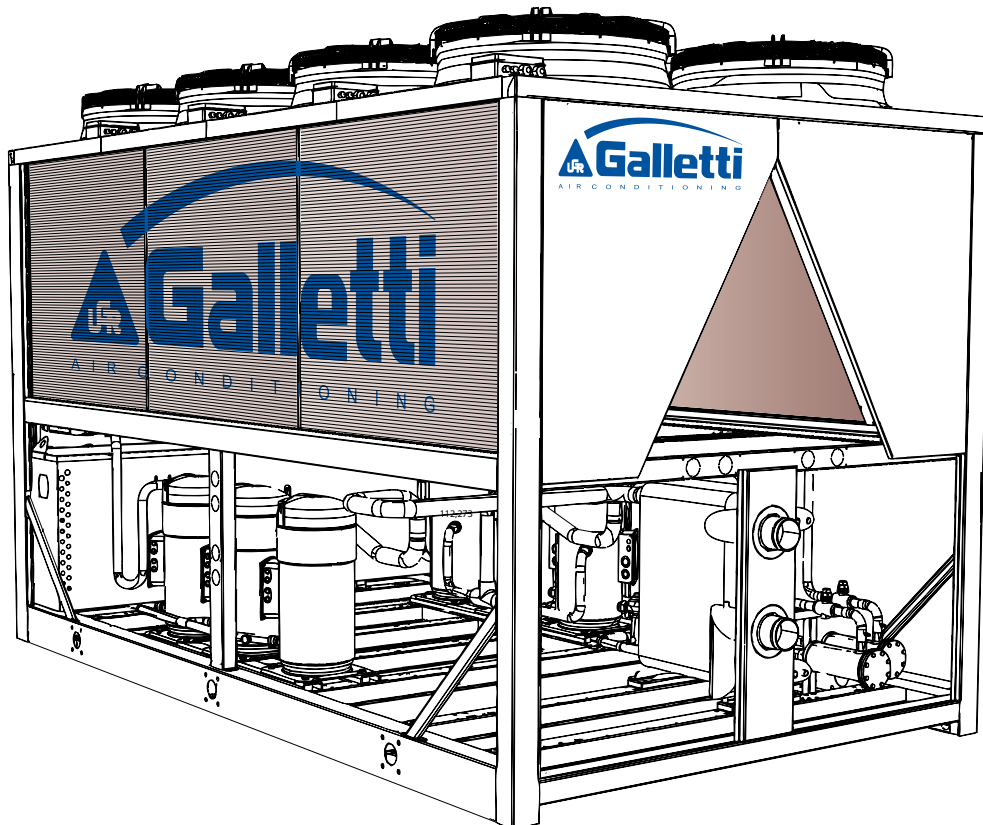


INSTALLATION, USE AND MAINTENANCE MANUAL

GLE

AIR-CONDENSED CHILLER, HEATPUMP, FREE-COOLING

680 - 1080 kW



R-454B
refrigerant



A2L gas leak
detection



Scroll
compressor



Cooling only



Heating/
Cooling

PLUS

- » High efficiency when operating at partial load
- » Electronically controlled electric expansion valve
- » Incorporable hydronic kit
- » High configurability and wide availability of accessories
- » Compact dimensions
- »
- » 3 different acoustic configurations

CE

Dear Customer,

Thank you for placing your trust in one of the products of Galletti S.p.a

This product is the result of our work and our commitment to design, research, and production and has been made from the finest materials, employing state-of-the-art components and production technology.

The CE marking of the product ensures its compliance with the safety requirements of the following directives: the Machinery Directive, the Electromagnetic Compatibility Directive, the Electrical Safety Directive, and the Pressure Equipment Directive. Fulfillment of the Ecodesign requirements is fully in keeping with the environmental awareness that has always guided our company.

The company certification of the Quality and Safety management system ensures that product quality is constantly checked and improved, and that the product is manufactured in full compliance with the highest standards.

By choosing our product, you have opted for Quality, Reliability, Safety, and Sustainability.

At your disposal, once again.

Galletti S.p.a

ORIGINAL INSTRUCTIONS

The water chillers and heat pumps comply with directive 2014/68/EC (PED).

The technical and dimensional data reported in this manual may be modified in view of any product improvement.

For any information , please contact the company: info@galletti.it



The unit data are reported on the rating label in this page. (FAC-SIMILE)

THE LABEL SHOWS THE FOLLOWING DATA:

- Series and size of the unit
- Date of manufacture
- Main technical data
- Manufacturer
- The label is applied on the unit, usually on the enclosing panels

IMPORTANT: NEVER REMOVE THE LABEL

- Unit serial number
- The serial number permits to identify the technical characteristics and the components installed
- Without this datum it will be impossible to identify the unit correctly

 	Galletti S.p.A. - Via L.Romagnoli 12/a 40010 Bentivoglio (BO) Italy Made in Italy CATEGORY III
Serial number Code Date of production Cooling capacity (W) Heating capacity (W) Power supply Power input (kW) Weight (kg) Max power input (kW) Max running amperage (A) HP power input (kW) Refrigerant Max refrigerant pressure Max refrigerant temperature (°C)	

GENERAL CAUTIONARY NOTES

Do not put into service until you have read and understood the information in the following manual. This document, together with all other documents provided, should be retained for the entire life of the unit. Contact the manufacturer for any further information.

Carefully read all the information contained in this manual! Failure to comply with the instructions provided could result in injury to persons or damage to the equipment.

Should a fault occur, consult this manual and if necessary contact the nearest Galletti S.p.A. service centre.

All installation and maintenance operations must be carried out by qualified personnel, unless otherwise indicated in this manual. Before performing any work on the unit, disconnect it from the power supply.

The first start up must be carried out exclusively by qualified personnel and authorized by Galletti S.p.A. (see warranty sheet attached).

Failure to comply with the rules provided in this manual will result in the immediate invalidation of the warranty.

Galletti S.p.A. shall not accept any liability for injury or damage resulting from improper use of the equipment or failure to comply with the directions provided in this manual and on the unit itself.

It's mandatory to install filters heat exchangers protection will immediately invalidate the warranty.

SAFETY SYMBOLS



Carefully read this manual.



Warning



Use personal protective equipment (gloves for refrigerant, protective goggles)



Warning: the unit of this range are charged with A2L fluid (slightly flammable) R454B



Warning:

Electrical and electronic products may not be mixed with unsorted household waste. Do NOT try to dismantle the system yourself: the dismantling of the system, treatment of the refrigerant, of oil and of other parts must be done by an authorized installer and must comply with applicable legislation. Units must be treated at a specialized treatment facility for reuse, recycling and recovery. By ensuring this product is disposed of correctly, you will help to prevent potential negative consequences for the environment and human health. For more information, contact your installer or local authority.



It's strictly forbidden to smoke near the unit

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1 WARNINGS

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;
- constant and accurate preventive maintenance always guarantees high operational safety of the unit. Never postpone necessary repairs and have them carried out exclusively by skilled personnel, by only using original spare parts.

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 operations during the maintenance of the unit;
- changes made to the unit without a prior written

- authorisation obtained from the MANUFACTURER;
- events that are, in any case, unrelated to the normal and correct use of the unit;
- in any case, should the user attribute an incident that may have occurred to a unit fault, he or she must prove that the resulting damage occurred has a main and direct consequence of such "fault".

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 when working on the chiller unit, it is necessary to strictly comply with the regulations contained in this manual, observe the instructions provided on-board the unit and in any case, adopt all the necessary precautions.
- The presence of pressurised fluids in the refrigerant circuit and of electrical components can create hazardous situations during installation and maintenance.
- 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, be sure to have disconnected 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.
- 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.
- Please ensure that all users have fully understood the directions for use and the meaning of any symbols provided 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 plates are applied to the unit to make it safer to use, therefore, it is very important to replace them if they are no longer legible.

 **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.

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

2 SERIES

2.1 SCOPE OF APPLICATION

The water chillers and heat pumps of the GLE series have been designed for cooling or heating water and glycol solutions in applications suitable for civil, industrial and technological conditioning.

WARNING

Regarding the unit setting and its use, it is important to know that:

- all models of the series GLE are designed and built for outdoor installations: avoid covering with canopies or positioning close to trees (even if only partially covering the unit) - which might obstruct regular ventilation of the unit external finned heat exchanger;
- the units are designed and built to operate in the temperature ranges indicated in paragraph 7.2 Operating limits p. 32: applications outside the indicated limits may be authorised by the MANUFACTURER, subject to verification and subsequent written authorisation. The air-water units are equipped with electric resistors, on request, for heating the plate heat exchanger, should the unit be exposed to cold temperatures during the winter shutdown period. This resistor is activated when the water temperature at the exchanger outlet falls below the anti-freezing probe calibration temperature;
- the storage temperature of the unit must be within the limits indicated in the paragraph 7.2 Operating limits p. 32;
- the units are designed to operate in a closed hydraulic **circuit**. In the case of open tanks, it is advisable to contact the design department which will indicate the best solution to adopt, such as uncoupling the exchanger;
- ventilation of the unit external finned heat exchanger and the clearance space around it must be guaranteed;
- avoid positioning the unit in such a way that the prevailing winds cause the recirculation of air to the external exchangers; a speed of 8 m/s (28.8 km/h) is enough to produce a sufficient stagnation pressure to guarantee about 60% of the rated airflow. [For situations where the wind action is unavoidable and there is a simultaneous presence of temperatures below -5°C, condensation control for low outdoor temperatures must necessarily be of the condenser exchanger flooding or throttling type. Please contact the manufacturer's design department for details];
- be aware that in certain environments there could be sound wave reverberation;
- the installation environment must be immediately suitable

from first positioning of the unit and not just after installation completion (for example, do not install and operate the unit in premises and open work sites where completion works might damage the unit);

- the unit must only be used for housing, industrial and technological conditioning; any other use is considered not recommended.
- failure to comply with the aforementioned items and those contained in the manual will cause an immediate loss of guarantee validity; in this case, the manufacturer declines all responsibility for any damage to persons, property or the unit that may derive from it.

DANGER

- Install the unit in environments without any risks of explosion, corrosion or fire.
- Make sure that the unit is supplied an adequate volume of air at both intake and outlet ends.
- Any use that does not conform to the expected conditions could result in serious consequences for the unit.
- All ordinary and extraordinary maintenance operations must be carried out with the unit switched off, by disconnecting the power supply.
- Wait approximately 30 minutes after switching off the unit before carrying out any maintenance operations to avoid burns.

ATTENTION

- 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 technical information contained 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.

2.2 PRODUCT INFORMATION

GLE It is the range of air condensed liquid chillers by Galletti S.p.A. with Scroll compressors.

The different versions and numerous power output rates make these units highly versatile and suited to a wide range of system set-ups.

Sizing and selection of individual components have focused on

containing energy consumption, aiming to optimize energy savings not just for individual chillers but for the entire system.

The unit is suitable for being installed in environments where noise abatement is fundamentally important, thanks to the possibility of choosing from three soundproofing set-ups.

2.3 MODELS AND VERSIONS

The units in the series GLE are available in the version with Liquid chiller, Free-Cooling chiller and Reversible heat pump.

It is possible to choose from different operating noise versions

(Standard, Low Noise, Quiet), and the available chilling configurations allow an extensive power range to be covered.

All models are filled with R454B refrigerant.

The naming methods and the unit configuration options are shown below.

» Configuration options

1	Power supply
0	400/3/50 + N
1	400V-3-50Hz + transformer
2	400/3/50 + N + Circuit breakers
3	400/3/50 + circuit breakers
2	Refrigerant
B	R454B
3	User side water pump
0	Absent
1	Single pump
2	Oversize single pump
5	Double pump in timed rotation
6	Oversize double pump in timed rotation
7	Single modulating pump (electr. Flow switch included)
8	Single HP modulating pump (electr. Flow switch included)
9	Double modulating pump (standby rotation) (electr. Flow switch included)
A	Double HP modulating pump (standby rotation) (electr. Flow switch included)
4	Water buffer tank
0	Absent
S	Inertial tank on user side
5	Partial heat recovery (condensation control mandatory)
0	Absent
D	Desuperheater (recovery of 40% of P _f in rated conditions)
6	Air flow modulation
C	Condensation control by phase-cut fans
E	Condensation control with "EC brushless" electronic control fans
7	Antifreezing kit
0	Absent
E	Protecting the water exchanger (standard machine)
P	Protecting the water exchanger and pump
S	Protecting the water exchanger, pump and tank

8	Remote communication
0	Absent
1	RS485 serial card (Modbus or Carel protocol)
2	Lonworks serial card
4	Ethernet card (SNMP or BACNET protocol) + clock card
5	Ethernet card + clock card + monitoring software
9	Special coils / Protective treatments
0	Standard
B	Epoxy pre-painted fin and overall painting
C	Cataphoresis
H	Hydrophilic treatment
R	Copper / copper
10	Packing
0	Standard
1	Wooden cage
2	Wooden crate
11	Anti vibration shock mounts
0	Absent
G	Rubber vibration dampers at the base of the unit
M	Spring vibration dampers at the base of the unit
12	Maintenance kit
0	Absent
S	Shut-off valves on compressor tandem / trio
13	Documentation language
D	German
F	French
G	English
I	Italian
N	Dutch
P	Polish
R	Russian
S	Spanish

» Accessories

Chiller accessories	
A	Power factor capacitors
B	Soft starter
C	Service kit (advanced controller required)
D	Pair of couplings Victaulic
E	ON/OFF status of the compressors
F	Remote control for step capacity limit (advanced controller required)
G	Configurable digital alarm board (advanced controller required)
H	Set point compensation outdoor temperature probe
I	Refrigerant pressure gauges
L	Filter shut-off kit (solenoid and tap on liquid line)
M	Special cable according to VDE regulation
N	Remote control panel for programmable microprocessor
P	Outdoor finned coil heat exchanger protection grille
Q	Finned battery metal filters
R	Y-shaped water filter (loose delivered)
S	Unit without refrigerant
T	Measurement and limitation of the absorbed current

2.4 RATED TECHNICAL DATA

» GLE C water chillers rated technical data

GLE			658	748	818	900	942	1072
Power supply		V-ph-Hz	400 / 3+N / 50					
Cooling capacity	(1)	kW	677	739	815	927	1037	1078
Total power input	(1)	kW	232	243	280	298	338	370
EER	(1)		2,92	3,04	2,92	3,11	3,06	2,91
SEER	(2)		4,98	5,10	4,93	5,14	5,40	5,30
Water flow	(1)	l/h	116360	126965	140077	159254	178111	185264
Water pressure drop	(1)	kPa	16	26	32	34	42	45
Available pressure head - LP pumps	(1)	kPa	228	192	151	203	175	162
Available pressure head - HP pumps	(1)	kPa	263	285	268	298	272	260
Maximum current absorption		A	479	568	588	706	715	839
Start up current		A	753	667	743	834	1013	1095
Buffer tank volume		dm ³	1040	1040	1040	1040	1040	1040
Compressors / circuits			8/4	8/4	8/4	10/4	12/4	12/4
Sound power level	(3)	dB(A)	93	93	95	93	95	94
Sound power level, low-noise version	(3)	dB(A)	91	90	92	91	93	92
Sound power level quiet version	(3)	dB(A)	89	89	90	89	90	90
Weight without options		kg	4662	4996	5116	5682	5980	8350

- (1) Outdoor air temperature 35°C, water temperature 12°C / 7°C (EN14511:2018)
- (2) η efficiency values for heating and cooling are respectively calculated by the following formulas: $[\eta = SCOP / 2,5 - F(1) - F(2)]$ e $[\eta = SEER / 2,5 - F(1) - F(2)]$. For further information, please refer to the technical document "ErP 2009/125/EC DIRECTIVE" in the catalogue introducing pages, or to the EN14825:2017 regulation.
- (3) Sound power level measured according to ISO 9614

» GLE H heat pumps rated technical data

GLE			658	748	818	900	942	1072
Cooling capacity	(1)	kW	677	734	811	906	1012	1118
Total power input	(1)	kW	232	246	283	311	352	356
EER	(1)		2,92	2,99	2,87	2,92	2,87	3,14
SEER	(2)		4,92	4,96	4,80	4,84	5,04	5,30
Water flow	(1)	l/h	116360	126052	139346	155644	173844	192154
Water pressure drop	(1)	kPa	16	26	31	33	40	48
Available pressure head - LP pumps	(1)	kPa	228	195	154	208	182	150
Available pressure head - HP pumps	(1)	kPa	263	286	269	304	279	248
Heating capacity	(3)	kW	692	717	791	957	1073	1145
Total power input	(3)	kW	219	237	262	301	334	368
COP	(3)		3,16	3,02	3,02	3,18	3,21	3,12
SCOP	(2)		4,07	4,00	4,08	3,91	4,09	3,90
Heating energy efficiency class	(4)		A++					
Water flow	(3)	l/h	120232	124497	137389	166137	186368	198928
Water pressure drop	(3)	kPa	16	24	28	34	42	47
Available pressure head - LP pumps	(3)	kPa	217	199	161	193	159	136
Available pressure head - HP pumps	(3)	kPa	258	287	272	288	256	234
Maximum current absorption		A	479	568	588	706	715	839
Start up current		A	753	667	743	834	1013	1095
Compressors / circuits			8/4	8/4	8/4	10/4	12/4	12/4
Buffer tank volume		dm ³	1040	1040	1040	1040	1040	1040
Sound power level	(5)	dB(A)	93	93	95	94	95	94
Sound power level, low-noise version	(5)	dB(A)	91	90	92	91	93	92
Sound power level quiet version	(5)	dB(A)	89	89	90	90	91	91
Weight without options		kg	4662	5116	4996	5980	5682	8350

- (1) Outdoor air temperature 35°C, water temperature 12°C / 7°C (EN14511:2018)
- (2) η efficiency values for heating and cooling are respectively calculated by the following formulas: $[\eta = SCOP / 2,5 - F(1) - F(2)]$ e $[\eta = SEER / 2,5 - F(1) - F(2)]$. For further information, please refer to the technical document "ErP 2009/125/EC DIRECTIVE" in the catalogue introducing pages, or to the EN14825:2017 regulation.
- (3) Outdoor air temperature dry bulb 7°C / wet bulb 6°C, water temperature 40°C / 45°C (EN14511:2018)
- (4) Seasonal energy efficiency class for LOWTEMPERATURE room heating under AVERAGE climatic conditions [EUROPEAN REGULATION No 811/2013]
- (5) Sound power level measured according to ISO 9614

3 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.

