MITSUBISHI ELECTRIC

Air conditioners for IT Cooling

x-MEXT

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.

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 (1), 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.

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". This information is also available into other languages as "TRANSLATION OF THE ORIGINAL INSTRUCTIONS" to meet legislative and/or commercial requirements. 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 operations of regulation and checking expressly indicated in this manual, and which must be strictly followed. His/her work will be limited only 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 the Manufacturer 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 machine 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 (multilingual)**: this manual accompanies the unit and contains the main installation, use and maintenance information.
- **Installation, use and maintenance manual (extended)**: in electronic format and available on the manufacturer's website, it offers detailed information on the installation, use and maintenance steps set out in the multilingual manual supplied with the machine.
- **Cooling circuit diagrams** (paper and electronic format).
- **Hydraulic diagrams** (paper and electronic format).
- **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 drawings:** with handling, lifting and transport information.
- **EC declaration of conformity**: indicates that the machines comply with current European directives.

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

3.1.1 General safety regulations

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.

The inclusion of these machines in a system requires an overall project that must take into account all the “good practice” requirements, as well as the legislative and regulatory provisions. 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. 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.

When moving the machine, refer to the information provided on the instructions for use supplied by the manufacturer.

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.

This device is not intended for use by people (including children) with reduced physical, sensory or mental capabilities, or without experience and not duly informed, unless they are given adequate supervision and training regarding its use by an experienced operator or specialist technician.
Children should be supervised to make sure that they don't play with the machine.

WARNING:
During the periodic maintenance activities, or in the event of a fault, replace faulty parts with original spare parts. Use the components recommended by the manufacturer, so as to ensure the machine performance and the expected safety level.

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 personal protective equipment (gloves, goggles, safety helmet, etc.) appropriate for the work being carried out. Do not wear clothes or accessories that can get caught or sucked in by the air flows; tie back long hair before entering the machine;
- 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 machine is operating
- before restarting the machine, make sure that the guards protecting moving components are correctly installed;
- 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 for possible coolant or fluid leaks
- never exceed the maximum pressure limit (PS) of the hydraulic circuit of the machine indicated;
- before removing parts on the pressurised water circuits, close the section of the piping concerned and drain the fluid gradually to stabilise the pressure at the atmospheric level;
- All the maintenance operations have to be performed from the front panel.

Prevention of residual electrical risks

- disconnect the machine from the mains using the main switch before opening the electrical panel;
- check that the machine has been grounded correctly before starting it;
- units belonging to the x-MEXT series are intended for indoor installation. The machine must be installed in a suitable place where there is no risk of falling objects or dripping liquids;
- do not use cables with inadequate sections nor extension cable connections, even for very short periods or emergencies.

Prevention of residual environmental risks
The machine contains substances and components that are dangerous for the environment, such as refrigerant gases and lubricant, ethylene or propylene glycol.
The units may only be serviced and disposed of by qualified technicians.

Machines ready for coupling with remote condenser (x-MEXT-i/f-G02-DX / x-MEXT-i/f-G02-DX-DF) are supplied with nitrogen seal charge and require to be charged with refrigerant gas (by the installer).
Monobloc machines (x-MEXT-i/f-G02-DW / x-MEXT-i/f-G02-DW-DF / x-MEXT-i/f-G02-DW-FC) already contain the refrigerant required for operation and do not require additional charging by the installer.

The units contain fluorinated greenhouse gas <HFC R410A [GWP_{100} 2088]>; the refrigerant gas cannot be discharged into the atmosphere and must be recovered in accordance with current regulations.

The cooling compressors and the refrigeration circuit contain lubricating oil, which must be recovered in accordance with the regulations in force.

Prevention of other residual risks
- the machine contains pressurised refrigerant gas: the pressurised equipment must not be touched except during maintenance, which must be entrusted to qualified and authorised personnel
- connect the utilities to the machine following the indications set out in this manual and in the symbols on the panels of the machine itself;
- the water circuit contains harmful substances. Do not drink from the hydraulic circuit and make sure the material contained in it does not touch your skin, eyes or clothing.
- in order to avoid an environmental risk, 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 that 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 refrigerant, as specified on the safety data sheets of these fluids, and compatibly with the installation site and any other existing equipment;
- the machine is equipped with pressure relief valves (safety valves): when these valves are triggered, the refrigerant gas is released at a high temperature and speed; channel the gas discharge according to the provisions of EN 378-3 and the local regulations in force, making sure in particular to discharge fluids that belong to a safety class other than A1 into safe, open areas;
- 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
- solder or braze only empty pipes after removing all traces of lubricant oil; do not use flames or other heat sources in the vicinity of pipes containing cooling fluid
- do not use naked flames near the machine;
- 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 discharge of coolant in a closed area can cause a lack of oxygen and, therefore, the risk of asphyxiation: install the machine in a well ventilated area according to the EN 378-3 standard and the local regulations in force, and coolant detectors whenever 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

Danger of burns

Appliance powered

Internal moving

Check the drain

Earth connection

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 and identification plate

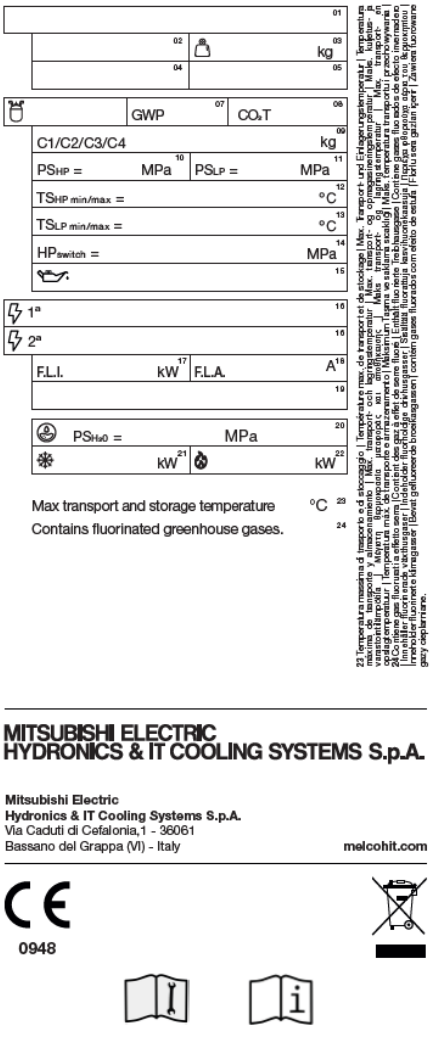
Designation: the alphanumerical code of the machine model, which is given on the identification plate, represents precise technical specifications which are indicated in the figure shown.
Identification plate: the machine type can be found on the label attached directly to the machine**.** The label provides the reference data and all the essential information required to ensure safe operation.

DESIGNATION

x-MEXT-i-G02-DX-O-029

x-MEXT	**Series**
-i-	**Compressor type** i = inverter f = fixed speed
-G02-	**R410A refrigerant**
-DX-	**Version** DX = direct expansion DX DF = Dual fluid: direct expansion + chilled water coil DW = direct expansion, water cooled DW DF = Dual fluid: direct expansion + chilled water coil, water condensate DW FC = direct expansion, water condensate + FC coil
	-O- Air delivery O = over – delivery air flow up U = under - downflow air delivery
	-029- **Model / Cooling capacity (kW)**

IDENTIFICATION PLATE



3.3 Storage temperature

When stored for a long period of time, the machine must be placed in a protected environment, at a temperature between -30 °C and 45 °C, without surface condensation and away from direct sunlight.

3.4 Operating limits

ROOM AIR CONDITIONS
Room air temperature:
12.5°C minimum temperature with wet bulb.
24.5 °C maximum temperature with wet bulb.
20°C minimum temperature with dry bulb.
40°C maximum temperature with dry bulb.
Room air humidity:
20%RH minimum relative humidity.
60%RH maximum relative humidity.

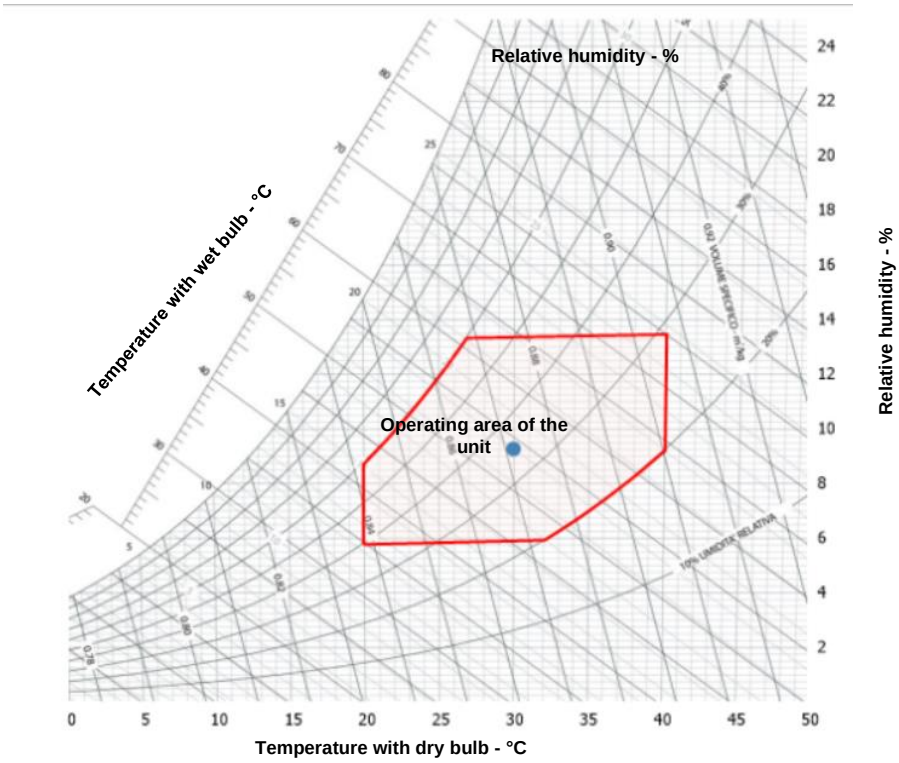
OUTDOOR TEMPERATURE (DX)
45°C maximum temperature
-20°C minimum temperature
-40°C minimum temperature with kit air -40°C

WATER COOLED CONDENSER (DW)
6-20°C inlet temperature range with 2-way condensing control valve
20-50°C inlet temperature range without 2-way condensing control valve
25-55°C Outlet water temperature range
4-20°C water inlet/outlet operating ΔT

CHILLED WATER TEMPERATURE (DF/FC)
6-25°C water inlet temperature range
ΔT 3°C minimum ΔT between inlet and outlet
ΔT 10°C maximum ΔT between inlet and outlet

HYDRAULIC CIRCUIT
ΔP 5-150kPa
Pressure drop range (Dual Fluid / Free-cooling circuit)
16 Bar Maximum working pressures

POWER SUPPLY
± 10% Maximum tolerance of the supply voltage (V)
± 2% Maximum unbalancing of the phases.



All the values are indicative. The working temperatures are influenced by a series of variables as:

- Working conditions;
- Cooling load;
- Microprocessor control settings;
- Piping length - distance between internal and external unit.

3.5 Description of the main components

3.5.1 Electrical panel

The electrical panel is manufactured in accordance with EN60204-1 and is only suitable for indoor installation. It is positioned at the front of the unit, for easy access in case of need.
For each machine, there are the following main components:

- Main switch with door lock safety on frontal panel.
- Overcurrent protection switches for each compressor
- Overcurrent protection switches for the fans
- Remote control switches for ON/OFF activation of compressors, heaters and humidifiers (when installed as optionals).
- Transformer for auxiliary circuit and microprocessor supply.
- Numbered wirings.
- Terminals:
  OUTLETS
  - Voltage free deviating contact for General Alarm 1-2.
  - Voltage free contact for supply fans status.
  - Voltage free smoke sensor contact (optional smoke sensor).
  - Voltage free fire sensor contact (optional fire sensor).

  INLETS
  - External enabling.

3.5.2 Cooling circuit

The x-MEXT range provides for two different types of compressors. The machines can be equipped with variable-speed compressors (**x-MEXT-i** series) or with fixed-speed compressors **(x-MEXT-f**). With these two configurations, there are one or two cooling circuits depending on the cooling capacity of the machine. The machines can also be installed in combination with an external remote condenser (**DX** machines, air-cooled) or with a condenser incorporated in the unit (**DW** machines, water-cooled).

For each cooling circuit, the main components are:

- Compressor:
  - **x-MEXT-i:** single **inverter BLDC scroll** compressor or **inverter BLDC scroll compressor + ON/OFF scroll compressor**, depending on the machine model. Inverter compressors are controlled by a dedicated driver installed inside the machine. For each compressor, a sound-insulating hood, a crankcase electric heater and anti-vibration supports are also provided.
  - **x-MEXT-f:** single or double **ON/OFF scroll** compressor, depending on the machine model. A crankcase electric heater and anti-vibration supports are provided for each compressor.
- Evaporator:
  Depending on the machine model, the unit can be equipped with:
  - **Microchannel evaporator**: completely made of aluminium, it keeps the refrigerant charge in the circuit to a minimum. The evaporator is provided with a peraluman support frame with integrated air filter holder. A peraluman condensate collection pan is located underneath the exchanger.
  - **Finned pack evaporator**: with copper tubes and high-efficiency aluminium fins, it has an integrated air filter support frame. A peraluman condensate collection pan is located underneath the exchanger.
- Electronic expansion valve.
- Liquid receiver, with safety valve.
- Oil separator (**air-cooled x-MEXT-i machines only**), with safety valve.
- Pressure transducer (low pressure line).
- Pressure transducer (high pressure line).
- Manual reset safety pressure switch (high pressure line).
- Liquid and humidity sight glass.
- Dehydration filter and de-acidifier.
- Taps on gas delivery line and liquid return line (**air-cooled machines only**).

3.5.3 Hydraulic circuit

- **DX-DF / DW DF / DW FC versions:** In addition to the direct expansion cooling circuit, inside the machines of the x-MEXT range is a heat exchanger installed in series with the direct expansion heat exchanger with respect to the incoming air stream, and connected to a second source of cooling energy, such as well water, chilled water from a chiller or a dry-cooler.
  The chilled water cooling circuit consists of:
    - Water cooling coil: with copper tubes and high-efficiency aluminium fins;
    - Motorised 2-way valve, for regulating the flow of water in the exchanger, with 0-10V signal and manual emergency control;
    - Temperature probe on water inlet side;
    - Copper liquid pipes with anti-condensation insulation;

  In case of use of well water we recommend the installation of an intermediate exchanger.
  In order to prevent the formation of ice in the hydraulic circuit, we recommend the use of glycol mixtures with a concentration appropriate to the operating temperatures of the mixture and / or winter outdoor air in the installation area

3.5.4 Fan

x-MEXT series machines are equipped with proprietary design Plug-Fans.
The main features of the fan section are:

- Plug-Fans with backward-inclined blades;
- Composite material impeller with recycled polymer base;
- Brushless type synchronous EC motor with integrated electronic commutated system and continuous variation of the rotation speed. The motor rotation control is obtained with the EC system (Electronic Commutation) that manage the motor according to the signal coming from the microprocessor control;
- Fan control via Modbus. In the event of an anomaly, the control stops the fan concerned, indicating the type of fault. A unit with more than one fan is not stopped;
- Adjustable head.

3.5.5 Air filter

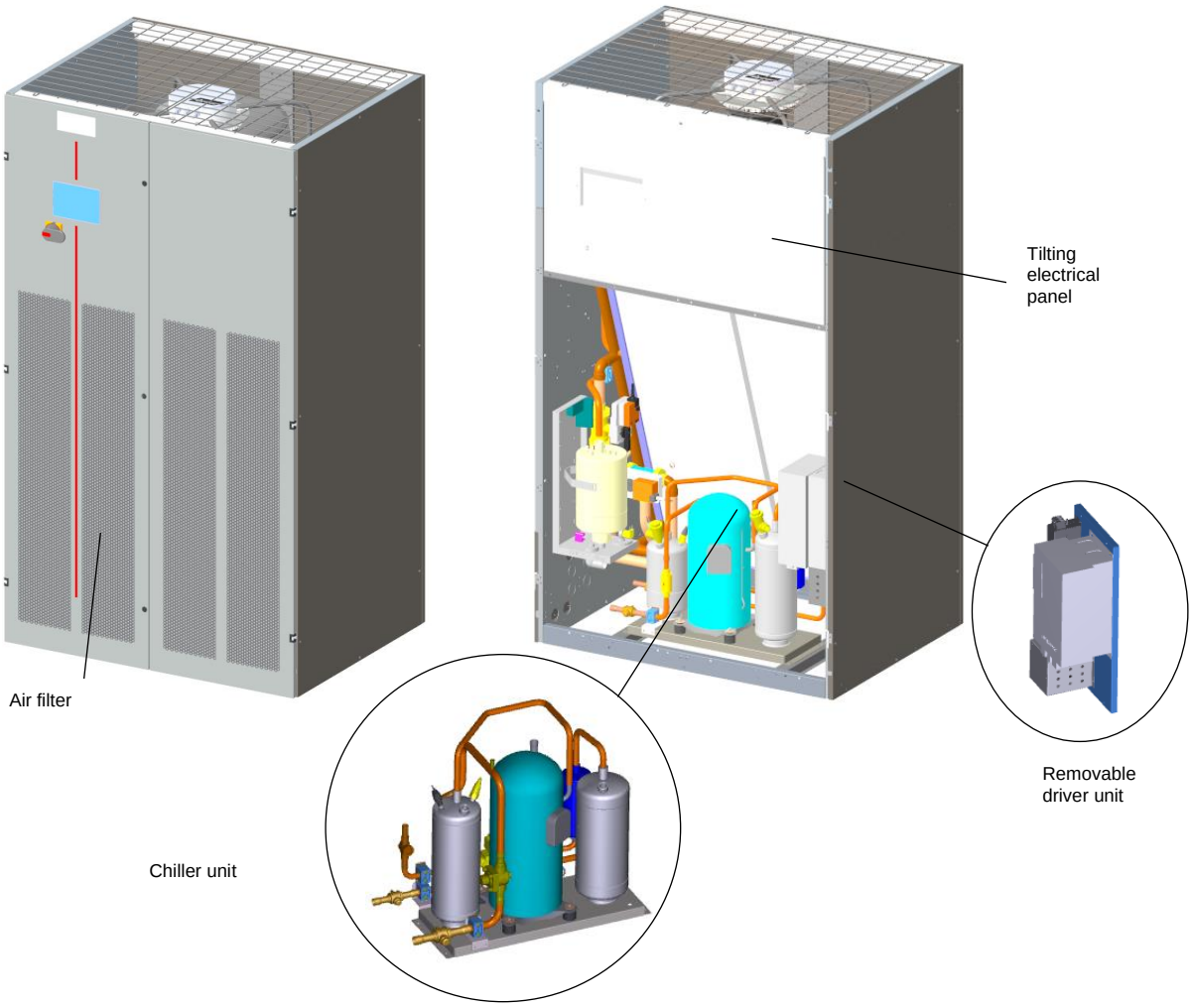
x-MEXT series machines are supplied with air filters with 60% COARSE efficiency (ISO EN 16890), with synthetic fibre filter media to ensure high aeraulic efficiency. A differential pressure switch is also provided to monitor the state of cleanliness of the filters. Access to the air filters is ensured for normal cleaning and/or replacement.
For **OVER** machines: the filters are located on the front panel of the machine. The air filters can be accessed from the front.
For **UNDER** machines: the filters are positioned upstream of the evaporating pack. The air filters can be accessed from above.

3.5.6 Structure

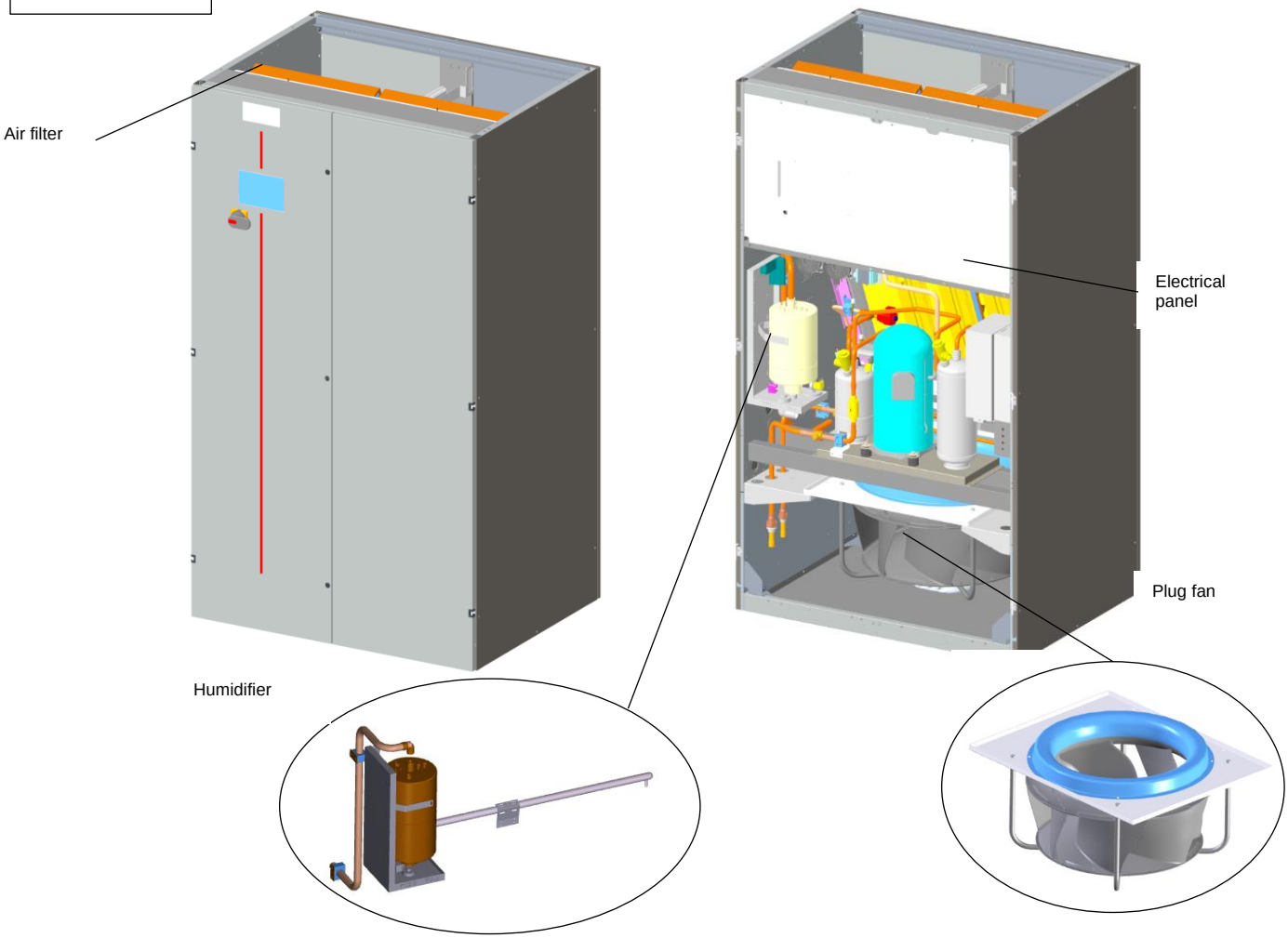
The main features of the structure are:

- Front access to all components requiring adjustment and routine maintenance;
- The internal panelling is in steel sheet metal with protective surface treatment in compliance with UNI ISO 9227/ASTMB117 and ISO 7253;
- Front aesthetic panels in RAL 9006 colour with wrinkled finish, hinged and with quick release system for easy removal;
- Side and rear aesthetic panels in RAL 7016 colour with wrinkled finish, fully removable;
- Panels internally insulated with polyurethane foam;
- Tilting electrical panel, for access to the fan section (M and L size, OVER versions only);
- Air flow OVER version:
  - Air intake from the front through honeycomb type grille and air delivery from the top.
  - Air intake from the bottom base and air delivery towards the top.
- Air flow UNDER version:
  - Air intake from the top and air delivery from the bottom.
  - Air intake from the top and air delivery towards the front.
- Compartment for electrical panel on unit front for direct access to control and regulation devices.

OVER VERSION



UNDER VERSION

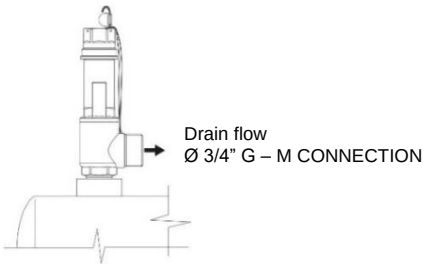


3.6 Safety components

3.6.1 Refrigerant gas safety valves

In accordance with the requirements of European Directive 2014/68/EU (PED), the cooling circuit of x-MEXT units is protected against overpressure generated by abnormal operation of the unit or external events (e.g. fire), both on the low-pressure and the high-pressure side.
x-MEXT range machines are fitted with two safety valves:

- **x-MEXT-i:** safety valve on the oil separator and the liquid receiver.
- **x-MEXT-f:** safety valve on the low pressure side and the liquid receiver.



