MAXA HEATING & COOLING

Air-to-water inverter heat pumps with axial fans

# User-installer Manual

## Models

i-290 0106
i-290 0109
i-290 0109T
i-290 0112
i-290 0112T
i-290 0114
i-290 0115
i-290 0118



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The manual of the i-290 units contains all the instructions on optimal machine use to safeguard the operator's safety.

## 1. PURPOSE AND CONTENTS OF THE MANUAL

This manual provides basic information as to the selection, installation, operation and maintenance of the i-290 unit. It is intended for the operators of the appliance and it enables them to use the equipment efficiently, even if they do not have any previous specific knowledge.

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|  | **CAUTION: Although this manual is designed for the end user, some of the operations described are only be carried out by qualified personnel who have completed technical or skilled manual training to perform this particular work. They must also keep themselves properly updated with courses recognised by the competent authorities. These tasks include: installation, routine and extraordinary maintenance, decommissioning of the appliance and any other operation indicated "by qualified personnel".** |
| | **When installation and/or maintenance operations are completed, the qualified operator must correctly inform the end user regarding the use and the necessary routine maintenance of the appliance.** |
| | **It is the responsibility of the operator to submitting all of the documentation necessary (including this manual) and of explaining that it all must be kept carefully, in the vicinity of the appliance and always available.** |

The manual describes the machine at the moment it was sold. It must therefore be considered adequate with respect to the state-of-the-art in terms of potentiality, ergonomics, safety and functionality.
The company also performs technological upgrades and does not consider itself obliged to update the manuals of previous machine versions which could even be incompatible. Please refer to the manual supplied with the unit installed.
It is recommended to follow the instructions contained in this manual, especially those concerning safety and routine maintenance.

### 1.1 HOW TO KEEP THE MANUAL

The manual must always be present with the machine to which it refers. It must be placed in a safe place, protected from dust, humidity and easily accessible to the operator, who must necessarily consult it in case of doubt about the use of the machine.
The company also makes technological improvements and is not obliged to update machine manuals of previous versions that may be incompatible. We also decline any responsibility for possible inaccuracies in the manual if due to printing or transcription errors.
Any updates that are sent to the customer must be kept as an annex to this manual.
The company is available to give any detailed information about this manual and to give information regarding the use and the maintenance of its own units.

### 1.2 GRAPHIC SYMBOLS USED IN THE MANUAL

| | |
|---|---|
|  | **Indicates potentially hazardous situation for people and/or the proper functioning of the unit.** |
|  | **Indicates prohibited operations.** |
|  | **Indicates important information that the operator has to follow in order to guarantee the correct operation of the unit in complete safety.** |

## 2. NORMATIVE REFERENCES

The units i-290 are designed in compliance with the following directives and harmonized standards on the safety of machinery:

- Community directives, 2014/35/UE, 2014/30/UE, 2011/65/UE, 2012/19/UE, 2014/68/UE
- Standard EN 12735-1:2020, EN 12735-2:2016
- Standard IEC 60335-1:2010 + COR1:2010 + COR2:2011 + A1:2013 + A2:2016, IEC 60335-2-40:2018
- Standard EN IEC 55014-1:2021, EN IEC 55014-2:2021
- Standard ISO 5149-1:2014 + A1:2015 + A2:2021, ISO 5149-2:2014 + A1:2020, ISO 5149-3:2014 + A1:2021, ISO 5149-4:2022
- Standard EN 62233:2008 + AC:2008
- Standard EN IEC 63000:2018
- Standard EN 14276-1:2020, EN 14276-2:2020
- Standard EN ISO 13585:2012, UNI EN 13134:2002

And the following directives, regulations and standards on ecodesign and energy labelling:

- Community directive 2009/125/EU and subsequent transpositions
- Community directive 2010/30/EU and subsequent transpositions
- EU Regulation no. 811/2013
- EU Regulation no. 813/2013
- Standard EN 14511-1:2022, EN 14511-2:2022, EN 14511-3:2022, EN 14511-4:2022
- Standard EN 14825:2022
- Standard EN 12102:2022
- Standard UNI EN ISO 9614-1:2009

## 3. PERMITTED USE

- The company excludes any contractual and extra contractual liability for damage caused to persons, animals or objects, by incorrect installation, setting and maintenance, improper use of the equipment, and the partial or superficial reading of the information contained in this manual.
- These units are built for the heating and/or cooling of water and for outdoor use only in residential and commercial applications. A different application, not expressly authorised by the manufacturer, is considered improper and therefore not permitted. The fluid to be used is exclusively water or a mixture of water and glycol (in a concentration not exceeding 10%) in the case of low water temperatures.



**It is absolutely NOT permitted to connect the flow of heated water from the machine directly to the taps of the sanitary circuit. This fluid is not intended for sanitary use and must not be ingested.**

- The location, hydraulic and electrical installation must be determined by the system designer and must take into consideration technical requirements, current local legislation and specific authorisations.



**All work must be carried out by experienced and qualified personnel who are familiar with the existing regulations in the country where the installation takes place, as defined in IEC 60335-2-40 Annex HH. Personnel must also be aware of the physical properties and special hazards involved in handling R290 refrigerant gas, as well as the necessary equipment and protective devices. Each operator must have the qualification levels and overall competence defined in EN ISO 13313.**

- This device is intended for use by experienced or trained users in shops, light industry and farms, or for commercial use by non-experts.
- The appliance may be used by children at least 8 years old and by persons with reduced physical, sensory or mental capabilities or without experience or the necessary knowledge as long as they are supervised or after they themselves have received instructions on the safe use of the appliance and understand the relevant dangers. Children must not play with the appliance. The cleaning and maintenance which the user is expected to carry out on the unit cannot be done by children without supervision.
- Direct interaction with the unit by persons with electrically controlled medical devices, such as pacemakers, is prohibited, as harmful interference may result. It is recommended that an adequate distance be maintained from the installation site of the unit, as indicated by the medical system used.



**Users of electrically controlled medical devices should exercise caution when interacting with the unit.**



**Users of metallic prostheses should exercise caution when interacting with the unit.**

## 4. GENERAL SAFETY REGULATIONS

Before starting any type of operation on the i-290 units, the operator must have read the information contained in the manual in order to be familiar with the operation of the machine and its controls.

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|  | **CAUTION: The machine operates with R290 refrigerant, which is a class A3 flammable refrigerant (according to ASHRAE 34 classification). In the event of a leak, the escape of refrigerant gas into the environment can lead to the formation of a flammable atmosphere.<br>Do not smoke and do not use open flames or fires in the vicinity of the machine (see chapters 5.4 and5.5 for specific warnings).<br>DANGER: Risk of death or serious personal injury, observe the fire and explosion hazard information described in the manual.** |
| | **CAUTION: Any routine or extraordinary maintenance operation must be carried out with the machine stopped and disconnected. Always check that there is no voltage: there is a risk of death by electrocution if you come into contact with live electrical parts.** |
| | **For installations in rooms that can reach outside temperatures below 0 °C, freezing of some components may occur if the unit is not in operation. Ensure that the heating system remains in operation at all times and that all rooms are sufficiently heated if there is a risk of frost. If operation cannot be guaranteed, have the heating system drained by a qualified technician.** |
| | **Do not insert your hands, screwdrivers, spanners or any other tools into moving parts.** |
| | **The machine operator and maintenance personnel must receive suitable training for the performance of their tasks in safety.** |
| | **Operators must be familiar with the personal protective equipment and the accident-prevention rules laid down in national and international laws and regulations.** |

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|  | **Do not remove and/or tamper with any safety device.** |
| | **Do not allow children or unassisted disabled persons to use the appliance.** |
| | **Do not touch the appliance when barefoot or parts of the body are wet or damp.** |
| | **Do not perform any cleaning operation when the master switch is 'ON'.** |
| | **Do not pull, detach or twist the appliance's electric cables, even if it is disconnected from the power supply.** |
| | **Do not step on, sit down on and/or place any type of object on the appliance.** |
| | **Do not spray or pour water directly on the unit.** |
| | **Do not dispose of, abandon or leave within reach of children packaging materials (cardboard, staples, plastic bags, etc.) as they may represent a hazard.** |

## 4.1 WORKERS' HEALTH AND SAFETY

The European Union has issued directives on the safety and health of workers, including 89/391/EEC, 89/686/EEC, 2009/104/EC, 86/188/EEC, and 77/576/EEC, as well as subsequent amendments, which every employer is obliged to comply with and ensure compliance. Please be reminded that:

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|  | **Do not tamper with or replace parts of the machine without the express authorisation of the manufacturer. These interventions relieve the manufacturer of any civil or criminal liability.** |
|  | **The unit contains flammable refrigerant gas R290. Any refrigerant leakage can generate a flammable atmosphere. Always carry out a careful fire and explosion risk evaluation.** |
|  | **Using components, consumables or spare parts that do not correspond to those recommended by the manufacturer and/or listed in this manual may be dangerous for the operators and/or damage the machine.** |
|  | **Keep the workplace clean, tidy and free of objects that may limit free movement. The workplace must be adequately lit for the intended operations. Insufficient or excessive lighting may cause risks.** |
|  | **Ensure that adequate ventilation of the working areas is always guaranteed and that the suction systems are always operational, in good condition and in compliance with current laws.** |

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|  | **In the design phase, the indications contained in UNI EN ISO 14738 regarding workstations on the machinery were followed and the lifting limits imposed by UNI ISO 11228-1 were evaluated.**<br>**During installation and maintenance of the unit, make sure to maintain a posture that does not cause fatigue. Check the weight before moving any component.** |

The unit works with R290 refrigerant, which is a refrigerant gas with a low greenhouse effect (GWP 0.02). R290 is a hydrocarbon with a low environmental impact and is not included in the list of fluorinated substances that comply with the requirements of EU Regulation 2024/573 called "F-GAS" (mandatory in the European area).
The gaseous form of R290 refrigerant is heavier than air and, if released into the environment, tends to concentrate in poorly ventilated areas. Inhaling it can cause dizziness and sensations of suffocation and, if in contact with naked flames or hot objects, lethal gases may develop (see the refrigerant's safety data sheet in chapter 4.5).
Pay attention to the fact that refrigerant R290 is odourless.
For any operation on the heat pump system:

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|  | **Wear the appropriate PPE (specifically gloves and goggles).** |
| | **Ensure that the workplace is well ventilated. Do not work in closed rooms or ditches with insufficient air circulation.** |
| | **Do not work on the refrigerant in the vicinity of hot parts or naked flames.** |
| | **Check that there is no voltage and ensure that the unit cannot be reconnected to the power supply during operation.** |
| | **Avoid any leakage of refrigerant into the environment and pay particular attention to accidental leaks from pipes and/or fittings even after the system is emptied.** |
| | **Ensure that there is a fire extinguisher near the unit.** |

## 4.2 PERSONAL PROTECTIVE EQUIPMENT

Use the following personal protective equipment when operating and maintaining i-290 units:

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|  | **Clothing: Maintenance technicians and operators must wear protective clothing that does not leave parts of the body uncovered, as during maintenance it is possible to come into contact with hot or sharp surfaces. Avoid clothes that can get caught or sucked into airflows. Use antistatic clothing (ESD).** |
|  | **Wear safety shoes with non-slip soles, especially in rooms with slippery floors. Use antistatic footwear (ESD).** |
|  | **Gloves: Protective gloves must be worn during cleaning and maintenance. Wear antistatic gloves (ESD).** |
|  | **Explosimeter for R290 gas: During maintenance operations, each operator must use an explosimeter for R290 refrigerant gas to check for its possible presence in the air. The explosimeter must not be a possible source of ignition and its sensitivity must be such that it signals an alarm when a concentration of 20% of the lower flammability limit (LFL) is reached.**<br>**Do not carry electronic devices (e.g. mobile phones, computers, etc.) in the vicinity of the product before evaluating the possible presence of refrigerant in the environment.** |
| <br> | **Mask and googles: A respiratory protection mask and protective goggles must be used during cleaning operations.** |

Personal protective equipment must be checked periodically and comply with the refrigerant gas R290.

## 4.3 SAFETY SIGNS

Personnel must adhere to the following safety signs on the unit:

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|  | **Generic hazard.** |
|  | **Dangerous electric voltage.** |
|  | **Presence of moving parts.** |
|  | **Surfaces which can cause injuries.** |
|  | **Boiling surfaces which can cause burns.** |
|  | **Fire hazard.** |

## 4.4 WARNING LABELS

Warning labels with essential product safety information are applied to the external panels and in the internal parts of the units. The main symbols on the labels are the following:

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|  | **Flammable substance symbol (ISO 7010-W021).** |
|  | **Read the warnings and technical instructions in the manual (ISO 7000-1659).** |
|  | **No open flames (ISO 7010-P003).** |
|  | **No smoking (ISO 7010-P003).** |

Note that the essential warning and safety symbols are also shown on the packaging of each unit.

## 4.5 REFRIGERANT SAFETY DATA SHEET

| | |
|---|---|
| **Name:** | R290 |
| **HAZARDS IDENTIFICATION** | |
| **Main hazards:** | Highly flammable gas.<br>Vapours are heavier than air and can cause asphyxiation due to reduced oxygen levels. |
| **Specific hazards:** | Contact with the liquid can cause ice burns. |
| **FIRST AID MEASURES** | |
| **General information:** | In high concentrations it can cause asphyxia. Symptoms may include loss of mobility and/or consciousness.<br>In low concentrations it may have a narcotic effect. |
| **Inhalation:** | Move the victim to an uncontaminated area while wearing self-contained breathing apparatus. Use oxygen or artificial respiration if necessary. Keep the patient lying down and warm. Call a doctor. |
| **Eye contact:** | Carefully rinse with plenty of water for at least 15 minutes. |
| **Skin contact:** | Wash immediately with plenty of water for at least 15 minutes.<br>Immediately remove contaminated clothing. |
| **FIRE FIGHTING MEASURES** | |
| **Extinguishing media:** | Water spray, dry powder. |
| **Specific hazards:** | Exposure to flames may cause the vessel to rupture or explode. |
| **Specific methods:** | Cool down the containers with a water spray from a safe position. Stop the product leakage if possible. Use water spray, if possible, to abate the fumes. Move the vessels away from the area of the fire if this can be done without posing any risks. |
| **ACCIDENTAL LEAKAGE MEASURES** | |
| **Personal precautions:** | Try to stop the leak.<br>Evacuate personnel to safe areas.<br>Eliminate the ignition sources.<br>Ensure proper ventilation.<br>Avoid entering sewers, basements, excavations and areas where accumulation can be dangerous.<br>Use personal protective equipment.<br>Remain upwind. |
| **Environmental precautions:** | Try to stop the leak. |
| **Cleaning methods:** | Ventilate the area. |
| **HANDLING AND STORAGE** | |
| **Handling:<br>technical measures/precautions:** | Ensure sufficient air exchange and/or suction in the working area. Do not smoke.<br>Keep away from sources of ignition (including electrostatic charges).<br>Use only appropriate equipment, suitable for the product. |
| **Advice for safe use:** | Do not inhale the gas. |
| **Storage:** | Close carefully and store in a cool and well ventilated area. Storage containers should be checked periodically. Do not store with other oxidants in general or other combustible substances. Containers must not be stored in conditions that could lead to corrosion.<br>All electrical equipment in the storage area should be compatible with the risk of forming an explosive atmosphere. |
| **EXPOSURE CONTROLS/PERSONAL PROTECTION** | |
| **Control parameters:** | OEL: data not available.<br>DNEL: data not available.<br>PNEC: data not available. |
| **Respiratory protection:** | Filter masks can be used if the ambient conditions and duration of use are known. |
| **Eye protection:** | Safety goggles. |
| **Hand protection:** | Work gloves. |
| **Hygiene measures:** | Do not smoke. |
| **PHYSICAL AND CHEMICAL PROPERTIES** | |
| **Colour:** | Colourless. |
| **Odour:** | Odourless. |
| **Boiling point:** | -42.1 °C at atm press. |
| **Auto-ignition temperature:** | 470°C |
| **Relative gas density (air=1)<br>Relative liquid density (water=1)** | 1,50<br>0,58 |
| **Solubility in water:** | 75 mg/l. |
| **STABILITY AND REACTIVITY** | |
| **Stability:** | Stable under normal conditions. |
| **Materials to avoid:<br>Hazardous decomposition products:** | Air, oxidising agents. Keep away from heat sources/sparks/open flames/heated surfaces.<br>Under normal conditions of storage and use, dangerous decomposition products should not be generated. |
| **TOXICOLOGICAL INFORMATION** | |
| **Acute toxicity:<br>Local effects:<br>Long term toxicity:** | CL50/inhalation/4 hours/on rat = 20000 ppm.<br>No known effect.<br>No known effect. |
| **ECOLOGICAL INFORMATION** | |
| **Global warming potential GWP (R744=1):** | 0,02 |
| **Ozone Depletion Potential ODP (R11=1):** | 0 |
| **Notes on disposal:** | Refer to the supplier's gas recovery programme. Avoid direct discharge into the atmosphere. Do not discharge where accumulation may be dangerous. Ensure that the emissions limits required by local regulations or specified in authorizations are not exceeded. |

## 4.6 SPECIFIC R290 GAS WARNINGS

The R290 refrigerant gas:

- is odourless;
- is highly flammable (Class A3 refrigerant), but only if an ignition is present;
- it may cause an explosion, but only if a given concentration in air is reached.

The following instructions must be followed:

- do not smoke near the unit;
- affix a no smoking sign near the unit;
- do not inhale the gas;
- install the unit in an outdoor area respecting the required clearances and danger zones indicated in this manual;
- do not drill or burn the unit;
- do not place the unit near ignition sources, such as open flames, electric heaters, light switches, sockets, lamps or other permanent ignition sources;
- any extraordinary maintenance or repairs on the unit must be carried out by specialised technicians or qualified personnel who are properly trained with specific skills in handling flammable refrigerant gases, in accordance with local laws;
- after installation of the machine and before carrying out any maintenance work, conduct a leak detection test to ensure that no concentration of R290 gas can be measured in the danger zone around the unit.

## 4.7 INDICATIONS FOR VACUUM AND CHARGE WITH R290 GAS

Vacuum, charging and refrigerant gas recovery procedures may only be carried out by specialised technicians or qualified personnel who are properly trained with specific skills in handling flammable refrigerant gases, in accordance with local laws. Follow the requirements below:

- ensure that other types of refrigerant do not contaminate the R290 (the minimum purity of the refrigerant gas used for charging operations must be at least 99.5%);
- for refrigerant gas recovery, use cylinders with a left-hand connection and appropriate pitch. The maximum charging capacity must be 0.42 kg/L;
- before charging the refrigerant gas, carry out three flushing cycles with pressurised nitrogen followed by a proper vacuum procedure;
- keep the gas cylinder in a vertical position when charging;
- apply the appropriate label on the unit after charging;
- wear work equipment suitable for use with flammable gas (see Chapter 5.9 for more information). Always keep the work area well ventilated and use R290 detection devices;
- do not charge more refrigerant gas than necessary. Note that the performance of i-290 units is very sensitive to the quantity of gas charged, so a charging error can lead to malfunctions or even machine stoppages. We recommend charging the unit using calibrated scales with a reading sensitivity of at least one tenth of a gram;
- once charging is complete, conduct a leak test prior to the running test;
- conduct a second leak test once all the previous operations have been completed.

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|  | **CAUTION: Each unit is equipped with two charging connections (high-pressure side and low-pressure side) to ensure charging and discharging of the refrigerant circuit. The maximum tightening torque of the charging connections is 0.5 Nm.** |
|  | **CAUTION: The unit is already charged with the refrigerant gas necessary for its correct operation. If it needs topping up, after maintenance or a leak, follow the procedures described in Chapter 5.9.** |
|  | **CAUTION: During the charging and recovery procedure of the unit, beware of possible refrigerant gas leaks that could start a fire. Always carry out a risk assessment and apply the necessary preventive actions.** |

## 4.8 R290 GAS DISPOSAL

The procedures described below may only be performed by specialised technicians or qualified personnel who are properly trained with specific skills in accordance with local laws:

- do not discharge the gas in areas where there is a risk of explosive mixtures forming with air. The gas should be disposed of in a suitable torch with a flashback arrestor. Follow current regulations regarding the disposal of refrigerant gases. Contact the supplier if operating instructions are considered necessary;
- only use equipment approved for use with R290 refrigerant;
- when removing and disposing of the refrigerant, ensure that no air enters where the refrigerant is present (refrigerant circuit, cylinders or other containers for transporting the refrigerant).



**CAUTION: During the refrigerant disposal procedure, beware of possible gas leaks that could start a fire.**

## 4.9 SAFETY RULES FOR TRANSPORT AND STORAGE OF R290 UNITS

Before opening the unit's packaging, check for gas leaks in the area using an appropriate gas detector. Ensure there are no ignition sources near the unit.
Do not smoke near the unit;
Units must be transported and stored in accordance with current national regulations. Specifically, according to the provisions of ADR, which regulates the transport of goods by road and rail in Europe, the maximum total quantity per transport unit in terms of net mass in kg for flammable gases is 333. In addition, for road transport, use vehicles that are preferably open or equipped with a ventilation system and operated by trained personnel.
The units are R290 heat pumps and, according to the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), are assigned UN number 3358 (Refrigerating Machines containing flammable, non-toxic, liquefied gas). Since the refrigerant charge is less than 12 kg, compliance with the ADR requirements is not required.
For prerequisites on the transport by sea of equipment charged with flammable refrigerant, refer to the International Maritime Dangerous Goods Code (IMDG), and for transport by air check the regulations prescribed by the International Air Transport Organisation (IATA).
Please observe the following precautions:

- if stored in a closed location, leave the machine in a dedicated place that is always dry, cool, well ventilated and protected from possible ignition sources, direct sunlight or other heat sources. We also recommend using one flammable gas detection sensor every 36-40 $m^2$. Always refer to national regulations;
- if stored in an open area, observe the minimum safety distances from drains, cisterns, sewers and other underground areas, in accordance with current national regulations;
- do not remove covers and packaging;
- ensure that all panels are correctly mounted;
- do not obstruct the openings and holes made in the machine panels;
- avoid cleaning the unit with aggressive detergents or chemicals;
- We recommend removing any heating water inside the unit to prevent possible corrosion or, in cold climates, damage to components caused by freezing.



**CAUTION: When transporting and storing the unit, beware of possible refrigerant gas leaks that could start a fire.**

# 5. INSTALLATION

| | |
|---|---|
|  | **CAUTION: All the operations described below must be carried out by QUALIFIED PERSONNEL only (IEC 60335-2-40 Annex HH). Before carrying out any operation on the unit, ensure the power supply is disconnected. Also ensure, by means of appropriate locks, that the power cannot be accidentally switched on again until all operations have been completed.** |

## 5.1 GENERAL INFORMATION

When installing or working on the refrigeration circuit, it is necessary to scrupulously comply with the regulations given in this manual, observe the instructions on board the unit and in any case apply all necessary precautions. Failure to comply with the regulations may lead to dangerous situations.

| | |
|---|---|
|  | **After receiving the unit, immediately check its integrity. The unit left the factory in perfect condition; any damage must be immediately reported to the carrier and recorded on the Delivery Note before signing it.** |

The company must be informed of the extent of the damage within 8 days. The customer must prepare a written report in the event of significant damage.

| | |
|---|---|
|  | **The units are designed to be installed outdoors. The units are designed to be installed outdoors. Under no circumstances should the outdoor ambient temperature exceed 46°C when the unit is not in operation. Above this temperature, the unit is no longer covered by current pressure equipment safety regulations.** |
|  | **The installation site must be completely free of fire hazards. All necessary measures must therefore be taken to prevent the risk of fire at the installation site (see Chapter 5.5 for more details). The appliance must not be placed in the vicinity of open flames, ignition sources or heat sources.<br>The wall of the buildings adjacent to the unit must have an adequate fire resistance class, in order to contain any fire that may develop inside the rooms. However, it is good practice to keep a fire extinguisher near the unit.** |
|  | **The unit must be installed in order to allow maintenance and repair. The warranty does not cover costs for platforms or other handling equipment needed for any work.** |
|  | **All maintenance and inspection operations must be carried out by QUALIFIED PERSONNEL only (IEC 60335-2-40 Annex HH). All equipment used during maintenance operations must be compatible with the refrigerant gas R290.** |
|  | **Before carrying out any operation on the unit, make sure that the power supply is disconnected and cannot be switched on again accidentally. After disconnecting the power supply from the unit, wait at least 5 minutes before performing any operation on the machine to allow the condensers to discharge.** |
|  | **Do not use equipment to speed up the defrost process or for cleaning except for those recommended by the manufacturer.** |
|  | **The appliance must be installed outdoors, in a place without continuously operating ignition sources (e.g. open flames, an operating gas appliance or an operating electric heater). Refer to Chapter 5.5.** |
|  | **Cable ducts and electrical conduits to the machine must not contain potential ignition sources.** |
|  | **Do not perforate or burn. Do not make mechanical modifications to the unit.** |
|  | **There are some moving parts inside the unit. Use extreme caution when working near them, even if the power supply is disconnected. In particular, pay attention to the fan blades when removing the front protective grilles. Do not touch or insert any objects into the moving parts.** |

| | |
|---|---|
|  | **The compressor heads and discharge pipes are at quite high temperatures. The pipes on the suction side of the compressor, on the other hand, can reach very low temperatures. Uninsulated pipes can cause burns or ice burns: only handle these components when their temperature is close to the ambient temperature.** |
|  | **Take particular care when working near the condensing coils. The aluminium fins are very sharp and can cause serious injuries.** |
|  | **After the maintenance operations, close the panels by fixing them with screws.** |
|  | **After maintenance or replacement of components, reconnect the cables in the same position as in the factory.** |
|  | **Routine maintenance operations can be carried out with the machine charged, while in the case of extraordinary operations, repairs or replacement of components and heavy work in the vicinity of the machine (e.g. construction sites), drain the machine of refrigerant gas and move it to a safe area if necessary (in accordance with Chapter 5.5).** |
|  | **Insulating materials are not self-extinguishing: remove them when working on the unit, if necessary.** |
|  | **Do not remove, replace or make illegible the adhesive labels on the unit and packaging. Do not cover the labels after installation of the unit.** |

## 5.2 TRANSPORT AND STORAGE TEMPERATURE LIMITS

| | |
|---|---|
| Minimum storage temperature [°C] | -10°C |
| Maximum storage temperature [°C] | +50 °C |

## 5.3 LIFTING AND HANDLING

The unit must be handled by qualified personnel who are properly equipped with gear suitable for the weight and size of the unit, in compliance with current accident-prevention regulations.
Proceed as follows:

1. check the weight on the unit's technical label or in the technical data table;
2. check that when moving the unit there are no uneven paths, ramps, steps, doors which could destabilise the movement and damage the unit;
3. ensure the unit remains in a horizontal position while it is being moved;
4. during handling, do not make any sudden, abrupt manoeuvres in order not to destabilise the unit;
5. before handling the unit, check that the equipment is suitable for lifting and preserving the integrity of the unit;
6. only perform lifting operations using one of the listed methods;
7. ensure the unit is stable before starting handling.

