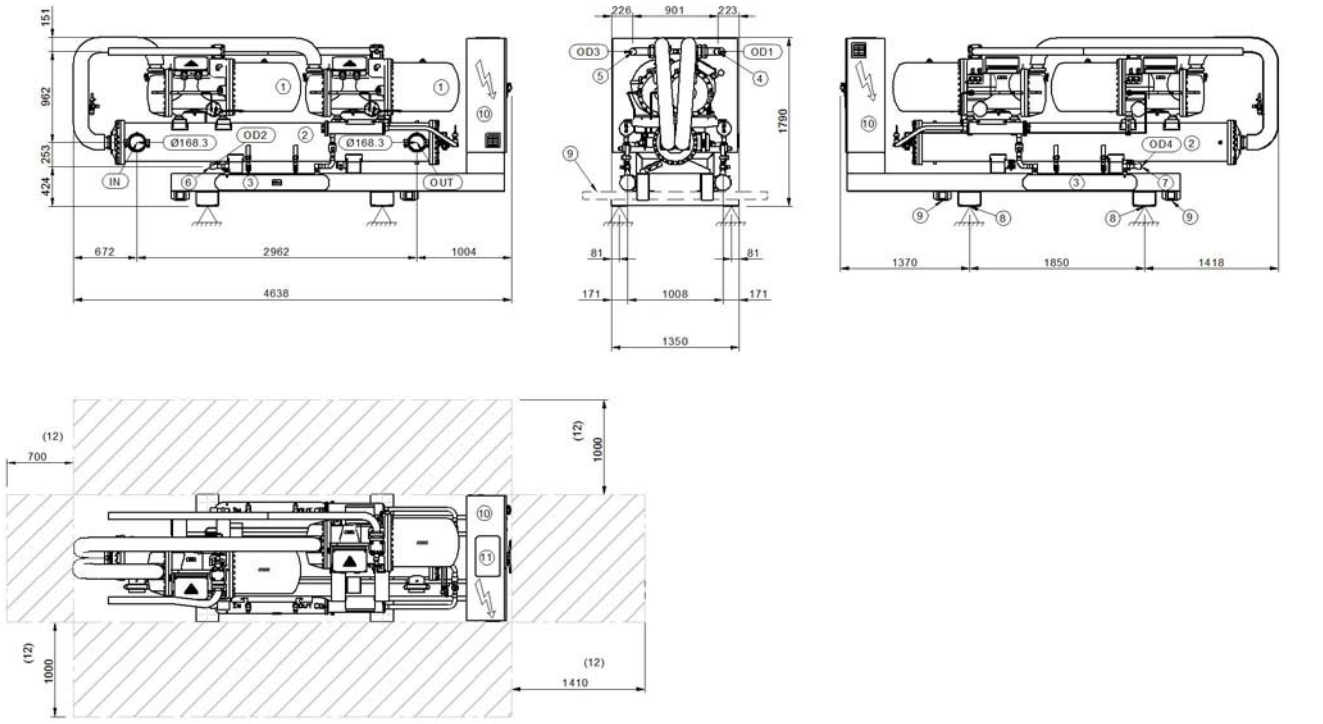
- 1°C on the supply line to the remote condenser
- 0.5°C on the liquid line to the remote condenser

The difference in height is referred to the remote condenser condition in an higher position than the evaporator unit. Attention. To take all countermeasures to avoid liquid hammers to the compressor and to ensure a correct oil return to the compressor, etc., such as sloping lines, installing traps, insulation, etc., refer to the standard and correct design rules for refrigerant lines; the manufacturer CLIVET declines all responsibilities for these.

Dimensional Drawing

Size 220.2-280.2 Acoustic configuration: Standard (ST)

