



WATER-WATER HEAT PUMPS DISTRICT HEATING, INDUSTRIAL APPLICATIONS HOT WATER PRODUCTION



EN TRANSLATION OF THE ORIGINAL INSTRUCTIONS





DECLARATION OF CONFORMITY

CAREFULLY READ THIS MANUAL BEFORE USING THE UNIT.

warning

The declaration of conformity is attached separately to the documents on board the unit, usually placed inside the electrical compartment.

Dear Customer,

whilst thanking you for having chosen a product of ours, we are pleased to provide this manual for optimal use of our product for better work results.

EKW

Please read the recommendations described in the following pages carefully and keep the manual available to personnel who will be responsible for managing and maintaining the unit.

Our company is at your complete disposal for any and all questions that you should require both in the unit starting phase and at any time of its utilization.

Should scheduled and unscheduled maintenance be necessary, please contact our After-sales Technical Service for assistance and spare parts.

Please find our contact details below for a more rapid service:



ENEREN S.r.l. Viale Spagna, 31/33 35020 Tribano (Pd) ITALY Tel + 39 049 9271513 Fax + 39 049 9588522 e-mail : info@eneren.it



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START-UP INSTRUCTIONS

1 YOUR INSTALLATION

All the tips required for a perfect installation of the equipment can be found in the installation manual. It is important to place a net filter at all water circuit inlets. The filter must be made of stainless steel with a mesh that does not exceed 1 mm.

2 REQUIRED ACCESSORIES FOR A PROPER INSTALLATION OF THE UNIT

For the proper operation of the unit and for the validity of the warranty, the installation of the following hydraulic components will be necessary:

- Y-strainers in the inlet pipes to the unit;
- anti-vibration couplings in each pipe connected to the unit;
- appropriately dimensioned safety valves on each circuit of the system;
- appropriately dimensioned expansion vessels on each circuit of the system.

3 FIRST START-UP

With at least 15 working days in advance, send the machine start request via email or fax to the following contact ENEREN:

Fax. 049 9588522

e-mail: support@eneren.it

Tel. 049 9271513

ENEREN Assistance will organize the intervention by putting you in contact with Authorized Technical Assistance Center of the area.

All the preliminary checks and testing of the machine will be carried out together with your staff. Your staff will be given instructions for the correct running of the machine.

4 WARRANTY ISSUE

For the warranty to be valid, the first start-up by an Authorized Technical Assistance Center is mandatory After testing, the Authorized Technical Assistance Center will issue a valid test certificate for the machine warranty. Each unit has an identification plate that is located on its frame and inside the electrical control panel, which shows all the data necessary for the installation, maintenance and traceability of the machine.

THE LABEL SHOWS THE FOLLOWING DATA:

- Manufacturer/Marketing body
- CE mark, possibly accompanied by a subscript that identifies the certifying body for the Pressure Equipment Directive 2014/68/EU (PED). The number of the certifying body must be indicated for units of a PED category equal to or greater than class 2.
- Series and size of the unit
- Date of manufacture
- Main technical data

Note the model, the serial number, the final refrigerant charge and the machine reference diagrams attached to this manual so that they can be easily found in case of data plate damaging and system maintenance.

ATTENTION

Never remove the label. This shows the serial number of the unit from which it is possible to obtain information about the technical features and the components installed, to then identify the unit correctly.

IF WARNING

The data contained in this manual are subject to change without notice.

Modello - Model				
Matricola - Serial number				
Codice identificativo - ID code				
Data di produzione - Date of production				
Categoria PED/ 2014/68/EU - Category PED/ 2014/68/EU				
Procedura di valutazione conformità PED - PED conformity module				
Max pressione ammissibile (PS) lato alta pressione - Max allowable pressu-				
May pressione esercizio (PS) lato bassa pressione - May allowable pressure				
(PS) low pressure side [bar-r]				
Max/min temperatura di stoccaggio - Max/min storage temperature [°C]				
Max/min temperatura ambiente di funzionamento - Max/min ambient working temperature [°C]				
Potenza frigorifera* - Cooling capacity* [kW]				
EER*			_	
Potenza termica* - Heating capacity* [kW]				
COP*				
Refrigerante - Refrigerant [Ashrae 15/1992] / GWP				
Carica refrigerante - Refrigerant charge [kg]	C1	C2	C3	C4
Refrigerante aggiunto - Added refrigerant [kg]	C1	C2	C3	C4
Carica totale refrigerante - Total charge refrigerant [kg]				
CO2 equivalenti - CO2 equivalent [t]				
Taratura pressione lato alta - High pressure switch set [bar-r]				
Taratura pressione lato bassa - Low pressure switch set [bar-r]				
Taratura valvola sicurezza refrigerante lato alta/bassa pressione - Safety				
Valve reingerant nigh/low pressure side set [bai-1]				
circuit [bar-r]				
Taratura valvola sicurezza acqua - Safety valve water side set [bar-r]				
Alimentazione elettrica - Power supply				
Potenza massima assorbita - Max absorbed power [kW]				
Corrente massima - Full load ampere FLA [A]				
Corrente di spunto - Starting current LRA [A]				
Schema elettrico - Wiring diagram				
Schema frigorifero - Refrigeration diagram				
Peso a vuoto - Empty weight [kg]				
* EN14511-2				
Contiene gas fluorurati ad effetto serra disciplinati dal protocollo di Kyoto/				
Contains fluorinated greenhouse gases governed by the Kyoto protocol				
Ermeticamente sigillato/Hermetically sealed				

SAFETY SYMBOLS	
IF WARNING	With reference to additions or recommendations for the correct use of the unit.
	With reference to dangerous situations that may occur with the use of the unit to guarantee personal safety.
	With reference to dangerous situations that may occur with the use of the unit to prevent damage to property and to the unit itself.

GENERAL CAUTIONARY NOTES

The operating rules contained in this manual are an integral part of the unit supply and are valid exclusively for the units covered by this manual. They contain all the useful and necessary information for safe operation and ideal, recommended use of the unit. The declaration of conformity is attached individually to the literature kept on the machine, usually inside the control cabinet.

Please follow the instructions given below:

• Read carefully the instruction manual which should be considered an integral part of the unit.

 Every operator and the personnel in charge of unit maintenance must read the manual throughout carefully and observe its prescriptions.

• The employer is requested to make sure that the operator has the necessary aptitude requirements for operating the unit and has carefully read the manual.

• The instruction manual must be easily available to the operation and maintenance personnel.

· Keep the manual for the entire working life of the unit.

Make sure any updates that are received are integrated into the text.

• Hand over the manual to any other user or subsequent owner.

• Use the manual so that the contents are not damaged - entirely or in part.

• Do not remove, tear off or rewrite parts of the manual for any reason.

• Keep the manual with care; it must be available at the unit, stored in a special container, to protect it from moisture and heat, until final scrapping of the machine. The location where the manual is kept must be known to the user of the unit, to the managers, to the persons in charge of transportation, installation, use, maintenance, repairs, and end-of-life dismantling and scrapping. If the manual is lost or partially damaged, so that it is no longer possible to read all of its contents, it is advisable to request a new one from the manufacturer.

 Avoid hasty and incomplete preparation that lead to improvisation and cause many accidents.

Pay close attention to the safety symbols shown in the table on the previous page and to their meaning.

Before starting to work, read through and strictly observe the following suggestions:

 the operator must always have the instruction manual readily available at any time;

• plan each action carefully;

 before beginning to work, make sure that the safety devices work properly and you have no doubts about their operation; otherwise, do not under any circumstances start the unit;

 carefully observe the warnings relating to special hazards contained in this manual;

 preventive and thorough maintenance guarantees constantly high operating safety for the unit. Never delay repairs and always have them carried out solely by qualified personnel; only original spare parts are to be used.

THE MANUFACTURER shall not be liable for any accident to persons or property which may occur due to:

• failure to comply with the instructions in this manual regarding the operation, use and maintenance of the unit;

 violent actions or incorrect manoeuvres when performing maintenance on the unit;

 alterations made to the unit without prior written authorisation from the MANUFACTURER;

• events that are, in any case, unrelated to the normal and correct use of the unit;

• in any case, if the user attributes the incident to a defect in the unit, he must prove that the damage caused was a main and direct consequence of this "defect".

This manual reflects the state of the art at the time of unit sale: The MANUFACTURER reserves the right to update its products and manuals without any obligation to update earlier products and manuals, except in special circumstances. These may not be considered inadequate only because they have been subsequently updated based on new experience.

ATTENTION

• The installer must provide adequate documentation that must comply with EN 378-3 if applicable in the country of installation; otherwise, reference should be made to the local regulations in force.

• When installing or servicing the unit, the rules stipulated in this manual must be complied with together with those on board the unit and in any case all necessary precautions must be taken.

• The fluids under pressure in the cooling circuit and the presence of electrical components may cause hazardous situations during installation and maintenance work.

• Any action on the unit must be carried out by qualified and authorised personnel. In the event of a fault, do not attempt repairs on your own and do not let unauthorised technicians carry out repairs, or the guarantee will no longer be valid.

• The initial start-up must be carried out exclusively by qualified personnel authorised by the marketing entity (see annex).

• Before performing any work on the unit, ensure it has been disconnected from the power supply.

• For maintenance service or repairs always and exclusively use original spare parts. THE MANUFACTURER declines all responsibility for damages that may occur due to non-compliance with the above.