Note that the weight of the unit is concentrated more on the side of the refrigeration circuit: take into consideration the weight distribution of the machine when transporting it manually with cables, in order not to lift excessive loads and avoid damage or personal injury.
We recommend removing the packaging only after the machine has been placed in the actual installation location. Dispose of the different packaging materials in accordance with national regulations.

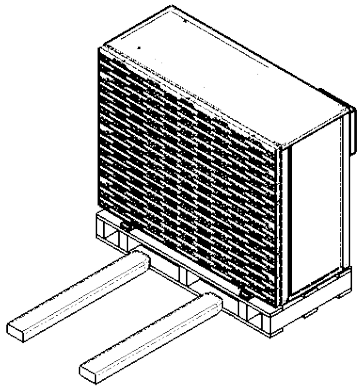
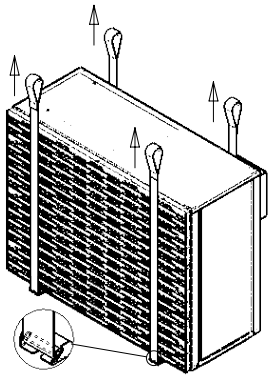
| | |
|---|---|
|  | **Before commissioning, carefully inspect the unit and packaging for damage or refrigerant leakage.** |
|  | **Do not proceed with the start-up of the unit if damage was found during transport. Immediately inform the Company of the problem.<br>The company is not liable for any damage to the product caused by handling and transporting the unit in a manner not in accordance with this manual and the regulations in force.** |

### 5.3.1 Lifting mode

The following lifting methods are allowed:

- forklift truck;
- ropes / bands.

Make sure to tension the lifting cables gradually and check they are positioned correctly.

| | |
|---|---|
|  | Lifting with a forklift truck. |
|  | Lifting with cables / straps. |

### 5.3.2 Damage to the unit

In the event that the product is damaged during handling, storage or transport (e.g. due to dropping), follow the procedure described below:

1. take the damaged unit outside.
2. enclose a zone of at least 3 m around the unit, within which there must be no manholes, drains, wells, depressions or other connections to underground areas.
3. ensure that there is no ignition source from the newly defined work area.
4. check for possible refrigerant leaks using a leak detector.
5. if necessary, remove the product packaging.
6. drain the refrigerant gas as described in chapter 5.9.

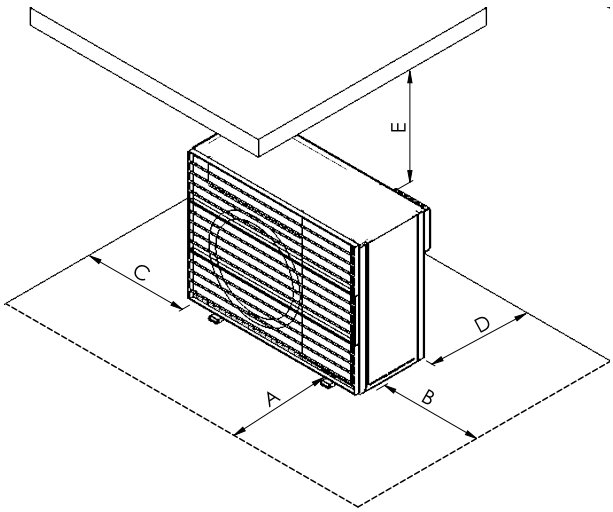
For further clarification, contact a technical support centre.

## 5.4 POSITIONING AND MINIMUM TECHNICAL CLEARANCES

All models in the i-290 series are designed and constructed for outdoor installation. The company is not liable for any damage to property, animals and/or persons resulting from failure to comply with the instructions on installing the unit given in this manual.
It is advisable to create an adequately sized support base for the unit. The units transmit a small amount of vibrations to the ground: however, it is advisable to place anti-vibration mounts between the base frame and the supporting surface. It is preferable to install the unit away from places sensitive to noise and vibration (e.g. windows and glass panes).
Always conduct an environmental impact assessment based on the power and sound pressure data given in chapter 12 and the sound emission limits according to the unit's installation area, with reference to the DPCM of 14/11/1997. An assessment must also be conducted if the unit is installed near workers, according to LEG. DEC. 81/2008 Art. 189 and subsequent amendments. To reduce vibration and noise, we recommend using rubber seals for wall installation.

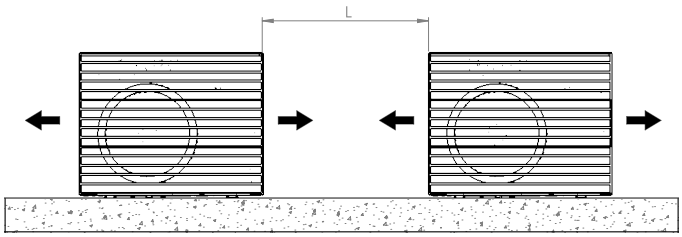
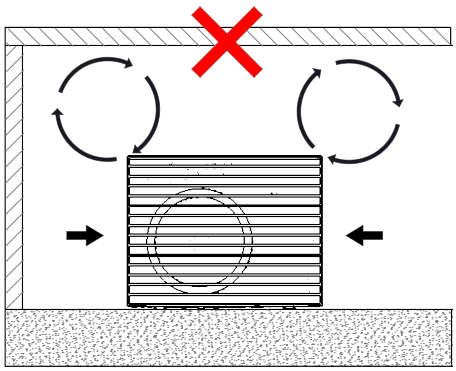
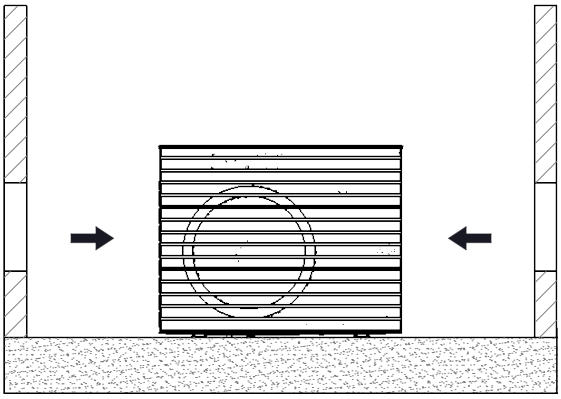
| | |
|---|---|
|  | **If the unit is to be mounted on a wall, ensure that the wall is made of solid brick, concrete or similar. The load-bearing capacity of the wall must be sufficient to support at least four times the weight of the unit. The maximum installation height is 800 mm.** |
|  | **The supporting surface must have a sufficient load-bearing capacity to support the unit weight, which can be checked both on the technical label on the unit and in this manual in the "Technical data" chapter.<br>The supporting surface must not be tilted to ensure the unit works properly and does not tip over.<br>The supporting surface must not be smooth, to avoid water/ice deposits which are potential sources of danger.** |
|  | **The unit's installation site must be free from foliage, dust, etc., which could clog or cover the coils.<br>Avoid installing in areas subject to water stagnation or dripping, for example from gutters.<br>Also avoid areas subject to snow accumulation (such as corners of buildings with sloping roofs). When installing in areas subject to harsh temperatures and snowfall, it is advisable to mount the unit on a plinth raised 20-30 cm above the ground, in order to prevent the formation of snow accumulations around the machine that may obstruct the coil and the perforations on the side panels and plinth of the machine.<br>Also avoid positioning near lightning towers or other objects that can attract an electric shock.** |
|  | **It is recommended that sufficient air exchange be ensured to dilute R290 gas in the event of its accidental escape, thus preventing the formation of explosive atmospheres. For this reason, a minimum distance (depending on the unit) must be maintained from any gas vents or sumps, in which the gas could accumulate. Comply with national regulations for the installation of machines.** |
|  | **The units are suitable for installation in urban, industrial, coastal and rural areas.<br>If the unit is installed in an environment with aggressive atmospheres, the air drawn in by the fan may contain substances that can cause damage to the panels, grilles and internal components of the unit. In this case, the service life of the unit will be limited.** |
|  | **Do not install the unit under roofs of any kind, such as roofs, canopies and similar, placed at a height of less than 1.5 m from the unit cover.** |
|  | **Do not install the unit below ground level (such as cellars, underground car parks, basement or underground work rooms, etc.).** |

It is very important to avoid recirculation between suction and discharge, otherwise the performance of the unit will deteriorate or even interrupt normal operation.
This is why the minimum clearances shown below must be strictly guaranteed.




| MODEL i-290 | | A | B | C | D | E |
|---|---|---|---|---|---|---|
| **0106** | mm | 1500 | 500 | 400 | 400 | 1500 |
| **0109 / 0109T** | mm | 1500 | 500 | 400 | 400 | 1500 |
| **0112 / 0112T** | mm | 1500 | 500 | 400 | 400 | 1500 |
| **0114 / 0115 / 0118** | mm | 1500 | 500 | 400 | 400 | 1500 |

| | |
|---|---|
|  | **Avoid obstructing or covering the ventilation openings on the top cover.** |
|  | **For installations in locations with strong winds, please refer to the area classification according to the Beaufort scale. If the value is > 7 (strong wind, average wind speed = 13.9-17.1 m/s) it is strictly necessary to keep the fan powered at all times, thus preventing unintentional fan rotation.** |
|  | **If the unit is installed at a distance of less than 1 km from coastal and maritime areas, the presence of salt and sand in the air greatly increases the likelihood of corrosion. Install the unit so that it is protected from direct sea wind if necessary, provide windbreaks on site (observing the minimum distances indicated).** |

| | |
|---|---|
| In the case of side-by-side units, the minimum distance L between them is 1 m. |  |
| Avoid covering with canopies or placing near plants or walls to prevent air recirculation. |  |
| In the event of winds stronger than 2.2 m/s the use of wind barriers is recommended. |  |

## 5.5 DANGER AND SAFETY ZONES

The units of the i-290 series contain R290 refrigerant gas. The density of this gas is higher than that of air; therefore, in the event of a leak, it tends to disperse by accumulating in niches, ground depressions, or underground areas.
When installing the units, the danger and safety zones set out in this manual must be observed.
These zones have been defined in accordance with EN 60079-10-1 by evaluating different scenarios and estimating:

- a refrigerant leak rate from 0.1 to 3 g/s
- an air velocity from 0.1 to 0.5 m/s

The resulting area classification is:

- Zone Type (lower degree of dilution): 2
- Group and temperature class: IIA T2

Our risk analysis has defined an EPL (Equipment Protection Level) Gc in accordance with EN 60079-14.
A **danger zone** is defined as a area around the machine in which, in the event of a refrigerant gas leak, a flammable atmosphere is formed for a short time, within which it is necessary to implement all the precautions described in the manual. In the absence of specific standards or regulations, when using the unit in an industrial or working environment, the classification of explosion hazard locations should be carried out as per the ATEX Directive 2014/34/UE and Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work.



**The areas reported in the following chapters are based on conservative assumptions, considering an air velocity of 0.1 m/s and the most severe leakage scenario applicable to the unit.**
**Any reductions in safety distances must be justified by a specific risk analysis carried out by the designer in accordance with EN 60079-10-1, under their full responsibility.**

There must NOT be any ignition sources in the danger zones, including:

- flammable gases and sprays, self-igniting powders;
- electrical equipment that is not suitable for use in potentially explosive areas (zone 2);
- naked flames, heated surfaces (maximum surface temperature of 360°C) and hot processes; all smoking, including electronic cigarettes, is prohibited;
- sparks, electrostatic charges, direct and indirect lightning effects, eddy currents and cathodic protection;
- ignition sources due to remote processes (ionising and non-ionising radiation);
- permanent electrical sources (switches, lamps, etc.) or other possible triggers;
- In addition, the danger zones must NOT:
- contain potentially dangerous areas or elements such as wells, manholes, openings to the sewage system and other openings to underground places and premises (e.g. garages), river drains, power lines, flammable deposits, electrical installations, etc.;
- include doors, windows or glass panes, to prevent the possible return of the gas inside the building;
- extend towards neighbouring residential properties, parking areas, public access sites, roads or railways.

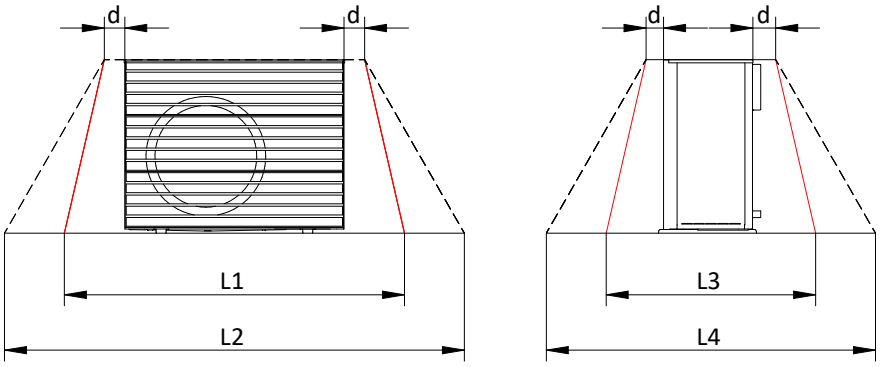
A **safety zone** extending beyond the danger zone must also be identified. Within the safety zone, in the event of a refrigerant leak, the concentration of the gas in the air is typically below the critical levels for the formation of flammable or hazardous atmospheres. The following provisions must be complied with:

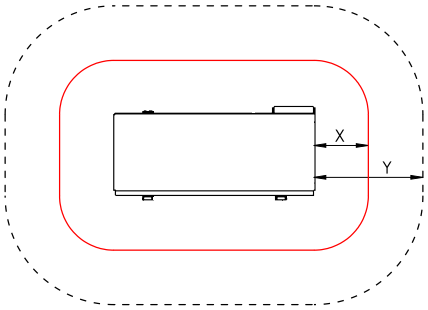
- prevent accumulation and stagnation in underground spaces, drains, manholes, cellars, etc.;
- do not place building vents inside or near the safety zone;
- do not use naked flames and other direct heat sources.

In any case, comply with national and local regulations on the installation of machinery (where applicable) in order to prevent the formation of fire hazards and to prevent gases from seeping underground into openings to the ground or floors below.
No structural modifications may be made in the danger and safety zones that would alter their extent or change the behaviour of the air-refrigerant mixture.
Do not tamper with, alter, remove or compromise, even partially, the functionality of the devices, guards and provisions provided for the safety of property and persons.
Various types of outdoor installation are considered in this manual, as indicated in the following paragraphs.

### 5.5.1 Free-field ground installation

For units installed on free-field terrain, the danger (continuous red line) and safety zones (dashed black line) are shown in the figures below:

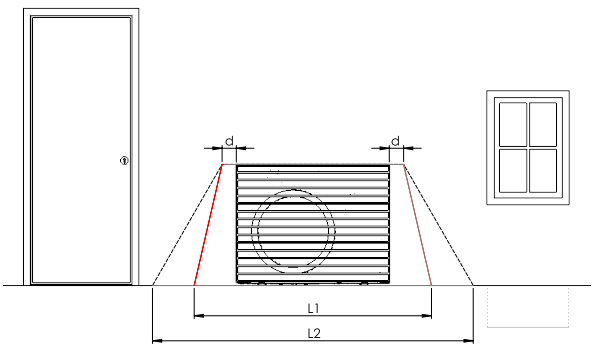


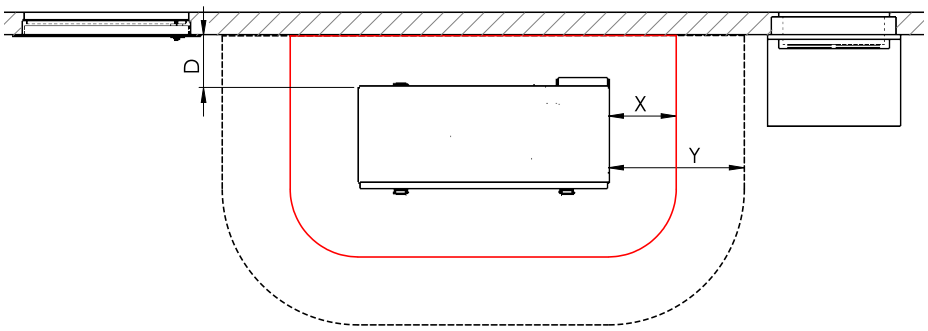




| MODEL i-290 | | X | Y | L1 | L2 | L3 | L4 | d |
|---|---|---|---|---|---|---|---|---|
| **0106 / 0109 / 0109T** | mm | 1000 | 1500 | 3105 | 4105 | 2490 | 3490 | 250 |
| **0112 / 0112T / 0114 / 0115 / 0118** | mm | 1500 | 2000 | 4105 | 5105 | 3490 | 4490 | 250 |

### 5.5.2 Ground installation in front of a wall

For units installed on the ground in front of a wall, the danger (continuous red line) and safety zones (dashed black line) are shown in the figures below:

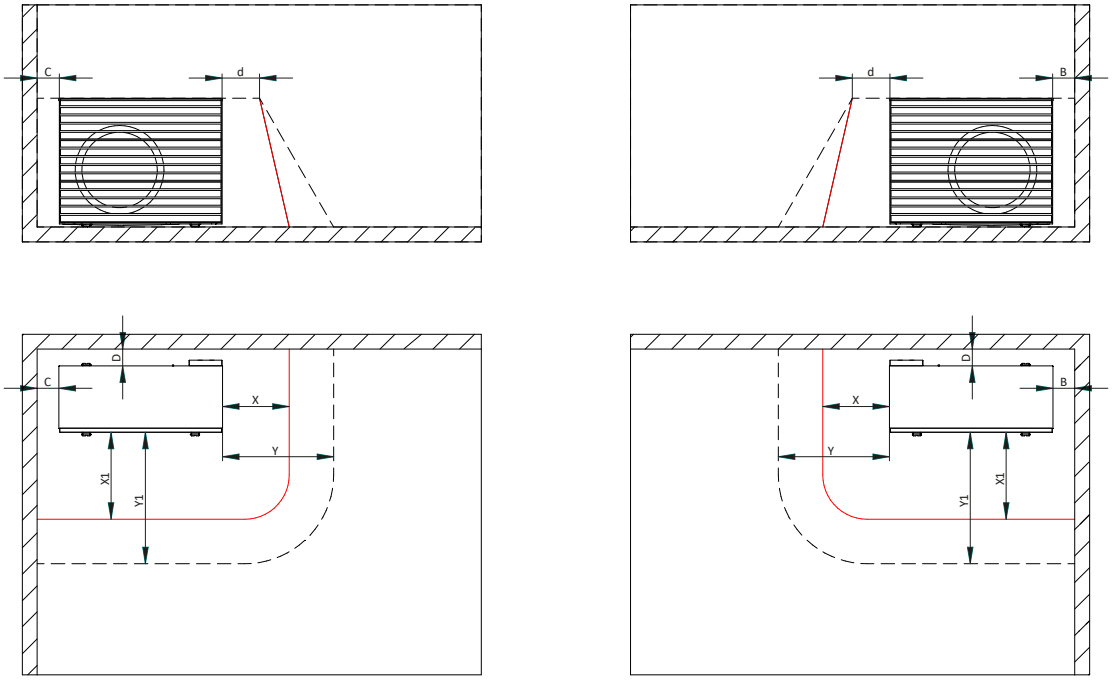





| MODEL i-290 | | X | Y | L1 | L2 | D | d |
|---|---|---|---|---|---|---|---|
| **0106 / 0109 / 0109T** | mm | 1000 | 1500 | 3105 | 4105 | 400 | 250 |
| **0112 / 0112T / 0114 / 0115 / 0118** | mm | 1500 | 2000 | 4105 | 5105 | 400 | 250 |

### 5.5.3 Ground installation in a corner

For units installed on the ground in a corner, the danger (continuous red line) and safety zones (dashed black line) are shown in the figures below:




| MODEL i-290 | | X | Y | X1 | Y1 | B | C | D | d |
|---|---|---|---|---|---|---|---|---|---|
| **0106 / 0109 / 0109T** | mm | 1000 | 1500 | 2000 | 2500 | 500 | 400 | 400 | 250 |
| **0112 / 0112T / 0114 / 0115 / 0118** | mm | 1500 | 2000 | 2750 | 3250 | 500 | 400 | 400 | 250 |

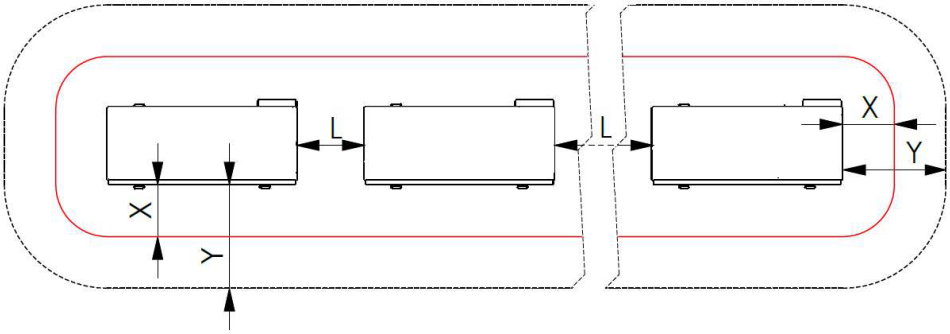
### 5.5.4 Flat roof installation

The installation configuration on a flat roof is similar to that on free-field terrain, although some additional aspects must be considered:

- place the machine at a sufficient distance from side walls and protrusions, which must therefore be beyond the safety zone;
- ensure that the structure of the building's roof is solid;
- choose a location where no snow, dust or foliage can accumulate;
- pay attention to noise emissions and maintain an adequate distance from surrounding buildings;
- if high air velocities are detected, install the protections listed in the previous chapter.

### 5.5.5 Multiple installation

When installing several machines side by side, follow the above configurations and, in addition, maintain a buffer of L between each machine. As an example, see the following buffer zones (danger and safety) for a generic number "n" units installed on free-field terrain:



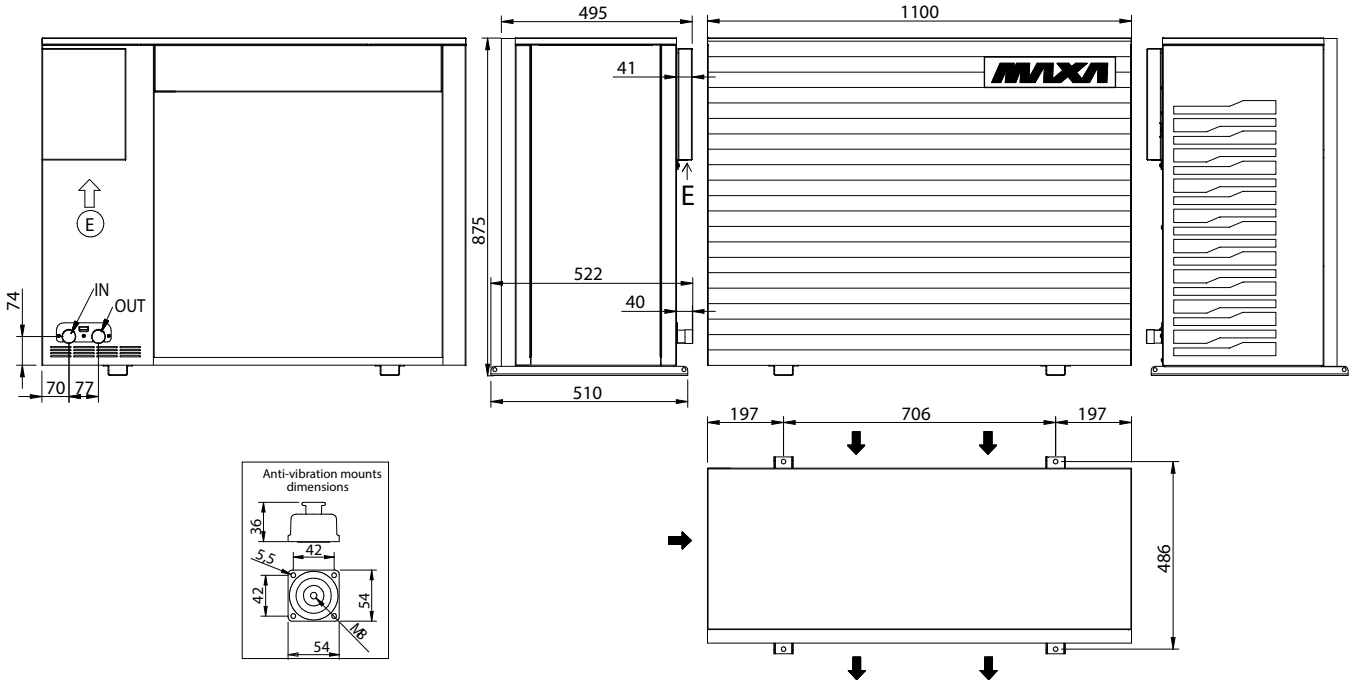

| MODEL i-290 | | X | Y | L |
|---|---|---|---|---|
| **0106 / 0109 / 0109T** | mm | 1000 | 1500 | 1000 |
| **0112 / 0112T / 0114 / 0115 / 0118** | mm | 1500 | 2000 | 1000 |

For other types of installation not covered in this manual, contact technical support. If in doubt about the installation of the units, request a technical assessment by the fire brigade or a fire prevention expert.