DAA4J220 2_280 2_ST_0
Date: 29/07/14



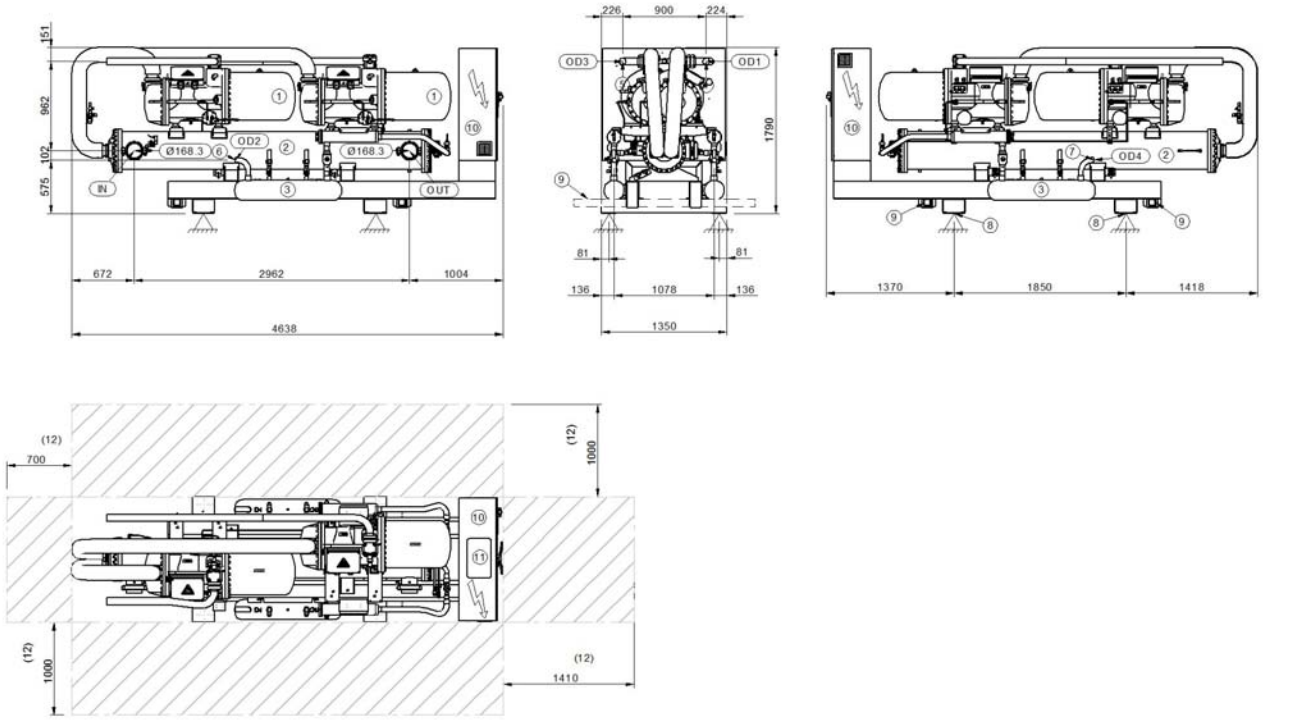
1. Compressor
2. Internal exchanger (evaporator)
3. Liquid receiver
4. Discharge line C1
5. Discharge line C2
6. Liquid line C1
7. Liquid line C2
8. Antivibration mount fixing holes Ø 25mm
9. Lifting bars
10. Electrical panel
11. Power input
12. Minimum space for maintenance.

Size		ST-EXC			
		220.2	240.2	260.2	280.2
OD1	mm	76	76	76	76
OD2	mm	42	42	42	54
OD3	mm	76	76	76	76
OD4	mm	42	42	54	54
A - Length	mm	4638	4638	4638	4638
B - Width	mm	1350	1350	1350	1350
C - Height	mm	1790	1790	1790	1790
Shipping weight	kg	3083	3115	3190	3307
Operating weight	kg	3390	3422	3497	3587

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

Size 300.2-320.2 Acoustic configuration: Standard (ST)

DAA4J300 2_320 2_ST_0
Date: 29/07/14



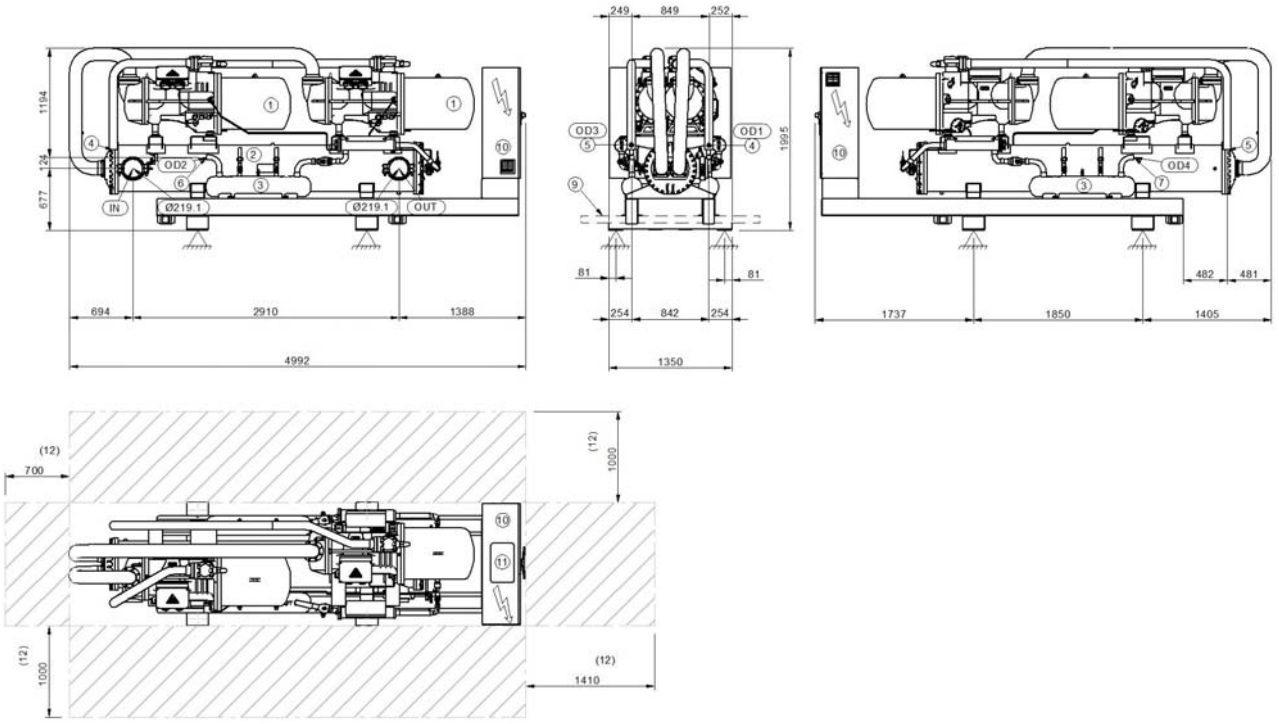
1. Compressor
2. Internal exchanger (evaporator)
3. Liquid receiver
4. Discharge line C1
5. Discharge line C2
6. Liquid line C1
7. Liquid line C2
8. Antivibration mount fixing holes Ø 25mm
9. Lifting bars
10. Electrical panel
11. Power input
12. Minimum space for maintenance.

