MITSUBISHI ELECTRIC

Air conditioners for IT Cooling

MEGR

INSTALLATION, USE AND MAINTENANCE MANUAL

English

Italian is the original language.
The other languages versions are translation of the original.

To ensure safe and correct use, carefully read this manual and make sure to understand all the contained indications and information.

Before carrying out any operation on the machine, you must carefully read this manual and make sure you understand all the instructions and information given.

Keep this manual in a known and easily accessible place to refer to as necessary during the entire life-span of the unit.

CONTENTS

1 GENERAL PROVISIONS

1.1 General information and safety

1.1.1 Scope of the manual

This manual, which is an integral part of the machine (*), was prepared by the Manufacturer to provide the necessary information to all those who are authorised to interact with it during its life span: Buyers, System Designers, Carriers, Handling Operators, Installers, Expert Operators, Specialist Technicians and Users.
(*) in the interest of clarity, this term is used as defined in the Machinery Directive.

As well as adopting a code of good practice, the recipients of the manual must read the information with care and apply it scrupulously. Taking a little time to read this information can help avoid risks to the health and safety of persons as well as prevent financial losses.

The information was written by the Manufacturer in the manufacturer's native language (Italian) and is referred to as the "ORIGINAL INSTRUCTIONS". The information is valid even if the machine in your possession is not exactly the same as the one referred to.

Keep this manual in a known and easily accessible place to refer to as necessary.

The Manufacturer reserves the right to modify the product without prior notice.
A number of symbols are used to highlight some parts of the text that are of particular importance. These are described below.

(1) in the interest of clarity, this term is used as defined in the Machinery Directive.

2 SYMBOLS

DANGER:
Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING:
Warning indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

ATTENTION:
Attention indicates a potentially hazardous situation which, if not avoided, could cause minor or moderate damage.

PROHIBITION:
Prohibition to perform certain movements or activities.

OBLIGATION:
This indicates mandatory actions and behaviours to ensure product reliability and safety.

INFORMATION:
Indicates technical information of particular importance which should not be neglected.

NOTICE:
This is used to address practices not connected with possible physical injury.

3 GLOSSARY AND TERMINOLOGY

There are some recurring terms in the manual which are described below in more detail.

Manufacturer: this is the company that has designed and built the machine in line with current laws, implementing all the good construction rules, and paying attention to the health and safety of people interacting with the machine.

Buyer: the person responsible for making the purchase who must supervise the organisation and assignment of duties to ensure that everything is done in compliance with the applicable laws.

Owner: Legal representative of the company, a body, or a natural person who owns the plant where the machine is installed and is responsible for checking compliance with all the safety rules in this manual and the national regulations in force.

Designer: a competent specialist person duly appointed and authorised to draw up a project that takes into account all the legislative and regulatory aspects and code of good practice that apply to the system as a whole. In any case, as well as comply with the instructions provided by the machine Manufacturer, the designer must consider all the safety aspects for all those persons who will have to interact with the system during its expected life span.

Installer: specialist competent person duly appointed and authorised to set up the machine or system according to the project specifications and the recommendations of the machine Manufacturer and in compliance with the laws on safety at work.

User: person authorised to manage use of the machine in compliance with the "instructions for use" and the laws in force concerning safety at work.

Carriers: the persons who take the machine to the destination in a suitable means of transport. They must stow and position the machine in a suitable way to ensure that it cannot move suddenly during transfer. When using devices for loading and unloading, they must observe the instructions that can be found on the machine to ensure their own safety and that of those people with whom they interact in the process.

Handling operators: those who duly set up the machine and implement all the applicable measures so that it can be handled in a safe and correct manner. They are also those persons who, upon receipt of the machine, move it to the place of installation according to the instructions which can be found on the machine. All the above employees must have adequate skills and observe the instructions to ensure their own safety and that of those people with whom they interact in the process.

Maintenance person: the person authorised by the owner to carry out on the machine all the adjustment and check activities expressly indicated in this manual, and which must be strictly followed. His/her work will only be limited to what is clearly allowed.

Expert operator: person appointed and authorised by the User or the Buyer to use the machine and carry out the routine maintenance according to the instructions provided by the Manufacturer. In the event of failures not considered in this manual, the expert operator must request the assistance of a specialist technician.

Specialist technician: the person authorised directly by MEHITS to carry out all operations of ordinary and extraordinary maintenance. He/she will also carry out all regulations, checks, repairs and replacement of parts that should become necessary during the life of the unit itself. Outside Italy and those countries where the Manufacturer is not directly present, the Agent is personally responsible for acquiring a suitable number of Technicians, proportional to the area and the business.

Routine maintenance: all the operations that help to ensure the good performance and efficiency of the machine. These operations are planned by the Manufacturer who defines the skills required and the procedures to be implemented.

Extraordinary maintenance: all the operations that help to ensure the good performance and efficiency of the machine. These operations, which are not foreseeable, are not planned by the Manufacturer and must only be carried out by the specialist technician.

3.1 Attached documentation

The following documents are delivered with the unit:

- **Installation, use and maintenance manual**: it contains the list of operations to carry out.
- **Wiring diagram:** it is specific to the machine in question. It is useful for the persons who will have to carry out work on the electrical system, as it shows the various components and connections.
- **Dimensional and lifting drawings.**
- **Instructions for the installation of accessories:** describes the procedures for their installation on the machine.
- **EC declaration of conformity**: indicates that the machines comply with current European directives.

The instructions are also available in an alternative format on the website https://www.melcohit.com/EN/download/

3.1.1 General safety rules

The manufacturer, during design and construction, has paid particular attention to aspects that may pose a risk to the safety and health of people interacting with the machine. The manufacturer has complied with the applicable laws as well as the code of good manufacturing practice. The purpose of this manual is to encourage users to take all due care and thereby avoid any risks. In any case, prudence is required at all times. Safety is also the responsibility of all operators who interact with the machine.

Carefully read the instructions in this manual and those applied directly on the machine, and respect those concerning safety in particular.

An overall project that envisages implementation of this machine in a system must take into account the code of good practice as well as the legislative and regulatory aspects. Particular attention must be paid to all the recommendations and technological information provided by the manufacturer. Do not tamper with, avoid, remove or bypass the safety devices installed on the machine. Failure to observe this requirement could result in serious risks to the health and safety of the persons involved.

The personnel who carry out any kind of work during the entire life span of the machine must have precise technical knowledge, special skills and recognised experience in the specific sector. The personnel must also possess and use/wear all the personal protective equipment (PPE) required by law. Non-fulfilment of these requirements could endanger people's health and safety.

Keep the area around the machine in a good state in order to avoid risks to the health and safety of persons during normal use and maintenance of the machine.
Some processes may require the assistance of one or more helpers. In which case, these helpers must be duly trained and informed of the type of work to be carried out in order to avoid risks to their health and safety.

Move the machine observing the information shown on the packaging and the instructions on use provided by the manufacturer.

When handling, if the circumstances demand it, request the assistance of one or more helpers who can give directions.

The personnel who carry out loading, unloading and handling of the equipment must have recognised skills and experience in the specific sector and must have absolute command of the lifting equipment to be used.

During installation, observe the clearances indicated by the manufacturer and take into account all the work activities carried out in the vicinity. Installation must also be carried out in compliance with the laws in force on safety at work.

The machine must be installed and connected in accordance with the manufacturer's instructions. The person in charge must also take into account all regulatory and legislative requirements, carrying out all installation and connection operations in a workmanlike manner.
After installation and before commissioning the machine, he must perform a general check to make sure that these requirements have been met.

Check that any means of transport to be used for transfer of the machine are suitable for the purpose, and that the machine is loaded and unloaded with care to ensure the safety of the operator and of any other persons who are directly involved. Before transfer, make sure that the machine and its components are duly anchored to the vehicle and do not exceed the maximum permitted dimensions for transport on the vehicle. Apply any necessary signs.

The operator must have read and understood the information on use of the machine, and have suitable skills and experience for carrying out the work in hand.

Put the machine only to the uses foreseen by the manufacturer. Improper use of the machine may pose risks to the health and safety of the persons and cause financial losses.

The machine has been designed and constructed to meet all the operating conditions indicated by the manufacturer. Tampering with any of the devices to change the performance can expose the persons to health and safety risks and cause financial losses.

Only use the machine with the safety devices properly installed and in perfect working order. Failure to observe this requirement could result in serious risks to the health and safety of the persons involved.
Keep the machine in perfect working order and perform the routine maintenance recommended by the manufacturer. Good maintenance can help to ensure the best possible performance, a long useful life and constant compliance with the safety requirements.

Before maintenance and adjustments, activate all the applicable safety devices and provide the personnel and any other people in the vicinity with all necessary information. In particular, cordon off the area and prevent access to all the devices that could, if activated, inadvertently cause danger and pose risks to health and safety.

Maintenance and adjustments must be carried out by authorised persons who must implement all the necessary safety measures according to the procedures set down by the manufacturer.

All maintenance operations that require specific technical expertise or skills must only be carried out by qualified personnel with recognised experience in the field.

In the case of maintenance in areas that are awkward or dangerous to access, implement appropriate measures to ensure the safety of oneself and of other people, in compliance with the laws in force on safety at work.

Replace excessively worn parts. All the above can help to ensure the good working order of the machine and the required level of safety.

This appliance must not be used by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, unless they are supervised or given instructions.
Children must be supervised to make sure they do not play with the appliance.

WARNING:
During regular maintenance activities or in the event of a fault only use original components.

3.1.2 Precautions against residual risks

Prevention of residual mechanical risks

- install the machine according to the instructions of this manual;
- regularly carry out all the maintenance operations foreseen in this manual;
- wear protective equipment (gloves, eye protection, hard hat, etc.) suited to the work in hand; do not wear clothes or accessories that can get caught or sucked in by flows of air, tie back long hair before entering the unit
- before opening the machine panelling make sure that it is firmly hinged or screwed to the machine;
- the fins on heat exchangers and the edges of metal components and panels can cause cuts;
- do not remove the guards from mobile components while the unit is operating;
- make sure that mobile component guards are fitted correctly before restarting the unit;
- fans, motors and belt drives might be running: before accessing these, always wait for them to stop and take appropriate measures to prevent them from starting up
- the surfaces of the machine and pipes can get very hot or cold and cause the risk of scalding;
- do not use your hands to check possible coolant leaks.

Prevention of residual electrical risks

- disable the unit from the mains using the main switch before opening the electrical panel;
- check that the unit has been grounded correctly before starting it;
- before carrying out maintenance on the fans, wait at least 5 minutes after switching off the unit;
- do not use cables with inadequate sections nor extension cable connections, even for very short periods or emergencies.

Prevention of environmental risks

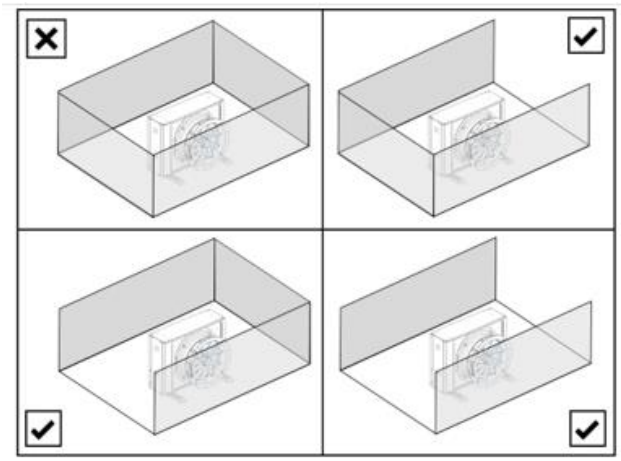
- The machine contains substances and components that are dangerous for the environment, such as refrigerant gases and lubricant.
- The units may only be serviced and disposed of by qualified technicians.
- Refrigerant gas:
  The cooling circuit contains fluorinated greenhouse gases covered by the Kyoto Protocol.
  The fluorinated greenhouse gases contained in the cooling circuit must not be disposed of in the atmosphere.
  Refrigerant gases must be recovered in accordance with current laws.

  The units may contain fluorinated greenhouse gases <HFC R410A [GWP100 2088]> or <HFC R32 [GWP100 675]>

- Lubricant oil:
  The cooling compressors and the cooling circuit contain lubricant oil.
  The oil must be recovered in accordance with current laws.
  Do not disperse the oil in the environment.

Prevention of other residual risks

- When using R32 refrigerant, it will be necessary to take into account its LFL (Low Flammable Level), equal to 0.307 kg/m3. To reduce the risk of flame, avoid areas with a gas concentration greater than 0.077 kg/m3 (25% LFL).
- Like other refrigerants, R32 is heavier than air and therefore tends to accumulate at the base (near the floor). If R32 accumulates around the base, a flammable concentration can be reached. To avoid ignition, a safe working environment must be maintained by ensuring proper ventilation. If a refrigerant leak is found in a room or area with insufficient ventilation, avoid using flames until the working environment can be improved by ensuring proper ventilation.
- Do not install in a space where all four sides are closed.



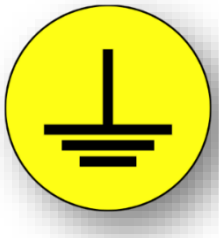
- the machine contains pressurized refrigerant gas. The pressurised equipment must not be touched except during maintenance, which must be entrusted to qualified and authorised personnel;
- make the connections between the system and the machine following the instructions given in this manual;
- in order to avoid environmental hazards, make sure that any leaking fluid is collected in suitable devices in accordance with local regulations;
- if a part needs to be dismantled, make sure it is correctly re-assembled before starting the unit;
- when the rules in force require the installation of fire-fighting systems near the machine, check that these are suitable for extinguishing fires on electrical equipment and on the lubricating oil of the compressor and the coolant, as specified on the safety data sheets of these fluids (for example, a CO_2 extinguisher);
- if the machine is equipped with overpressure release devices (safety valves), when these devices are activated, the refrigerant gas is released at high temperature/speed. Prevent this from causing damage to people or property: channel the release appropriately, according to the provisions of the EN 378-3 standard and the current local regulations in force, making sure to discharge to open and safe places any fluids belonging to a safety group other than A1.
- keep all the safety devices in good working order and check them periodically according to the regulations in force;
- keep all lubricants in suitably marked containers
- do not store inflammable liquids near the unit
- only carry out brazing or welding activities on clean and empty pipes, without lubricant oil residues. Do not bring flames or other sources of heat near pipes containing refrigerating liquid;
- do not use naked flames near the machine;
- the machinery must be installed in structures protected against atmospheric discharge according to the applicable laws and technical standards
- do not bend or hit pipes containing pressurised fluids

- it is not permitted to walk or rest other objects on the machines
- the user is responsible for overall evaluation of the risk of fire in the place of installation (for example, calculation of the fire load)
- during transport, always secure the unit to the bed of the vehicle to prevent it from moving about and overturning
- the machine must be transported according to the regulations in force taking into account the characteristics of the fluids in the machine and the description of these on the safety data sheet
- inappropriate transport can cause damage to the machine and even leaking of the cooling fluid. Before the first start up, check that the cooling circuit is pressurised.
- the accidental release of refrigerant in an enclosed area can cause lack of oxygen, and therefore a risk of asphyxiation. Install the machine in a suitably ventilated area, in accordance with the EN 378-3 standard and local regulations, and install refrigerant detectors when required;
- unless arranged otherwise with the Manufacturer, the machine be installed in environments where there is no risk of explosion (SAFE AREA).