• The unit is guaranteed according to the contractual agreements entered into upon its sale: however, failure to comply with the rules and instructions contained in this manual and any modification in the unit not previously authorised, will cause an immediate loss of guarantee validity.

• This manual describes the intended use of the unit and provides instructions for its handling, installation, assembly, adjustment and use. It supplies information on the maintenance schedule, how to order spare parts, the presence of residual risks, and staff training. Therefore, before handling, installing, using or carrying out any maintenance on the unit, read the manual very carefully.

• It is important to remember that the use and maintenance manual can never replace adequate user experience. This manual represents a reminder of the main operations to be performed by operators who have received specific training, for example by attending training courses held by the manufacturer, with reference to particular maintenance operations.

• Make sure all the users have thoroughly understood the operating instructions together with the meaning of any symbols on the unit.

• Possible accidents can be avoided by following these technical instructions drafted in accordance with the Machinery Directive 2006/42/EC and subsequent additions.

· In any case, always comply with national safety regulations.

• Do not remove or damage guards, decals, stickers and wording, especially any that are required by law.

• Adhesive labels intended for safer use are applied to the unit, therefore, it is very important to replace them if they become illegible.

IF WARNING

• The electrical wiring, hydraulic and refrigeration diagrams and the technical data shown in this manual are supplied for guidance only and may be changed without prior notice for the purpose of improving the product range. For detailed information on specific models, refer to the specific documentation attached to the each product.

Any updates or additions to this use and maintenance manual are to be considered an integral part of the manual and may be requested via the contact phone numbers listed in this manual. Contact the MANUFACTURER for additional information and to share any feedback and recommendations aimed at improving the manual.

If the unit is transferred to a new owner, the MANUFACTURER expects you to please notify the address where to send any manual additions for the new user.



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3 GENERAL DESCRIPTION

3.1 Precautions for use

The operating rules contained in this manual are solely applicable for the units:

EKW

The instructions manual must be read and used as follows:

- every unit operator and maintenance technician must carefully read the entire manual and comply with that stipulated therein;
- the employer must ensure that the operator has the requirements to operate the unit and has carefully read the manual;
- read the instructions manual carefully and consider it an integral part of the unit;
- the instructions manual must be readily available to operating personnel and maintenance technicians;
- keep the manual throughout the life of the unit;
- make sure that any update is included in the text;
- Hand the manual to any other user or subsequent owner of the unit;
- Use the manual so that the contents are not damaged entirely or in part;
- do not, for any reason, remove, tear or rewrite parts of the manual;
- keep the manual away from humidity and heat;
- if the manual is lost or partially damaged, so that it is no longer possible to read all of its contents, it is advisable to request a new one from the manufacturer.

3.2 Preamble

ATTENTION

The operating rules described in this manual are an integral part of the unit supply.

These rules are also intended for the previously trained operator specifically to operate this type of unit and contain all the necessary and important information for operating safety and optimal, proper use of the unit.

Hurried and incomplete training leads to improvisation, which is the cause of many accidents.

Before starting to work, read through and strictly observe the following suggestions:

- the operator must always have the instruction manual readily available at any time;
- plan each action carefully;
- before starting work, make sure the safety devices function correctly and you have no doubts on how they work; otherwise, do not start-up the unit;

- carefully observe the warnings relating to special hazards contained in this manual;
- preventive and thorough maintenance guarantees constantly high operating safety for the unit. Never delay repairs and always have them carried out solely by qualified personnel; only original spare parts are to be used.

3.3 Liability

THE MANUFACTURER shall not be liable for any accident to persons or property which may occur due to:

- failure to comply with the instructions provided in this manual regarding unit management, use and maintenance;
- violent actions or incorrect manoeuvres when performing maintenance on the unit;
- alterations made to the unit without prior written authorisation from the MANUFACTURER;

 incidents beyond the normal and correct use of the unit.
 In any case, if the user attributes the incident to a defect in the unit, he must prove that the damage caused was a main and direct consequence of this "defect".

ATTENTION

When installing or servicing the unit, the rules stipulated in this manual must be complied with together with those on board the unit and in any case all necessary precautions must be taken.

- The presence of pressurised fluids in the refrigerant circuit and of electrical components can create hazardous situations during installation and maintenance.
- Therefore, only qualified personnel may perform work on the unit.
- The initial start-up must be carried out EXCLUSIVELY BY QUALIFIED PERSONNEL AUTHORIZED BY THE MAR-KETING ENTITY (see annex).
- Failure to comply with the rules stipulated in this manual and any alteration to the unit without prior authorization will immediately make THE WARRANTY NULL AND VOID.
- Before performing any work on the unit, ensure it has been disconnected from the power supply.
- For maintenance service or repairs always and exclusively use original spare parts. THE MANUFACTURER declines all responsibility for damages that may occur due to non-compliance with the above.
- The unit is covered by the warranty according to the contractual agreements established at the time of sale.
- However, the warranty is rendered null and void if the regulations and user instructions stipulated in this manual are not complied with.



3.4 Intended use

The units are intended for heating water and glycol solutions up to a maximum of 35% the weight, in civil, industrial and technological air conditioning environments.

IF WARNING

Their use is recommended within the functioning limits carried in this manual, or else the warranty attached to the sales contract would cease.

ATTENTION

Any other use is to be considered inappropriate and the manufacturer declines all liability for any damage caused to persons, property or the unit that may derive from such use.

- Place the unit in environments where there is no risk of explosion, corrosion or fire.
- Make sure that the unit is supplied an adequate volume of air at both intake and outlet ends.
- Improper use could cause serious repercussions on the unit.
- All routine and special maintenance operations must be performed with the unit off and the power supply disconnected.
- Wait approximately 30 minutes after switching off the unit before carrying out any maintenance operations to avoid burns.

ATTENTION

- Before performing any work on the unit, each operator must be perfectly aware of how the unit and its controls work and must have read and understood all the technical information in this manual.
- It is forbidden to use the unit in conditions or for uses other than what is indicated in this manual and the MANUFACTURER may not be held responsible for breakdowns, accidents or injuries due to failure to comply with this prohibition.
- Do not repair high pressure pipes with welds.
- It is forbidden to tamper with, alter or modify, even partially, the systems or equipment described in the instruction manual, and in particular, the guards and warning symbols required for personal safety.
- It is also forbidden to operate in manners different from those indicated or fail to perform operations necessary for safety reasons.
- Safety instructions are particularly important, as well as general information contained in this manual.

3.5 **Operating limits**

Operating limits of EKW chillers or heat pump in relation to the outlet water temperature and water dew point.

warning

For details please contact the local Eneren dealer.

It is possible to produce water at temperatures below 5°C and as low as -10°C using glycol solutions that lower the freezing point according to the following table:

Minimum temperature of water produced	5°C	2°C	-1°C	-5°C	-10°C
Percentage by weight of ethylene glycol	0%	10%	15%	25%	30%
Mixture freezing temperature	0°C	-4°C	- 8°C	-14°C	-18°C

Given an equal volumetric flow rate of water, pressure drops will depend on the percentage of glycol, as shown in the following table:

Glycol percentage by weight %	0%	10%	15%	25%	30%
Pressure drop change %	0%	+12%	+21%	+43%	+55%

Operating limits

Thermal carrying fluid	Only water or glycol + water mixture with no more than 35% anti-freezing agent
Max. water operating pressure	3 bars
Max. operating P – High pressure side	32 bar-g
Maximum operating ambient T	45 °C
Minimum operating ambient T	-10 °C
Max. operating P – Low pressure side	20.0 bar-g
Supply voltage	+/- 5 % of rating plate voltage
Max. storage temperature	+ 55 °C
Min. storage temperature	- 20 °C (*)

(*) -10°C in case of inverter or flow measuring instruments



Evaporator and condenser water flow rate

The nominal flow rate is based on a thermal differential of 5° C between inlet and outlet water, in relation to the cooling capacity provided at the nominal water temperatures.

Always refer to the technical selection conditions of the unit. The maximum permitted flow rate relates to the maximum speed in the heat exchanger. A high flow rate causes a greater drop in pressure.

The minimum allowed flow rate is associated to the trigger of the safety devices and to ensure turbulent water flow.

ATTENTION

It is mandatory to install a mechanical filter (to be provided by the customer or available as an option with the unit supply) at the inlet to the hydraulic circuit of the plate heat exchangers, under penalty of immediate loss of the guarantee validity

3.6 General instructions

ATTENTION

- This manual must be read very carefully before transporting, installing, using or servicing the unit.
- This manual must be stored carefully in a place that is known by the user of the unit, managers and operators in charge of transport, installation, use, maintenance, repairs and final dismantling.
- This manual indicates the intended use of the unit and provides instructions regarding transport, installation, assembly, adjustment and use. It provides information regarding maintenance, ordering spare parts, the presence of residual risks and personnel training.
- Please note that the use and maintenance manual is not intended to be a substitute for adequate user experience. For particularly complex maintenance operations, this manual serves as a reminder of the main tasks to carry out for operators having received specific training, for example, in the form of training courses delivered by the manufacturer.
- This manual is to be considered an integral part of the unit and must be stored near the unit in a special container until the unit is eventually demolished. Request a new copy from the manufacturer if it is lost or deteriorated.
- Make sure all the users have thoroughly understood the operating instructions together with the meaning of any symbols on the unit.
- Possible accidents can be avoided by following these technical instructions drafted in accordance with the Machinery Directive 2006/42/EC and subsequent additions.
- In any case, always comply with national safety regulations.
- Do not remove or damage guards, decals, stickers and wording, especially any that are required by law.
- Adhesive labels intended for safer use are applied to the unit, therefore, it is very important to replace them if they become illegible.
- This manual reflects the applicable technology at the time the unit is sold and cannot be considered inadequate due to subsequent updates based on new experience.