Size		ST-EXC	
		300.2	320.2
OD1	mm	76	76
OD2	mm	54	54
OD3	mm	76	76
OD4	mm	54	54
A - Length	mm	4638	4638
B - Width	mm	1350	1350
C - Height	mm	1790	1790
Shipping weight	kg	3401	3465
Operating weight	kg	3681	3745

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

Size 340.2-360.2 Acoustic configuration: Standard (ST)

DAA4J340 2_360 2_ST_0
Date: 30/07/14



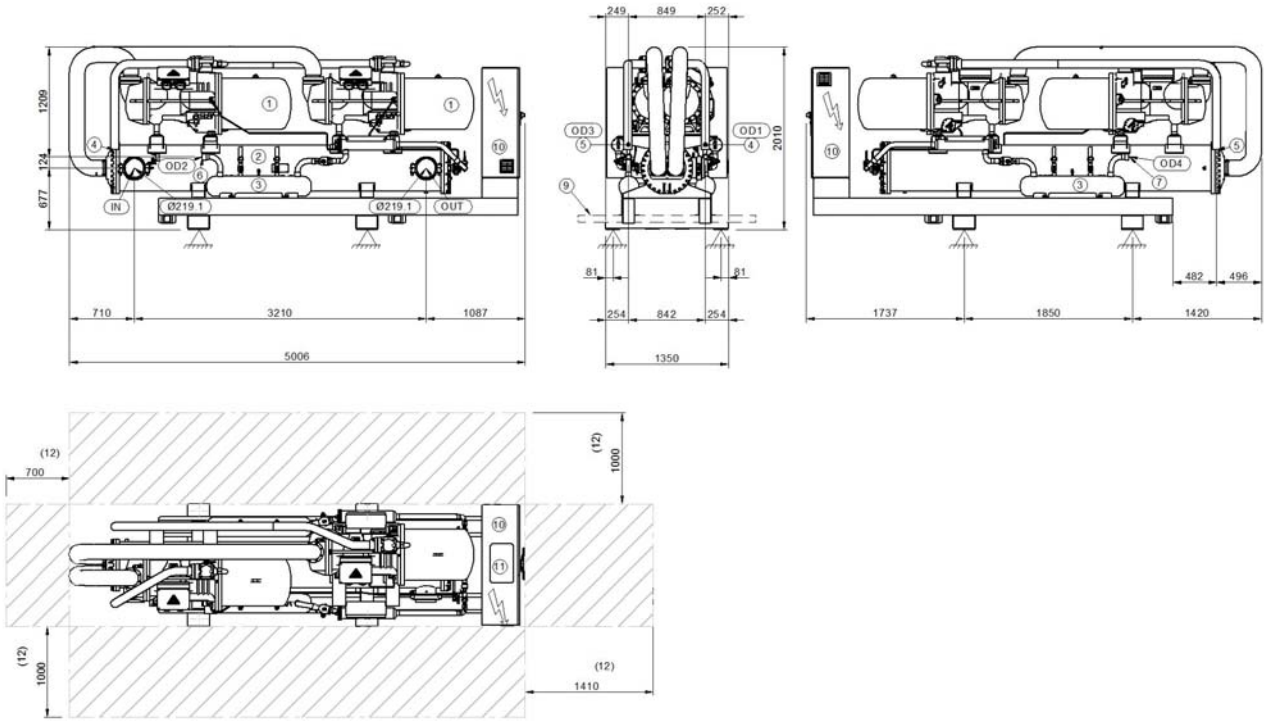
1. Compressor
2. Internal exchanger (evaporator)
3. Liquid receiver
4. Discharge line C1
5. Discharge line C2
6. Liquid line C1
7. Liquid line C2
8. Antivibration mount fixing holes Ø 25mm
9. Lifting bars
10. Electrical panel
11. Power input
12. Minimum space for maintenance.