3.1.3 List of machine internal symbols

Internal moving components

Equipment under voltage



Earth connection

Fire risk
(Only present with R32)

3.1.4 Procedure for requesting support

For support, please contact one of the authorised centres (Italy) or our branches/distributors (outside Italy). When requesting technical support concerning the machine, cite the data on the identification plate, and the serial number in particular, and describe the conditions of access and the area around the machine.

In your request, indicate the approximate hours of use and the fault detected. In case of alarm, indicate the alarm message number.

3.2 Machine identification

3.2.1 Designation

The alphanumerical code of the model of the machine, which is given on the identification plate, represents precise technical specifications which are indicated in the figure.

Model:
MEGR-MC-SL-A 015

MEGR R410A remote capacitors

MC **Coil type**
MC = Microchannel exchanger
TF = Cu/Al exchanger

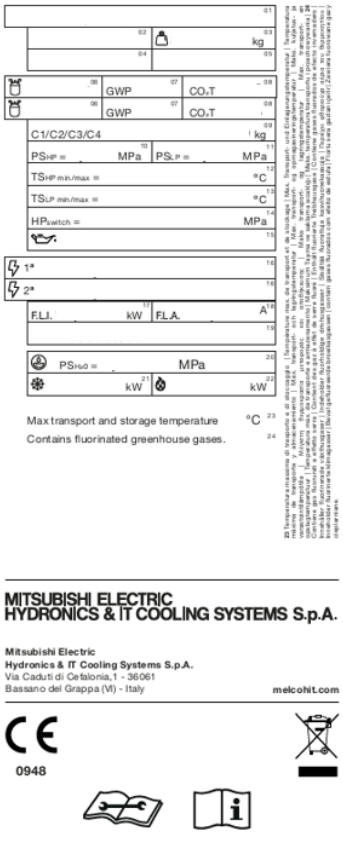
B **Acoustic preparation**
[ ] = Standard
SL = Low Noise

A **Fan electric motor**
A = with AC electric motors
E = with EC electric motors

015 **Model code** corresponding to the rated power (kW)

3.2.2 Identification plate

The type of machine is shown on the label on the machine, normally found in the electrical panel. The label provides the reference data and all the essential information required to ensure safe operation.



3.3 Storage temperature

During transport and if the machine is not installed at the reception, do not remove the packaging and place the machine in an enclosed, dry and protected from sunlight site at temperatures ranging between -40°C and 60°C in absence of superficial condensation.

3.4 Operating limits

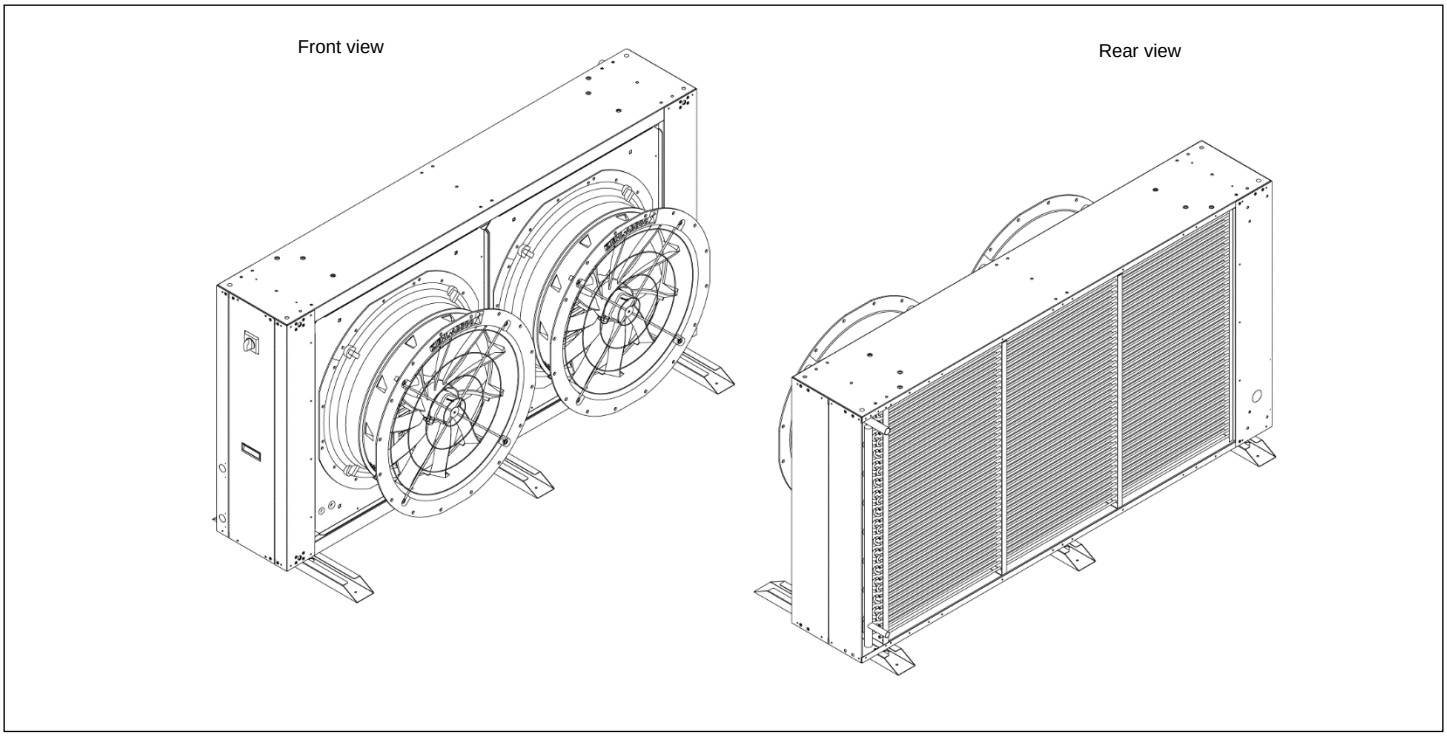
Please refer to the Data Book for the operating limits of the machines.

3.5 Description of the main components

Air-cooled condensers for IT Cooling equipped with axial fans with horizontal or vertical air flow. Air flow from coil to fan.
The design solution allows a high degree of application flexibility. There are 4 series with 12 models each.
Between the internal unit and the condenser, it is necessary to make the cooling and electrical connection of the condensation control proportional signal and of the alarms.
The machines in this series are designed and built for use in technological air conditioning systems.
The machines are not suitable for ducting the intake and discharge of air.
On request, it is possible to have:

- The support feet kit, to transform the machine into a machine with vertical air flow;
- The shut-off taps kit for the cooling line;
- Protective E-coating treatment for the microchannel coil;
- The Finguard protective treatment for the tube and fin coil;
- The earthquake anchoring kit (only on machine with microchannel coil and single row of fans).

In order to ensure maximum performance and guarantee the safety of people, the product and the environment, before installation it will be necessary to complete a full design of the system within which the machine will be installed, assessing all the predicted and foreseeable critical points during its life, from installation to dismantling.
The machines essentially consist of a heat exchange section and one or more fans.
They work by condensing the coolant in the cooling circuit.
The air from the external environment is made to flow through the coil by the fans to allow the condensation of the cooling fluid.
The heat extracted from the coil is released into the ambient air.
The remote condenser is connected to the main machine by cooling pipes.
For further machine characteristics and technical data, please refer to the Data Book.



3.5.1 Electrical panel

The power supply is independent of the internal unit.
The electrical panel is installed on the machine and is fitted with a line disconnector.
In accordance with the standard EN 60204-1, the handle of the circuit breaker must be easy to access and at a height of between 0.6 and 1.9 metres above the floor. The position of the machine in the place of installation must be considered, because if the unit is placed on a raised platform the height of the circuit breaker might no longer be in compliance with the standard. In which case the installer must arrange for a walkway or a similar solution that can allow operators to access the safety device with ease.

3.5.2 Cooling circuit

The cooling circuit includes a heat exchange coil. This can be an aluminium microchannel type or a Cu/Al tube and fin type.
The condensers are supplied with a charge for tightness testing and they must be filled with the coolant charge.

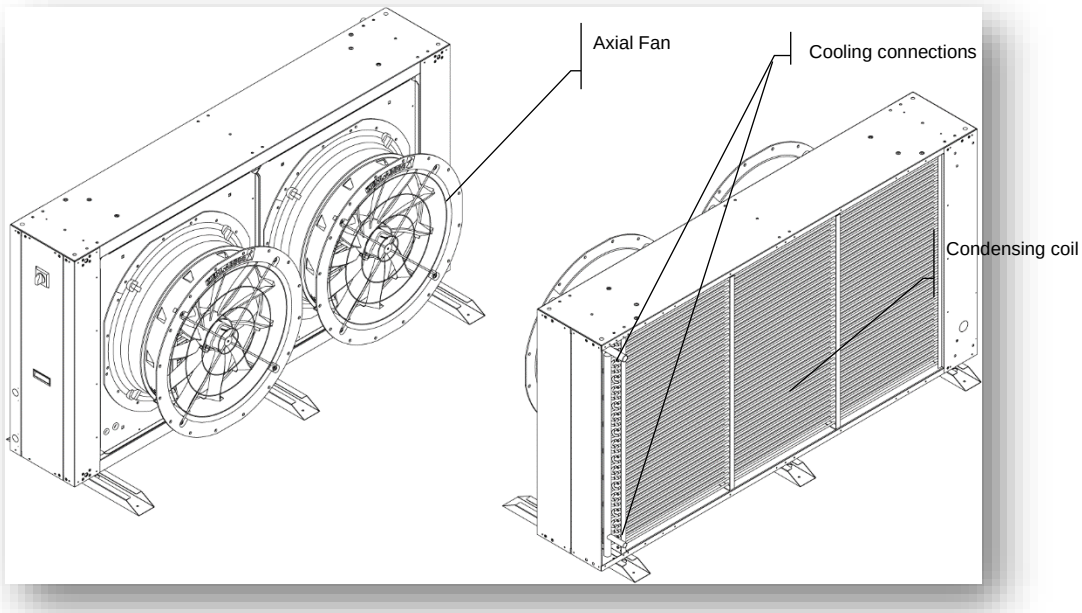
INFORMATION:
The machines are supplied with a sealing charge (nitrogen) and must be filled with the correct refrigerant charge (see the “refrigerant charge” chapter).

3.5.3 Ventilating section

The unit is equipped with axial fans and protective grilles on the air supply. Units can have 1, 2, 3 fans, or 4, 6 fans.
Both AC and EC fans are available.

3.5.4 Structure

The all-aluminium structure is particularly suitable for outdoor installation.
The machines are fully assembled in the factory, supplied with control equipment in order to reduce installation time and costs.

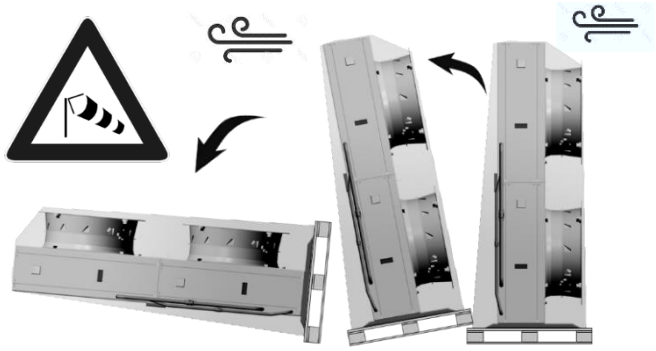


4 TRANSPORT, STORAGE AND INSTALLATION

4.1 Transport and moving

4.1.1 Storage

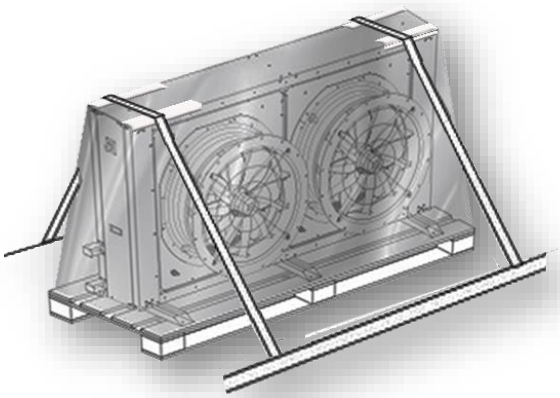
Place in a protected environment, where there is no wind or condensation. Secure the machine in place so that there is no risk of overturning.



4.1.2 Transport

For road transport it is advisable to use a low loader truck with tarpaulin or in any case to use a tarpaulin to protect the units against bad weather. Use straps with a ratchet system to secure the unit for the purpose of transport.

INFORMATION:
To avoid damage to the panels, it is recommended to secure the machine as shown in the figure.
The belts must be tensioned with care.
Make sure that the belts don't press against the mouthpiece of the fans.
For more information, contact the Shipping Office of the Manufacturer.



4.1.3 Discharge

Lift and move the machine as indicated on the packaging and/or directly on the machine.
It is advisable NOT TO REMOVE the shrink wrap protection during the unloading, handling and positioning operations.