3.1 GENERAL SAFETY RULES

3.1.1 Thoroughly know the unit

⚠ ATTENTION

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.

3.1.2 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 12.3 R454B REFRIGERANT FLUID SAFETY DATA SHEET.

3.1.3 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 12.3 R454B REFRIGERANT FLUID SAFETY DATA SHEET.

3.1.4 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.

3.2 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.

🗨 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 MANUFACTURER.

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.

3.2.1 Safety information

WARNING

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.

3.2.2 Accident prevention

ATTENTION

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.

3.2.3 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.

3.2.4 Residual risk areas

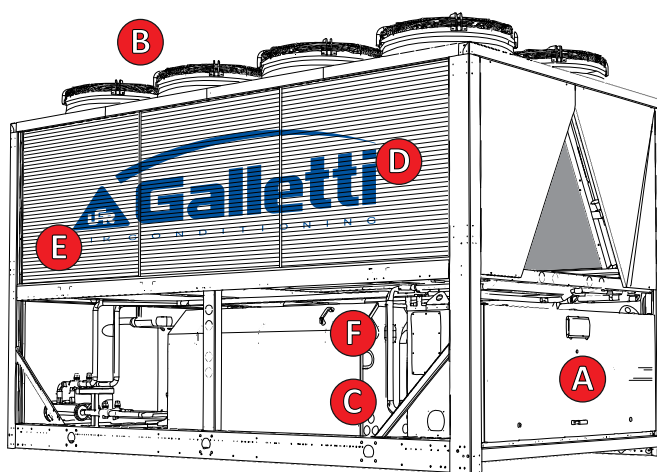
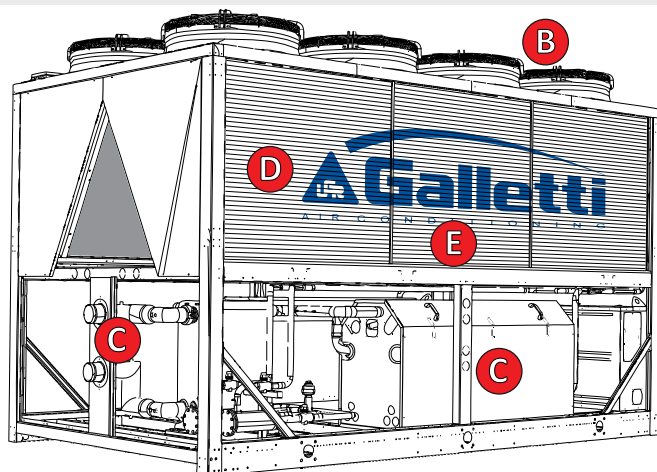
DANGER

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.

WARNING

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

- set the control panel according to the manufacturer's instructions. 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 p. 47);
- not touch the internal components during operation without adequate protection.

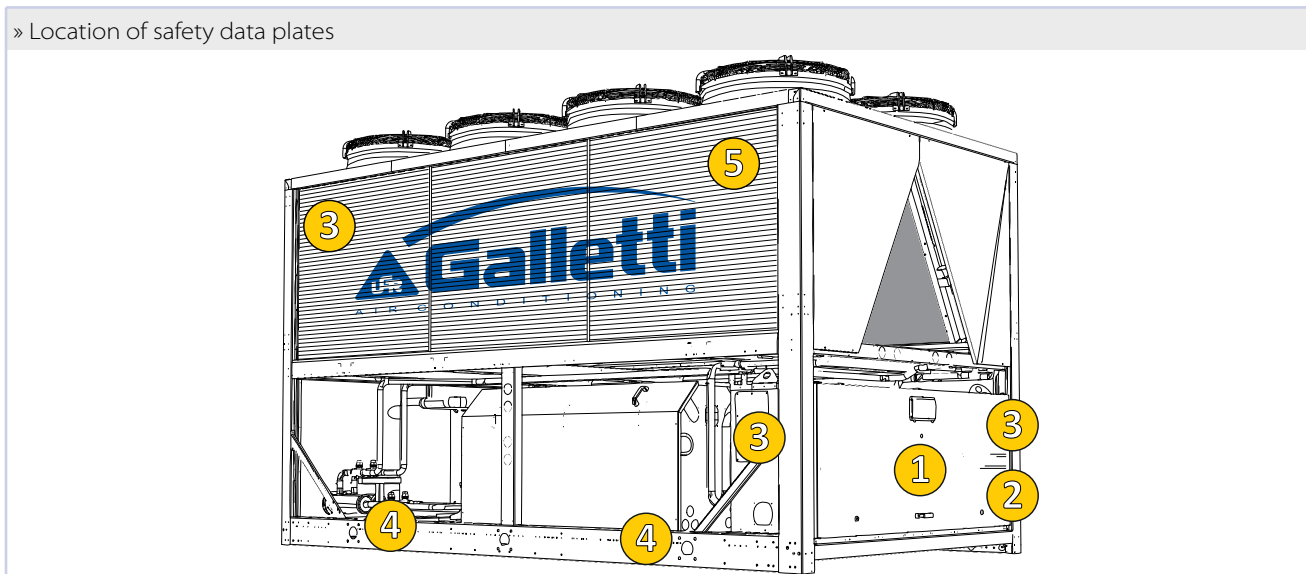


- A. Danger of fire
- B. Impact and abrasion hazard in fan area
- C. Danger of explosion due to the presence of pressurised circuits
- D. Danger of pollution due to the presence of refrigerant in the circuit
- E. Danger of cutting injuries near finned exchangers
- F. Danger of burns due to the presence of high temperature pipes

3.3 LOCATION OF SAFETY DATA PLATES

3.3.1 Description of the safety symbols

» Location of safety data plates



<p>A. Warning: danger due to poor familiarity with all the functions of the unit and the resulting risks. B. Read the use and maintenance manual carefully before operating the unit.</p>	1	
<p>Electric power supply data plate</p>	2	
<p>A. Danger: hot parts. B. Danger: live parts. C. Danger of cutting injuries in the finned exchangers area. D. Danger of burns.</p>	3	
<p>Anchor points for lifting</p>	4	
<p>Refrigerating liquid</p>	5	

3.4 MAINTENANCE PRECAUTIONS

3.4.1 Tools

DANGER

Use only tools prescribed by the unit manufacturer; in order to avoid personal injury, do not use worn or damaged, low quality or makeshift tools.

ATTENTION

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

3.4.2 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.

3.4.3 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.

3.4.4 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.

3.4.5 Warnings for inspections and maintenance

Display a sign with the warning: "INSPECTION IN PROGRESS" on all sides of the unit. Check the unit carefully following the list of operations contained in this manual.



3.4.6 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.

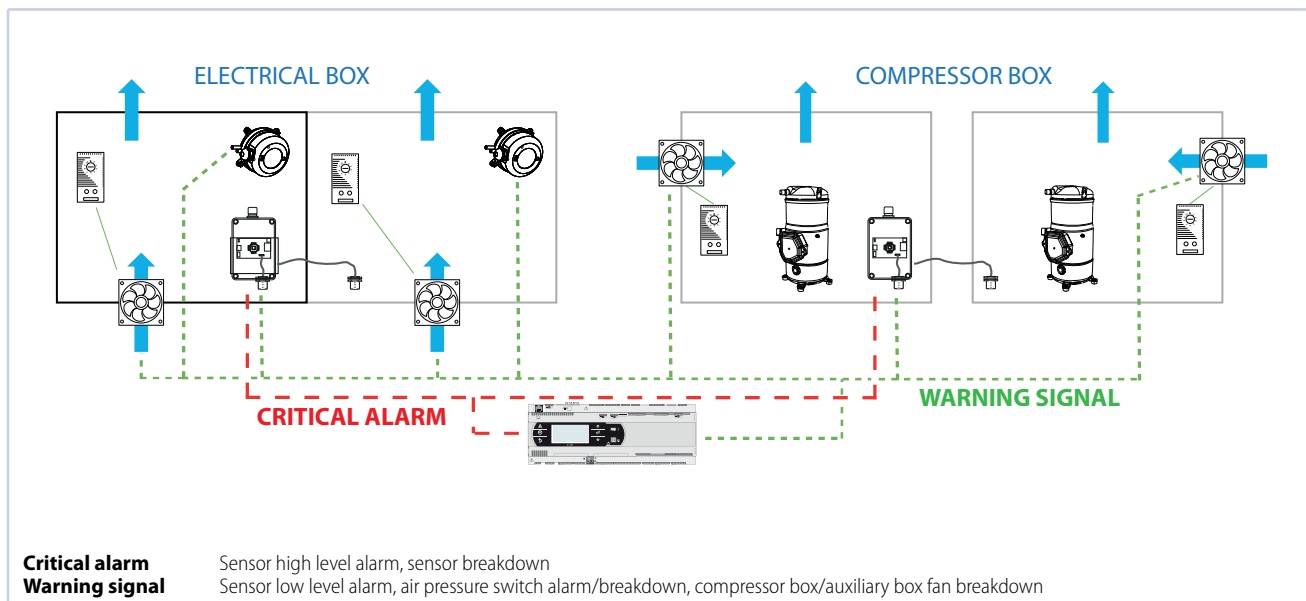
3.5 PRECAUTIONS IN CASE OF REFRIGERANT LEAKAGE

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 - SIGNAL. 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
R454B	A2L	900 ppm	1800 ppm

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



» Safety chain

EVENT	ACTION	SIGNAL
Compressor box fan alarm fault	Electrical box fans activation (when $T_{air} \leq T$ 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 $T_{air} \leq T$ 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

⚠ DANGER

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 Galletti S.p.A..
- 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.

⚠ ATTENTION

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.

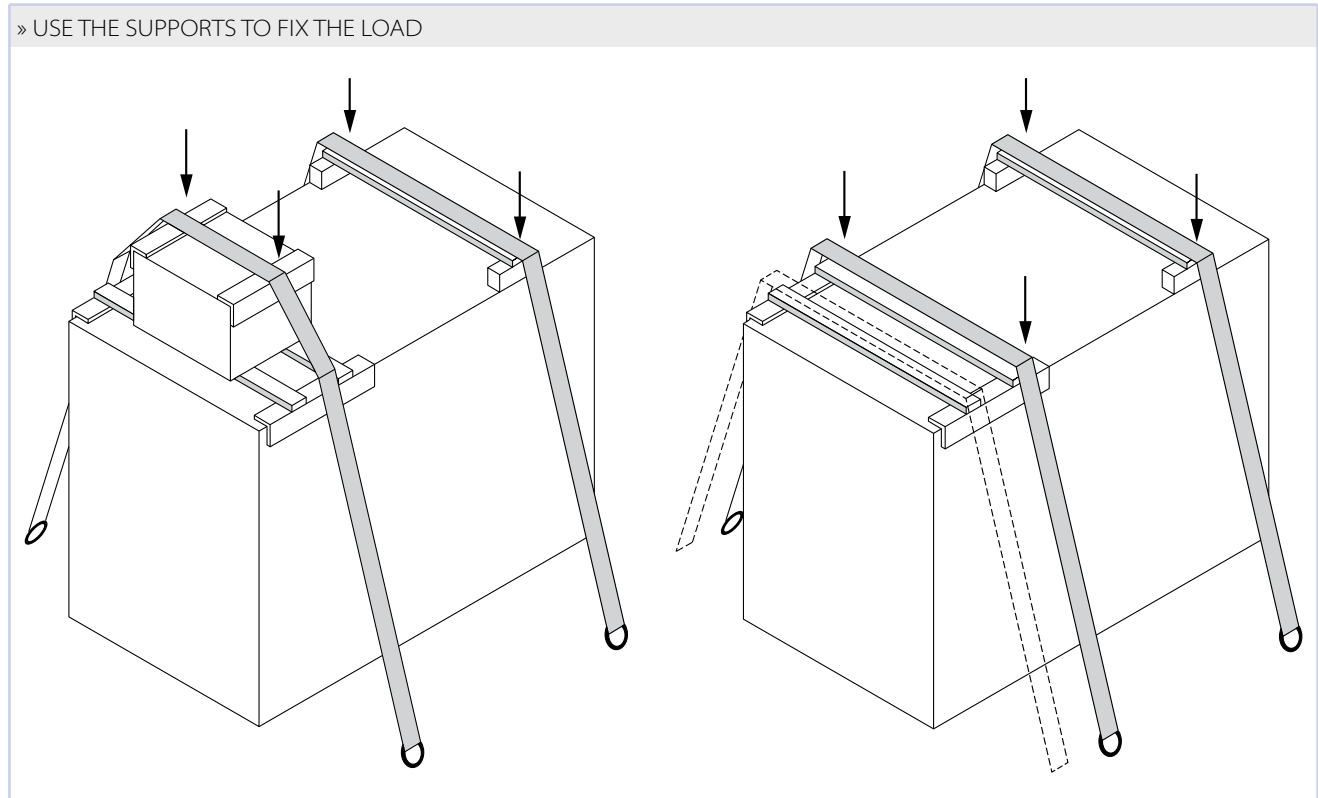
- Once the circuit is set up and the refrigerant charge is restored, close the compartments and power up the chiller, if there are no alarms, the machine can be restarted.

4 TRANSPORT, INSPECTION, HANDLING, DIMENSIONS AND POSITIONING OF THE UNIT

4.1 TRANSPORT

In order not to damage the structure and components, the units GLE must be fixed to the transport vehicle using the supports

shown in the following figure. The image on the left refers to cases including accessories.



The storage temperature of the unit must be in accordance with the indications in paragraph 7.2 Operating limits p. 32 and on the identification plate on the unit frame. Outside of this range the Manufacturer will not be responsible for any damage that

may occur on the unit. Outside of this range the Manufacturer will not be responsible for any damage that may occur on the unit.

4.2 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. In particular, check that the fins of the finned pack exchangers are not bent and have not suffered impacts that could have compromised the pressurised system tightness. The manufacturers or their agents must be informed as soon as

possible about the extent of the damage. The Customer must submit a written report for any significant damage.

Check that the following items are present:

- commissioning report
- wiring diagram

Also check the integrity of the documents supplied on-board the machine and attached to this manual.