Size		ST-EXC	
		340.2	360.2
OD1	mm	76	89
OD2	mm	54	54
OD3	mm	89	89
OD4	mm	54	54
A - Length	mm	4992	4992
B - Width	mm	1350	1350
C - Height	mm	1995	1995
Shipping weight	kg	3967	4194
Operating weight	kg	4448	4675

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

Size 400.2-470.2 Acoustic configuration: Standard (ST)

DAA4J400 2_470 2_ST_0
Date: 30/07/14



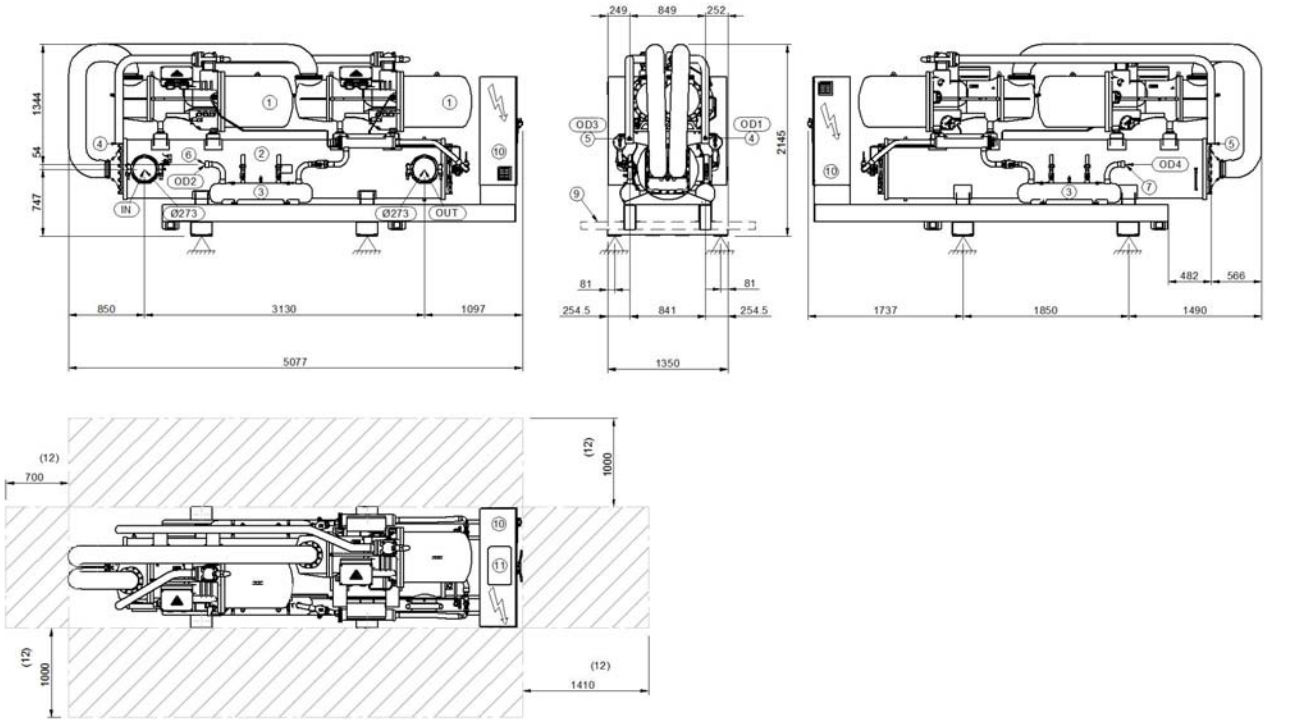
1. Compressor
2. Internal exchanger (evaporator)
3. Liquid receiver
4. Discharge line C1
5. Discharge line C2
6. Liquid line C1
7. Liquid line C2
8. Antivibration mount fixing holes Ø 25mm
9. Lifting bars
10. Electrical panel
11. Power input
12. Minimum space for maintenance.

Size		ST-EXC		
		400.2	440.2	470.2
OD1	mm	89	89	89
OD2	mm	54	64	64
OD3	mm	89	89	89
OD4	mm	54	64	64
A - Length	mm	5006	5006	5006
B - Width	mm	1350	1350	1350
C - Height	mm	2010	2010	2010
Shipping weight	kg	4282	4303	4351
Operating weight	kg	4763	4784	4832

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

Size 500.2-580.2 Acoustic configuration: Standard (ST)