DANGER:
The tripping of the valve causes the discharge of pressurised and possibly hot coolant liquid.
It is necessary to install a drain piping system, appropriately sized in accordance with current regulations, for the channelling of the coolant fluid to the outside.

Safety valves do not guarantee repeated tripping, which means that once the valve has tripped, the initial calibration conditions can no longer be ensured. MEHITS recommends that valves are replaced every time they trip.

OBLIGATION:
It is the installer's responsibility to check whether the system complies with the 2014/68/EU standard regarding the installation of the safety valve.
By the system we mean the complete system that includes the internal unit, the remote condenser and the connection pipes.

3.6.2 Safety valve for direct expansion machines in two sections (DX) and risk overpressure in case of fire

OBLIGATION:
For machines in two sections (internal unit + remote condenser), even if appropriate pressure-limiting devices have already been provided by the manufacturer, it is the responsibility of the installer to check the protection of the connection line between the internal unit and the remote condenser. Should it be necessary to use an additional safety valve to protect the line, this should be installed outside the machine.
DO NOT INSTALL THE SAFETY VALVE INSIDE THE MACHINE.

3.6.3 Values for the intervention of high pressure switches and safety valves

x-MEXT-i

	High pressure manual reset pressure switch	Safety valve Factory installed		Possible safety valve At Installer care
		On liquid receiver	On oil separator	
Model	**[bar]**	**[bar]**	**[bar]**	**[bar]**
029	39.5	41.5	41.5	41.5
040	39.5	41.5	41.5	41.5
051	39.5	41.5	41.5	41.5
052	39.5	41.5	41.5	41.5
067	39.5	41.5	41.5	41.5
076	39.5	41.5	41.5	41.5
078	39.5	41.5	41.5	41.5
090	39.5	41.5	41.5	41.5
108	39.5	41.5	41.5	41.5
140	39.5	41.5	41.5	41.5

x-MEXT-f

	High pressure manual reset pressure switch	Safety valve Factory installed		Possible safety valve At Installer care
		At the evaporator output	On liquid receiver	
Model	**[bar]**	**[bar]**	**[bar]**	**[bar]**
035	40.5	29.5	45	45
038	40.5	29.5	45	45
042	40.5	29.5	45	45
047	40.5	29.5	45	45
048	40.5	29.5	45	45
054	40.5	29.5	45	45
061	40.5	29.5	45	45
070	40.5	29.5	45	45
075	40.5	29.5	45	45
076	40.5	29.5	45	45
085	40.5	29.5	45	45
098	40.5	29.5	45	45
125	40.5	29.5	45	45
136	40.5	29.5	45	45

4 TRANSPORT, STORAGE AND INSTALLATION

4.1 Transport and moving

4.1.1 General transport, handling and storage information

During transport and when not installed immediately upon receipt, the machine should be kept in its packaging in a closed and dry location, away from direct sunlight.

Temperature and humidity limits for transportation and storage

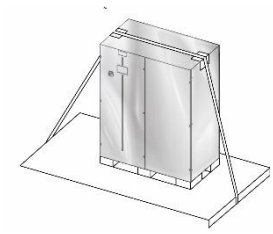
Temperature and humidity limits		INV machines	ON/OFF machines
Minimum temperature	°C	-30	-30
Maximum temperature	°C	50	50
Maximum non-condensing humidity	RH%	90	90

Larger limits of temperature are possible and must be requested when ordering.

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.

Fixing the machine during transport



INFORMATION:
To avoid damage to the panels, it is recommended to secure the machine as shown in the figure.
Protect the point of contact between the belt and the machine with a soft thickness.
Avoid securing the straps too tightly on the load.
For more information, contact the Shipping Office of the Manufacturer.

4.1.3 Discharge

Carry out the lifting and handling operations as shown in the figure below.
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.

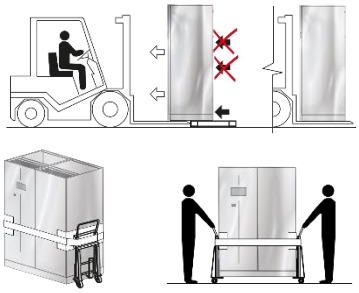
- Check the number of packages against the transport document. If incorrect, notify the carrier and the Manufacturer.
- Perform a visual inspection of the packaging.

INFORMATION:
If any of the packages are damaged or missing, contact the Sales Office of the manufacturer and the carrier, to agree the next plan of action.

4.1.5 Handling

Removing the machine from the pallet.
Remove the unit from the pallet by sliding it onto the forks of the forklift truck, being careful of the risk of the unit tipping over. Push the unit from both side uprights to prevent damage to the external panelling (see the figures on the side).

Transport to the place of installation.
It is possible to use trolleys: make sure that the machine is properly secured. The operation must be performed by two people.



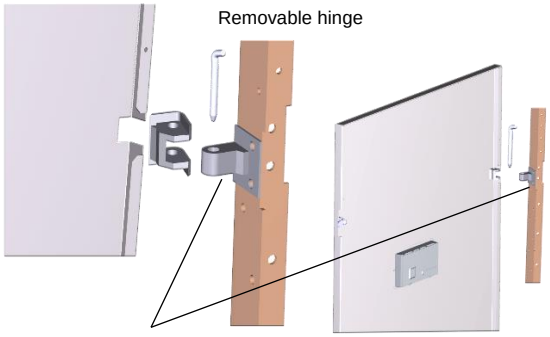
Removing the trolleys at the installation location.
To place the machine on the ground, remove the trolleys as shown in the figure on the right.
Once the machine is positioned, it is possible to remove the shrink wrap protection.

4.2 Removal of the machine panels

DANGER:
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 EXTERNAL PANELS
The panels of x-MEXT machines can be removed: the front panels are hinged and can be quickly removed without the need for tools. The side and rear panels are screwed and can be removed to facilitate the installation and/or maintenance activities.

FRONT PANELS



Pin secured to the structure.
Open the panel and remove the pin from the top to release it.

4.3 Installation

4.3.1 Installation of the standard machiine

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

Before starting these phases, 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:

- that the area is perfectly flat and can ensure long-term stability;
- that in case of installation on a raised building floor, this is of adequate capacity;
- that it is easily accessible to all people who must interact with it during its expected useful life;
- that it is 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.
- that the volumetric spaces are adequate to ensure appropriate air flow for correct machine operation and ventilation;
- that the minimum space requirements for operation and inspection indicated in this manual are ensured;
- that air intake and delivery are never hindered or obstructed, even partially.

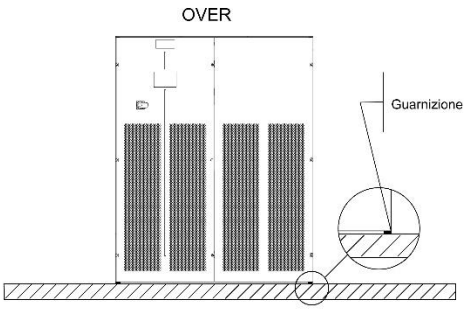
The machine must be installed indoors, in a non-aggressive atmosphere.

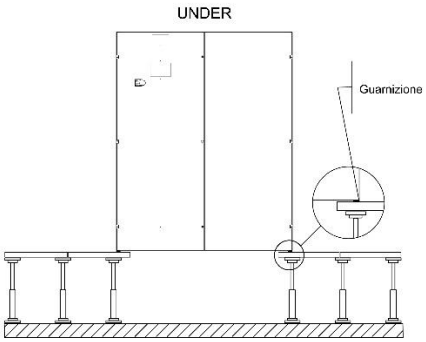
OBLIGATION:
The unit must be installed according to the requirements of standard EN 378-3 and the local regulations in force, in particular taking into account the category of occupation of the premises and the safety class defined by EN 378-1.

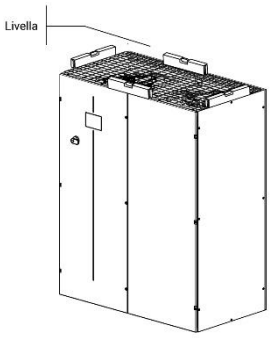
OBLIGATION:
The unit must be installed in an area where access is only permitted to OPERATORS, MAINTENANCE PERSONNEL and TECHNICIANS. If this is not possible, it must be enclosed in a perimeter fence positioned at least two metres from the external surfaces of the machine itself.
The staff of the INSTALLER 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.
Appliance not accessible to the general public.

4.3.2 Positioning of OVER and UNDER machines

The machine is placed directly on the floor of the building or on an elevated floor. It is recommended to place an elastic rubber seal between the base of the machine and the floor, covering the entire support surface, to prevent the transmission of noise and vibrations.
Once the machine has been positioned, it must be checked that it is level in the four positions indicated in the figure.





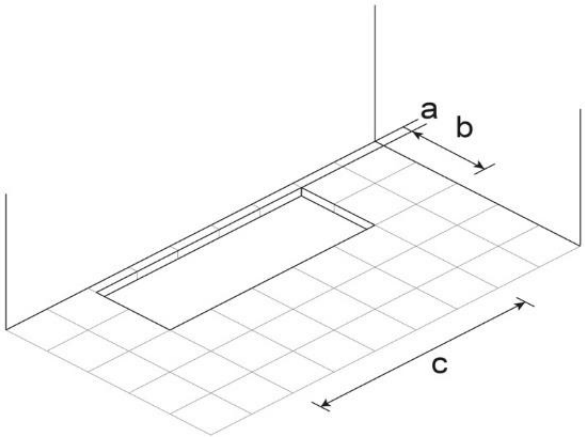


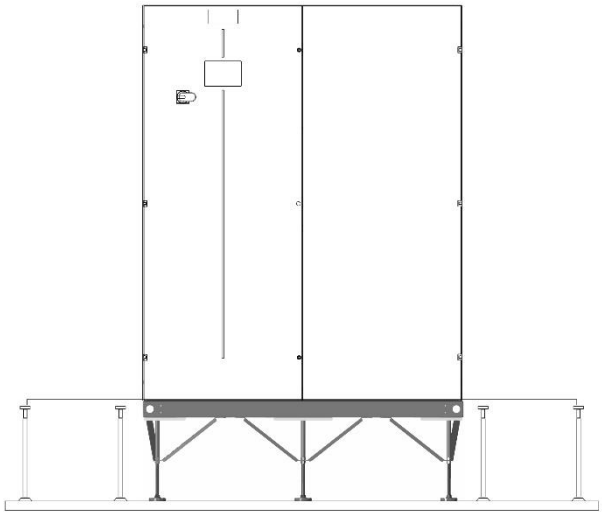
Check that the unit is level: a level deviation of more than 5 mm between the ends of the base may cause the condensate to overflow from the collecting tray.

HOLE IN THE RAISED FLOOR WITH FLOOR STAND (OPTION)

x-MEXT-i-G02-DX / x-MEXT-i-G02-DX-DF x-MEXT-f-G02-DX / x-MEXT-f-G02-DX-DF				
SIZE		**M**	**L**	**XL**
a	mm	25	25	25
b	mm	840	840	840
c	mm	1142	1600	2250

x-MEXT-i-G02-DW / x-MEXT-i-G02-DW-DF / x-MEXT-i-G02-DW-FC x-MEXT-f-G02-DW / x-MEXT-f-G02-DW-DF / x-MEXT-f-G02-DW-FC				
SIZE		**M**	**L**	**XL**
a	mm	25	25	25
b	mm	840	840	840
c	mm	1142	1930	2880



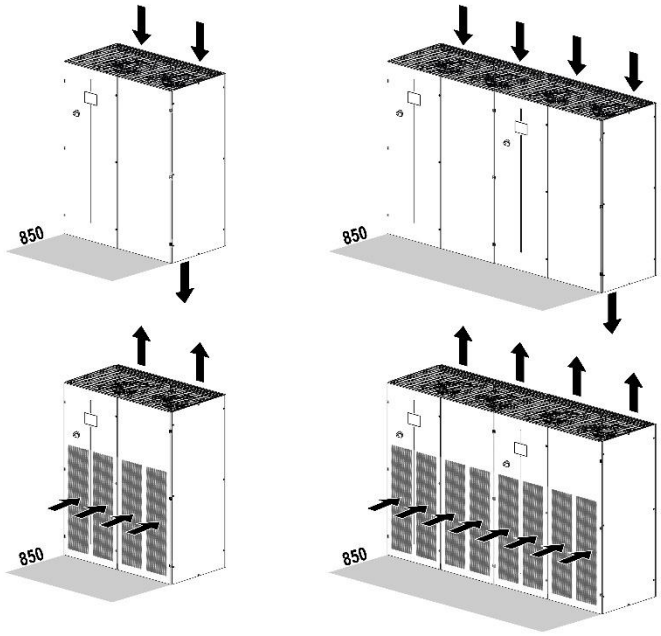


4.3.3 Installation clearances

To ensure correct operation and maintenance, the machine must be installed ensuring compliance with the minimum space requirements.

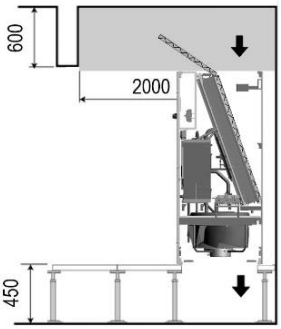
OBLIGATION:
For a correct installation of the machine, it is necessary to ensure a free area at the front of the machine, as shown in the figure.

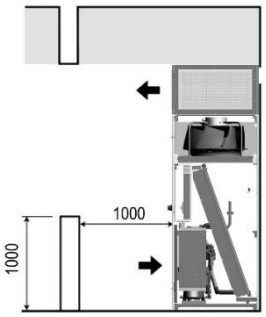
INFORMATION:
A minimum side clearance of 15 cm per side must be provided when installing an earthquake anchoring kit.



4.3.4 Obstacles on air circulation for UNDER/OVER machines / displacement and minimum clearance from combustible surfaces

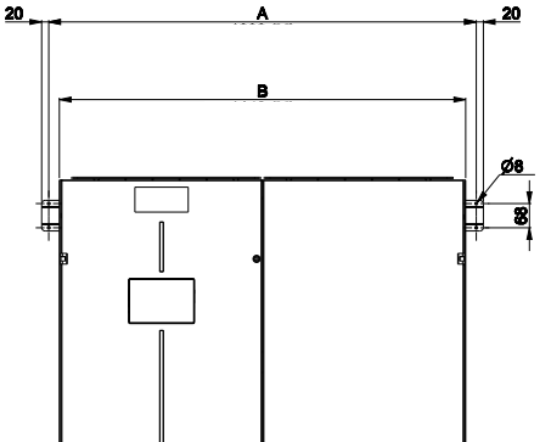
To ensure adequate air circulation around the machine, the minimum distances between the machine and any obstacles (walls / ducts / pipes / general obstacles) must be observed, as shown in the figures below.
For **UNDER** machines: it is necessary to ensure the minimum distance between the machine and the ceiling of the installation site, in order to allow the correct flow of return air to the machine and the extraction of the filters. It is also necessary to ensure a minimum height of the raised floor to allow the treated air to correctly flow out of the machine.
For **OVER** machines: clearances must be ensured as shown in the figures below. The air delivery with plenum must be unobstructed, to allow correct air distribution.



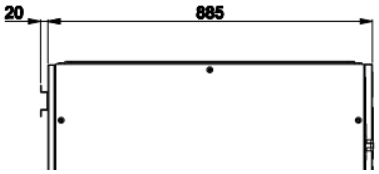


4.3.5 Unit fastening bracket

The bracket is supplied as a mounting kit, with bolts for fixing to the machine (wall mounting screws are not supplied).
This is a safety device that must be installed with the unit and secured to a structural section of the installation site (wall, frame, etc.), to avoid the risk of overturning of the unit due to external causes (accidental collision, earthquake, etc.). It is the responsibility of the installer to verify the adequate strength of the structure to which the machine is anchored.



Front view



Side view

x-MEXT-i-G02-DX / x-MEXT-i-G02-DX DF x-MEXT-f-G02-DX / x-MEXT-f-G02-DX DF			
QUOTE	**M**	**L**	**XL**
A	1202	1660	2610
B	1142	1600	2550

x-MEXT-i-G02-DW / x-MEXT-i-G02-DW DF / x-MEXT-i-G02-DW FC x-MEXT-f-G02-DW / x-MEXT-f-G02-DW DF / x-MEXT-f-G02-DW FC			
QUOTE	**M**	**L**	**XL**
A	1202	1990	2940
B	1142	1930	2880

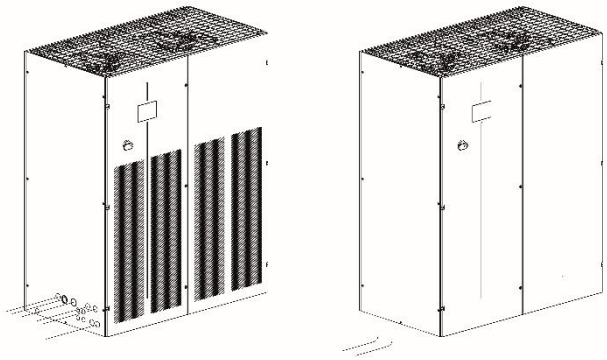
4.4 Refrigerant connections to the remote air-cooled condenser

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.
Two-section machines are delivered with nitrogen seal charge. The filling with refrigerant charge is the responsibility of the installer.
Do not open the taps during the realization of the refrigerant line with the remote condenser.

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.
The connections are positioned on the left side of the machine when looking at the front.

OVER
Refrigerant connections are inside to the machine.
Hydraulic connections are external to the machine.

UNDER
Refrigerant and hydraulic connections are inside to the machine.



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. For the bending operations, use a pipe bender. 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. For making bends, siphons, etc. Use formed 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:

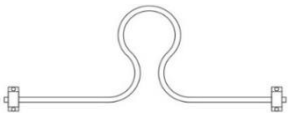
- limit pressure drops;
- reduce the coolant content;
- facilitate the return of lubricant oil to the compressor;
- facilitate the flow of liquid coolant to the expansion valve;
- prevent the return of liquid coolant with the compressor stopped.

It is therefore recommended to:

- reduce vertical sections to a 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 saw, 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, 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:

LIRA compensator

OMEGA compensator



4.4.3 Speed of the coolant in the pipes

When sizing the system piping, make sure that the speed of the fluid is within the range of values given in the table below. It is in fact necessary to have sufficient speed to ensure efficient return of the lubricant oil to the compressor. However, the speed must also at the same time be limited, to avoid pipe corrosion and hammer effects caused by the closure of the electric valves.

OBLIGATION:
The system designer is responsible for the precise sizing of the piping, in compliance with the recommendations regarding the speed of the liquid inside the pipes, as shown in the table that follows.

	Circuit line	Minimum Speed (m/s)	Maximum Speed (m/s)
Coolant R410A	Delivery	5	18
	Liquid	0.5	2.5
	Suction	4	25

4.4.4 Pipe identification

The inlet and outlet pipes of the refrigerant can be identified by the plates placed directly on the machine.

ATTACCO GAS CALDO
HOT GAS CONNECTION
HEISSGASLEITUNG
RACCORDEMENT GAZ
ЛИНИЯ ЖИДКОСТИ

ATTACCO LIQUIDO
LIQUID CONNECTION
FLUSSIGKEITSLEITUNG
RACCORDEMENT LIQUIDE
ЛИНИЯ ГОРЯЧЕГО ГАЗА

4.4.5 Diameters of the machine cooling connections

The tables show the diameters of the cooling connections of the machine:

x-MEXT-i-G02-DX / x-MEXT-i-G02-DX DF											
MODEL		**029**	**040**	**051**	**052**	**067**	**076**	**078**	**090**	**108**	**140**
Gas delivery	[mm Ø]	18	22	22	22	28	28	2 x 22	2 x 22	2 x 28	2 x 28
Liquid return	[mm Ø]	16	18	18	18	18	18	2 x 18	2 x 18	2 x 18	2 x 18

x-MEXT-f-G02-DX / x-MEXT-f-G02-DX DF															
MODEL		**035**	**038**	**042**	**047**	**048**	**054**	**061**	**070**	**075**	**076**	**085**	**098**	**125**	**136**
Gas delivery	[mm Ø]	18	22	22	22	28	28	28	28	28	2 x 22	2 x 22	2 x 28	2 x 28	2 x 28
Liquid return	[mm Ø]	16	18	18	18	18	18	18	18	18	2 x 18	2 x 18	2 x 18	2 x 18	2 x 18

4.4.6 Equivalent length values (ml) for the fittings

The values in the table that follows are for reference only. For a more precise check, it is recommended to seek support from the manufacturer.

	Pipe external diameter [mm]				
Fittings	Ø 16	Ø 18	Ø 22	Ø 28	Ø 35
Standard 90° bend	0.48	0.5	0.6	0.8	1.0
90° wide radius bend	0.3	0.3	0.4	0.5	0.7
90° elbow	0.76	0.8	1	1.2	1.7
45° bend	0.24	0.28	0.3	0.4	0.5
45° elbow	0.4	0.4	0.5	0.6	0.9
180° bend	0.76	0.8	1.0	1.2	1.7
Siphon	3.0	3.2	4	4.8	6.8
Direction change attachment	0.91	1	1.2	1.5	2.1
Tee without adapter	0.3	0.3	0.4	0.5	0.7
Tee with ¼ adapter	0.43	0.5	0.6	0.7	0.9
Tee with ½ adapter	0.48	0.5	0.6	0.8	1
Straight tap (1)	5.4	5.8	6.6	8.7	11.4
Inclined tap (1)	2.7	2.9	3.3	4.6	6.1
Right-angle tap (1)	2	2.3	2.7	3.6	4.6
Gate valve (1)	0.21	0.23	0.27	0.3	0.5
Check valves (2)	1.8	2.0	2.4	3.6	4.2
Silencer	5.5	6.0	8.4	9.7	14.0
Oil separator	4.4	4.8	6.4	7.6	11.6

(1) Values refer to fully open valves.
(2) Values refer to straight ball valves.

4.4.7 Recommended cooling lines

Below are the diameters of the refrigerant lines recommended for connection to x-MEXT series air conditioners and referred to the "equivalent length" (max. 100 m). For equivalent pipe lengths of more than 100 m, please contact the sales department of the manufacturer.
Please always refer to the "INSTALLATION DIAGRAM" for the correct selection of all the necessary components.
It is necessary to check the need for using pressure relief devices (safety valves), where not already provided for in Directive 2014/68/EU.

Nominal diameter: cooling connection of the internal unit. In some cases the diameter of the cooling lines may not correspond with the nominal diameter. This is entirely normal; it is sufficient to use an adapter to adjust the diameter.

Pipe diameters according to the International System
Pipe thicknesses must be respected, otherwise the warranty will become void.