## 5.6 DIMENSIONS

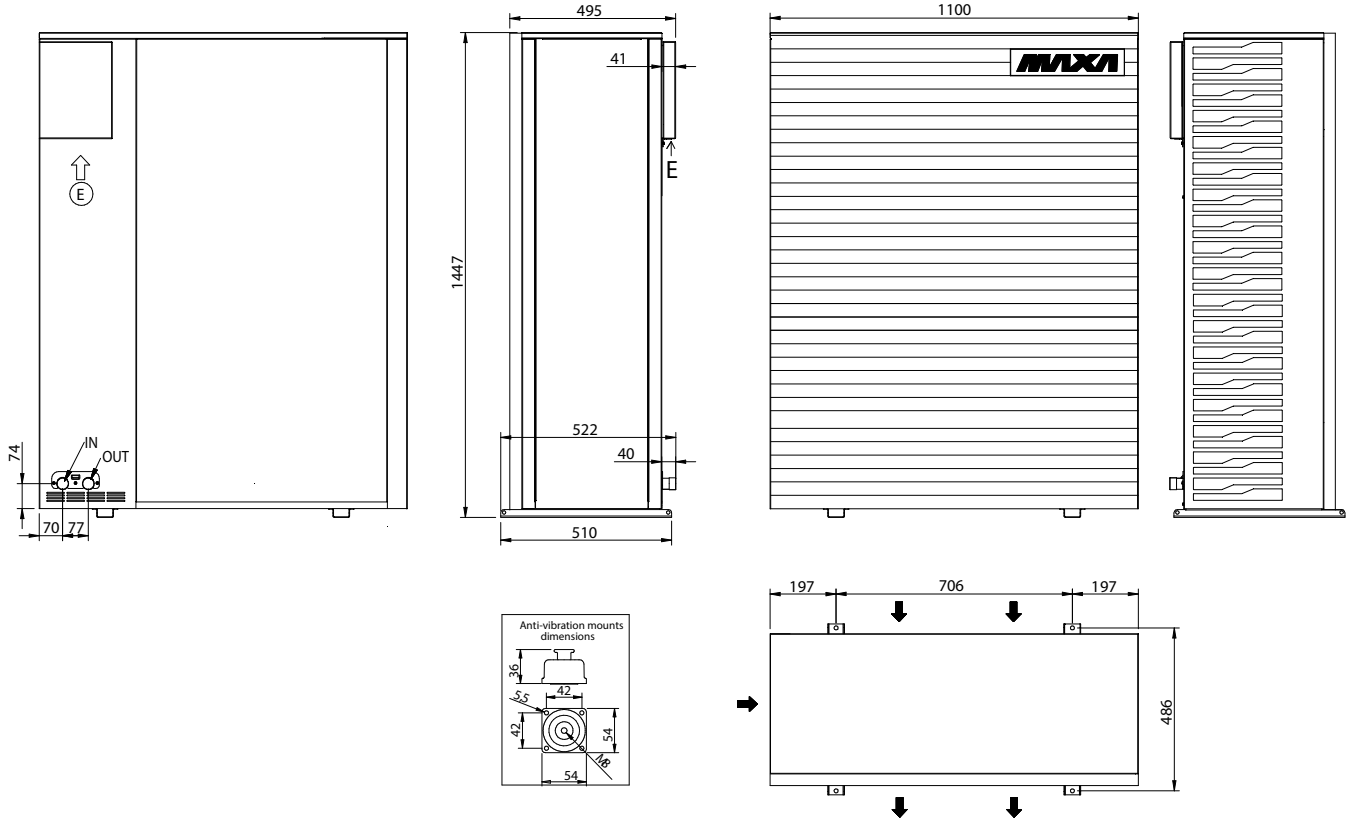
### 5.6.1 Models i-290 0106 / 0109 / 0109T

IN/OUT: 1" G
E: power supply input.



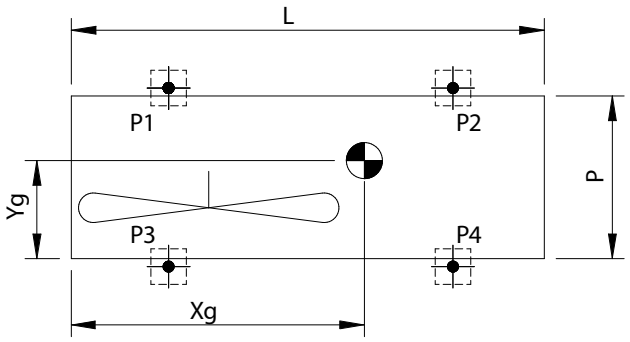

### 5.6.2 Models i-290 0112 / 0112T / 0114 / 0115 / 0118

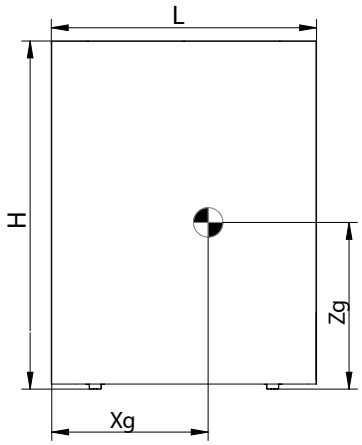
IN/OUT: 1" G
E: power supply input.



## 5.7 POSITIONING OF CENTRE OF GRAVITY AND VIBRATION DAMPERS

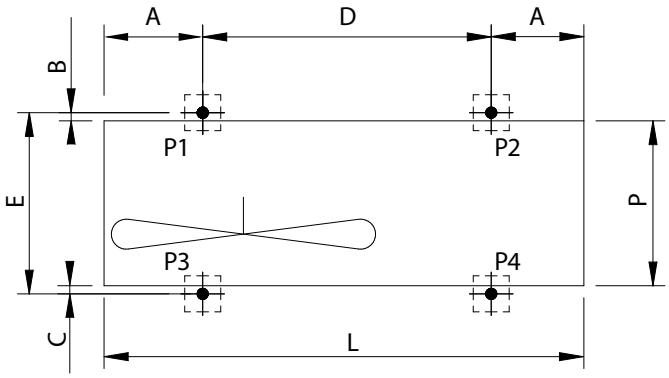
The position of the centre of gravity of each machine is indicated in the tables, with reference to the dimensions shown in the image.




| Version | Model i-290 | Shipping weight [kg] | Operating weight [kg] | L [mm] | P [mm] | H [mm] | Xg [mm] | Yg [mm] | Zg [mm] |
|---|---|---|---|---|---|---|---|---|---|
| Standard | 0106 | 117 | 103 | 1100 | 510 | 875 | 594 | 240 | 345 |
| | 0109 | 119 | 105 | 1100 | 510 | 875 | 584 | 238 | 350 |
| | 0109T | 129 | 115 | 1100 | 510 | 875 | 584 | 238 | 350 |
| | 0112 | 170 | 156 | 1100 | 510 | 1447 | 710 | 180 | 665 |
| | 0112T | 179 | 165 | 1100 | 510 | 1447 | 710 | 180 | 665 |
| | 0114 | 184 | 170 | 1100 | 510 | 1447 | 715 | 185 | 665 |
| | 0115 / 0118 | 188 | 174 | 1100 | 510 | 1447 | 715 | 185 | 665 |
| Silenced | 0106 SL | 122 | 108 | 1100 | 510 | 875 | 594 | 240 | 345 |
| | 0109 SL | 124 | 110 | 1100 | 510 | 875 | 584 | 238 | 350 |
| | 0109T SL | 134 | 120 | 1100 | 510 | 875 | 584 | 238 | 350 |
| | 0112 SL | 175 | 161 | 1100 | 510 | 1447 | 710 | 180 | 665 |
| | 0112T SL | 184 | 170 | 1100 | 510 | 1447 | 710 | 180 | 665 |
| | 0114 SL | 189 | 175 | 1100 | 510 | 1447 | 715 | 185 | 665 |
| | 0115 SL / 0118 SL | 193 | 179 | 1100 | 510 | 1447 | 715 | 185 | 665 |

The positions for the installation of vibration dampers for each type of machine are shown in the images below.

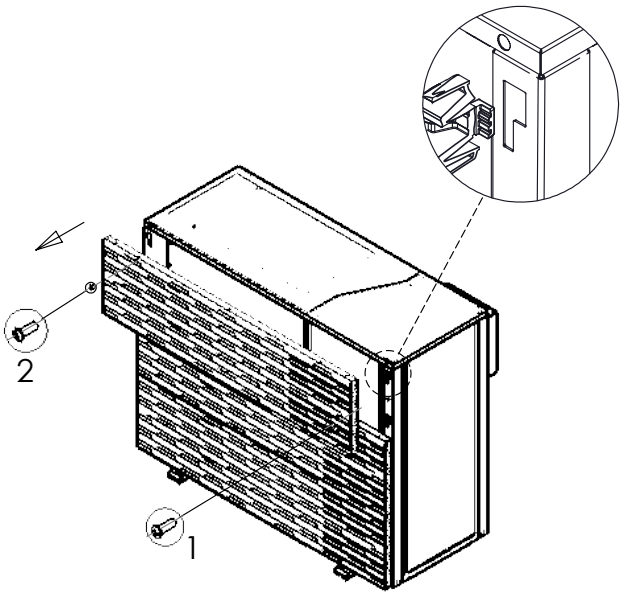



| Model i-290 | A [mm] | B [mm] | C [mm] | D [mm] | E [mm] |
|---|---|---|---|---|---|
| 0106 / 0109 / 0109T / 0112 / 0112T / 0114 / 0115 / 0118 | 197 | 16 | 16 | 706 | 486 |

## 5.8 ACCESS TO THE INTERNAL PARTS

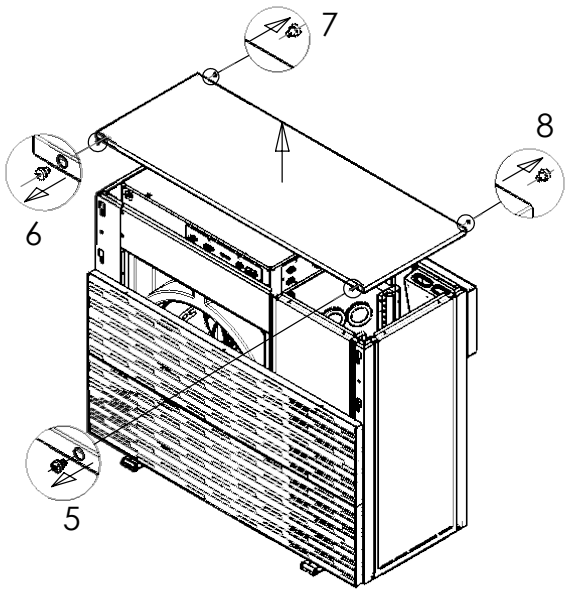
| | |
|---|---|
|  | **All access to internal parts and the electrical cabinet must be carried out strictly with the machine switched off and disconnected from the power supply. Operations to be performed by qualified personnel.** |
|  | **When the work is complete, replace all the removed covers with all the screws and seals provided (if any).** |

### 5.8.1 Models i-290 0106 / 0109 / 0109T



Removal of plastic grille:

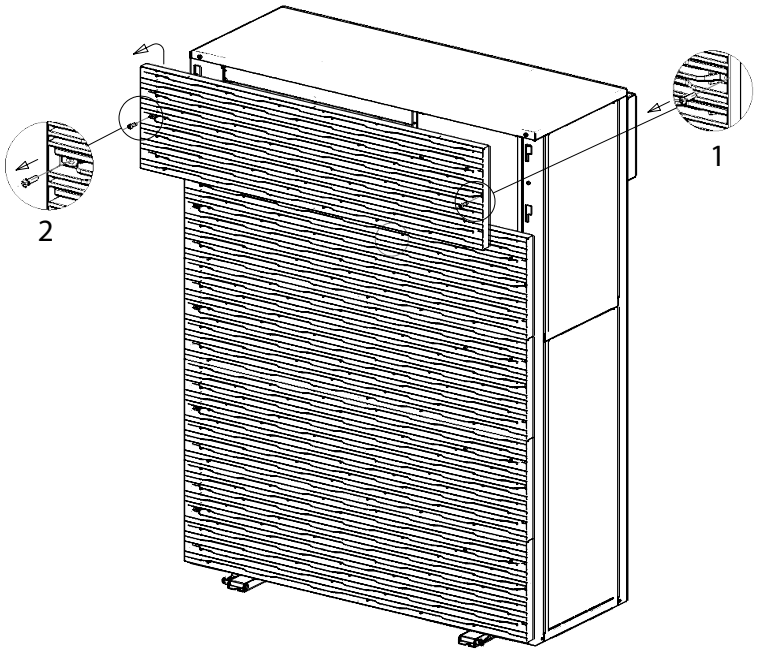
1. Unscrew the M5 screws (number 1, 2) using a Phillips screwdriver.
2. Slide the grille upwards to pull out the interlocking tabs (as shown in detail).
3. Pull the grille out.
4. Repeat the steps described for the other two grilles.




Removal of cover and side panel:

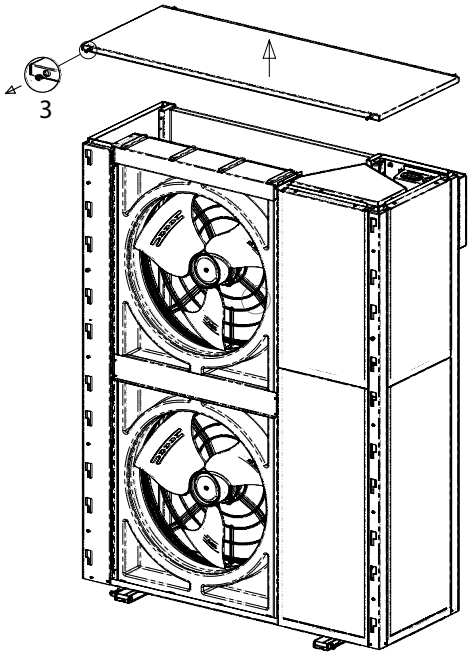
1. Unscrew the M4 screws (number 5, 6, 7, 8) using a Phillips screwdriver.
2. Remove the sheet by pulling it upwards.
3. Unscrew the M4 screws on the panel using a Phillips screwdriver and pull it upwards in order to release the attachment tabs.
4. Pull the panels forward to remove them.

### 5.8.2 Models i-290 0112 / 0112T / 0114 / 0115 / 0118



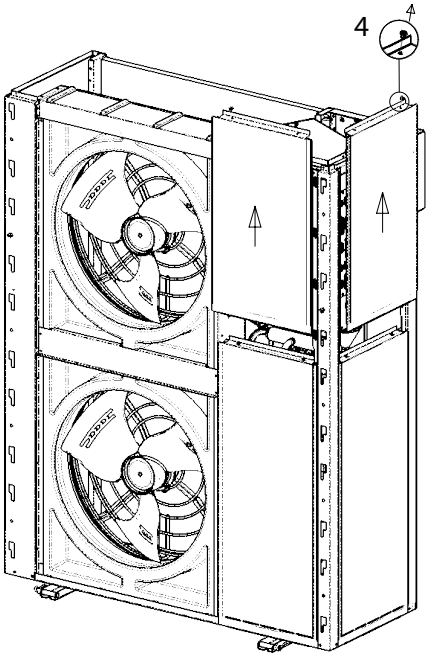

Removal of plastic grille:

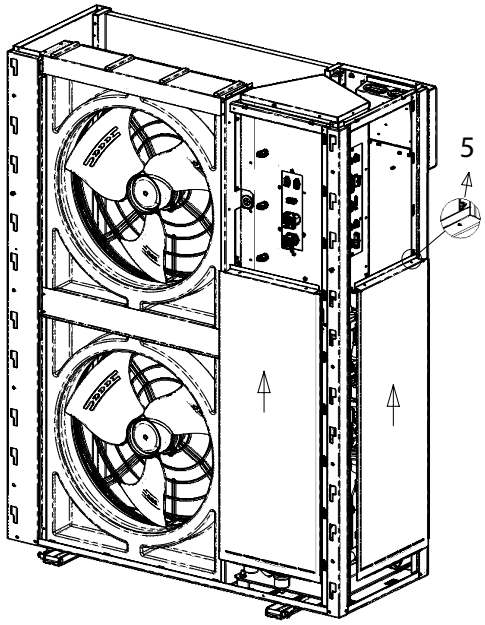
1. Unscrew the M5 screws (number 1, 2) using a Phillips screwdriver.
2. Slide the grille upwards to remove the interlocking tabs.
3. Pull the grille out.
4. Repeat the steps described for the other grilles.




Removal of cover:

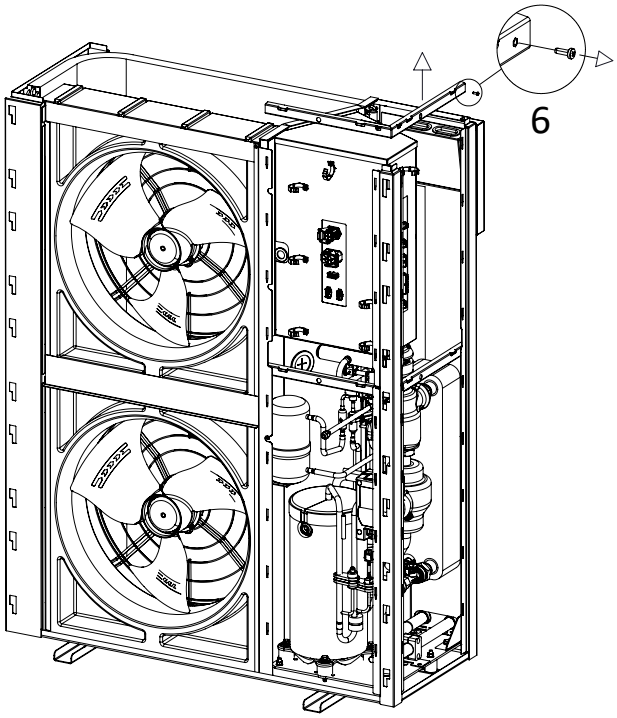
1. Unscrew the M4 screws of the cover (point 3) using a Phillips screwdriver.
2. Remove the cover by pulling it upwards.




Removal of side panels:

1. Unscrew the M4 screws (points 4, 5) using a Phillips screwdriver.
2. Push the panels upwards to remove the interlocking tabs.
3. Pull the panels forward to remove them.

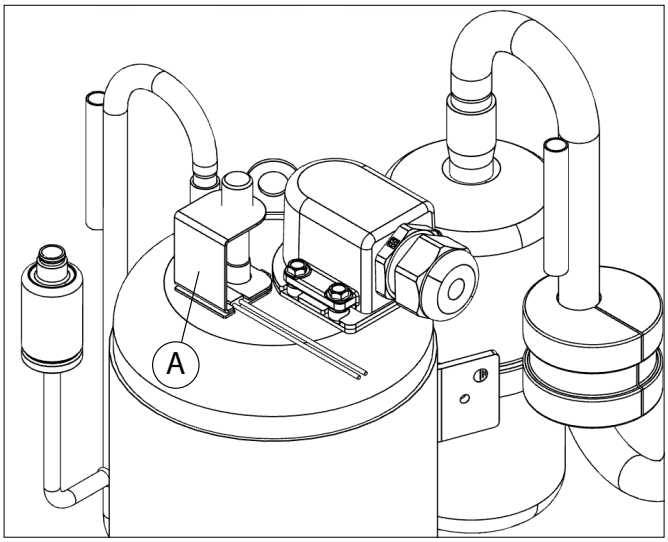



Removing corners:

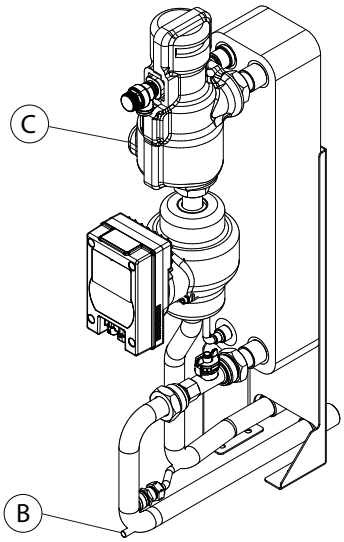
1. Unscrew the M4 screw (number 6) using a Phillips screwdriver.
2. Release the angle bracket and pull it upwards to remove it.

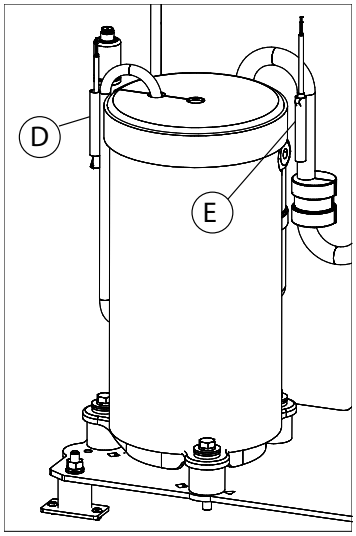
### 5.8.3 Thermostat and temperature probe position

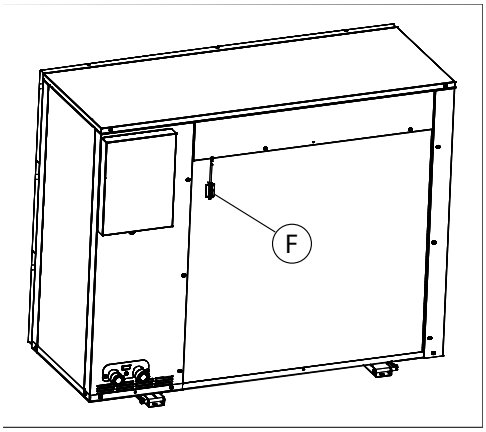
The safety thermostat is located on the compressor head (position A in the figure). To access it, remove the insulation of the component.




There are 5 temperature probes inside the machine: the return and discharge probes on the water side (position B, C) and those on the compressor suction and discharge (position D, E) are located in dedicated wells, while the external air probe (position F) is located on a dedicated mount. The probes on the compressor pipes are fixed by clips to the respective wells.



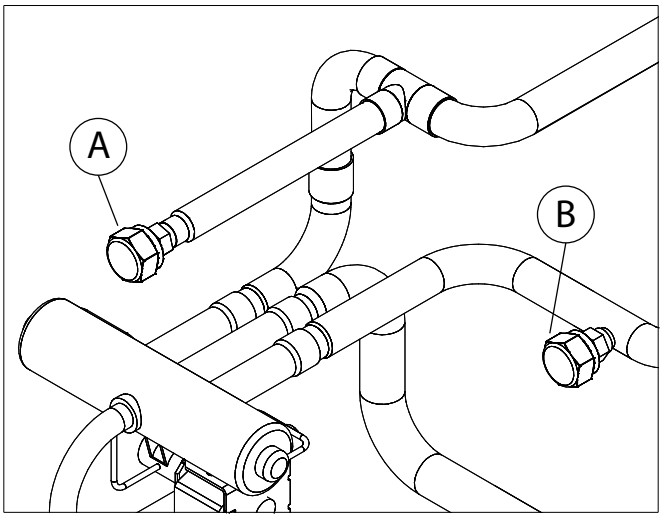




## 5.9 MACHINE CHARGING PROCEDURE

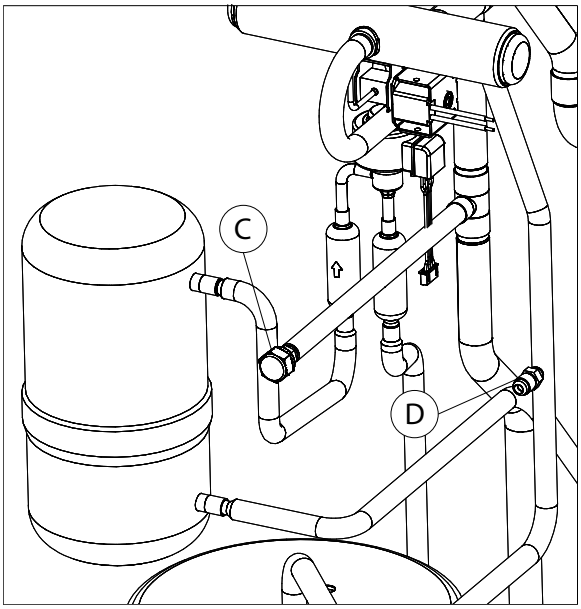
The unit is supplied already charged with refrigerant gas. If it needs topping up, after maintenance or a leak, follow the steps listed below in this exact order:

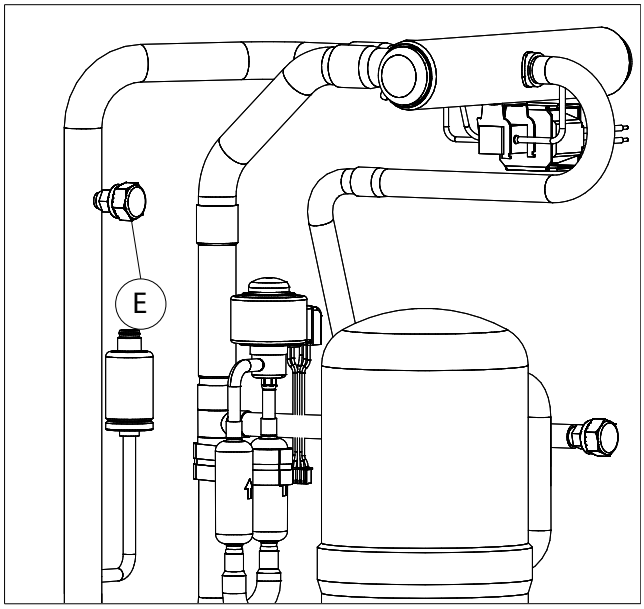
- Before proceeding with any work, carry out a risk analysis and demarcate the work area. Ensure that there is no possible ignition source in the area. The minimum clearance should be 3 m around the unit and must not include manholes, drains or other depressions where refrigerant gas could be deposited;
- Display warning signs and prevent access by unauthorised personnel;
- Use the PPE indicated in this manual and the appropriate personal equipment for the work. This equipment includes:
- Explosimeter, to check for the presence of hydrocarbons in the environment (to be used before and while working on the system).
- Appropriate hoses for the type of compressor oil.
- Approved non-sparking equipment.
- Non-sparking sockets.
- Antistatic footwear and clothing (ESD).
- ATEX torch.
- Fittings for minimum emissions.
- Pin extractor.
- $CO_2$ extinguisher.
- Connect a hose to the circuit charging socket (position A, B and C, D, E in the image below) and recover the refrigerant gas completely. Use a suitable recovery machine (ATEX). In order not to contaminate the recovered gas, reclaim the equipment by vacuuming the hoses and the recuperator. Frequently check the condition of seals and filters. We recommend removing the pin using a pin extractor to considerably reduce the vacuum and charging time of the system;

**i-290 0106 / 0109 / 0109T**




**i-290 0112 / 0112T / 0114 / 0115 / 0118**




**CAUTION: Always use new charging connections for maintenance and charging/discharging of units.**

- Flush the circuit by introducing nitrogen and bringing the pressure up to 4-5 bar. Expel the nitrogen from the unit away from heat sources, ignition points, wells and other possible stagnation points;
- Vacuum the system to an absolute pressure value of no more than 200 Pa. At this stage, use a fan (ATEX) to avoid refrigerant gas stagnation in the working area. Take care to direct the air flow to an area without ignition sources;
- Complete this wash and vacuum cycle at least three times;
- Create a high vacuum in the circuit. The vacuum cycle must include an evacuation phase followed by an ascent phase, in which the system is allowed to reach an equilibrium condition. The absolute pressure at the end of this process must not exceed 150 Pa. To ensure optimum machine performance, the vacuum process must be carried out with care and precision;
- Before carrying out the vacuum process, make sure that the oil in the pump used to create the vacuum is clear and free of bubbles, in order to prevent non-condensable gases or other particles from entering the system circuit. Use an ATEX vacuum pump;
- Connect a hose to the circuit charging socket and charge the refrigerant gas carefully and slowly. Do not charge more gas than necessary: the R290 gas charge must be equal to that stated in the data sheets. Use calibrated scales (ATEX) with a reading sensitivity of at least one tenth of a gram. If available, the use of heating covers for cylinders is also recommended in order to speed up the circuit filling phase;
- Once the desired charge has been completed, remember to insert the pin into the charging socket again and disconnect the equipment used;
- Ensure the tightness of the system by monitoring for refrigerant gas leaks with a suitable detector.