- The manufacturer has the right to update the production and manuals, without being obliged to update previous production and manuals, except for exceptional cases.
- Any updates or additions to this use and maintenance manual are to be considered an integral part of the manual and may be requested via the contact phone numbers listed in this manual.
- Contact the manufacturer for further information and to submit any proposals on how to improve the manual.
- If the unit is transferred to a new owner, the manufacturer expects you to please notify the address where to send any manual additions for the new user.

4 SAFETY PRESCRIPTIONS

The following are some general rules useful for ensuring the safety of people who are in contact with the unit.

ATTENTION

It is up to the installer and the owner of the installation site to define the safety and protection devices to be used for unit maintenance operations or in dangerous situations - as well as the emergency procedures to be adopted in the latter case. All this in accordance with current legislation and in conjunction with local rescue units.

4.1 General safety rules

4.1.1 Thoroughly know the unit

The unit must only be used by qualified personnel, who are expected to know the arrangement and function of all controls, instruments, indicators, indicator lights and various data plates.

4.1.2 Wear protective clothing

Each operator must use personal protective equipment such as gloves, headgear, safety goggles, safety shoes, and hearing protection.



ATTENTION

Please also refer to the relevant section in chapter 14 Safety data sheet of refrigerant p. 41.

4.1.3 Use safety equipment

A first aid kit and a fire extinguisher must be placed near the unit.



ATTENTION

Please also refer to the relevant section in chapter 14 Safety data sheet of refrigerant p. 41.

4.1.4 Fire extinguisher and a first aid kit

Check the presence and location of the fire extinguisher. Regularly check that the fire extinguishers are charged and their operating instructions are clearly understood.

It is required to be aware of where the first aid box is kept. Periodically check that the first aid kit is stocked with disinfectants, bandages, drugs, etc.

The personnel must know what to do in the event of a fire. Make sure that emergency help phone numbers are readily available.

In the event of a fire, use a fire extinguisher in compliance with the regulations in force. Contact the fire department.

warning

The owner of the building where the unit is installed must provide the required fire extinguisher.

4.2 General precautions

The Machinery Directive 2006/42/EC provides the following definitions (Annex 1.1.1.1):

DANGER ZONE: any area next to and/or inside a machine, where the presence of an exposed person constitutes a risk for the safety and health of said person.

EXPOSED PERSON: any person found entirely or partially within a danger zone.

OPERATOR: the person (or persons) appointed to install, set up, adjust, maintain, clean, repair and transport the machine.

IF WARNING

 Before carrying out any operation or maintenance on the unit it is mandatory to read and follow the instructions given in the use and maintenance manual. During the actual work, it would be too late: any not recommended



or wrong operation could then cause serious damage to people or property.

- The employer must inform in detail all operators about the risks of accidents and particularly about risks related to noise, required personal protective devices and general accident prevention rules provided by laws or international standards and national standards in the Country of destination of the unit. All operators must comply with the international accident prevention standards and standards in force in the country of destination of the unit. Please be reminded that the European Union has issued some directives concerning the safety and health of workers, among which the directives 89/391/ EEC, 89/686/EEC, 89/654/EEC, 2009/104/EC, 89/656/ EEC, 2003/10/EC, 92/58/EEC and 92/57/EEC that each employer has an obligation to observe and to enforce. In the event that the unit is installed outside the European union, always refer to the regulations in force in the country of installation.
- Before starting any work on the unit, each operator must be perfectly familiar with its operation and its controls, and have read and understood all the information contained in this manual.

ATTENTION

It is forbidden to tamper with or replace parts of the unit unless this has been expressly authorised by the MANUFAC-TURER.

The use of accessories, tools, consumables or spare parts other than those recommended by the MANUFACTURER and/or specified in this manual may be a hazard to operators and/or damage the unit.

Any alteration of the unit not expressly authorised by the MANUFACTURER shall not imply any civil or criminal liability for the manufacturing company.

warning

- It is strictly forbidden to remove or tamper with any safety devices.
- Any installation, ordinary and extraordinary maintenance operations must be carried out with the unit stopped and without power supply.
- Once the unit has been cleaned, the operator must check that there are no worn or damaged parts or parts that are not safely fixed, or if this is the case, ask the maintenance staff to fix the problem. Special attention must be paid to the state of repair of the pressurised pipes or other parts exposed to wear. It must also be ensured that there are no leaks of fluid, or other dangerous substances. In these cases, it is forbidden for the operator to restart the unit before the situation has been remedied. If any of these occurrences are detected, the operator, before leaving the unit unattended, must display a warning sign indicating that maintenance is in progress and it is forbidden to start the unit.
- The use of flammable fluids in cleaning operations is prohibited.
- Periodically check the condition of the data plates and arrange, if necessary, for them to be restored.
- The operator work place must be kept clean, tidy and free from any objects that may limit unhindered movement.
- Operators should avoid operating the device from unsafe, uncomfortable positions that may affect their balance.

- Operators must be aware of possible risks of entrapment and entanglement of clothes and/or hair in moving parts; it is recommended to wear caps over long hair.
- Wearing chains, bracelets and rings can also be dangerous.
- The workplace must be adequately lit for the intended operations. Insufficient or excessively bright lighting can imply safety risks.
- The instructions, accident-prevention rules and warnings contained in this manual must be observed at all times.

4.2.1 Safety information

The units have been designed and built according to the current state of the art and the technical rules currently applicable to fluid chillers and heat pumps and/or fluid chillers with free-cooling exchange intended for cooling water or water and anti-freezing agent mixtures, for housing air conditioning and industrial cooling systems. Compliance with the laws, provisions, prescriptions, orders and directives in force for these machines has been ensured.

The materials and the equipment parts used, as well as the production, quality assurance and control processes meet the highest safety and reliability requirements.

By using them for the purposes specified in this user manual, by operating them with the required diligence and performing accurate maintenance and overhauling in a workmanlike manner, consistent performance and functionality and durability can be ensured.

4.2.2 Accident prevention

The MANUFACTURER will not be liable for accidents, during the use of the unit, due to failure by the user to comply with laws, provisions, prescriptions and regulations applicable to fluid chillers and heat pumps and/or fluid chillers with free-cooling exchange system.

4.2.3 Operational safety

The MANUFACTURER will not be responsible in case of malfunctions and damage if the unit:

- it is used for purposes other than those for which it is intended;
- it is not operated and maintained according to the service standards specified further on in this manual;
- it does not regularly and consistently receive maintenance as prescribed or non-original spare parts are used;
- is modified or some components are replaced without the MANUFACTURER's written authorisation, especially when the effectiveness of the safety systems has been altered or minimised on purpose;
- it is used outside the permissible temperature range.

4.2.4 Residual risk areas

In some areas of the unit there are some residual risks that could not be eliminated during the design phase nor isolated with guards due to the unit's operating characteristics. Each operator must be aware of the residual risks present in this unit in order to prevent any accidents.





- **C.** Danger of pollution due to the presence of refrigerant in the circuit
- **D.** Danger of burns due to the presence of high temperature pipes

warning

In order to avoid the risks listed above it is essentially important to:

- set the control panel according to the manufacturer's instructions;
- to avoid the risk of impact or abrasion in the fan area, cut off the power to the unit before intervening;
- not place metal objects inside the electrical control panel;
- not store flammable materials near the machine;
- not alter any component of the refrigerant circuit;
- not let the machine work outside the limits indicated by the manufacturer;
- dispose of all the materials that make up the machine correctly, use suitable equipment for the recovery of the refrigerant gas (see chapter " Retiring the unit ");
- not touch the internal components during operation without adequate protection.



4.3 Location of safety data plates

4.3.1 Description of the safety symbols



4.4 Maintenance precautions

4.4.1 Tools

Use only tools suitable for safe service and maintenance operations.

Personal injury is prevented by not using worn or damaged, low quality or makeshift tools.

If tools not recommended or modified without authorisation are used, the manufacturer will no longer be liable for damages caused.

4.4.2 Personnel

Ordinary maintenance prescribed in this manual must only be performed by authorised and trained personnel. For the maintenance or overhauling of components not specified in this manual, contact the MANUFACTURER.

4.4.3 Keep the unit clean

Oil and grease stains, misplaced tools or broken pieces are harmful to people as they can cause slipping or falls. Always keep the area where the unit is installed clean and tidy.

Do not use diesel fuel, oil or solvents to clean the unit as the first two leave an oily film that makes it easier for dust to stick, while solvents (even milder ones) damage the paint finish and cause rusting.

If a water jet hits the inside of electrical equipment, in addition to causing contact oxidation, it may cause the unit malfunction.

For this reason, do not use water or steam jets on sensors, connectors or any electrical parts.