International	**Diameter**	**mm**	**16**	**18**	**22**	**28**	**35**
System	Thickness	mm	1	1	1	1.5	1.5

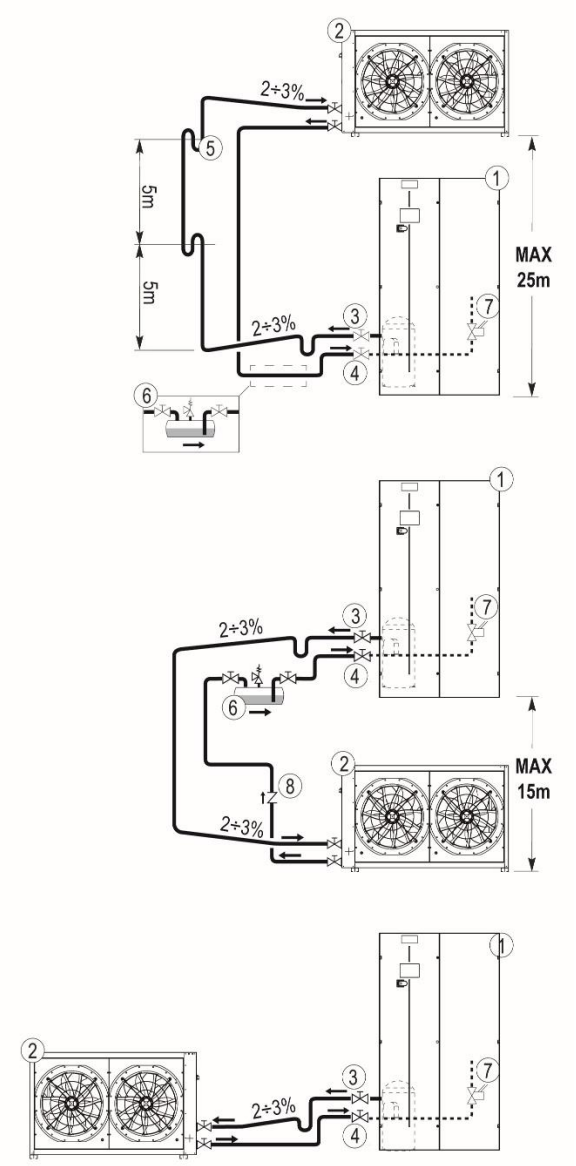
x-MEXT-i-G02-DX / x-MEXT-i-G02-DX-DF

			Equivalent length [m]											
MODEL		Nominal Ø [mm]	5	10	15	20	25	30	35	40	45	50	75	100
29	Gas delivery	18	Ø 18 mm							Ø 22 mm				
	Liquid return	16	Ø 16 mm							Ø 18 mm				
40	Gas delivery	22	Ø 22 mm											
	Liquid return	18	Ø 18 mm								Ø 22 mm			
51	Gas delivery	22	Ø 22 mm								Ø 28 mm			
	Liquid return	18	Ø 18 mm						Ø 22 mm					
52	Gas delivery	22	Ø 22 mm								Ø 28 mm			
	Liquid return	18	Ø 18 mm						Ø 22 mm					
67	Gas delivery	28	Ø 22 mm					Ø 28 mm						
	Liquid return	18	Ø 18 mm					Ø 22 mm						
76	Gas delivery	28	Ø 22 mm					Ø 28 mm						
	Liquid return	18	Ø 18 mm				Ø 22 mm							
78	Gas delivery	22	Ø 22 mm											
	Liquid return	18	Ø 18 mm								Ø 22 mm			
90	Gas delivery	22	Ø 22 mm								Ø 28 mm			
	Liquid return	18	Ø 18 mm						Ø 22 mm					
108	Gas delivery	28	Ø 22 mm					Ø 28 mm						
	Liquid return	18	Ø 18 mm					Ø 22 mm						
140	Gas delivery	28	Ø 22 mm					Ø 28 mm						
	Liquid return	18	Ø 18 mm				Ø 22 mm							

x-MEXT-f-G02-DX / x-MEXT-f-G02-DX-DF

				Equivalent length [m]											
MODEL			Nominal Ø [mm]	5	10	15	20	25	30	35	40	45	50	75	100
035	Gas delivery		18	Ø 18 mm					Ø 22 mm						
	Liquid return		16	Ø 16 mm					Ø 18 mm					Ø 22 mm	
038	Gas delivery		18	Ø 18 mm				Ø 22 mm							
	Liquid return		16	Ø 16 mm					Ø 18 mm				Ø 22 mm		
042	Gas delivery		22	Ø 22 mm										Ø 28 mm	
	Liquid return		18	Ø 18 mm							Ø 22 mm				
047	Gas delivery		22	Ø 22 mm								Ø 28 mm			
	Liquid return		18	Ø 18 mm						Ø 22 mm					
048	Gas delivery		22	Ø 22 mm								Ø 28 mm			
	Liquid return		18	Ø 18 mm						Ø 22 mm					
054	Gas delivery		22	Ø 22 mm						Ø 28 mm					
	Liquid return		18	Ø 18 mm					Ø 22 mm						
061	Gas delivery		22	Ø 22 mm						Ø 28 mm					
	Liquid return		18	Ø 18 mm				Ø 22 mm							
070	Gas delivery		28	Ø 22 mm				Ø 28 mm							
	Liquid return		18	Ø 18 mm			Ø 22 mm								Ø 28 mm
075	Gas delivery		28	Ø 22 mm				Ø 28 mm							
	Liquid return		18	Ø 18 mm			Ø 22 mm							Ø 28 mm	
076	Gas delivery		2x18	Ø 18 mm				Ø 22 mm							
	Liquid return		2x 16	Ø 16 mm					Ø 18 mm				Ø 22 mm		
085	Gas delivery		2x 22	Ø 22 mm										Ø 28 mm	
	Liquid return		2x 18	Ø 18 mm							Ø 22 mm				
098	Gas delivery		2x 22	Ø 22 mm								Ø 28 mm			
	Liquid return		2x 18	Ø 18 mm						Ø 22 mm					
125	Gas delivery		2x 28	Ø 22 mm				Ø 28 mm							
	Liquid return		2x 18	Ø 18 mm			Ø 22 mm								Ø 28 mm
136	Gas delivery		2x 28	Ø 22 mm				Ø 28 mm							
	Liquid return		2x 18	Ø 18 mm			Ø 22 mm							Ø 28 mm	

4.4.8 Installation diagram



OBLIGATION:
Construct the pipes with the indicated slopes to facilitate the return of the lubricating oil to the compressor.

Apply the diagram to each refrigerant circuit of the unit.

Difference in height between the units as an absolute value.

Maximum equivalent length of the connection pipes:

- Machine equipped with on/off compressor = 100 m
- Machine equipped with Inverter compressor = 100m

LEGENDA

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.

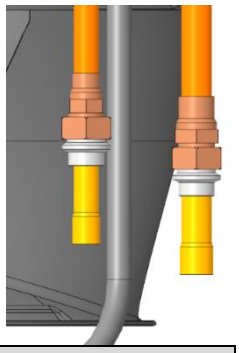
OBLIGATION:
Insulate the liquid pipe if it comes in contact with the gas delivery pipe or exposed to high heat sources.

4.4.9 Connection of the refrigerant pipes

4.4.9.1 Machine

The connections of the cooling circuit with the condensing unit are located inside the machine. On both the gas delivery line and the liquid return line are ball valves, downstream of which are threaded copper pipe sections.
Complete the coupling in accordance with the requirements:

- Disconnect the solder junction from the straight fitting;
- Cut the bottom of the welded section using a pipe cutter. **Do not** use a hacksaw, to avoid the risk of burrs or shavings;
- Make a cup joint on the cooling piping and braze weld the stub pipe;
- Connect to the straight fitting, making sure to replace the gasket.



If possible, avoid brazing activities inside the machine.

OBLIGATION:
Do not open the machine cooling circuit taps.

4.4.10 Washing of coolant piping

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.

4.4.11 Refrigerant charge for DX machine

OBLIGATION:
Coolant charging operations must be carried out by qualified personnel in compliance with the local regulations in force.

In the absence of specific local regulations, for the refrigerant charge 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 vacuum to both the low-pressure and high-pressure sides;
- Do the same on the remote condenser;
- Open the machine and the remote condenser taps, and any other taps on the cooling line;
- Slowly create a vacuum in the machine, in the connection line and the condenser, 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, investigate the cause.
- 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.
- **Charging must be carried out with liquid coolant**. Connect the refrigerant cylinder to the coupling. **Charging must be with liquid refrigerant**. Connect the coolant cylinder to the Schrader connection located downstream of the liquid receiver. Place the cylinder on scales to check and quantify the weight of the coolant injected.
- Charge with refrigerant: if necessary, any charge top up must be carried out on the low pressure side, immediately downstream of the electronic expansion valve.
- Start the machine and start the compressors. **All the machine compressors must be in operation. Compressors with inverter control must be at maximum speed.**
- Check under operating conditions that the refrigerant charge is correct. Please refer to the indicative values below:

- Condensation temperature 45°C. If necessary, partially obstruct the condensing coil or restrict its ventilation;
- Subcooling of the liquid at the inlet of the expansion valve: between 3 and 5K;
- Overheating of vapour at evaporator outlet: between 5 and 8K;
- There must be no bubbles of vapour or foam in the liquid passage indicator. The coolant flow must be continuous and constant.

OBLIGATION:
It is advisable to carry out the charge with caution by introducing small-dose of refrigerant into the circuit until the subcooling and superheating values indicated above are reached.

Machine with remote air-cooled condenser
The values indicated in the table refer to the charge to be performed for each refrigerant circuit of the machine.

x-MEXT-i-G02-DX / x-MEXT-i-G02-DX-DF											
MODEL		**029**	**040**	**051**	**052**	**067**	**076**	**078**	**090**	**108**	**140***
COOLANT		**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**
Gas circuits x refrigerant charge	n x kg	1 x 5.5	1 x 6.6	1 x 6.7	1 x 7	1 x 8.9	1 x 9	2 x 8.6	2 x 8.7	2 x 10.6	2 x 10.7
HFC R410A - F Gas - equivalent CO_2	t	11.5	13.7	14.0	14.6	18.6	18.8	35.9	36.3	44.3	44.7

* model not available in the DF version

x-MEXT-f-G02-DX / x-MEXT-f-G02-DX-DF															
MODEL		**035**	**038**	**042**	**047**	**048**	**054**	**061**	**070**	**075**	**076**	**085**	**98**	**125***	**136***
COOLANT		**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**
Gas circuits x refrigerant charge	n x kg	1 x 5.5	1 x 6	1 x 7.1	1 x 7.1	1 x 7.2	1 x 7.2	1 x 8.9	1 x 8.8	1 x 10	2 x 8	2 x 8.1	2 x 8.1	2 x 9.7	2 x 10.9
HFC R410A - F Gas - equivalent CO_2	t	11.5	12.5	14.8	14.8	15	15	18.6	18.4	20.9	33.4	33.8	33.8	40.5	45.5

* model not available in the DF version

Remote condensers
The remote condensers are supplied with a charge for tightness testing. In the table the charge values for each condenser.

MEGR MC													
MODEL		**013**	**015**	**024**	**027**	**034**	**049**	**055**	**067**	**082**	**110**	**134**	**164**
COOLANT		**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**
Gas circuits x refrigerant charge	kg	0.50	0.50	0.85	0.85	1.30	2.07	2.07	2.56	2.56	4.14	5.12	5.12
HFC R410A - F Gas - equivalent CO_2	t	1.044	1.044	1.774	1.774	2.704	4.322	4.322	5.354	5.354	6.844	10.690	10.690

MEGR TF													
MODEL		**014**	**019**	**028**	**036**	**045**	**057**	**065**	**074**	**088**	**130**	**149**	**176**
COOLANT		**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**	**R410A**
Gas circuits x refrigerant charge	kg	0.8	0.7	1.5	2.3	1.9	2.7	3.8	4.9	4.9	7.6	9.7	9.7
HFC R410A - F Gas - equivalent CO_2	t	1.67	1.46	3.13	4.8	3.97	5.64	7.93	10.23	10.23	15.87	20.25	20.25

4.4.12 Quantity of refrigerant per linear meter

Quantity of refrigerant to be added for each linear meter both on the liquid line and on the discharge line.

External pipe diameter	mm	16	18	22	28	35
Liquid (1)	gr/m	143	186	291	---	---
Gas (2)	gr/m	13	18	28	43	71

External pipe diameter	inches	7/8"	1"	1 1/8"	1 3/8"
Liquid (1)	gr/m	297	398	---	---
Gas (2)	gr/m	28	38	45	70

1. Value referred to Condensing temperature 45°C; Subcooling 4°C, Liquid density 926 kg/m3
2. Value referred to Discharge temperature 78°C; Gas density 87,7 kg/m3

4.4.13 Compressor lubricant oil top up

The compressors are charged with lubricating oil as indicated below:

x-MEXT-i-G02-DX / x-MEXT-i-G02-DX DF x-MEXT-i-G02-DW / x-MEXT-i-G02-DW DF / x-MEXT-i-G02-DW FC		**x-MEXT-f-G02-DX / x-MEXT-f-G02-DX DF x-MEXT-f-G02-DW / x-MEXT-f-G02-DW DF / x-MEXT-f-G02-DW FC**	
MODEL	**OIL TYPE**	**MODEL**	**OIL TYPE**
029	FV 50S	035	POE RL 32-3 MAF
040	FVC68D	038	POE RL 32-3 MAF
051	FVC68D	042	POE RL 32-3 MAF
052	FVC68D	047	POE RL 32-3 MAF
067	FVC68D	048	POE RL 32-3 MAF
076	FVC68D	054	POE RL 32-3 MAF
078	FVC68D	070	POE RL 32-3 MAF
090	FVC68D	075	POE RL 32-3 MAF
108	FVC68D	076	POE RL 32-3 MAF
140	FVC68D	085	POE RL 32-3 MAF
		098	POE RL 32-3 MAF
		125	POE RL 32-3 MAF
		136	POE RL 32-3 MAF

NOTICE:
Avoid exposing the oil to air. The lubricating oil has the particularity of being very hygroscopic and therefore absorbs high quantities of moisture if exposed to the air even for short periods.
The quantity of lubricating oil to be topped up in the circuit must be in the proportion of 6% of the refrigerant injected.
Oil residues not used for topping up must be disposed of and not re-used.

4.4.14 Refrigerant charge for DW machine

The machines with built-in water condenser are supplied with refrigerant charge and do not require the addition of refrigerant fluid or lubricating oil. The factory refrigerant charges are as follows:

x-MEXT-i-G02-DW / x-MEXT-i-G02-DW-DF / x-MEXT-i-G02-DW-FC											
MODEL		**029**	**040**	**051**	**052**	**067**	**076**	**078**	**090**	**108**	**140***
COOLANT		**R410A**									
Gas circuits for refrigerant charge	n x kg	1 x 6.2	1 x 7.3	1 x 7.4	1 x 8.4	1 x 10.3	1 x 10.4	2 x 9.4	2 x 9.5	2 x 12	2 x 12.1
HFC R410A - F Gas - equivalent CO_2	t	12.9	15.2	15.4	17.5	21.5	21.7	39.2	39.7	50.1	50.5

* model not available in the DF / FC version

x-MEXT-f-G02-DW / x-MEXT-f-G02-DW-DF / x-MEXT-f-G02-DW-FC															
MODEL		**035**	**038**	**042**	**047**	**048**	**054**	**061**	**070**	**075**	**076**	**085**	**98**	**125***	**136***
COOLANT		**R410A**													
Gas circuits for refrigerant charge	n x kg	1 x 6.3	1 x 6.9	1 x 7.9	1 x 7.9	1 x 8.7	1 x 8.7	1 x 10.2	1 x 10.2	1 x 11.4	2 x 8.8	2 x 8.9	2 x 9.5	2 x 11.1	2 x 12.3
HFC R410A - F Gas - equivalent CO_2	t	13.2	14.4	16.5	16.5	18.2	18.2	21.3	21.3	23.8	36.7	37.2	39.7	46.4	51.4

* model not available in the DF / F version

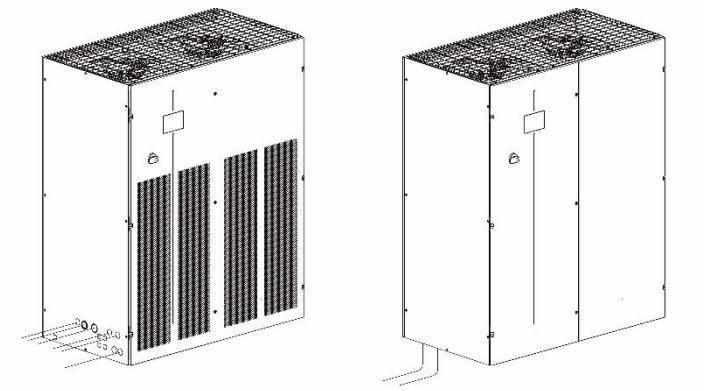
4.5 Hydraulic connections

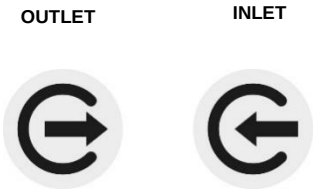
OBLIGATION:
The execution of the hydraulic connection must be carried out by qualified personnel.
All the works, the choice of the components and the materials used must comply with the "Good Practices", according to the regulations in force in the different countries, taking into account the intended operating conditions of the system.

The hydraulic connection to the water exchangers must be defined during the design stage.
Refer to the dimensional drawing of the machine for the spacing of the connections.
The connections are positioned on the left side of the machine when looking at the front. The in and out directions are highlighted by circular plates.

OVER
Connections are external to the

UNDER
Connections are inside to the machine





OBLIGATION:
The maximum pressure of the hydraulic system in operation must not exceed 16 bar.

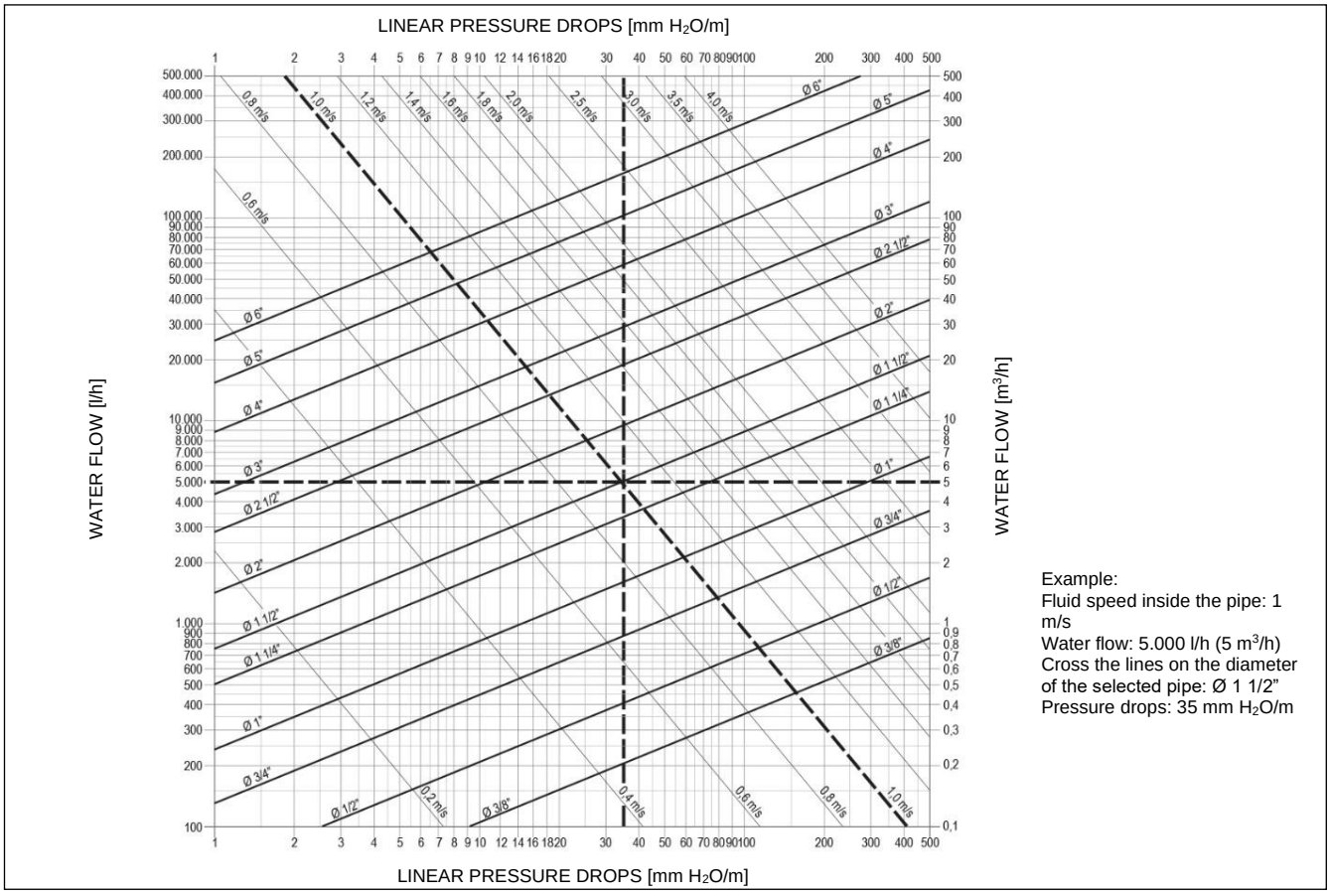
OBLIGATION:
It is absolutely essential that, in the presence of dirty and/or aggressive water, an intermediate heat exchanger is placed upstream of the heat exchangers.

4.5.1 Determination of hydraulic circuit pressure drops

The calculation of the pressure drops of the hydraulic circuit must be defined during the design of the system.
Please refer to the diagrams below for the calculation and check of pressure drops in the hydraulic circuit.

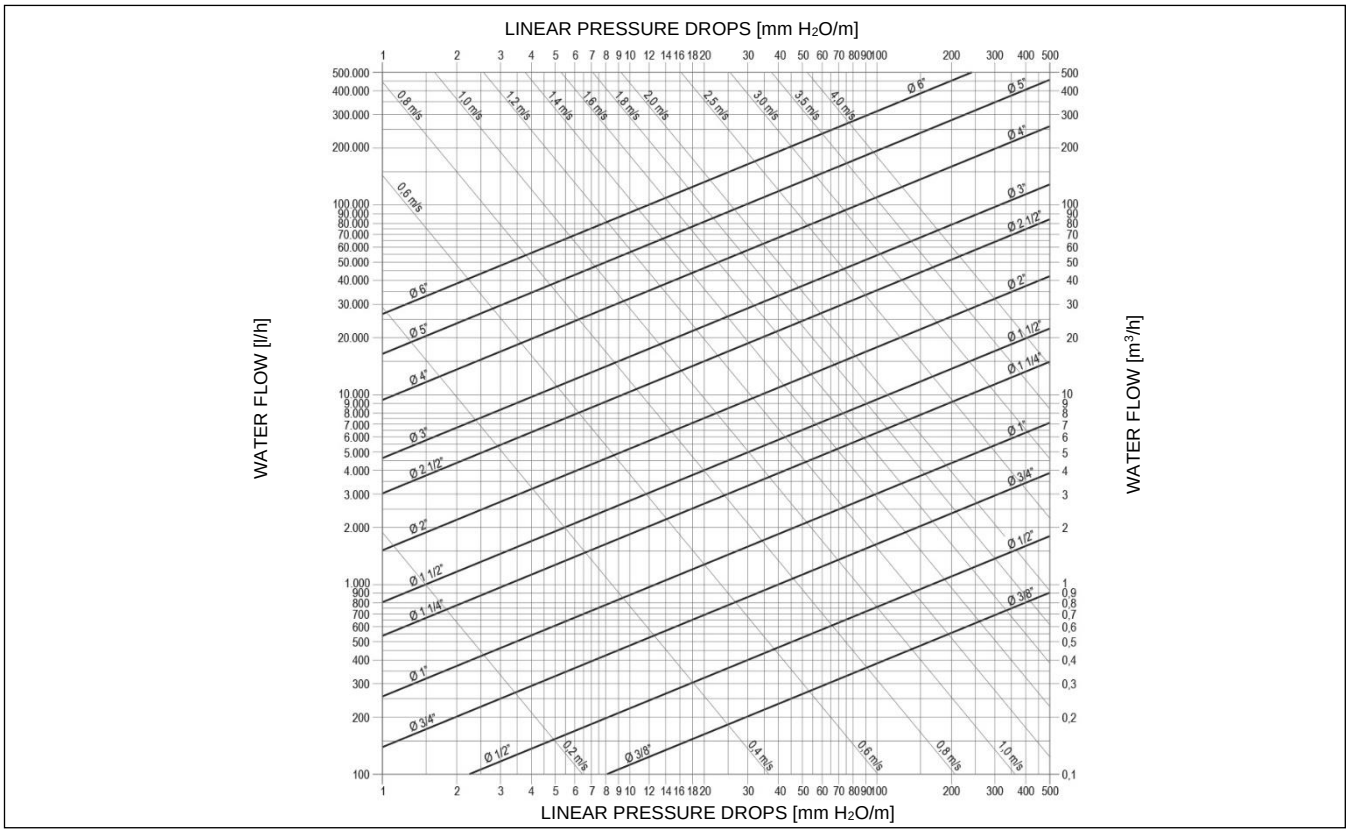
Continuous pressure drops

STEEL PIPES - WATER TEMPERATURE 10°C

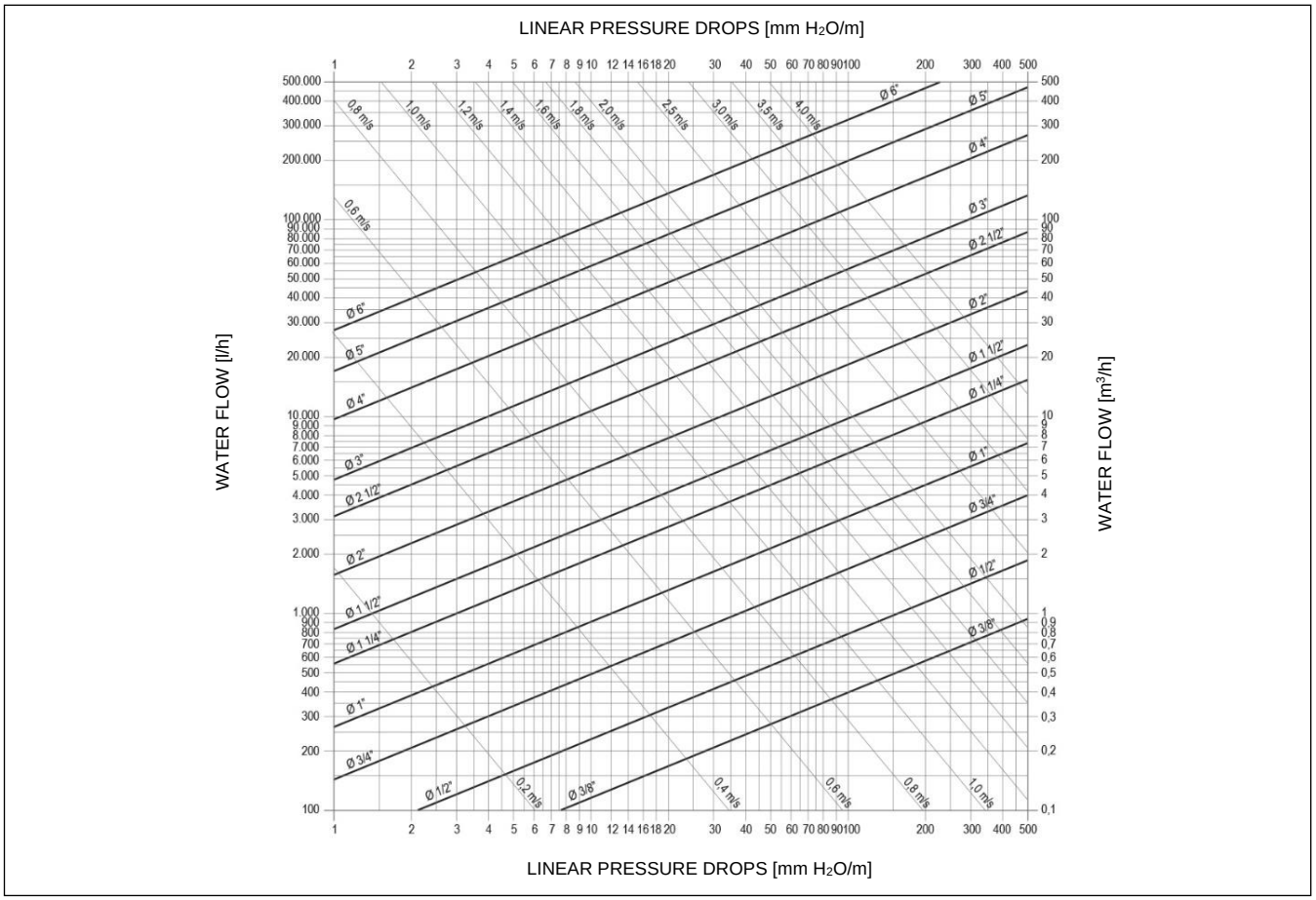


Example:
Fluid speed inside the pipe: 1 m/s
Water flow: 5.000 l/h (5 m^3/h)
Cross the lines on the diameter of the selected pipe: Ø 1 1/2”
Pressure drops: 35 mm H_2O/m

STEEL PIPES - WATER TEMPERATURE 50°C



STEEL PIPES - WATER TEMPERATURE 80°C



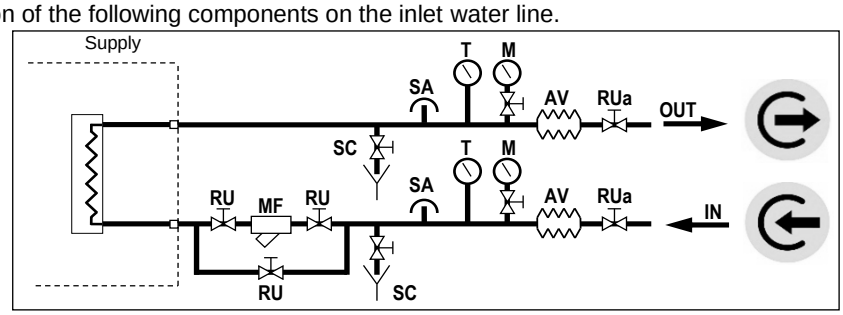
Equivalent lengths (ml) for concentrated pressure drops.
Values for completely open valves.