Failure to comply with the rules set out in this manual may result in:

- Malfunctions and loss of machine performance;
- Leakage of refrigerant gas, with possible formation of an explosion hazard zone;
- Damage to components or piping (e.g. freezing).

| | |
|---|---|
|  | **CAUTION: All machine charging/discharging operations must be carried out by QUALIFIED PERSONNEL (IEC 60335-2-40 Annex HH).** |
|  | **CAUTION: During charging/discharging operations, there is always a risk of refrigerant gas leakage and thus the formation of flammable atmospheres. Take the utmost care to ensure that no refrigerant gas is present in the environment before and during each operation.** |

## 5.10 PLUMBING CONNECTIONS

The plumbing connections must be made in accordance with national or local regulations; pipes can be made of steel, galvanised steel, multilayer steel or PVC. Pipes must be accurately sized according to the maximum water flow rate of the unit and the pressure drops of the water circuit. All plumbing connections must be insulated with closed-cell material of suitable thickness. The chiller must be connected to the pipes using new flexible joints, not reused ones. The water circuit should include the following components:

- Well thermometers to monitor the circuit's temperature.
- Manual gate valves to isolate the chiller from the water circuit.
- Metal Y filter or a dirt separator (installed on the return pipe) with metal mesh no larger than 1 mm.
- Charging group and exhaust valve where necessary.

| | |
|---|---|
|  | **When sizing the pipes, make sure not to exceed the maximum loss on the system side shown in the technical data table in chapter 12 (see useful head).** |
| | **Always connect the pipes to their fittings using the key-to-key method.** |
| | **Create a suitable drain for the safety valve.** |
| | **CAUTION: The installer is responsible for checking that the expansion tank is suitable for the actual capacity of the installation.** |
| | **CAUTION: Place the return pipe from the system at the "WATER INLET" label, otherwise the evaporator may freeze.** |
| | **CAUTION: It is mandatory to install a metal filter (with mesh no larger than 1 mm) on the return pipe from the system labelled "WATER INLET". Alternatively, it is possible to install a dirt separator that guarantees a filtration degree of no more than 1 mm; in this case is not necessary to install the Y-filter.<br>If the flowmeter is tampered with or altered, or if the metal filter or the dirt separator are not present on the system, the warranty is immediately void. The filter (or the dirt separator) must be kept clean, therefore, after installing the unit, you must make sure that they are still clean and check them regularly.** |
| | **CAUTION: All the units leave the company supplied with flowmeter (installed in factory). If the flowmeter is tampered with or removed or if the water filter and dirt separator are missing from the unit, the warranty will not be considered valid. Refer to the wiring diagram attached to the unit to connect the flowmeter. Never jumper the flowmeter connections in the board.** |
| | **The heating system and the safety valves must comply with the requirements of standard EN 12828.** |
| | **ATTENTION: For installations in Denmark, Sweden, Norway, and Finland, if the maximum inlet pressure of the hydraulic circuit exceeds 3 bar, a pressure reducer must be installed upstream of the unit, with performance in accordance with EN 1567. The following technical characteristics are recommended:**<br>• **Fluid temperature range: 2–80 °C**<br>• **Pressure adjustment range: 0.5–6 bar**<br>• **Material: brass** |

### 5.10.1 System water characteristics

To guarantee proper unit operations, the water must be appropriately filtered (see the instructions at the start of this paragraph) and the amount of dissolved substances must be minimal. The maximum permitted values are shown below:

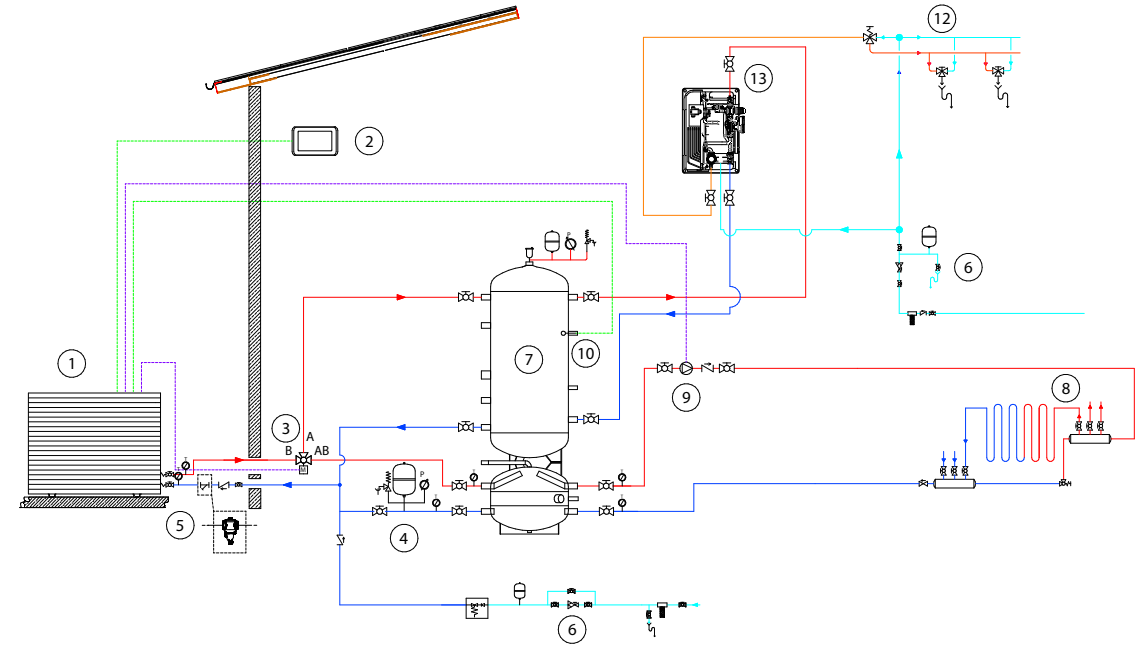
| MAXIMUM CHEMICAL-PHYSICAL PROPERTIES ALLOWED FOR THE SYSTEM WATER | |
|---|---|
| PH | 7,5 - 9 |
| Electrical conductivity | 100 - 500 µS/cm |
| Total hardness | 4.5 – 8.5 dH |
| Temperature | < 75°C |
| Oxygen content | < 0.1 ppm |
| Max glycol quantity (*) | 10 % |
| Phosphates ($PO_4$) | < 2 ppm |
| Manganese (Mn) | < 0.05 ppm |
| Iron (Fe) | < 0.3 ppm |

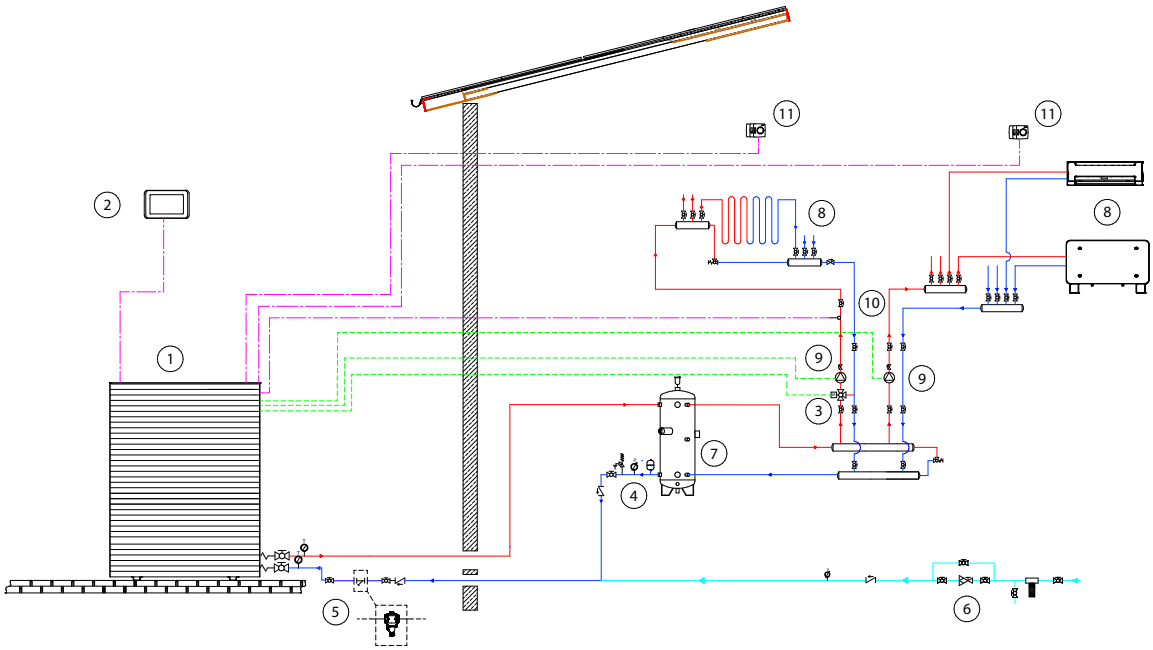
| MAXIMUM CHEMICAL-PHYSICAL PROPERTIES ALLOWED FOR THE SYSTEM WATER | |
|---|---|
| Alkalinity ($HCO_3$) | 70 – 300 ppm |
| Chloride ions (Cl-) | < 50 ppm |
| Sulphate ions ($SO_4$) | < 50 ppm |
| Sulphide ions (S) | None |
| Ammonium ions ($NH_4$) | None |
| Silica ($SiO_2$) | < 30 ppm |

(*) Pure water is preferable. Do not add more antifreeze than the maximum quantity specified in this manual.

## 5.10.2 Typical plumbing diagram

Refer to the “Handbook” for further information on possible unit installation configurations.



| Num. | Description |
|---|---|
| 1 | Heat pump |
| 2 | Remote control |
| 3 | Mixing valve |
| 4 | Expansion tank |
| 5 | Y-Filter or Dirt separator with integrated filter |
| 6 | Water supply |
| 7 | Technical storage |
| 8 | Hydronic terminals |
| 9 | Booster pump |
| 10 | Mixing probe |
| 11 | Local thermostat |
| 12 | Domestic hot water |
| 13 | Boiler |

### 5.10.3 Minimum water content and water circuit volumes

The table shows the minimum system water content recommended for the unit. The volume of the water circuit is also indicated.
To ensure proper operation of the heat pump, this minimum content must be met. Taking into consideration the volume of water in the primary circuit piping, size the thermal flywheel to achieve the indicated volume.

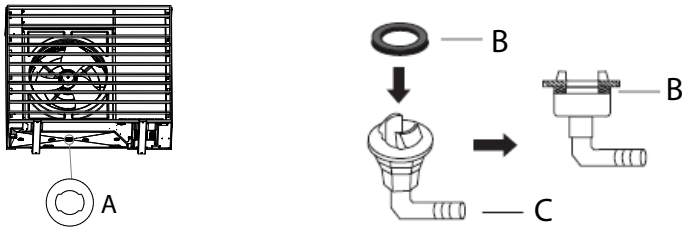
| Model i-290 | 0106 | 0109 / 0109T | 0112 / 0112T | 0114 / 0115 / 0118 |
|---|---|---|---|---|
| Minimum system water content [L] | 65 | 95 | 125 | 155 |
| Water circuit volume [L] | 2,1 | 2,9 | 3,5 | 3,5 |

### 5.10.4 Handbook

If you need more information on the possible configurations, a “Handbook” has been compiled, i.e. a technical notebook consisting of a collection of system diagrams where some proposed installation configurations of our high-efficiency heat pumps are highlighted. The “Handbook” is also intended to show the symbiosis potential with some of our catalogue items.
Please contact our headquarters for the technical handbook.

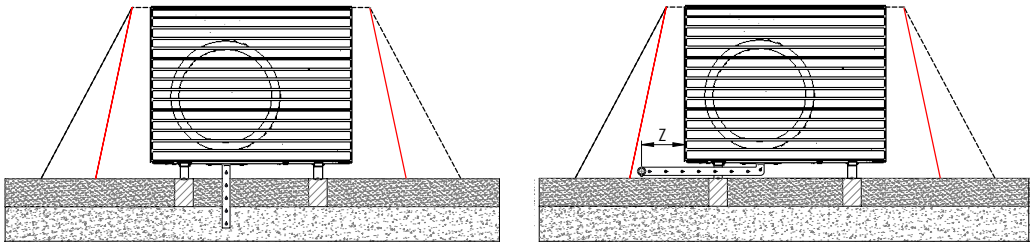
### 5.10.5 Condensate drainage system

All units in the i-290 series are designed so that the base of the unit functions as a condensate drip tray. A plastic fitting is supplied as standard, to be connected underneath the base in the special provision for connecting a drainage pipe to channel the condensation.
The fitting and its corresponding gasket, shown in the image below, are included in the bagged kit (screws, cable clamps, fitting) located behind the protective box for access to the user board.
For access to the user board, refer to chapter 5.13.1, while the complete list of available accessories is provided in the technical bulletin.




A = Condensate drain hole of the unit base panel
B = Gasket supplied with the kit (bagged accessory)
C = Drain fitting supplied with the kit (bagged accessory)

Each unit is fitted with a hole on the base of the hydronic kit (on the side of the coil) for draining any condensation that may percolate from the plumbing pipes and water formed as a result of the defrosting process. The pipes are well insulated, condensation production is minimal.
In the event of a leak, refrigerant gas can escape from the unit through the hole in the base panel, so it is recommended that the condensate drain is always directed to an open place near the machine (within the danger zone defined in Chapter 5.5). If the unit is installed on the ground, it is also possible to direct the condensation into a bed of rubble or gravel for drainage. For the typical free-field installation, please refer to the images below:




| MODEL i-290 | | z |
|---|---|---|
| 0106 / 0109 / 0109T/ 0112 / 0112T / 0114 / 0115 / 0118 | mm | < 250 |

**Caution: do not obstruct the hole in the base panel for condensate drainage.**

In particularly cold climates, we recommend installing elevation supports to prevent the unit from being damaged in the event of ice formation.

**When outside air temperatures fall below 0°C, to prevent condensation from freezing, a heating element should be installed on the drainage pipe. In this case, the heating element must be compatible with R290 refrigerant gas.**

## 5.10.6 System charge

**CAUTION: Supervise all charging/top-up operations.**

**CAUTION: Before charging/topping up the system, disconnect power to the units.**

**CAUTION: The system must always be charged/topped up under controlled pressure (max. 1 bar). Ensure that a pressure reducer and safety valve are installed on the charging/top-up line.**

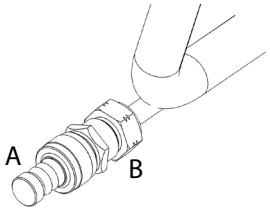
**CAUTION: The water in the charging/top-up line must be properly pre-filtered from impurities and suspended particles. Ensure that a removable cartridge filter and a dirt separator are installed.**

**CAUTION: Regularly check and vent the air built up in the system.**

**CAUTION: Install an automatic air valve at the highest point of the system.**

## 5.10.7 System discharge

If the unit needs to be drained completely, first close the manual inlet and outlet gate valves (not provided) and then detach the pipes on the outside of the water inlet and outlet to drain liquid from the unit (to make this operation easier, we recommend installing two drain valves between the unit and the manual gate valves on the outside of the water inlet and outlet).




If it is necessary to top up the system or adjust the glycol content, the service tap can be used. Unscrew the cap of the service tap (A) and connect a 14 or 12 mm pipe (inside diameter measurements - check the tap model installed on your unit) connected to the water mains to the hose connector, then charge the system by unscrewing the ring nut (B). Once the procedure is completed, tighten the ring nut (B) again and screw the cap (A) back on. In any case, it is advisable to use an external tap to charge the system, which is set up by the installer.

### 5.10.8 Deaerator

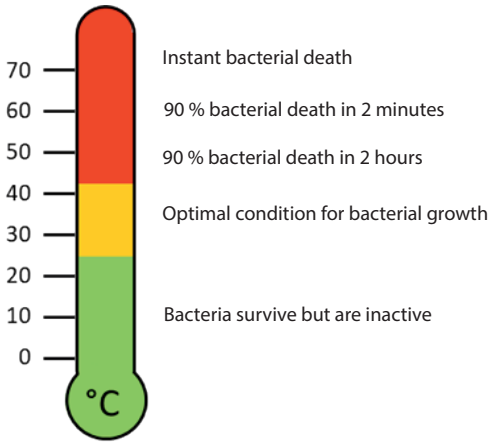
The unit is equipped with a high-efficiency deaerator that continuously captures and eliminates air and any refrigerant gas that may accumulate within the water circuit, avoiding undesirable effects such as premature corrosion and wear, reduced efficiency and exchange yield, as well as possible contamination of the water by R290 gas. The discharge capacity is very high, with automatic gas expulsion down to micro-bubble level.
The deaerator is equipped with a safety valve set at 3 bar to protect the hydraulic circuit from possible sudden pressure increases. The deaerator body also includes a pocket for housing the water supply temperature sensor.
The deaerator ensures the safety of people, animals, and property. Always follow the instructions provided in this manual: incorrect installation, installation in locations other than those specified (indoor or outdoor), as well as failure to install, commission, or properly maintain the device, must be considered a possible cause of fire.
The mixture of water and glycol can greatly reduce the deaerator's ability to remove dissolved gases: it is recommended to limit the glycol concentration to a maximum of 10%. Use products with a low tendency to foam, which could completely nullify the degassing effect and damage the system.



| | |
|---|---|
|  | **Ensure that the device connection fittings are hydraulically tight.**<br>**Do not exert mechanical stress on the connection threads during installation, which could damage the component.** |
|  | **Do not exceed the maximum amount of glycol indicated in the manual, as this may reduce the deaerator's ability to remove gas, causing damage to the component.** |
|  | **For maintenance or repair activities, the deaerator safety valve can be replaced. After isolating the system, follow the instructions below:**<br>• **Remove the retaining clip using a flat-head screwdriver and unscrew the valve**<br>• **Insert the replacement valve, ensuring that the component is kept at the correct angle and that the gasket is properly positioned and lubricated.**<br>• **Check that there are no leaks.** |

## 5.11 ANTI-LEGIONELLA FUNCTION

Legionella is a bacterium present in natural and artificial aquatic environments, from which it is able to reach the pipes of the cold drinking water supply network, and then proliferate in the production, storage and distribution systems of domestic hot water in buildings under certain temperature conditions.
All units in the i-290 series can activate an anti-legionella disinfection cycle, significantly reducing the growth of bacteria and the risk of infection. The cycle consists in a heat treatment in which the temperature of the water in the domestic hot water storage tank is raised above 60°C, at which most bacteria die within a few minutes.




Disinfection is carried out regularly once a week, on the day and time specified by the controller. The system designer must prepare all technical solutions necessary for the prevention and control of legionella. Heat treatment is only really effective if it reaches all points in the plant, including the distribution terminals.
The document "Guidelines for the prevention and control of Legionellosis" of 07/05/2015 incorporates all the updated guidance on the subject, while Legislative Decree 81/2008 Title X, Chapter I contains the provisions that apply to activities and workplaces exposed to biological agents.

**CAUTION: It is the designer's responsibility to check that the installation complies with the regulations in force in the country of installation.**

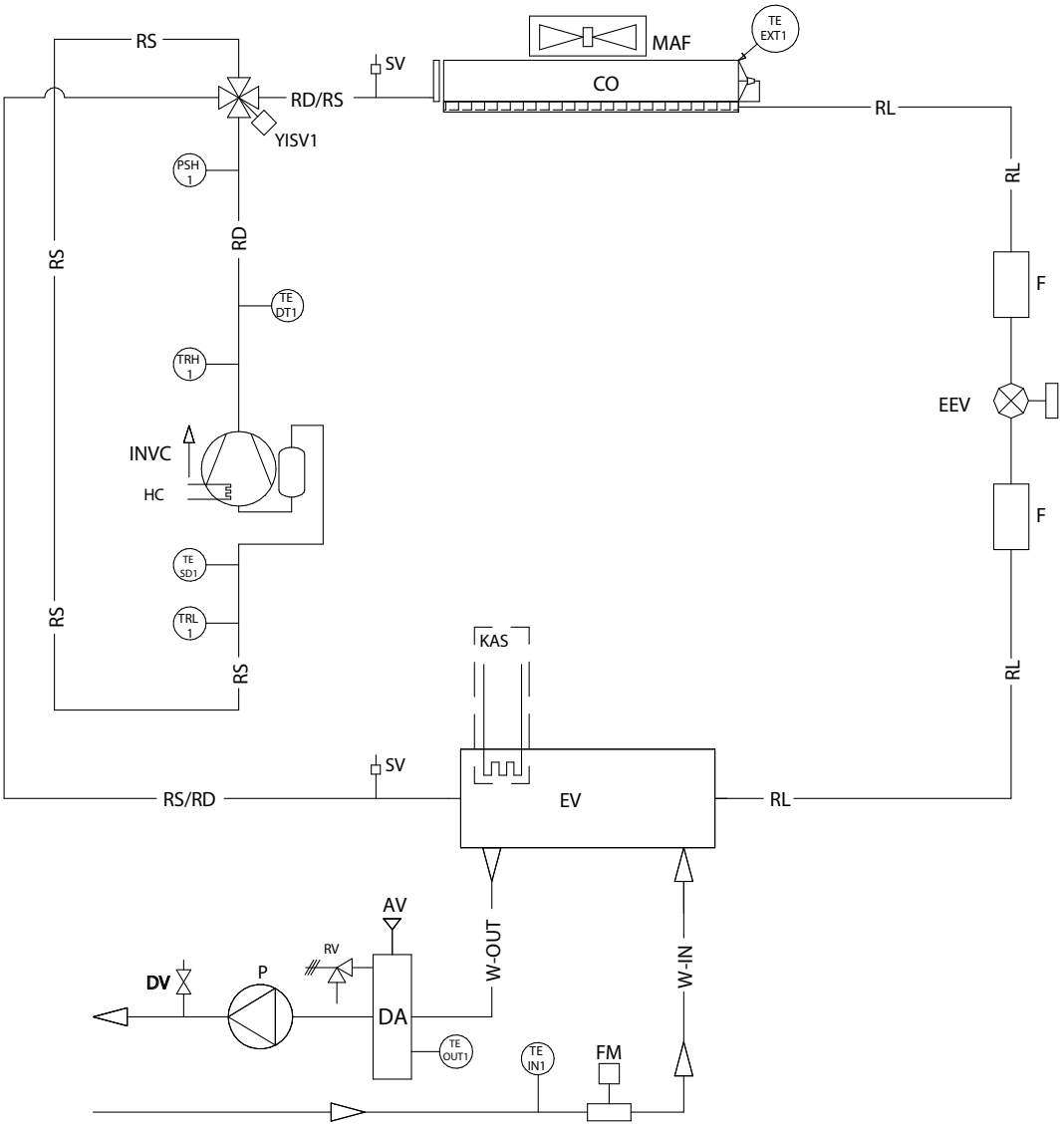
The operation of the anti-legionella cycle is shown below:

- At the day and time set on the controller, the machine switches to domestic hot water production mode.
- When the temperature of the water in the tank reaches a threshold value set by the controller, the integrated electric heater is activated, thermoregulating the system in order to maintain the water temperature above a minimum value.
- If the water temperature remains above the minimum value for a continuous time specified by the controller, the anti-legionella cycle is successfully completed, allowing the unit to return to normal operating condition.

The cycle fails if the machine is switched off ("OFF" status) or if it is not completed within a time limit.
A notification is saved in the alarm history for each cycle indicating the outcome of the anti-legionella function. The user must periodically check that disinfection is working properly.
For more information on how the anti-legionella cycle works, please refer to the MCO manual.