4.4.4 Warning plates

Before starting any maintenance operation, turn off the unit. If other people start the unit and operate the control buttons while maintenance operations are being performed, serious injury or even death may result.

To avoid these dangers, before carrying out maintenance, hang caution signs around the unit.

4.4.5 Warnings for inspections and maintenance

Display a sign with the warning: "INSPECTION IN PRO-GRESS" on all sides of the unit.

Check the unit carefully following the list of operations contained in this manual.



4.4.6 Care and maintenance

The cause of damages and accidents is often attributable to wrong maintenance, such as:

- no water in the circuit;
- incorrect percentage of anti-freezing agent in the hydraulic circuit;
- inadequate refrigerant;
- poor cleaning in the unit setting;
- circuit inefficiency (damage to the exchangers, pipe connections, tightening of pipes, screws, etc.).

Carry out maintenance work as required: this is also critical for your own safety.

Never postpone scheduled repairs.

Only assign skilled or authorised personnel to repair tasks. Always observe the following safety rules, even when you are thoroughly familiar with the operations involved:

- always keep the unit and the surrounding area clean;
- before beginning to work, check the perfect efficiency of protective devices;
- make sure that no unqualified or not specially appointed persons enter the unit operating area.



4.5 Precautions in case of refrigerant leakage

In case the unit is charged with an A2L classified refrigerant, (low flammable refrigerant), the unit is provided with one refrigerant leakage sensor inside each compressor box (if present) and inside all separated sections of the electrical box.

The following safety chain is applied: EVENT - ACTION - SIG-NAL

Each sensor is set on two different concentration thresholds. The threshold is depending on refrigerant type, and listed in the table below:

Refrigerant	Classification	Low level threshold	High level threshold
R1234ze	A2L	500 ppm	900 ppm

The following image and table describe the safety chain EVENT - ACTION - SIGNAL



EVENT	ACTION	SIGNAL
Compressor box fan alarm fault	Electrical box fans activation (when Tair <= T limit)	Dedicated warning signal
Underpressure inside electrical panel alarm/fault	Compressor box fans activation	Dedicated warning signal
Low level alarm	Compressor box fans activation Electrical box fans activation (when Tair <= T limit)	Dedicated warning signal
Refrigerant sensor fault	Switch off all the unit (electrical supply still present)	General serious alarm + Dedicated serious alarm
High level alarm	Switch off all the unit (electrical supply still present)	General serious alarm + Dedicated serious alarm

Refrigerant safety devices are not active when the unit is not powered: risk of refrigerant presence in the electrical panel. Check any refrigerant leaks with a suitable device before starting the unit.

WARNING

Follow the instructions below in the event of a refrigerant leak signal from the sensors installed on the machine or possibly present near the machine:

- In case of low level alarm, contact technical support.
- Do not stand in the vicinity of the machine.

It is necessary to have a remote refrigerant alarm signal, so that it is not necessary to approach the machine in the event of an alarm. This remote signal can be performed:

- Via remote display, available as an option and available at any time by contacting the After-sales center.
- By reading the unit alarms via remote communication (e.g. via Modbus or Ethernet) and by remotely setting up

a specific danger signal far from the unit to activate in the event of an alarm.



In case of serious alarm:

- Remove voltage from the unit, keeping the dedicated alarm signal via wired contact active (see wiring diagram).
- Call a service centre for assistance.

Technical assistance must:

- Well ventilate all the closed compartments of the machine well for at least 5 minutes, before energizing.
- Check the cooling circuit for leaks.
- Once the circuit is set up and the refrigerant charge is restored, close the compartments and power up the chiller, if there are no alarms, the machine can be restarted.



5 DESCRIPTION AND TECHNICAL DATA

5.1 Series

5.1.1 Heating only

The EKW series of water-condensing heat pumps includes this range of models:

 EKW K water-water heat pump - only heating - high User water temperatures. EKW heat pumps are available in versions with different acoustic designs ("S" standard , "L" low noise).

The EKW units are developed in a completely enclosed version for a low noise operation making it possible to install them in non-segregated environments. They are characterized by a rounded shape contributing to an attractive appearance.

The EKW units can be identified by the following symbol:



5.1.2 Structure

All EKW units have a self-supporting base. The unit features an exclusive design which lends it an at-

tractive appearance. This characteristic, together with the extensive use of soundproofing material inside the compartment – an optional feature of low-noise models – reduces noise to exceptionally low levels.

5.1.3 Operating limits

5.1.3.1 Operation restrictions diagram

IF WARNING

The choice of different available options can lead to changes in the corresponding envelope.

Please refer to the manual of the specific selected configuration.





5.1.3.2 Anti-vibration rubber devices

The units EKW can be equipped with the spring-type anti-vibration devices.

ATTENTION

For the exact position of each foot, refer to the attached dimension drawing.



CODE		D 60-95
A	mm	95
В	mm	40
С	mm	M-16
Н	mm	45
MAX LOAD	daN	1200
f	mm	8







CODE		BSB150	BSB180	BSB180
A	mm	155	180	180
В	mm	49	67	67
С	mm	M-16	M-20	M-20
D1	mm	176	149	149
D2	mm	188	163	163
E	mm	218	192	192
F	mm	14.5	14.5	14.5
WEIGHT	g	1818	3800	3800
LOAD	kg	950	1750	2100
HARD- NESS		50 Sh	50 Sh	60 Sh

ATTENTION

The values shown are approximate figures only - due to elastomer hardness tolerance range and other factors; they can be reassessed in case of actual need.





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5.1.3.3 Anti-vibration spring devices

The units EKW can be equipped with the spring-type anti-vibration devices shown below.

ATTENTION

For the exact position of each foot, refer to the attached dimension drawing.



Frame	Spring anti-vibration device
1	EMCV 305
2	EMCV 305
3	EMCV 305
3+	EMCV 305
4	EMCV 305
5	EMCV 305
6-7	EMCV47



Frame	Spring anti-vibration device
F1	RF411-Z220-124
F2	RF411-Z220-124
F3	RF411-Z220-124
F4	RF412-Z220-X108
F5	RF412-Z220-X108
F6	RF412-Z220-X108
F4S	RF411-Z220-124
F5S	RF411-Z220-124
F6S	RF411-Z220-124











5.1.4 **Refrigerant circuit**

The entire cooling circuit is built in the manufacturer factory using only components of the finest quality brands and processes conforming to the specifications of Directive 97/23 for brazing.

The heat pumps have a single or dual circuit and use only components supplied by leading international manufacturers.

Compressor: from 2 to 4 scroll compressors optimized for high condensing and evaporating temperature.

Evaporator: plate evaporator, double circuit refrigerant side and single circuit water side, optimized for maximize the heat transfer capacity (pure countercurrent of the flows) . Insulation included on the delivery. Hydraulic connection on water side. Electronic expansion valve for each circuit.

Security device: High pressure switch with fixed set and manually restart, low pressure switch with fixed set and semiautomatic restart. Paddle flow switch. Compressors thermal protection (magnetothermal as option).

Electrical panel: PLC controller, a power supply unit with door lock switch. Circuit breaker protection for auxiliary units. Protection rating IP55.





warning

The manufacturer reserves the right to apply changes to the diagram for product improvement. Always refer to on-board documentation.



6 INSPECTION, TRANSPORT AND POSITIONING

6.1 Inspection

Upon receiving the unit, check its integrity: the machine has left the factory in perfect condition; any damage must be immediately reported to the forwarder and noted on the Delivery report before signing it.

IF WARNING

Eneren or its Agent must be promptly notified of the entity of the damage.

IF WARNING

The Customer must submit a written report describing any significant damage.

6.2 Lifting and Conveyance

ATTENTION

During the unloading and positioning of the unit, be extremely careful to avoid bumps and knocks or sudden movements.

Factory handling must be carried out with the utmost care, avoiding using any machine components for support.

The unit shall be lifted using seamless pipes - ref. EN10255 S195T - in steel $\emptyset 1\frac{1}{2}$ " GAS at least 3 mm thick (optional) inserted into the round holes provided in the base rails (a) and marked with the special stickers.

The pipes that must protrude by at least 300 mm from each end will be harnessed with identical ropes, secured to the lifting hook.

ATTENTION

Provide fasteners at the ends of the pipes in order to avoid that, due to the applied weight, the rope slips off the pipe.

C WARNING

Use ropes or belts whose length exceeds the machine height and place spacer boards and bars on the top of the unit to avoid damaging the sides and upper part of the unit itself.

ATTENTION

In all lifting operations make sure that the unit is securely anchored in order to prevent accidental falls or overturning.



6.3 Unpacking

ATTENTION

The unit packaging must be carefully removed avoiding possible damage to the machine.

IF WARNING

Different packing materials are used: wood, cardboard, ny-lon, etc.

It is recommended to keep them separately and deliver them to suitable waste disposal or recycling facilities in order to minimize their environmental impact.

6.4 Siting

You should bear in mind the following aspects when choosing the best site for installing the unit and the relative connections:

- Size and origin of water pipes;
- power supply location;
- accessibility for maintenance or repairs;
- solidity of the supporting surface

All models belonging to the EKW series are designed and built for indoor installation As special care has been taken in the sound insulation and sealing of the components and hot parts in general, they need not be installed in dedicated rooms.



IF WARNING

It is advisable to place a rigid rubber strip between the base frame and the supporting surface.