DAA4J500 2_580 2_ST_0
Date: 30/07/14



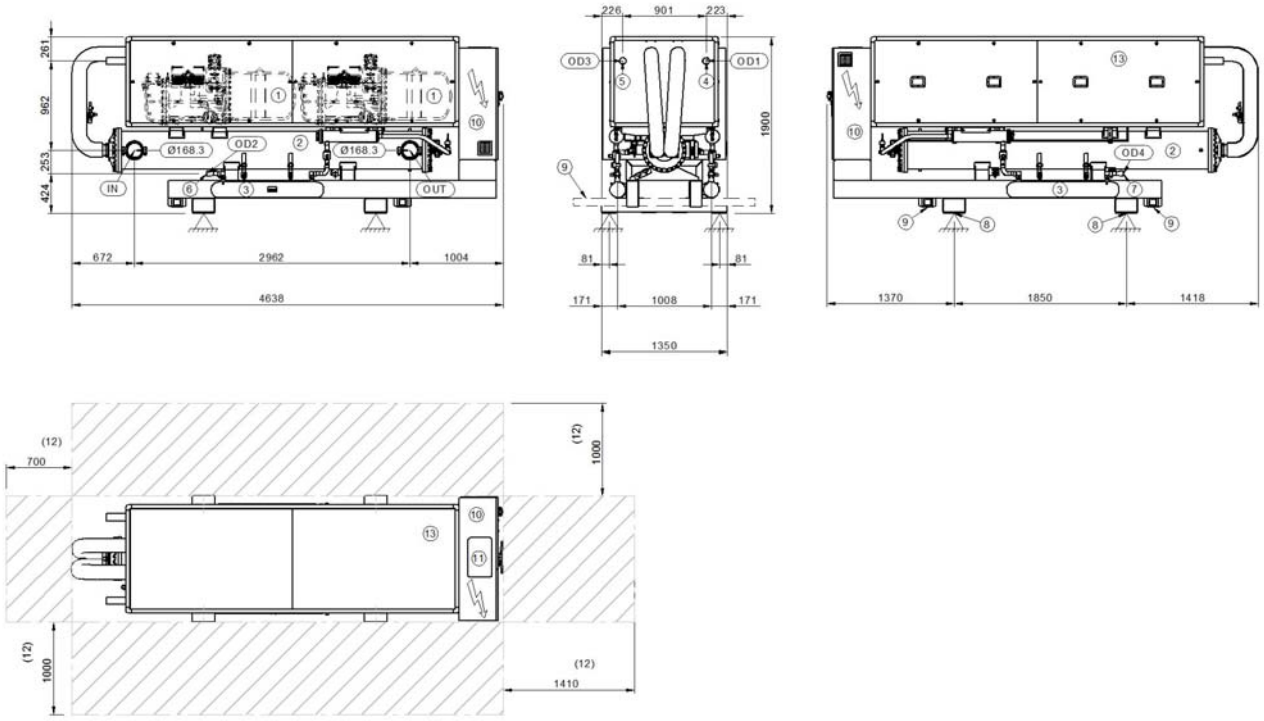
1. Compressor
2. Internal exchanger (evaporator)
3. Liquid receiver
4. Discharge line C1
5. Discharge line C2
6. Liquid line C1
7. Liquid line C2
8. Antivibration mount fixing holes Ø 25mm
9. Lifting bars
10. Electrical panel
11. Power input
12. Minimum space for maintenance.

Size		ST-EXC		
		500.2	540.2	580.2
OD1	mm	89	89	89
OD2	mm	64	64	64
OD3	mm	89	89	89
OD4	mm	64	64	64
A - Length	mm	5077	5077	5077
B - Width	mm	1350	1350	1350
C - Height	mm	2145	2145	2145
Shipping weight	kg	4763	4900	4959
Operating weight	kg	5680	5817	5876

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

Size 220.2-280.2 Acoustic configuration: Super-silenced (EN)