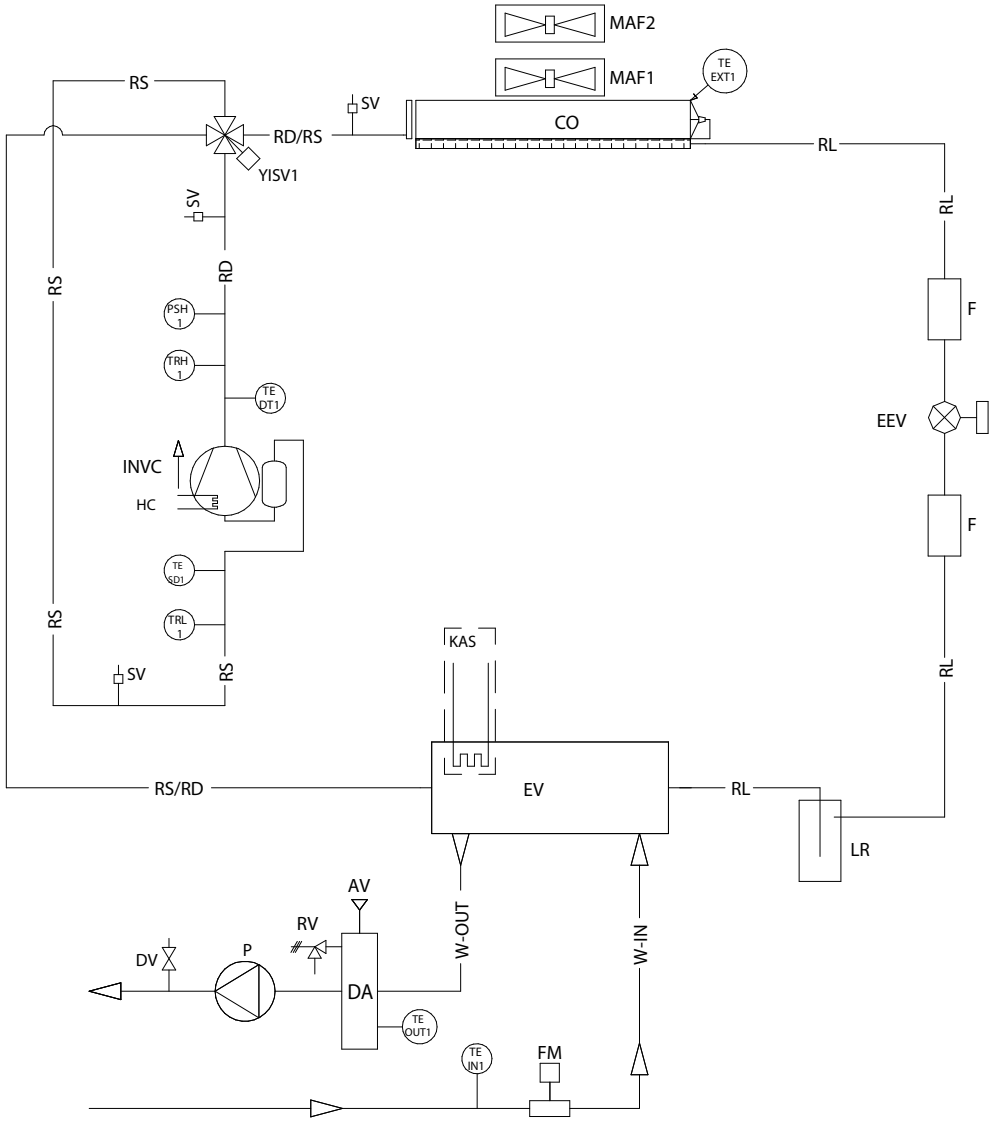
## 5.12 FUNCTIONAL DIAGRAMS

### 5.12.1 i-290 0106 / 0109 / 0109T



| LEGEND | | | | | |
|---|---|---|---|---|---|
| **ACRONYM** | **NUM.** | **DESCRIPTION** | **ACRONYM** | **NUM.** | **DESCRIPTION** |
| INVC | 1 | VARIABLE SPEED COMPRESSOR | W-OUT | | SYSTEM WATER OUTLET LINE |
| CO | 1 | COIL | W-IN | | SYSTEM WATER INLET LINE |
| EV | 1 | PLATE HEAT EXCHANGER | TRH | 1 | HIGH PRESSURE TRANSDUCER |
| EEV | 1 | ELECTRONIC EXPANSION VALVE | TRL | 1 | LOW-PRESSURE TRANSDUCER |
| YISV | 1 | 4-WAY CYCLE REVERSING VALVE | TE EXT | 1 | OUTDOOR AIR TEMPERATURE PROBE |
| RS | | HEAT EXCHANGER ANTIFREEZE HEATER | TE SD | 1 | SUCTION LINE TEMPERATURE PROBE |
| F | 1,2 | FILTER | TE DT | 1 | COMPRESSOR DISCHARGE TEMPERATURE PROBE |
| SV | 1,2 | CHARGING CONNECTION | PSH | 1 | HIGH PRESSURE SWITCH |
| HC | 1 | CRANKCASE HEATER | TE IN | 1 | RETURN TEMPERATURE PROBE |
| MAF | | AXIAL FAN | TE OUT | 1 | DISCHARGE TEMPERATURE PROBE |
| KAS | | SUCTION LINE | DV | | DRAIN VALVE |
| RD | | DISCHARGE LINE | RV | | SAFETY VALVE |
| RL | | LIQUID LINE | FM | | FLOWMETER |
| RD/RS | | DISCHARGE/SUCTION LINE | P | | PUMP |
| RS/RD | | SUCTION/DISCHARGE LINE | AV | | AUTOMATIC AIR VALVE |

## 5.12.2 i-290 0112 / 0115 / 0118



| LEGEND | | | | | |
|---|---|---|---|---|---|
| **ACRONYM** | **NUM.** | **DESCRIPTION** | **ACRONYM** | **NUM.** | **DESCRIPTION** |
| INVC | 1 | VARIABLE SPEED COMPRESSOR | W-OUT | | SYSTEM WATER OUTLET LINE |
| CO | 1 | COIL | W-IN | | SYSTEM WATER INLET LINE |
| EV | 1 | PLATE HEAT EXCHANGER | TRH | 1 | HIGH PRESSURE TRANSDUCER |
| EEV | 1 | ELECTRONIC EXPANSION VALVE | TRL | 1 | LOW-PRESSURE TRANSDUCER |
| YISV | 1 | 4-WAY CYCLE REVERSING VALVE | TE EXT | 1 | OUTDOOR AIR TEMPERATURE PROBE |
| LR | 1 | LIQUID RECEIVER | TE SD | 1 | SUCTION LINE TEMPERATURE PROBE |
| F | 1,2 | FILTER | TE DT | 1 | COMPRESSOR DISCHARGE TEMPERATURE PROBE |
| SV | 1,2 | CHARGING CONNECTION | PSH | 1 | HIGH PRESSURE SWITCH |
| HC | 1 | CRANKCASE HEATER | TE IN | 1 | RETURN TEMPERATURE PROBE |
| MAF | 1,2 | AXIAL FAN | TE OUT | 1 | DISCHARGE TEMPERATURE PROBE |
| KAS | | SUCTION LINE | DV | | DRAIN VALVE |
| RD | | DISCHARGE LINE | RV | | SAFETY VALVE |
| RL | | LIQUID LINE | FM | 1 | FLOWMETER |
| RD/RS | | DISCHARGE/SUCTION LINE | P | 1 | PUMP |
| RS/RD | | SUCTION/DISCHARGE LINE | AV | | AUTOMATIC AIR VALVE |
| RS | 1 | HEAT EXCHANGER ANTIFREEZE HEATER | | | |

## 5.13 ELECTRICAL CONNECTIONS

Check that the power supply matches the unit's rated data (voltage, phases, frequency) displayed on the rating plate on the unit's side panel. The electrical connection must be made in accordance with the wiring diagram enclosed with the unit and in compliance with national and international standards (provide a general circuit breaker, differential circuit breakers for each line, adequate system earthing, etc.).

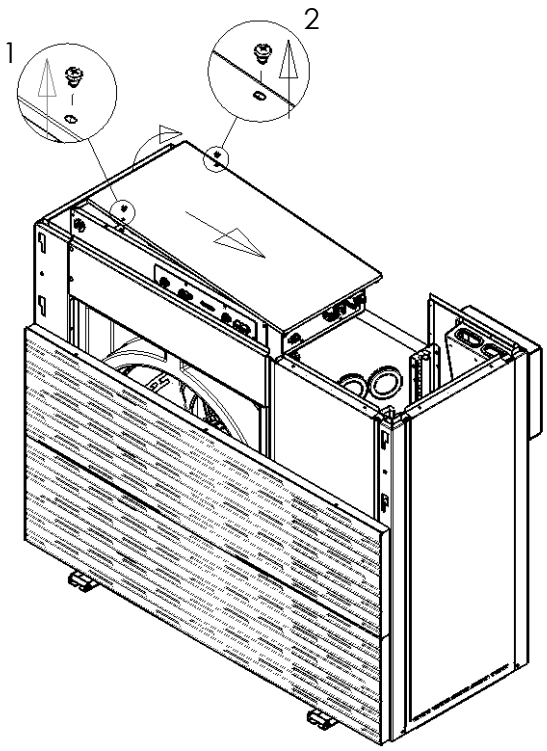
| | |
|---|---|
|  | **Before starting any operation, make sure that the power supply is disconnected.** |
|  | **The electrical panel is positioned below the cover. Comply with the minimum clearances given in Chapter 5.4 to make the electrical connections.** |
|  | **The installer is responsible for providing an isolating system (e.g. magnetothermal differential circuit breaker) upstream of the unit's electrical connections.** |
|  | **The supply voltage must not vary by more than ±10% of the nominal value. Please contact the electricity provider if this tolerance is not met. The power supply must comply with the limits mentioned, otherwise the warranty is immediately void.** |
|  | **If the supply cable is damaged, it must be replaced by qualified personnel (IEC 60335-2-40 Annex HH), in order to prevent any risk.** |
|  | **Any appliances placed nearby can cause / suffer electromagnetic disturbances to / from the unit. Be aware of this risk at the installation site. It is recommended to electrically power the unit with an adequate line and protections and use an independent cable duct.** |
|  | **The flowmeter (FM element in the hydraulic diagram above and factory installed) must ALWAYS be connected as shown in the circuit diagram. Never jumper the flowmeter connections on the board. The warranty will no longer be valid if the flowmeter connections have been altered or incorrectly connected.** |
|  | **The remote control panel is connected to the chiller by 4 cables with a cross-section of 1.5 mm². The power cables must be separate from the remote control cables. Maximum distance 50 metres.** |

| | |
|---|---|
|  | **The remote control panel must not be installed in an area with strong vibrations, corrosive gases, excessive dirt or high moisture. Leave the area near the chiller clear.** |
|  | **All electrical components have been designed to work in an environment where R290 gas is present. Any damage, tampering or alteration can cause a fire hazard.** |
|  | **Do not tamper with the cable fixing. Do not disconnect the electrical panel connectors.** |

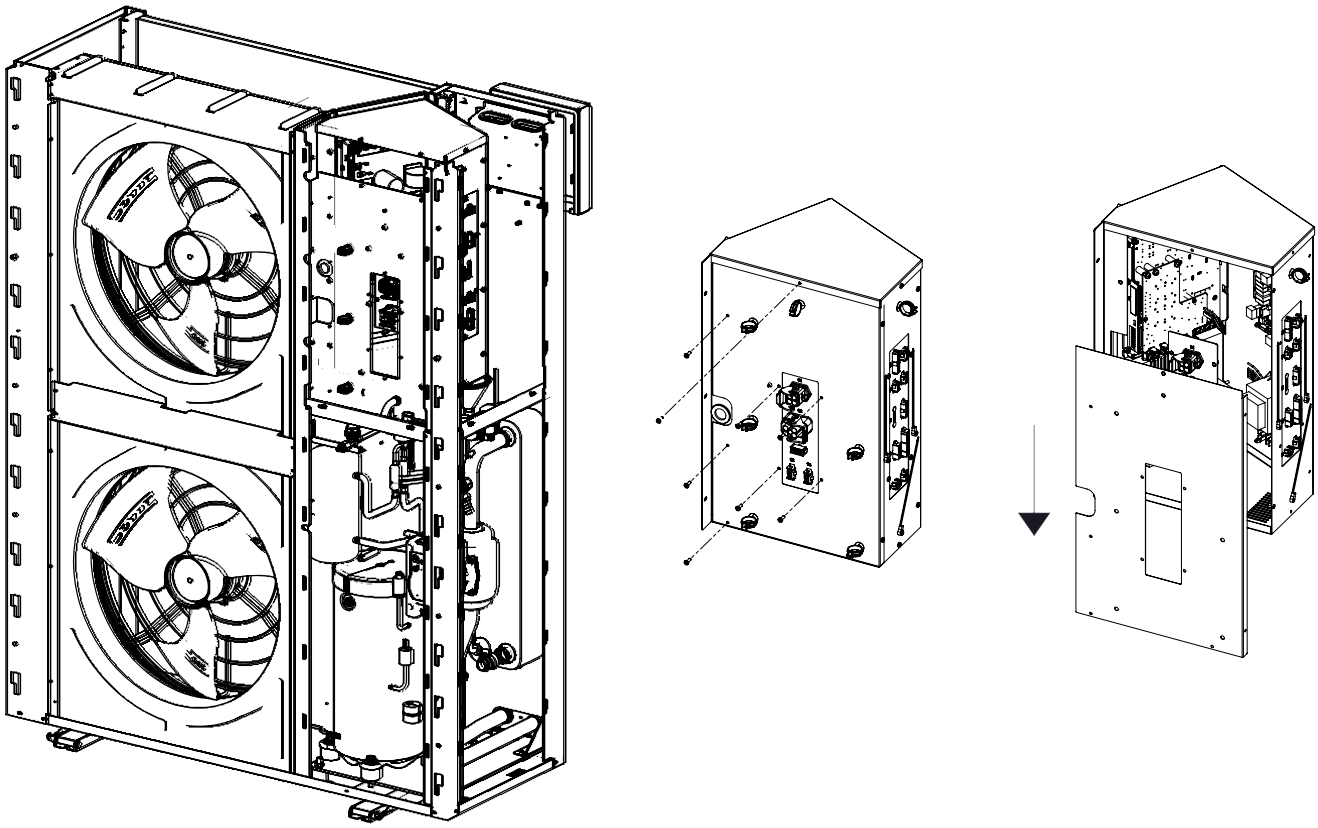
### 5.13.1 Access to the electrical panel and user board

Proceed as follows to remove the cover of the electrical panel and user board housing. The images show sizes 0106 / 0109 / 0109T (single fan) and sizes 0112 / 0112T / 0114 / 0115 / 0118 (twin fan).

To access the electrical panel follow the instructions below:

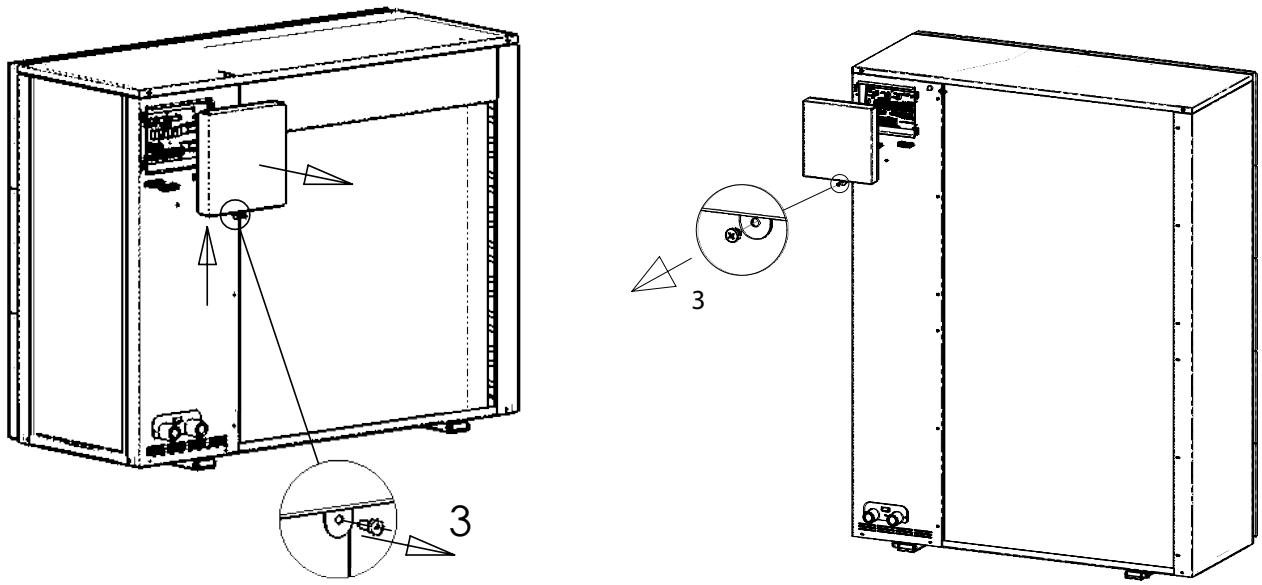



1. After removing the upper grille and cover (as described in Chapter 5.8), unscrew the screws holding the cover in place with a Phillips screwdriver (number 1, 2).
2. Lift up the electrical panel cover to remove it and proceed with wiring operations.

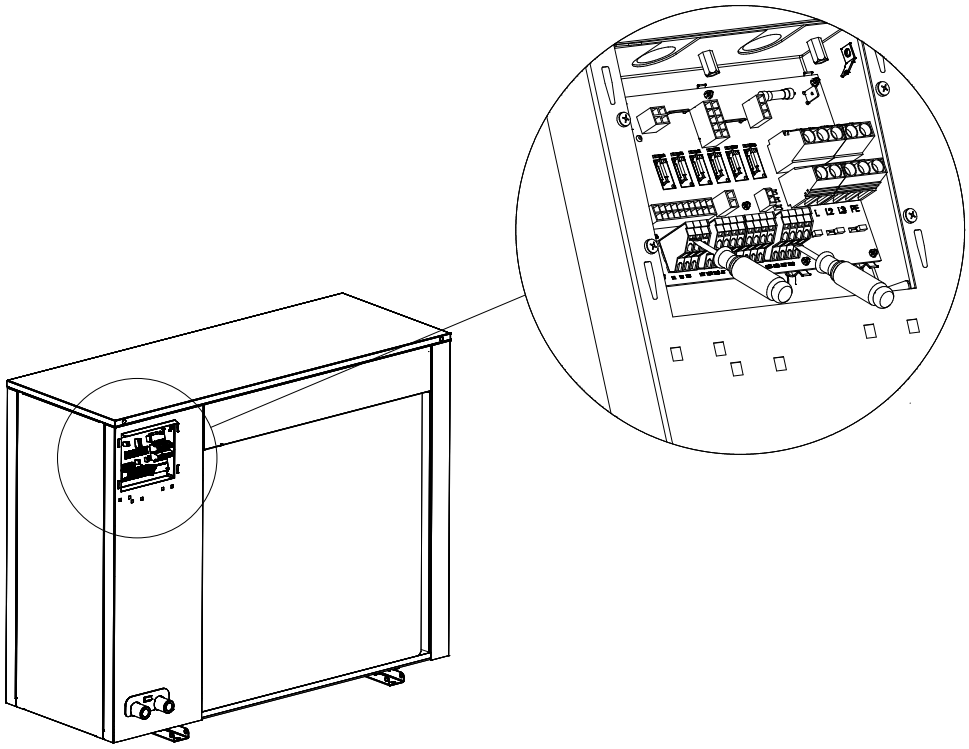


1. After removing the grilles, cover, side panels and angle brackets (as described in Chapter 5.8), unscrew the highlighted screws holding the cover of the electrical panel with a Phillips screwdriver.
2. Push down the control panel cover to remove it and proceed with wiring operations.

To access the user board instead, proceed as follows:




1. Unscrew screw M4 (number 3) using a Phillips screwdriver.
2. Release the box by first pulling it upwards and then outwards.



Use the supplied screwdriver, located behind the cover, to open the terminals and carry out the wiring in accordance with the wiring diagram.

**WARNING: To open the terminals of the user board, it is mandatory to use exclusively the supplied accessory screwdriver. The use of other tools may damage the terminals or the electronic board, impairing proper operation.**

**The above-mentioned operations must be carried out with the machine off and power disconnected (by means of the specific disconnector applied by the installer).**
**Operations to be carried out by qualified personnel (IEC 60335-2-40 Annex HH).**

**When the work is complete, replace all the removed covers with all the screws and seals provided (if any).**

## 5.13.2 Power supply

**Electrical connections must only be carried out by QUALIFIED PERSONNEL in accordance with current regulations.**

**Make sure to install a proper earth connection; an incomplete earth connection can lead to electric shocks. The manufacturer cannot be held liable for any damage arising from failure to earth or ineffective earthing.**

The power cables, electrical protections and line fuses must be sized in accordance with that stated in the unit's wiring diagram and in the electrical data contained in the technical data table.
Use a dedicated power line, do not power the appliance through a line connected to other utilities. Fasten the power cables securely and make sure they do not come into contact with sharp corners. Use double insulated cables with copper wires: for the power supply of the units, we recommend using a cable with H07VV-F or higher specifications.
The earth connection must be made first when connecting, and must be removed last when disconnecting the unit. If the power cable becomes loose, the active conductors must be tensioned before the earth wire.
Lay the building's electrical cables through the wall feedthrough in the direction of the product. Depending on the type of laying, the physical location and the length of the cables (whether less or more than 10 m), the electrical system designer is responsible for making an appropriate choice as to the sizing of the system.

### 5.13.3 Protective devices

It is mandatory to install electrical isolation devices upstream of the unit, sized according to the nameplate data on the unit:

- For electrical protection, a main switch or disconnection device with adequate breaking capacity must be installed, featuring contact separation on all poles.
- The residual current device (RCD) must be compatible with inverter-equipped devices. It is recommended to install a type B or F RC circuit breaker sensitive to all currents (tripping threshold 30 mA, breaking capacity 4.5 kA). Installing a different type of device may cause unintended trips.

| Power supply | Model i-290 | Rated current of the protective device | Recommended cable cross-section (max. length 10 m) | Clamps tightening torque |
|---|---|---|---|---|
| 230V / 1ph | 0106 | 16 A | $3G^{4\ mm2}$ | N-L-PE: 0,8 Nm |
| 230 V / 1ph | 0109 | 25 A | $3G^{6\ mm2}$ | N-L-PE: 0,8 Nm |
| 400V / 3ph | 0109T | 16 A | $5G^{4\ mm2}$ | N-L1-L2-L3-PE: 0,8 Nm |
| 230V / 1ph | 0112 | 32 A | $3G^{6\ mm2}$ | N-L-PE: 0,8 Nm |
| 400V / 3ph | 0112T | 16 A | $5G^{4\ mm2}$ | N-L1-L2-L3-PE: 0,8 Nm |
| 230V / 1ph | 0114 | 32 A | $3G1^{0\ mm2}$ | N-L-PE: 0,8 Nm |
| 400V / 3ph | 0115 / 0118 | 20 A | $5G^{4\ mm2}$ | N-L1-L2-L3-PE: 0,8 Nm |

The units comply with electromagnetic compatibility specifications, however, the electrical system designer must make the appropriate assessments to ensure the absence of interference.

### 5.13.4 User board

For access to the user board, see the instructions provided in chapter 5.13.1.
The board must be connected in accordance with the notes below. The connections shown below are standard. Other connections are given in the MCO manual of the on-board control (see “USER AND INSTALLER CONFIGURATION TABLES”), according to the configurations adopted.



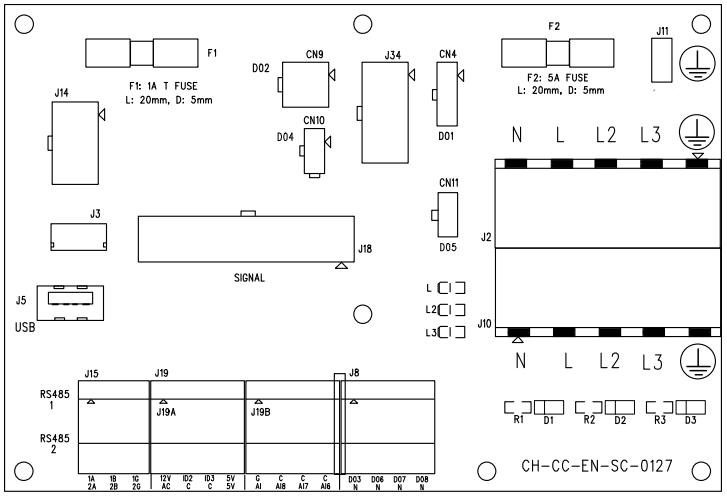
**CAUTION: It is important to keep the high voltage cables separated from the very low voltage ones.**

| TERMINAL | CONNECTION | Type |
|---|---|---|
| PE | Connect the earthing cable | Input for 1-Ph/N/PE power supply, 230 V, 50 Hz. (only for sizes 0106 / 0109 / 0112 / 0114) |
| N | Connect the neutral cable from the mains | |
| L | Connect phase L1 cable from the mains | |
| L2 | Connect phase L2 cable from the mains | Input for 3-Ph/N/PE power supply, 400 Vac, 50 Hz. (only for sizes 0109T / 0112T / 0115 / 0118) |
| L3 | Connect phase L3 cable from the mains | |
| 1A | Signal connection channel 1 Modbus RTU + remote keyboard | Modbus communication for remote keyboard |
| 1B | Signal connection channel 1 Modbus RTU - remote keyboard | |
| 1C | Signal connection channel 1 Modbus GND remote keyboard | |
| 12 Vac | Remote keyboard power supply (12V, 50Hz, 500mA) | |
| 12 Vac | Remote keyboard power supply (12V, 50Hz, 500mA) | |
| 2A | Signal connection channel 2 Modbus RTU + Module GI3 or remote supervision | Connection of GI3 module, if fitted as an accessory. Alternatively connection of Modbus RTU RS 485 communication for remote supervision, if CM accessory present. The GI3 module and CM supervision cannot be connected at the same time. |
| 2B | Signal connection channel 2 Modbus RTU - Module GI3 or remote supervision | |
| 2C | Signal connection channel 2 Modbus GND Module GI3 or remote supervision | |
| ID2 | Smart Grid Ready 1 input | Voltage-free digital input |
| ID3 | Remote on/off input (closed = machine on / open = machine off) | Voltage-free digital input |
| AI6 | DHW probe (to activate the function see the relevant section in the MCO manual) | Configurable analog input NTC sensor – 10 kΩ at 25 °C, β 3435 |
| AI7 | System remote probe (to activate the function see the relevant section in the MCO manual) | Configurable analog input NTC sensor – 10 kΩ at 25 °C, β 3435 |
| AI8 | Smart Grid Ready 2 input | Voltage-free digital input It corresponds to digital input ID9 |

| TERMINAL | CONNECTION | Type |
|---|---|---|
| DO3 (*) | Machine lock signal | Single-phase voltage output 230 Vac, 50 Hz, maximum current 300 mA (AC1) |
| DO6 (*) | Domestic hot water valve outlet | Single-phase voltage output 230 Vac, 50 Hz, maximum current 300 mA (AC1) |
| DO7 (*) | Double set point valve output | Single-phase voltage output 230 Vac, 50 Hz, maximum current 300 mA (AC1) |

(*) If used, it is advisable to operate the coil of a relay or contactor with the voltage output to manage the resource.