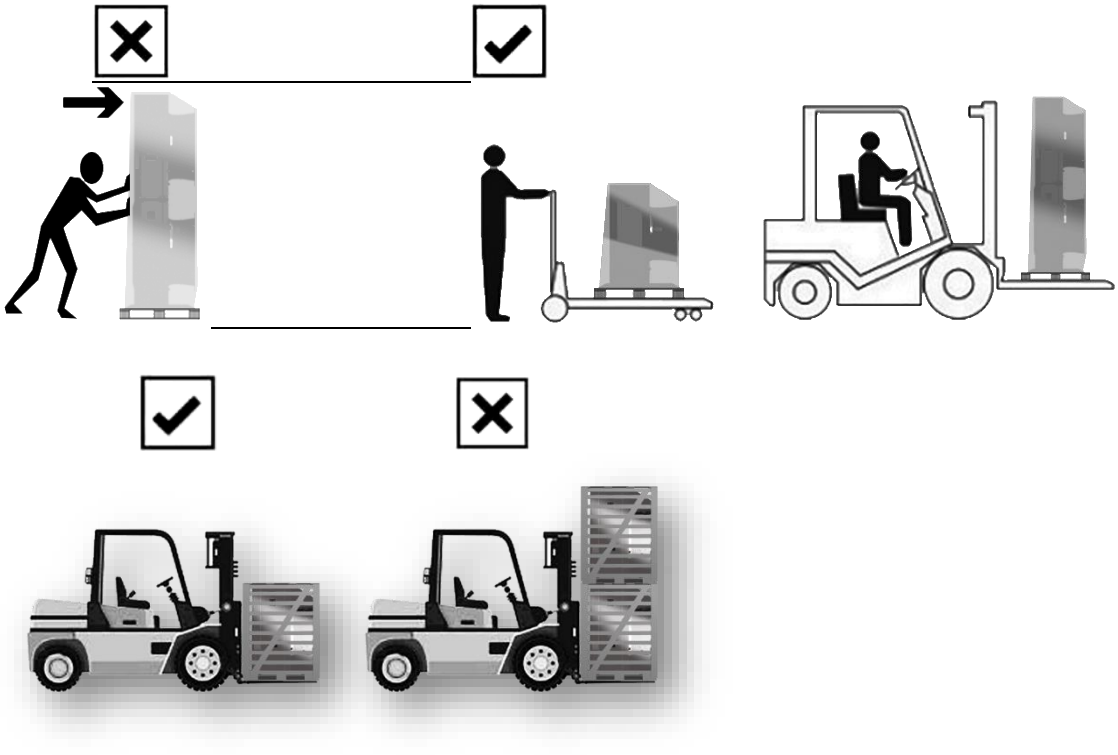
OBLIGATION:
All the unloading, handling and positioning operations must be carried out using appropriate means and by experience personnel, trained and authorised for such activities.
Keep the machine on the pallet for unloading and handling operations.

4.1.4 Receipt and inspection

Upon receipt, verify the integrity of the machine and check it against the order.
- Check the number of packages against the transport document. If incorrect, notify the carrier and the Manufacturer.
- Perform a visual inspection of the packaging.

INFORMATION:
If any of the packages are damaged or missing, contact the Sales Office of the manufacturer and the freight forwarder, to agree the next plan of action.
For more information, contact the Shipping Office of the Manufacturer.
If the machine is not installed immediately after receipt, it should be stored in a protected environment as indicated in the “storage” and “storage temperature” sections.

4.1.5 Handling

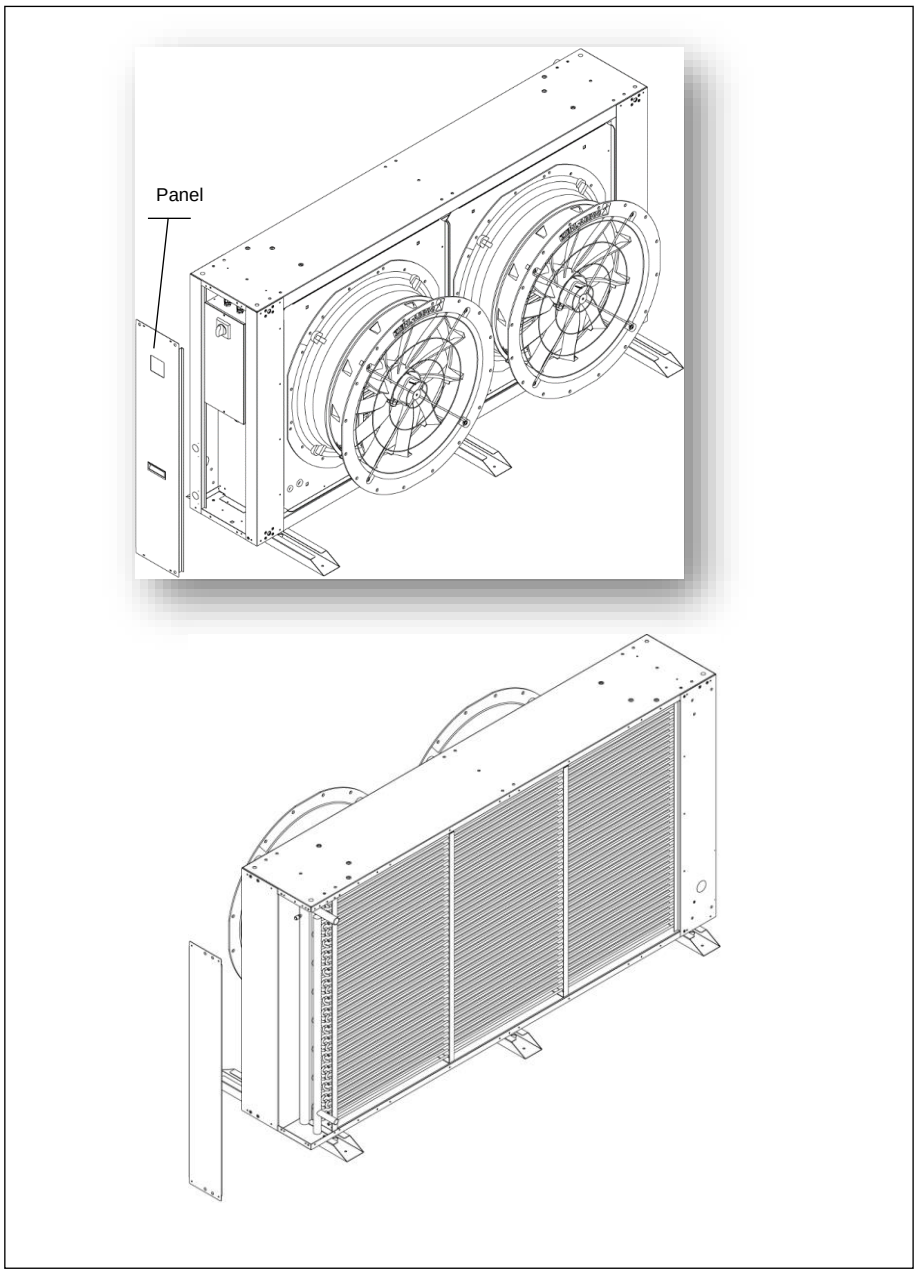


4.2 Disassembly of the machine panels

DANGER:
The machine panelling is made of heavy aluminium sheet.
All the assembly and disassembly operations must be carried out using suitable means and by experienced individuals, trained and authorised for these types of operations.

Machine panels

The side panels can be removed. The panels are screwed onto the machine.



4.3 Installation

INFORMATION:
For the installation / commissioning / positioning of units containing R32, depending on the amount of refrigerant, check the regulatory requirements that must be met for the installation site.

4.3.1 Installation of the standard machine

OBLIGATION:
All the phases of installation must be covered in the general project.

Before starting the installation of the machine, in addition to defining the technical requirements, the person authorised to perform the work must, if necessary, implement a "safety plan" to safeguard the safety of the people directly involved, and strictly implement the safety rules and, in particular, the laws that apply to mobile construction sites.

Before installing the machine, be sure that:

- the area is perfectly flat and can ensure long-term stability;
- the floor of the building on which the machine is to be installed is of adequate capacity;
- the machine is easily accessible to all people who must interact with it during its expected useful life.
- it must be possible to perform all maintenance and replacement operations (routine and extraordinary) easily and without risks to people and in compliance with the laws in force concerning safety at work.
- the spaces are adequate to ensure appropriate air flow for correct machine operation and ventilation.
- the minimum space requirements for operation and inspection indicated in this manual are ensured.
- air intake and delivery are never hindered or obstructed, even partially.
- if people and vehicles are expected to transit in the vicinity, suitable fencing must be erected, in compliance with existing regulations and ensuring at least the minimum required clearance around the machine for carrying out any intervention that may be required on the same.

The machine must be installed indoors, in a non-aggressive atmosphere.

Avoid suspended wall or ceiling installations.

OBLIGATION:
The unit must be installed according to the requirements of standard EN 378-3 and the local regulations in force, in particular taking into account the category of occupation of the premises and the safety class defined by EN 378-1.

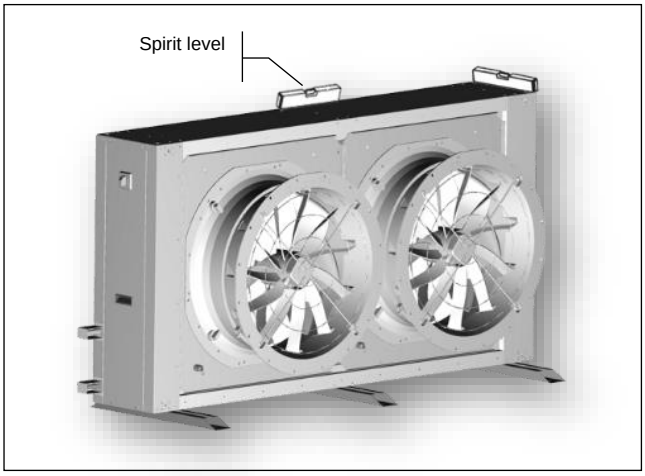
Coolant	R410A	R32
Safety class	A1	A2L

INFORMATION:
R32 gas is classified as slightly flammable (A2L). The installer/maintenance technician must ensure, in accordance with the regulations in force, proper ventilation of the site, in order to prevent the development of dangerous conditions in the event of a refrigerant leak.

OBLIGATION:
The machine must be placed in an area only accessible by OPERATORS, MAINTENANCE PEOPLE and TECHNICIANS; if this is not possible, it must be surrounded by a fence that is at least two metres from the external surface of the machine (if possible).
The staff of the INSTALLER or any other visitors must always be accompanied by an OPERATOR. Under no circumstances, must unauthorised personnel be left alone in contact with the machine.
The MAINTENANCE MAN must limit him/herself to the controls of the machine only; the only panel that can be opened by him/her is the one that accesses the control module - no other must be touched.
The INSTALLER must limit him/herself to connecting the plant to the unit
Access the machine using the relative personal protective equipment and only after having read and understood the documents and instructions, which must always be kept close at hand.

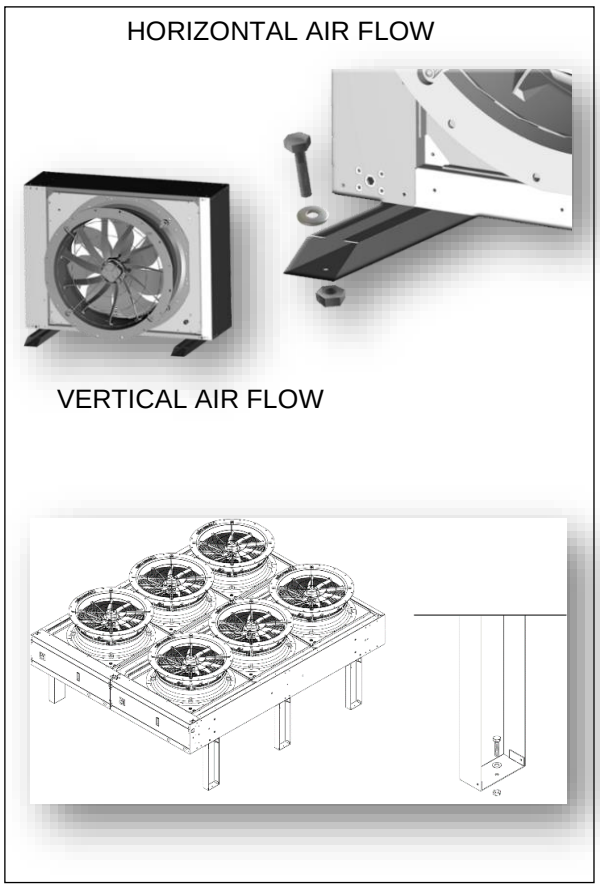
4.3.2 Machine positioning

The machine is placed directly on the ground. Once the machine has been positioned, it must be checked that it is level in the four positions indicated in the figure.



4.3.3 Fixing the machines to the ground

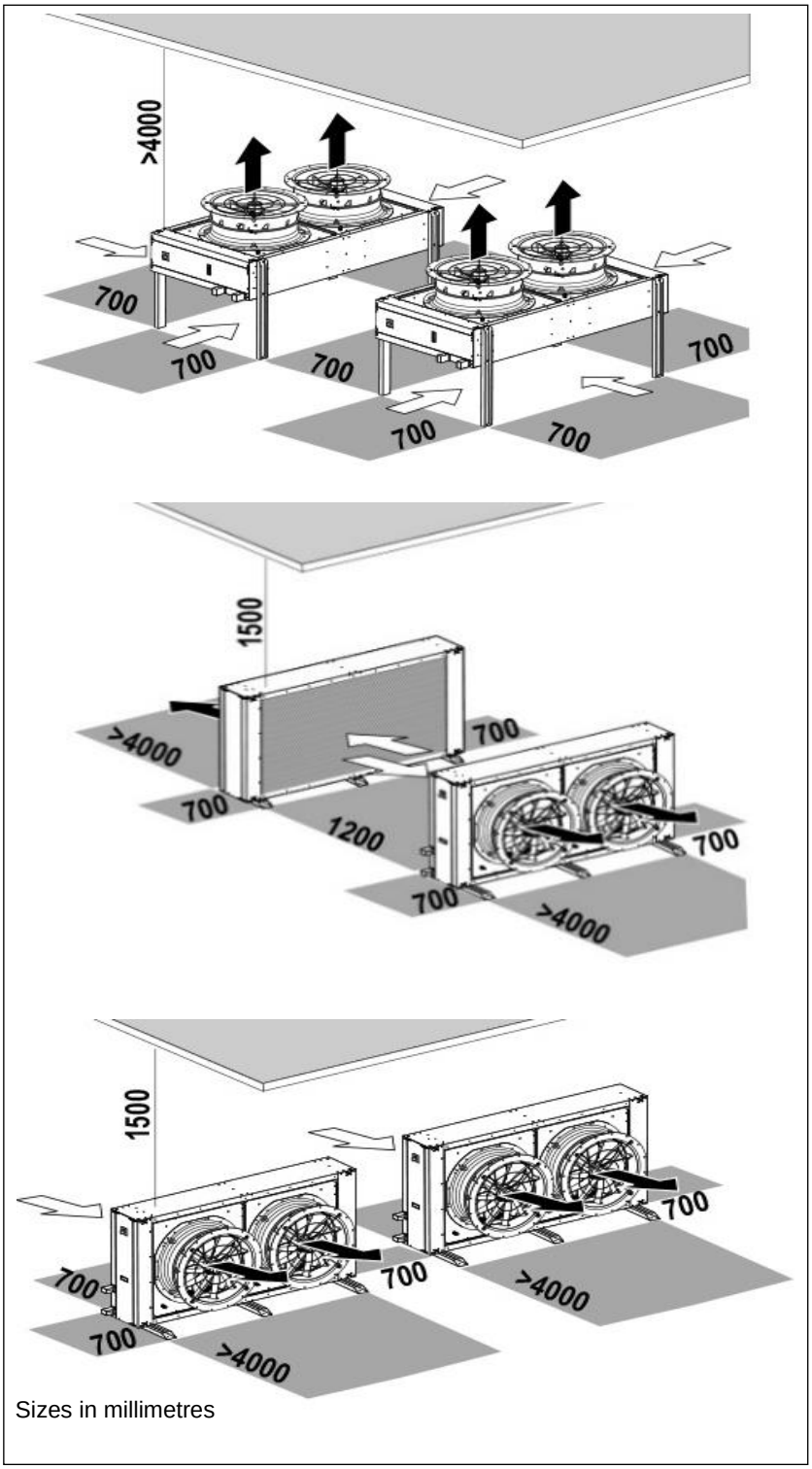
The machines must be fixed to the ground or to the support structure. The support feet are provided with holes for fixing as shown in the figure. Fixing systems are not supplied.