DAA4J220 2_280 2_EN_0
Date: 30/07/14



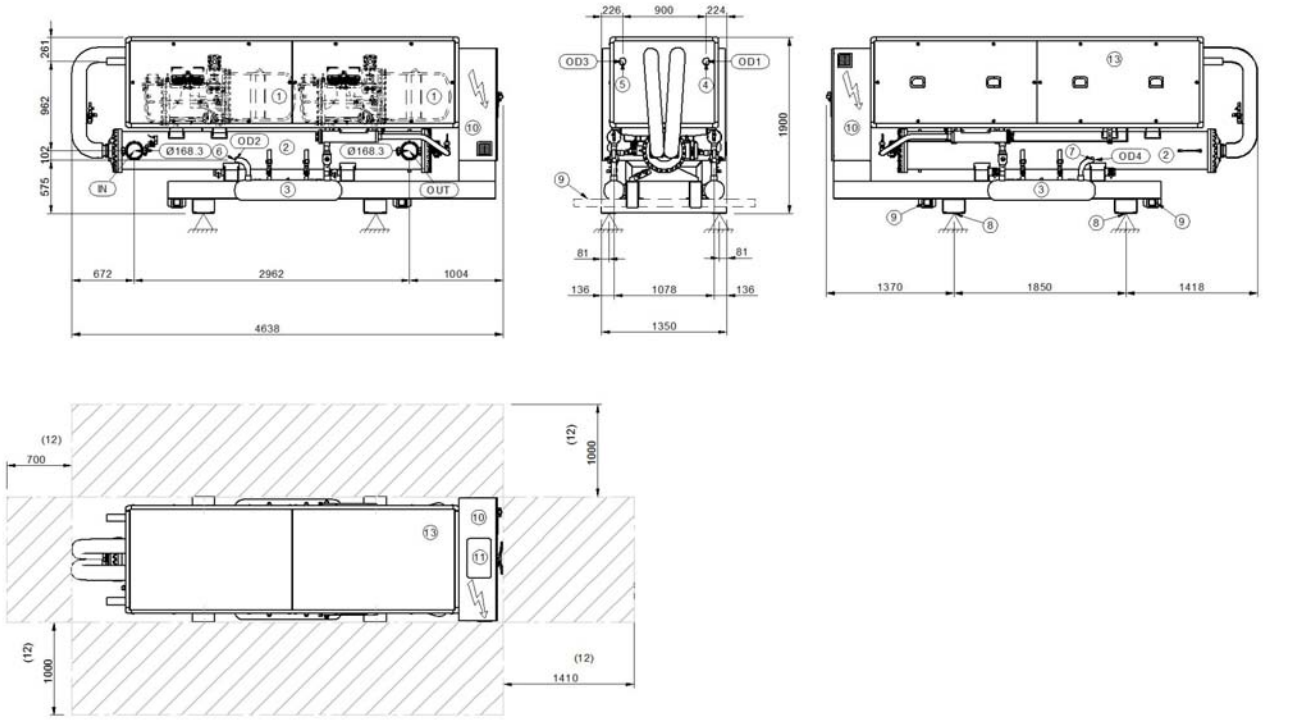
1. Compressor
2. Internal exchanger (evaporator)
3. Liquid receiver
4. Discharge line C1
5. Discharge line C2
6. Liquid line C1
7. Liquid line C2
8. Antivibration mount fixing holes Ø 25mm
9. Lifting bars
10. Electrical panel
11. Power input
12. Minimum space for maintenance.
13. Soundproofing cabin

Size		EN-EXC			
		220.2	240.2	260.2	280.2
OD1	mm	76	76	76	76
OD2	mm	42	42	42	54
OD3	mm	76	76	76	76
OD4	mm	42	42	54	54
A - Length	mm	4638	4638	4638	4638
B - Width	mm	1350	1350	1350	1350
C - Height	mm	1900	1900	1900	1900
Shipping weight	kg	3411	3443	3547	3693
Operating weight	kg	3830	3862	3966	4013

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

Size 300.2-320.2 Acoustic configuration: Super-silenced (EN)

DAA4J300 2_320 2_EN_0
Date: 30/07/14



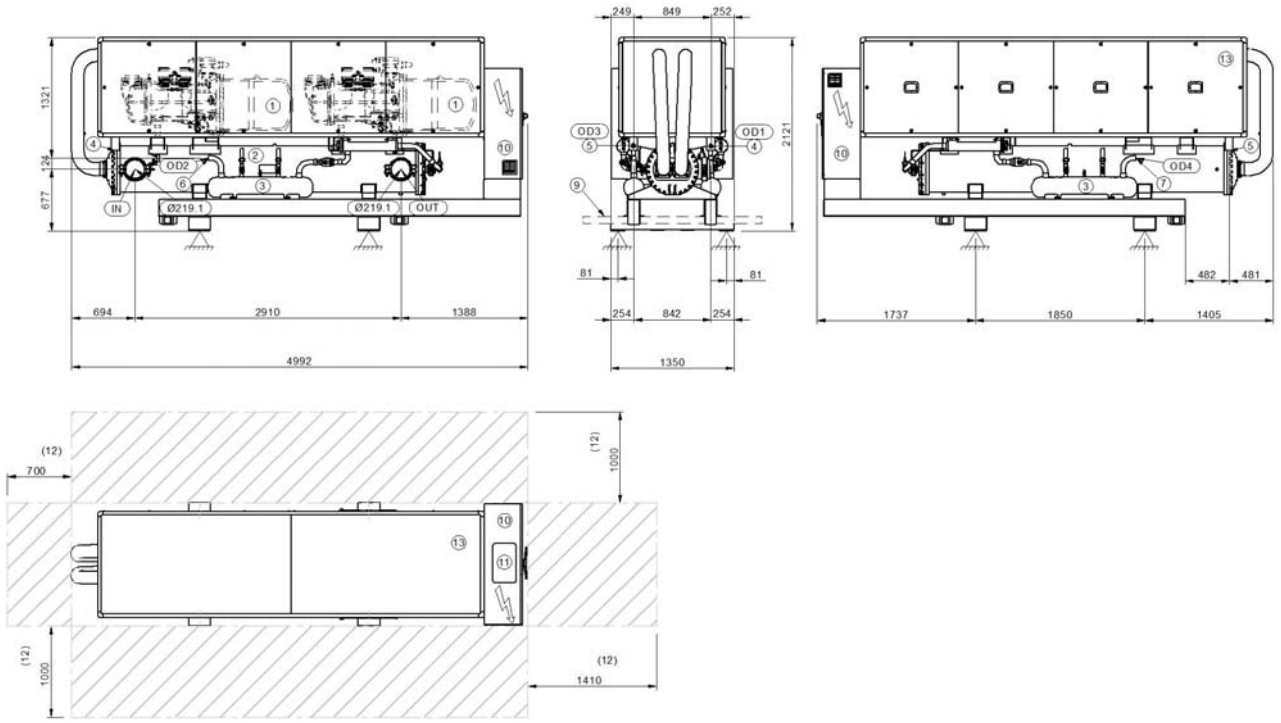
1. Compressor
2. Internal exchanger (evaporator)
3. Liquid receiver
4. Discharge line C1
5. Discharge line C2
6. Liquid line C1
7. Liquid line C2
8. Antivibration mount fixing holes Ø 25mm
9. Lifting bars
10. Electrical panel
11. Power input
12. Minimum space for maintenance.
13. Soundproofing cabin