**User board 0106 / 0109 / 0109T / 0112 / 0112T / 0114 / 0115 / 0118**




## 5.13.5 Smart Grid Ready

i-290 heat pumps are Smart Grid Ready (SG Ready) certified, a label introduced by the German Heat Pump Association (BWP) that identifies heat pumps capable of communicating with the public electricity grid via the SG Ready interface. This allows the electricity provider an efficient load management for grid support: in case of electricity peaks or shortages, the grid operator can give the input to heat pumps equipped with SG Ready logic to temporarily switch off or on, achieving intelligent utility control.
Heat pumps, regardless of current demand, can in fact store excess electricity in the form of thermal energy (e.g. in a hot water accumulator or a dedicated tank) and use it to satisfy heat demand, as well as being switched off in a targeted manner to mitigate consumption peaks. The SG Ready interface can be used by grid operators to control the device or to increase self-consumption in combination with a photovoltaic system. To enable the SG Ready function, the grid provider's SG Ready cables must be connected to the user board's terminals ID2, C (digital input reference ID2 = SG Ready 1) and AI8, C (digital input reference ID9 = SG Ready 2). Depending on the states of the two digital inputs for the SG Ready function, the unit is able to cover four operating states (heating and/or DHW mode):

| Digital inputs | | Description |
|---|---|---|
| ID 2 (SG Ready 1) | ID9 (SG Ready 2) | |
| Closed | Open | OFF command<br>The heat pump remains in the forced-off condition. |
| Open | Open | Normal operation. |
| Open | Closed | ON command<br>The heat pump increases the set point by an offset, applying it only when the compressor and/or thermoregulation is running. |
| Closed | Closed | Forcing command ON<br>The heat pump immediately forces an offset set point increase, regardless of the compressor status. |

The operating states OFF, ON and forced ON can be set by the grid provider for a maximum time of 2 hours, after which the unit reverts to normal regulation.

**CAUTION: If the power grid to which the unit is connected is set up as a smart grid, the SG Ready function can be configured according to the MCO manual and the wiring diagram.**

Heat pumps labelled "SG Ready" are a step towards electricity supply optimisation and are eligible for further funding in some EU member states.

### 5.13.6 Control logics

For control logics please refer to the MCO manual of unit control, which can be obtained from the manufacturer.

### 5.13.7 Fuses

Details of the type and nominal characteristics of the fuses can be found on the machine label, on the wiring diagrams and printed directly on the control board.

## 5.14 ENERGY COUNTER

The units in the i-290 series include software for extrapolating operating data from the unit. The data that can be read are: the unit's output power, the total power input, the total cumulative output and consumed energy for: the current day, the previous month (from the day before to one month prior) and the previous year (from last month to one year prior).
These data are made available, differentiated between cooling and heating production modes, in order to monitor the operation of the heat pump and in compliance with the regulations in force in some EU countries.
The data for heating power and total input power are the instantaneous operating values of the heat pump, while the other values are cumulative for the defined time.

### 5.14.1 Operation and necessary equipment (i-CR/Hi-TV415/e-LITE/e-PRO)

The system measures and projects instantaneous data in the first registers, while data reporting energy over time is only available if the heat pump is connected to a master remote control equipped with a clock, such as e-LITE.



**The heat pump and remote controls do not have a memory area for storing data. It is necessary to use a master with datalogger function.**

### 5.14.2 Data availability

Instantaneous data are in kW, while cumulative data are in kWh. Below are the registers for reading and saving data from the unit:

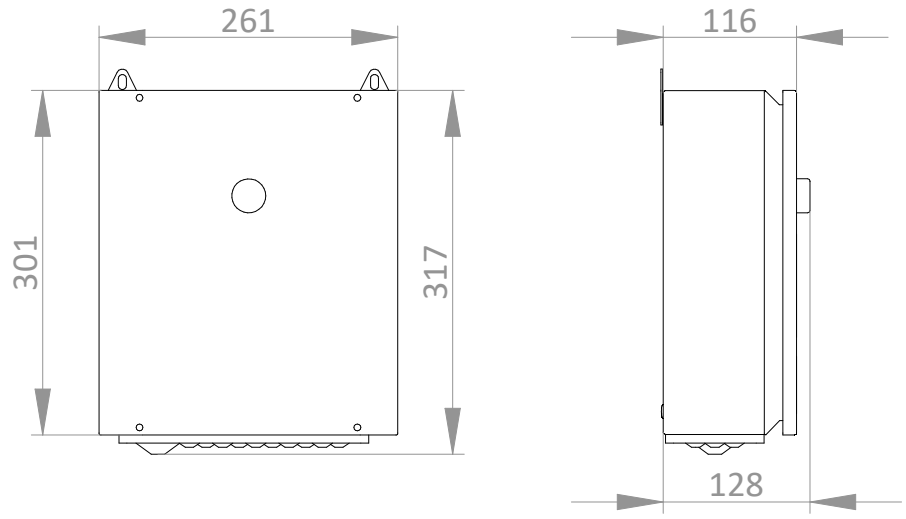
- 8000: Heating power output
- 8004: Total input power
- 8005: Energy consumed yesterday in cooling
- 8006: Energy consumed last month in cooling
- 8007: Energy consumed last year in cooling
- 8008: Energy output yesterday in cooling
- 8009: Energy output last month in cooling
- 8010: Energy output last year in cooling
- 8011: Energy consumed yesterday in heating
- 8012: Energy consumed last month in heating
- 8013: Energy consumed last year in heating
- 8014: Energy output yesterday in heating
- 8015: Energy output last month in heating
- 8016: Energy output last year in heating

## 5.15 EXTERNAL MODULE (GI3)

The GI3 system management module allows you to increase the functions managed by the machine. It is only supplied as an external kit.

### 5.15.1 Dimensions with and without packaging

| Description | Width [mm] | Height [mm] | Depth [mm] | Weight [kg] |
|---|---|---|---|---|
| net | 261 | 317 | 128 | 5,3 |
| with packaging | 372 | 422 | 185 | 5,6 |



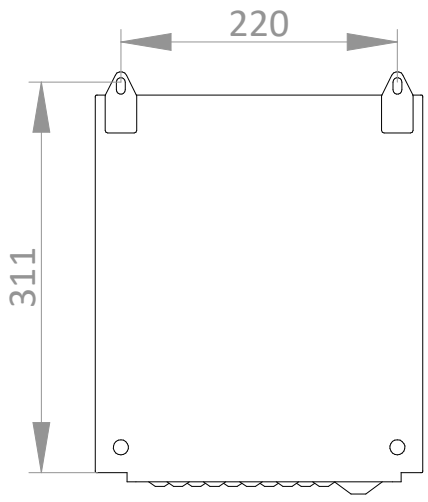

## 5.15.2 Technical data

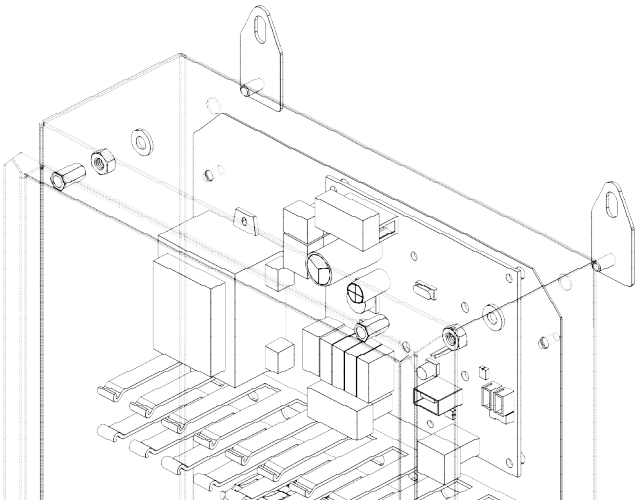
| Technical characteristics | Unit | Value |
|---|---|---|
| Supply voltage | V | 230 |
| Power supply frequency | Hz | 50 |
| Maximum input power | kW | 1,5 |
| Maximum current for DO | A | 0,5 |
| Min/Max ambient operating temperature | °C | -20 / +50 |
| Operating weight | kg | 5,3 |

## 5.15.3 Installation of the external kit (GI3)

The product has an IPX4 protection rating and can be installed outdoors away from the safety zone of the unit.
The box is supplied with brackets for fixing with nuts and washers. Refer to the images below for mounting the brackets on the box and for drilling instructions. The dowels are not provided, choose the most suitable ones according to the type of wall where the product will be fixed and the weight shown in the table.

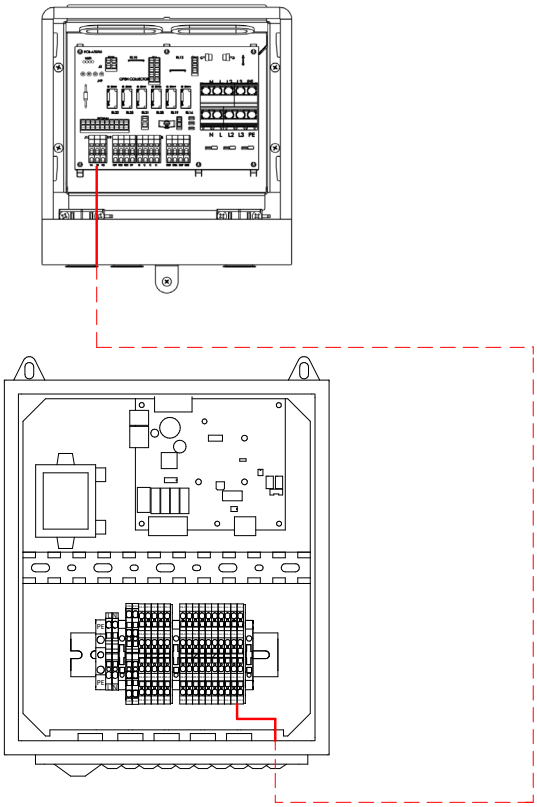
| | |
|---|---|
|  | **Check the safety clearances in chapter 5.5. The product is not suitable for installation in areas where explosive atmospheres may occur.** |
|  | **Check that the supporting wall and dowels are adequate to support the weight of the product.** |



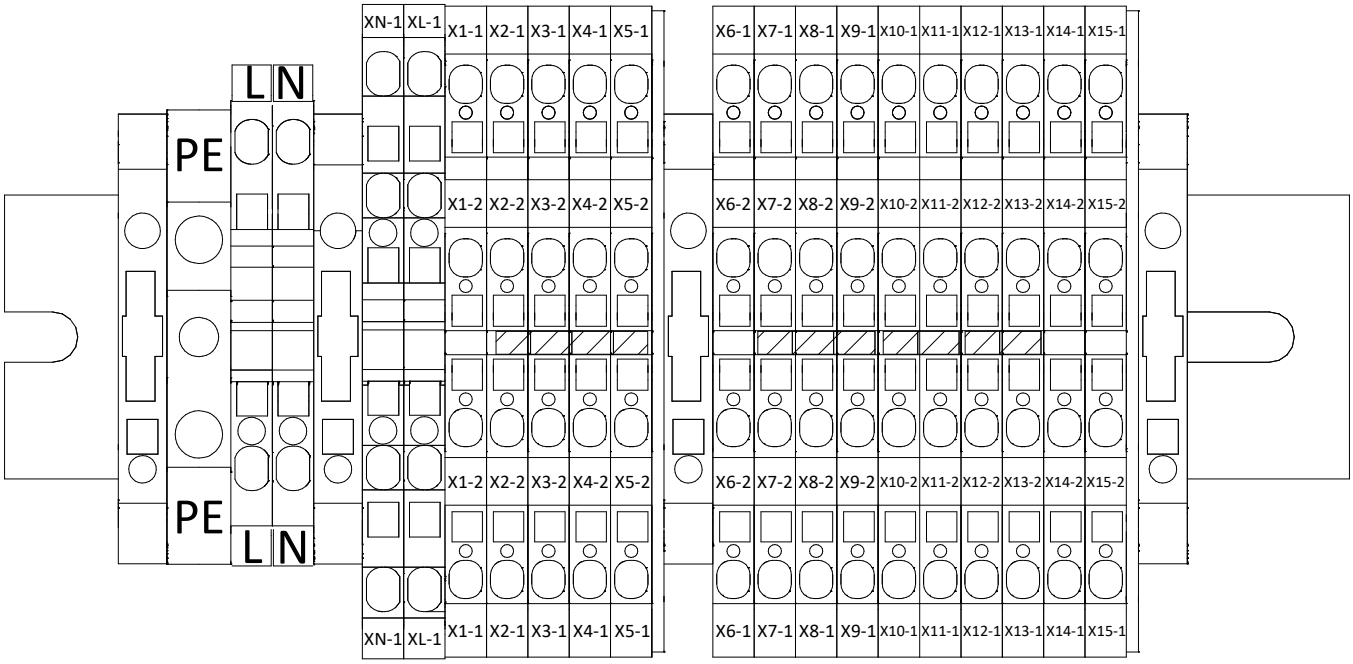



3. Connect the external kit to the heat pump via a cable suitable for Modbus communication (cable not provided, type to be used 3x0.5 mm² twisted and shielded). See the correspondence between the terminals of the user board and those of the kit in the table below:

| Heat pump terminal | GI3 kit terminal |
|---|---|
| 2C (GND) | X-14.2 |
| 2A (+) | X-15.1 |
| 2B (-) | X.14.1 |



**External module terminal board:**




| TERMINAL | CONNECTION | Type |
|---|---|---|
| PE | Connect the earthing cable | Input for 1-Ph/N/PE power supply, 230V, 50Hz |
| L | Connect the phase cable from the mains | |
| N | Connect the neutral cable from the mains | |
| X1-1/ X2-1/ X2-2 | Connect the mixing valve | Digital outputs |
| X3-1/ X3-2 | Connect the solar circulator | |
| X4-1/ X4-2 | Connect the solar drain valve | |
| X5-1/ X5-2 | Connect the booster circulator | |
| X6-1/ X6-2 | Connect the mixing valve probe | Analogue inputs |
| X7-1/ X7-2 | Connect the ACC. solar probe | |
| X8-1/ X8-2 | Connect the solar collector probe | |
| X9-1/ X9-2 | Connect the room thermostat | |
| X10-1/ X11-1 | / | Analogue outputs |
| X10-2/ X11-2 | / | |
| X12-1/ X12-2/ X13-1 | / | Digital inputs |
| X14-1/ X14-2/ X15-1 | Modbus connection to the machine's CNTR board | Modbus communication |

## 6. STARTUP

Before startup:

- Check that the diagrams and manuals of the installed machine are available.
- Check the availability of wiring and plumbing diagrams of the system to which the machine is connected.
- Check that the shut-off valves of the water circuits are open.
- Check that the water circuit was filled under pressure and the air vented.
- Check that all water connections are correctly installed and that all instructions on the rating plates are complied with.
- Ensure that provisions have been made for condensate drainage.
- Check the electrical connection and correct fastening of all the terminals.
- Check that electrical connections have been carried out correctly according to current regulations including earthing.
- The voltage must be as stated on the nameplate of the unit.
- Ensure that the electric voltage is within the tolerance limits (±5%).
- Check that the electric heaters of the compressors are properly powered.
- Check, if required for the installation site, whether a residual current circuit breaker is installed.
- Check there are no gas leaks. Each operator must use a personal explosimeter for R290 gas.
- Before switching the unit on, check that all panels are positioned correctly and secured with the appropriate screws.

| | |
|---|---|
|  | **CAUTION: The unit must be connected to the electric mains and placed in STANDBY (powered on) by closing the master switch at least 12 hours before start-up. This will allow the heaters to adequately warm up the compressor crankcase (the heaters are powered automatically when the switch is closed). The heaters are working properly if after a few minutes the temperature of the compressor crankcase is 10-15°C higher than ambient temperature.** |
| | **CAUTION: Check that the weight of the pipes does not weigh on the machine structure.** |
| | **CAUTION: Never use the master switch to stop the unit temporarily, this must only be used to disconnect the unit from the power supply for long downtimes (e.g. seasonal stops etc.). Furthermore, without power, the crankcase heaters will not be powered with the risk of breaking the compressors when the unit is switched on.** |
| | **CAUTION: Do not modify the electrical connections of the unit otherwise the warranty will be immediately void.** |
| | **CAUTION: Summer/winter operation must be selected at the beginning of the relative season. In order not to cause damage to the compressors, avoid frequent and sudden changes of this operation.** |
| | **CAUTION: When installing and starting up for the first time, make sure that the machine operates correctly in both heating and cooling mode.** |

## 6.1 SWITCHING ON THE UNIT

The unit is switched on via the remote interface function (e-PRO). Please refer to the dedicated chapter for more information.
All units in the i-290 series have no display mounted on board.

# 7. INSTRUCTIONS FOR THE USER

Note down the identification data of the unit so that it can be provided to technical support in the event of a service request.

| | |
|---|---|
|  | **The identification plate applied to the machine shows all the technical and performance data of the appliance.<br>In case of tampering, removal or deterioration, request a duplicate from Technical Support.** |
| | **Tampering, removal and deterioration of the identification plate makes any installation, maintenance and spare parts request difficult.** |

We recommend keeping track of the interventions carried out on the unit so as to make any troubleshooting easier.
In case of failure or malfunctioning:

- check the type of alarm triggered to report it to technical support;
- contact an authorised service centre;
- if requested by the service centre, immediately deactivate the unit without resetting the alarm;
- require the use of original spare parts.

# 8. SHUTDOWNS FOR LONG PERIODS

System shutdown mode depends on the application site and the time the system is expected to be shut down. If the unit is equipped with the antifreeze system, even when off (“off” position of the on-board system).

| | |
|---|---|
|  | **The anti-freeze system remains in operation if continuity of power supply to the appliances is guaranteed.** |

If the system is expected to remain idle for a long period, we recommend emptying the liquid from the system unless there is an adequate amount of glycol.
To switch off the unit completely after having emptied the system:

- Switch off the unit by turning the switch on each appliance to “OFF”.
- Close the water taps.
- Set the main differential circuit breaker to “OFF” (if installed upstream of the system).

| | |
|---|---|
|  | **If the temperature drops below zero there is a serious danger of frost: provide a mixture of water and glycol in the system, otherwise drain the water system and the circuits of the heat pump.** |
|  | **CAUTION: Operation, albeit transient, with water temperatures below +5°C is not guaranteed on the basis of the limits set out in chapter . Before switching the unit on again after a long downtime, make sure that the temperature of the mixture of water and glycol is higher than or at least equal to +5°C.** |

## 9. MAINTENANCE AND PERIODIC CHECKS

| | |
|---|---|
|  | **CAUTION: All the operations described in this chapter must be carried out by QUALIFIED PERSONNEL only (IEC 60335-2-40 Annex HH). The end user shall not carry out any modification, repair or maintenance of the product.<br>Before performing any intervention on the unit or accessing internal parts, make sure you have disconnected the power.** |
|  | **CAUTION: Before starting work, safety checks must be performed to ensure the risk of combustion is minimised. Work must be undertaken following a controlled procedure to minimise the risk of flammable gases or vapours being present while work is being performed. The area must be checked with an appropriate refrigerant gas detector before and during the work.** |
|  | **During any work carried out on the machine, the operator must always use a personal explosimeter for detecting the refrigerant gas R290, calibrated to a maximum threshold of 20 %LFL (this device must be compliant for use in fire risk zones and not be a source of ignition).** |
|  | **Maintenance must only be carried out in weather conditions suitable for the intended operations.** |
|  | **Before working on the unit, make sure that you have the appropriate working equipment available that complies with the use with flammable gases.** |
|  | **For maintenance, the use of a lock-valve is strongly recommended (refrigerant circuit access valve) for connecting to hoses (hose), in order to avoid gas leaks and risk of burns.** |
|  | **CAUTION: It is possible that a certain quantity of oil from the compressor is deposited in the pipes of the refrigeration circuit, especially by bends. In case of maintenance operations in which it is necessary to unsolder the pipes, it is strongly recommended to proceed with the cutting of the same and not with the disordering with a torch, as the flame triggers any oil present.** |
|  | **Do not fill the refrigerant circuits with a refrigerant other than that indicated on the identification plate. Using a different refrigerant can cause serious damage to the compressor.** |
|  | **Do not use oils other than those indicated in this manual. Using a different oil can cause serious damage to the compressor.** |
|  | **The compressor heads and discharge pipes are at quite high temperatures.** |
|  | **Take particular care when working near the condensing coils.<br>The aluminium fins are very sharp and can cause serious injuries.** |
|  | **Always use appropriate personal protective equipment.** |
|  | **After the maintenance operations, close the panels by fixing them with screws. Take particular care to ensure the electrical panel box is closed correctly].** |
|  | **During the winter months in particularly cold and humid climates, ice may form on the front protective grilles of the units. To allow proper air flow, check for such ice deposits and remove them if necessary.** |
|  | **After maintenance work, pay attention to the correct positioning of the electrical cables in the respective cable glands of the user board housing.** |



**In the event of work/building work in the vicinity of the unit, consider whether it is necessary to switch off the unit, drain it of refrigerant or install suitable protection. If the product is in an area where vehicles are operating, install adequate collision protection.**



**It is recommended to have specialised personnel perform periodical inspections and maintenance. EU regulation 2024/573 establishes that users must perform regular inspections on the systems, checking water tightness and eliminating any leaks as quickly as possible. Check the mandatory and necessary documentation on regulation 2024/573 and its subsequent amendments or repeal.**

Schedule all maintenance activities necessary for the safety of the unit. The recommended (R) and mandatory (M) activities for proper unit operation are set out below. The mandatory activities must be carried out by an authorised customer service which issues a corresponding certificate. Failure to comply with these activities will void the warranty and could considerably shorten the service life of your product.

| OPERATION | M / R | 1 month | 4 months | 6 months | 12 months |
|---|---|---|---|---|---|
| Filling the water circuit. | R | x | | | |
| Presence of bubbles in the water circuit. | R | x | | | |
| Check the safety and control devices work correctly. | M | x | | | |
| Check that there are no oil leaks from the compressor. | R | x | | | |
| Check that there are no water leaks in the water circuit. | R | x | | | |
| Check that the flowmeter works properly. | M | x | | | |
| Check that the crankcase heaters are powered and running. | R | x | | | |
| Clean the metal filters of the water circuit. | M | x | | | |
| Clean the finned coil with compressed air or water jet. | R | | x | | |
| Check that the electrical terminals both inside the electrical panel and in the terminal boards of the compressor are well tightened. | M | | x | | |
| Tightening of plumbing connections. | R | | x | | |
| Factory tightening torques. | M | | | | x |
| Check fixing and balancing of the fans. | R | | x | | |
| Clean the air filters in the electrical panel or replace them if necessary (when present). | M | | x | | |
| Correct electrical voltage and phase imbalance (without load and under load). | R | | | x | |
| Correct absorption. | R | | | x | |
| Check the refrigerant charge and any leaks. | M | | | x | |
| Check the operating pressure, superheating and sub-cooling. | R | | | x | |
| Circulation pump efficiency. | R | | | x | |
| If the unit is to be out of service for a long period, drain the water from the pipes and heat exchanger. This operation is essential if, during seasonal stoppages, ambient temperatures are expected to go below the freezing point of the fluid used. | M | | | x | |
| Check for corrosion/oxidation. | R | | | | x |
| Check panel fastening. | R | | | | x |
| Check the water quality (see chapter “System water characteristics”) and the glycol concentration, if any. | M | | | x | |
| Check the pressure drops of any filter driers on the liquid line. | R | | | x | |
| Check the hydronic side safety valve according to EN 806-5. | R | | | x | |
| Condensate drain cleaning. | R | | | x | |

## 9.1 CLEANING THE FINNED COIL

To correctly clean the coil, follow the instructions below:

- Remove surface dirt. Deposits such as leaves, fibres etc. should be removed using a vacuum cleaner (use a brush or other soft accessory and avoid rubbing against metal or abrasive parts). If compressed air is used, care must be taken to keep the airflow perpendicular to the surface of the coil to avoid bending the aluminium fins. Take care not to bend the fins with the compressed air nozzle.
- Rinse with water. Chemicals (specific detergents for finned coils) can be used. Rinse by running water through the fins until they are perfectly clean. Take care to direct the water jet perpendicularly to the surface of the coil to avoid bending the aluminium fins. Do not strike the coil with the water hose. We recommend placing your thumb on the end of the rubber hose to increase the pressure of the water jet instead of using specific nozzles which could damage the coil.

### 9.1.1 Cleaning the finned coils treated with the anti-corrosion method

The anti-corrosion treatment applied to the finned coils (available as an alternative to the standard coils) guarantees protection against aggressive atmospheres.
The frequency of cleaning depends on the environmental conditions and is left to the common sense of maintenance personnel. When oxidizing dust or grease particles are observed on the coil surface, cleaning is recommended. In general, in a slightly polluted atmosphere, we recommend carrying out the cleaning treatment every three months.
Washing should be carried out with preferably hot water (40-60°C) and detergent with neutral pH, while rinsing is carried out with plenty of fresh water (50 l / $m^2$).
If maintenance personnel notice there is no protective cover on the edge of the fins, contact the nearest service centre in order to reapply the cover and fully restore the corrosion protection.



**Do not clean the coil using high-pressure cleaners to prevent excessive pressure from causing irreparable damage. Damage caused by cleaning with unsuitable chemical substances or excessively high water pressure will not be recognised under the warranty.**

**The aluminium fins are thin and sharp. Take particular care and use appropriate PPE to avoid cuts and abrasions. Cover your eyes and face appropriately to avoid squirting water and dirt while blowing. Wear waterproof shoes or boots and clothing covering your entire body.**

**For units installed in aggressive atmospheres with a high fouling rate, cleaning of the coil must be part of the routine maintenance programme. In these types of installations, all of the dust and particles deposited on the coils must be removed as soon as possible through regular cleaning according to the methods shown above.**

## 9.2 CLEANING THE EXTERNAL SURFACES

The sheets of the outer enclosure must be properly cleaned to avoid the accumulation of dust/dirt, preventing the onset of corrosion. The paint ensures resistance to atmospheric agents but it is good practice to ensure that any dirt present is removed by cleaning the surfaces with a neutral detergent and water, especially if the unit is installed in locations with an aggressive atmosphere (high level of pollution, salt, etc.).

## 9.3 EXTRAORDINARY MAINTENANCE

All extraordinary maintenance work must be carried out by an authorised service centre.