4.3.4 Installation clearances

OBLIGATION:
For a correct installation of the machine, it is necessary to ensure a free area around the same, as shown in the figure. This allows correct air circulation and ease of access to the components of the machine for the purpose of normal inspection and maintenance operations.

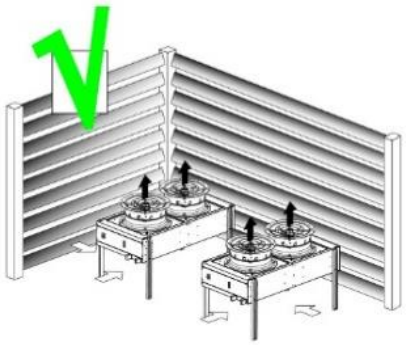
If several machines are installed side-by-side, provide a space between the machines as shown in the figure:



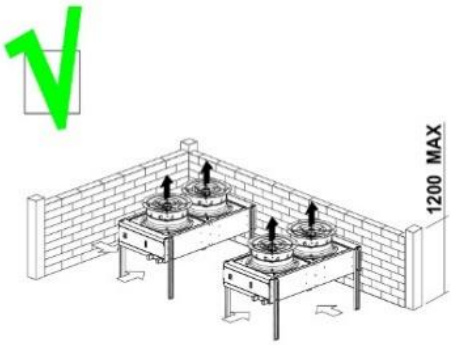
Sizes in millimetres

4.3.5 Installation and position of any obstacles

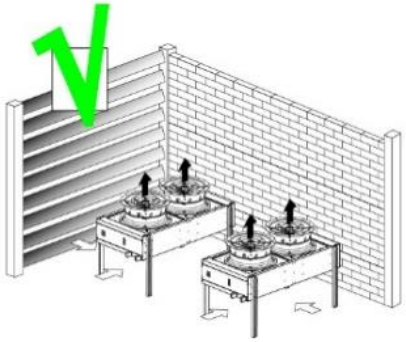
OBLIGATION:
The air expelled from the machine must be easily dispersed into the environment. Avoid the presence of obstacles that may cause the expelled air to recirculate.
Structures around the installation perimeter must ensure the free movement of air such as: finned barriers, finned barriers with sound-proofed passages. There are no height limits for finned barriers.
Masonry barriers must not exceed a height of 1200 mm.



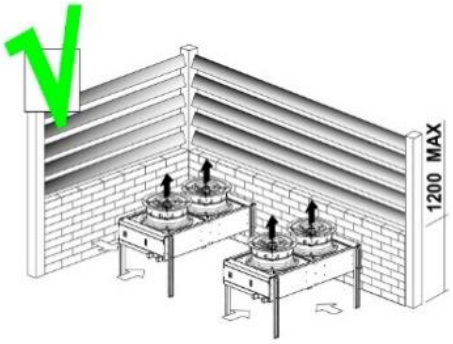
Perimeter structure with finned barriers.
No height limit.



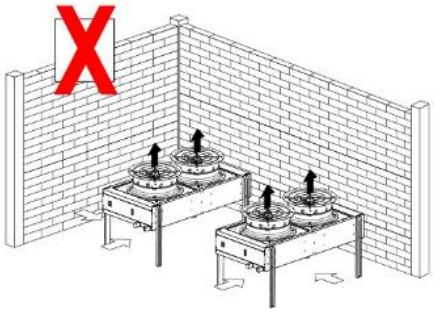
Masonry perimeter structure with a height limit of 1200 mm.



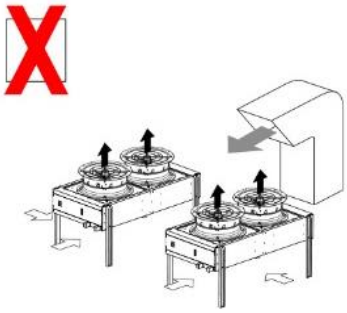
A very high masonry structure is allowed, but at least one very wide finned barrier must be present



Masonry perimeter structure with a height limit of 1200 mm.
The finned barrier can protrude over the masonry.



IT IS FORBIDDEN TO SURROUND THE INSTALLATION WITH A MASONRY BARRIER WITH A HEIGHT OF MORE THAN 1200 MM.



AVOID INSTALLING THE MACHINE IN THE DISCHARGE AIR FLOW OF ANY EXTRACTORS.

4.3.6 Installation in places with heavy snowfall

Snow can accumulate around and above the machine and low outside temperatures can freeze the snow in blocks of ice that block the fan grille or the coil.
This condition may cause a malfunction or breakage of the machine.
Check and keep the machine clear of snow.

4.3.7 Installation in places with strong winds for AC fans

Installation in areas sheltered from the wind is necessary in order to prevent dominant winds and possible air recirculation from interfering with fan operation and condensation control. For this reason, where strong winds are possible and for installations with horizontal air flow, it is suggested to place the condensers in a partial barrier to limit direct winds on the fans. These recommendations are not necessary with EC fans.

If it is not possible to install the condenser in an area protected from the wind, it is recommended to install it with vertical air flow.

Machines with horizontal air flow
Strong winds (above 50 km/h) generate very high forces on the machine structure. It is therefore necessary to counteract these forces with anchorages suitable for the support structures (refer to the technical manual).

4.4 Connection of the cooling circuit to the internal machine

OBLIGATION:
The cooling circuits must be completed by qualified personnel.
All the works, the choice of the components and the materials used must comply with the "Good Practices", according to the regulations in force in the different countries, taking into account the intended operating conditions and uses of the equipment.
Errors in the design and/or connection of the cooling circuits can cause irreparable damage to the compressor or malfunctioning of the machine.
The machine Is delivered with a charge for tightness testing.
Discharge the cooling circuit of the machine through the Schrader valve located on the coil manifold.

The cooling circuit connection must be completed as defined in the design phase.
Refer to the dimensional drawing of the machine for the spacing of the connections.

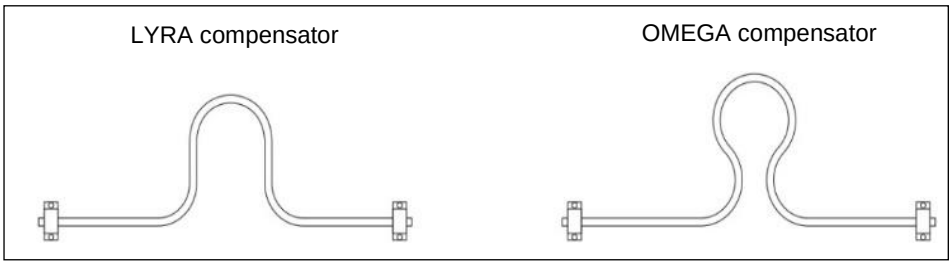
4.4.1 Type of copper to be used for the cooling line

SOFT COPPER: It's soft and malleable, and can be shaped or bent to make bends, siphons, etc. Use a pipe bending tool for the bending activities.
Avoid repeated bending or shaping, as the material will gradually harden at the point of the bend and may break.

HARD COPPER: It's rather stiff, and not suitable for being bent. Only to be used for straight sections. To make bends, siphons, etc. use forged fittings.

4.4.2 General information for the completion of the cooling line

The cooling line must have a rational and practical path, in order to:
- limit pressure drops;
- reduce the coolant content;
- facilitate the return of lubricant oil to the compressor;
- facilitate the flow of liquid coolant to the expansion valve;
- prevent the return of liquid coolant with the compressor stopped;
- vertical sections must be reduced to the minimum;
- always make large bends, with a minimum radius at least equal to the diameter of the pipe;
- always use a roller tube cutter to cut the pipes. Do not use a hacksaw, as it causes internal burrs and shavings;
- fix the pipes both horizontally and vertically with copper or plastic collars every 2 m;
- do not use galvanized iron collars, since corrosion may occur at the point of contact with the copper pipe;
- for insulated pipes, it is advisable to use collars with insulating shells;
- keep a distance of at least 20 mm between piping;
- do not place electric cables nearby, as they may deteriorate;
- make “expansion joints” on the line, to balance the natural elongation / shrinkage of the pipes, as shown in the figure:



4.4.3 Speed of the coolant in the pipes

OBLIGATION:
The designer of the plant is responsible for the precise sizing of the pipes in accordance with the speed of the fluid in the pipes as shown below.

Coolant R410A	Circuit line	Minimum Speed (m/s)	Maximum Speed (m/s)
	Delivery	5	18
	Liquid	0.5	2.5

It is necessary to consider sufficiently high fluid speeds to allow an effective return of the lubricating oil to the compressor.
At the same time, sufficiently low fluid speeds must be evaluated to avoid pipe erosion and water hammer due to electric valve closures.

4.4.4 Thickness of the pipes

Pipe thicknesses must be respected otherwise the warranty will be forfeited.

Pipe external diameter (Ø mm)	Thickness (mm)
12	1.0
16	1.0
18	1.0
22	1.0
28	1.5
35	1.5

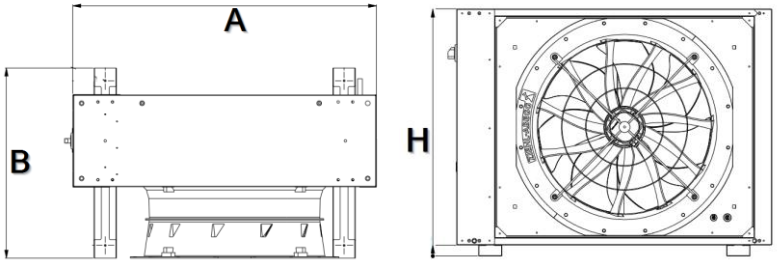
4.4.5 Pipe identification

The coolant inlet and outlet pipes can be identified by the labels applied directly on the machine:

ATTACCO GAS
HOT GAS
HEISSGASLEITUNG
RACCORDEMENT
ЛИНИЯ ЖИДКОСТИ

ATTACCO LIQUIDO
LIQUID CONNECTION
FLUSSIGKEITSLEITUNG
RACCORDEMENT
ЛИНИЯ ГОРЯЧЕГО

4.4.6 Diameters of the machine cooling connections



MICROCHANNEL EXCHANGER

STANDARD MODEL		**013**	**015**	**024**	**027**	**034**	**049**
A - Length	mm	840	840	1220	1220	1430	2110
B - Width	mm	718	718	718	718	718	718
H - Height	mm	900	900	900	900	1100	1100
COOLING CONNECTIONS							
Liquid – ODS	Ø mm	12	12	16	16	16	18
Gas - ODS	Ø mm	16	16	18	18	18	22

STANDARD MODEL		**055**	**067**	**082**	**110**	**134**	**164**
A - Length	mm	2110	2670	2670	2280	2835	2849
B - Width	mm	718	718	718	2200	2200	2200
H - Height	mm	1100	1100	1100	1168	1168	1168
COOLING CONNECTIONS							
Liquid – ODS	Ø mm	18	18	22	22(*)	22(*)	28(*)
Gas - ODS	Ø mm	22	22	28	28(*)	28(*)	35(*)

(*) Referring to the manifold.