Size		EN-EXC	
		300.2	320.2
OD1	mm	76	76
OD2	mm	54	54
OD3	mm	76	76
OD4	mm	54	54
A - Length	mm	4638	4638
B - Width	mm	1350	1350
C - Height	mm	1900	1900
Shipping weight	kg	3787	3851
Operating weight	kg	4107	4171

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

Size 340.2-360.2 Acoustic configuration: Super-silenced (EN)

DAA4J340 2_360 2_EN_0
Date: 30/07/14



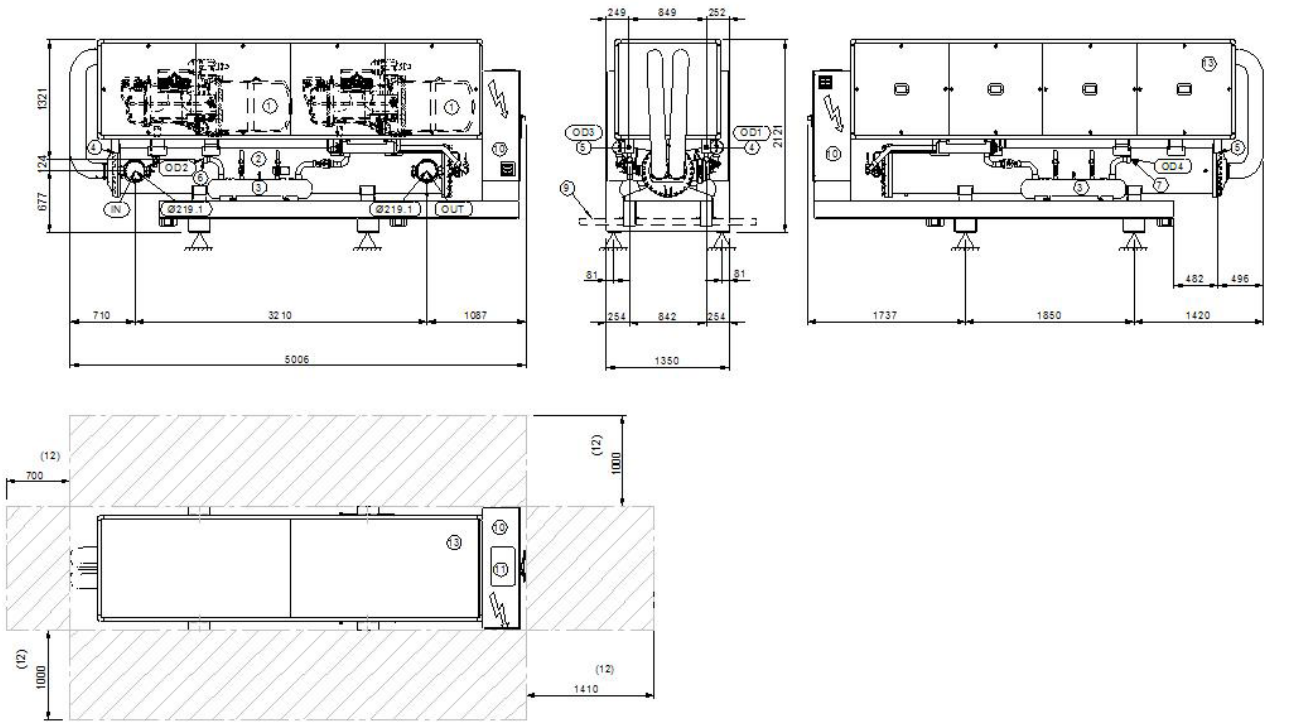
1. Compressor
2. Internal exchanger (evaporator)
3. Liquid receiver
4. Discharge line C1
5. Discharge line C2
6. Liquid line C1
7. Liquid line C2
8. Antivibration mount fixing holes Ø 25mm
9. Lifting bars
10. Electrical panel
11. Power input
12. Minimum space for maintenance.
13. Soundproofing cabin

Size		EN-EXC	
		340.2	360.2
OD1	mm	76	89
OD2	mm	54	54
OD3	mm	89	89
OD4	mm	54	54
A - Length	mm	4992	4992
B - Width	mm	1350	1350
C - Height	mm	2121	2121
Shipping weight	kg	4383	4640
Operating weight	kg	5010	5267