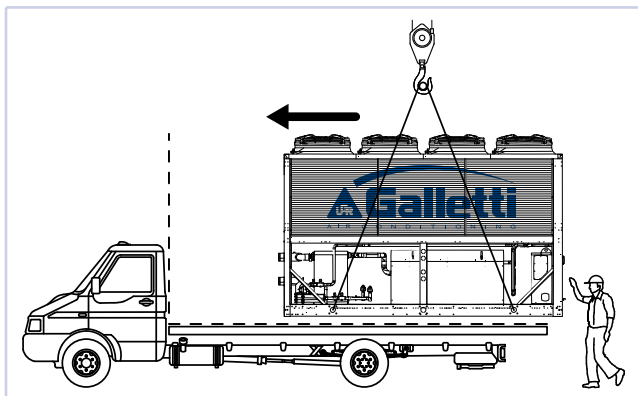
4.3 CONVEYANCE

During handling, it is mandatory to check the dimensions, weights, centre of gravity and lifting points. Also check that the lifting and positioning equipment complies with the applicable safety regulations.

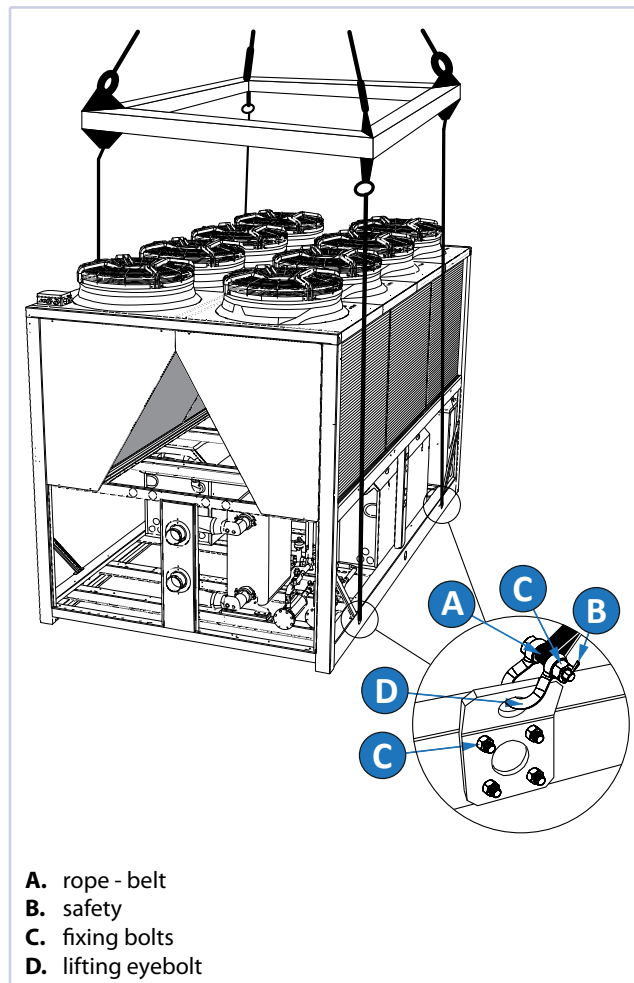
During the unloading and positioning of the unit, be extremely careful to avoid bumps and knocks or sudden movements. Handling must be carried out carefully and gently, avoiding to apply pressure to any machine components.

Depending on the unit frame, there will be different handling modes.

Rear loading/unloading is strongly recommended using a crane of adequate capacity and following the instructions below.



The upper part and the sides of the unit must be protected by a rigid wooden structure, or by a steel pipe that acts as a spacer between the lifting ropes and the machine.



Lateral loading/unloading via a lift truck is not possible unless by using a low-floor truck (minimum loading clearance 3000 mm) that can be fully opened on the sides and not curtainsided.

⚠ ATTENTION

In all lifting operations make sure that the unit has been securely anchored, in order to avoid overturning or accidental falls. Use all the lifting points.

Once the load has been positioned on the vehicle floor, the unit must be secured with special straps. See the paragraph 4.1 Transport p. 16 for strap fixing instructions.

4.4 UNPACKING

The unit packaging must be carefully removed avoiding possible damage to the machine; the materials that make up the packaging are of a different kinds: wood, cardboard, nylon, etc. It is good practice to collect them separately and deliver them for disposal or recycling to specialised disposal companies - thus reducing their environmental impact.

⚠ ATTENTION

If the unit is equipped with (a) pump(s) and/or a tank, the expansion tank will be packed inside it, to be fixed to the

suction line of the pump where a sealed "TEE" junction is provided, or on the tank itself. Remove the cap and tighten the expansion tank (this should be performed by qualified personnel), and check the pre-charge pressure (0.5/1.0 bar) before filling the water circuit and starting the machine.

The size of the expansion tank depends on the water content of the system as well as on its temperature range; always check the capacity of the tank in relation to the water content of the system.

4.5 SITING AND DAMPERS

Check the following points to select the best installation setting for the unit and its connections:

- Size and origin of water pipes;
- power supply location;

- accessibility for maintenance or repairs;
- solidity of the supporting surface
- adequate ventilation of the area (taking into account the maximum permitted ambient temperature);

- application limits of the unit (see chapters 2.1 Scope of application p. 7 and 7.2 Operating limits p. 32).

It is a good idea to provide a supporting base of adequate dimensions. This precaution becomes mandatory when the unit is to be sited on loose ground (various types of soil, gardens, etc.) It is also advisable to place a rigid rubber strip between the base frame and the support surface.

If more thorough insulation is required, it is advisable to use rubber or spring type anti-vibration mounts.

In the case of installation on roofs or intermediate storeys, the unit and pipes must be insulated from walls and ceilings by placing rigid rubber joints in between and using supports that are

not rigidly anchored to the walls.

If the unit is to be installed in proximity to private offices, bedrooms or areas where noise levels must be kept down, it is advisable to conduct a thorough analysis of the sound field generated and verify its compatibility with the local laws in force.

4.5.1 Anti-vibration rubber devices

The units GLE can be equipped with spring-type anti-vibration rubber mounts. The following table provides a summary of rubber anti-vibration elements adopted for this series, depending on the frame.

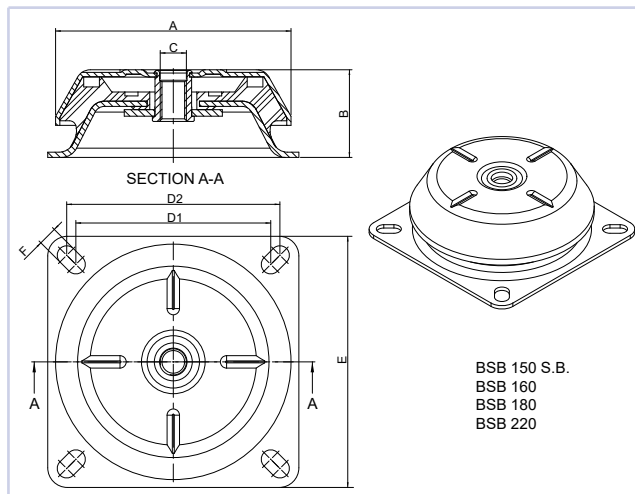
» Rubber vibration dumpers table

Frame	Rubber anti-vibration mount
1	BSB 180 50°SH
2/A	BSB 180 60°SH
3/B	BSB 180 60°SH
4/C	BSB 180 60°SH

The following paragraph describes in detail the properties of the anti-vibration devices mentioned above.

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

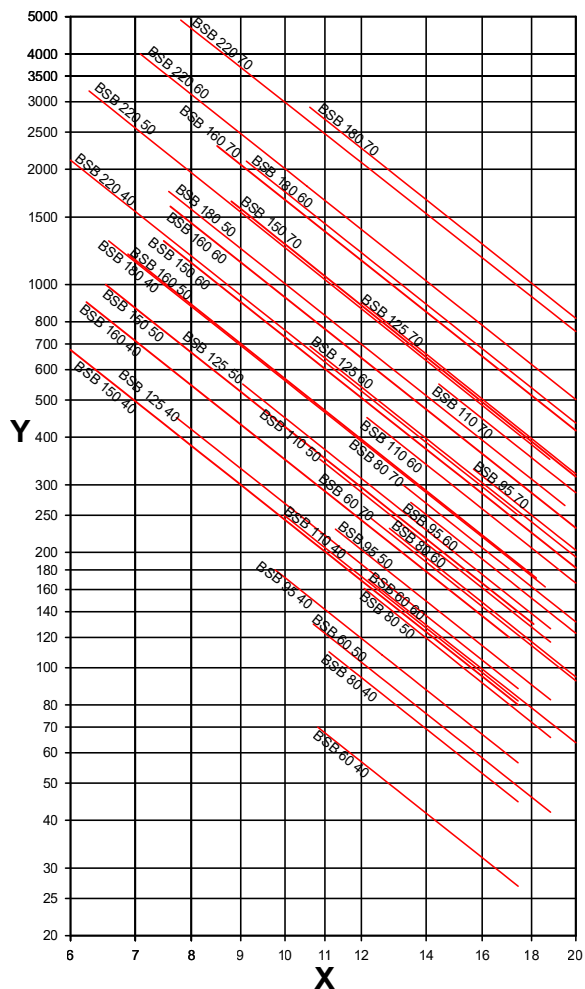
- Frame 1: BSB180 Shore hardness 50°
- Frame 2-3-4; A-C: BSB180 for 60° Shore hardness



CODE		BSB180	BSB180
A	mm	180	180
B	mm	67	67
C	mm	M-20	M-20
D1	mm	149	149
D2	mm	163	163
E	mm	192	192
F	mm	14.5	14.5
WEIGHT	g	3800	3800
LOAD	kg	1750	2100
HARDNESS		50 Sh	60 Sh

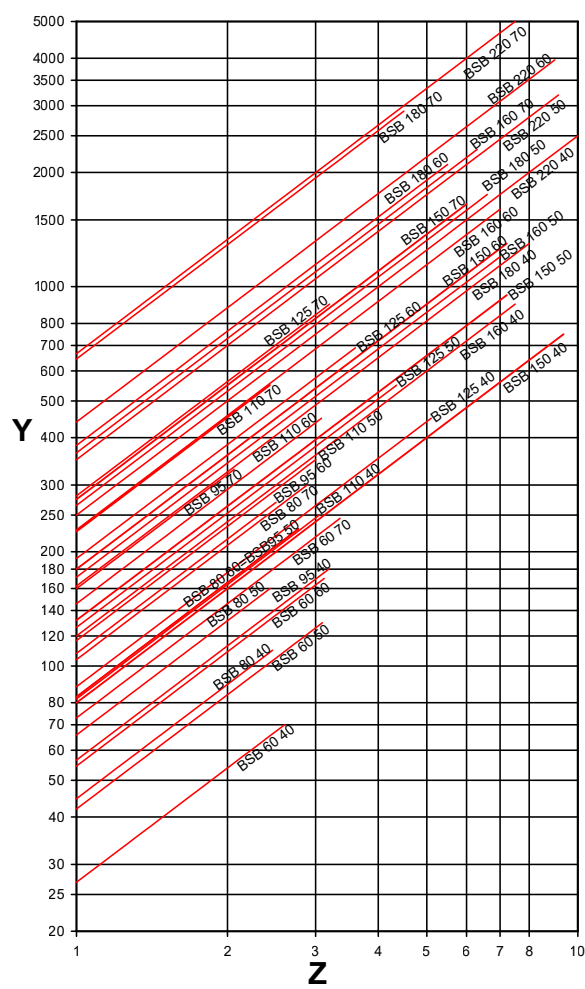
The values shown are approximate figures only - due to elastomer hardness tolerance range and other factors; they can be reassessed in case of actual need.

» OWN FREQUENCIES Type BSB



X own frequency Hz
Y load (kg)

» LOAD-DEFLECTION CURVES Type BSB



Z bending (mm)
Y load (kg)

4.5.2 Anti-vibration spring devices

The units GLE can be equipped with the spring-type

» Spring vibration dumpers table

Frame	Spring anti-vibration device
1	RF411-Z220-124
2/A	RF412-Z220-X108
3/B	RF412-Z220-X108
4/C	RF412-Z220-X108

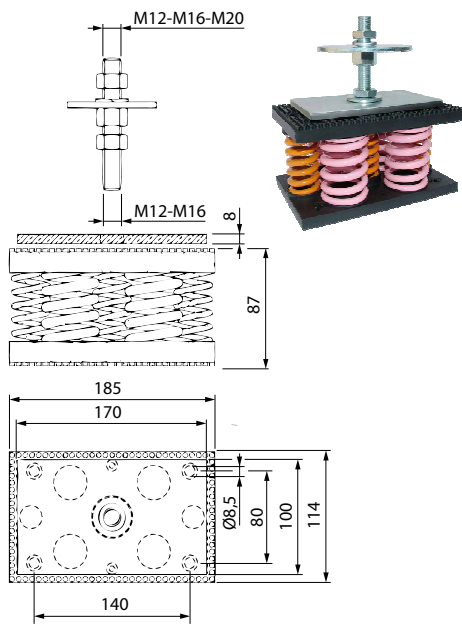
The following paragraph describes in detail the properties of the anti-vibration devices mentioned above.

anti-vibration devices shown below.

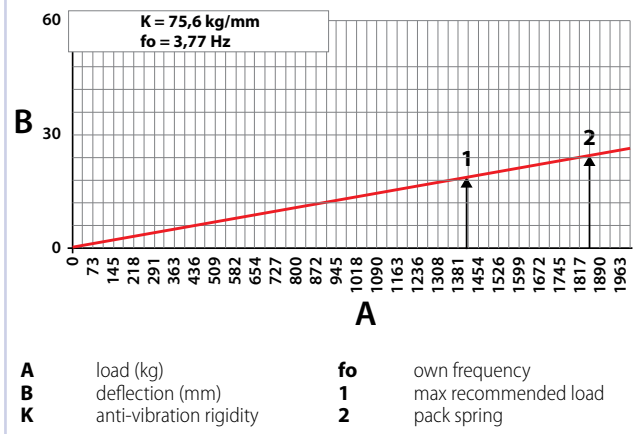
The following table provides a summary of the spring anti-vibration mounts adopted for this series, depending on the frame.

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

» RF411_Z220_124 - RF412_Z220_X108

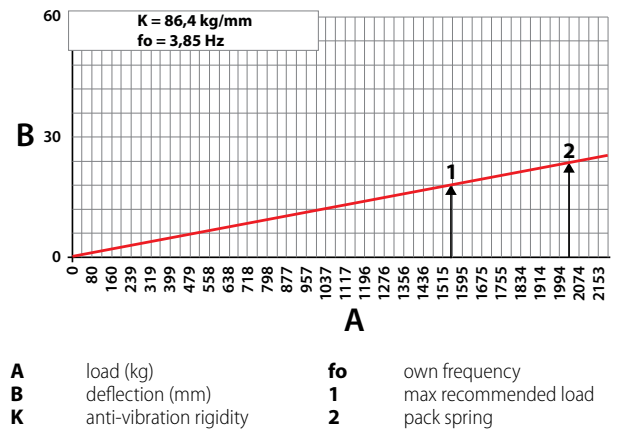


» RF411-Z220-124



A load (kg) **fo** own frequency
B deflection (mm) **1** max recommended load
K anti-vibration rigidity **2** pack spring

» RF412-Z220-X108



A load (kg) **fo** own frequency
B deflection (mm) **1** max recommended load
K anti-vibration rigidity **2** pack spring

4.6 INSTALLATION CLEARANCE REQUIREMENTS

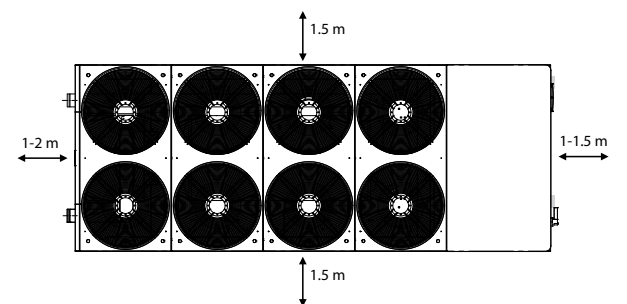
Ensuring sufficient clearance spaces is of critical importance as it ensures an adequate volume of air at both the intake and the delivery ends of the external heat exchangers and avoids recirculation between the two airflows. Failure to do so would result in poorer unit performance or even discontinuance of normal operation. An adequate service space also allows for ordinary maintenance operations to be carried out.

The distances to be observed are the following:

- rear side/connections: minimum 2 m;
- control panel side: minimum 1.5 m;
- side parts: minimum 1.5 m;
- top side: there must be no obstacle to air outlet.

In special cases these requirements can be changed according to design department decisions.