TUBE AND FIN EXCHANGER

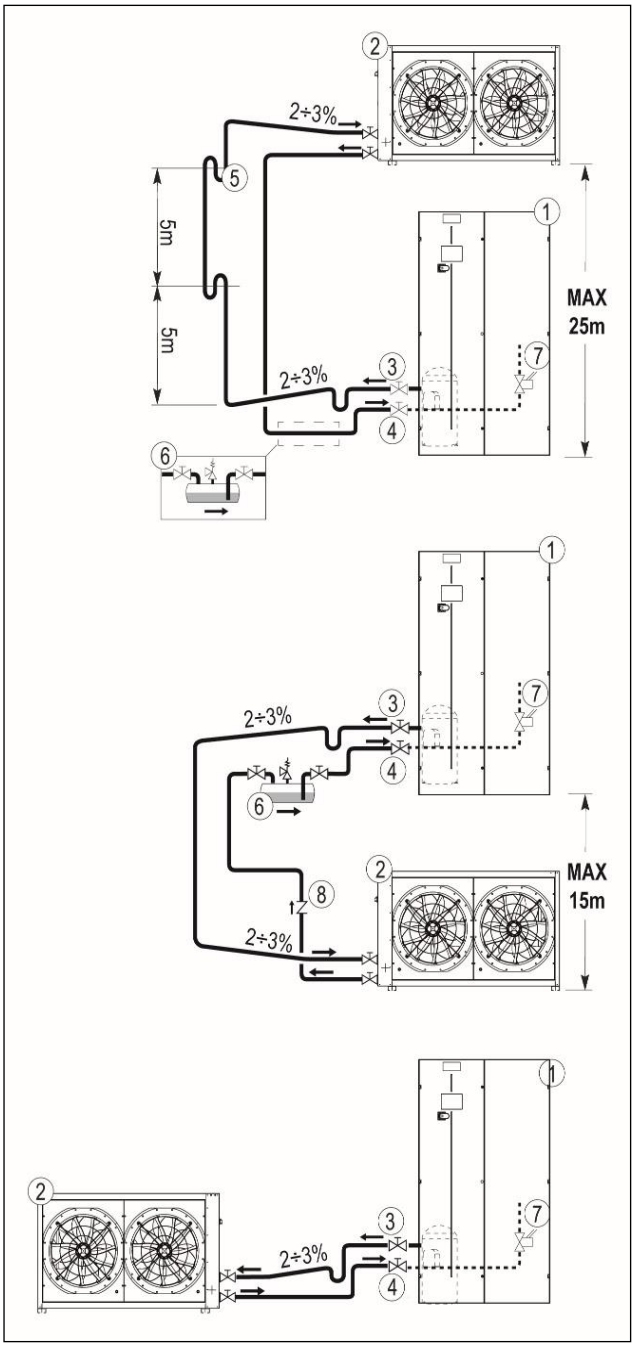
STANDARD MODEL		**014**	**019**	**028**	**036**	**045**	**057**
A - Length	mm	770	1150	1150	1360	2040	2040
B - Width	mm	718	718	718	718	718	718
H - Height	mm	900	900	900	1100	1100	1100
COOLING CONNECTIONS							
Liquid – ODS	Ø mm	12	16	16	18	22	22
Gas - ODS	Ø mm	16	18	18	22	28	28

STANDARD MODEL		**065**	**074**	**088**	**130**	**149**	**176**
A - Length	mm	2040	2600	2600	2067	2600	2600
B - Width	mm	718	718	718	2120	2120	2120
H - Height	mm	1100	1100	1100	1166	1166	1166
COOLING CONNECTIONS							
Liquid – ODS	Ø mm	22	22	22	28	28	28
Gas - ODS	Ø mm	28	28	28	35	35	35

4.4.7 Installation diagram

OBLIGATION:
The pipes must have the indicated slopes, to facilitate the return of the lubricating oil to the compressor.

Apply the diagram to each refrigerant circuit of the unit.
Height difference between machine and remote condenser: value expressed in equivalent length.



Legend:

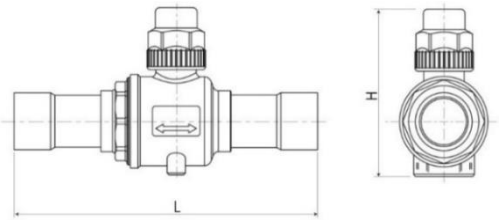
1. Conditioner.
2. Remote air-cooled condenser.
3. Gas delivery line.
4. Liquid return line.
5. Siphon. Provide a siphon for every 5 m of pipeline in the vertical sections.
6. Additional liquid receiver, external to the air conditioner (supplied by the installer).
   It is recommended for:
   - systems with cooling lines of an equivalent length of more than 25 metres.
   - systems with cooling lines of any length and operating with external temperatures below 0°C.
7. Liquid line solenoid valve. Machine accessory recommended for cooling systems with lines over 10 m.
8. Check valve (supplied by the installer). The valve must be installed on the liquid line near the condenser. The valve prevents liquid from returning to the condenser, particularly in the event of system downtime during the winter season.

WARNING:
It is necessary to integrate the refrigerant and lubricating oil charge for the connection pipes and for the remote air-cooled condenser.
For the quantities requiring reintegration, refer to the internal unit manual.

4.4.8 Connection of the cooling pipes to the machine

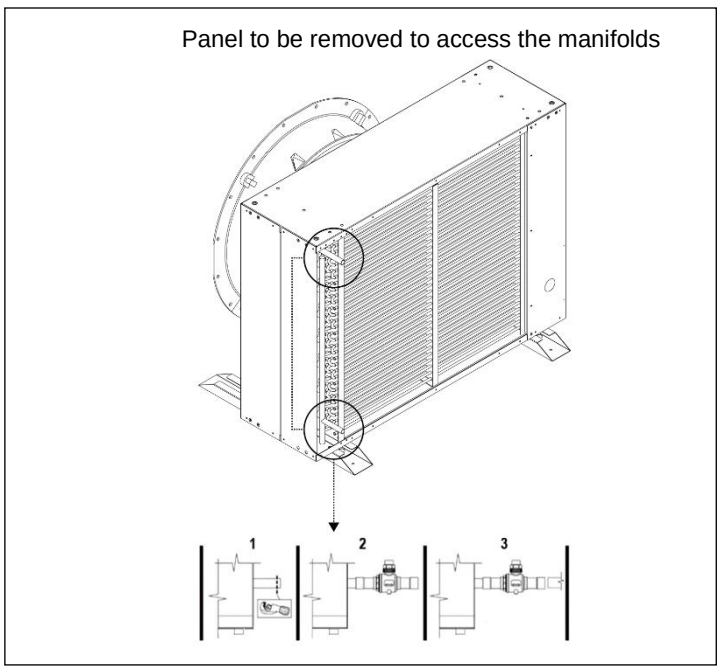
Ball valves for cooling line. The taps are supplied as an optional assembly kit.

ODS connections	PS	PED.	H	L
Ø [mm]	[bar]		[mm]	[mm]
12	50	Art. 4.3	48	121
16	50	Art. 4.3	55	139
18	50	Art. 4.3	55	139
22	50	Art. 4.3	70	175
28	50	Art. 4.3	79	204
35	50	II	100.5	213



4.4.8.1 Connection of the cooling pipes to the remote condenser

The ball valves must be installed on the remote condenser. Taps are not included in the supply, but can be purchased as an accessory.
The remote condenser is charged with inert gas (nitrogen) for tightness testing. Discharge the condenser via the appropriate valve.



4.4.8.2 Connection of the pipes and fittings of the cooling line

- The junction is for strong brazing with silver-based alloy (an alloy with medium-high silver content and low melting temperature is recommended).
- Use appropriate equipment.
- Before brazing, clean the pieces to remove oil, grease, oxides, scale and dirt.
- Use an appropriate solvent to remove oxides that form at high temperature during heating and brazing.

OBLIGATION:
The oxide that forms inside the pipe during the brazing process is dissolved by the HFC fluids and causes obstruction of the coolant filter. During the brazing process it is advisable to introduce nitrogen into the piping. If this is not possible, after completing the brazing operation wash the piping using solvents.

4.4.9 Coolant charge

OBLIGATION:
Coolant charging operations must be carried out by qualified personnel in compliance with the local regulations in force.
Below are the details for ensuring that the "good practice" rules are followed during the refrigerant charge.

When charging with refrigerant, follow the "good practice" rules below:

- Empty the machine of the inert gas charge;
- Connect the vacuum pump to the Schrader connections on the machine and apply a vacuum;
- Open the remote condenser taps and any other taps on the cooling line;
- Do not open the taps on the internal machine;
- Create a vacuum slowly in the connection line and in the condenser up to an absolute pressure of 0.3 mbar;
- Once the value of 0.3 mbar has been reached, stop the vacuum pump and wait 3 hours to check the tightness of the circuit. A slight rise in pressure is normal and must not exceed 0.5 - 1 mbar;
- If the vacuum is not reached, there are leaks in the circuit;
- In the case of very extensive cooling lines or lines heavily polluted by humidity, it is necessary to break the vacuum by loading the circuit with anhydrous nitrogen (without oxygen), then repeat the vacuum operation as described above;
- Disconnect the pump;
- Charge with refrigerant as indicated in the specific internal machine manual.

Values to be used for calculating the system coolant charge.

4.4.9.1 Refrigerant content of remote condensers

The remote condensers are supplied with a charge for tightness testing. The cooling gas must be charged.
The tables show the coolant charge to be integrated for the condenser only: the internal unit, the connection pipes and any accessories are excluded.

MICROCHANNEL EXCHANGER

STANDARD MODEL		013	015	024	027	034	049
Charging the coolant	Kg	0.50	0.50	0.85	0.85	1.30	2.07

STANDARD MODEL		055	067	082	110	134	164
Charging the coolant	Kg	2.07	2.56	2.56	4.14	5.12	5.12

TUBE AND FIN EXCHANGER

STANDARD MODEL		014	019	028	036	045	057
Charging the coolant	Kg	0.8	0.7	1.5	2.3	1.9	2.7

STANDARD MODEL		065	074	088	130	149	176
Charging the coolant	Kg	3.8	4.9	4.9	7.6	9.7	9.7

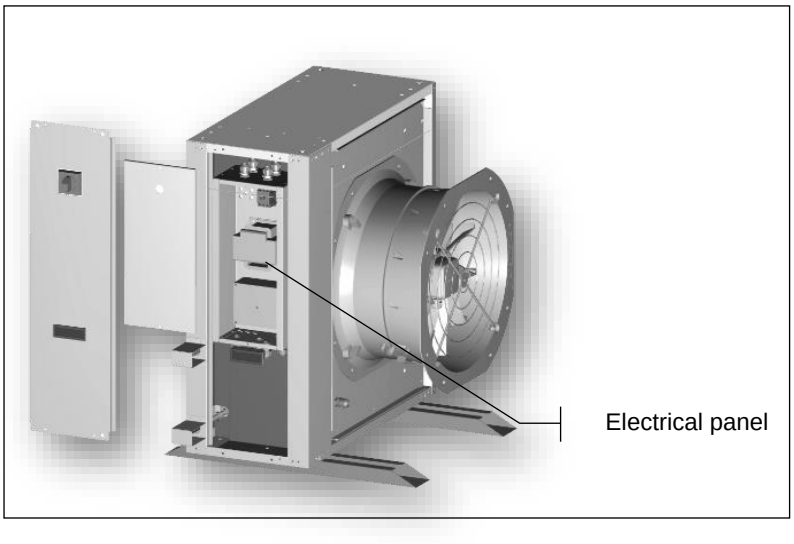
4.5 Electrical connections

The electrical connections of the machine must be defined during the system design

DANGER:
The electrical connections must only be designed and completed by personnel with precise technical competence or particular skills in the field of activity.
Before proceeding, personnel must disconnect all power supply sources, making sure that no one may inadvertently re-connect them.

The specifications of the mains power supply must comply with IEC 60204-1 and the local regulations in force and be sufficient for the absorption requirements of the machine indicated in the wiring diagram and on the data plate.

- The machine must be connected to a single-phase or three-phase power supply depending on the model (type TT). Should the installation of a circuit breaker be envisaged in the electrical system, it must be type A or B.
- For the electrical connection, open the panels covering the electrical panel.



OBLIGATION:
The power supply line must be equipped with a main switch to protect the machine from overload or short circuit, if the machine is not powered by the internal unit

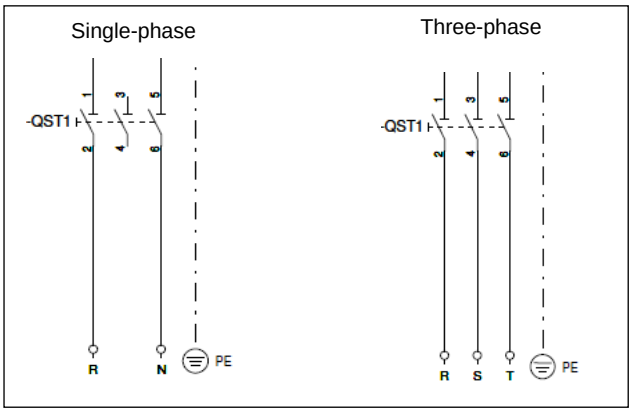
The power supply must never be disconnected, except during maintenance operations, to ensure the operation of the fans.

4.5.1 Electrical data

Refer to the wiring diagram, the data plate on the machine and the Data Book.

4.5.2 Electric power supply connection

The standard power supply of the unit is independent of the internal unit.
The power supply line must be equipped with all the protections and controls required by current regulations.
If the condensers are powered by the internal unit, the protections of the supply line are already present.
Use a conductor with protective sheath. The cable section depends on the maximum absorbed current of the machine (A) as shown in the dedicated wiring diagram.
For the entry of the power cables in the machine use the holes provided by the Manufacturer.
Do not touch hot or sharp surfaces.
Connect the power cable to the terminal board and to the ground terminal.



POWER SUPPLY

4.5.3 Electrical panel

The electric power panel is located inside the structure of the condenser; to access it, the side panel must be removed.
The electric power panel is suitable for outdoor installation and complies with EN60204-1 standards.
The electric power panel includes:

- Degree of protection IP44 - degree of protection of the electric power panel inserted in the machine structure and not referring only to the panel.
- General isolating switch with door safety lock.
- Terminal board for electrical connections:
  - power supply - the power supply is independent of the internal unit.
  - 0-10Vdc signal for fan rotation speed control - to be connected to the internal unit.
  - alarm signal of the fans and, if present, of the FMC electronic board - to be connected to the internal unit.

VERSION WITH AC ELECTRIC MOTORS - MEGR-A series
FMC electronic board for fan rotation speed control. In case of power failure and malfunction, the board sends a digital alarm signal to the internal unit (refer to the wiring diagrams).
The system for regulating the supply voltage of the fans is managed by the FMC electronic board.

VERSION WITH EC ELECTRIC MOTORS - MEGR-E series
Direct control of the fan rotation speed by 0-10 Vdc signal.

Models with 4/6 fans:
There are two electric power panels, each with the above equipment. The panels are already interconnected, but only one of them performs the main panel action. The power supply and the control and alarm signals must be connected in this panel.

4.5.4 Auxiliary electrical connections with the internal unit

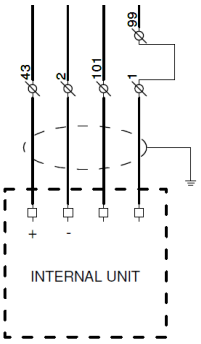
The auxiliary connections can be found in the terminal board contained in the electrical panel of the main machine. Connections to be completed by the installer:

- 0-10Vdc signal for condensation control;
- Fan thermal alarm;

For the connection of the auxiliaries use shielded cable 4 x 0.75 mm2 with a maximum length of 120 m.