7 INSTALLATION

7.1 Installation clearance requirements

In the case of units with a remote condenser, the plumbing and cooling connections are provided on the top of the unit. This allows the unit to be placed practically against the rear wall. Only for the highest size there are hydraulic connections on the rear wall.

ATTENTION

It is essential to ensure the following service spaces:

- back side: min. 0 metres (except the 2 last sizes);
- electric control board side: min. 1,0 metres to guarantee access for inspection and/or maintenance of cooling components;
- lateral side: min. 0,5 metre for extraordinary maintenance;
- top side: min. 1.0 metre for adequate connection to the external hydraulic and cooling piping.



7.2 General guidelines for plumbing connections

When you are getting ready to set up the water circuit for the evaporator you should follow the directions below and in any case make sure you comply with national or local regulations (use the diagrams included in this manual as your reference).

Connect the pipes to the chiller using flexible couplings to prevent the transmission of vibrations and to compensate thermal expansions.

For the types and size of the water and cooling connections [versions with remote condenser only] refer to the table of technical data.

🕼 WARNING

It is recommended to install the following components on the pipes:

- temperature and pressure indicators for routine maintenance and monitoring of the unit. Checking the pressure on the water side will enable you to verify whether the expansion tank is working efficiently and to promptly detect any water leaks within the equipment;
- traps on incoming and outgoing pipes for temperature measurements, which can provide a direct reading of the operating temperatures. Temperature readings can in any case be obtained from the microprocessor installed on the unit;
- regulating valves (gate valves) for isolating the unit from the water circuit during maintenance work;
- metal mesh filter (incoming pipes), with a mesh not to exceed 1 mm, to protect the exchanger from scale or impurities present in the pipes. This prescription is particularly important at first start-up;
- air vent valves, placed on the higher parts of the water circuits to bleed the air. The internal pipes of the unit are fitted with manual air vent valves to bleed the unit: this operation can only be carried out when the unit is disconnected from the power supply;
- drainage valve and, where necessary, a drainage tank for emptying out the equipment for maintenance purposes or when the unit is taken out of service at the end of the season.

7.3 Water connection to the evaporator

ATTENTION

It is of fundamental importance that the incoming water supply is hooked up to the connection marked "Water Inlet".

Otherwise the evaporator would be exposed to the risk of freezing since the antifreeze thermostat would not be able to perform its function; moreover the reverse cycle would not be respected in the cooling mode.

The dimensions and position of plumbing connections are shown in the dimension tables in this manual.

ATTENTION

- The water circuit must be set up in such a way as to guarantee that the nominal flow rate of the water supplied to the evaporator remains constant (+/- 15%) in all operating conditions.
- A standard feature of EKW units is a device for controlling the flow rate (paddle type flow switch) in the water circuit in the immediate vicinity of the evaporator.
- Any tampering with said device will immediately invalidate the warranty.
- It's mandatory the metallic filter installation with mesh less than 1mm, on the inlet water pipe.
- It is strongly recommended to install a safety valve in the water circuit. In the event of serious equipment faults (e.g. fire) it will enable water to be drained from the system, thereby preventing possible bursts. Always connect



the drain outlet to a pipe with a diameter at least as large as that of the valve opening and direct it toward an area where the discharge of water cannot harm people.

When making the plumbing connections, make sure there are no open flames in proximity to or inside the unit.

The compressors' action is intermittent, as the refrigeration requirements of the user may not match the supply from the unit EKW.

In systems containing little water, in which the thermal inertia is low, verify that the water content of the delivery section (to users) satisfies the equation below:



The following figure shows the integrated and balanced effect of the storage tank. Its function helps ensure accurate temperature control according to the environmental parameters of the connected groups.



7.4 Procedure for filling the tank (of the system)

ATTENTION

The tank is not designed to withstand a negative pressure greater than -0,15 bar. For this reason, make sure that the suction pressure of the pump, where the expansion tank is positioned, is always greater than 0,5 bar with the pump running: this also helps reduce the risk of pump cavitation.

It is essential that the installer follows and verifies point by point the procedure indicated below, to prevent any risk of implosion of the tank or cavitation in the pump:

- A. Empty the expansion tank until the pressure is 0,5 Bar;
- B. Charge the system and pressurize it until about + 1 Bar in suction, pump side (with pump not working);
- C. Allow air to escape from the system;
- **D.** Check the suction pressure of the pump (about 1 Bar) and start the system;
- **E.** Stop the pump after 15-30 minutes and repeat from point c) until you don't hear noises, caused by air still present in the system, anymore.

7.5 Safety management high pressure side

On each refrigerant circuit, according to the volumetric capacity of the installed compressors, the PED category of the machine and the refrigerant circuit configuration, there are safety devices for the refrigeration circuit as prescribed by the 97/23 (PED) regulation.

In particular, this regulation requires designing to be carried out by referring to the technical standard that is closest to the type of item produced.

In the case of machines designed for air conditioning or cooling of liquids, the UNI EN 378-2 standard is referred to.

This standard requires the installation on the high pressure side of each cooling circuit of two safety vent valves connected to a changeover valve, set to trip at the maximum pressure PS that can be reached for the high pressure side. Another vent valve shall be installed on the low pressure side of each cooling circuit and set at the relative maximum pressure PS that can be reached on that side.

The high and low pressure sides have a maximum pressure PS defined by the pressure limit of the machine components, this pressure cannot be reached during normal machine operation.

IF WARNING

For more details, refer to the refrigerant circuit diagram of the unit.

During normal use, the high pressure at the outlet of the compressor is limited by the high pressure switch, set at the maximum operating pressure of the same compressor, that depends on the model of the unit and is lower than PS x 0.9, in compliance with the standard UNI EN 378-2.

8 ELECTRICAL CONNECTIONS

8.1 General description

Before carrying out any operation on electrical parts, make sure that there is no applied voltage.

Check that the mains electricity supply is compatible with the specifications (voltage, number of phases, frequency) shown on the unit rating plate.

Power is connected via a more neutral three-core cable and earth cable or unipolar cables (one per phase) plus earth according to the minimum sections indicated in the wiring diagram, an integral part of the documentation supplied with the machine and whose identification code also appears on the characteristic data plate located inside the compressor compartment.

ATTENTION

The size of the cable and line protections must conform to the specifications provided in the wiring diagram.

The supply voltage may not undergo fluctuations exceeding $\pm 5\%$ and the unbalance between phases must always be below 2%.

WARNING

The unit must operate within the above values, or the warranty will be invalidated.

Carry out the electrical connections following the wiring diagram provided with the unit, as well as current regulations.

The electrical connections and the preliminary checks:

- Open the main disconnecting switch;
- Introduce the power cable 400/3/50+N through the hole provided in the base of the panel (after first removing and making a hole in the aluminium square based on the diameter of the electric cable) and secure it with a cable gland;
- Connect the power supply and earthing wire to the terminals of the main switch;
- Open the fuse holders F1 and F2 (or Q1 and Q2 for the motor protection) of the compressors to check that these do not run in the incorrect direction due to the phase sequence;
- Apply voltage by turning the main switch (IG) to ON;
- Check the phase sequence relay situated in the middle of the electric control board to make sure the phases are in the right sequence R-S-T; the green indicator light should go on: if it does not, disconnect the power supply to the unit from the external distribution board, invert two phases and repeat the check. IN NO CASE SHOULD YOU TAMPER WITH THE WIRING DOWNSTREAM FROM THE MAIN SWITCH since this may alter the correct sequence of other devices, e.g. pump(s);
- Open the fuse holders F1 and F2 of the compressors;
- Close the control panel.

Earthing is mandatory by law. The installer must provide for the connection of the earthing cable (yellow-green cable) to the special earth terminal located in the electrical control panel.

The power supply to the control circuit is shunted from the power line through an insulating transformer situated on the electric control board.

The control circuit is protected by suitable fuses.

All the units are usually equipped with a phase sequence relay which ensures the correct phase sequence, necessary for the machine to be fully functioning before allowing the compressor(s) to start.

8.2 Flow switch of water side

All the EKW units are fitted with a paddle flow switch to protect the evaporator as standard, this is installed in series with the water and electrical circuits and wired.



8.3 Remote control

If you wish to include a remote control for switching the unit, you must remove the bridge between the contacts indicated in the wiring diagram and connect the remote ON/OFF control to the terminals themselves [see annexed wiring diagram].

WARNING

All the remote controls use a very low voltage (24 Vac) supplied by the insulating transformer situated on the electrical panel.

8.4 Remote summer/winter switching

If you wish to include a remote control for summer/winter switching of the unit, you must remove the bridge between the contacts indicated in the wiring diagram and connect the remote control to the terminals themselves [see annexed wiring diagram].

The switching modalities are different according to the type of microprocessor control, i.e. whether it is the basic or advanced type: the detailed instructions are below (see relevant wiring diagram) and in the microprocessor operating manual, an integral part of the documentation supplied.