DN (mm)	Ø (inch)	Globe valve	Globe valve 60°	Globe valve 45°	Valve 90°	Check valve	Curve 90°	Curve 90°	Curve 45°	Curve 180°	Tee
											
10	3/8”	5.1	2.4	1.8	1.8	1.5	0.42	0.27	0.21	0.70	0.82
15	1/2”	5.4	2.7	2.1	2.1	1.8	0.48	0.30	0.24	0.76	0.91
20	3/4”	6.6	3.3	2.7	2.7	2.4	0.61	0.42	0.27	0.98	1.2
25	1”	8.7	4.6	3.6	3.6	3.6	0.79	0.51	0.39	1.2	21.5
32	1 1/4”	11.4	6.1	4.6	4.6	4.2	1.0	0.70	0.51	1.7	2.1
40	1 1/2”	12.6	7.3	5.4	5.4	4.8	1.2	0.80	0.64	1.9	2.4
50	2”	16.5	9.1	7.3	7.3	6.1	1.5	1.0	0.79	2.5	3.0
65	2 1/2”	20.7	10.7	8.7	8.7	7.6	1.8	1.2	0.98	3.0	3.6
80	3”	25.2	13.1	10.7	10.7	9.1	2.3	1.5	1.2	3.6	4.6
90	3 1/2”	30.5	15.2	12.5	12.5	10.7	2.7	1.8	1.4	4.6	5.4
100	4”	36.8	17.7	14.6	14.6	12.2	3.0	2.0	1.6	5.1	6.4
125	5”	42.6	21.6	17.7	17.7	15.3	4.0	2.5	2.0	6.4	7.6
150	6”	52.0	26.8	21.4	21.4	18.3	4.9	3.0	2.4	7.6	9.1
200	8”	67.1	35.1	26.0	26.0	24.4	6.1	4.0	3.0	10.4	10.7

4.5.2 Hydraulic connection to water coils

This diagram applies to the hydraulic circuit of the additional coil of the Dual Fluid / Free-Cooling system
The water inlet and outlet pipes can be identified by the labels applied directly on the machine.

During the design phase, envisage the installation of the following components on the inlet water line.



- **RUa - Shutoff valve**: for the hydraulic detachment of the heat exchanger from the plant during maintenance.
- **AV - Anti-vibration**: to isolate the vibrations that can be transmitted from the system.
- **M - Pressure gauge** (with stopcock): indicates the water pressure in the inlet line.
- **T - Thermometer**: indicates the water temperature in the inlet line.
- **SA - Air vent**: to eliminate air in the inlet line.
- **SC - Drain valve**: to drain water out of the system. To be used also for connecting an external pump for chemical washing.

MF - Mains filter: (with RU tap system for filter cleaning): to trap impurities inside the system (with particle filtration degree not less than 140 mesh = 105 microns).

Assemble the following components on the water outlet line.

- **RUa - Shut-off valves**: for shutting off the supply of water to the machine during maintenance.
- **AV - Anti-vibration**: to isolate the vibrations that can be transmitted from the system.
- **M - Pressure gauge** (with stopcock): indicates the water pressure in the inlet line.
- **T - Thermometer**: indicates the water temperature in the outlet line.
- **SA - Air vent**: to eliminate air in the outlet line.
- **SC - Drain valve**: to drain water out of the system. To be used also for connecting an external pump for chemical washing.

Install an expansion vessel with a safety valve in the hydraulic circuit. The hydraulic circuit must be sized according to the applicable laws in force.

Diameters of the hydraulic connections and water content (volume) for chilled water cooling coil.

WATER COIL TECHNICAL DATA

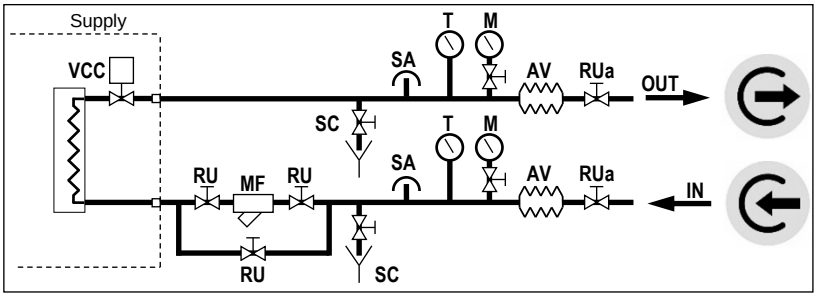
SIZE		M	L	XL
Water content	l	9.2	12.5	20.3
HYDRAULIC CONNECTION				
WATER INPUT / OUTPUT - ISO 7/1 - R	Ø	1 1/2”	2”	2 1/2”

4.5.3 Hydraulic connection to built-in water-cooled condenser (DW)

This diagram is valid for the hydraulic circuit of the following heat exchangers:

- **Water condenser**: connect the condenser to the cooling water distribution hydraulic circuit. The circuit can be:
  - open: cooling tower with water hardness control system / open-to -recycle well system.
  - close: with remote dry cooler.
- **Free-Cooling system**: with water cooled condenser and additional coil connected to a remote dry cooler.

We recommend isolating the hydraulic lines.



VCC = Modulation 2-way valve for condensing control. It is supplied as an accessory by the manufacturer for Dual Fluid versions.

During the design phase, envisage the installation of the following components on the inlet water line.

- **RUa - Shut-off valves**: for shutting off the supply of water to the machine during maintenance.
- **AV - Anti-vibration**: to isolate the vibrations that can be transmitted from the system.
- **M - Pressure gauge** (with stopcock): indicates the water pressure in the inlet line.
- **T - Thermometer**: indicates the water temperature in the inlet line.
- **SA - Air vent**: to eliminate air in the inlet line.
- **SC - Drain valve**: to drain water out of the system. To be used also for connecting an external pump for chemical washing.
- **MF - Mains filter:** (with RU tap system for filter cleaning): to trap impurities inside the system (with particle filtration degree not less than 140 mesh = 105 microns).

Assemble the following components on the water outlet line.

- **RUa - Shut-off valves**: for shutting off the supply of water to the machine during maintenance.
- **AV - Anti-vibration**: to isolate the vibrations that can be transmitted from the system.
- **M - Pressure gauge** (with stopcock): indicates the water pressure in the inlet line.
- **T - Thermometer**: indicates the water temperature in the outlet line.
- **SA - Air vent**: to eliminate air in the outlet line.
- **SC - Drain valve**: to drain water out of the system. To be used also for connecting an external pump for chemical washing.

Install an expansion vessel with a safety valve in the hydraulic circuit. The hydraulic circuit must be sized according to the applicable laws in force.

Diameters of the hydraulic connections and water content of the built-in water-cooled condenser

SIZE		M	L	XL
Water-cooled condenser volume	lt	3.6	3.6 – 6.1	2 x 3.6 – 2 x 6.1
HYDRAULIC CONNECTION				
WATER INPUT / OUTPUT - ISO 7/1 - R	Ø	1 1/2”	2”	2 1/2”

4.5.4 Water content for linear meter of pipe

Pipe diameter	1”	1 1/4"	1 1/2"	2”	2 1/2"	3”
Litres	0.58	1.02	1.38	2.21	3.85	5.28

4.5.5 Installation technical notes

The connection pipes must be suitably supported so that they do not weigh down on the machine.
Avoid rigid connections between the machine and the pipes, and install vibration dampers.
For temperatures values, minimum and maximum water flow rates and the volumes of water in the heat exchanger water circuit refer to the technical bulletin.

4.5.6 Cleaning and filling the hydraulic circuit

OBLIGATION:
Wash the pipes of the hydraulic circuits to remove any processing residues and other dirt inside.
This operation must be performed to avoid damaging the parts of the machine.

After washing, check the hydraulic circuits for any leaks. To do this, load the circuits at a pressure higher than atmospheric pressure and check that there are no pressure leaks over time.

INFORMATION:
The thermal insulation of the pipes outside the machine is the responsibility of the installer and must only be completed after ascertaining that there are no leaks.

If other products are expected, in addition to mixtures of water and ethylene or propylene glycol, contact the manufacturer's technical office.

Both the finned water coil and the water-cooled condenser have air vent valves:

- Finned water coil: the vent valves are located at the front of the unit and are connected to the finned water coil manifolds.
- Water-cooled condenser: the vent valve is located on the water outlet pipe of the condenser.

4.5.7 Water quality

OBLIGATION:
The values shown in the table must be guaranteed during the entire life cycle of the machine.

	Description	Symbol	Range values
1	Hydrogen ions	pH	7.5 - 9
2	Presence of calcium (Ca) and magnesium (Mg)	Hardness	4 ÷ 8.5 °D
3	Chloride ions	Cl^-	< 150 ppm
4	Iron ions	Fe^{3+}	< 0.5 ppm
5	Manganese ions	Mn^{2+}	< 0.05 ppm
6	Carbon dioxide	CO_2	< 10 ppm
7	Hydrogen sulphide	H_2S	< 50 ppb
8	Oxygen	O_2	< 0.1 ppm
9	Chlorine	Cl_2	< 0.5 ppm
10	Ammonia NH_3	NH_3	< 0.5 ppm
11	Ratio between carbonates and sulphates	HCO_3-/SO_4^{2-}	> 1
12	Sulphate ions	SO_4^{--}	< 100 ppm
13	Phosphate ions	PO_4^{3-}	< 2.0 ppm

where: 1/1.78°D = 1°Fr with 1°Fr = 10 gr $CaCO_3$ / m^3 - ppm = parts per million - ppb = parts per billion

Explanatory notes:

ref. 1:	Concentrations of hydrogen ions greater than those indicated implies a high risk of deposits, whereas concentrations of hydrogen ions lower than those indicated implies a high risk of corrosion;
ref. 2:	The hardness measures the amount of Ca and Mg carbonate dissolved in the water with a temperature lower than 100°C (temporary hardness). A high hardness implies a high risk of deposits;
ref. 3:	concentrations of chloride ions higher than those indicated causes corrosion;
ref. 4 - 5 - 8:	the presence of iron and manganese ions and oxygen leads to corrosion;
ref. 6 - 7:	carbon dioxide and hydrogen sulphide are impurities that promote corrosion;
ref. 9:	In water from the waterworks it is a value of between 0.2 and 0.3 ppm. High values cause corrosion;
ref. 10:	The presence of ammonia reinforces the oxidising power of oxygen
ref. 11:	Below the value shown in the table, there is a risk of corrosion due to the trigger of galvanic currents between copper and other less noble metals.
ref. 12:	the presence of sulphate ions leads to corrosion;
ref. 13:	the presence of phosphate ions leads to corrosion.

Checks should be carried out on a regular basis, taking samples at various points of the hydraulic system.
During the first year of operation, it is recommended to perform checks every 4 months. Checks can then be performed once every six months as from the second year of operation.

OBLIGATION:
Parameter values outside the indicated ranges may lead to the formation of deposits and scale, and/or encourage the occurrence of corrosive phenomena inside the system. In case of service fluids other than water (e.g. ethylene or propylene glycol), it is advisable to always use special inhibitors that offer thermal stability within the operating temperature ranges and protection against corrosion phenomena.
It is absolutely essential that, in the presence of dirty and/or aggressive water, an intermediate heat exchanger is placed upstream of the heat exchangers.

4.5.8 Anti-freeze solutions

In plants that are not adequately protected by heating cables, protect the hydraulic circuit with an anti-freeze mixture when the ambient air temperature can drop below 5°C.

		suggested % by weight								
		%	0	12	20	30	35	40	45	50
ETHYLENE GLYCOL	**Minimum ambient air temperature**	°C	5	0	-5	-10	-15	-20	-25	-30
PROPYLENE GLYCOL	**Minimum ambient air temperature**	°C	5	2	-3	-9	-13	-17	-23	-29

The values shown are indicative and may vary depending on the manufacturer. Refer to your glycol supplier for more details.
The values indicated consider a precautionary difference of 5°C between the minimum outside air temperature and the freezing temperature of the solution.

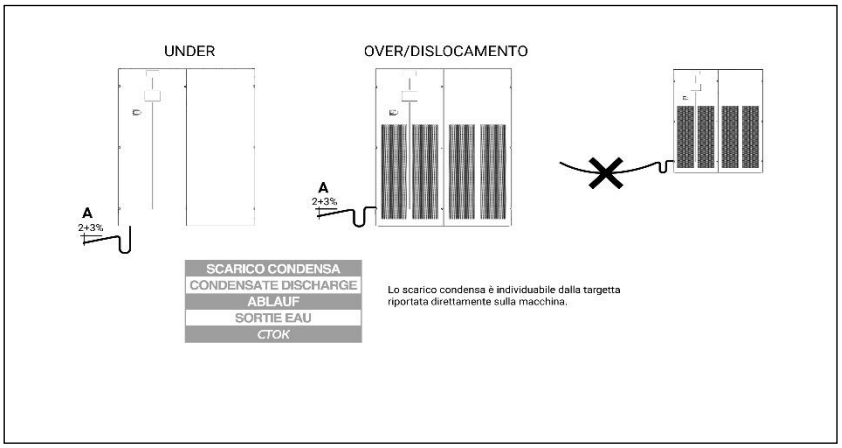
Do not use fluids other than water or ethylene glycol/propylene glycol water solutions in the hydraulic circuit.
If other products are provided, in addition to mixtures of water and ethylene or propylene glycol, contact the Manufacturer to check the compatibility with the machine components.

4.6 Hydraulic connection of the condensate drain

The connection of the condensate drain must be carried out as decided during the design stage.

SUPPLY
The condensate drain pipe is made of plastic (internal Ø 19 mm) and is connected to the collection tank. It takes the condensate drain just outside the machine. The condensate drains by gravity.

BY THE INSTALLER
Set up a trap (A) in the vicinity of the machine, as shown in the figure.
Fill the trap with water.
Ensure a 2 - 3% gradient of the pipe down towards the drain.
Keep the same internal diameter for drain pipes of up to 4 - 5 metres.
For greater lengths, increase the section of the drain.



The condensate drain can be identified on the plate affixed directly on the machine.

OBLIGATION:
No part of the drain line should be uphill.

The connection pipes must be suitably supported so that they do not weigh down on the machine.

4.7 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 characteristics of the power supply network must comply with the IEC 60335-2-40 standards and the local standards in force and be suited to the absorption of the machine indicated in the chapter ELECTRICAL DATA, in the wiring diagram, and on the data plate.
- The machine must be connected to a three-phase power supply type TN (S). Should the installation of a circuit breaker be envisaged in the electrical system, it must be type A or B.
- The machine power cable of Class I appliances has a green/yellow core for grounding.
- Be sure to leave a slightly longer ground wire so that the current-carrying conductors become taut before the ground wire. If the cable slips out, anchor it.
- In the case of multi-phase appliances, the colour of the neutral conductor of the power cable is blue.
- Refer to local bylaws. Power electrically the machine only if the refrigerant / water circuit is charged.

OBLIGATION:
The electricity power supply line must be fitted with a general switch for the disconnection of the machine from the energy source.

In accordance with the IEC 60204-1 standard, the handle of the circuit breaker must be easy to access and at a height between 0.6 and 1.9 metres from the floor.

The power supply must never be excluded, except during maintenance operations, to guarantee the operation of the electric heater of the compressor crankcase.
If the power cable is damaged, it must be replaced by the manufacturer, ITS service personnel, or qualified personnel in order to avoid any risks.
The power cable must be replaced with at least a standard polyvinyl chloride cord.

4.7.1 Electrical data

For the electrical sizing, please refer to the wiring diagram supplied with the unit. The information given in the wiring diagram includes the electrical data of the machine under maximum operating conditions, complete with any installed optional accessories.

Below are the electrical data for the maximum operating conditions of the internal unit alone, in the basic configuration and without accessories:

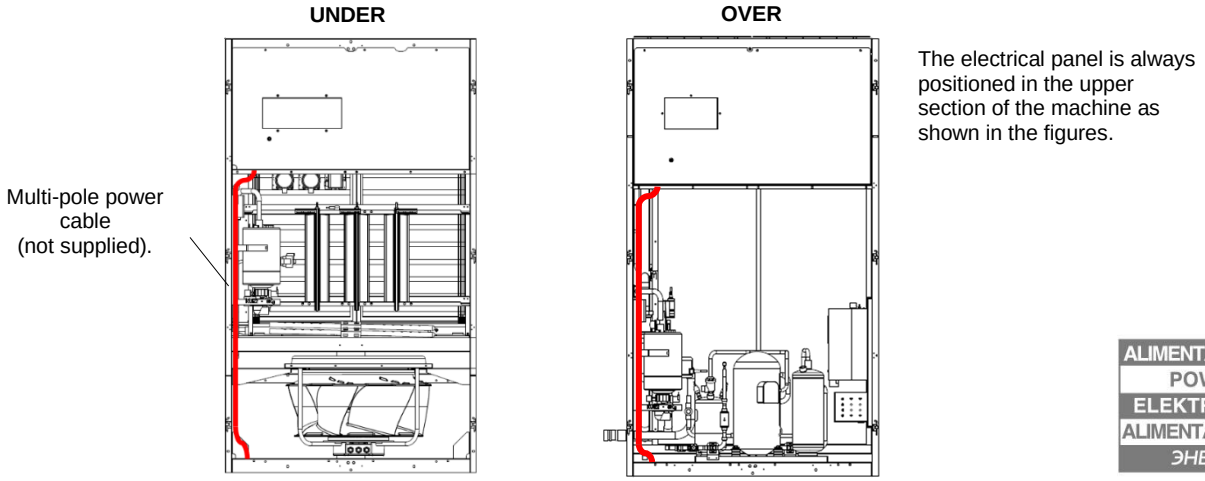
x-MEXT-i-G02-DX / x-MEXT-i-G02-DX DF /x-MEXT-i-G02-DW / x-MEXT-i-G02-DW DF / x-MEXT-i-G02-DW FC											
MODEL		**29**	**40**	**51**	**52**	**67**	**76**	**78**	**90**	**108**	**140**
Power supply	V/ph/Hz	400/3/50									
Maximum absorbed current (FLA)	A	31,6	41,5	41,5	47	57,4	57,4	82	82	108	108

x-MEXT-f-G02-DX / x-MEXT-f-G02-DX DF /x-MEXT-f-G02-DW / x-MEXT-f-G02-DW DF / x-MEXT-f-G02-DW FC														
MODEL		**035**	**038**	**042**	**047**	**048**	**054**	**061**	**070**	**075**	**076**	**85**	**98**	**125**	**136**
Power supply	V/ph/Hz	400/3/50													
Maximum absorbed current (FLA)	A	25.1	26.8	29.9	35.5	35.4	41.0	43.5	49.2	52.6	52.6	58.7	75.4	91.9	98.7

INFORMATION:
The electrical data provided only refer to the internal unit. The electrical data for the optional accessories are indicated in the dedicated chapters and must be added.
Refer to the “ELCA WORLD” selection program to calculate the electrical data for the air conditioner based on the optional accessories required.
In case of discrepancies between the data in the manual and the wiring diagram, always refer to the wiring diagram supplied with the unit.

4.7.2 Power supply for packaged machine

Use a multipole conductor with protective sheath. The power cable section depends on the maximum absorbed current of the machine (A) as shown in the dedicated wiring diagram, in the technical bulletin and in the identification label.
To insert the power cable in the machine, use the holes provided by the Manufacturer in the base (UNDER version) or in the side panel (OVER version).
Secure the power cable to the appropriate positions inside the unit using cable ties. Do not touch hot or sharp surfaces.
Connect the power cable to the terminals of the door locking switch and to the ground terminal. The power cable must not be placed into the machine cable ducts.



ALIMENTAZIONE ELETTRICA
POWER SUPPLY
ELEKTROEINSPEISUNG
ALIMENTATION ÉLECTRIQUE
ЭНЕРГОПИТАНИЕ

4.7.3 Auxiliary electric connections

The command and control circuit is derived inside the electrical panel, from the power circuit. The auxiliary connections are present in the terminal board contained in the electrical panel of the machine
Connections required:

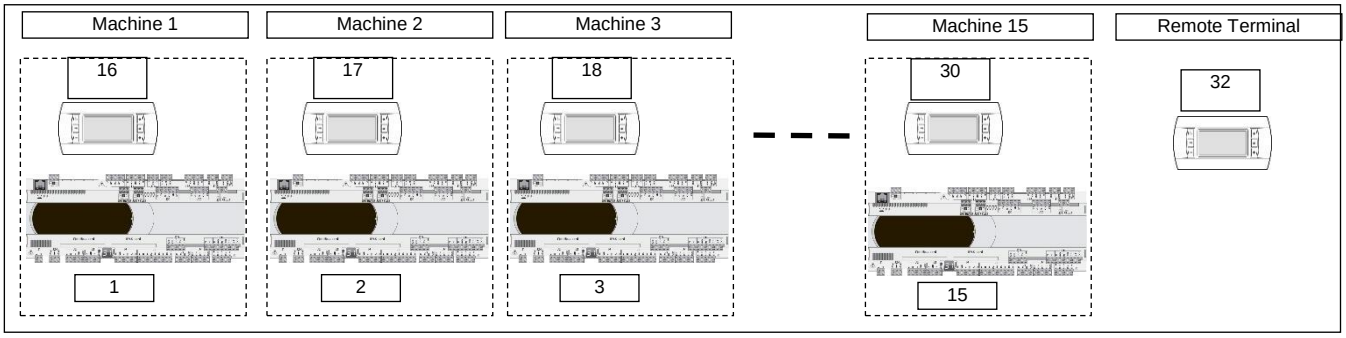
- 0-10 Vdc signal and alarm return (one for each cooling circuit), to be connected to the remote air-cooled condenser for condensing control (DX series)
- Remote on/off (for all series – live contact);
- Two configurable general alarm signals (for all series - voltage-free contact);
- Machine operating status output (for all series – voltage-free contact);
- Possible auxiliary outputs (refer to the wiring diagram);

It is recommended that any auxiliary connection cables are separate from power cables. Otherwise, screened cables should be used.
For electrical connections, refer to the electrical diagram of the machine.