Remove the panels to access the power supply box

Junction box for power supply input



SEGNALE

43 – 2 → segnale 0-10V

101 – 1 → relè allarme

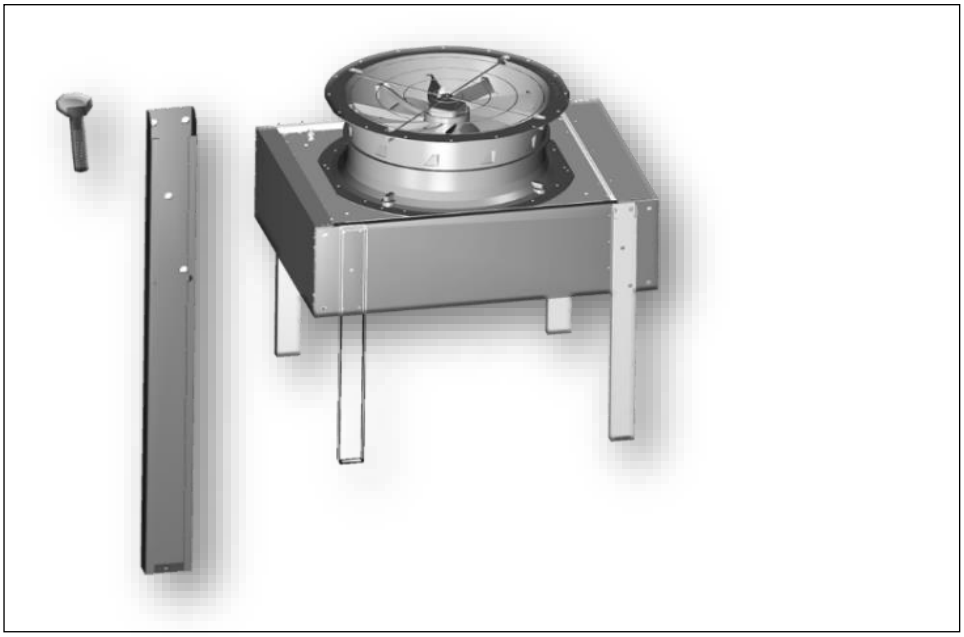
4.6 Optional installation

4.6.1 Vertical air flow

The accessory is only available for machines equipped with 1/2/3 fans.
The units can be supplied with support feet to obtain a vertical airflow.
The support feet are supplied in assembly kits together with the necessary hardware
The installation of the feet is the responsibility of the installer.
Always fix the unit to the floor as envisaged for the basic version.

The vertical airflow version is recommended for installations in windy areas.
The vertical airflow version is not suitable for installations in seismic areas.

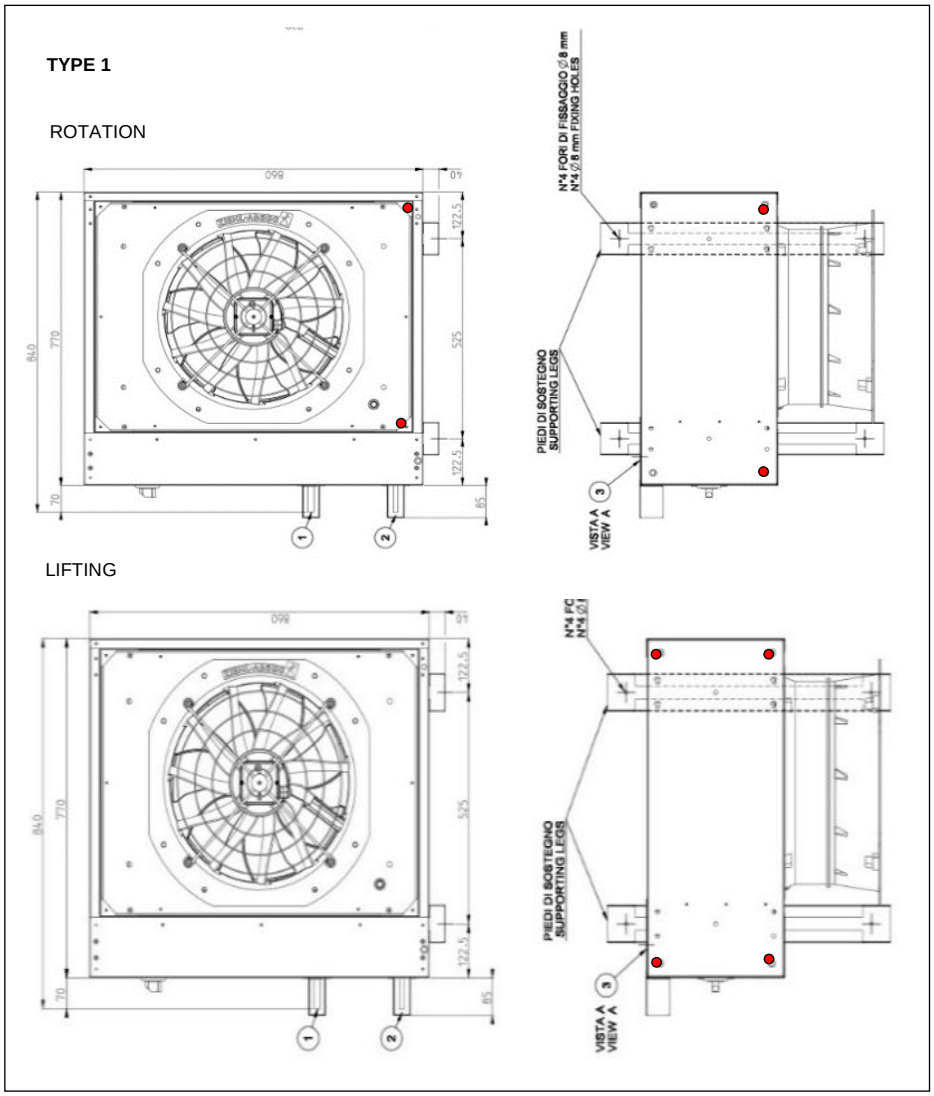
4.6.1.1 Support feet for vertical air flow



OBLIGATION:
• Carefully carry out all handling operations to avoid damaging the coil and fans.
• Large machines are equipped with eyebolts to facilitate lifting.
• The version with vertical air flow is subject to all the regulations and instructions contained in this manual. In particular, the protection of the condenser from snow.

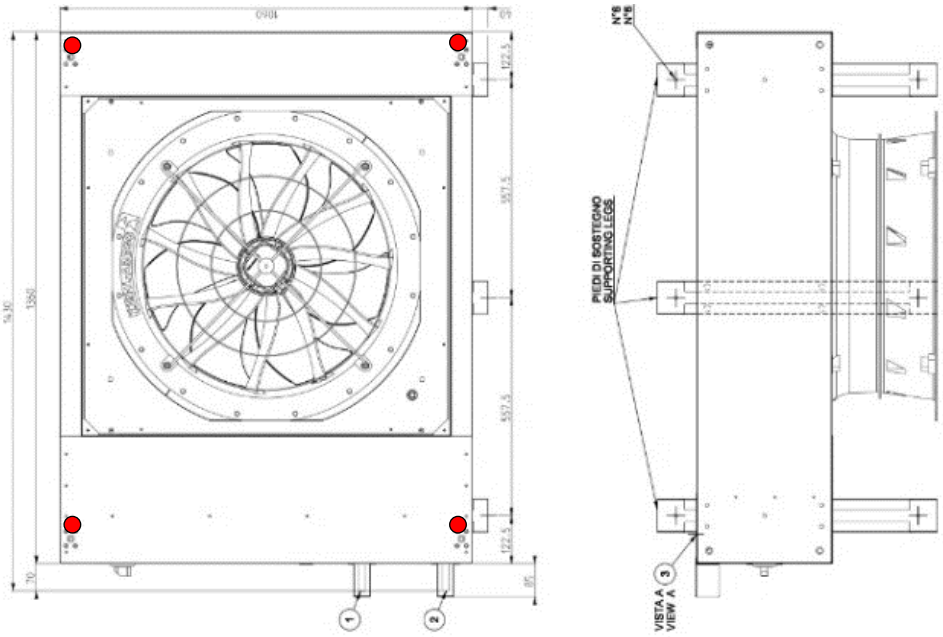
4.6.2 Lifting and rotation hooks for MEGR-MC

The types of supports for lifting and rotating the machine can be of 3 types, depending on the size and number of fans of the machine itself. The machines are supplied with lifting eyebolts.

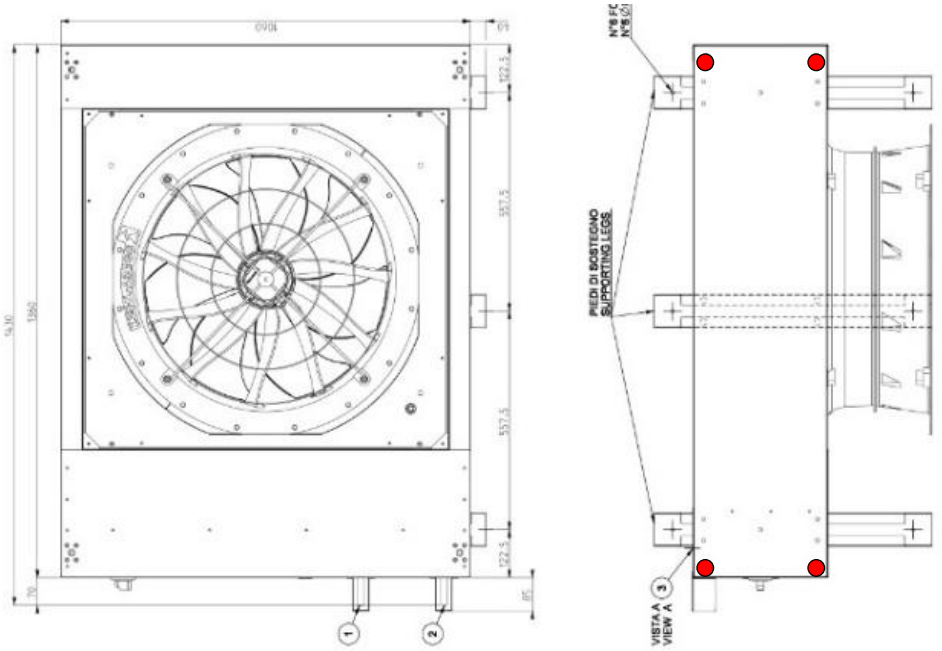


TYPE 2

ROTATION

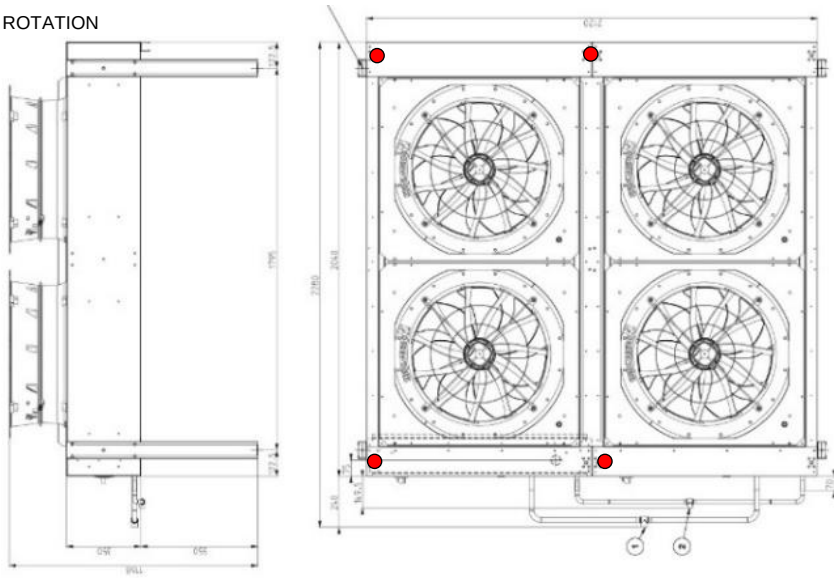


LIFTING

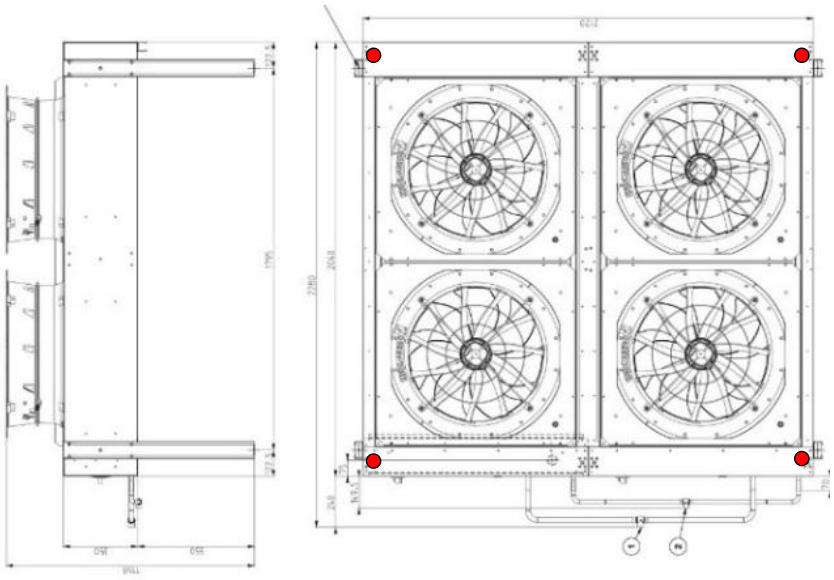


TYPE 3

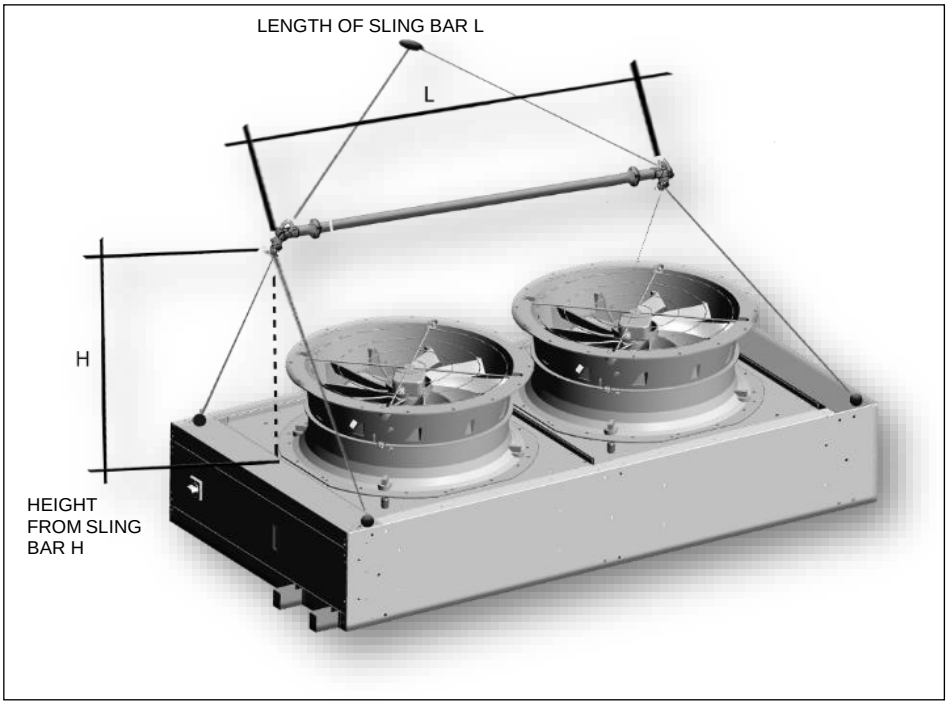
ROTATION



LIFTING



OBLIGATION:
All the unloading, handling and positioning operations must be carried out using appropriate means and by experience personnel, trained and authorised for such activities.
Keep the machine on the pallet for unloading and handling operations.