9 START-UP

9.1 Preliminary checks

- Check that all the valves in the cooling circuit are open (liquid line).
- Check that the electrical connections have been made properly and that all the terminals are securely tightened. This check should also be included in a periodic sixmonth inspection.
- Check that the voltage at the RST terminals is 400 V ± 5% and make sure the yellow indicator light of the phase sequence relay is on. The phase sequence relay is positioned in the middle right part of the electrical panel; if the sequence is not duly observed, it will not enable the machine to start.
- Make sure that there are no refrigerant leaks due to accidental impacts during transport and/or installation.
- Check the power supply to the crankcase heating elements, where present.
- To ensure the correct operation of the heating elements, check that the lower part of the compressors is hot and in any case, that it is at a temperature 10 - 15°C higher than ambient temperature.
- Check that the plumbing connections have been properly made according to the indications given on the plates to be found on the unit itself (proper inlet and outlet connections).
- Make sure that the water circuit is duly bled to completely eliminate the presence of air: fill the circuit gradually and open the air vent valves on the top part, which the installer should have set in place.

WARNING

The insertion of the resistors must be made at least 12 hours before, and takes place automatically closing the main switch. They are intended to elevate the T oil sump limiting the amount of refrigerant dissolved in it.



The diagram above illustrates a specific property [Charles' Law] of gases. which are more soluble in liquids as the pressure increases but less soluble as the temperature increases.

If the oil in the sump is held at a constant pressure, an increase in temperature will significantly reduce the amount of refrigerant dissolved in it, thus ensuring that the lubricating function desired is maintained. A slight foaming [1-5 mm] of the oil at start-up (pressure drop => decrease in solubility %) is physiological and will not affect the reliability of the system.

9.2 Start-up

Before starting the unit, turn the main switch on, select the operating mode desired from the control panel [red button = **heating**, green button = **cooling**] and press the "ON" button on the control panel.

The group will start if an enabling signal is received:

- By the safety devices of the water circulation pump/s;
- By the flow switch (or differential pressure switch);
- By the T sensor measuring the temperature of the water returning from the system [chiller inlet];
- And no alarms have been triggered.

Starting up:

- Check that all external cocks of the water circuit are open and water flows properly (the flow alarm should not be triggered);
- Put the main switch on the ON position;
- The pump will start immediately;
- After 60 seconds the compressor will start;
- Check the temperature difference at water level (12-7°C to be checked with a thermometer on the unit inlet and outlet pipes);
- Check that there are no leaks on the refrigerant side and water side.

IF WARNING

If the unit fails to start up, check whether the set point has been set at the rated calibration values.

ATTENTION

You should not disconnect the unit from the power supply during periods when it is inoperative but only when it is to be taken out of service for a prolonged period (e.g. at the end of the season). To turn off the unit temporarily follow the directions provided in the section 9.6 Group stop p. 31.

9.3 Inspections during operation

Check the correct phase sequence by means of the phase sequence relay provided in the electrical control panel: if it is not correct, switch off voltage and reverse two phase wires at unit inlet.

ATTENTION

Never alter the internal electrical wiring, otherwise the warranty will be voided.



IF WARNING

All three-phase on-board devices: compressor, water pump, fans (in some versions), have a mandatory rotation direction and have been factory-synched with each other.

Check that the temperature of the water entering the evaporator (returning from the system) is close to the setpoint value entered.

The time required to reach steady state conditions depends on the starting conditions, the system size and the load conditions.



9.4 Refrigerant charge checks

- After a few hours of operation, check that the liquid indicator (a) has a green crown: a yellow colour indicates the presence of moisture in the circuit. In this case, the circuit must be drained by qualified personnel.
- Large quantities of bubbles should not appear through the liquid level indicator. A constant passage of numerous bubbles may indicate that the refrigerant level is low and needs to be topped up.
- A few minutes after the compressors have started up, check that the end-of-condensation temperature shown on the pressure gauge (refer to the pressure gauge scale for the refrigerant in use, marked with the initials D.P. -Dew Point) is about 3-8°C (depending on the type of unit and charging conditions) higher than the temperature of the water leaving the condenser.

Ensure that overheating of the refrigerating fluid is between 5 and 8°C; to do this:

- **A.** detect the temperature indicated by a contact thermometer placed on the compressor intake pipe;
- **B.** detect the temperature indicated on the scale of a pressure gauge also connected at the intake end; refer to the scale of the pressure gauge for the refrigerant in use marked with the initials D.P. (Dew Point).

The degree of superheating is given by the difference between the temperatures thus determined.

Ensure that undercooling of the refrigerating fluid is between 4 and 6°C; to do this:

A. detect the temperature indicated by a contact thermometer placed on the compressor outlet pipe;

B. detect the temperature indicated on the scale of a pressure gauge connected to liquid intake at the condenser outlet; refer to the scale of the pressure gauge for the refrigerant in use - marked with the initials B.P. (Bubble Point).

The difference between the temperatures determined in this way indicates the undercooling value.



ATTENTION

All EKW units are charged with HFC R134a or HFOR1234ze: any top-ups must be made by specialised personnel using the same type of refrigerant, exclusively in the liquid phase.

🕼 WARNING

The R134a refrigerant requires "POE" polyolester oil of a type approved by the compressor manufacturer. For no reason should mineral oil be introduced in the circuit.

9.5 Expansion valve

An electronically controlled expansion valve is installed as a standard feature on all EKW units.

This device, if correctly parameterized and controlled by the software, can make the operation of the refrigeration circuit highly effective, which has as a final effect that of decreasing the power absorbed by the system.

When a sudden change in the thermal load occurs, a traditional expansion valve is designed to be in a transient state for 2÷3 minutes before reaching its equilibrium condition.

- Example:
- One compressor switches off
- Evaporation temperature increases
- Overheating decreases
- Valve closes
- Refrigerant flow decreases
- Refrigerating power decreases
- Evaporation temperature decreases
 ...and so on...





Proactive action of an Electronic Expansion Valve

In the event of a compressor on/off request:

- The electronic driver pre-positions the valve at a point very near the final equilibrium point;
- The state of balance is quickly reached by small adjustments;
- The electronic expansion valve becomes an active, rather than passive, component within the system;
- The transient time is greatly reduced;
- Overall the system is more efficient, with higher EERs and therefore greater savings.



9.6 Group stop

WARNING

The group is stopped by pressing the "**OFF**" key on the front panel or by acting on the main disconnector, or by acting on the special controls of the LCD user interface.



To stop the unit do not disconnect it using the main switch: this device must only be used to disconnect the unit from the power supply without current flow, i.e. when the unit is switched **OFF**.

Moreover, if you completely disconnect the unit from the electricity supply, the crankcase heating elements will receive no power, thereby jeopardising the integrity of the compressor the next time the unit is started.



10 SETTING OPERATING PARAMETERS

10.1 General description

All the safety devices are set and tested in the factory before the unit is dispatched.

After the unit has been in service for a reasonable period of time you can perform a check on the operating and safety devices. The settings are shown in Table -Setting of safety - control devices .

All service operations on the control equipment must be carried out **EXCLUSIVELY BY QUALIFIED PERSONNEL**: incorrect calibration valuescan cause serious personal injuries and damage the unit.

IF WARNING

Many of the operating parameters and system settings are configured by means of the microprocessor control and are protected by passwords.

» Setting of safety - control devices

Control device	Unit of measurement	Start up	Differential	Re-activation
Antifreeze thermostat	°C	+4	1	Semi-automatic
Maximum pressure switch IV PED	bar-g	32	8	Manual
Maximum admissible PS	bar-g	HP32 / LP20		
Minimum pressure switch	bar-g	0.3 / 0.5*	+0.7	Semi-automatic
Minimum time between two starts on the same compressor	S	450		
Flow switch alarm delay	S	15 start up / 5 running		
Low pressure alarm delay	S			

* Valid for R134a. The double option depends on the specific model.

10.2 Maximum pressure switch

The maximum pressure switch stops the compressor when its outlet pressure exceeds the preset value.

ATTENTION

Do not attempt to change the setting of the maximum pressure switch. Should the latter fail to trip in the event of a pressure increase, the pressure relief valve will open.

ATTENTION

If, during this operation, the safety device is not activated, the second pressure switch in a cascade configuration or a second protection system will operate by switching off the unit; in any case, however, always be sure to be ready to turn the unit off as indicated in section 9.6 Group stop p. 31 - see also the paragraph 7.4 Procedure for filling the tank (of the system) p. 26.

Resetting the high pressure switch must be done manually and only when the pressure has fallen below the value indicated by the set differential value (see Table -Setting of safety - control devices).

10.3 Minimum pressure switch

The reset of the low pressure switch is semi-automatic and can only occur when the pressure has risen above the value indicated by the set differential (see Table -Setting of safety - control devices).

10.4 Service thermostat

This function starts and stops the compressors according to the demand for chilled water, as determined by a sensor placed at the evaporator inlet [water returning from the system].

IF WARNING

For further details, refer to the microprocessor control section in the manual.

10.5 Anti-freeze thermostat function

The anti-freeze sensor situated at the evaporator outlet detects the presence of excessively low temperatures and stops the unit.

Together with the flow switch and low pressure switch, this device protects the evaporator from the risk of freezing as a result of faults in the water circuit.

🞯 WARNING

For further details, refer to the microprocessor control section in the manual.

10.6 Anti-recycle timer

The function of the timer is to prevent excessively frequent compressor starts and stops.

This device imposes a minimum time lapse of 450 seconds between two compressor starts.

🕼 WARNING

For further details, refer to the microprocessor control section in the manual.

ATTENTION

Never change the delay time set by default: incorrect values could cause serious damage to the unit.