**All maintenance and inspection operations must be carried out by QUALIFIED PERSONNEL only (IEC 60335-2-40 Annex HH). All equipment used during maintenance operations must be compatible with the refrigerant gas R290.**

Some extraordinary maintenance work may involve the replacement of broken components, which may have significant mass. Below is a list of components (standard and optional) and the approximate weight per piece (please note that any residual oil, liquid gas, water may increase the weight). Refer to the table before carrying out maintenance work (or refer to the label on the component itself) and choose the most suitable equipment/posture for the work to be carried out, taking into account the load limits imposed by technical standards and the worker's own health and capacity.

| Weight [kg] | Unit model | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Component** | **0106** | **0109** | **0109T** | **0112** | **0112T** | **0114** | **0115** | **0118** |
| Compressor | 13,7 | 14,1 | 14,1 | 25,7 | 19,0 | 22,5 | 25,5 | 25,5 |
| Plate heat exchanger | 4,8 | 8,3 | 8,3 | 8,3 | 8,3 | 8,3 | 8,3 | 8,3 |
| Cu-Al heat exchanger coil | 6,9 | 10,7 | 10,7 | 14,3 | 14,3 | 22,0 | 22,0 | 22,0 |
| Liquid receiver | - | - | - | 0,6 | 0,6 | 0,8 | 0,8 | 0,8 |
| Circulator | 2,0 | 2,0 | 2,0 | 2,8 | 2,8 | 2,8 | 2,8 | 2,8 |
| Deaerator | 0,7 | 0,7 | 0,7 | 1,0 | 1,0 | 1,0 | 1,0 | 1,0 |
| Fan | 4,5 | 4,5 | 4,5 | 4,5 | 4,5 | 4,5 | 4,5 | 4,5 |
| Compressor driver | 2,0 | 2,0 | 2,9 | 2,5 | 2,9 | 3,7 | 2,5 | 2,5 |
| Electric filter | 0,5 | 0,5 | 1,4 | 1,5 | 1,4 | 1,0 | 1,5 | 1,5 |
| Inductance | 1,4 | 1,4 | 4,2 | 3,7 | 4,2 | - | 3,7 | 3,7 |

## 10. DECOMMISSIONING

When the unit reaches the end of its life cycle and needs to be replaced, the following operations are recommended:

- the refrigerant must be recovered by specialised personnel and sent to collection points;
- any antifreeze additives in the water circuit must be recovered and disposed of properly;
- the compressors' lubricating oil must also be collected and sent to proper collection centres;
- the electronic components, such as regulators, driver boards and inverters, must be disassembled and sent to proper collection centres;
- the structure and the different components, if unusable, must be scrapped and sorted according to their nature; particularly the good amount of copper and aluminium in the machine.

These operations facilitate the recovery and recycling of substances, thereby reducing the environmental impact, in accordance with Directive 2012/19/EU on waste electrical and electronic equipment (WEEE).
The user is responsible for the proper disposal of this product, according to current national regulations in the country of use. For more information, please contact the installation company or the competent local authorities.

| | |
|---|---|
|  | **Improper decommissioning of the appliance may create serious environmental damage and endanger people's safety. Therefore, it is recommended that the unit be disposed of only by authorised persons with technical training who have attended training courses acknowledged by the competent authorities.** |
| | **Follow the same precautions described in previous paragraphs.** |
| | **Take particular care while disposing of the refrigerant gas.** |
| | **The illegal disposal of the product by the end user leads to the application of the penalties in accordance with the law in the country where the disposal takes place.** |
|  | **The crossed-out bin symbol applied on the appliance indicates that the product, at the end of its useful life, must be collected separately from other solid/municipal waste.<br>The units are manufactured in accordance with the EC Waste Electrical and Electronic Equipment Directive and the harmful effects of incorrect disposal are provided in the user/installer manual. The manufacturer or its importer/distributor is available to respond to any requests for additional information.** |

## 11. RESIDUAL RISKS

The residual risks related to handling, installation and normal operation of the unit are listed below. Any failure by the user and installer to comply with the instructions/indications in the manual (references to which are given in the table) will result in the continuation of these risks, which cannot be eliminated by the manufacturer, who has already taken all the necessary design precautions to ensure that each risk is minimised.

| Danger | Directions / Instructions | Residual risk | User / Activity | | | | |
|---|---|---|---|---|---|---|---|
| | | | Operator | | | User | |
| | | | Transport phase | Installation phase | Maintenance phase | Interaction with the unit | Normal unit operation |
| Mechanical: crushing caused by the possible instability of the unit during handling. | Chapter 5 of the user-installer manual sets out the procedures for correct unit handling and installation, with information on the centre of gravity, lifting points and equipment. The use of protective equipment is also recommended as required by current regulations. | Failure by the installer to comply with the installation procedures. | X | X | | | |
| Mechanical: crushing caused by the possible instability of the unit. | Chapter 5 of the user-installer manual sets out the proper procedures for installing the unit. | Failure by the installer to comply with the installation procedures. | | X | X | | |
| Mechanical: Cutting/severing/ shearing caused by the fan not being protected against accidental contact. | Specific warnings, including on routine maintenance, are given in chapter 9 of the user-installer manual. | Removal of the protective grille by the user or maintenance technician. | | | X | X | |
| Entanglement caused by the fan not being protected against accidental contact. | Specific warnings, including on routine maintenance, are given in chapter 9 of the user-installer manual. | Removal of the protective grille by the user or maintenance technician. | | | X | X | |
| Mechanical: cutting/abrasion due to contact with the heat exchanger coil. | Chapter 9 of the user-installer manual gives specific warnings to be taken into consideration when working near the coil. | Failure to observe the warnings in the manual and on the label. | | | X | X | |
| Mechanical: slipping/falling caused by ice/water near the unit as a result of water leaks due to burst pipes or seals or from venting of the water-side safety valve in the event of overpressure and failed conveyance. | Paragraph 5.10 of the user-installer manual recommends paying attention to the conveyance of the water side safety valve and paragraph 5.4 gives information on the surface on which the unit rests. Using PPE during maintenance work and removing any water residue near the machine after the work is recommended. | Failure to comply with the instructions given in the manual. | | | X | X | |
| Mechanical: cutting/abrasion caused by the presence of edges on the outer enclosure of the machine and/or screws protruding both outside and inside the unit. | The correct maintenance procedures are given in chapter 9 of the user-installer manual. Paragraph 4.2 recommends the use of the necessary personal protective equipment. | Failure to comply with the procedures and/or failure to use PPE by the maintenance technician. | | | X | X | |
| Mechanical: projection of parts or fluids caused by exceeding the operating pressure limits. | The correct maintenance procedures are given in chapter 9 of the user-installer manual. Paragraph 4.2 recommends the use of the necessary personal protective equipment. | Simultaneous damage to both types of protective equipment. | | | X | X | |
| Electrical: electrocution/shock/ burn caused by contact with live parts. | Chapter 9 of the user-installer manual sets out the safety measures to be adopted in case of maintenance, cleaning or inspection of the unit. Any intervention must only be carried out by qualified personnel and with the machine switched off. | Failure to comply with the procedures by the maintenance technician or irresponsible behaviour by the user. | | | X | X | |

| Danger | Directions / Instructions | Residual risk | User / Activity | | | | |
|---|---|---|---|---|---|---|---|
| | | | Operator | | | User | |
| | | | Transport phase | Installation phase | Maintenance phase | Interaction with the unit | Normal unit operation |
| Electrical: effects on medical implants (pacemakers) caused by electromagnetic phenomena. | Chapter of the user-installer manual states that direct interaction with the unit by persons with electrically controlled medical devices, such as pacemakers, is prohibited. It is recommended to keep a distance from the unit's installation site as indicated by the medical system used. | Failure to comply with the instructions given in the manual. | | | X | X | |
| Electrical: fire causes short circuit or electric arcs. | Chapter 5 of the user-installer manual sets out the proper installation procedures. In case of maintenance, the use of the necessary personal protective equipment is recommended. | The risk of ignition cannot be eliminated but its probability of occurrence is reduced. With the measures adopted, the spread of the fire is reduced. | | | X | X | |
| Electrical: projection of particles and emission of harmful substances as a result of electrical overload. | Chapter 9 of the user-installer manual states that maintenance must be carried out with the machine off. | Failure to comply with the instructions given in the manual. | | | X | X | |
| Thermal: burning/scalding from contact with hot surfaces. | Chapter 9 of the user-installer manual sets out the safety measures to be adopted in case of maintenance, cleaning or inspection of the unit and the personal protective equipment to be used. | Failure to comply with the procedures and/or failure to use PPE by the maintenance technician. | | | X | X | |
| Noise generated: discomfort caused by noise from the unit during operation. | Chapter 5 of the user-installer manual recommends conducting an environmental impact assessment based on the unit's installation area, also in the case of installation close to workers. | Failure to follow the actions recommended in the manual and the environmental impact study. | | | | | X |
| Vibration generated: discomfort caused by unit vibration during operation. | Chapter 5 of the user-installer manual recommends the use of vibration dampers. | Failure to follow the actions recommended in the manual and the environmental impact study. | | | | | X |
| Radiation generated: electromagnetic radiation that the unit generates during operation. | - | None. | | | | | X |
| Generated by materials/substances: breathing difficulties and/or damage to eyes and skin caused by possible leakage of refrigerant gas. | Paragraph 4.2 of the user-installer manual recommends the use of personal protective equipment. The safety data sheet for the refrigerant (paragraph 4.5) and specific warnings (paragraph 4.6) are also shown. | Failure to comply with the procedures by the maintenance technician. | | | X | X | |
| Generated by materials/substances: fire/explosion causes gas classified as flammable. | Chapter 5 of the user-installer manual gives specific information on the unit's installation site and protective equipment. | Failure to comply with instructions relating to the installation site and proper maintenance procedures. | | | X | | X |
| Generated by materials/substances: infections caused by bacteria potentially present in the carrier fluid (technical water). | Chapter of the user-installer manual lists the permitted uses of the unit. | Failure to comply with the instructions given in the manual. | | | X | | X |
| Generated by materials/substances: burning caused by the presence of R290 dissolved in oil inside the refrigeration circuit, triggered by a welding torch flame. | Paragraph 4.2 of the user-installer manual recommends the use of personal protective equipment.<br>In Chapter 9 it is recommended that, in the case of maintenance involving the unsoldering of pipes, the pipes should be cut, as the flame of the unsoldering torch will ignite any oil present. | Failure to comply with the instructions given in the manual. | | | X | | |

| Danger | Directions / Instructions | Residual risk | User / Activity | | | | |
|---|---|---|---|---|---|---|---|
| | | | Operator | | | User | |
| | | | Transport phase | Installation phase | Maintenance phase | Interaction with the unit | Normal unit operation |
| Generated by materials/substances: burning/scalding from escaping refrigerant. | Chapter 9 of the user-installer manual sets out the safety measures to be adopted in case of maintenance, cleaning or inspection of the unit and the personal protective equipment to be used. | Failure to comply with the instructions given in the manual. | | | X | | X |
| Generated by materials/substances: pollution due to inappropriate disposal. | Chapter 10 of the user-installer manual gives information on proper disposal. | Failure to comply with the instructions given in the manual. | | | | | |
| Ergonomic: fatigue/musculoskeletal disorders caused by exertion during maintenance/installation. | Paragraph of the user-installer manual recommends compliance with current regulations (international and local) on the health and safety of workers. During maintenance, it is advisable to keep a posture that does not cause fatigue and to check the weight of the component before proceeding with its handling (paragraph 9.3). | Failure to comply with the instructions given in the manual. | | X | X | | |
| Generated by the machine's use environment: slipping/falling caused by ice/water near the unit due to condensate drain/defrost. | Paragraph 5.10.5 of the user-installer manual covers the condensate drainage system, recommending that attention be paid to the risk of slipping. | Failure to comply with the instructions given in the manual. | | | X | X | |
| Generated by the machine's use environment: unexpected events as a result of malfunctions due to water/snow/humidity. | Chapter 9 of the user-installer manual recommends paying attention to the correct positioning of the electrical power cables in the respective cable glands of the user board housing and to the reassembly of all the sheets, especially those of the electrical panel, in order to maintain the declared protection rating. | Failure to comply with the procedures by the maintenance technician. | | | X | X | |
| Generated by the machine's use environment: lightning that can potentially hit the unit. | Chapter 9 of the user-installer manual recommends carrying out maintenance only in weather conditions suitable for the operations envisaged. It is also indicated that the installation site must be sufficiently far from lightning rods or objects that could attract lightning (par 5.4). The unit must be electrically connected to a system that complies with the regulations in force. | Failure to comply with the instructions given in the manual. | | | X | X | |
| Generated by the machine's use environment: electromagnetic disturbances caused by interference between equipment placed near the machine and the machine itself. | Paragraph 5.13 of the user-installer manual recommends powering the unit via a dedicated line and protections. It is also recommended to use an independent cable duct in order to remove the possibility of interaction with other devices. | Failure to comply with the recommendations regarding the electrical system. | | | | | X |
| Generated by the machine's use environment: possibility of breakage of components/mounts caused by corrosion and oxidation. | Chapter 9 of the user-installer manual gives specific warnings on maintenance and cleaning to be carried out on the surfaces of the sheets and heat exchanger coils. The technical file gives advice on which treatments to choose according to environmental conditions. | Lack of cleanliness and maintenance and/or incorrect assessment of the weather conditions at the installation site. | | | X | X | |

# 12. DTECHNICAL DATA

## 12.1 UNIT TECHNICAL DATA SHEET

**Performance under the following conditions, according to standard UNI EN 14511:2022:**

(1) Cooling: outdoor air temperature 35°C; in/out water temperature 12/7°C.
(2) Cooling: outdoor air temperature 35°C; in/out water temperature 23/18°C.
(3) Heating: outdoor air temperature 7 °C b.s. 6 °C b.u.; inlet/outlet water temp. 30/35°C.
(4) Heating: outdoor air temperature 7 °C b.s. 6 °C b.u.; inlet/outlet water temp. 47/55°C.
(5) Cooling: low temperature, variable output, fixed flow rate.
(6) Heating: average climatic conditions; $T_{biv}$=-7°C; low temperature, variable output, fixed flow rate.
(7) Indicative data subject to change. For the correct value, always refer to the technical label on the unit.
(8) Calculated for a decrease in system water temperature of 10°C with a defrost cycle lasting 6 minutes.
(9) Sound mode: heating mode according to EN 12102:2022 Annex A; value determined on the basis of measurements made in accordance with UNI EN ISO 9614-1, in compliance with Eurovent certification requirements.
(10) Sound pressure: value calculated from the sound power level in condition (9) using the standard UNI EN ISO 3744:2010.
(11) Heating: outdoor air temperature 7 °C b.s. 6 °C b.u.; inlet/outlet water temp. 55/65°C.
(*) Activating the maximum Hz function.

**N.B. performance data are indicative and are subject to change. Furthermore the performance declared in points (1), (2), (3) and (4) is intended to refer to instantaneous power according to EN 14511:2022. The value declared in point (5) and (6) is determined according to UNI EN 14825:2022.**

| TECHNICAL CHARACTERISTICS | | Unit of measure-ment | i-290 | | | |
|---|---|---|---|---|---|---|
| | | | 0106 | 0109 | 0112 | 0114 |
| **Cooling** | Cooling capacity (1) min/nom/max | kW | 2,35 / 5,43 /5,78* | 3,54 / 8,57 / 9,20* | 4,24 / 10,7 / 11,2* | 5,60 / 11,7 / 12,5* |
| | Input power (1) | kW | 1,95 | 2,77 | 3,75 | 3,63 |
| | EER (1) | W/W | 2,79 | 3,09 | 2,85 | 3,24 |
| | Cooling capacity (2) min/nom/max | kW | 3,62 / 5,62 / 6,19* | 5,12 / 9,15 / 9,89* | 6,38 / 12,6 / 13,3* | 8,01 / 12,2 / 13,7* |
| | Input power (2) | kW | 1,25 | 1,93 | 2,83 | 2,41 |
| | EER (2) | W/W | 4,48 | 4,75 | 4,44 | 5,07 |
| | SEER (5) | W/W | 4,77 | 5,41 | 4,72 | 5,01 |
| | Water flow rate (1) | L/s | 0,26 | 0,40 | 0,49 | 0,57 |
| | User side heat exchanger pressure drops (1) | kPa | 7,8 | 5,1 | 7,5 | 10,6 |
| | Nominal usable head (1) | kPa | 65,7 | 57,3 | 81,2 | 85,0 |
| **Heating** | Heating power (3) min/nom/max | kW | 3,48 / 6,24 / 6,86* | 4,31 / 9,07 / 10,4* | 6,30 / 12,6 / 13,7* | 7,16 / 14,8 / 15,9* |
| | Input power (3) | kW | 1,31 | 1,99 | 2,61 | 3,19 |
| | COP (3) | W/W | 4,76 | 4,56 | 4,83 | 4,64 |
| | Heating power (4) min/nom/max | kW | 3,12 / 5,97 / 6,42* | 3,65 / 8,74 / 9,39* | 5,18 / 11,6 / 12,8* | 6,32 / 13,8 / 14,4* |
| | Input power (4) | kW | 1,91 | 2,85 | 3,60 | 4,34 |
| | COP (4) | W/W | 3,12 | 3,07 | 3,22 | 3,17 |
| | Heating power (11) min/nom/max | kW | 3,04 / 5,87 / 6,41* | 3,39 / 9,05 / 9,81* | 4,91 / 12,0 / 13,1* | 5,92 / 14,2 / 15,1* |
| | Input power (11) | kW | 2,29 | 3,40 | 4,60 | 5,34 |
| | COP (11) | W/W | 2,57 | 2,66 | 2,62 | 2,66 |
| | SCOP (6) | W/W | 4,74 | 5,07 | 4,71 | 4,70 |
| | Water flow rate (3) | L/s | 0,29 | 0,44 | 0,58 | 0,72 |
| | User side heat exchanger pressure drops (3) | kPa | 9,6 | 6,2 | 10,5 | 17,4 |
| | Nominal usable head (3) | kPa | 63,6 | 53,0 | 79,5 | 77,2 |
| | Energy efficiency water 35°C / 55°C | Class | A+++/A++ | A+++/A+++ | A+++/A++ | A+++/A++ |
| **Compressor** | Type | | Twin Rotary DC Inverter | | | |
| | Refrigerant oil (type) | A | PZ46M | PZ46M | PZ46M | VG60 |
| | Number of compressors | n° | 1 | 1 | 1 | 1 |
| | Oil charge (quantity) | L | 0,45 | 0,52 | 0,90 | 0,90 |
| **Refrigerant** | Type | | R290 | | | |
| | Refrigerant charge (7) | kg | 0,43 | 0,75 | 1,00 | 1,27 |
| | Amount of refrigerant in equivalent CO2 tonnes (7) | ton | 0,000009 | 0,000015 | 0,000020 | 0,000025 |
| | Design pressure (high/low) heat pump mode | bar | 30,3/0,3 | 30,3/0,3 | 30,3/0,3 | 30,3/0,3 |
| | Design pressure (high/low) chiller mode | bar | 30,3/2 | 30,3/2 | 30,3/2 | 30,3/2 |
| **External zone fans** | Type | | Brushless DC motor | | | |
| | Number | n° | 1 | 1 | 2 | 2 |
| **Internal heat exchanger** | Internal heat exchanger type | | Plates | | | |
| | N° internal heat exchangers | n° | 1 | 1 | 1 | 1 |
| | Water content | L | 0,94 | 1,69 | 1,69 | 1,69 |
| **Hydraulic circuit** | Water content of hydronic circuit | L | 2,2 | 2,2 | 3,7 | 3,7 |
| | Maximum water side pressure | bar | 3 | 3 | 3 | 3 |
| | Plumbing fittings | inch | G1” | G1” | G1” | G1” |
| | Minimum water volume (8) | L | 65 | 95 | 125 | 125 |
| | Maximum circulator output | kW | 0,095 | 0,095 | 0,14 | 0,14 |
| | Circulator maximum input current | A | 0,7 | 0,7 | 1,2 | 1,2 |
| **Noise level** | Sound power level Lw (9) | dB(A) | 57 | 57 | 59 | 62 |
| | Sound pressure at 1m distance Lp1 (10) | dB(A) | 42 | 42 | 44 | 47 |
| | Sound pressure at 10m distance Lp10 (10) | dB(A) | 26 | 26 | 28 | 31 |
| **Noise level Version SL** | Sound power level Lw (9) | dB(A) | 55 | 55 | 57 | 57 |
| | Sound pressure at 1m distance Lp1 (10) | dB(A) | 40 | 40 | 42 | 42 |
| | Sound pressure at 10m distance Lp10 (10) | dB(A) | 24 | 24 | 26 | 26 |
| **Electrical data** | Power supply | | 230V/1/50Hz | | | |
| | Maximum input power | kW | 2,9 | 4,4 | 5,1 | 6,4 |
| | Maximum input current | A | 14,4 | 21,4 | 25,8 | 28,5 |
| | Maximum input power with antifreeze kit | kW | 3,0 | 4,6 | 5,3 | 6,5 |
| | Maximum input current with antifreeze kit | A | 15,0 | 22,0 | 26,4 | 29,1 |

| TECHNICAL CHARACTERISTICS | | Unit of measure-ment | i-290 | | | |
|---|---|---|---|---|---|---|
| | | | 0109T | 0112T | 0115 | 0118 |
| **Cooling** | Cooling capacity (1) min/nom/max | kW | 3,54 / 8,57 / 9,20* | 4,33 / 10,6 / 11,2* | 4,61 / 12,4 / 13,5* | 4,94 / 13,8 / 14,3* |
| | Input power (1) | kW | 2,77 | 4,01 | 3,71 | 4,34 |
| | EER (1) | W/W | 3,09 | 2,65 | 3,35 | 3,16 |
| | Cooling capacity (2) min/nom/max | kW | 5,12 / 9,15 / 9,89* | 6,48 / 12,4 / 13,3* | 7,20 / 12,9 / 14,4* | 7,52 / 13,9 / 14,8* |
| | Input power (2) | kW | 1,93 | 3,08 | 2,40 | 2,69 |
| | EER (2) | W/W | 4,75 | 4,02 | 5,37 | 5,18 |
| | SEER (5) | W/W | 5,41 | 4,49 | 5,02 | 5,04 |
| | Water flow rate (1) | L/s | 0,40 | 0,49 | 0,57 | 0,66 |
| | User side heat exchanger pressure drops (1) | kPa | 5,1 | 7,5 | 11,7 | 16,0 |
| | Nominal usable head (1) | kPa | 57,3 | 81,2 | 79,7 | 73,5 |
| **Heating** | Heating power (3) min/nom/max | kW | 4,31 / 9,07 / 10,4* | 5,56 / 12,1 / 13,0* | 6,89 / 16,3 / 17,7* | 7,14 / 18,7 / 19,8* |
| | Input power (3) | kW | 1,99 | 2,67 | 3,30 | 4,05 |
| | COP (3) | W/W | 4,56 | 4,54 | 4,94 | 4,62 |
| | Heating power (4) min/nom/max | kW | 3,65 / 8,74 / 9,39* | 4,94 / 11,3 / 11,9* | 6,20 / 15,2 / 16,6* | 6,38 / 17,4 / 18,7* |
| | Input power (4) | kW | 2,85 | 3,66 | 4,52 | 5,32 |
| | COP (4) | W/W | 3,07 | 3,09 | 3,37 | 3,27 |
| | Heating power (11) min/nom/max | kW | 3,39 / 9,05 / 9,81* | 4,61 / 12,0 / 12,7* | 5,78 / 14,7 / 15,9* | 5,87 / 16,7 / 17,7* |
| | Input power (11) | kW | 3,40 | 4,83 | 5,17 | 6,04 |
| | COP (11) | W/W | 2,66 | 2,48 | 2,83 | 2,76 |
| | SCOP (6) | W/W | 5,07 | 4,47 | 4,85 | 4,76 |
| | Water flow rate (3) | L/s | 0,44 | 0,58 | 0,78 | 0,87 |
| | User side heat exchanger pressure drops (3) | kPa | 6,2 | 10,5 | 22,0 | 27,8 |
| | Nominal usable head (3) | kPa | 53,0 | 79,5 | 66,8 | 59,8 |
| | Energy efficiency water 35°C / 55°C | Class | A+++/A+++ | A+++/A++ | A+++/A++ | A+++/A++ |
| **Compressor** | Type | | Twin Rotary DC Inverter | | | |
| | Refrigerant oil (type) | A | PZ46M | VG60 | PZ46M | PZ46M |
| | Number of compressors | n° | 1 | 1 | 1 | 1 |
| | Oil charge (quantity) | L | 0,52 | 0,9 | 0,9 | 0,9 |
| **Refrigerant** | Type | | R290 | | | |
| | Refrigerant charge (7) | kg | 0,75 | 1,00 | 1,27 | 1,27 |
| | Amount of refrigerant in equivalent CO2 tonnes (7) | ton | 0,000015 | 0,000020 | 0,000025 | 0,000025 |
| | Design pressure (high/low) heat pump mode | bar | 30,3/0,3 | 30,3/0,3 | 30,3/0,3 | 30,3/0,3 |
| | Design pressure (high/low) chiller mode | bar | 30,3/2 | 30,3/2 | 30,3/2 | 30,3/2 |
| **External zone fans** | Type | | Brushless DC motor | | | |
| | Number | n° | 1 | 2 | 2 | 2 |
| **Internal heat exchanger** | Internal heat exchanger type | | Plates | | | |
| | N° internal heat exchangers | n° | 1 | 1 | 1 | 1 |
| | Water content | L | 1,69 | 1,69 | 1,69 | 1,69 |
| **Hydraulic circuit** | Water content of hydronic circuit | L | 2,2 | 3,7 | 3,7 | 3,7 |
| | Maximum water side pressure | bar | 3 | 3 | 3 | 3 |
| | Plumbing fittings | inch | G1" | G1" | G1" | G1" |
| | Minimum water volume (8) | L | 95 | 125 | 155 | 155 |
| | Maximum circulator output | kW | 0,095 | 0,14 | 0,14 | 0,14 |
| | Circulator maximum input current | A | 0,7 | 1,2 | 1,2 | 1,2 |
| **Noise level** | Sound power level Lw (9) | dB(A) | 57 | 59 | 62 | 62 |
| | Sound pressure at 1m distance Lp1 (10) | dB(A) | 42 | 44 | 47 | 47 |
| | Sound pressure at 10m distance Lp10 (10) | dB(A) | 26 | 28 | 31 | 31 |
| **Noise level Version SL** | Sound power level Lw (9) | dB(A) | 55 | 57 | 57 | 57 |
| | Sound pressure at 1m distance Lp1 (10) | dB(A) | 40 | 42 | 42 | 42 |
| | Sound pressure at 10m distance Lp10 (10) | dB(A) | 24 | 26 | 26 | 26 |
| **Electrical data** | Power supply | | 400V/3/50Hz | | | |
| | Maximum input power | kW | 4,4 | 5,2 | 7,7 | 8,2 |
| | Maximum input current | A | 6,7 | 9,5 | 15,8 | 16,5 |
| | Maximum input power with antifreeze kit | kW | 4,6 | 5,3 | 7,9 | 8,3 |
| | Maximum input current with antifreeze kit | A | 7,3 | 10,1 | 16,4 | 17,1 |

## 12.2 UNIT AND AUXILIARY ELECTRICAL DATA

| | | |
|---|---|---|
| Unit power supply (*) | V/~/Hz | 230/1PH+PE/50 |
| Unit power supply (**) | V/~/Hz | 400/3PH+PE/50 |
| On-board control circuit | V/~/Hz | 12/1/50 |
| Remote control circuit | V/~/Hz | 12/1/50 |
| Fans power supply | V/~/Hz | 230/1/50 |

(*) For sizes 0106, 0109, 0112, 0114 - (**) For sizes 0109T, 0112T, 0115, 0118.