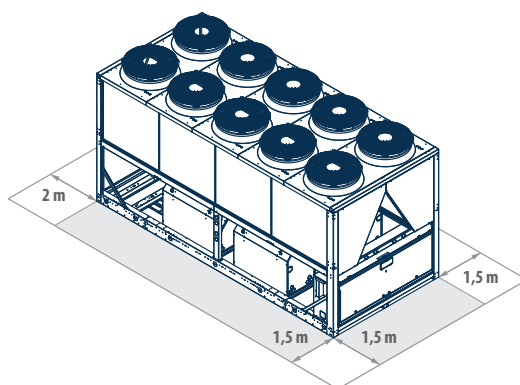
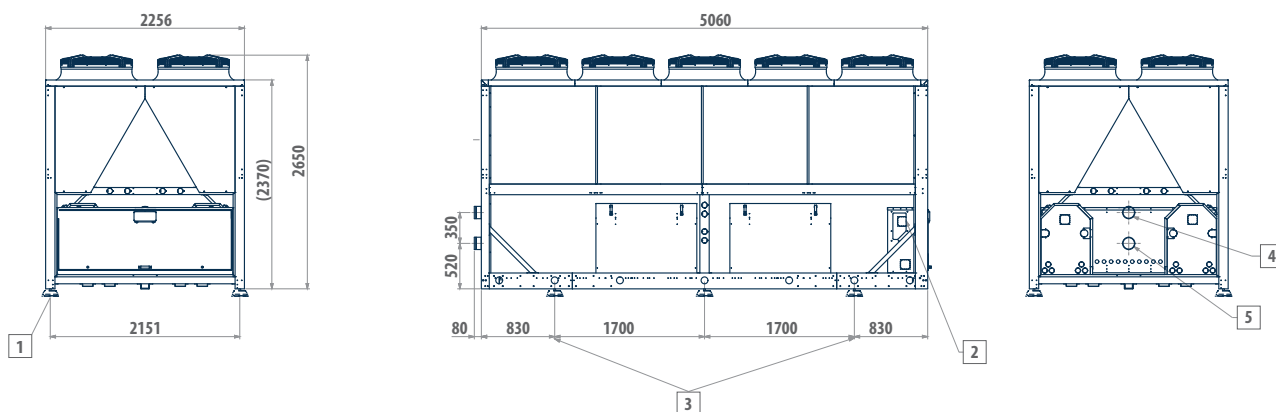
» View from above



4.7 DIMENSIONS

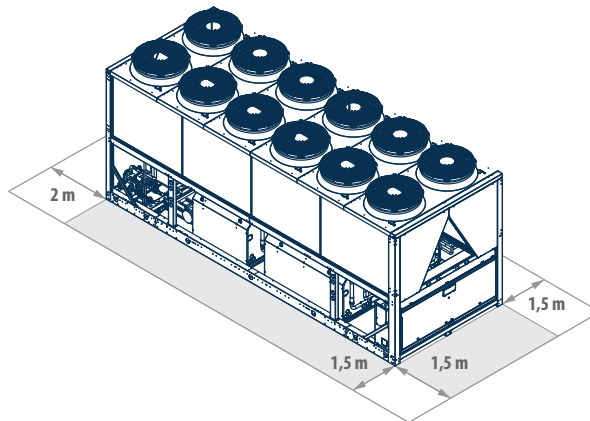
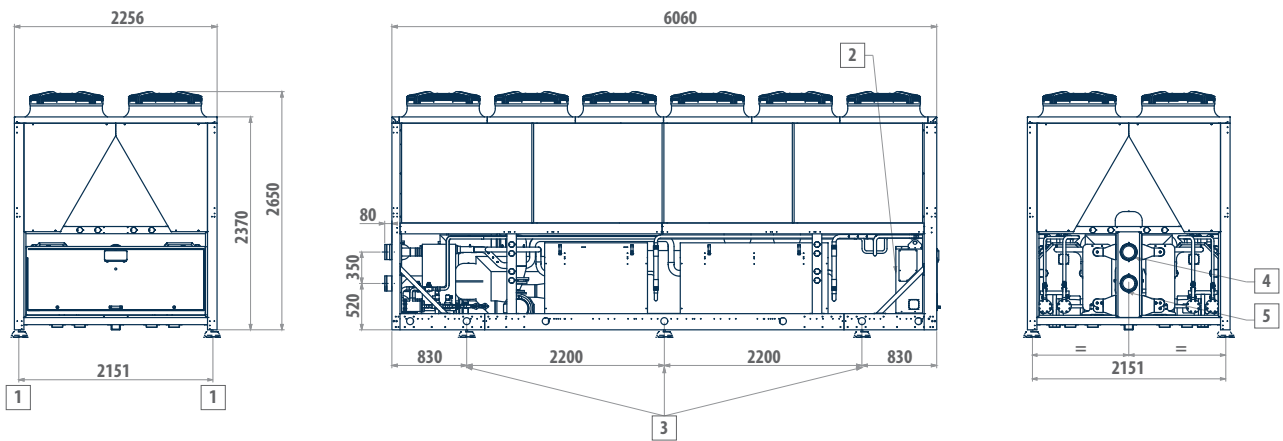
For dimensional drawing of H models, contact the manufacturer.

» GLE 658 C



LEGEND

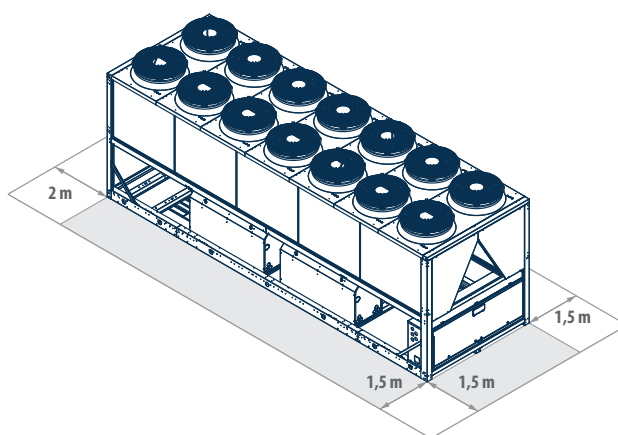
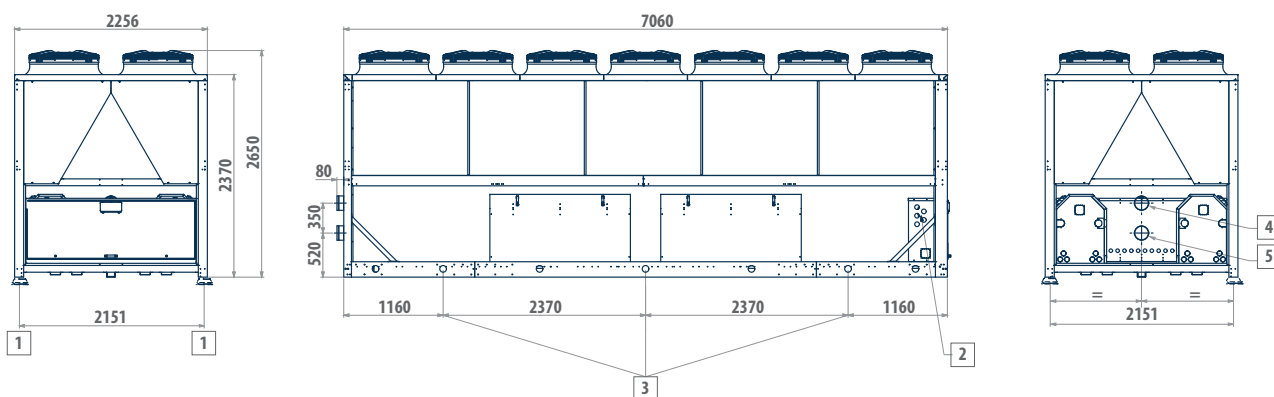
- 1 Vibration dampers
- 2 Power supply input
- 3 Lifting points
- 4 Water inlet (5"Victaulic)
- 5 Water outlet (5"Victaulic)



LEGEND

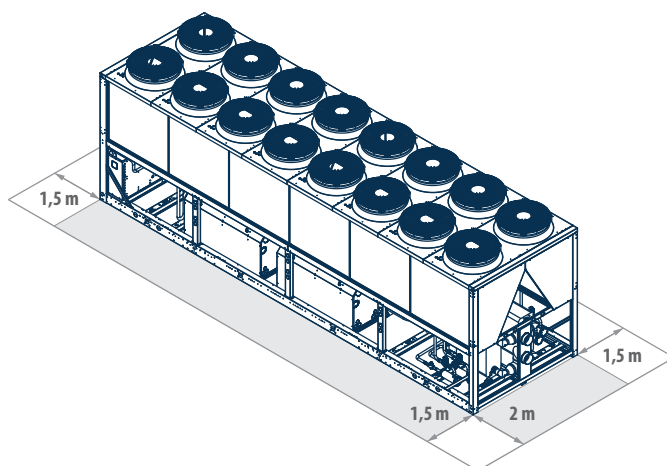
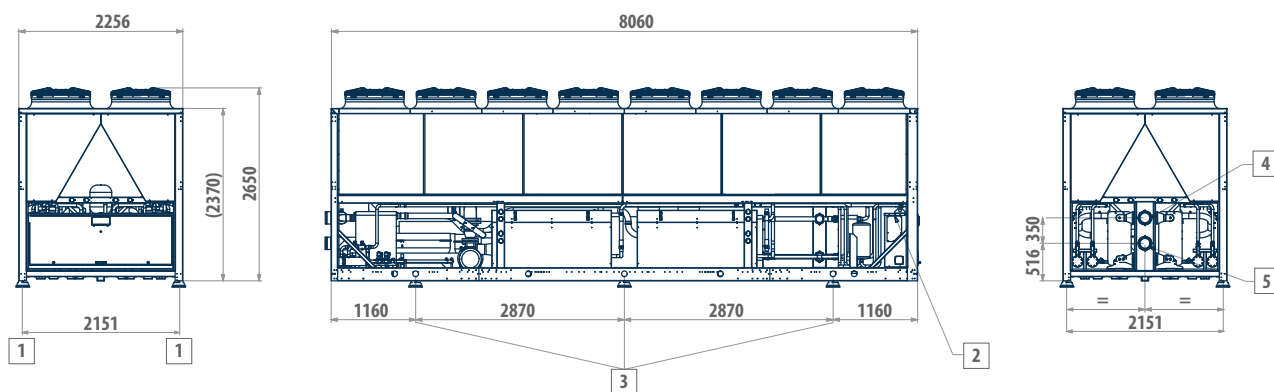
- 1** Vibration dampers
- 2** Power supply input
- 3** Lifting points
- 4** Water inlet (6" Victaulic)
- 5** Water outlet (6" Victaulic)

» GLE 900 - 942 C



LEGEND

- 1 Vibration dampers
- 2 Power supply input
- 3 Lifting points
- 4 Water inlet (6"Victaulic)
- 5 Water outlet (6"Victaulic)



LEGEND

- 1 Vibration dampers
- 2 Power supply input
- 3 Lifting points
- 4 Water inlet (6" Victaulic)
- 5 Water outlet (6" Victaulic)
- 6 Optional heat recovery water outlet (Victaulic 4")
- 7 Optional heat recovery water inlet (Victaulic 4")

5 PLUMBING AND ELECTRICAL CONNECTIONS

5.1 HYDRAULIC CONNECTIONS

This paragraph provides the necessary instructions that must be followed for a correct hydraulic connection of the unit.

⚠ ATTENTION

All operations must be performed EXCLUSIVELY BY QUALIFIED PERSONNEL, in compliance with the regulations applicable in the country of installation.

🗨 WARNING

In any case, please also refer to the document "First start up instructions", supplied with the unit.

🗨 WARNING

It is mandatory to install a metal mesh filter on the inlet pipe with a recommended 1 mm mesh size, to protect the exchanger from residues or impurities in the pipes. If the machine works in combination with process cycles, it is advisable to install an inspectable uncoupling exchanger, in order to avoid possible lockups and/or breaks of the plate heat exchanger. Note that the units are designed to operate in a closed hydraulic circuit.

In the case of open tanks, it is advisable to contact the design department which will indicate the best solution to adopt, such as uncoupling the exchanger.

5.1.1 General guidelines for plumbing connections

When preparing the hydraulic circuit for plate heat exchangers, it is highly recommended to follow the instructions given below, and in any case, comply with national or local regulations (refer to the diagrams included in the manual).

1. Connect the pipes to the chiller using flexible couplings to prevent the transmission of vibrations and to compensate for thermal expansions. These units are all configured for installation of the water inlet-outlet pipes outside the unit (on the rear) and these pipes are supplied as standard accessories at no extra cost for the customer.
2. Install the following components on the piping:
 - pair of quick couplings with welded socket (optional - selectable from price list). They make system connection operations easier and the installation tasks very quick;
 - temperature and pressure indicators for routine group maintenance and inspections. Pressure monitoring on water side allows the efficiency of the expansion tank - if any - to be ensured, alerting to any system water leaks early on. **N.B.:** check that the water pressure on the suction side of the pump is at least 0.6 bar; otherwise, the storage tank could be damaged.
 - Sumps on the inlet and outlet pipes for temperature measurements through direct viewing of the operating temperatures. They can, however, be checked by means of the on-board microprocessor;
 - shut-off valves (gate valves) to isolate the unit from the hydraulic circuit;
 - vent valves, to be located in the highest parts of the hydraulic circuit, to allow for air bleeding. On the internal machine pipes there are smaller vent valves for on-board machine air bleeding: **this operation must exclusively be carried out with no electric power supply to the group.** Especially as far as the Free-Cooling versions are concerned, make sure that the

circuit is completely filled with water, then bleed the air from the water heat exchangers in order to avoid pump cavitation.

- Outlet tap and, where necessary, draining tank to allow the system to be emptied for maintenance operations or seasonal breaks. (A 1" drain tap is provided on the optional storage tank: **this operation must be carried out with no electric power supply to the group).**

🗨 WARNING

On Free-cooling versions it is mandatory to use glycol solutions (max 40% in weight) in order to prevent hard-to-repair damage to the finned heat exchanger caused by frosting. Carefully evaluate the minimum air temperatures to which the unit can be exposed and define the percentage of anti-freezing agent to be added accordingly.

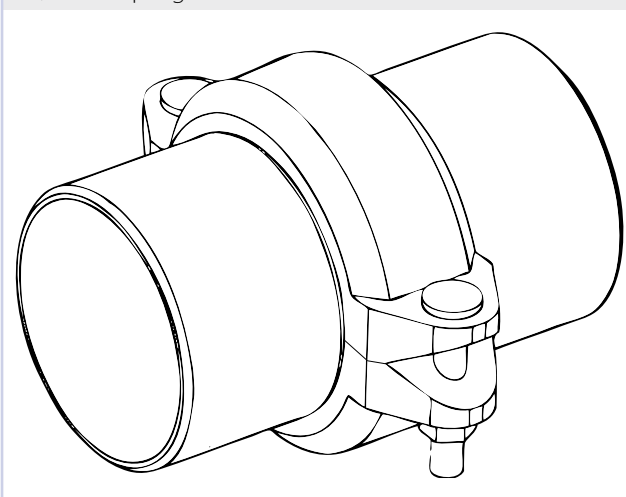
⚠ ATTENTION

Failure to use anti-freezing solutions can cause serious damage to the free-cooling exchangers and to the hydraulic/refrigeration circuit in general.

🗨 WARNING

If the unit is intended for the production of domestic hot water, the use of an uncoupling exchanger between the unit's hydraulic circuit and the domestic hot water circuit is mandatory.

» Quick couplings



5.1.2 Recommended water circuit

⚠ ATTENTION

During hydraulic connection operations, never work with naked flames near or inside the unit.

The recommended hydraulic circuit is shown in figure Recommended water circuit. It is equipped with:

- valves for regulating (VI) the unit on the water pipes, immediately upstream and downstream from the unit itself, to be used in the event maintenance work is required;
- a mechanical filter (F) (MANDATORY!) on the pipe at machine inlet next to it;

- a mechanical filter (F) (MANDATORY!) and a check valve (VR), on the supply line upstream from the filling tap (RC);
- an air vent in the highest point of the installation, to allow for air bleeding;
- safety valve conveyor pipe (VS), which, if the valve is opened, directs the water jet to areas where it cannot damage people or property (Important!);
- anti-vibration joints (AV) on the pipes to prevent vibration transmission to the system.