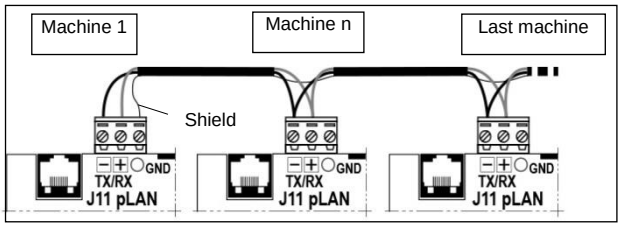
4.7.4 LAN network connection

Max 15 machines connected in LAN. Machines addressing:
Each machine in the LAN network (programmable controller or machine terminal) is identified by a unique address. The Remote Terminal has address 32.

Machine #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	--
Motherboard address	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	--
Terminal address	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	32



Connection between the machines:
LAN connection is performed using only a twisted pair AWG24 shielded cable + sheath.
Maximum LAN network length: 500m.
Respect the network polarity RX/TX+, RX/TX- and GND
The electrical connections are on the controller terminal board.



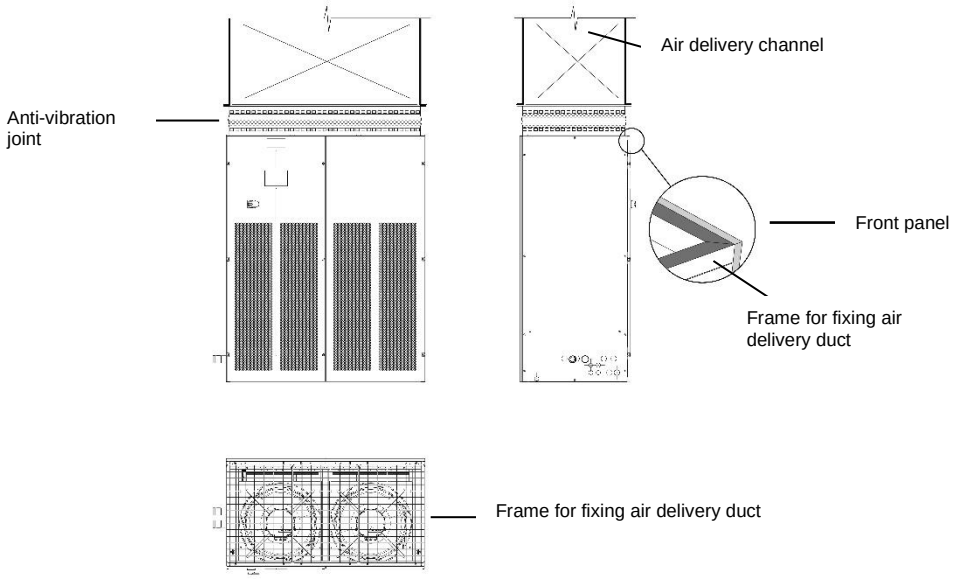
4.8 Air connections

4.9 Air delivery channel for OVER machines

The sizing of the ducts must be defined at the system design stage. Refer to the nominal and maximum useful head values of the machine indicated in the relevant Data Book.
Duct pressure drops must be limited, as high values will cause an increase of fan power consumption.

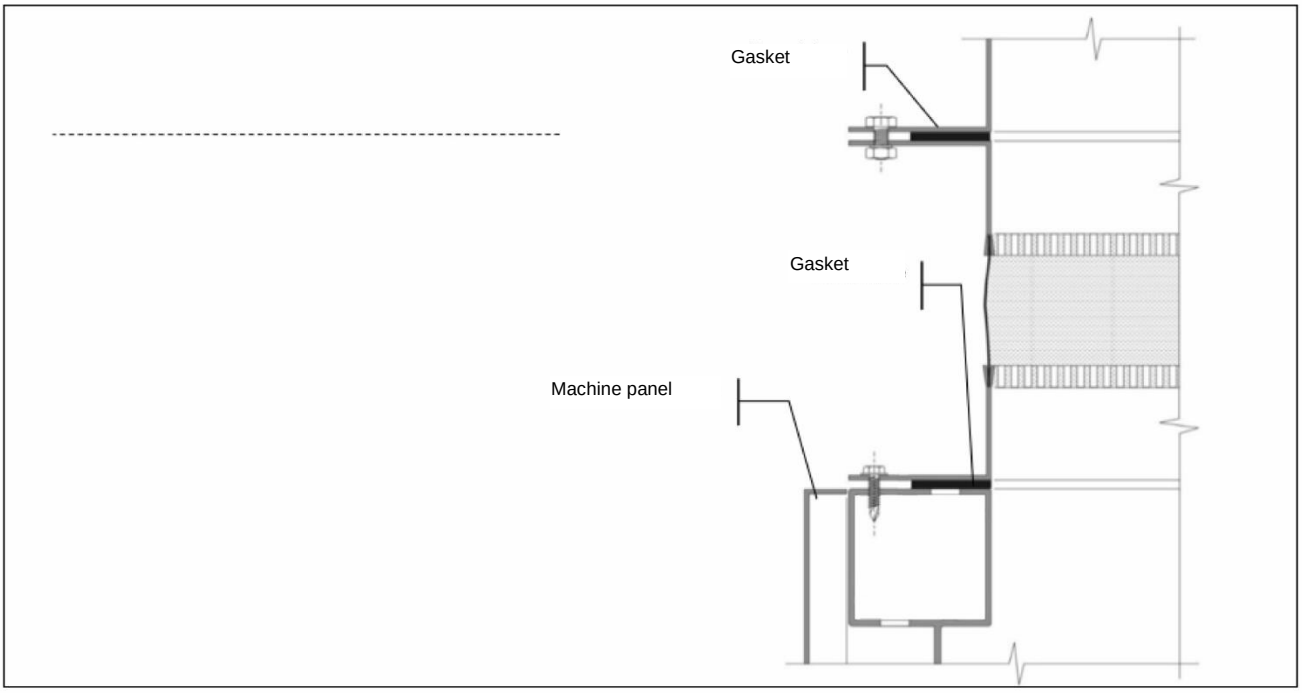
Install an anti-vibration joint between the machine and the delivery duct:

- **Air delivery duct (not supplied):** secure the air delivery duct to the anti-vibration joint as shown in the figure (fastening system not supplied). Interpose a gasket as shown in the figure (not supplied).
- **Anti-vibration joint (not supplied):** the anti-vibration joint prevents the transmission of vibrations to the ducts.
- **Machine upper frame:** secure the anti-vibration joint to the machine frame using self-tapping screws as shown in the figure. Interpose a gasket as shown in the figure (not supplied).



Size		M	L	XL
A	mm	1080	1538	2488
B	mm	760	760	760

4.9.1 Channel fastening



OBLIGATION:
Make sure that the weight of the duct is not supported by the machine support frame.

4.9.2 Air delivery for UNDER machines

The underfloor arrangement of the air delivery system must be defined at the system design stage. Refer to the nominal and maximum useful head values of the machine indicated in the relevant Data Book.
Pressure drops in the raised floor must be minimal; high values will cause an increase in electricity consumption of the fans.

OBLIGATION:
Avoid the presence of obstacles of any kind in the raised floor as they prevent proper air circulation by increasing the air side pressure drops
The air outlet grilles of the raised floor must be suitably calibrated, if possible, to guarantee the correct air flow defined in the design phase.

4.10 Options

OBLIGATION:
All assembly, positioning and maintenance operations must be carried out with adequate means and by skilled personnel, trained and authorized for this type of manoeuvres.

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

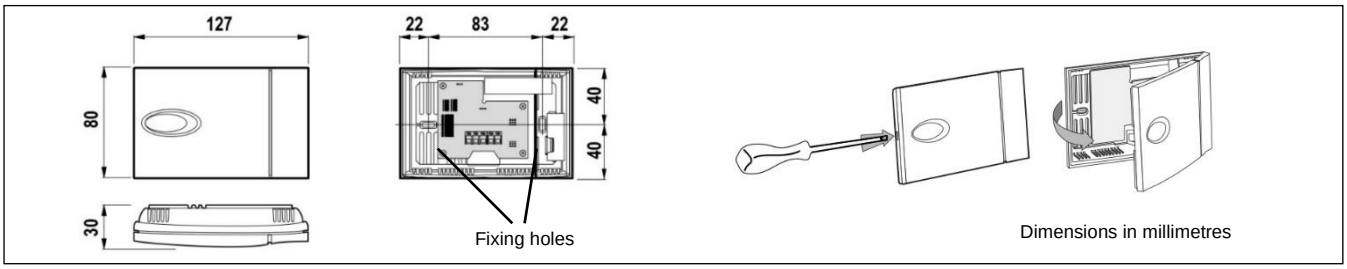
OBLIGATION:
Any maintenance and / or replacement operations on the refrigerant circuit must be carried out by qualified personnel.
All work must be carried out in accordance with the "GOOD RULE", according to the current regulations in force in the various countries, taking into account the operating conditions and the uses to which the plant is destined.

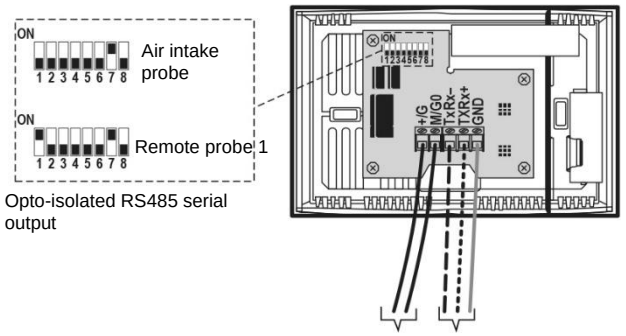
INFORMATION:
Design errors and / or errors in the cooling circuit can cause irreparable compressor failure or malfunctions.

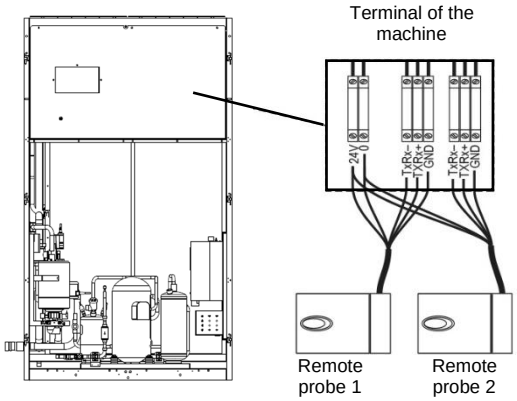
4.10.1 Serial probes for temperature and humidity

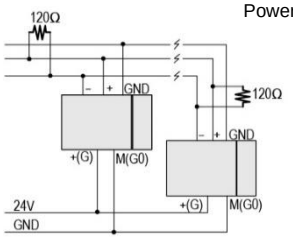
OBLIGATION:
The probe must be installed protected by atmospheric agents.

For the installation use the fixing holes as shown in the figure. The connection cable must be connected to the machine's terminal board.
Avoid direct contact of the connection cable with hot or sharp surfaces. If the connecting cable is not supplied, use a twisted pair AWG 20 cable with shielding.









OBLIGATION:
For electrical connections with a connection cable longer than 100 m, install a 120 Ω resistor as shown in the figure.

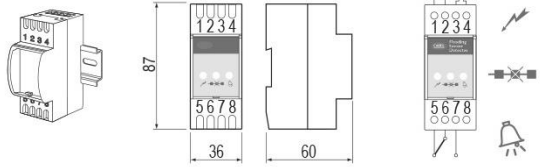
4.10.2 Floor water sensor

The system includes an electronic relay installed in the machine electrical panel and a water sensor (supplied as part of the documentation)
The 10 KΩ resistor is located on the relay inside the electrical panel, while the electrical connections for the probe and alarm contact are in the machine terminal board. Refer to the electrical diagram of the machine for the numbering of the cables and terminals. Install the water probe in the point defined in the design phase and connect it to the machine terminal block.

TECHNICAL CHARACTERISTICS

Input voltage	24V ~ 50/60Hz
Alarm relay circuit	250 Vac; 2A resistive / inductive
Index of protection	IP40
Probe cable section	2 x 1,5mm2 (cable not supplied)
Max cable length	500m
Working conditions	from -10°C to 60°C with 95% RH, non- condensing

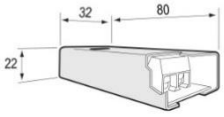
ELECTRONIC RELAY



Notification LED:
Green: Power on
Yellow: Probe not connected, or line not closed with 10KΩ resistor
Red: Alarm – water presence

Terminals of the relay:
1-2: Power supply 24Vac – 50/60Hz
3-4: Probe connection
5-6: N.C. alarm contact
6-7: N.O. alarm contact

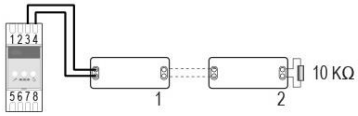
WATER PROBE



Point probe

Metal box to be placed on the ground.
The probe includes terminals for electrical connections.
The sensitive element is present in the part to install on the ground

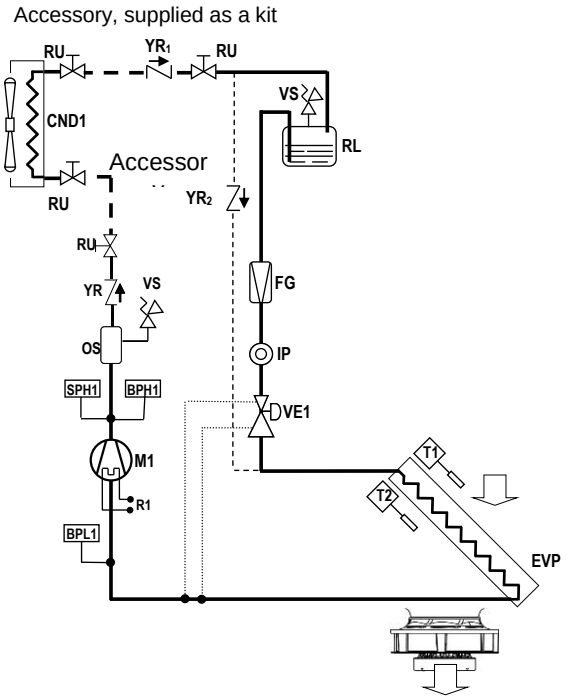
ADDITIONAL PROBE



The additional probe must be connected in series to the previous one.
Total max length of the cable 500 m.
Close the circuit of the probe with the 10 KΩ resistor supplied with the probe.

4.10.3 Low outdoor temperature kit
4.10.4 Low outdoor temperature kit + additional liquid receiver
4.10.5 Additional liquid receiver

Low outdoor temperature kit
Low outdoor temperature kit + additional liquid receiver



LEGENDA

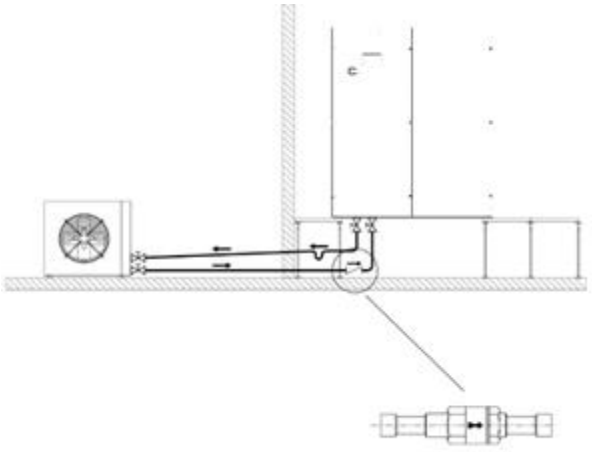
M1	Compressor
R1	Crankcase heater
CND	Condenser
EVP	Evaporator
BPH	High pressure transducer
BPL	Low pressure transducer
SPH	High pressure safety switch
YR	Check valve
OS	Oil separator
VS	Safety valve
FG	Drier filter
IP	Sight glass
VE	Expansion valve
T	Temperature probe
RU	Taps.
RL	Liquid receiver
YR1	Check valve to be installed on the liquid line close the machine inside the room
YR2	Unidirectional check valve with controlled opening that limits pressure rising on the liquid line

The system is necessary to ensure the correct start and operation of the unit at very low outside air temperatures: between -20°C and -40°C (the minimum attainable temperature depends on the remote condenser used, with AC fans (- 40°) or EC fans (- 35°).

For each cooling circuit, the accessory provides for:

- A check valve (YR1), **supplied in a kit**, to be installed inside the room near the unit, on the liquid line leaving the outdoor remote condenser. It avoids the migration towards the condenser of the refrigerant in the liquid state in conditions of low ambient air temperature.
  The valve must have the same diameter as the liquid line pipe and must be positioned close to the machine, inside the room. During the installation, pay attention to the direction of the flow (indicated on the valve). Do not put weight on the pipe.

- A check valve (YR2) with controlled opening, installed on the unit at the factory. It limits pressure increases in the liquid pipe section between the expansion valve and the check valve (YR1).



- 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.

INFORMATION:
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.

- **Low outdoor temperature kit + additional liquid receiver**

  Besides the low temperature kit, it is also possible to request an additional liquid receiver, to be installed on the liquid line outside the unit (see the recommended minimum volumes in the table below).

Additional liquid receiver

In installations with an equivalent length of the refrigerant lines of more than 25 m, the installation of an additional liquid receiver is recommended, on the outside liquid line.

Table of minimum recommended volumes:

x-MEXT-i-G02-DX / x-MEXT-i-G02-DX DF											
MODEL		**29**	**40**	**51**	**52**	**67**	**76**	**78**	**90**	**108**	**140**
Additional receiver volume	l	4.8	6	6	4.8	8	8	2 x 6	2 x 6	2 x 8	2 x 8

x-MEXT-f-G02-DX / x-MEXT-f-G02-DX DF															
MODEL		**035**	**038**	**042**	**047**	**048**	**054**	**061**	**070**	**075**	**076**	**85**	**98**	**125**	**136**
Additional receiver volume	l	4.8	4.8	6	6	6	6	8	8	8	2 x 6	2 x 6	2 x 6	2 x 8	2 x 8

Liquid receivers are supplied with a safety valve and must be installed in a vertical position.

4.11 Dirty filter air differential pressure switch

Dirty filter air differential pressure switch.

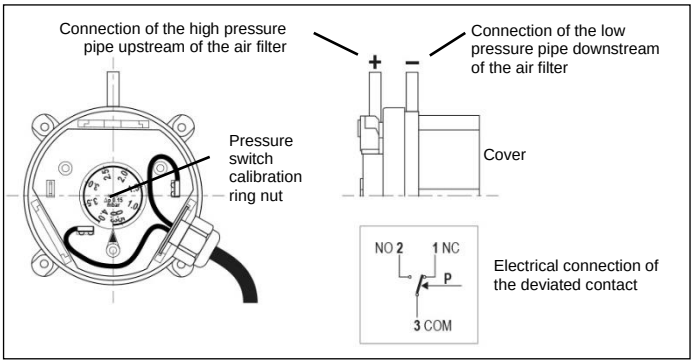
The system is installed inside the unit, below the QE, and consists of the pressure switch and the pressure detection pipes upstream and downstream of the filter section.

Technical features

Electrical data:	1.0A max / 250 Vac
Electrical connection:	6.3 x 0.8 mm Faston connector
Protection class:	IP54
Field of adjustment:	0.2 … 3.0 mbar (20 … 300 Pa)
Differential for intervention:	0.15 mbar (15 Pa)
Operation conditions:	from -20°C to 85°C

ALWAYS INSTALL THE PRESSURE SWITCH IN ITS UPRIGHT POSITION.

Calibration of the pressure switch
With the machine running, gradually cover the air filter surface and check that the pressure switch triggers at an approximate level of cover of the filtering surface of 50-60%.
In the event of triggering failure or premature triggering, re-calibrate the pressure switch and check that triggering occurs as required.



4.12 Air flow notification air differential pressure switch

Dirty filter air differential pressure switch.

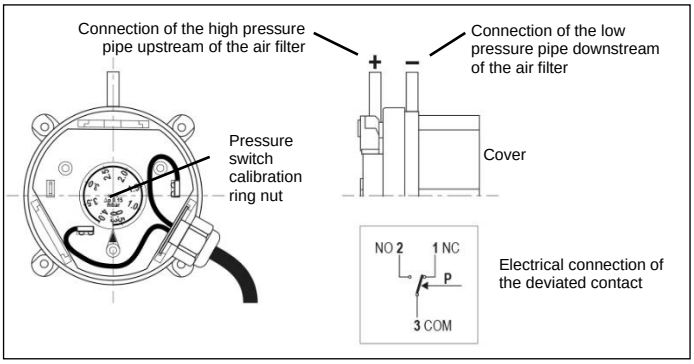
The system is installed inside the unit, below the QE, and consists of the pressure switch and the pressure detection pipes upstream and downstream of the filter section.

Technical features

Electrical data:	1.0A max / 250 Vac
Electrical connection:	6.3 x 0.8 mm Faston connector
Degree of protection:	IP54
Field of adjustment:	0.2 … 2.0 mbar (20 … 200 Pa)
Differential for intervention:	0.10 mbar (10 Pa)
Operation conditions:	from -20°C to 85°C

ALWAYS INSTALL THE PRESSURE SWITCH IN ITS UPRIGHT POSITION

Calibration of the pressure switch
With the machine running, gradually cover the air filter surface and check that the pressure switch triggers at an approximate level of cover of the filtering surface of 50-60%.
In the event of triggering failure or premature triggering, re-calibrate the pressure switch and check that triggering occurs as required.



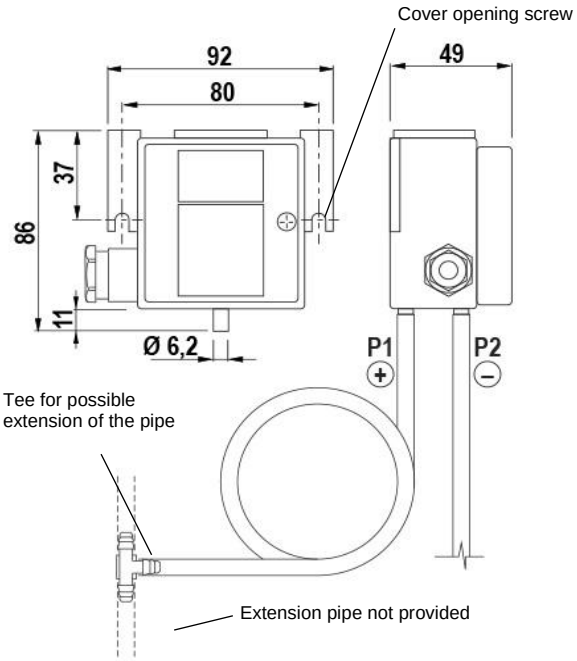
4.13 Control of the air pressure or air flow

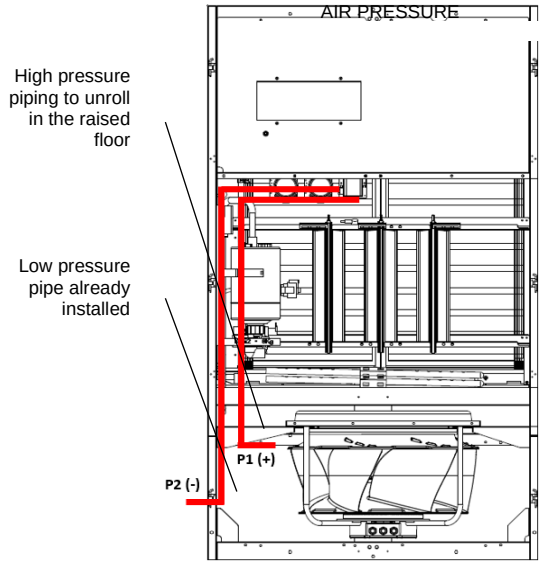
The accessory is installed in the front compartment of the machine. The system controls the rotation speed of the fans in order to keep the air pressure or air flow constant.
It is possible to carry out only one check, of either the pressure or the air flow.

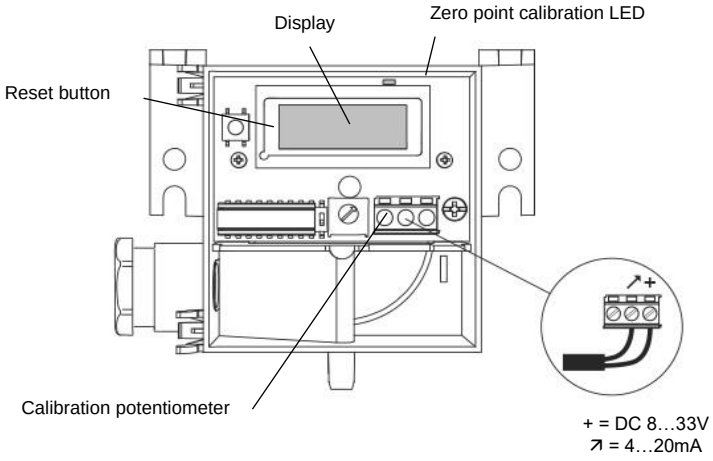
Features

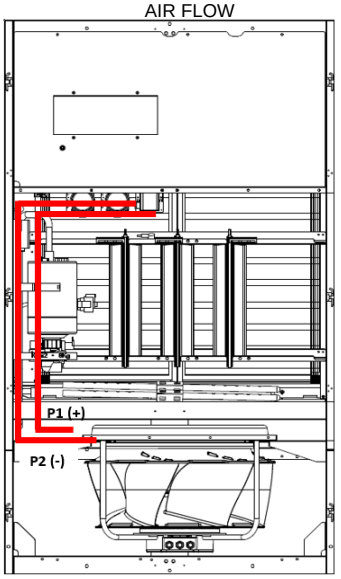
Power supply	DC 8...33V
Power cable	max 1,5 mm2
Output signal	4 … 20 mA
Measurement range:	
minimum = 4 mA:	0 Pa – With root extraction 100 Pa
maximum = 20 mA:	100 Pa – air pressure
	1000 Pa – Air flow
Degree of protection	IP 54
Operating temperature	0 … 70°C
Max humidity	< 90% UR non- condensing

- Install the sensor in a vertical position.
- If the pressure connection fittings are pointing upwards or are lower than the pressure relief piping, condensation can accumulate inside the sensor causing damage to the device.
- Do not crush the pressure relief plastic hoses
- The plastic pipes must have wide curves to facilitate pressure relief
- The device can be installed horizontally. In this case it is necessary to reset the device using the appropriate button for more than 2 seconds until the LED lights up.