10.7 Refrigerant sensors (if "A2L-ready" and "R1234ze" refrigerant options present)

When the unit is provided with A2L-ready or R1234ze refrigerant options, refrigerant sensors are installed in all compressor boxes and in all separated sections of the electrical box.

The refrigerant sensor is composed by:

- A main and a remote control board
- One sensor cartridge for each control board (only for "R1234ze" refrigerant option)

Pay attention that in the "A2L-ready" configuration the refrigerant sensor cartridge is not present. For this reason, the unit can't be operated with R1234ze refrigerant charge. If needed to charge the unit with R1234ze refrigerant, please see chapter 11.7 Substitution of R134a with R1234ze refrigerant p. 36.

For the units provided with R1234ze refrigerant, the unit is equipped with sensor cartridges.

In addition to the gas sensor element and the measuring amplifier, the sensor cartridge also contains a processor for measured value processing. All data and measured values of the sensor element are stored in the processor fail-safe and are transmitted digitally via the digital interface to the control board.

The control board functions are communication and supply of the gas sensors.

In normal operating mode (measuring mode) there are no faults present, the gas concentration of the active sensors is continuously polled and checked for plausibility.

The device continuously monitors itself, the measurement signal, the alarm relay and the communication to the sensor head.

When the alarm evaluation is activated, the gas signal is checked with each measurement cycle, if \geq or \leq alarm threshold and if exceeding, the alarm LED and the alarm relay are triggered. If the value falls again below the alarm threshold minus the set hysteresis, the alarm is automatically cancelled.





11 ROUTINE MAINTENANCE AND CHECKS

11.1 Warnings

For safety reasons, adequate measures and precautions must be taken regarding installation, to prevent ambient temperature - when the machine is switched on or off - exceeding 50°C.

- All the operations described in this chapter MUST AL-WAYS BE PERFORMED BY QUALIFIED PERSONNEL.
- Before carrying out any work on the unit or accessing internal parts, make sure you have disconnected it from the mains electricity supply.
- The compressor delivery pipe and upper part reach a maximum temperature of 110°C.
- Be very careful when operating nearby with the unit in operation.
- For the safety of the maintenance staff in charge of the groups EKW, it is essential to switch off the unit from the main switch before carrying out maintenance operations.



11.2 General description

It is a good idea to carry out periodic checks to ensure that the unit is working properly:

- Check the efficiency of all the control and safety devices as previously described.
- Check the terminals on the electrical panel and compressor terminal boards to ensure that they are securely tightened. The contacts of the fuses must be periodically cleaned and replaced whenever they show signs of deterioration.
- Check the refrigerant level by means of the liquid level indicator (every 6 months).
- Check the oil levels through the windows provided on the compressor crankcases (every 6 months).
- Check the water circuit for leaks (every 6 months).
- Check the filling of the hydraulic circuit, by venting it from the valves placed at the highest points.
- Check the efficient operation of the flow switch or differential pressure switch.

- Check the crankcase compressor heater, where present.
- Clean the external metal filters in the hydraulic lines.
- Check the humidity indicator on the liquid level indicator (green = dry, yellow = humid); if the indicator is not green as shown on the indicator sticker, replace the filter (every 6 months).
- Check that no unusual noise is emitted by the machine (every 6 months) and in particular, that there are no vibrations and/or beating.

IF WARNING

If the unit is to remain inactive for a long period of time, discharge the water from the piping and from the heat exchanger.

This operation is essential if during the time the unit is out of service ambient temperatures below the freezing point of the liquid used are expected (typical seasonal operation).

11.3 Refrigeration circuit repairs

ATTENTION

While performing repairs on the cooling circuit or maintenance work on the compressors, make sure the circuit is left open for as little time as possible.

Even short exposure times of the ester oil to ambient air will cause the absorption of large amounts of moisture by the oil with the resulting formation of weak acids.

If the system has to be drained, always recover the refrigerant present in the circuit using suitable equipment; the refrigerant should be handled exclusively in the liquid phase.

If the refrigeration circuit has been repaired, the following operations must be carried out:

- leak test;
- refrigeration circuit vacuum and drying cycle;
- refrigerant charge

IF WARNING

If the system has to be drained, always recover the refrigerant present in the circuit using suitable equipment; the refrigerant should be handled exclusively in the liquid phase.

During the pressurisation phase, do not exceed the pressure setting of the safety valves; otherwise you will cause the latter to open.

11.4 Leak test

Fill the circuit with anhydrous nitrogen supplied from a tank with a pressure-reducing valve until the pressure rises to 10 bar.

ATTENTION

During the pressurisation phase, do not exceed the pressure setting of the safety valves; otherwise you will cause the latter to open.

The presence of any leaks must be determined using special leak detectors.

IF WARNING

Should any leaks be detected during the test, empty out the circuit before repairing the leaks with suitable alloys.

Do not use oxygen in the place of nitrogen as a test agent, since this could cause a risk of explosion as well as the certainty of extensive oxidisation in high-temperature areas.

11.5 High vacuum and refrigeration circuit drying

To obtain high vacuum in the refrigerant circuit, it is necessary to have a pump capable of generating a high degree of vacuum, at least 15 Pa of absolute pressure, with a capacity of 10 mc/h.

If this pump is available, normally one draining only should be controlled to reach the absolute pressure of 15 Pa.

When a suitable vacuum pump is not available or when the circuit has been open for long periods of time, it is strongly recommended to follow the triple draining method.

This method is also indicated when there is moisture in the circuit.

The vacuum pump should be connected to the inlets. The procedure to be carried out is as follows:

- Drain the circuit to an at least 35 Pa absolute pressure: at this point, introduce nitrogen in the circuit up to a pressure of about 1 bar.
- Repeat the operation described in the point here above.
- Repeat the operation described in the point here above for the third time, now trying to achieve the hardest possible vacuum condition.

With this procedure it is possible to easily remove up to 99% of the pollutants.

11.6 Refrigerant charge

It is recommended to read the safety data sheet (MSDS) before using the refrigerant.

TOXICITY

The expected refrigerants can be used safely in all applications for which they have been designed, based on data compiled by the "Program for Alternative Fluorocarbon Toxicity Testing" (PAFT1).

DROPS

The area must be immediately evacuated if there is a constant leak of refrigerant gas.

Vapour concentration is higher at floor level, limiting the availability of oxygen.

After evacuation, it is necessary to ventilate the area with fans or blowers to ensure air circulation at floor level.

FLAMMABILITY

In accordance with the standard 34 ASHRAE, the R134a is classified as non-flammable at a pressure of 1 atm (101.3 kPa) and at 18° C.

Refrigerant R1234ze is classified in the A2L safety group, i.e. mildly flammable at 1 atm pressure (101.3 kPa) and 18°C.

CATEGORY

The refrigerant is a non hazardous category II fluid.

 Connect the tank of refrigerant gas to the male 1/4 SAE inlet situated on the liquid line after discharging a little gas to eliminate air in the connection pipe.



- Carry out the charging operation with the refrigerant in liquid form until you reach 75% of the total charge.
- Then connect to the intake on the suction line and complete liquid charge loading until no more bubbles appear on the liquid viewer and the operating values are reached that are indicated in the paragraph "9.4 Refrigerant charge checks p. 30".

ATTENTION

- A unit that was originally charged with refrigerant in the factory cannot be charged with other refrigerants.
- The EKW units can be charged with the refrigerants R134a, R1234ze.
- If the (mildly flammable) R1234ze is used, it is recommended to provide all the safety devices required by law during installation. In case of indoor installation, contact the manufacturer.

The law implementing the regulations [reg. EEC 2037/00] which govern the use of ozone-depleting substances and greenhouse gases bans the dispersal of refrigerant gases in the environment and requires whoever is in their possession to recover them and, at the end of their useful life, either to return them to the dealer or take them to a suitable waste disposal facility.

The refrigerants, although not harmful to the ozone layer, is listed among the substances responsible for the greenhouse effect and must therefore be used in compliance with the above obligations.

ATTENTION

Therefore, special care should be taken when carrying out maintenance work to minimise refrigerant leaks.

11.7 Substitution of R134a with R1234ze refrigerant

In the units provided with A2L-ready option, it is possible to substitute the R134a refrigerant with the new generation refrigerant R1234ze.

All the actions connected to the refrigerant substitution must be performed by authorized technicians, who will:

- certify the correct execution of the charging process;
- check for the correct start-up and operation of the refrigerant sensors;
- provide a new silver label to replace the old one.

Please contact Eneren Support Team to organize the substitution process.

11.8 Refrigerant sensors (if "A2L-ready" and "R1234ze" refrigerant options present)

It is obligatory to perform maintenance regularly in order to maintain safety, measuring and warning functions of the device. The maintenance includes visual, functional and system inspections and must only be carried out by appropriately qualified personnel.

When carrying out maintenance and repair work according to the user manual, only use original spare parts from MSR-Electronic. Repairs or changes of the warning devices not complying with the maintenance manual or carried out by unauthorized persons can affect proper equipment and safety features and always result in a termination of the manufacturer's warranty and certificates.

For regular maintenance und calibration of the sensor by trained technicians we recommend contacting Technical Support.

According to EN 45544-4, inspection and service has to be executed at regular intervals. The maximum intervals have to be determined and observed by the person responsible for the gas warning system according to the legal requirements. It is recommended to apply the inspection and maintenance intervals as prescribed in the general regulations of the gas measuring technique like EN50545, VDI-2053, EN 60079-29-1 etc. The inspection interval normally is three months.