⚠ ATTENTION

Regarding the choice of mechanical filters, the degree of filtration adopted, expressed as "maximum particle size" (mm), is as follows:

- 1.1 mm

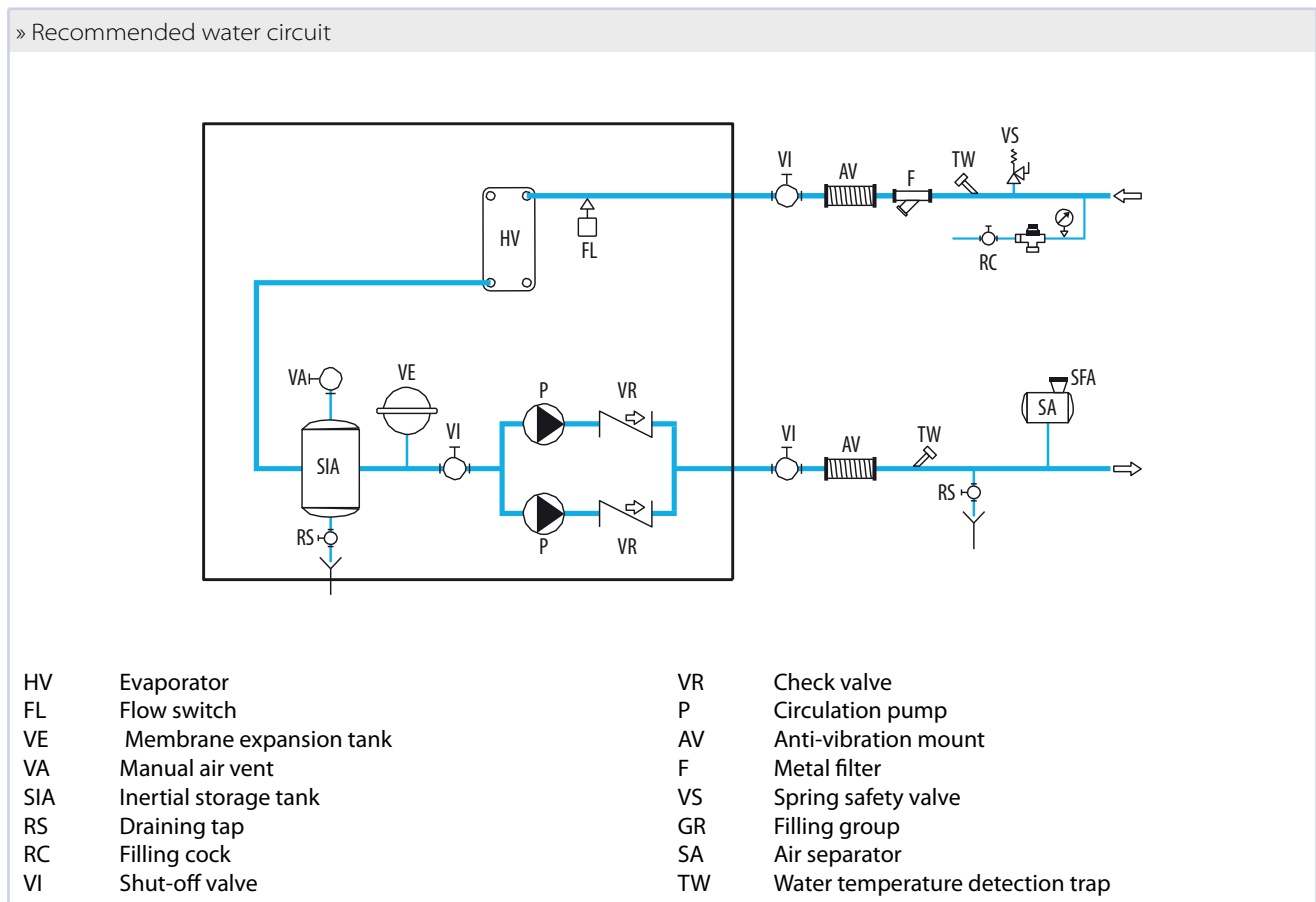
It is a good rule for the pipes departing from and returning to the unit not have a smaller diameter than the unit hydraulic connections!

During the winter it is necessary to empty the system (or the chiller only) to avoid damage caused by freezing; alternatively, load the system with a mixture of water and glycol in adequate percentages, chosen according to the lowest expected temperature (see 7.3 Thermal carrying fluid p. 35).

⚠ ATTENTION

In case an anti-freezing agent of a different type must be used, please contact the office.

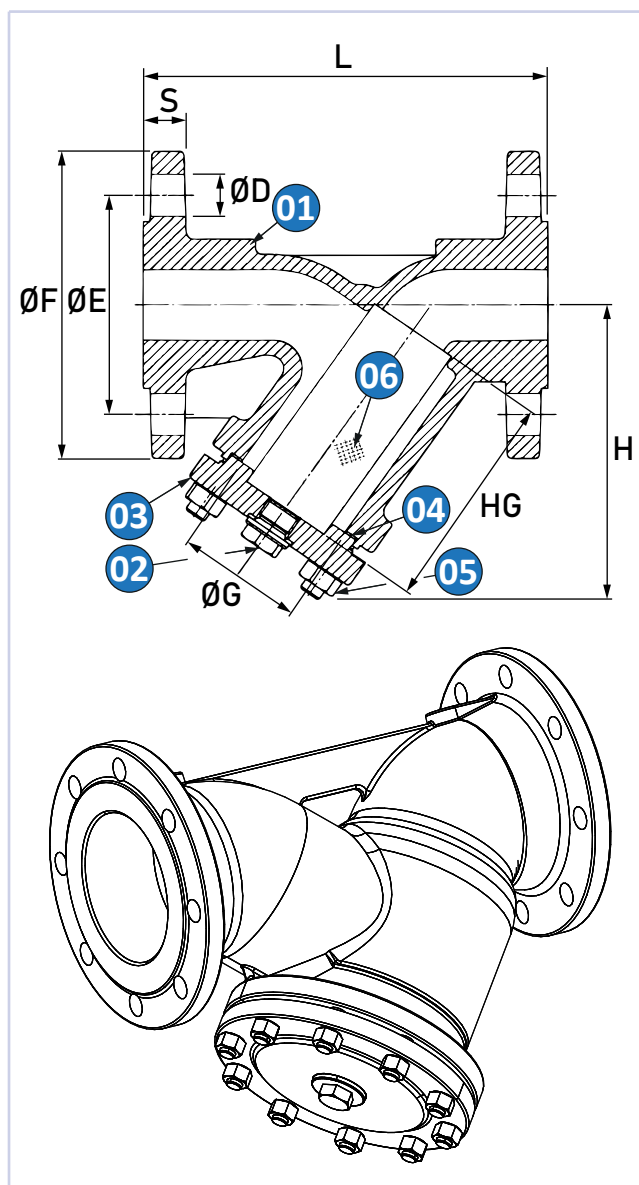
Failure to install filters and anti-vibration mounts can cause obstruction, breakage and noise problems for which the manufacturer may not be held responsible.



5.1.3 Metal mesh filter

efficiency pack 4	Approximate cooling capacity in vers. "cooling only" [kW]	Filter size
GLE658_S_L_Q	695	5" FLANGED
GLE748_S_L_Q	765	6" FLANGED
GLE818_S_L_Q	838	6" FLANGED
GLE900_S_L_Q	958	6" FLANGED
GLE942_S_L_Q	1063	6" FLANGED
GLE1072_S_L_Q	1116	6" FLANGED

5.1.3.1 Metal mesh filter in cast iron



Cast iron strainer in GG25
 Flanged PN16 according to EN1092-2 (ex DIN2533)
 Lengths according to EN558-1 series 1 (ex DIN3202 F1)
 Epoxy coating (min. 200µm)
 Steel strainer in SS304 with round holes mesh
 Hole diameter 1,5mm up to DN≤150, 2,0mm above
 With threaded drain (from 1/2" to 1" depending on the sizes)
 TR CU 010 compliant
 GOST compliant
 Optional WRAS compliant version available (DN32-DN500)
 Working conditions: water, from 0°C to +120°C

Part List			
n.	Component	Material	Norm
1	Body	Cast Iron	GG25
2	Drain cap	Cast Iron	GG25
3	Bonnet	Cast Iron	GG25
4	Gasket	Graphite	-
5	Nuts	Carbon steel	A3
6	Filter	Stainless steel	SS304

Dimensions									
DN	ØF (mm)	ØE (mm)	S (mm)	NxØD (mm)	L (mm)	H (mm)	HG (mm)	ØG (mm)	Weight (kg)
032	140	100	18	4x18	180	111	90	37	6,2
040	150	110	18	4x18	200	128	100	44	7,5
050	165	125	18	4x18	230	140	120	54	10,8
065	185	145	18	4x18	290	161	130	68	15,5
080	200	160	20	8x18	310	187	150	88	20,2
100	220	180	20	8x18	350	215	175	106	26,8
125	250	210	22	8x18	400	249	200	133	37,1
150	285	240	22	8x23	480	292	235	158	56,1
200	340	295	24	12x23	600	361	290	208	90,6
250	405	355	30	12x27	730	429	345	258	144,0
300	460	410	30	12x27	850	492	400	308	185,0
350	520	470	36	16x27	980	595	492	342	294,0
400	580	525	38	16x30	1100	673	552	412	388,0

5.1.4 Flow switch installation

GLE units are supplied with loose delivered flow switch, already mounted on a suitable steel pipe, which must be installed on the unit.

The pipe has a minimum length suitable for guaranteeing the correct distance from curved pipe sections in the system. Please refer to the dimensional drawing.

A horizontal arrangement of the pipe on which it is mounted is mandatory, to avoid mishaps. To install the flow switch:

- connect the pipe, by means of a vic-taulic coupling, to the unit inlet connector;
- wire the flow switch to the electrical panel as indicated in the wiring diagram.

It is critically important to connect the socket with the flow switch as required to the connector marked "Water inlet".

5.1.5 Hydraulic connection to the plate heat exchanger

⚠ ATTENTION

It is critically important that water inlet occurs at the connection marked with the words "Water Inlet".

Otherwise, there would be a risk of freezing the plate heat exchanger, since there would be no control by the antifreeze thermostat and the countercurrent circuit operation requirement during cooling would not be met - with added risks of malfunctioning.

The dimensions and the position of the hydraulic connections are shown in the dimensional tables and in the assembly drawings of this manual and of the attached documents

⚠ ATTENTION

- The hydraulic circuit must be designed in such a way as to guarantee the consistency of the rate water flow (+/- 15%) to the exchanger in all operating conditions.
- On the units GLE a device is provided for controlling the water flow (paddle type flow switch) on the hydraulic circuit, in the immediate vicinity of the plate heat exchanger. If this device is tampered with, the guarantee is no longer valid.
- It is strongly recommended to install a safety valve on the hydraulic circuit (already installed if there is an expansion tank). In case of severe system faults (e.g. fire) it will allow the system to be drained, avoiding possible explosions. Always connect the outlet to a pipe with a diameter not smaller than that of the valve opening, and direct it to areas where the jet is not likely to harm people. For units equipped with an

(optional) storage tank or pump kit(s), it is part of the standard equipment.

⚠ DANGER

During hydraulic connection operations, never work with naked flames near or inside the unit.

The compressors' action is intermittent, as the refrigeration requirements of the user may not match the supply from the unit. In systems with a low water content, where the water thermal inertia effect is less sensitive, it is advisable to check that the water content of the delivery section to the users matches the following ratio:

$$V = \frac{C_c \times \Delta T}{\rho \times Sh \times \Delta T \times N_s}$$

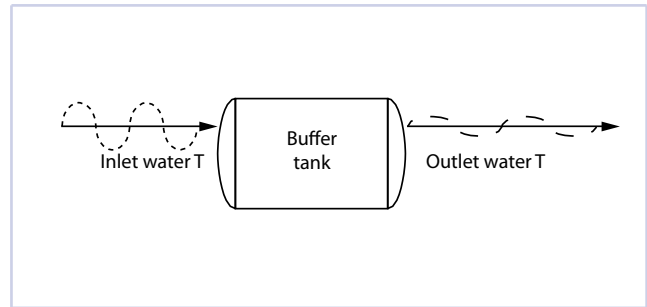
V	water content in the user section [m ³]
Sh	fluid specific heat [J/(kg·°C)]
ρ	fluid density [kg/m ³]
ΔT	minimum time between 2 restarts of the compressors [s]
ΔT	permitted waterT differential [°C]
Cc	refrigerating power [W]
Ns	No. of partial loading steps

Regardless of their configuration, all the groups have a single external hydraulic connection (inlet + outlet). This is an important factor which shortens on-site connection times. Normally, each group is provided with a flow switch which immediately stops the group in case of faults, thus preventing the plate heat exchanger from freezing or being damaged. A water temperature probe is also provided on the outlet side of the plate heat exchanger, which is connected to the antifreeze thermostat.

For all groups there are options that allow various configurations to be created with:

- single or double pumps for applications at -10°C and with maximum 40% ethylene and propylene glycol (available for applications with > 40% glycol on request, by contacting the design department);
- storage tank at the hydraulic circuit outlet end. This system facilitates the balancing of the inevitable temperature fluctuations due to the modulating action of the compressor.

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.



5.1.6 Tank filling mode

⚠ ATTENTION

The tank, if present, 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.** Drain the expansion tank until pressure is 0.5 bar
- B.** Charge the system and pressurise it up to about + 1 bar at the pump suction end (pump not running)
- C.** Vent the system
- D.** Check the pump suction pressure (about 1 bar) and start the system
- E.** Stop the pump after 15-30 minutes and repeat from point c) until there are no more noises caused by air in the system.

5.1.7 Filling the system

- Before you start filling, make sure that the system draining tap is closed.
- Open all the air vent valves of the system and of the indoor units and chiller.
- Open the system regulating devices.
- To fill the circuit open slowly the water tap of the system (optional).
- When water starts coming out of the air vent valves of the indoor units, close them and continue filling until the pressure gauge reading is 1.5 bars.

5.2 ELECTRICAL CONNECTIONS

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

⚠ WARNING

All operations must be performed by qualified personnel, in compliance with the regulations applicable in the country of installation. For any electrical intervention, please refer to the information shown on the wiring diagram attached to the unit.

⚠ ATTENTION

Check that the mains voltage matches the unit rated data (voltage, phase number, frequency) stated on the data plate on the machine. The input voltage must not undergo fluctuations greater than ± 5% and the unbalance between individual phase voltage values must always be below 2%.

⚠ WARNING

Operation must occur within the above voltage value range, otherwise, the guarantee will no longer be valid.

⚠ ATTENTION

It is the installer's responsibility to choose the power connection cable and to dimension the line protection systems on the basis of the electrical data declared in the silver label and in the wiring diagram supplied, in compliance with the regulations applicable in the country of installation. The wiring diagram shows the data and minimum requirements that may help the installer select a cable and carry out correct dimensioning of the protection devices.

⚠ ATTENTION

No provisional supply or site supplies are allowed, subject to the immediate loss of validity of the guarantee.

The electrical control panel is designed and wired according to the declaration of conformity enclosed with the unit, completed

in accordance with the regulations in force in the country of installation.

To access the electrical control panel and its components, it is necessary to open the external panel provided with pneumatic lifting pistons that keep it in its locked position. However, before opening the unit, disconnect it from the power supply by turning the red main disconnect switch. All remote and auxiliary controls have 24V voltage supplied by an insulating transformer located in the electrical control panel. The position of the general disconnect has been chosen in order to facilitate wiring operations locally and avoid difficulties in leading the wires through and routing 3+1 power cables.

All components are protected against overload and short circuits. An optional factory setting for automatic thermal protections for all loads can be selected. In any case, thermal protection consisting of a set of thermal sensors in a chain configuration on all connected electric motors is provided as standard. In addition, the compressors are controlled by their respective on-board electronics that also control the oil and phase sequence alarms.

All the devices are usually provided with a general phase sequence relay which, in addition to ensuring internal protection, also ensures the correct operation of the compressor(s) when the correct phase indications are not observed. The degree of protection of the unit is IP54 and when the electrical panel is open it still meets IP20 protection class requirements, thanks to the plastic cover on the front of the electrical distribution panel. The preliminary checks and the electrical connections to be made are as follows (**refer also to the document "First start up instructions", supplied with the unit**):

- Open the main disconnecting switch.
- Insert the power cable through the special hole provided on the left side of the unit (by first removing and drilling the square plate according to the diameter of the electric cable) and lock it with a cable gland.
- Connect the power supply and the earth cable to the terminals of the main disconnect switch.
- Open the protections of the installed compressors to prevent that, in case of a wrong phase sequence, they start in the wrong direction.
- Apply voltage by turning the main switch to ON.
- Check the correct L1 - L2 - L3 direction of the phase wires by checking on the phase sequence relay that the green indicator lights up for voltage presence and also the yellow one for the correct sequence; if this does not happen, disconnect power supply to the machine on the external distribution panel, exchange two phase wires and repeat the operation. **IN NO CASE SHOULD THE WIRING DOWNSTREAM FROM THE GENERATOR BE ALTERED**, because doing so could jeopardize the correct sequence of other devices, for example the pump(s).
- Close the compressor protections.
- 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.