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

Size 400.2-470.2 Acoustic configuration: Super-silenced (EN)

DAA4J400 2_470 2_EN_0
Date: 30/07/14



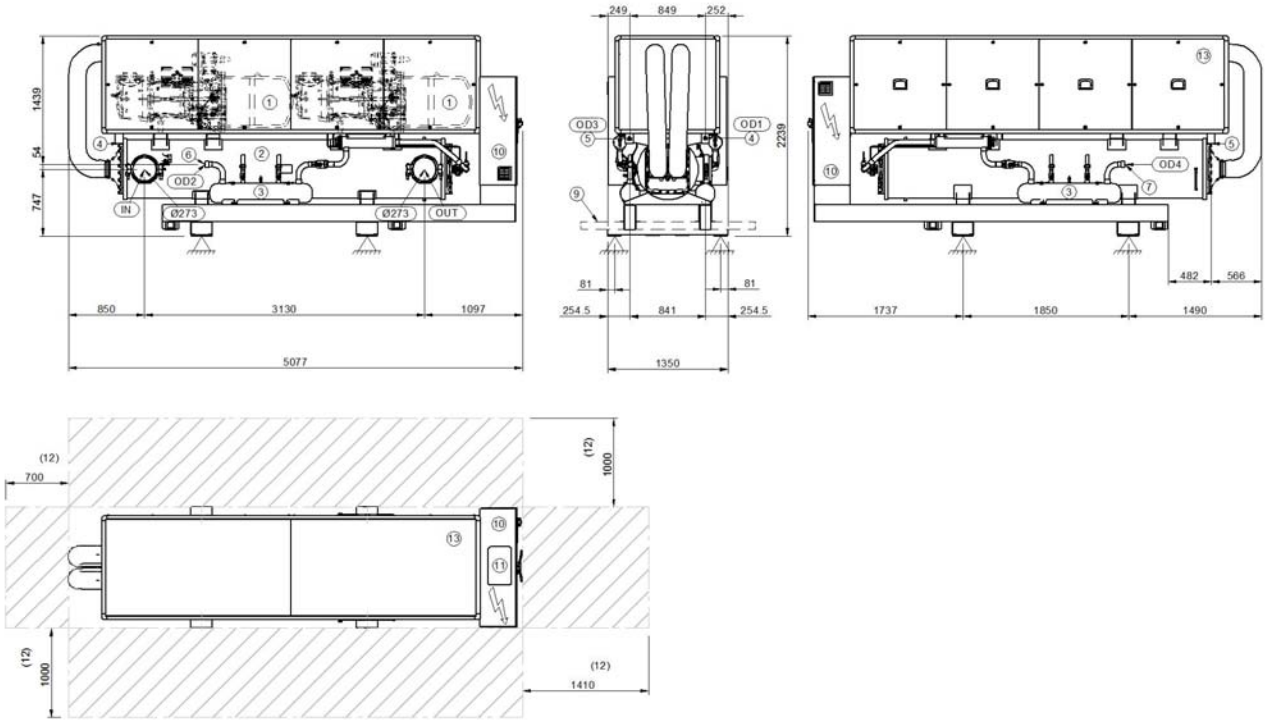
1. Compressor
2. Internal exchanger (evaporator)
3. Liquid receiver
4. Discharge line C1
5. Discharge line C2
6. Liquid line C1
7. Liquid line C2
8. Antivibration mount fixing holes Ø 25mm
9. Lifting bars
10. Electrical panel
11. Power input
12. Minimum space for maintenance.
13. Soundproofing cabin

Size		EN-EXC		
		400.2	440.2	470.2
OD1	mm	89	89	89
OD2	mm	54	64	64
OD3	mm	89	89	89
OD4	mm	54	64	64
A - Length	mm	5006	5006	5006
B - Width	mm	1350	1350	1350
C - Height	mm	2121	2121	2121
Shipping weight	kg	4728	4749	4797
Operating weight	kg	5388	5445	5493

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

Size 500.2-580.2 Acoustic configuration: Super-silenced (EN)

DAA4J500 2_580 2_EN_0
Date: 30/07/14



1. Compressor
2. Internal exchanger (evaporator)
3. Liquid receiver
4. Discharge line C1
5. Discharge line C2
6. Liquid line C1
7. Liquid line C2
8. Antivibration mount fixing holes Ø 25mm
9. Lifting bars
10. Electrical panel
11. Power input
12. Minimum space for maintenance.
13. Soundproofing cabin

Size		EN-EXC		
		500.2	540.2	580.2
OD1	mm	89	89	89
OD2	mm	64	64	64
OD3	mm	89	89	89
OD4	mm	64	64	64
A - Length	mm	5077	5077	5077
B - Width	mm	1350	1350	1350
C - Height	mm	2239	2239	2239
Shipping weight	kg	5209	5346	5405
Operating weight	kg	6318	6455	6514

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

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