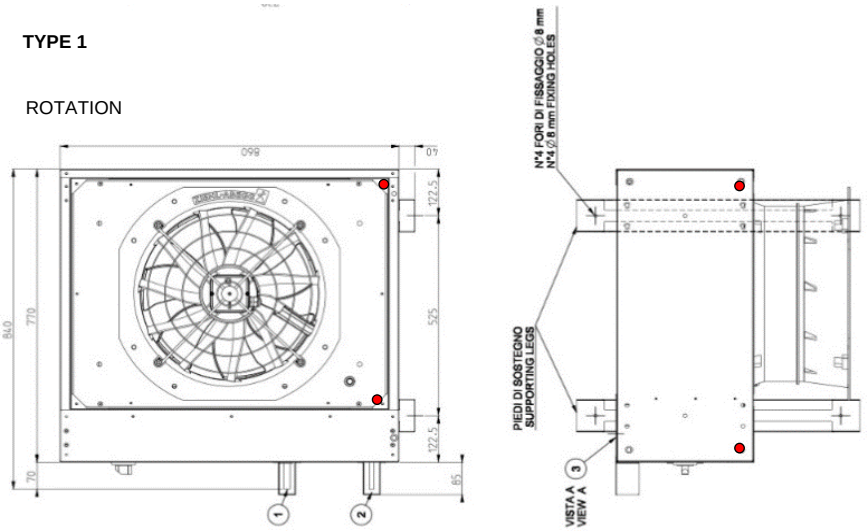
OBLIGATION:
The sling bar length 'L' must never be less than the length of the machine.
Ensure that the distance 'H' between the machine and the sling bar is greater than 1.1 metres.

4.6.3 Lifting and rotation hooks for MEGR-TF

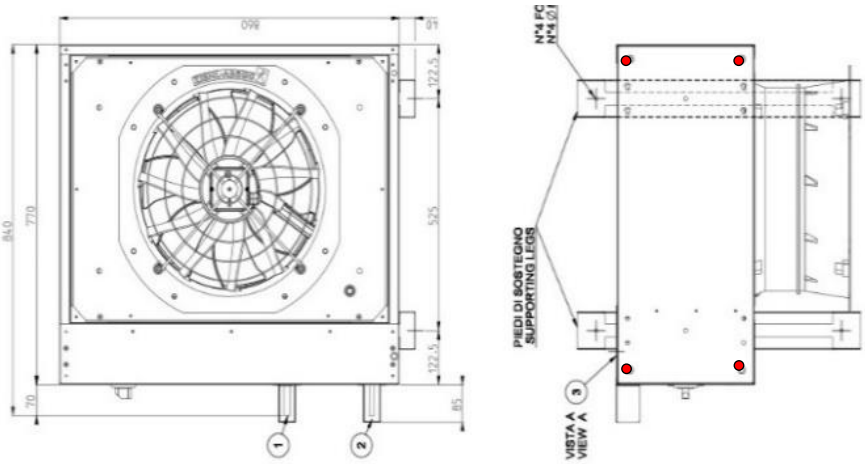
The types of supports for lifting and rotating the machine can be of 3 types, depending on the size and number of fans of the machine itself.

TYPE 1

ROTATION

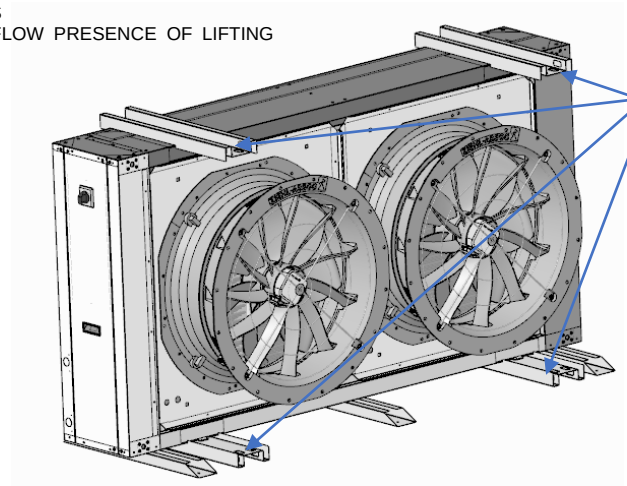


LIFTING



TYPE 2

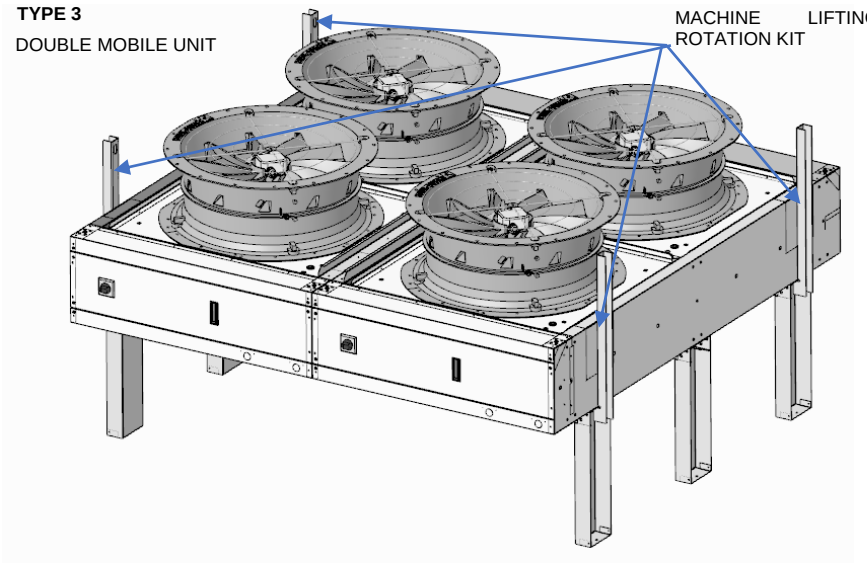
UNIT WITH 2/3 FANS
HORIZONTAL AIR FLOW PRESENCE OF LIFTING EYEBOLTS



LIFTING AND ROTATION KIT FOR VERTICAL AIRFLOW MACHINES

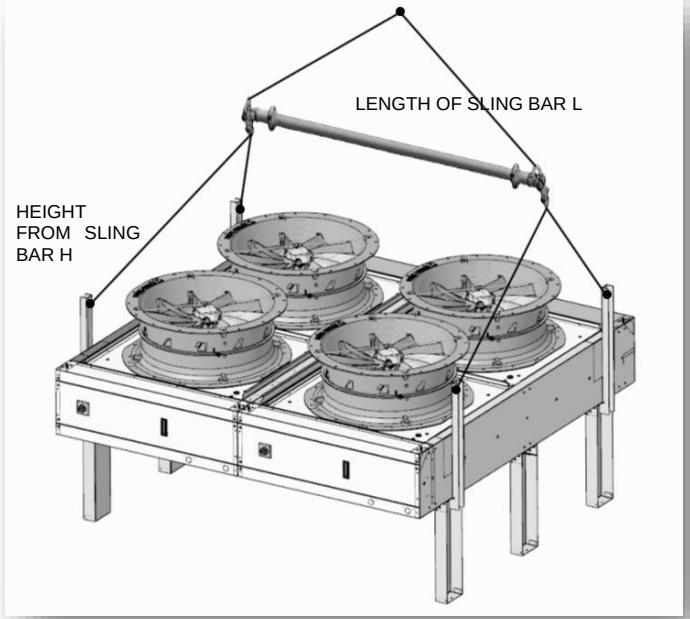
TYPE 3

DOUBLE MOBILE UNIT



LIFTING

OBLIGATION:
All the unloading, handling and positioning operations must be carried out using appropriate means and by experience personnel, trained and authorised for such activities.
Keep the machine on the pallet for unloading and handling operations.

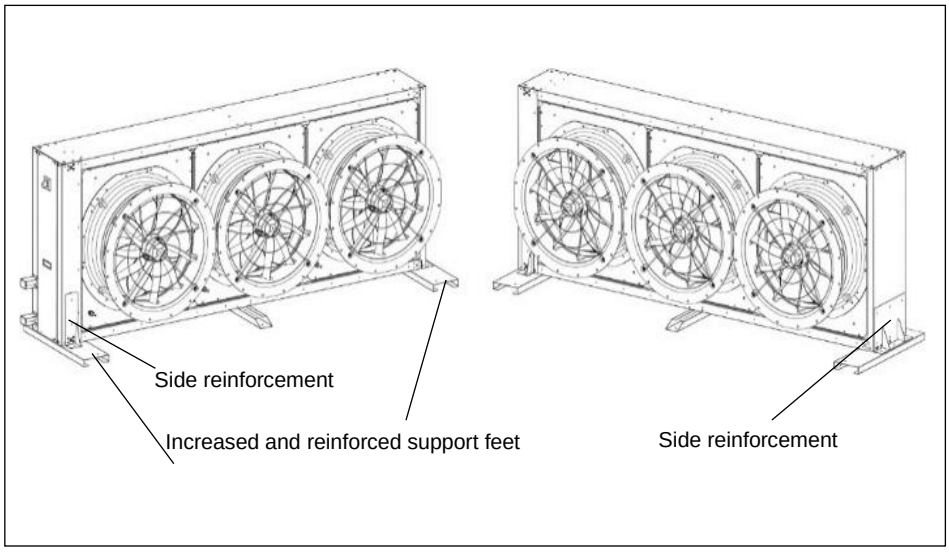


OBLIGATION:
During lifting, the sling bar length "L" must never be less than the length of the machine. Ensure that the distance 'H' between the machine and the sling bar is greater than 1.1 metres.

4.6.4 Earthquake anchoring kit only for MEGR-MC

Where seismic installations are planned, the machines must be installed in a suitable manner:
- Avoid installations with vertical air flow.
- Pay particular attention to the anchoring to the support structure (refer to the technical manual).

The anti-seismic version of the machine is equipped with a reinforced structure already assembled at the factory and must be selected at the time of order.



4.6.5 Cooling/electrical connections in seismic areas

Avoid rigid connections between the machine and the system; it is necessary to isolate the machine with a flexible system that allows free movement in the event of an earthquake.
The cooling / electrical connection is the responsibility of the installer; the choice of flexible components and installation must follow the instructions of the designer responsible for the system.

5 PRE-COMMISSIONING

5.1 Before starting the unit

Before contacting the Specialist Engineer, who will execute the first commissioning running test, the Installer must carefully check that the installation complies with the requirements and specifications set-out during the design stage, making sure that:
- the electrical connection is correct, and that it guarantees compliance with the current Electromagnetic Compatibility Directive;
- the cooling connection is correctly terminated;
- there are no leaks in the cooling circuit;
- all shut-off valves are open.

6 START

6.1 Machine start-up

Commissioning must be carried out by a specialist Engineer, in the presence of the Installer and an experienced Operator.
The specialist Engineer will test the equipment, carrying out checks, calibrations and commissioning according to the applicable procedures falling under their responsibility.
The experience Operator must address questions to the specialist Engineer in order to acquire the necessary information to be able to carry out the control and operation activities that will fall under their responsibility.
Before start-up, ensure the following:

- Check maintenance clearances and safety distances;
- Measure the absorption of the fans by comparing the value with the indications in the Data Book;
- Check the **power supply voltage**. Check that the mains voltage does not exceed +/- 10% of the machine nominal value;
- Check the **unbalancing between the phases**. Check that the unbalancing between the phases does not exceed 2%;
- Otherwise, contact the electricity distribution company to solve the problem;
- When the machine is fully loaded, measure condensation pressure and subcooling values;
- Check for coolant leaks.

7 METHOD OF USE

7.1 Provisions and warnings for use

The day-to-day use of the equipment does not require the presence of the operator, who must only intervene to carry out regular checks, in case of emergency, or in case of planned starts and stops.
If these activities are carried out consistently and correctly, good long-term performance of the machine and the equipment will result.

INFORMATION:
Failure to comply with the procedures can cause bad operation of the machine and the system as a whole, resulting in early deterioration.

INFORMATION:
The machine runs automatically and is controlled by the main machine.

7.2 Emergency stop

Considering that there are no directly accessible moving parts in the machine, there is no need to install an emergency stop device. In any case, if installed this device would not reduce the risk as the emergency stop would be identical to the normal stop using the main switch.

7.3 Prolonged shutdowns of the machine

In case of extended machine inactivity (e.g. seasonal shutdown), the specialist Engineer must:

- check the condition of pressure vessels;
- carry out a leak test on the system;
- opening of the line circuit breaker;
- close the shut-off valves.

7.4 Start-up after extended machine inactivity

Before starting the machine, carry out all the maintenance activities.
The specialist Engineer must also carry out adequate checks, calibrations and the start-up procedure.

8 FIRST DIAGNOSTICS

8.1 Troubleshooting …

List of actions to be taken in case of machine fault.

Fault	Cause	Solution	Intervention level
High pressure at the delivery	Remote condenser	Check that the fan is turning freely	User
		Check the power supply to the fan	Service
		Check the condensation controller signal	Service
		Check that the condensing coil is clean	Service
		Check recirculation of hot air	User
		Check remote condenser sizing	Service
	Refrigerant circuit	Check refrigerant charge	Service
		Check for incondensable	Service
		Check the refrigerant circuit's taps	Service
Low Air Flow	Fan	Check the power supply to the fan	Service
		Check the analogue output of the speed reference from the controller	Service
		Check for system load losses	Service
		Check that the heat exchange coil is clean	User

9 MAINTENANCE

9.1 Maintenance instructions

OBLIGATION:
Both regular and extraordinary maintenance activities must be carried out by AUTHORISED TRAINED INDIVIDUALS equipped with all the necessary personal protective equipment.
The machine site of installation must meet all the safety requirements
The procedures set by the Manufacturer must be followed.