Power supply to the control circuit is derived from the power line via an insulation transformer located in the electrical control panel.

The control circuit is protected by special fuses or magnetothermal switches.

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.

ATTENTION

In the event of units equipped with an inverter, as regards the differential electrical protection to be installed upstream, it is necessary to use a type B circuit-breaker that is sensitive to impulsive and direct currents. It is preferable that it has the following characteristics:

- adjustable activation threshold, with a minimum activation threshold of 0.3 A and maximum activation threshold depending on the type and number of inverters and other components installed in the unit;
- adjustable operation delay;
- dedicated switch for the heat pump only.

The differential protection adjustment must be compatible with the type of inverter used and obviously, comply with the legal provisions in force in the country of installation.

It will therefore be necessary, during installation, to check the suitability of the room and the installation setting; any liability for non-compliance may not be attributed to the heat pump/chiller manufacturer.

As far as the main isolating circuit breaker is concerned, an input voltage automatic switching system is provided, padlockable in the OFF position to allow for maintenance, but no external disconnecting operations are required. If an emergency disconnection system is deemed necessary, it must be set up externally during installation. This must be provided by the installer.

The short-circuit current is assumed to be $I_{cc} = 6$ kA. If I_{cc} is higher at the point of installation, the installer is requested to provide an adequate circuit breaker system.

In any case, refer to the laws and regulations in force in the country of installation.

5.2.1 Electrical wiring of the circulation pump

For all units of series GLE, the pump kits, if selected during the ordering phase, are pre-wired. For the double pump kits, whether in the "AND" or "OR" versions, the rotation is managed on a time/fault basis.

WARNING

The pump must be started before the chiller starts and stopped after the chiller has stopped (recommended minimum delay: 60 seconds.) If available as an option on the machine, this function is already carried out by the on-board microprocessor.

5.2.2 External enabling controls

If you wish to perform remote ON-OFF controlling of the unit, it is necessary to remove the jumper between the contacts shown on the wiring diagram and connect external enabling to these same terminals (refer to the attached wiring diagram). The subsequent enabling of the "REMOTE" function via the switch in the electrical panel is only possible if a basic type microprocessor control is used.

If the unit can be used in both the cooling and the heating modes, to carry out remote switching between summer and winter modes it is necessary to remove the jumper between the contacts shown on the wiring diagram and connect external enabling to these same terminals (refer to the attached wiring diagram). The switching modes are different as a function of changes in the microprocessor control - which can be of a basic or an advanced type: detailed instructions are given in the microprocessor user manual, which is an integral part of the documentation supplied.

WARNING

All external controls and enabling signals at very low 24 Vac

voltage are supplied by the insulation transformer available on the control panel.

5.3 ELECTRICAL DATA

For the electrical data of each specific configuration, refer to the silver plate on the unit and to the wiring diagram supplied.

 **WARNING**

Please be reminded that the electrical components of the

unit are dimensioned according to electrical absorption at maximum system PS, i.e. at the maximum admissible pressure (or design pressure) for which the unit has been designed. This also includes safety accessories and electrical cables.

5.4 HYDRAULIC AND REFRIGERATION DIAGRAMS

To view the hydraulic and refrigeration diagrams, please refer to the documentation supplied with the unit.

6 MICROPROCESSOR CONTROL

 **WARNING**

To obtain access to all the information related to unit switching on and off, its use, the setting of the working set-point, the display of the alarms and all the parameters related to microprocessor control, possibly linked to customer specifications details, please refer to the dedicated "Microprocessor Manual", supplied with the unit.

7 START-UP

This paragraph provides the necessary instructions that must be followed for correctly starting the unit.

WARNING

7.1 PRELIMINARY CHECKS

Before starting the unit it is necessary to carry out the following checks:

- check that all the taps in the cooling circuit are open (liquid line) and that the flow switch is closed, by entering the status menu of the digital inputs;
- check that electrical wiring has been carried out correctly and that all the terminals are tightened hard (see paragraph 5.2 Electrical connections p. 28);
- after checking that the unit is powered, check that voltage at the terminals complies with the value indicated on the silver label and the corresponding tolerance; then check that the yellow phase sequence relay light (if any) is lit. The phase sequence relay is marked RSF and failure to observe the sequence will not enable a machine start;
- make sure that there are no refrigerant leaks due to accidental impacts during transport and/or installation;
- check the correct power supply to the enclosure resistors if present.

WARNING

The introduction of compressor casing resistances, if any, must be done at least 12 hours before the first start-up; it then occurs automatically when the main disconnect switch is closed. They are intended to increase the

7.2 OPERATING LIMITS

The following tables and graphs describe the continuous operation limits of the units.

WARNING

Non-compliance of these limits makes it null and void the stipulated warranty contract.

WARNING

Depending on the working conditions of the unit, it may be mandatory to adopt some devices supplied as options. Please refer to the indications given in the key to the operating limits diagrams.

WARNING

The envelopes shown in the following diagrams refer to the general standard range. The choice of different available options can lead to changes in the corresponding envelope. Please refer to the specific technical selection.

ATTENTION

Standard units with pure water are not designed to operate with chilled water temperatures below 5°C at the plate heat exchanger output. Water can be produced at temperatures below 5°C and down to -10°C using glycolate solutions that lower the freezing point, as shown in paragraph 7.3 Thermal carrying fluid p. 35.

In this occurrence, it is necessary to contact the manufacturer's design department to set up the unit appropriately.

The main limits regarding the operation of the units GLE are:

- Heat transfer fluid: only water or glycol + water mixture with no more than 40% anti-freezing agent
- Water operating pressure: refer to the silver label on the unit

In any case, please also refer to the document "First start up instructions" and to the Microprocessor Manual, supplied with the unit.

temperature of the oil in the sump, thus limiting the amount of refrigerant dissolved in it and ensuring that the desired lubrication characteristics are preserved.

- 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.

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.

- Check that the hydraulic connections have been performed correctly, in accordance with the indications on the data plates on-board the machine (correct inlet and outlet connectors). Please refer to paragraph 5.1 Hydraulic connections p. 25.
- Check that the hydraulic system has been vented, bleeding any residual air, filling it gradually and opening the venting devices at the top - which the installer must have prepared in advance.
- Check that all the conditions specified in this manual have been observed, among which the working limits and the characteristics of the heat transfer fluid, as will be explained further on.

- Input voltage: $\pm 5\%$ of the rated voltage
- Maximum storage temperature: refer to the silver label on the unit and the accompanying declaration of conformity
- Minimum storage temperature: refer to the silver label on the unit and the accompanying declaration of conformity

WATER FLOW AT EVAPORATOR

The rated flow rate is linked to the temperature difference of 5°C between the water inlet and outlet, in relation to the cooling capacity supplied at rated water (12/7°C) and air (35°C) temperatures. Always refer to the technical selection conditions of the unit.

The maximum permitted flow rate is that featuring a temperature difference of 3°C: higher flow rates, while being admissible, will cause unnecessarily high pressure drops.

The minimum admissible flow rate features a temperature difference of 8°C or a minimum pressure drop equal to 10 kPa: lower flow rates will cause a reduction in the heat exchange coefficients and too low evaporation temperatures, with the resulting possible activation of the safety devices and unit shutdown.

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.

ATTENTION

Units are designed to operate with water and air temperatures fixed by operating limits. Operation beyond these

limits may cause irreparable damage to the units.

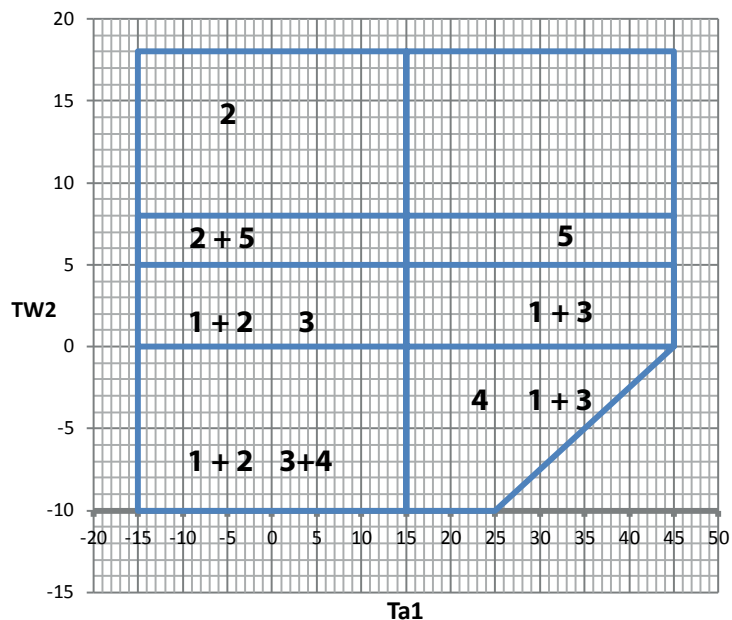
⚠ ATTENTION

The units are designed to operate in a closed hydraulic circuit. In the case of open tanks, it is advisable to contact the

design department which will indicate the best solution to adopt, such as uncoupling the exchanger.

7.2.1 Operating limits in chiller mode

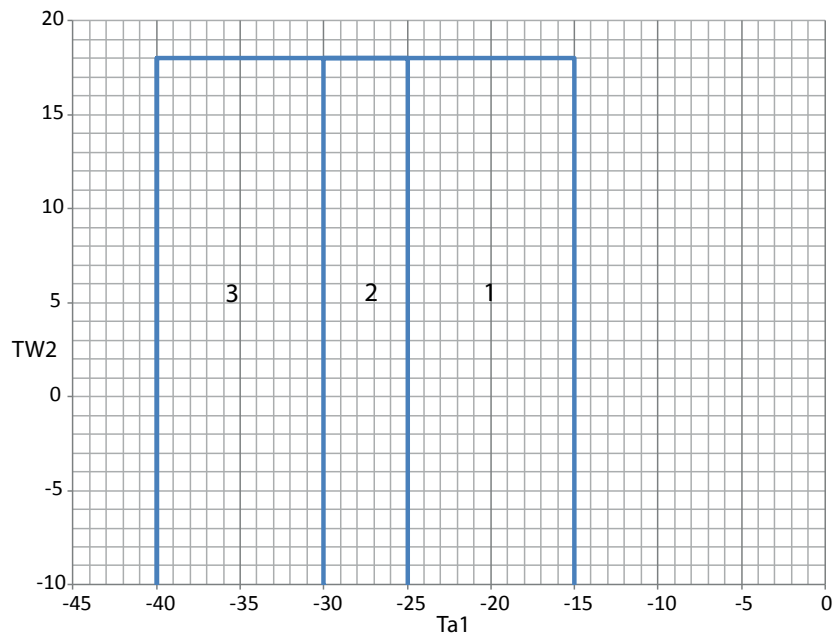
» Operating limits in chilling mode



- Ta1** Outside air temperature
- TW2** Water outlet temperature
- 1** Glycol mix on source side
- 2** Condensation control
- 3** Counter flow on user side
- 4** Custom version on request
- 5** Pure water only if counter-flowing

7.2.2 Operating limits in Free-cooling mode

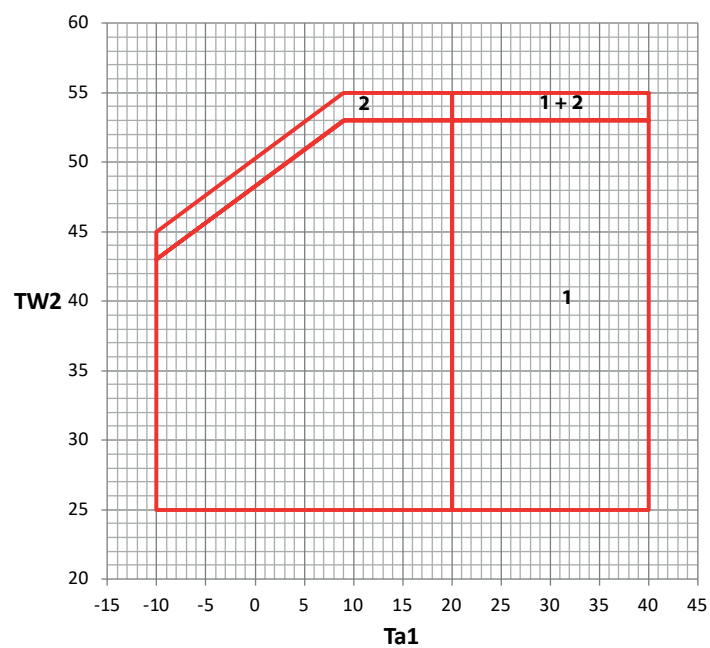
» Operating limits in Free-cooling mode



- Ta1** Outside air temperature
- TW2** Water outlet temperature
- 1** Standard Free-Cooling
- 2** Free-Cooling with kit -30°C
- 3** Free-Cooling with kit -40°C

7.2.3 Operating limits in heat pump mode

» Operating limits in heating mode



- Ta1** Outside air temperature
- TW2** Water outlet temperature
- 1** Evaporation control
- 2** $\Delta T > 7^\circ\text{C}$ user side

7.3 THERMAL CARRYING FLUID

The units of the series GLE can work with mixtures of water and glycol, with percentages of the latter up to 40%. If this percentage is exceeded, please contact the sales department for a special selection of pumps.

⚠ ATTENTION

Using glycol is necessary in all cases in which the temperature of the heat transfer fluid drops below 5°C, i.e. even

when the unit is switched off or only running in summer mode, should this temperature condition occur. This will prevent water freezing and the resulting internal damage to components.

The percentage of glycol must be selected according to the lowest expected temperature. In the following tables, the freezing temperatures of the mixture are given as a function of the glycol content and the recommended amount of glycol - respectively.

% by weight of glycol	Freezing temperature of the mixture with ethylene glycol (°C)	Freezing temperature of the mixture with propylene glycol (°C)
0	0	0
10	-3	-3
15	-5	-5
20	-8	-7
25	-11	-10
30	-14	-13
40	-22	-21
50	-34	-33
60	-48	-51

Minimum water production temperature	°C	5	2	1	-3	-6
Glycol percentage by weight	%	0%	10%	15%	25%	30%

The use of glycol will determine a change in terms of heating capacity, water flow and pressure drop. The corrective factors to

be used according to the percentage of glycol are shown in the following table.

Glycol percentage by weight	%	0%	10%	20%	30%	40%
ETHYLENE-BASED	Developed heat capacity correction factor	1,00	1,00	0,99	0,99	0,98
	Water flow rate correction factor	1,00	1,05	1,09	1,14	1,20
	Pressure drop correction factor	1,00	1,16	1,35	1,58	1,86
PROPYLENE-BASED	Developed heat capacity correction factor	1,00	1,00	0,98	0,97	0,96
	Water flow rate correction factor	1,00	1,02	1,04	1,07	1,10
	Pressure drop correction factor	1,00	1,11	1,31	1,53	1,78

Another very important aspect for the protection of your machine is the type of water used in the system. Depending on the water quality, limescale buildup can form (solid deposits, usually of calcium carbonate), most commonly on the heat exchanger. This means that high concentrations of calcium carbonate can cause scaling.

For this reason, it is necessary to treat (by softening/desalting, neutralization, pH stabilization) the heating water of an installation.

To fill the heating systems, it is advisable to comply with the applicable regulations in force, in particular the VDI-2035 standard. The values of dissolved substances and the water characteristics recommended by the manufacturer are shown below. The data refer to the use of copper, AISI 304 or AISI 316 exchangers.