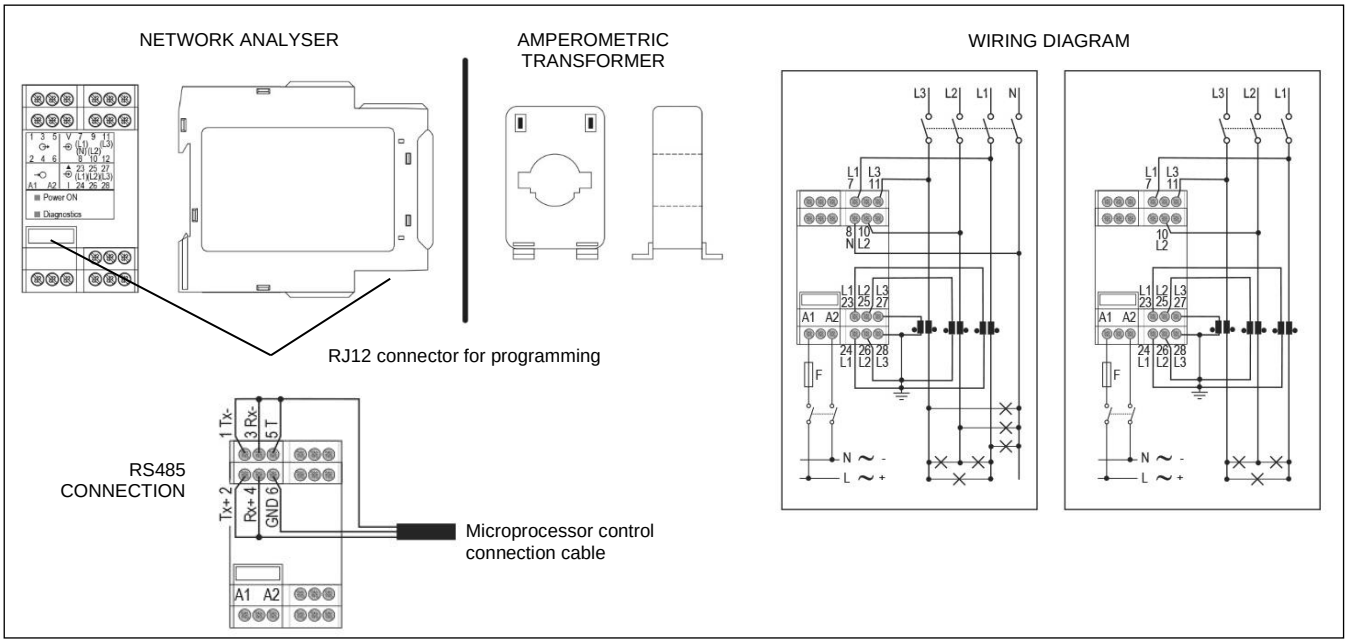

Cover opening screw
92
80
49
37
86
11
Ø 6,2
P1
P2
Tee for possible
extension of the pipe
Extension pipe not provided


AIR PRESSURE
High pressure
piping to unroll
in the raised
floor
Low pressure
pipe already
installed
P1 (+)
P2 (-)


Display
Zero point calibration LED
Reset button
Calibration potentiometer
+ = DC 8…33V
↗ = 4…20mA


AIR FLOW
P1 (+)
P2 (-)

4.13.1 Network analyser



The data that can be read on the microprocessor control display are:

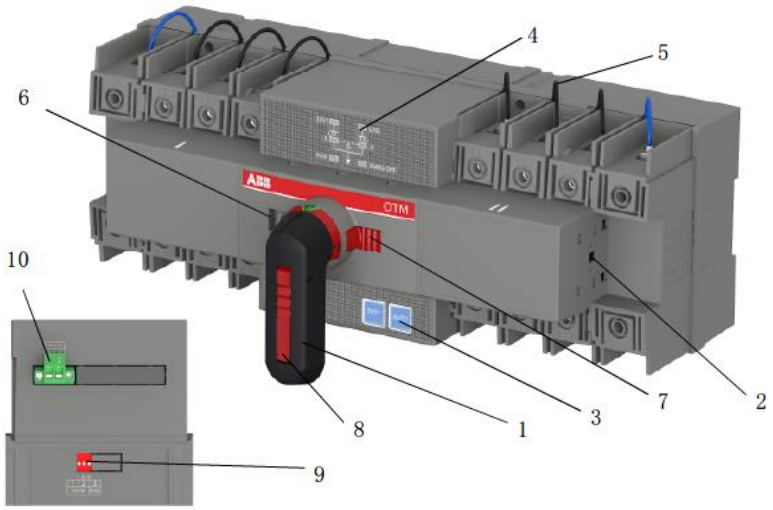
- Linked voltage (phase - phase) for three-phase machines;
- Phase voltage (phase-neutral);
- Phase current;
- Neutral current only for three-phase units;
- Active phase power for three-phase units;
- Total active power;
- Delivered energy;
- Hour counts.

4.13.2 Double power supply with automatic transfer switch

Switching is automatic. In emergency situations, switching can be performed manually.

INFORMATION:
Open transition type transfer switch with a minimum interruption of the supply during transfer.

Any remote condenser must be powered by the indoor machine.



1. Handle for manual operation.	6. Padlock loop.
2. Auxiliary contact block position.	7. Handle release catch.
3. Button.	8. Locking clip for preventing manual operation.
4. Synoptic view.	9. Dip switch.
5. Voltage detection connections.	10. Connection terminals.

Mounting kit

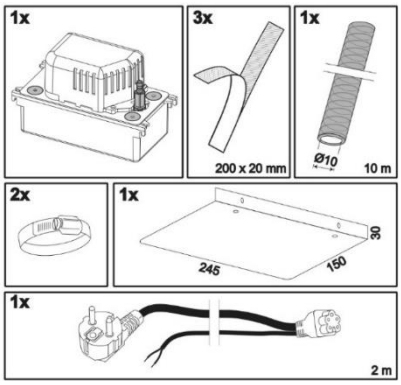
In case of A842 - NETWORK ANALYZER installed, the installation is always as an EXTERNAL KIT.

INFORMATION:
For the electrical connection, please refer to the wiring diagram supplied with the machine.

4.13.3 Condensate discharge pump kit

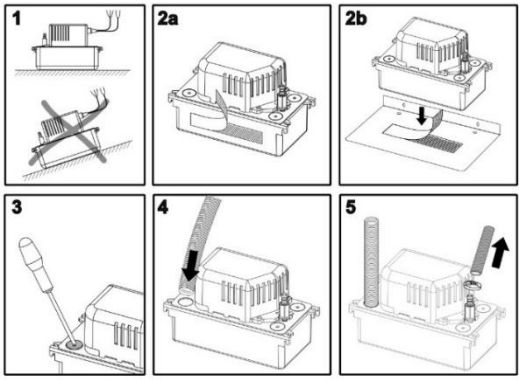
The pump if supplied in mounting kit.
The kit includes:

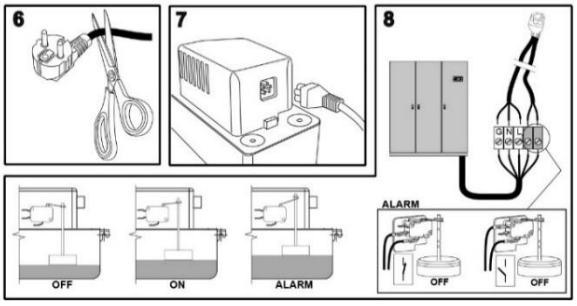
- Centrifugal pump with check valve on water discharge;
- Adhesive Velcro strip for fixing;
- Anti-crushing spiral hose – internal diameter Ø 10 mm;
- Hose clamps in stainless steel;
- Metallic support;
- Electrical connection with European plug (Schuko) for electric power supply and bipolar cable for alarm signalling;
- Plug-in plug for quick connection to the pump.



The pump must only be used with water.
Pump operation is only intended for indoor environments.
The pump must not be immersed and / or placed in humid environments and must be protected from frost.
In case of faults, in particular if the power cable is damaged, any intervention must be carried out by suitably qualified persons, in order to avoid any risk.

(Sizes in millimetres)





OFF: Pump stopped;
ON: Pump running and condensate drain;
ALARM: Alarm condition for overflow

INSTALLATION

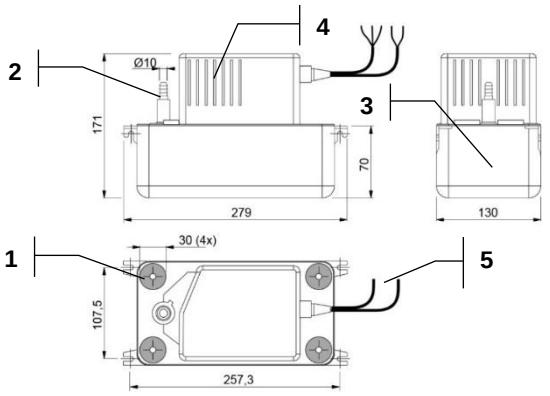
- Be sure to install the pump horizontally to prevent condensation overflow;
- Use the supplied Velcro or metal support for attachment;
- Use the condensation inlet hole best suited to the installation;
- Insert the condensate drain pipe of the machine;
- Connect the spiral hose to the check valve and secure it with the supplied clamp. The check valve prevents the return of condensation into the pan.

- Prepare the electric connection;
- Connect the plug-in plug to the pump;
- The machine is equipped with a 5x0.75mm2 cable already connected to the terminal board for the connection to the pump.

The GNL + ALARM terminals for the connection between the machine cable and the pump cable are not provided.
Check if the alarm contact meets the system needs; the contact is supplied NC (Normally Closed). The microswitch is contained inside the pump.

Power supply: 230V~ 50/60Hz
Electrical data: 70W – 0,67A
Safety contact: NC 8A resistive - 250V
Max water flow: 500 l/h
Maximum delivery height: 5.0 m
Sound level: 45dBA at 1 m
Max water temperature: 65°C
Water acidity: pH>2.5
Pan volume: 2.0 l
Degree of protection IP 20
Safety norms: CE - EAC
Complies with Directives: RoHS – RAEE

1. n. 4 holes Ø 30 mm for condensate inlet.
2. Check valve on condensate discharge.
3. Condensate collection tank.
4. Pump motor and alarm switch.
5. Electrical connection cables.

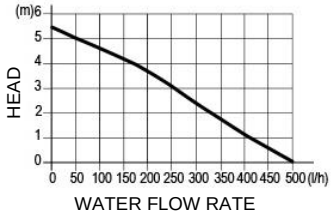


(Sizes in millimetres)

FUNCTIONAL CHECKS
Pour water into the condensate collection try of the machine and check that the pump activates and stops when the water level has been lowered.
To verify the operation of the safety contact, continue to pour water until the alarm is triggered.

CLEANING
DANGER: before any intervention make sure that the pump is not electrically connected.
The pump must be cleaned regularly.
Remove the pump pan and clean it with a detergent.
Check that the float remains clean.
Reposition the pan and check again the correct operation of the pump and of the safety contact.

WORKING LIMITS

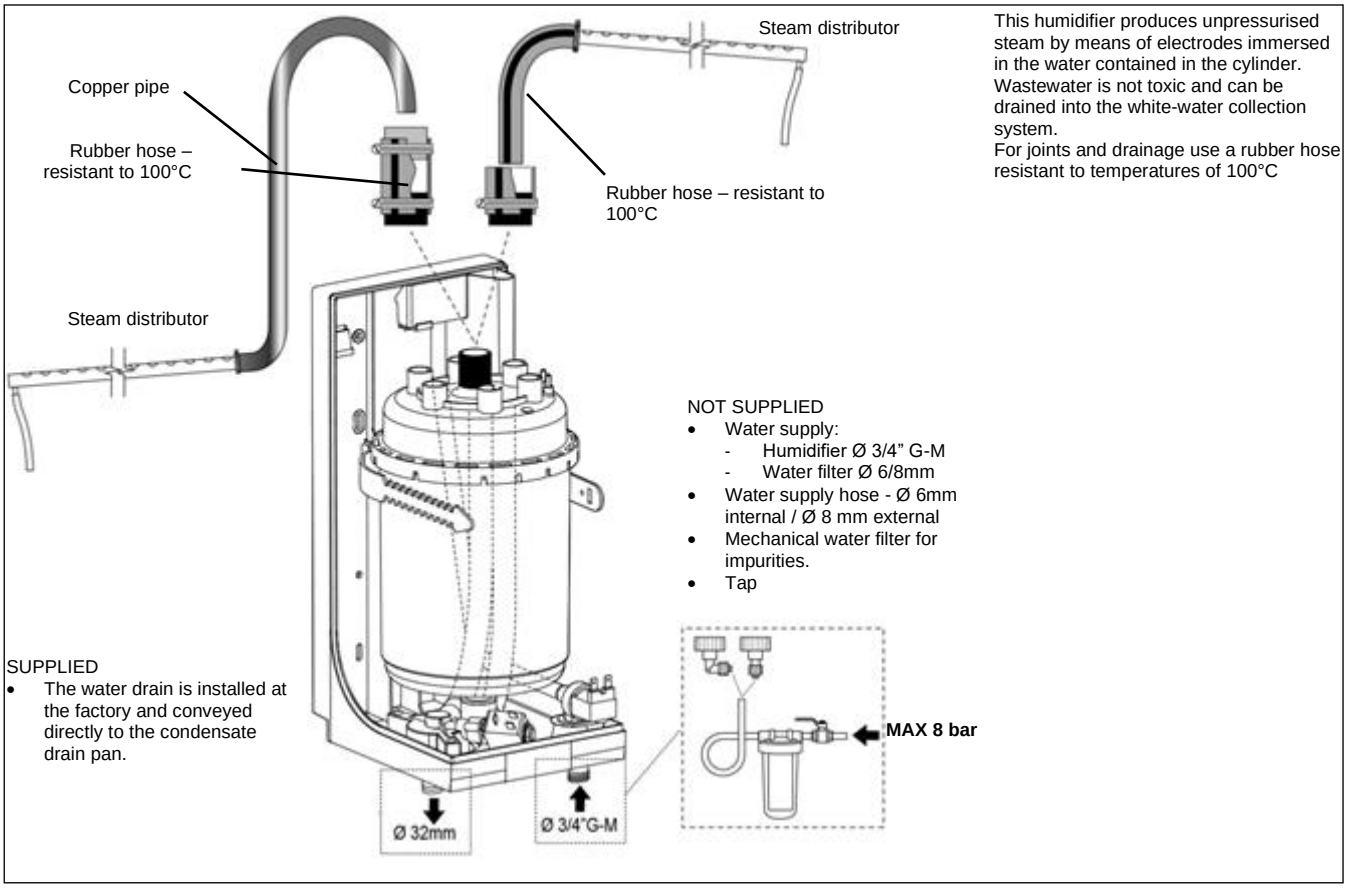


	Max length of discharge pipe (Ø 10 mm)			
Head	5 m	10 m	20 m	30 m
1m	380	300	240	190
2m	310	260	200	150
3m	240	200	145	110
4m	150	130	80	60
5 m	30	20	0	0

Real water flow in l/h

4.13.4 Proportional steam humidifier

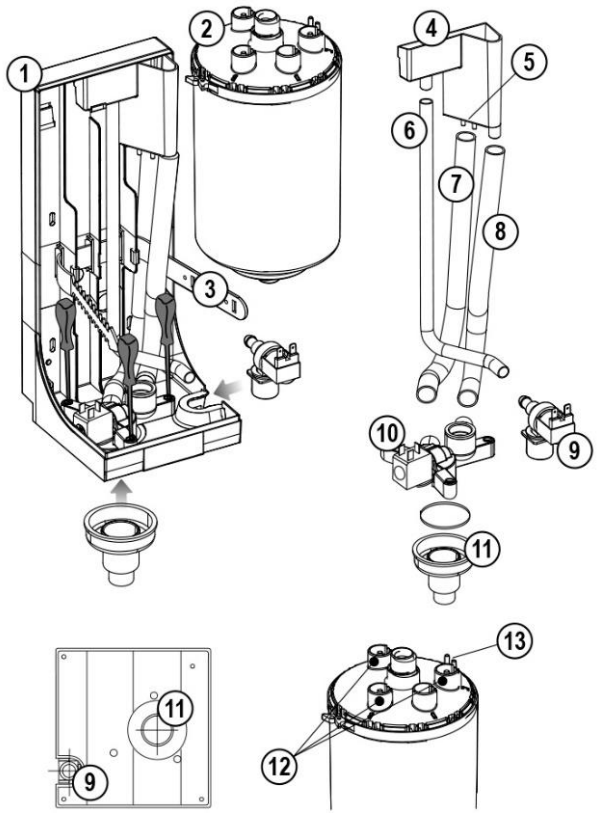
The accessory includes the combined air temperature / humidity probe and the system management control.
The optional is factory installed and requires only water filling connection.



This humidifier produces unpressurised steam by means of electrodes immersed in the water contained in the cylinder.
Wastewater is not toxic and can be drained into the white-water collection system.
For joints and drainage use a rubber hose resistant to temperatures of 100°C

DANGER:
Operating temperature up to 100°C.

4.13.5 Humidifier



1. Load-bearing frame.
2. Steam cylinder.
3. Cylinder strap.
4. Supply tank and overflow.
5. Water conductivity meter.
6. Fill hose.
7. Overflow pipe.
8. Cylinder fill hose.
9. Fill solenoid valve – Ø 3/4" GM.
10. Drain solenoid valve and supply / drain assembly.
11. Drain connector Ø 32mm.
12. Electrode electrical connection.
13. Overflow and foam sensor.

Caution sticker on the steam cylinder.

HUMIDIFIER CONTROL BOARD

The control board is connected to the main controller and is contained in the electrical panel of the machine.
All the electrical components of the humidifier are connected to the board.
The board has indicator LEDs:
RED: Presence of alarm.
YELLOW: Vapour production.
GREEN: Voltage presence.

All operating data are transmitted to the controller through serial connection.
For electrical connections, refer to the electrical diagram of the machine.

Characteristics of the water
The quality of the water used affects the evaporation process for which the humidifier must be supplied with untreated water, drinkable and not demineralized.

CHARACTERISTICS	UNIT OF MEASURE	WATER CONDUCTIVITY					
		LOW		MEDIUM		HIGH	
		Min	Max	Min	Max	Min	Max
Specific conductivity at 20°C ($\sigma_{R,\ 20\ °C}$)	µS/cm	75	350	350	750	750	1250
Hydrogen ions (pH)		7	8.5	7	8.5	7	8.5
Total dissolved solids (TDS)	mg/l	(1)	(1)	(1)	(1)	(1)	(1)
Dry residue at 180°C (R_{180})	mg/l	(1)	(1)	(1)	(1)	(1)	(1)
Total hardness (TH)	mg/l $CaCO_3$	50 (2)	160	100 (2)	400	100 (2)	400
Temporary hardness	mg/l $CaCO_3$	30 (3)	100	60 (3)	300	60 (3)	300
Iron + Manganese	mg/l Fe + Mn	0	0.2	0	0.2	0	0.2
Chlorides	ppm Cl	0	20	0	30	0	30
Silica	mg/l SiO_2	0	20	0	20	0	20
Residual chlorine	mg/l Cl^-	0	0.2	0	0.2	0	0.2
Calcium sulphateo	mg/l $CaSO_4$	0	60	0	100	0	100
Metallic impurities	mg/l	0	0	0	0	0	0
Solvents, diluents, soaps, lubricants	mg/l	0	0	0	0	0	0

1. Values depending on specific conductivity; in general: TDS ≅ 0,93 * $\sigma_{R,\ 20\ °C;}$ R_{180} ≅ 0,65 * σ_R
2. Not lower than 200% of the chloride content in mg/l of Cl^-
3. Not lower than 300% of the chloride content in mg/l of Cl^-

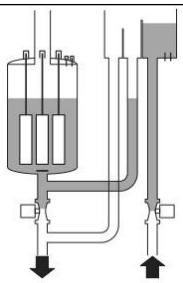
DANGER:
- Use only with drinking water.
- It is forbidden to use well water, industrial water or water drawn from cooling circuits; in general, avoid using potentially contaminated water, either from chemicals or bacteria.
- Do not add disinfectants or corrosion inhibiters to water, as these substances are potentially irritant.
- There is no reliable relationship between hardness and water conductivity
- Do not carry out water treatments with water softeners. This could cause corrosion of the electrodes or the formation of foam, leading to potential operating problems.

Preliminary checks before start-up
Before starting the humidifier, check that:
- the humidifier is in perfect conditions, that there are no water leaks and that the electrical parts are dry. Do not apply voltage if the humidifier is damaged or even partially wet;
- the water and electrical connections and the steam distribution system have been completed according to the instructions contained in this manual;
- the water shut-off tap to the humidifier is open;
- the line fuses are installed and intact / the magnetothermic protection switch is in the ON position;
- jump on terminals AB of the CP control board;
- the steam outlet pipe is not choked.

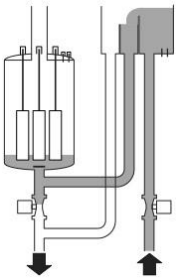
Starting
Start with empty cylinder: this phase will be performed automatically when the unit is started and can last up to a few hours (depending on water conductivity).

After one our of operation: for both disposable cylinders and opening cylinders, check that there are no significant water leaks.

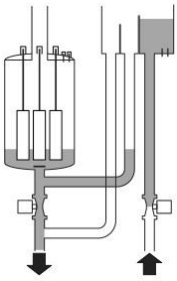
Working logic



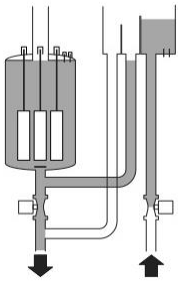
STEAM PRODUCTION
The filling / draining solenoid valves are closed.
The electrodes are electrically powered and steam is produced.
Steam production is controlled by adjusting the water level in the boiler.



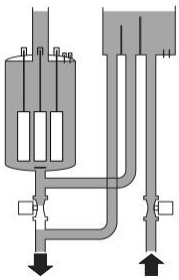
WATER FILLING
The water filling is automatic and is deducted by the operating current of the electrodes.
The fill solenoid valve opens by filling the water loading tank.
The conductivity of the water is measured in the load compartment.
The water enters the cylinder through the loading hose.
The electrodes are electrically powered during the water loading phase.



WATER DRAIN
The water drain is automatic and is activated cyclically by the system.
The drain solenoid valve opens by emptying the cylinder.
The electrodes are electrically powered during the water discharge phase to check the water level.
Once the drain cycle has been completed, the filling cycle described above is activated.



DRAIN DUE TO OVERFLOW
The activation of the overflow drain is deduced from the system via the tank level sensors.
The electrodes are electrically powered during the water discharge phase to check the water level.
Once the drain cycle has been completed, the filling cycle described above is activated.



FAILURE OF THE FILLING SOLENOID VALVE
In the event of failure of the water filling solenoid valve (continuous water load), the system provides a safety drain as shown in the figure.

Humidifier water manual discharge

To manually drain the water from the cylinder, follow these instructions:

- Stop the machine using the ON / OFF switch on the keypad with display;
- Go to the SERVICE menu and select the MANUAL menu;
- Enable the “Humidifier manual activation” function;
- Enable the “Manual Drain” function to drain the cylinder;
- Complete the desired operations;
- Disable the “Manual Drain” function;
- Disable “Humidifier manual activation” function
- Switch on the machine using the ON/OFF switch on the keypad with display.

Replacing the cylinder

DANGER:
The cylinder could be hot. Let it cool before touching it or use protective gloves.

To replace the cylinder:

- stop the machine using the on / off switch on the keypad with display;
- completely drain the water from the cylinder following the manual procedure described above;
- disconnect the machine from the mains by opening the power supply line disconnector (safety procedure);
- remove the steam tube from the cylinder;
- disconnect the electrical connections from the cylinder;
- release the cylinder from the fixing and lift for extraction;
- mount the new cylinder on the humidifier by performing the previous operations in reverse.