Before any kind of maintenance is carried out the following measures must be observed:

- isolate the machine from the power supply by acting on the yellow/red switch of the electric power panel and on the general protection upstream from the machine (installation by the customer);
- place a sign saying, "Do not operate - maintenance in progress" on the disconnecting switch open;
- use appropriate personal protective equipment (for example: helmet, insulating gloves, protective goggles, safety shoes, etc.);
- use tools that are in good condition and be sure to be familiar with the instructions before putting them into practice.

Whenever measurements must be taken or checks performed with the machine running, it is necessary to:

- • make sure that any remote control systems are disconnected. Keep in mind, however, that the PLC on board of the main machine controls their functions and can activate and deactivate the components, creating dangerous situations (such as for example powering fans and their mechanical drive systems);
- work on the open electrical panel for as short a time as possible;
- close the electrical panel as soon as the single measurement or check has been performed.

Furthermore, the following precautions must always be taken:

- the cooling circuit contains pressurised refrigerant gas: all maintenance must be carried out by qualified personnel with the authorisations or certifications required by the laws in force;
- never disperse the fluids contained in the refrigeration circuit to the environment;
- never keep the refrigerant circuit open, as the oil absorbs moisture and degrades;
- during venting operations, protect against possible fluid leaks at dangerous temperatures and / or pressures;
- when replacing electronic boards, always use suitable equipment (extractor, antistatic bracelet, etc.);
- if replacing a fan or other heavy component, make sure that the lifting equipment is suitable for the weight;
- do not access the fan compartment without first isolating the machine using the main switch on the panel and displaying a “Maintenance - do not switch on” sign;
- always use only original spare parts purchased directly from the Manufacturer or from official dealers;
- before closing and restarting the machine, make sure to remove all tools or foreign bodies.

The list of scheduled maintenance operations is shown in the next paragraph of this manual.
For each intervention, both of ordinary and extraordinary maintenance, a special form must be issued and kept by the user.
If a Scheduled Ordinary Maintenance notebook is available on the machine, all the operations carried out must also be recorded on the same.

9.2 Scheduled maintenance

Carry out all the scheduled maintenance activities at the indicated intervals.

INFORMATION:
Failure to carry out regular maintenance will make the warranty null and void and relieve the manufacturer of all safety related responsibilities

The scheduled maintenance activity intervals are indicated in the tables on the following pages.

9.3 Table of general maintenance jobs

		WORK INTERVALS		
	WORK TO BE CARRIED OUT	**Every day**	**Start of season every 500 hours or 2 months**	**Start of season every 1000 hours or 3 months**
Expert Operator	Check any alarms.	●		
	Visually check for coolant leaks	●		
Specialist technician	Cleaning of the condenser coil. See following chapter			●
	Check of electric connection tightness			●
	Check for worn or damaged cables and replace as necessary			●
	Check the noise level of the fan bearings			●
	Check the torque of bolts, moving components and components subjected to vibration			●
	Check for any leaks on the cooling circuit.			●(1)
	Check for rust on the cooling circuit, especially the pressure vessels			●
Specialist technician	**Checking the operating parameters of the cooling circuits. For each circuit check the following:**			
	The condensation pressure, comparing it with the outside temperature			●
	The delivery temperature The sub-cooled gas temperature Liquid temperature			●
	Ambient air temperature			●
	Subcooling			●
	The electrical absorption of the fans			●
	Fan power supply voltage			●

(1) Unless otherwise required by applicable laws

The frequency of the operations described in the table above should be considered indicative. In fact, it may undergo variations according to the method of use of the machine and the system in which the latter is required to operate.

9.4 Check that the coils are clean

The accumulation of dirt on the exchange coils causes a malfunction of the machine.
This situation can lead to machine stoppage, as well as a definite increase in electrical consumption and wear.

INFORMATION:
Cleaning activities must be increased during the periods of higher formation of dirt (e.g.: in the period when leaves or flowers fall from trees).

OBLIGATION:
Do not use high pressure cleaners to clean the coil as excessive pressure can cause irreparable damage. Damage caused by cleaning with unsuitable chemical substances or excessive water pressure is not covered by the guarantee.

DANGER:
The aluminium fins are thin and sharp. Make sure to always wear appropriate PPE to avoid cuts and abrasions. Protect the eyes and face against the spraying of water and dirt during the cleaning process. Wear waterproof shoes or boots and clothes that cover all the body.

INFORMATION:
In the case of machines installed in aggressive atmosphere where there is a high degree of dirt, cleaning of the coil must be included in routine maintenance. This type of installation should in any case be cleaned on a regular basis, removing all dust and particles that settle on the coil as soon as possible and following the instructions below.

9.4.1 Cu-AL “tube and fin” coils

As a minimum requirement, the coils must be inspected and cleaned on an annual basis after initial commissioning. The frequency of inspections should be increased in the case of aggressive weather conditions or a high degree of dirt. Follow the instructions below on how to clean the coils properly:

- **Remove all traces of dirt on the surface**. Remove any deposits like leaves, fibres, etc. using a vacuum cleaner (or, if necessary, a brush or other soft accessory, making sure not to scratch and damage the metal parts). If using compressed air, always keep the flow of air perpendicular to the surface of the coil to avoid bending the aluminium fins. Be careful not to bend the fins with the nozzle of the compressed air gun.

Note:
If dirt and contaminants are not removed, rinsing with water will drive them into the coil, making cleaning even more difficult. Surface dirt and contaminants must be completely removed before rinsing with water.

- **Rinse**. Rinse with water. It is possible to use chemical substances (special detergents for finned coils). Rinse by letting water flow through each passage in the fins until they are perfectly clean. Always aim the jet of water perpendicularly to the surface of the coil in order to avoid bending the aluminium fins. Avoid hitting the coil with the hose. It is advisable to put a thumb on the end of the hose to adjust the pressure of the jet of water, rather than use nozzles that could knock against the coil and damage it.

9.4.2 Treated Cu-Al "tube and fin" coils

There are various types of surface treatment for protecting Cu-Al coils. The general rules are given below. It is advisable, in any case, to always refer to the specific documentation provided by the supplier with whom we recommend establishing a maintenance contract with guarantee (Blygold and Fin Guard Silver offer this option).
As a minimum requirement, the coils must be inspected and cleaned on an six-monthly basis after initial commissioning. In coastal and/or industrial areas, inspections and cleaning should be carried out on a quarterly or monthly basis, depending on the characteristics of the place and the degree of pollution.

Routine maintenance.

- **Remove all traces of dirt on the surface**. Remove any deposits like leaves, fibres, etc. using a vacuum cleaner (or, if necessary, a brush or other soft accessory, making sure not to scratch and damage the metal parts). If using compressed air, always keep the flow of air perpendicular to the surface of the coil to avoid bending the aluminium fins. Be careful not to scratch the coil with the nozzle of the compressed air gun.
- **Rinse**. Use a low pressure jet of hot or cold water (refer to the instructions of the coating manufacturer) to rinse the coil, then wash it with water mixed with the cleaning agent specified by the coating manufacturer, and rinse again.
- **Inspection**. After washing, always inspect the coil to check the coating for any signs of damage, deterioration and corrosion phenomena. Notify the qualified applicator immediately of any signs of damage, deterioration or corrosion on the coil. The following detergent has been approved for use on coated coils to remove mould, dust, soot, traces of grease, fluff and other particles, providing that it is used in compliance with the manufacturer's instructions on mixing and cleaning:

  Detergent for coated Cu-Al "tube & fin" coils**. Product:** Blygold

Retailer: Coil Clean Blygold

Supplementary maintenance.

The particular feature of the coating is the fact that it can be reapplied. Solid particles (like sand) can enter from the side of the coil where air flows in, and erode the corrosion protection exposing the metal. Should this happen, the surface coating must be reapplied. Reapplication should be carried out by qualified personnel.

The coating can be reapplied several times during the useful life of the coil. Normally, good routine maintenance reduces the need for supplementary maintenance.

9.4.3 Microchannel coils

Micro-channel tube & fin coils tend to accumulate dirt more on the outside and less on the inside, and are, therefore, easier to clean. As a minimum requirement, the coils must be inspected and cleaned on an quarterly basis after initial commissioning. The frequency of inspections should be increased in the case of aggressive weather conditions or a high degree of dirt. Follow the instructions below on how to clean the coils properly:

- **Remove all traces of dirt on the surface**. Remove any deposits like leaves, fibres, etc. using a vacuum cleaner (or, if necessary, a brush or other soft accessory, making sure not to scratch and damage the metal parts). If using compressed air, blow this from the inside outwards (the air should flow in the direction opposite that during normal operation). In this case, too, be careful not to scratch the coil with the hose or nozzle of the compressed air gun.
- **Rinse**. Rinse only with water. Do not use chemical substances (including special detergents for finned coils). These substances can cause corrosion. Rinse preferably from the inside outwards, aiming the jet perpendicularly to the face of the coil and allowing the water to flow in each passage of the fins until these are perfectly clean. These fins are sturdier than those of conventional coils but should still be handled with care. Avoid hitting the coil with the hose. It is advisable to put a thumb on the end of the hose to adjust the pressure of the jet of water, rather than use nozzles that could knock against the coil and damage it. Gently blow out any residual water at the centre of the fins.

DANGER:
If using a pressure washer, the distance between the same and the coil surface must be such not to cause damage.
Keep the line between the nozzle and the surface of the coil as much as possible at a vertical angle.
Cleaning damage, especially when caused by high-pressure cleaners or chemicals, is not covered by the warranty.

9.4.4 MICROCHANNEL coils with E-COATING treatment

The cleaning procedures below are recommended and should be carried out as part of routine maintenance for e-coated coils. A record of all routine cleaning of the coils must be kept in accordance with the terms and conditions of the guarantee provided by the supplier of the e-coating treatment.

- **Remove all traces of dirt on the surface**. Remove any deposits like leaves, fibres, etc. using a vacuum cleaner (or, if necessary, a brush or other soft accessory, making sure not to scratch and damage the metal parts). If using compressed air, blow this from the inside outwards (the air should flow in the direction opposite that during normal operation). In this case, too, be careful not to scratch the coil with the hose or nozzle of the compressed air gun.
- **Routine cleaning**. In coastal or industrial areas, the coil must be rinsed on a monthly basis using just water to remove chlorides, dirt and debris. It is important to use water at a temperature below 45°C and at a pressure below 40 bar to reduce surface tension and thereby facilitate the removal of dirt and chlorides without damaging the coil. Do not use chemical substances (including special detergents for finned coils). These substances can cause corrosion. Rinse preferably from the inside outwards, aiming the jet perpendicularly to the face of the coil and allowing the water to flow in each passage of the fins until these are perfectly clean. These fins are sturdier than those of conventional coils but should still be handled with care. Avoid hitting the coil with the hose. It is advisable to put a thumb on the end of the hose to adjust the pressure of the jet of water, rather than use nozzles that could knock against the coil and damage it. Gently blow out any residual water at the centre of the fins.
- **Quarterly cleaning**. Quarterly cleaning is required under the terms of the guarantee and can extend the useful life of the e-coated coil. Failure to perform quarterly cleaning renders the guarantee null and void and can reduce the performance and life-span of the coil. Follow the instructions below on routine quarterly cleaning:
    - Clean the coil using the approved type of detergent (refer to the list of approved products further on);
    - Then use the approved chloride removal product (CHLOR * RID DTS ™). This treatment will remove soluble salts and revitalise the machine. This product must be applied directly on the salts in order for it to be effective. The salts may be under a layer of grease or dirt. It is essential, therefore, to clean the surfaces thoroughly with detergent before applying the product. Apply a sufficient amount of CHLOR * RID DTS ™ in a uniform manner all over the surface of the coil. Make sure to coat the surface thoroughly without leaving any gaps. The product can be applied using a spray pump or a standard spray gun. When the surface has been completely wetted, the salts are made soluble. Lastly, rinse the surface with water as instructed in the section "b. routine cleaning". The following detergent has been approved for use on e-coated coils to remove mould, dust, soot, traces of grease, fluff and other particles, providing that it is used in compliance with the manufacturer's instructions on mixing and cleaning.

Approved detergent for e-coated coils:

Product	Retailer	Code
Enviro-Coil Concentrate	HYDRO-BALANCE CORPORATION	H-EC01
Enviro-Coil Concentrate	Home Depot Supply	H-EC01
Enviro-Coil Universal Coil Cleaner	Advanced Engineering	/

9.5 Extraordinary maintenance

If repairs are needed, contact a Service Centre authorized by the manufacturer.

INFORMATION:
Failure to comply with the above will make the warranty null and void and relieve the manufacturer of all safety related responsibilities.

OBLIGATION:
Only use original spare parts (see the list of “recommended spare parts”).

10 DISPOSAL OF THE MACHINE

Contact a Service Centre authorised by the Manufacturer to arrange for disposal of the machine.

OBLIGATION:
When components are replaced, or when the entire machine is removed from the installation at the end of its useful life, the following requirements must be observed to minimise impact on the environment:
• the refrigerant gas must all be collected by specialist personnel with the necessary certification and delivered to the collection centres;
• the lubrication oil in the compressors and cooling circuit must be collected and delivered to the collection centres;
• the structure, the electrical and electronic equipment and the components must be sorted according to category and material and delivered to the collection centres;
• if the water circuit contains mixtures with antifreeze, these must be collected and delivered to the collection centres;

- Observe the domestic laws in force.

OBLIGATION:
The machine contains fluorinated greenhouse gases regulated by the Kyoto protocol. In accordance with the law, these must not be dispersed in the environment but collected and delivered to the retailer or collection centre.

OBLIGATION:
The machine contains electrical and electronic parts that may contain substances that are harmful for the environment and human health, and which therefore cannot be disposed of with normal municipal waste. The machine cannot be disposed of with mixed municipal waste.

The machine is identified with the following symbol:

to indicate that it must be disposed of by separating the various materials.
The customer has an important role in ensuring reutilisation, recycling and other forms of recovery of the machine.
The machine is classed as PROFESSIONAL by WEEE Directive 2012/19/EU. Upon dismantling, it must be treated as waste by the user, who may ask the reseller to collect it, or take it to authorised waste collection centres.
Italy only:
MEHITS is part of the RIDOMUS consortium for the disposal of WEEE waste at the end of its life. At the end of the useful life, the owner of products classed as waste may contact the distributor, so that they can be collected free of charge by the consortium to which MEHITS belongs.

MITSUBISHI ELECTRIC HYDRONICS & IT COOLING SYSTEMS S.p.A.

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