WATER CONTENT	CONCENTRATION (ppm)
Alkalinity (HCO ₃ ⁻)	70 - 300
Sulphate (SO ₄ ²⁻)	< 70
HCO ₃ ⁻ / SO ₄ ²⁻	> 1.0
Electrical conductivity	10 - 500 µS/cm
pH*	7.5 - 9.0
Ammonium (NH ₄ ⁺)	< 2
Chloride (Cl ⁻)	< 30
Free chlorine (Cl ₂)	< 0.5
Hydrogen sulphide (H ₂ S)	< 0.05
Carbon dioxide (CO ₂)	< 5
Total hardness (°dH)	4.5 - 8.5
Nitrate (NO ₃ ⁻)	< 100
Iron (Fe)**	< 0.2
Aluminium (Al)	< 0.2
Manganese (Mn)**	< 0.05
Calcium carbonate (CaCO ₃)	< 200
Phosphate (PO ₄ ³⁻)	< 2
Ammonia (NH ₃)	< 0.5
Temperature (°C)	< 65 °C
Oxygen content	< 0.1

*Generally a low pH value (less than 6) increases the risk of corrosion and a high pH (above 7.5) decreases the risk of corrosion
 **Fe³⁺ and Mn⁴⁺ are powerful oxidants and may increase the risk of localized corrosion on stainless steel

7.4 START-UP

Before starting up, close the main disconnecter switch, select the desired operating mode on the control panel and press the "ON" key on the control panel (refer to the document "**First start up instructions**", supplied with the documentation).

The group will start if an enabling signal is received:

- linked to safety devices related to the water circulation pump(s);
- of the flow switch;
- of the plant backflow water temperature sensor [chiller inlet];
- that there are no active alarms.

If a start is controlled:

- switch the main disconnecter to ON;
- the pump will start immediately;
- after 60 seconds the compressor starts;

- 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;
- seal the unit with all the screws and panelling supplied.

If the unit does not start, check that the set point or the thermostat are set to the desired values.

WARNING

The commissioning of the unit must comply with the statutory regulations of the State where the machine is installed. The responsibility for correct use is exclusively ascribable to the user.

To ensure a correct shutdown of the unit, please refer to the paragraph 7.7 Group stop p. 37.

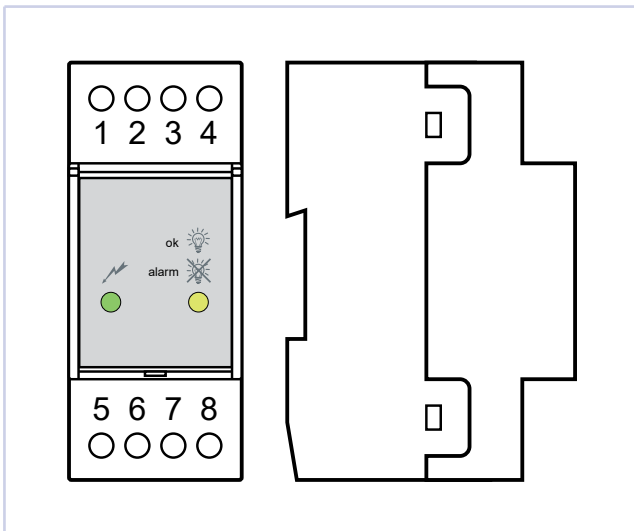
7.5 INSPECTIONS DURING OPERATION

- Check the correct phase sequence by means of the phase sequence relay (a) provided in the electrical control panel: if it is not correct, switch off voltage and reverse two phase wires at unit inlet. Never alter the internal electrical wiring, otherwise the warranty will be voided.

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 at the user exchanger inlet (return flow from the system) is close to the set value. The time required to reach steady state conditions depends on the starting conditions, the system size and the load conditions.



7.6 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.

Check that no large amounts of bubbles appear in the liquid viewing window. A continuous and intense flow of bubbles may indicate low levels of refrigerant which may need topping up. In any case, the presence of some bubbles is allowed, especially if a high glide ternary mixture is used as refrigerant.

After a few minutes from compressors start-up, check (during operation as a chiller) that the end-of-condensation temperature shown on the pressure gauge (refer to the scale of the refrigerant pressure gauge in use and marked with the initials D.P. - Dew Point) is about 16 - 22°C (depending on the type of unit and load conditions) above the temperature of the condenser inlet air with the fans forced to maximum speed.

Also check (during operation as a chiller) that the end-of-evaporation temperature shown on the pressure gauge (refer to the

scale of the refrigerant pressure gauge in use, marked with the initials D.P. - Dew Point) is about 3.5 - 4°C lower than the water outlet temperature from the evaporator.

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

- detect the temperature indicated by a contact thermometer placed on the compressor intake pipe;
- 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).

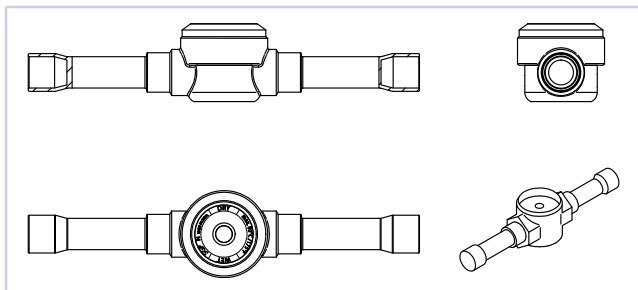
The difference between the temperatures determined in this way indicates the overheating value.

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

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



The difference between the Dew Point and Bubble point temperatures is known as "GLIDE" (gliding) and it is typical of refrigerant mixtures. If pure fluids are used, the phase change takes place at a constant temperature and therefore, the Glide is equal to zero. In caso of using HFC R454B (mixture 68,9%-31,1% of R32/R1234yf) must be considered 1°C of Glide.

⚠ ATTENTION

Any charge top-ups must be carried out with refrigerant of the same type as that indicated on the plate, by specialised personnel and exclusively in the liquid phase.

⚠ ATTENTION

The R454B refrigerant requires "POE" polyolester oil of a type approved by the compressor manufacturer. For no reason should mineral oil be introduced in the circuit.

7.7 GROUP STOP

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.

⚠ ATTENTION

It is recommended not to power off the unit via the mains power switch during regular shutdowns, but only in case of expected prolonged idle times (e.g. seasonal stops). The mains switch must be used to cut the unit off from the power supply when there is no current flow, i.e. when the unit is in the OFF state.

Additionally, by completely disconnecting voltage to the unit:

- any casing resistances would not be powered - which would damage the compressor upon its next start
- the only antifreeze protection would be the presence of glycol. If the unit is powered, the antifreeze protection is linked to the presence of the antifreeze option (if present).

8 CONTROL AND SAFETY DEVICES

All control equipment is calibrated and tested at the factory before shipping the machine. However, after the unit has been operating for a reasonable period of time, it is advisable to check the operating and safety devices.

DANGER

All service operations on the control equipment must be

carried out EXCLUSIVELY BY QUALIFIED PERSONNEL: incorrect calibration values can cause serious personal injuries and damage the unit.

Many of the operating and calibration parameters of control systems are set by microprocessor control and are password protected.

8.1 CONTROL DEVICES

8.1.1 Service thermostat

The service thermostat activates and deactivates the operation of the compressor, depending on chilled water (operation as a chiller) or heated water (operation as a heat pump) requirements, via a probe located at the inlet or outlet of the water exchanger. This device is managed by the microprocessor control and operates with a proportional band of adjustable width. For

further details please refer to the control manual.

8.1.2 Control device settings

The calibration values of the control devices set by default for the specific unit are contained in the document "Parameter List", made available to customers by the manufacturer.

8.2 SAFETY DEVICES

On each refrigerant circuit, according to the volumetric capacity of the installed compressors, the PED (Pressure Equipment Directive 2014/68/EU) category of the machine and the refrigerant circuit configuration, there are safety devices for the refrigeration circuit as prescribed by the 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.

According to this standard, on a case by case basis, on the high and low pressure sides of each refrigerant circuit safety venting valves can be provided, connected to an exchange tap, to protect the pressurised parts and programmed to be activated when the maximum pressure setting is reached on the corresponding side (PS).

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

During normal use, high pressure at the compressor outlet is limited by the high pressure switch, set to the maximum working pressure of the compressor itself, which depends on the unit model and is equal to the PS, in compliance with the UNI standard EN 378-2.

All the safety devices installed on the units are listed and described here below.

8.2.1 High pressure switch

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

To check its operation, shut the air flow in the condensers with the compressors running, and check on the compressor delivery pressure gauge (previously installed) that the pressure switch (compressor stop) is activated when the calibration value is reached.

ATTENTION

Any shutdown or alarm must be reported immediately to the service department.

ATTENTION

Do not attempt to change the maximum pressure switch

pre-setting. If the pressure switch is not activated after a pressure increase, the vent 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 7.7 Group stop p. 37. See also the paragraph 5.1.6 Tank filling mode p. 28.

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 8.1.2 Control device settings p. 38).

ATTENTION

The high pressure switch connector does not have the refrigerant sealing needle. Do not unscrew the device: this would cause the refrigerant to flow out of the refrigerating circuit.

8.2.2 Low pressure protections

To ensure protection against low pressure, the units are equipped with a low pressure switch that stops the compressor when the suction pressure falls below the calibration value for a set time.

Resetting is controlled manually and must be carried out by the user via the display.

As an antifreeze protection, a pressure probe is also provided which stops the unit as soon as the pressure falls below the calibration value for a set time.

For more information related to the operation, the calibration values and the set delays, please refer to the microprocessor manual and the document "Parameter List", supplied with the unit.

8.2.3 Compressors timing

The compressor switching on and off timing schedules programmed by the manufacturer on the units guarantee correct operation of the compressors and an increased durability and stability of the system. They establish:

- the minimum activation time of a compressor, which must remain on for a time equal to the set time;

- the minimum shutdown time of a compressor, which is not powered back on unless the minimum selected time has not elapsed since the last power-off;
- the delay time between two power-on requests of different compressors, i.e. the minimum time that must elapse between two power-ons of the devices independently of the detected measurement and the setpoint;
- the delay time between two successive power-ons of the same compressor, the minimum time that must elapse between two power-ons of the device.

The purpose of the minimum time intervals is to stabilize the operation of the compressors, ensuring adequate circulation of the oil in the refrigerant circuit and preventing too frequent compressor stops and starts, limiting the maximum number of starts per hour.

For more information related to the operation, the calibration values and the set delays, please refer to the microprocessor manual and the document "Parameter List", supplied with the unit.

⚠ ATTENTION

Never change the factory preset time interval: values other than the default ones may cause serious damage to the unit.

8.2.4 Antifreeze thermostat

The antifreeze sensor, located at the outlet of the plate heat exchanger, detects any temperatures that are too low and stops the unit operation.

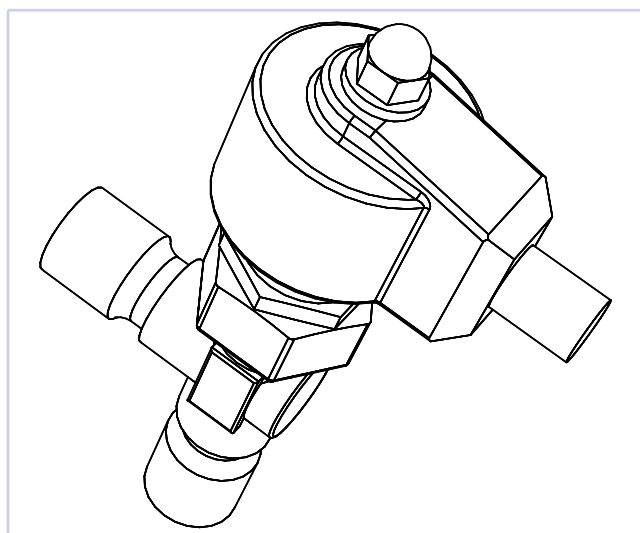
This function, together with the flow switch, the low pressure switch and the low pressure probe, protects the exchanger against the risk of freezing due to faults in the hydraulic circuit. This device is a feature included in the microprocessor control, for further details refer to the control manual.

⚠ ATTENTION

In the presence of alarms related to the activation of the described protections, the user must request technical assistance, otherwise the guarantee will lapse.

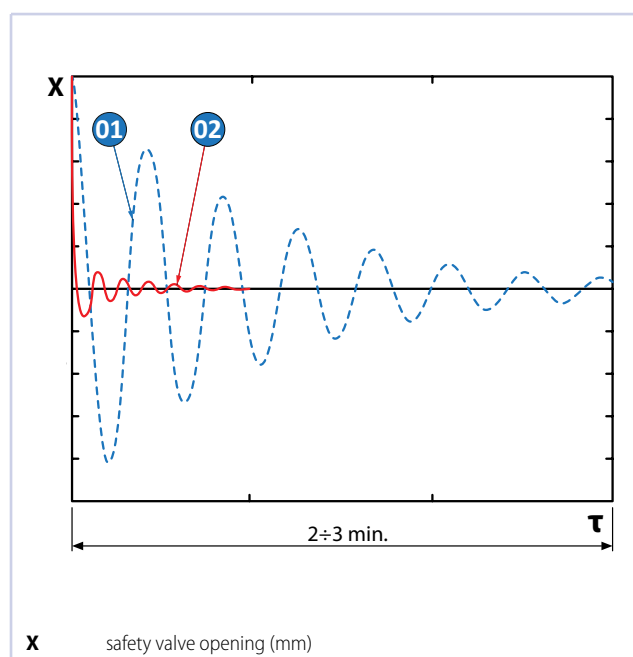
8.2.5 Expansion valve

On all units GLE the electronically controlled expansion valve (a) is fitted as part of the standard equipment. 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 ① is designed to be in a transient state for 2-3 minutes before reaching its equilibrium condition. E.g.:

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



If, on the other hand, there is an electronic expansion valve ②, in case of a compressor switch on or off request:

- the electronic driver pre-positions the valve at a point very close to that of final balance
- the state of balance is quickly reached by small adjustments
- the expansion valve becomes an active and no longer passive system component
- the transient state lasts for a very short time
- globally, the system is more efficient, with higher EER values and therefore, with more considerable savings.

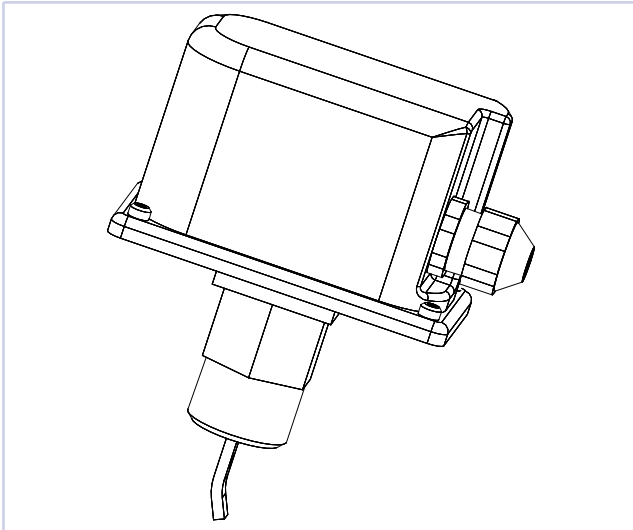
8.2.6 Safety device settings

The calibration values of the software and mechanical safety devices are visible respectively:

- in the "Parameter List" document, made available to customers by the manufacturer;
- in the silver label provided on the unit.

8.2.7 Water differential pressure switch

The paddle flow switch, supplied pre-mounted and wired or separately as part of the equipment, according to the different models, stops the unit in case of excessive reduction of the water flow, preserving it from frosting (operation as a chiller) and excessive condensation temperatures (operation as a heat pump).



8.2.8 Water safety valve

The water safety valve opens when the pressure within the water circuit reaches a level that may cause damage to the unit.

8.2.9 Refrigerant sensors

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

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.

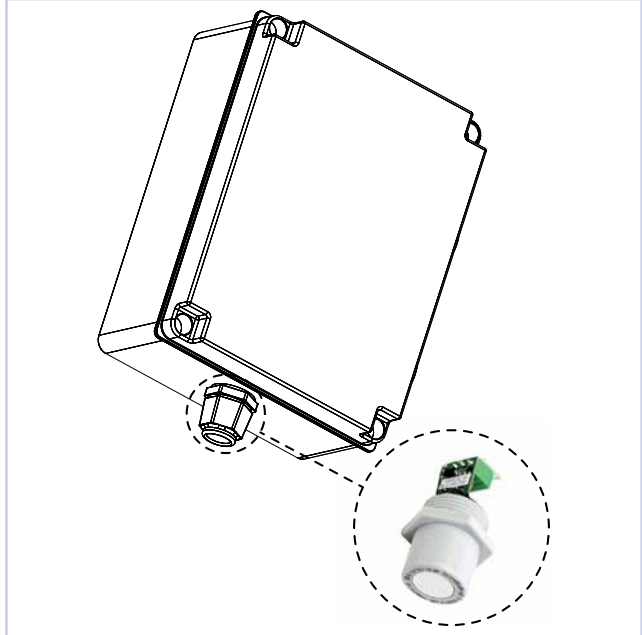
The control board functions are communication and supply of the gas sensors.