Cylinder maintenance
The life of the cylinder depends on a number of factors, including: the complete filling with lime scale and/or the partial or complete corrosion of the electrodes, the correct use and sizing of the humidifier, the output, and the quality of the water, as well as careful and regular maintenance. Due to the aging of the plastic and the consumption of the electrodes, even an openable steam cylinder has a limited life, and it is therefore recommended to replace it after 5 years or 10,000 operating hours.

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.
In case of leaks, switch off the humidifier before touching the cylinder as the water may be under tension.
Before working on the cylinder, make sure that the humidifier is isolated from the mains. Remove the cylinder from the humidifier only after it has been emptied completely.
Make sure that the model and the supply voltage of the replacement cylinder match the damaged one.

Regular checks
Every 15 days and no later than the first 300 operating hours.
In the case of both disposable cylinders and openable cylinders, check operation and for any significant water leaks, and assess the general condition of the container. Check that arcs or sparks are not generated between the electrodes during operation.

Every three months or no more than 1000 operating hours
In the case of disposable cylinders, check operation and for any significant water leaks, and replace the cylinder if necessary. In the case of cylinders that can be opened, check for any significantly blackened areas on the container. If so, check the electrodes for fouling and replace them as necessary, together with the sealing O-rings and the cover gasket.

Annually or no more than 2500 operating hours
Replace any disposable cylinders. Check the operation of cylinders that can be opened, if there are significant air leaks, the general condition of the container, any noticeable blackened areas of the container. Replace the electrodes, together with the sealing O-rings and the cover gasket.

After five years or no more than 10,000 operating hours
In the case of both disposable cylinders and openable cylinders, replace the entire cylinder.
After very prolonged use or when using water rich in salts, the solid deposits that form naturally on the electrodes may grow to adhere to the inner wall of the cylinder. In the case of particularly conductive deposits, the consequent development of heat could overheat the plastic to melting point. In the worst case scenario, this might cause the formation of a hole through which water could leak from the cylinder into the tray.
As a precaution, check, at the frequency recommended further on, the deposits and the blackening of the wall of the cylinder, and replace the cylinder if necessary.

Maintenance of the other components in the water circuit

OBLIGATION:

- when cleaning the plastic components do not use detergents or solvents;
- Lime scale can be removed with a 20% acetic acid solution, followed by water rinsing;
- The steam humidifier has just one part that requires periodical replacement: the steam production cylinder. This operation is necessary when the lime scale deposits that form inside the cylinder prevent the sufficient passage of current. This situation is displayed on the controller by an alarm signal. The frequency of this operation depends on the supply water: the higher the content of salts or impurities, the more frequently the cylinder will need replacing.

Fill solenoid valve
After having disconnected the cables and the pipe, remove the solenoid valve and check the condition of the inlet filter; clean if necessary using water and a soft brush.

Supply and drain manifold
Check that there are no solid residues in the cylinder attachment, remove any impurities.
Check that the seal (O-ring) not is damaged or cracked. Replace it if necessary.

Drain solenoid valve / drain pump
Disconnect the power supply, remove the coil, unscrew the fastening screws and remove the valve body. Remove all the impurities and rinse;

Supply tank + conductivity meter
Check that there are no obstructions or solid particles and that the electrodes for measuring the conductivity are clean, remove any impurities and rinse.

Supply, fill, overflow pipes
Check that they are free and clear of impurities. Remove all impurities and rinse.

INFORMATION:
After having replaced or checked the parts in the water circuit, check that the connections have been carried out correctly and the corresponding seals have been used. Restart the machine and perform a few feed and drain cycles (2 to 4). After the feed and drain cycles, apply the safety procedure and check for any water leaks.

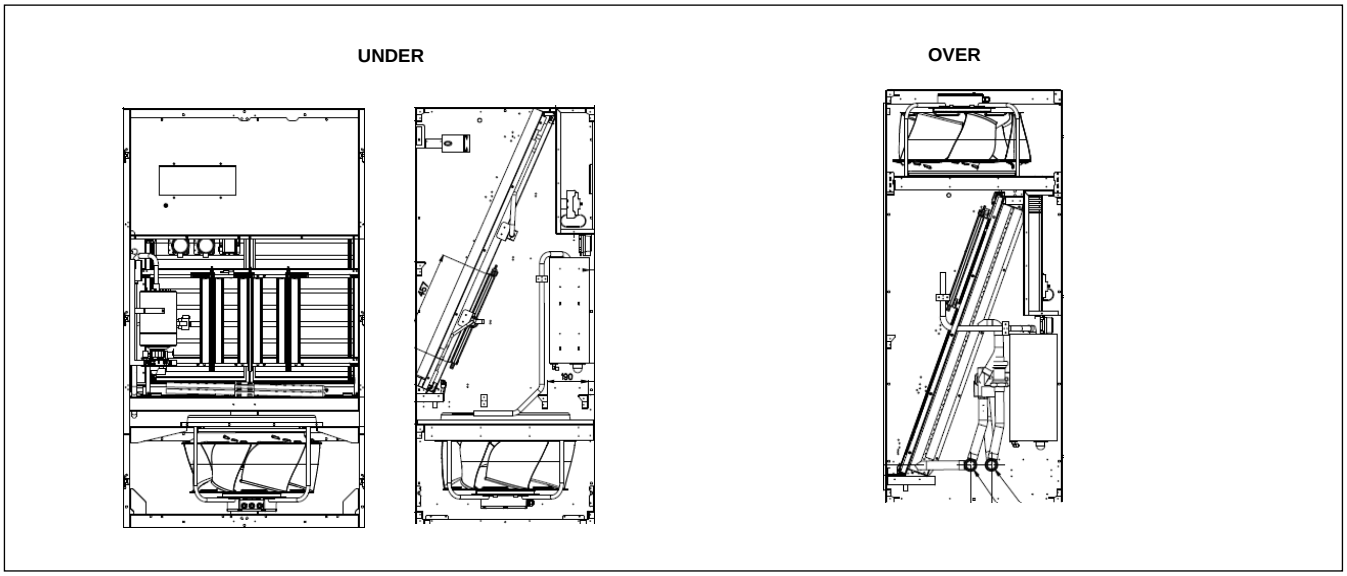
Troubleshooting …

PROBLEM	CAUSES	REMEDY
The humidifier does not turn on	• no electrical power supply. • electrical connections. • fuses blown. • transformer fault.	• check the protection device upstream of the humidifier and that the power supply is present. • check that the connectors are properly inserted in terminal block. • check fuses F1/F2/F3. • check that the voltage at the transformer secondary is 24Vac
The humidifier does not start operation	• remote ON/OFF contact open (relay/terminals AB – AB) on CP controller. • control signal not compatible with the type set.	• close the ON/OFF contacts (relay/terminals AB – AB) on CPY controller. • check that the external signal is 0 to 10 V
The humidifier fills with water without producing steam	• excessive backpressure in steam outlet. • cylinder inlet filter blocked. • lime scale in the supply tank. • drain solenoid valve fault.	• check that the steam outlet hose is not bent or choked. • clean the filter. • clean the supply tank. • check for abnormal voltage (24 Vac) at drain solenoid valve and/or replace the drain solenoid valve.
The line thermal overload switch is activated	• the thermal overload switch is undersized. • excess current to the electrodes.	• check that the thermal overload switch is rated for a current equal to at least 1.5 times the rated current of the humidifier. • check the operation of the drain solenoid valve, the seal of the fill solenoid valve when not energised, drain some of the water and re-start.

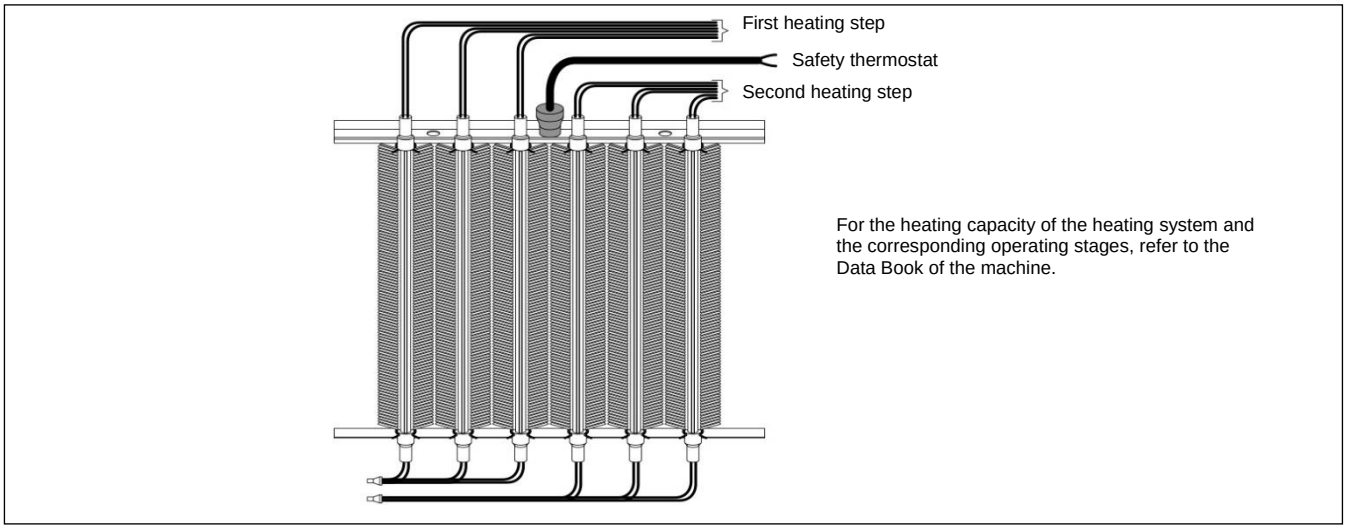
PROBLEM	CAUSES	REMEDY
The humidifier wets the coil	• the steam distributor is not installed correctly. • the condensate return is blocked. • the system is oversized. • humidifier on when the fan is off.	• check that the steam distributor has been installed correctly. • decrease the steam production set on the controller. • check the connection of terminals AB - AB on the CPY controller.
The humidifier wets the floor below	• the supply or overflow circuit has leaks. • the steam outlet hose is not properly secured to the cylinder.	• check the entire water circuit. • check that the clamp on the steam outlet is tight.

4.13.6 Electric heaters

The accessory is installed at the factory downstream of the cooling coil.
The accessory is not available for power supply voltages 460/3/60 and 460/3+N/60.



The electric heating system has three stages of operation, allowing for a step-by-step partialisation of the heating capacity of the system.
The excessive overheating of the electric heater is limited by two levels of protection that intervene in sequence: in the event of abnormal operation with the temperature of the resistive body rising above the permitted limit, a safety thermostat intervenes by sending an alarm signal to the controller. If the safety thermostat fails to intervene, a further thermostat (located on each heater) intervenes by interrupting the system power supply.



For the heating capacity of the heating system and the corresponding operating stages, refer to the Data Book of the machine.

ELECTRIC HEATER REPLACEMENT

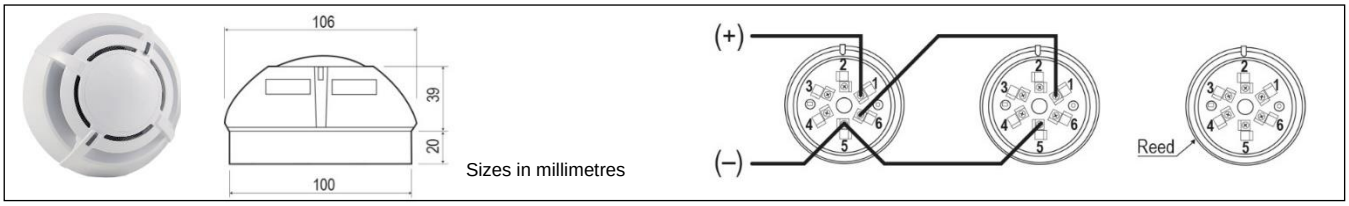
DANGER:
The electrical connections must only be designed and completed by personnel with precise technical competence or particular skills in the field of activity.
Before proceeding, personnel must disconnect all power supply sources, making sure that no one may inadvertently re-connect them.

For electric heater replacement:

- stop the machine using the on / off switch on the keypad with display;
- switch off the machine by opening the power line disconnector;
- disconnect the electrical connections;
- make sure that the model and the supply voltage of the new heater correspond to the damaged one;
- mount the new heater by performing the previous operations in reverse.

4.13.7 Smoke detector

The detector is supplied as an assembly kit.
The optical smoke detector reacts to the presence of products caused by combustion (visible fumes).
The operating principle is based on the light scattering technique (Tyndall effect).
The device is in conformity to EN 54-7 standard.



PERIODIC TEST
Verify the correct functioning of the detector by means of a smoke generator (be careful not to damage or dirty the sensor).
An alarm simulation can be performed by activating the internal REED with a magnet, stimulating the base at the point indicated "REED" on the connection diagram.

WARNING: the REED test does not verify the correct functioning of the sensor but only the functionality of the alarm contact.

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.

TECHNICAL CHARACTERISTICS

Plastic body	ABS
Power supply	12...28 Vdc
Normal current	50µA at 24 Vdc
Alarm current	25µA at 24 Vdc
LED visibility	360° (double LED)
Storage temperature	-10…+70°C
Operating temperature	-10…+70°C
Max. speed air	0.2 m/s

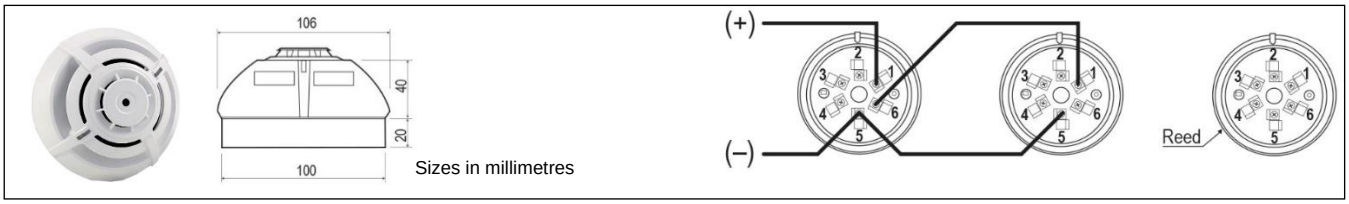
Relative humidity	<93% non-condensing
Index of protection	IP 20
Testing by magnet	Yes
Relay	max. 1A 30 Vdc
Signal repeater	14mA a 24 Vdc
Controlled area:	40m^2 max
Shielded cable	min 0.5 mm^2
Colour	White

Cleaning

Clean the detector periodically with a blown compressed air jet inside the detection chamber.
Remove the detector by unscrewing the two screws and open the detection chamber.
After cleaning, re-assemble paying attention to the assembly of the bottom disc (match the inner REED with the number 4 stamped on the bottom).
Close the detector with the two screws without tightening excessively.

4.13.8 Fire detector

The detector is supplied as an assembly kit.
The fire detector has been designed to identify temperatures at which fires may start.
When the temperature exceeds the set threshold or when there is a rapid variation in temperature, the relay is activated to signal an alarm. The device is in conformity to EN 54-5 standard.



PERIODIC TEST
Verify the correct operation of the detector by means of a heat generator (be careful not to damage or soil the sensor).
An alarm simulation can be performed by activating the internal REED with a magnet, stimulating the base at the point indicated "REED" on the connection diagram.

WARNING: the REED test does not verify the correct functioning of the sensor but only the functionality of the alarm contact.

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.

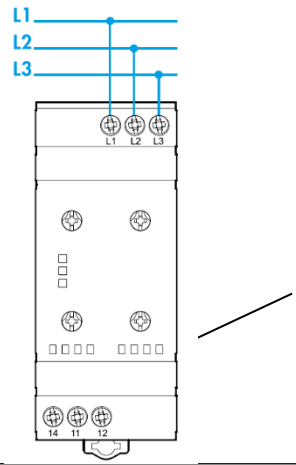
TECHNICAL CHARACTERISTICS

Plastic body	ABS
Power supply	12...28 Vdc
Normal current	50µA at 24 Vdc
Alarm current	25µA at 24 Vdc
LED visibility	360° (double LED)
Storing temperature	-10…+70°C
Operating temperature	-10…+70°C
Relative humidity	<93% non-condensing

Index of protection	IP 20
Testing by magnet	Yes
Relay	max. 1A 30 Vdc
Signal repeater	14mA a 24 Vdc
Alarm threshold	62°C
Controlled area:	40m^2 max
Shielded cable	min 0.5 mm^2
Colour	White

4.13.9 Phase sequence control + voltage control

The accessory is installed in the electrical panel downstream of the door-lock main switch.
The relay monitors the correct power supply of the unit, detecting undervoltage, overvoltage, phase failure and phase rotation: in the event of a fault, the relay sends an alarm signal to the microprocessor control, which prevents the machine from starting.
The accessory is not available for power supply voltages 460/3/60 and 460/3+N/60



TECHNICAL CHARACTERISTICS

Rated supply voltage:	380 … 415 VAC – 50/60 Hz
Minimum intervention delay:	0,5 s
Operation conditions:	from -20°C to 60°C
Degree of protection:	IP 20
Security logic:	Positive. The output relay opens in the event of a error.

4.13.10 power supply of remote condenser or Dry Cooler from indoor machine

WARNING:
The electrical connections must only be designed and completed by personnel with precise technical competence or particular skills in the field of activity.

The electrical panel of the machine is equipped with an overcurrent protection on the power supply line for each remote condenser or dry cooler.
The power supply can be single-phase or three-phase according to the condenser model.
Refer to the installation manual for use and maintenance of remote condensers or dry coolers for all the necessary information.

4.13.11 BMS connection

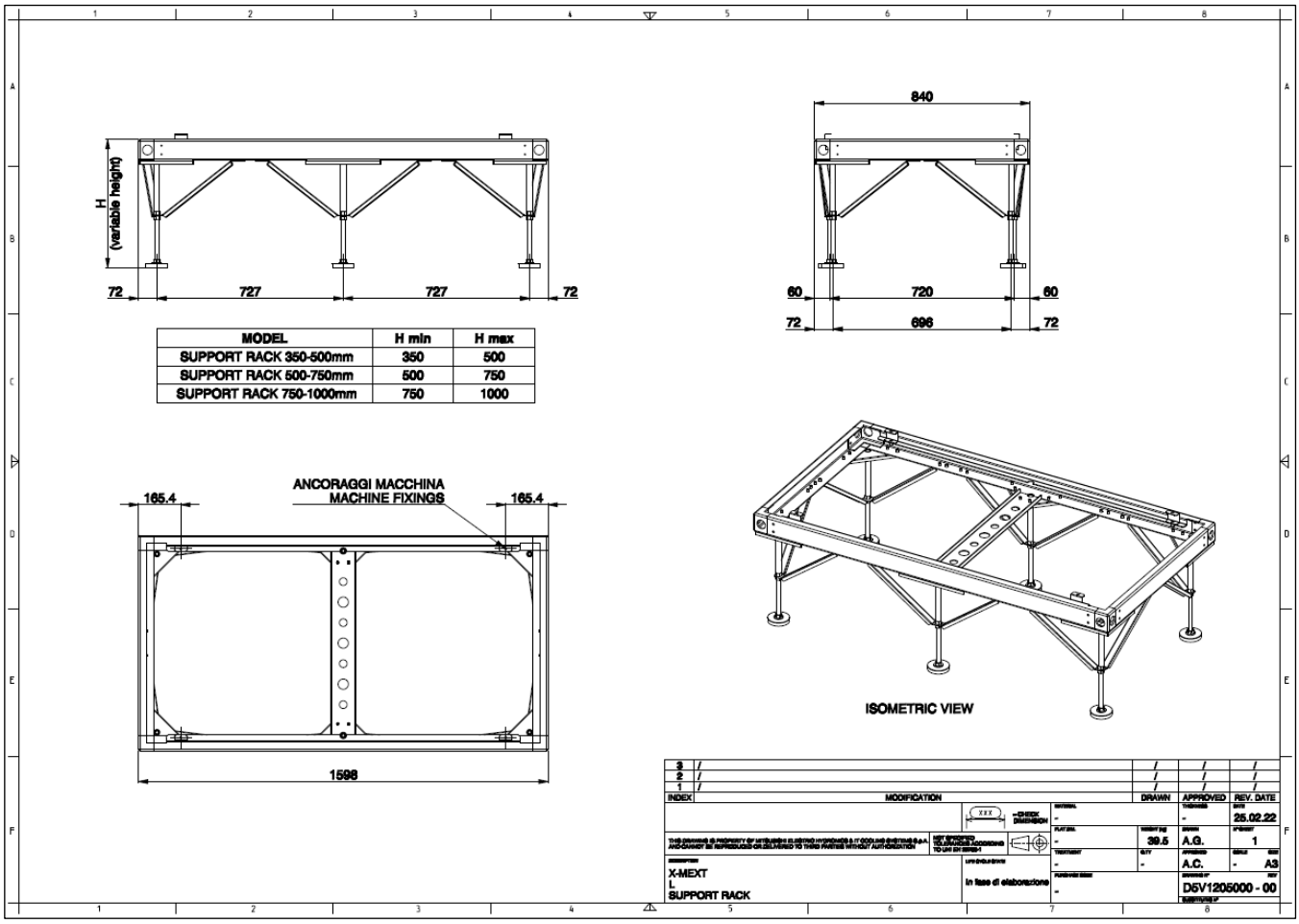
CARDS for interfacing with external supervision and control systems:

- RS485 Modbus/Carel.
- pCOnet for BACnet MS/TP (standard EIA-485).
- pCO Web for SNMP, BACnet Ethernet and BACnet /IP networks and other local or Internet networks.
- LonWorks.

INFORMATION:
Please refer to the technical and interfacing manual for the connections, the settings and the address list.

4.13.12 Floor stand

The accessory is supplied as an assembly kit and includes the unit support frame and the corresponding fasteners for fastening to the machine base (internal fastening).
The new design allows for easy installation and quick height adjustment. The footprint is fully integrated into the floor plan of the machine. It is not possible to install the floor stand together with the plenums under the unit.
The frame is available in 3 different heights, for wide installation flexibility.

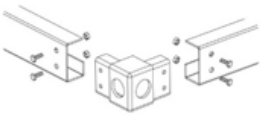


B981 - H max 500		M	L	XL
Min height	mm	350	350	350
Max height	mm	500	500	500
Weight	[kg]	27.4	39.5	48.5

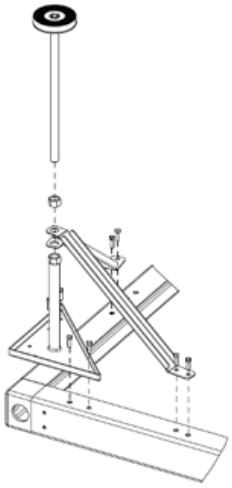
B982 - H max 750		M	L	XL
Min height	mm	500	500	500
Max height	mm	750	750	750
Weight	[kg]	27.7	39.8	48.8

B983 - H max 1000		M	L	XL
Min height	mm	750	750	750
Max height	mm	1000	1000	1000
Weight	[kg]	28	40.1	49.1

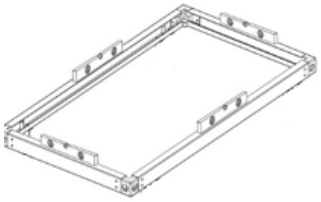
Mounting



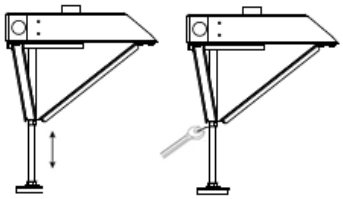
Install the frame as shown in the figure by attaching the angle brackets to the crossbars using the bolts provided.



Fit the support feet as shown in the figure, by fastening them to the frame with the bolts supplied.
The frame is equipped with fastening inserts.

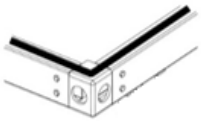


Position the frame and level it using a spirit level.
Check the level on the 4 sides of the frame, as indicated in the figure.



Adjust the height of the frame. When levelling is complete, lock the position with the lower nut.

A level deviation of more than 5 mm between the ends of the base may cause the condensate to overflow from the collecting tray.



Lay an airtight seal on the upper edge of the frame.

Place the machine on the frame. Make sure to centre the machine on the frame.
It is possible to select the side panels of the machine to facilitate the positioning operations.

Ensure the airtightness by fitting a seal between the machine base and the tiles of the raised floor.

4.13.13 Plenum

The plenums of the x-MEXT series can be installed on the return or the delivery of the unit, depending on the machine version and the plenum.
The accessory is supplied separately and must be installed on the machine by the installer.
It is not possible to install the plenum under the machine in combination with the unit support frame.

Transport, unloading and handling

For road transport, it is advisable to use a low loader truck with tarpaulin, or in any case to use tarpaulin to protect the units against bad weather. Secure the plenum with straps to prevent unwanted movements during transport.

INFORMATION:
Protect the contact point between belt and plenum with a soft shim and avoid over stretching the load securing straps.
For more information, contact the Shipping Office of the manufacturer.

Upon receipt, verify the integrity of the packages and that everything matches the order:

- Check the number of packages using the transport document. If incorrect, inform the carrier and the manufacturer.
- Visually check the packaging. If incorrect, inform carrier and the manufacturer.