During inspection it has to be checked in particular:

- Maintenance / calibration interval not exceeded;
- Visual inspection of the device including cable for damage, vandalism etc;
- Remove dust deposits etc. with a dry cloth, especially at the gas inlet;
- The filter at the gas inlet has to be replaced if extremely dirty.

Calibration of the sensor cartridge during commissioning/ inspection is only required if the calibration date is no longer current.

When the calibration period exceeds, it is recommended to contact Technical Support to have a new sensor cartridge.

11.8.1 Change of sensor cartridge SC2 on sensor board MSR WSB2 (only if R1234ze refrigerant option selected)

Products involved

- SENSOR BOARD WSB2, Code HF11000741 SENSORE GAS MSR;
- SCHEDA BASE WSB2 REMOT CARD Code HF11000742 SENSORE GAS MSR;
- **3.** SCHEDA REMOTA RB2 SENSOR CARTRIDGE SC2, following Codes for different refrigerants:
- A. SENSORE GAS MSR, CARTUCCIA R1234ZE HF11000743;
- B. SENSORE GAS MSR, CARTUCCIA R410A HF11000988;
- C. SENSORE GAS MSR, CARTUCCIA R452B HF11000951;
- D. SENSORE GAS MSR, CARTUCCIA R513A HF11000786;
- E. SENSORE GAS MSR, CARTUCCIA R454B HF11000950

Attached documentation

GA_WSB_02, Sensor board manual Db_SC2_Freon, Cartridge Manual

General information

ATTENTION

The Cartridge needs to be changed every 12 months

Once the cartridge expired the sensor will stop the unit in alarm

Keep in mind to exchange the cartridge before it expires



IF WARNING

The expired cartridge can be recalibrated up to 4-5 times.

The manufacturer at the moment doesn't provide this service but you need to contact the supplier or find instruction on the manual.

Exchange of sensor cartridge / instructions

Instead of the on-site calibration, the used (SC) can be easily and conveniently replaced by a calibrated one.

The communication of the local bus (Sensor Cartridge <> BSB) is continuously monitored during operation and results in an immediate error message on the gas controller in case

of fault or interruption. When replacing the sensor unit, the communication of the local bus is also interrupted when unplugging the SC connector which leads to an immediate triggering of the error message.

The local bus communication is automatically established and tested. At the same time the gas type and the measuring range of the "new" SC are compared with the data stored in the BSB. If they match and the communication is correct, the error message will be automatically acknowledged at the Gas Controller.

ATTENTION

For others useful information please read supplier manuals







12 RETIRING THE UNIT

When the unit has reached the end of its expected working life and therefore needs to be removed and replaced, a number of precautions must be followed:

- the refrigerant gas that it contains should be recovered by specialised personnel and sent to a waste collection facility;
- the lubrication oil of the compressors must also be recovered and sent to special collection centres;
- the structure and the various components, if not reusable, must be demolished and separated according to their product type: this is particularly relevant for copper and aluminium, which are present in fairly high amounts in the machine.

This should be done to facilitate work at the special collection, disposal and recycling centres and to minimise the environmental impact that this operation requires.

ATTENTION

If the unit, or part of it, has been decommissioned, any of its parts that are likely to cause dangers must be rendered harmless.

Please note that any replacement of unit parts subject to separate waste disposal must always be done by referring to the currently applicable legal provisions.

Please note that it is mandatory to record the loading and unloading of special and toxic-harmful waste.

Collection of special and toxic-harmful waste must be carried out by specially authorized companies.

Disposal of special and toxic or harmful waste must be carried out in compliance with the law provisions in force in the user's country.

For unit scrapping, follow the law prescriptions in force in the user's country. Before demolition ask the appointed organism to inspect the unit and write a report.

Finally, carry out scrapping according to the law in force in the country of use.

WARNING

Dismantling, disposal and scrapping operations must be carried out by qualified personnel.

12.1 Waste electrical and electronic equipment management

This product falls within the application scope of the Directive 2012/19/EU concerning the management of waste electrical and electronic equipment (WEEE).

Equipment must not be disposed of with household waste as it is made of different materials that can be recycled at special facilities. Please inquire through your municipal authorities as to the location of the eco-friendly waste management sites where waste can be received for disposal and its subsequent recycling as recommended.

Furthermore, please note that, when an equivalent appliance is purchased, the seller is expected to collect free of charge the old product to be disposed of. The product is not potentially dangerous for human health and the environment, as it does not contain any harmful substances according to the Directive 2011/65/EU (RoHS), but if disposed of freely in the environment, it might adversely affect the ecosystem.

Read the instructions carefully before using the equipment for the first time. It is strongly recommended not to use the product for any purpose other than that for which it was designed, to prevent the risk electric shock if the product is used incorrectly.

warning

The crossed-out wheelie bin symbol on the equipment label indicates that the equipment is compliant with the Waste Electrical and Electronic Equipment (WEEE) Directive. Disposing of the equipment freely in the environment or illegally disposing of the equipment are punishable by law.



12.2 Environment protection

In general, the laws regulating the use of substances that damage the stratospheric ozone layer and the gases responsible for the greenhouse effect in force in the various countries provide that it is forbidden to disperse refrigerant gases in the environment and request their originators to recover them and return them, at the end of their service life, to the retailers or to special collection centres.

The refrigerant HFC R134a and R1234ze, although not harmful to the ozone layer, is listed among the substances responsible for the greenhouse effect and must therefore be used in compliance with the above obligations.

ATTENTION

Caution is therefore recommended during maintenance operations in order to minimise refrigerant leaks as much as possible. In any case, refer to the laws in force in the country of installation.

12.3 Packaging disposal

The QR Code below is shown on a label on the packaging of the machine, which allows the user to identify the nature of



the packaging used in order to follow the correct disposal procedure.





For disposal of packaging, always refer to local laws that implement Directives 2018/851/UE and 2018/852/UE.



13 TROUBLESHOOTING

The following pages list the most common causes that can block the chiller unit or cause it to malfunction.

These causes are broken down according to easily identifiable symptoms.

You should be extremely careful when attempting to implement any of the possible remedies suggested: overconfidence can result in injuries, even serious ones, to inexpert individuals. Therefore, once the cause has been identified, you are advised to contact the manufacturer or a qualified technician for help.

FAULT	ANALYSIS OF POSSIBLE CAUSES	CORRECTIVE ACTIONS
The unit does not start.	No electrical power supply	Check its presence both on the primary and auxiliary circuit.
	The circuit board is not powered.	Check the fuses.
	There are alarms present.	Check the microprocessor panel for the presence of alarms, eliminate their cause and restart the unit.
	The phase sequence is wrong.	Invert two phases in the primary power line after disconnect- ing them upstream from the unit.
The compressor is noisy.	The compressor is rotating in the wrong direction.	Check the phase sequence relay. Invert the phases on the terminal board after disconnecting the unit and contact the manufacturer.
		Check the compressor inlet water temperature.
	Insufficient water flow rate if heat pump is operating	Check the condensation control device [optional].
Faulty high pressure.		Check the correct rotation of the pumps. Check the water circuit for leaking and the water filter for traces of dirt.
	Presence of air in the refrigerant circuit, as revealed by the presence of bubbles in the flow indicator also with undercooling values exceeding 5 °C.	Drain and pressurise the circuit and check for leaks. Evacuate slowly [for more than 3 hours] until reaching a pressure of 15 Pa and then recharge in the liquid phase.
	Unit overcharged. As revealed by an undercooling of more than 8 °C.	Drain the circuit.
	Clogged thermostatic valve and /or filter. Such faults may occur in the presence of low pressure.	Check the temperatures upstream and downstream from the valve and filter and replace them if necessary.
Low condensation procesure	Faulty transducers.	Check the setting of the condensation control device [opt].
Low condensation pressure.	Water temperature too low.	Check the condensation control device [optional]
Low evaporation pressure.	Low water flow rate.	Check the correct rotation of the pumps. Check the water circuit for leaking and the water filter for traces of dirt.
	Malfunctioning of thermostatic valve.	Warming the bulb with your hand, check whether the valve opens and adjust it if necessary. If it does not respond, replace it.
	Refrigerant filter clogged.	Pressure drops upstream and downstream from the filter should not exceed 2°C. If they do, replace the filter.
	Low condensing temperatures	Check the efficiency of the condensation control device [where present].
	Low level of refrigerant	Check the refrigerant level by measuring the degree of under- cooling; if it is below 2°C replenish the charge.
The compressor does not start.	The thermal protection device has tripped.	Check the status of the thermal contact in models equipped with protection modules. Identify the causes after restarting.
	Tripping of circuit breakers or fuses in line after short circuit.	Check the cause by measuring the resistance of the individual coils and the isolation towards the chassis before re-connecting the power.
	Intervention of HP or LP switches.	Check on the microprocessor, eliminate the causes.
	The phases in the distribution cabin have been inverted.	Check the phase sequence relay.
High evaporation pressure.	Too high water temperature.	Check the thermal load and/or efficiency of the thermostat function.
		Check the efficiency of the thermostatic valve.



14 SAFETY DATA SHEET OF REFRIGERANT

For refrigerant fluid safety data sheet, please refer to the documents supplied with the unit.



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