**NOTE: The electrical data are subject to change due to updates. It is therefore always necessary to refer to the technical specifications label applied on the right-hand panel of the unit.**

# 13. OPERATING LIMITS

## 13.1 EVAPORATOR WATER FLOW RATE

The nominal water flow rate refers to a 5°C temperature difference between the evaporator inlet and outlet. The maximum permitted flow rate features a 3°C temperature difference while the minimum one has an 8°C (in cooling mode) temperature difference at the nominal conditions as shown in the technical sheet. The maximum permissible temperature difference, however, is 10 °C when the heat pump is operating in heating mode.



**Insufficient water flow rates can cause excessively low evaporation temperatures, triggering safety devices and shutting down the unit and, in some extreme cases, leading to ice formation in the evaporator and consequent serious faults in the refrigeration circuit.**

For greater precision, we have attached a table below with the minimum flow rates for the plate heat exchanger to guarantee proper operation according to the model (please note: the water flowmeter is applied to protect against failed triggering of the antifreeze probe due to a lack of flow but does not guarantee the minimum water flow rate required for correct operation of the unit).

| Model i-290 | Chiller mode | | | | |
|---|---|---|---|---|---|
| | 0106 | 0109 / 0109T | 0112 / 0112T | 0114 / 0115 | 0118 |
| Minimum water flow to be assured in chiller mode (condition (1) technical sheet) [l/s] | 0,160 | 0,260 | 0,320 | 0,370 | 0,410 |
| Maximum water flow to be assured in chiller mode (condition (1) technical sheet) [l/s] | 0,430 | 0,680 | 0,850 | 0,990 | 1,090 |
| Flowmeter intervention rate – decreasing / increasing flow [l/s] | 0,100 | 0,133 | 0,167 | 0,200 | 0,250 |



**Pay attention to the pressure levels in the hydraulic system: too low values can cause the unit to malfunction.**

For very low pressure values in the water system, the flowmeter may show an unstable reading, so it is advisable to have an automatic charging system or a pressure monitoring system.
It is good practice to periodically check the state of the deaerator, especially if very high temperature differences are read between the inlet and outlet on the water side, as this could be a sign of air bubbles in the circuit that reduce the available water flow rate, altering the flowmeter reading.

## 13.2 COOLING WATER PRODUCTION (SUMMER MODE)

The minimum permissible temperature at the evaporator outlet is 5°C. For lower temperatures, contact our technical department. In this case, contact our technical department for a feasibility study and evaluation of the modifications to be made according to the requirements. The maximum temperature that can be maintained at steady state at the evaporator outlet is 20°C.

## 13.3 HOT WATER PRODUCTION (WINTER MODE)

When the system has reached steady state, the water outlet temperature must not drop below 22°C: lower values, not due to transient phases or reaching steady-state, can cause system failures and could possibly break the compressor. The maximum outlet water temperature must not exceed 75°C.
Temperatures higher than those indicated, especially in conjunction with low water flow rates, could lead to malfunctioning of the unit, or in the most critical cases safety devices could trip.

## 13.4 AMBIENT AIR TEMPERATURE AND SUMMARY TABLE

The units are designed and built to operate in summer mode, with condensation control, at outdoor air temperatures between -10°C and +46°C. In heat pump mode, the permitted temperature range of the outdoor air is from -20°C to 20°C depending on the outlet water temperature as shown in the table below.

**Operating limits**

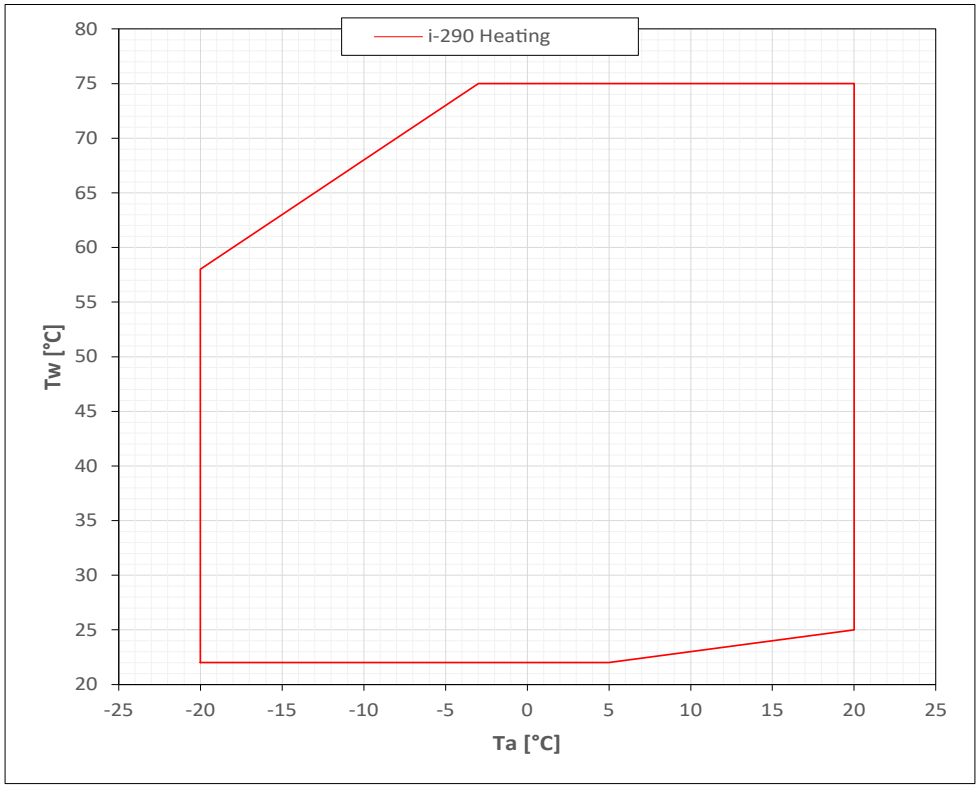
| **Water chiller mode** | | |
|---|---|---|
| Ambient temperature | Minimum +10 °C | Maximum +46°C |
| Outlet water temperature | Minimum +5°C | Maximum +20 °C |

| **Heat pump mode** | | |
|---|---|---|
| Ambient temperature | Minimum -20 °C | Maximum +20 °C |
| Outlet water temperature | Minimum +22 °C | Maximum +75 °C |

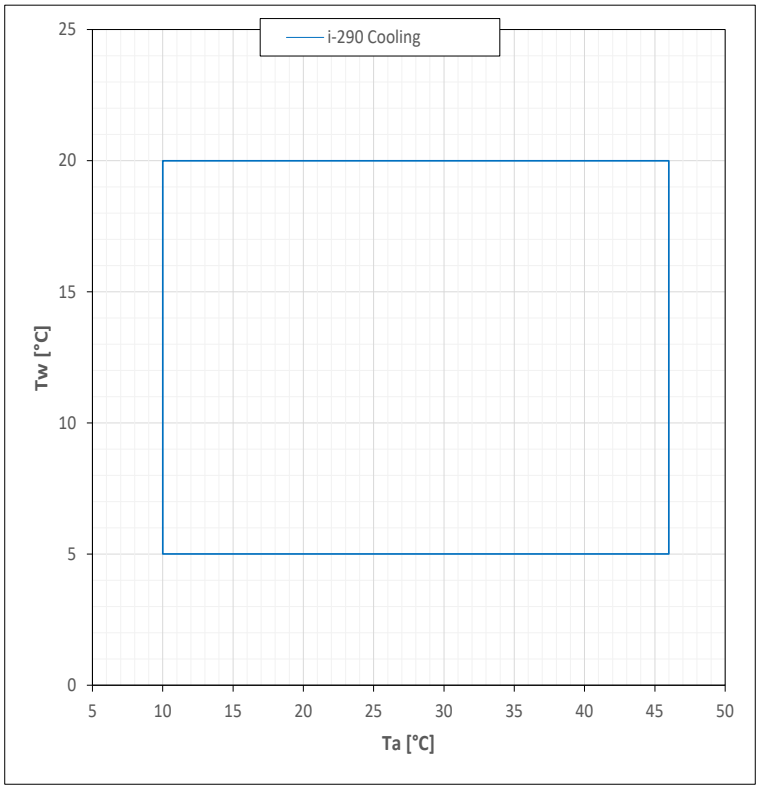
| **Heat pump mode for domestic hot water** | | |
|---|---|---|
| Ambient temperature with water at maximum 39°C | Minimum -20 °C | Maximum +43 °C |
| Ambient temperature with water at maximum 55°C | Minimum -20 °C | Maximum +43 °C |
| Outlet water temperature | Minimum +22 °C | Maximum +75 °C |

Graphs showing the operating limits for heating, cooling and domestic hot water production are shown below. Note that operating the unit outside the operating limits given causes blocking alarms that lead to the product shutting down, with possible damage to components and/or safety devices.

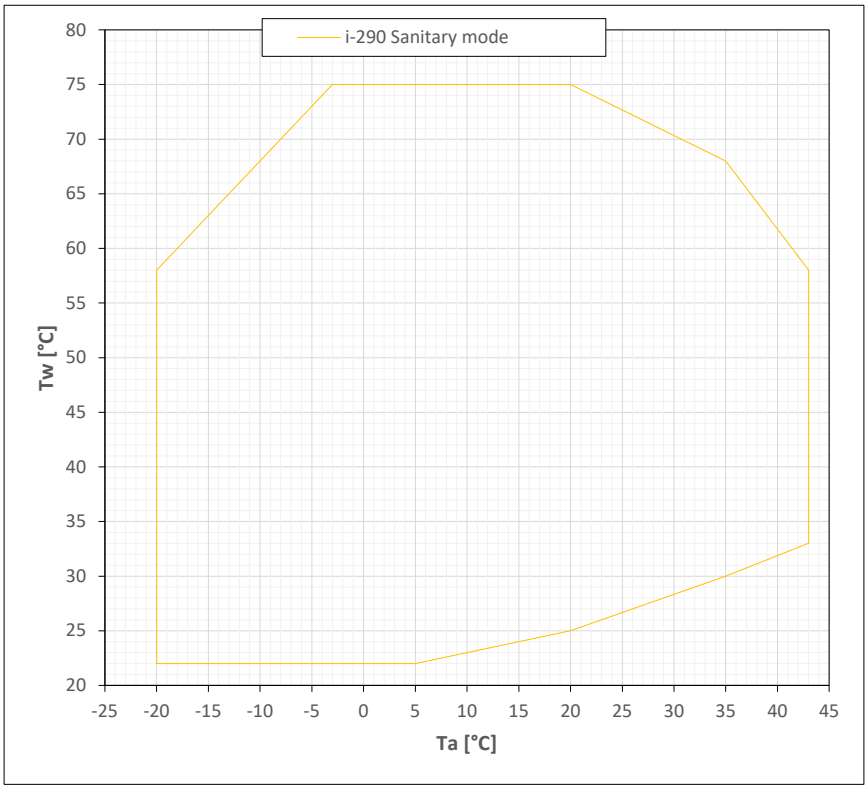
**HEAT PUMP MODE**



**CHILLER MODE**



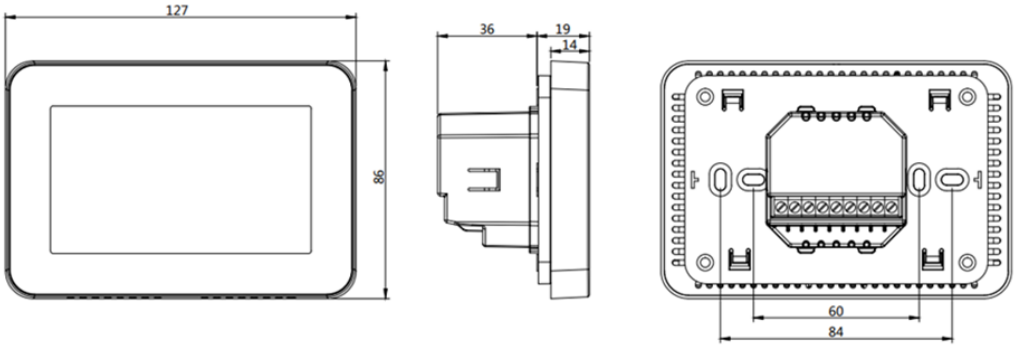

**DOMESTIC HOT WATER MODE**



# 14. REMOTE CONTROL INTERFACE

## 14.1 INTRODUCTION

The e-PRO device is a remote control for heat pumps with a room thermostat function. e-PRO is designed to efficiently manage heating, cooling and domestic hot water (DHW) production in residential and commercial sites. This manual provides instructions on how to install, configure and use the device.




## 14.2 TECHNICAL SPECIFICATIONS

- Dimensions: 96 x 86 x max 44 mm
- Working temperature: -5°C to 60°C
- Ambient humidity: 0% to 80% (non condensing)

## 14.3 MAIN FEATURES

- Colour LCD display: The device has a 4-inch LCD colour graphic display with touch technology.
- Wi-Fi connection: It supports Wi-Fi connection with a router in the 2.4 GHz band and direct connection to the Internet.
- Operating modes: It includes the heat pump control page and the chronothermostat page.
- Energy saving: Advanced energy-saving functions such as backlight intensity reduction and intelligent room temperature management.

## 14.4 INSTALLATION

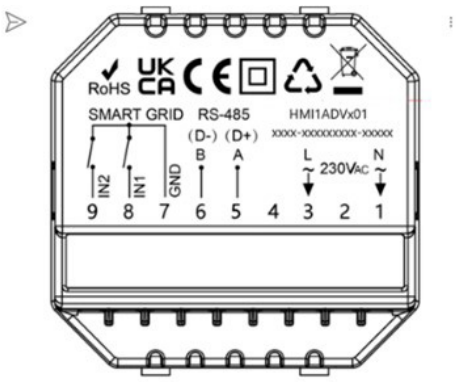
Read the paragraph on the electrical connection before switching on the chronothermostat.

**General Requirements:**

- **The control is suitable for wall mounting according to the 503 standard. Indoor use.**
- **Main power supply**: 100- 240Vac, 50/60Hz.
- **Power consumption**: <=2W with Wi-Fi active, ~1W in standby mode.

Applying light pressure, detach the screen part from the part to be inserted into the 503 housing.

## 14.5 ELECTRICAL CONNECTION




Electrical contacts: The device requires at least 4 electrical connections for proper functioning.

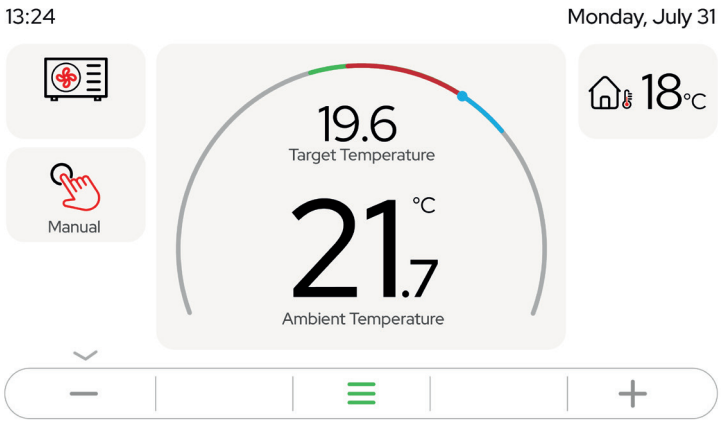
- Connection to the main power supply. 100-240 Vac 50/60 Hz (contacts: 1: N, 3: L).
- Low voltage RS485 connection: It uses the low-voltage Mod-Bus protocol for communication with the dedicated heat pump (contacts 5:D+ and 6:D-).
- Optional low voltage connections for intelligent energy saving services (contacts 7: GND, 8:IN1 and 9:IN2). Example: If only a single contact is available and the heat pump needs to be stopped on demand, connect the NO contact between IN2 and GND on the e-PRO, and enable the S-PRICE function.

Two connection cables are required between the chiller or heat pump unit and the remote control.

- Cable suitable for RS485 networks:
  - ◊ Cable with 2 twisted and shielded pairs 2x0,3 mmq (minimum section), characteristic impedance 120Ω.
  - ◊ Maximum length is 1000 m (standard transmission speed 9600 baud).
  - ◊ Lay the serial line separately from other cables, especially power cables, and away from cables or devices that may induce electromagnetic interference.
  - ◊ Do not use the shield as a GND cable.
- 2X1 mmq cable for 230Vac power supply.

**ATTENTION:**
**Do not confuse or connect the GND terminal with the system EARTH.**
**Do not connect electrical wires to terminals 4 and 2.**
**The channels used for data communication (Modbus) must be separate from those carrying mains voltage.**

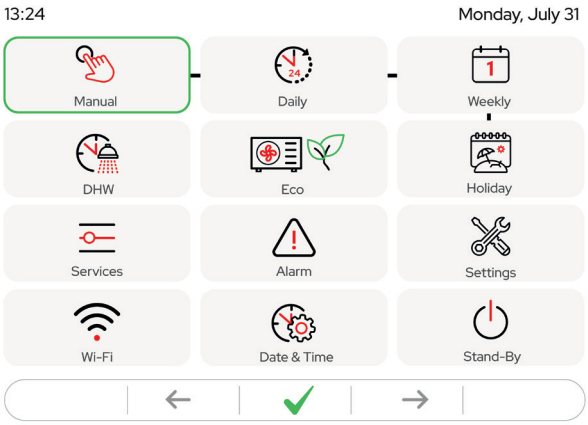
## 14.6 'HOME' SCREEN: CHRONOTHERMOSTAT




## 14.7 NAVIGATION IN THE MAIN 'HOME' SCREEN OF THE CHRONOTHERMOSTAT

- When switched on for the first time, the chronothermostat is set to manual operation mode.
- The home screen of the device in thermostat mode is designed to provide quick access to key information and functions.
- **Date and time**: This shows the current date and time.
- **Temperature**: The target temperature and actual room temperature are displayed in the centre of the screen. Using the '+' and '-' keys:
  - ◊ **In manual mode**, the newly set room temperature remains indefinitely active until the next power interruption. Therefore, it is advisable to store the new preferred value in the Eco or Comfort target.
  - ◊ **In daily or weekly programming mode**, changing the desired room temperature will activate the 'i-Feel' program (see chapter on Functions: i-Feel).
- **Heat pump status and outside temperature**: if the chronothermostat is connected to the heat pump, the operating status of the heat pump can be read in the top left corner of the screen and the outside temperature in the top right corner.
- The left-hand column displays the various services active in the device in time sequence.
- Pressing and holding down the (3-line) main menu key for 8 seconds will **lock** the screen from occasional input, press for another 8 seconds to unlock it.
- **Main Menu**: The central three-line key (between the '+' and '-' keys) provides access to the main menu.

## 14.8 SCREEN: MAIN MENU




## 14.9 SCREEN NAVIGATION: MAIN MENU

The main menu screen allows you to refine the functions of the chronothermostat and set the target temperature of the room where the chronothermostat is installed.

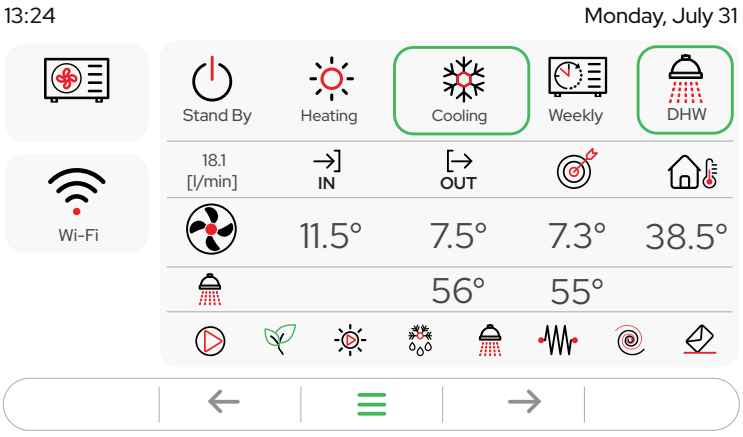
## 14.10 OPERATING MODES OF THE CHRONOTHERMOSTAT

- **Manual Mode**. It allows you to freely set and change the temperature by defining the ECO target and Comfort target.
- **Daily Mode**. It allows the temperature or several temperatures to be programmed depending on the time of day, valid every day of the week.
- **Weekly Mode**. It allows different temperatures to be programmed for each day of the week and up to 7 daily variations.
- **Holiday Mode**. Holiday mode puts the device on standby or maintains a minimum temperature to prevent freezing of the heating pipes.

## 14.11 FURTHER FUNCTIONS

- **Date and Time**. It allows the manual setting of date and time and time zone.
- **Wi-Fi**. It allows the chronothermostat to be connected to the internet via a built-in 2.4 GHz band Wi-Fi radio (b/g/n).
- **D.H.W. Domestic Hot Water**. It allows you to set the desired temperature for domestic water. Two temperatures can be set, Economy and Comfort temperature. The possibility of setting a lower temperature (ECO) is offered because the chronothermostat saves energy by facilitating the almost instantaneous exchange of targets set manually or by programming.
- **Eco or Comfort**. It allows the immediate exchange of all stored heat pump targets to save energy (eco) or boost comfort.
- **Alarms**. It allows you to examine whether there are active or stored alarms in the heat pump.
- **DHW settings**. It enables the activation of accessory functions useful for the perfect maintenance and operation of the heat pump.
- **Stand-By**. It allows you to switch off (deep standby) the chronothermostat and examine the energy performance of your system.
- **Services**: Various services and functions can be activated.

## 14.12 HOME SCREEN: CONTROL MODE



## 14.13 SCREEN NAVIGATION: CONTROL

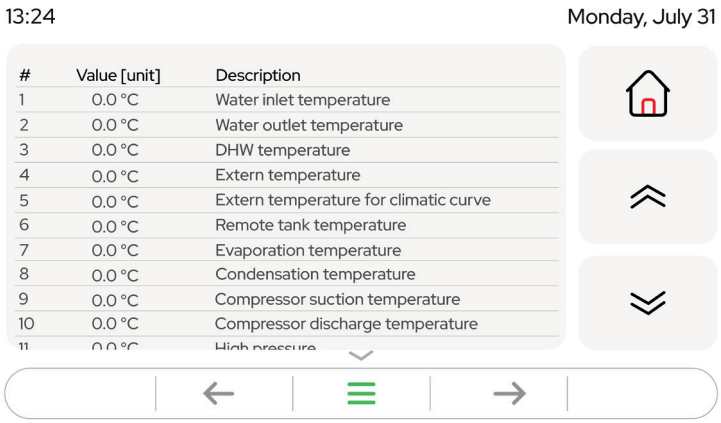
The device's 'home' screen in control mode allows quick access to the main functions of the heat pump. Some functions may be inhibited consistent with the system settings.
The 'control' screen allows the main operating modes of the heat pump to be activated by touching the icons in the first line:

- **Cooling**. It activates the heat pump in 'Cooling' mode to produce cold water.
- **Heating**. It activates the heat pump in 'Heating' mode to produce hot water.
- **Stand-by**. The heat pump stops producing hot or cold water and goes into stand-by.
- **Weekly**. It enables weekly scheduling of the heat pump.
- **D.H.W. (domestic hot water)** Enables the production of domestic hot water. Also for the 'Thermostat' mode, if you want the DHW mode active, without necessarily enabling the DHW chronothermostat, you have to enable the relevant icon on this screen.

The central part of the screen displays some values communicated by the heat pump concerning mainly temperatures and flows.
The small if visible icons in the bottom row show the active status of some actuators (from left to right):

1. **Pump**. It indicates the status of the heat pump's on-board circulator. If flashing, it indicates that the system is requesting activation of the circulator.
2. **Eco**. If active, it indicates that the heat pump is operating according to the 'Eco' setpoint.
3. **Solar Circulator**. If active, it indicates the operating state of the solar circulator.
4. **Defrost** If active, it indicates that defrosting of the heat pump is taking place. If flashing, it indicates that the system is requesting activation.
5. **Domestic hot water**. If active, it indicates that the heat pump is operating in DHW mode. If flashing, this indicates that the heat pump is requesting activation.
6. **Electric heater**. If active, it indicates that the heat pump is supplying the antifreeze electric heaters on board.
7. **Compressor**. If active, it indicates that the compressor on the heat pump is running. If flashing, this indicates that the heat pump is requesting activation.
8. **Message**. If active, it indicates receipt of a message, tap the icon to read it.

## 14.14 SCREEN: HP INFO




## 14.15 SCREEN NAVIGATION: HEAT PUMP INFORMATION

The heat pump information screen shows the values of certain sensors and component states on the heat pump.
The values update automatically.

**Screen functions:**

The arrow keys allow you to navigate through the list of values displayed on the screen.

## 15. TROUBLESHOOTING

For a list of error messages and the main troubleshooting actions for the units, refer to the MTR troubleshooting manual, which can be requested from the manufacturer.

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