INFORMATION:
If any of the packages are damaged or missing, contact the Sales Office of the manufacturer and the carrier, to agree the next plan of action.

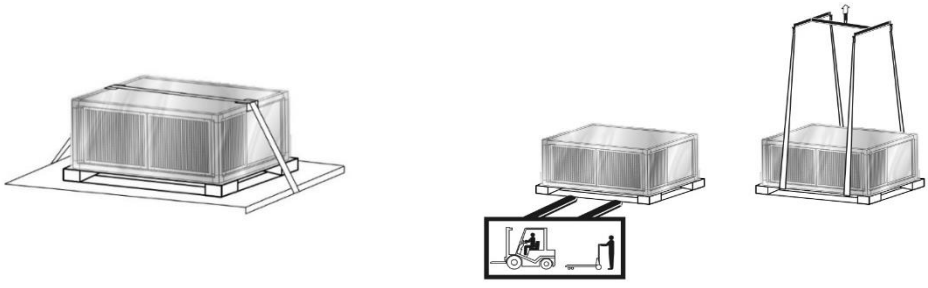
During transport and when not installed immediately upon receipt, the machine should be kept in its packaging in a closed and dry location, away from direct sunlight.

Temperature and humidity limits for transportation and storage

Temperature and humidity limits:		INV machines	ON/OFF machines
Minimum temperature	°C	-30	-30
Maximum temperature	°C	50	50
Maximum non-condensing humidity	RH%	90	90

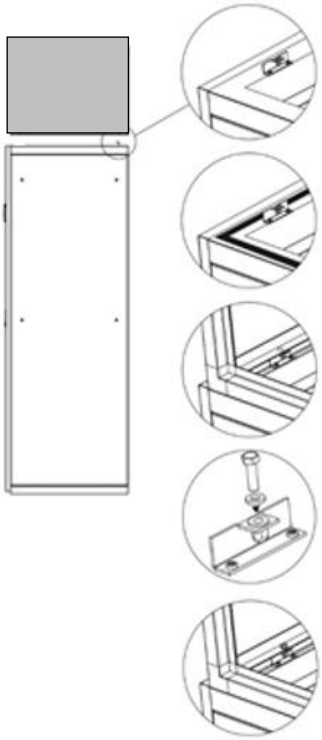
OBLIGATION:
All the unloading, handling and positioning operations must be carried out using appropriate means and by experience personnel, trained and authorised for such activities.

Carry out the lifting and handling operations as shown in the figure below. During the handling, loading and unloading operations, keep the plenum on the pallet. During handling, it is also recommended not to remove the shrink wrapping.



Plenum installation

OBLIGATION:
All the assembly operations must be carried out using suitable means and by experienced individuals, trained and authorised for these types of activities
For stability reasons, only one plenum can be installed on the machines.



The upper frame of the machine is equipped with brackets for fixing the plenum at the rear.
The plenum is equipped with the necessary fastening holes.

Lay an airtight seal on the upper frame of the machine.
Remove the plenum panel to facilitate the installation. The panels are fixed with screws.

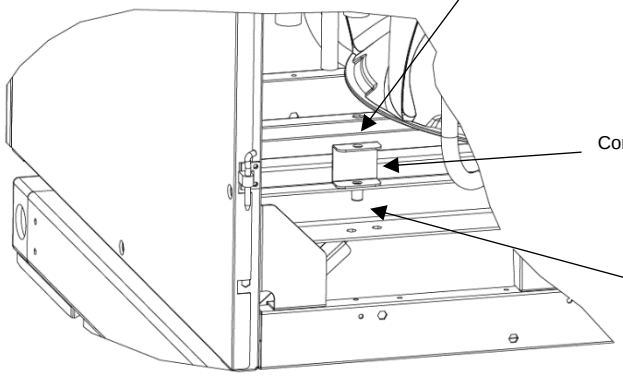
Place the plenum on the machine.
Take care not to damage the fixing brackets.

Secure the plenum to the machine with the bolts supplied.

When fixing is complete, replace the plenum panel.

Lay an airtight seal on the upper frame of the plenum.

Position the machine on the plenum
Make sure to centre the machine on the plenum
It is possible to select the side panels of the machine to facilitate the positioning operations.



The supporting frames and the plenums have special brackets for connection and fastening to the machine.

4.13.14 Direct free-cooling plenum

DIRECT FREE-COOLING PLENUM - UNDER

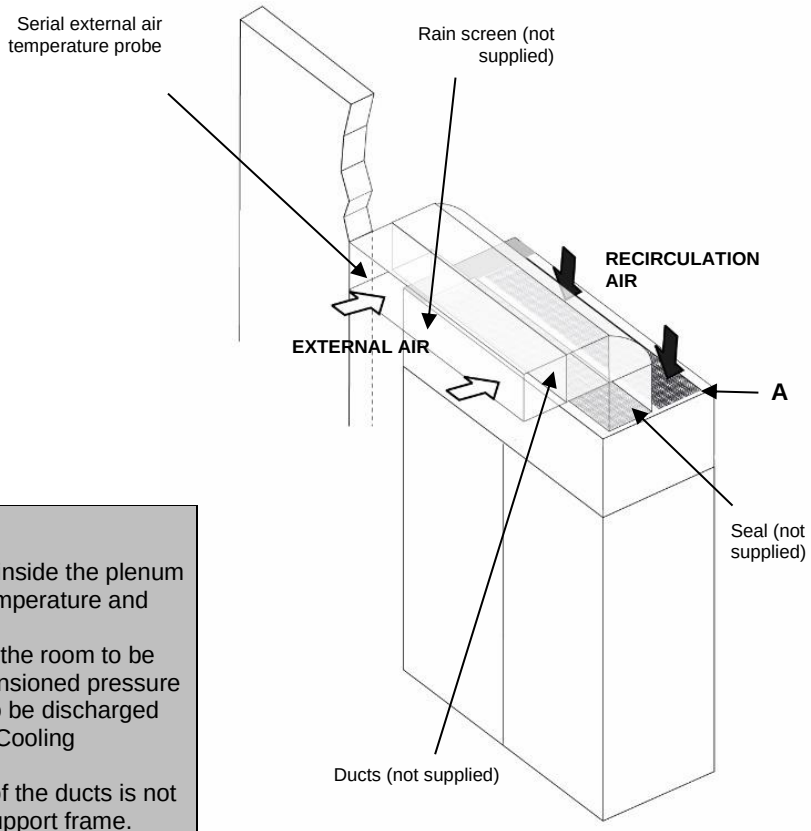
The external air must be channelled (by the customer) as shown in the figure.

Install the serial external air temperature probe supplied in the duct, or in any case making sure that it is protected from the weather.

Install an airtight seal between the ducts and the plenum.

It is recommended to install a rain screen (by the customer) on the external air port.

Move on the outside of the machine the serial temperature/humidity probe “A”, on the air return. The probe can be positioned on the room air return of the plenum, or on the machine panelling.

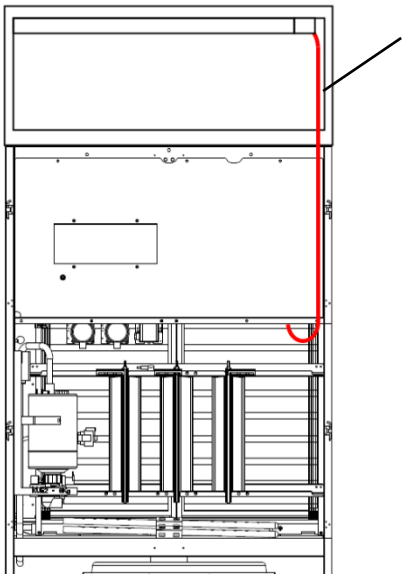


OBLIGATION:
Do not install serial probes inside the plenum as they would distort the temperature and humidity readings.
It is compulsory to install in the room to be conditioned a suitably dimensioned pressure relief damper, to allow air to be discharged from the room during Free-Cooling operation.
Make sure that the weight of the ducts is not supported by the plenum support frame.

Free-Cooling plenum electrical connections.
The electrical connections 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.

Electrical connection for plenum damper servomotors for plenums with dampers and free-cooling plenums.



Connect the cable supplied with the machine and already connected at the terminal board to the damper servomotor inside the plenum.
Use the preset cable routing and secure the cables with cable ties.
Do not touch hot or sharp surfaces.

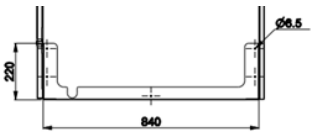
For electrical connections, refer to the electrical diagram of the machine.

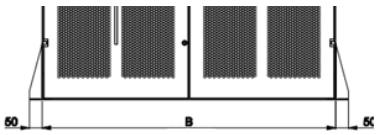
The servomotor does not require maintenance.

Operating conditions:
- Temperature: -30°C … +50°C
- Humidity: 95 % RH, non-condensing

4.13.15 Earthquake anchoring kit

The accessory is available for the internal unit and is supplied as an assembly kit. It consists of two side supports to be secured to the sides of the unit and to the support base.
This is a safety device that must be fitted by the customer prior to the installation of the unit and fastened to a structural part of the installation site with adequate strength, to avoid the risk of displacement and/or overturning due to earthquake.
The screws for fixing the unit to the structure must be provided by the customer.
To ensure resistance to earthquakes, the unit must be secured to a structural part with adequate strength with 4 x M10 steel screws (not supplied).
The accessory must be fitted to the side panels of the unit using the panel fastening screws
The accessory excludes the installation of plenums and the unit support frame.





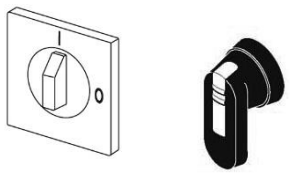
x-MEXT-i-G02-DX / x-MEXT-i-G02-DX DF x-MEXT-f-G02-DX / x-MEXT-f-G02-DX DF			
QUOTE	**M**	**L**	**XL**
B	1142	1600	2550
x-MEXT-i-G02-DW / x-MEXT-i-G02-DW DF / x-MEXT-i-G02-DW FC x-MEXT-f-G02-DW / x-MEXT-f-G02-DW DF / x-MEXT-f-G02-DW FC			
QUOTE	**M**	**L**	**XL**
B	1142	1930	2880

5 PRE-COMMISSIONING

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 refrigerant connection to the remote condenser is ended correctly (DX machine);
- there are no leaks in the cooling circuit;
- the hydraulic connection to the exchangers is correctly terminated;
- the hydraulic system is loaded with pressurised liquid;
- the pumping systems are working;
- all shut-off valves are open.

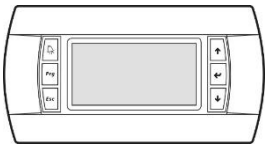
DOOR LOCKING SWITCH



For DX and DW direct expansion machines: at least 2 hours before the arrival of the specialized Engineer, turn on the compressor oil preheater, as follows.

- Check that the system's master switch is in the ON position.
- With the help of the wiring diagram of the machine, carry out the following operations:
  - Turn the electric door lock switch of the machine to the OFF position, open the machine panel and remove the cover of the electrical panel;
  - Turn OFF the protection switches of fans, compressors, heaters and humidifier;
  - Turn on the protection switch of the auxiliary circuits. To identify this switch, see the "Wiring Diagram";
  - Replace the cover of the electric panel, close the machine panel and turn the electric door lock switch to ON;
  - If these operations have been carried out properly, the microprocessor display will be ON.

MICROPROCESSOR DISPLAY



INFORMATION:
During this phase, the microprocessor can trigger some alarms (thermal switch of fan, humidifier (if applicable), no flow, etc.), due to some protection switches being off and some components being disabled.

- Press the Alarm key to disable the sound signal.

6 START

6.1 Calibration and fine-tuning

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. After the first few days of operation, check the mesh filters of the hydraulic circuits and clean as necessary.

At the first machine startup the operation control devices may need calibration and tuning.
These activities - the main among which are indicated below - must be carried out by specialist personnel:

- Air flow calibration;
- Water flow calibration (machine with cooled water coil)*;
- Microprocessor setpoint and differential calibration.
- Dirty filter pressure switch calibration**;
- No air flow pressure switch calibration**;

* The water flow can be calibrated by installing a calibration / balancing valve in the hydraulic circuit.
**For the calibration refer to the OPTIONAL chapter.

6.2 Machine start

- Check maintenance clearances and safety distances;
- Measure the absorption of the fans by comparing the value with the indications in the Data Book;
- Switching on the compressors.
- 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;
- Measure the absorption of the compressors by comparing the value with the indications in the Data Book;
- With the machine at full power, measure evaporation pressure values, condensation pressure, compressor suction temperature, discharge temperature, overheating and subcooling;
- Check for coolant/water leaks.

7 METHOD OF USE

7.1 Provisions and warnings for use

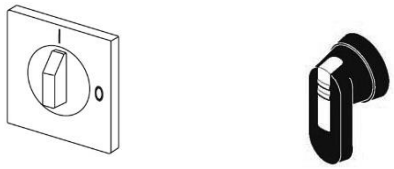
During the daily use of the system, the presence of an operator is not required. The operator must only intervene to carry out periodic checks, in case of emergency, or during the planned start and stop operations.
If these activities are carried out consistently and correctly, good long-term performance 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.

7.2 Description of controls

The various controls are shown below, with their descriptions and functions. These controls are positioned on the electrical panel.

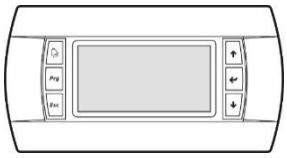
DOOR LOCKING SWITCH



Door lock main switch: opens and closes the power circuit.

- OFF (0) the machine is not powered.
- ON (I) position: the machine is powered.

MICROPROCESSOR DISPLAY



Microprocessor: controls the working process and allows the parameter setting and the monitoring the working conditions.

For details regarding the operation of the machine and its interfaces, refer to the User Manual.

7.3 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.

7.4 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;
- closing of the chilled water shut-off valves;
- drain the chilled water from the piping of the hydraulic circuits.

WARNING:
Risk of freezing for Dry Cooler.
In case of machine stop during the winter period, take the necessary precautions to prevent the water inside the system from freezing.

7.5 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 …

Fault	Cause	Solution	Intervention level
High discharge pressure	Remote condenser	Check if the fan is running	User
		Check fan rotation direction	User
		Check the condensation controller signal	Service
		Check that the condensing coil is clean	User
		Check recirculation of hot air	User
		Check remote condenser sizing	Service
	Condensing control valve	Check the condensation controller signal	Service
		Check the water inlet temperature	User
	Refrigerant circuit	Check refrigerant charge	Service
		Check for incondensable	Service
		Check that the expansion valve is not blocked closed	Service
		Check the refrigerant circuit's taps	Service
Low discharge pressure	Remote condenser	Check the condensation controller signal	Service
	Cooling circuit	Check that the suction pressure is not too low (see low suction pressure)	Service
Low inlet pressure	Remote condenser	Check that the condensation is not too low (fan speed too high in relation to the outside temperature)	Service
	Condensing control valve	Check the condensation controller signal	Service
		Check the water inlet temperature	User
	Fan	Check that the fan is turning	User
		Check speed reference signal	Service
		Check that the air flow is correct	Service
		Check that the filters are clean	User
		Check that the coil is clean	User
		Check the cold air recirculation from nearby units	User
	Refrigerant circuit	Check that the expansion valve is not blocked closed	Service
		Check that there are no obstructed/crushed capillary tubes	Service
		Check that the dryer filter is not blocked	Service
		Check that the liquid line is not too small	Service
		Check for leaks	Service
		Check the refrigerant quality	Service
		Check that valves/taps are closed	Service
	Setting	Increase cold set point	User
		Increase ventilation setpoint	User
Ambient temperature too high	Setting	Reduce setpoint	User
	Incorrect unit selection	Check that the machine is not undersized for the thermal load or the air volume handled	Service
	Faulty	Check the probe reading	Service
		Check for alarms	User
Ambient temperature too low	Setting	Increase Hot Setpoint	User
	Faulty	Check the probe reading	User
		Check for alarms	User

Fault	Cause	Solution	Intervention level
	Hot Resources	Check electric heaters supply	Service
		Check the heater safety thermostat	Service
		Check the operation of any free-cooling dampers	User
Ambient humidity too high	Setting	Reduce humidity setpoint	User
	Faulty	Check the humidity probe reading	User
	Humidifier	Check humidifier operation (see humidifier)	Service
	Cooling circuit	Verify correct operation of the expansion valve (if available)	Service
Ambient humidity too low	Setting	Increase humidity setpoint	User
	Faulty	Check the humidity probe reading	User
	Humidifier	Check humidifier operation (see humidifier)	Service
Low Air Flow	Setting	Check the speed settings of the fans	Service
		Check air flow or delta P Setpoint for variable adjustments	User
	Fan	Check the power supply to the fan	Service
		Check the fan speed settings	Service
		Check the reading and positioning of the differential pressure transducer in case of variable adjustments	Service
		Check for system load losses	Service
		Check the cleanliness of the unit filters	User
Compressor does not start	Controller	Check for machine, circuit or inverter alarms (if available)	User
	Compressor	Check compressor power supply	Service
		Verify thermal protection intervention	User
Noisy compressor	Compressor	Check for oil presence (if available with DANGER indicator)	Service
	Cooling circuit	Check expansion valve operation by measuring overheating	Service
		Check operation inside the envelope	Service
Compressor with lack of oil	Refrigerant circuit	Check refrigeration circuit (sections, curves, lifts, siphons, distances, differences in height)	Service
		Check if necessary to add oil as documentation	Service
	Unit selection	Check that the machine is not oversized compared to the minimum load required	Service
Activation of safety devices	Compressor	Check the windings and the phase-mass and phase-phase insulations	Service
Overheating too high or too low	Setting	Check expansion valve driver parameters	Service
	Driver	Check the compressor suction temperature probe reading	Service
		Check suction pressure transducer reading	Service
	Expansion valve	Verify that the valve is not blocked	Service

INFORMATION:
The list of alarms is available in the user manual.

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 carrying out any maintenance operation, it will be necessary to:

- isolate the machine from the mains using the yellow/red disconnector on the machine panel;
- 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.);
- equip yourself with tools in good condition and make sure you fully understand the instructions before using them;

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; be aware that the PLC on the machine controls these and can enable and disable the components, posing a degree of danger (for example, by powering and running the fans);
- 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.);
- in case of replacement of a motor, compressor, coils or any other heavy element, make sure that the lifting elements are compatible with the weight of the device;
- do not access the fan compartment without first having isolated the machine by means of the disconnecting switch on the panel board and having placed a sign saying, "Do not operate - maintenance in progress"";
- 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. To “read” the hours of operation, they must be displayed on the microprocessor display.

9.3 Table of general maintenance jobs

		WORK INTERVALS		
	WORK TO BE CARRIED OUT	**Every day**	**Beginning of season Every 500 hours every 2 months**	**Beginning of season Every 1000 hours every 3 months**
Expert Operator	Check any alarms.	□		
	Visually check for liquid leaks	□		
	Checking the outlet water temperature	□		
	Checking the hydraulic circuit filters		□ (1)	
Specialist technician	Check that the machine coil is clean			1 a year
	Check that the remote condenser coil is clean. See following chapter			1 a year
	Check the wear of the remote switches of compressors/heaters/humidifier			□
	Check of electric connection tightness			□
	Check for worn or damaged cables and replace as necessary			□
	Check the noise level of the fan bearings			□
	Checking the nuts and bolts, moving parts and / or subject to vibrations (egg: anti-vibration system for compressors)			□
	Check for any leaks from the cooling circuit			□(3)
	Check for rust on the cooling circuit, especially the pressure vessels			□
	Check the integrity of the safety valves			□
	Check the condition of hose pipes and capillary tubes			□

	Checking the operating parameters of the cooling circuits. For each circuit check the following:			
Specialist technician	Condensing pressure compared to outdoor temperature (DX) Or built-in condenser water outlet temperature (DW)			□
	Evaporation pressure compared with delivery air temperature			□
	Suction gas temperature / The suction superheated gas temperature The delivery temperature and the subcooling liquid temperature Liquid temperature			□
	External air temperature			□
	Overheating / Subcoolig			□
	Electric absorption of the compressors / fans 3phases (L1-L2-L3)			□
	Air delivery and return temperature			□
	Operation and calibration of pressure switches for minimum and maximum safety (if present)			□
	Three-phase line voltage The supply voltage of the compressors / fans Insulation resistance 100% and partial operation power consumption			□
	The working hours of the components The numbers of starts of components			□
	Check compressor status as specified in the next chapter			□

	Checking the operating parameters of the hydraulic circuits. In each circuit check the following			
Specialist technician	The calibration and correct functioning of the flow switch (if present)			□
	Water flow control and exchanger cleaning status. See next chapter			□
	Water quality control for condensation with well water or tower water			□(2)
	Control of the concentration of glycol solution (if present)			□

(1) Every 50 hours in the first month of operation.
(2) During the first year of operation, checks are recommended every 4 months, which can be reduced every six months starting from the second year of operation.
(3) Unless otherwise required by applicable laws

The frequency of the operations described in the table above should be considered indicative. The table may vary depending on the specific use of the machine and the system in which the same is required to operate.

9.4 Compressor maintenance activity table

Every 1000 h or 3 months				
Check the oil level (if the gauge glass is present)	Checking for any vibration and noise	Checking of the motor insulation	Checking of regulations and safety devices	Checking for leaks

OBLIGATION:
At each refill of refrigerant or intervention on the refrigerant circuit, check the oil quantity and the insulation of the compressor motor.

9.5 Checking of the water flow and cleaning of the exchangers

Check that the flow rate to the exchangers meets the design values. The variation of the flow rate in the exchangers can be caused not only by the presence of impurities in the filters, but also by faulty pumps, incorrect operations on the same, and presence of lime scale inside the exchangers. In this case, a chemical wash with suitable products must be carried out on the system.

9.6 Check that the coils are clean

The accumulation of dirt on the exchange coils causes the malfunction of the machine. This can lead to a reduction in the flow rate of air going through the heat exchanger, with an increase in fan consumption, a decrease in the cooling capacity of the machine, and even a stop.

OBLIGATION:
Avoid using pressure washers to clean the coils, as high pressures can cause permanent deformation of the fins.
Do not use chemical detergents or aggressive substances, as they can damage the heat exchanger.

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.

INFORMATION:
In case of machines installed in aggressive atmospheres with high levels of dirt, the cleaning of the coils must be included in the routine maintenance activities, which must also be carried out more frequently.

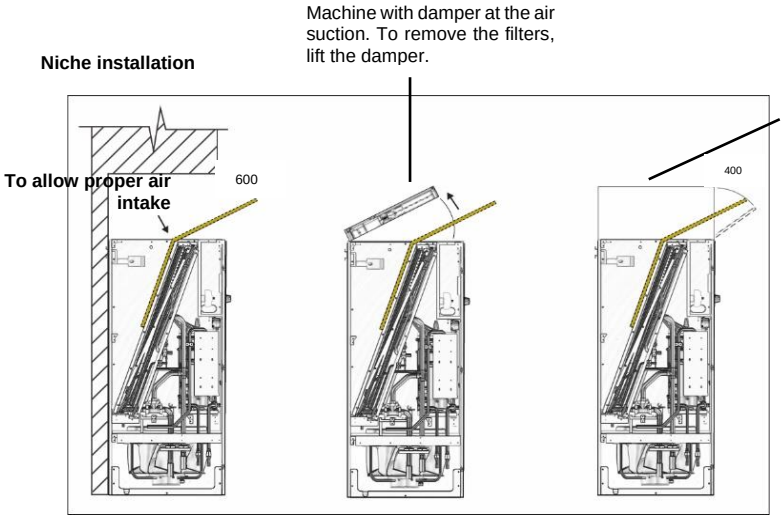
The cleaning procedures below are recommended and should be carried out as part of routine maintenance (both for “tube&fin” coils and “microchannel” coils).

- **Remove all traces of dirt on the surface**. All deposits must be removed using a vacuum cleaner (a brush or other soft tool without metal bristles may also be used). If using compressed air, make sure this blows in the opposite direction to the normal air flow of the machine. Be careful not to scratch the coil with the nozzle of the compressed air gun.

9.7 Air filter maintenance/replacement

Air filter access:

- version OVER: front access for all machines. Filter located on the front door.
- UNDER version: for all machines, access from the air suction side (folding filters).



Machines with air suction ducts: ensure the installation of a panel in the ducts for the removal of the filters. Machines with plenum at the suction: remove the front panel of the plenum to extract the filters.

INFORMATION:
If a non-return damper is installed, the filters can be removed once the damper is raised.

9.8 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:
When replacing components, only use original spare parts (see the list of “recommended spare parts”).

10 DISPOSAL OF THE MACHINE

When dismantling the machine, contact a service centre, distribution or branch authorised by the Manufacturer.

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.

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 recovered by specialist personnel with the necessary authorisations. The refrigerant gas must be handed over to appropriate collection points;
- The lubrication oil in the compressors and cooling circuit must be recovered and handed over to appropriate collection points;
- 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 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.
Electrical and electronic equipment may not 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 of which MEHITS is part.

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