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.

» Refrigerant sensor A2L



9 ROUTINE MAINTENANCE AND CHECKS

To keep the unit in good working order and guarantee the expected levels of performance and safety, it is necessary to carry out some periodic routine checks: some may be performed directly by the user while others must be carried out solely by

specialised personnel.

In any case, the regulations in force in the country of installation must always be complied with.

9.1 CHECKS TO BE PERFORMED BY THE USER

Operating these machine basically requires just switching on, switching off and seasonal switching between cooling and heating operation.

All other operations are maintenance tasks and must be performed by qualified personnel who are able to operate according

to the laws and regulations in force.

ATTENTION

Pay special attention when working near the finned exchangers as the aluminium fins are very sharp.

9.2 CHECKS AND MAINTENANCE TO BE PERFORMED BY SPECIALISED PERSONNEL

The periodic inspections that must be performed by qualified and authorised personnel are indicated in the following chapter.

DANGER

- All the operations described in this section **MUST ALWAYS BE PERFORMED BY QUALIFIED PERSONNEL**.
- 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 the provisions of paragraph 7.2 Operating limits p. 32.
- Before performing any work on the unit or accessing internal parts, be sure to have disconnected power 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.
- Pay special attention when working near the finned exchangers as the 0.11 mm thick aluminium fins can cause superficial cuts.
- After maintenance operations, always close back the unit using the provided panels, fixing them with their tightening screws.

- For the safety of the maintenance staff in charge of the groups GLE, it is essential to switch off the unit from the main switch before carrying out maintenance operations.

To preserve the unit from possible faults and guarantee its correct operation over time, it is necessary to regularly carry out the inspections shown in the following table.

WARNING

This table shows the inspection schedule recommended by the manufacturer to ensure the expected performance and safety levels. For information on the inspection schedule and methods required at regulatory level, especially for the prevention of refrigerant leaks, the main European reference standards are EN-378 and the European F-Gas Regulation No. 517/2014. If there is a national regulation, reference should be made to it.

The following table is for general guidance: please do not consider any operations involving components not present in a specific model.

All the following procedures must be performed in compliance with the safety regulations described in this manual.

ACTION		MAINTENANCE FREQUENCY			
		1 month	3 months	6 months	1 year
UNIT	Check that no unusual noise is emitted by the machine and in particular, that there are no vibrations and/or beating.			✓	
FANS Caution: do not access the fan while the fan wheel is in operation	Check for dirt, damage, corrosion, wear and ensure correct fixing.	✓			
	Check for any noise of the bearings and the balancing of the shaft.	✓			
	Measure current and power consumption.			✓	
	Check the electrical connections.		✓		
	Clean to preserve smooth functioning.		✓		
	Check the correct closing of the electrical box (if available).			✓	
AIR FILTERS	Check for dirt, damage, corrosion, and wear.	✓			
	Check the filter condition.	✓			
	Clean or replace if necessary.	✓			
	Perform checks more frequently in dusty environments.	✓			
	Check the efficiency of the differential pressure switch for dirty filters.			✓	
CONTROL SYSTEM	Check the correct installation and the winding conditions.	✓			
	Check the efficiency of the LEDs of the display control system and of the alarms.		✓		
	Check the connections for electrical and mechanical operation.			✓	
	Check the functional elements (e.g. operating controls and display devices).			✓	
	Check electrical/electronic and pneumatic input signals (e.g. sensors, remote controllers, control variables) to conform to normal values.			✓	
	Check the values in the parameter list (see the Microprocessor Manual).				✓
	Adjust the control function and control signals. Check the software cycle running (see the Microprocessor Manual).			✓	

ACTION		MAINTENANCE FREQUENCY			
		1 month	3 months	6 months	1 year
HUMIDIFIER	Check the cylinder filling and draining cycle.		✓		
	Check the water quality (conductivity and hardness).		✓		
	Check vapour production (vapour demand as opposed to actual vapour supply).		✓		
	Check the working hours of the cylinder; replace if the maximum permitted hour count is exceeded or if performance has fallen below standard. Reset the working hours after the replacement.		✓		
	Check the cylinder power consumption (current consumption of each phase compared to Tam readings).		✓		
	Check the electrical and cable connections: tightening, cable numbers.		✓		
SWITCH BOOTH POWER SUPPLY CIRCUITS Caution: the electric cables and electrical components of the air conditioner are live.	Check the power supply in all phases.			✓	
	Check the electrical connections and the mechanical function. Restore if not properly tightened.			✓	
	Check the power supply of all the terminals.			✓	
	Measure power consumption at all connected devices.			✓	
	Check, adjust and tighten the functional elements (e.g. operating controls and display devices).			✓	
	Check the safety equipment, e.g. thermal switch. Replace every 2 years.				✓
	Check the protective covers.				✓
CONDENSATE/FREECOOLING COOLING WATER	Check the tightening of the electrical terminals both inside the electrical panel and in the compressor terminal blocks. The mobile and fixed contacts of the contactors must be periodically cleaned and, if they show signs of deterioration, they must be replaced.				✓
	Check the cooling water circuit, check for damage, leaks and ensure correct fixing.	✓			
CONDENSATE/FREECOOLING COOLING WATER PUMP	Check the correct flow of water and clean the water filter.		✓		
	Make sure the water pump works correctly.			✓	
	Check the correct flow of water; clean the water filter.		✓		
	Check for internal air: bleed air if present from closed circuits.		✓		
	Check the safety equipment; water flow switch etc. - if present.			✓	
	Check the percentage of glycol by comparing the minimum annual ambient temperature.			✓	
REFRIGERATION CIRCUIT Fluoride based refrigerants increase the greenhouse effect and are expected to conform to restrictions and regulations, according to national and European standards.	Check the pumps for excessive noise.				✓
	Measure the pressures and working temperatures (to be performed by a refrigeration technician).			✓	
	Check the energy consumption, measure the heat temperature and check for unusual noise during operation.			✓	
	Make sure there is no frost formation in the evaporator and in the compressor.		✓		
	Check the operation of all the adjustment devices (power regulators, valves, etc.).	✓			
	Check the efficiency of the actuators.				✓
	Check the operation of the safety devices.			✓	
	Check the refrigerant charge, the liquid level indicator and the operating parameters (undercooling, overheating, high and low pressure, degree of valve opening). If the amount of refrigerant is not sufficient, it must be restored by refilling with fresh refrigerant.			✓	
	Check the oil level through the appropriate viewing windows.		✓		
	Perform a test to check the oil internal humidity level.				✓
FINNED PACK EXCHANGERS	Check the enclosure heater operation.			✓	
	Check the humidity indicator on the liquid indicator (green = dry, yellow = wet); if the indicator is not green, as shown by the indicator sticker, replace the filter.			✓	
FINNED PACK EXCHANGERS	If an external condenser or a Dry cooler is installed, refer to the appropriate manual.				
	In the case of internal heat exchangers, clean the finned pack with compressed air or brushes. If the unit is located in particularly dusty environments, perform the inspections more frequently.			✓	

ACTION		MAINTENANCE FREQUENCY			
		1 month	3 months	6 months	1 year
CHILLED WATER CIRCUIT	Check the filling of the hydraulic circuit, by venting it from the valves placed at the highest points.			✓	
	Make sure that there are no water leaks.			✓	
	Check for any air in the circuit: bleed air from the cooling water circuit using the special valve in the top part of the circuit.			✓	
	Check that chilled water supply is guaranteed.			✓	
	Check the water temperature and pressure at the inlet and outlet using thermometers and pressure gauges - if installed.			✓	
	Check the correct operation of the 2- or 3-way valve.			✓	
	Check the efficiency of the actuators.				✓
	Make sure that the system is filled with the prescribed amount of glycol and that there is no ice in the hydraulic circuit.			✓	
	In the event that there is a water leak and the circuit must be filled, make sure that the glycol concentration is correct.			✓	
	Check that the water circulation is as required.			✓	
	If the unit is expected not to be in operation for a long time, drain the water from the pipes and the machine, including the water exchanger if it is a Free-Cooling unit (if no glycol-based solutions are used). This operation is mandatory if ambient temperatures are expected to fall below the freezing point of the fluid used, during the unit down time.				
	Clean the external metal filters in the hydraulic lines.			✓	
	Check the efficient operation of the flow switch or differential pressure switch.			✓	
	REFRIGERANT SENSORS	Check for maintenance.		✓	
Visual inspection of the device including cable for damage, vandalism etc.			✓		
Remove dust deposits etc. with a dry cloth, especially at the gas inlet.			✓		
Clean of the gas inlet filter.			✓		
Sensor cartridge replacement.					✓

WARNING

Above a specific refrigerant charge, the installer is requested to prepare a system booklet which must be written and updated regularly for each maintenance operation, according to instructions provided by the applicable standards, including EN 378-2 and the European Regulation F-Gas n. 517/2014. In any case, the plant manager must comply with the regulations in force in the country of installation.

9.2.1 Inspection of the unit during service

EN 378-4: 2016 provides a number of indications concerning the checks to be performed on the unit during its working life.

WARNING

The information regarding in-service inspection contained in the aforementioned standard can be used if there are no similar criteria in the applicable national legislation.

This information is summarised in the standard in a table shown here below.

» Maintenance according to EN 378-2

Subclause	Inspection		Test		
	External visual inspection according to Appendix G of EN 378-2:2016	Corrosion	System pressure test	Refrigerant leak detection system ^a	Safety devices inspection
D.2	✓		✓	✓	
D.3	✓		✓	✓	
D.4	✓			✓	
D.5				✓	
D.6					✓
D.7	✓			✓	
D.9		✓ ^b			

^a The system pressure must be higher than the atmospheric pressure for the leak test.

^b Not for new equipment.

- D.2 In-service inspection is performed after a maintenance service that could affect the resistance, or when a change in use has occurred, or when switching to a different refrigerant at higher pressure, or after the equipment has been idle for more than two years. Components that are not compliant are changed. No test pressures higher than those suitable for the components' PS are applied.
- D.3 An in-service

- inspection is carried out after repairing or introducing significant changes or expansions in systems or components. Tests should be limited to the parts concerned.
- D.4 An in-service inspection is performed after reinstallation on another site.
- D.5 The system leak test must be performed if leaks are strongly suspected. For the purposes of this paragraph, "inspected for leaking" means that the

equipment or system is primarily tested for leaks using direct or indirect measurement methods, focusing on those parts of the equipment or system most likely to leak. The leak inspection frequency varies from:

- every 12 months for systems with at least 3 kg of refrigerant, with the exception of hermetically sealed systems containing less than 6 kg;
- every 6 months for applications containing at least 30 kg of refrigerant;
- every 3 months for applications containing at least 300 kg of refrigerant.

Systems must be inspected to check for leaks in the month following the repairing of a leak, to ensure that the repair has been effective.

For applications containing at least 3 kg of refrigerant, the operator must keep track of the amount and type of refrigerant used, the top-up quantities added and the amount recovered during maintenance, service and final disposal.

For applications containing at least 300 kg of refrigerant, the operator must install leak detection systems. These systems should be inspected at least once every 12 months to ensure their proper operation.

Where an efficient leak detection system is provided on site, the inspection frequency may be halved.

High leak rates are not acceptable. Actions should be taken to eliminate any detected leak.

NOTE Fixed refrigerant detectors are not leak detectors because they cannot locate leaks.

- D.6 Safety devices are checked on-site: every year for safety switching devices (see EN 378-2: 2016 6.3.4.3.3), emergency signals and alarm systems; every five years for external pressure relief devices.
- D.7 Overpressure relief valves and break discs are visually inspected in accordance with EN 378-2: 2016, 6.3.4.3.1, 6.3.4.3.4 and 6.3.4.3.5 and annually tested for leaks.
- D.8 In the case of systems fully assembled and tested before their installation and systems built at the factory and transported as complete assemblies, or in two or more sections, the in-service inspection is performed after repairs have been carried out. If there are obvious refrigerant leaks, the entire system is leak tested.
- D.9 When pipes, piping supports, components and component supports are not insulated, they must be visually inspected. Pipes and insulated components must be visually inspected if the vapour barrier is damaged or if it does not work as intended.

This information must be supplemented with the provisions defined by the regulations on maintenance, including the European F-Gas Regulation No. 517/2014. In any case, the regulations in force in the country of installation must always be referred to.

9.2.2 Refrigeration circuit repairs

ATTENTION

During any repairs to the refrigeration circuit or compressor maintenance, minimise the opening time of the circuit. 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 refrigeration circuit has been repaired, the following operations must be carried out:

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

WARNING

If the system needs to be drained, always collect all the refrigerant present in the circuit using suitable equipment, by working exclusively in the liquid phase.

9.2.2.1 Leak test

As far as leak tests are concerned, the units will leave the factory after having been tested according to the procedures indicated in EN 378-2.

A leak test on the installation site is necessary whenever the refrigeration circuit has been repaired or if the cooling connection between modules of a split unit must be carried out.

ATTENTION

Leak tests on site must be carried out by specialised and authorised personnel, who must operate according to the methods indicated in EN 378-2, if applicable in the country of installation, or according to local regulations in force.

9.2.2.2 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 m³/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 must be connected to the charging points. The required procedure 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.

9.2.2.3 Refrigerant charge

DANGER

Before carrying out any operation with the refrigerant, it is recommended to read the special safety data sheet (MSDS).

The refrigerants used in the entire Galletti S.p.A. product range are R454B.

These have the following characteristics:

- **TOXICITY**, the refrigerants mentioned above all belong to group A according to the standard 34 ASHRAE; this group includes all refrigerants that are found not toxic for concentrations equal to or lower than 400 ppm.
- **FLAMMABILITY**, according to the standard 34 ASHRAE, refrigerant R-454B is classified in the A2L safety group, i.e. mildly flammable at 1 atm pressure (101.3 kPa) and 18°C.
- **CATEGORY**, the refrigerants used are fluids of category II according to the PED 2014/68/EU directive and therefore, they are not dangerous.

DANGER

In the event of substantial refrigerant vapour release, the area must be immediately evacuated. 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.

For loading operations, follow the procedure described below:

- connect the refrigerant gas cylinder to the 1/4 SAE male filler

outlet located on the liquid line, making sure that there are no impurities, moisture and/or incondensable gases in the inlet pipes;

- load liquid state charge until 75% of the total charge has been introduced;
- 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 7.6 Refrigerant charge checks p. 36.

⚠ ATTENTION

A unit originally filled at the factory with a refrigerant type cannot be filled with different refrigerants without a written permission from Galletti S.p.A..

⚠ ATTENTION

If the (mildly flammable) R454B is used, it is recommended to provide all the safety devices required by law during installation. In case of indoor installation, contact the manufacturer.

⚠ ATTENTION

Refer to paragraph 11.2 Environment protection p. 47 contained in this document.

9.2.3 Refrigerant sensors

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 and calibration of the sensor by trained technicians we recommend contacting Galletti S.p.A. 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 Galletti S.p.A. Technical Support to have a new sensor cartridge.

9.2.3.1 Sensor cartridge replacement

The replacement of an old sensor cartridge with a new and calibrated one has to be performed every 12 months.

The substitution of the sensor cartridge has to be done by Galletti S.p.A. authorized technicians.

ATTENTION: The communication of the local bus (Sensor Cartridge <> control board) 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 sensor cartridge connector which leads to an immediate triggering of the error message.

- Disconnect the SC connector from the Base control board (BCB) or the Remote control board (RCB) (error message will be activated).
- Loosen the locknut.
- Remove used Sensor cartridge.
- Take calibrated Sensor cartridge out of the original packaging, check for gas type, measuring range and valid calibration date.
- Insert the Sensor cartridge and retighten with lock nut
- Insert the Sensor cartridge plug into the socket at the BCB or RCB. Check plug for proper engagement.

The local bus communication is automatically established and tested. At the same time the gas type and the measuring range of the "new" Sensor cartridge are compared with the data stored in the BCB. If they match and the communication is correct, the error message will be automatically reset at the controller.

The date for the next maintenance has to be affixed to the sensor.

9.3 COMPONENTS DESCRIPTION

For a clear representation of the components that make up the unit, please refer to the wiring diagram supplied with the unit.

10 TROUBLESHOOTING

For troubleshooting purposes, please refer to the list and to the complete description of the alarms related to the installed software version. This document can be downloaded from the portal <http://Obdoc.gallettigroup.com> after user registration

 **WARNING**

Do not reset the alarm until after an accurate analysis and subsequent removal of the causes of the alarm: continuous resetting operations could lead to compressor breakdowns.

 **DANGER**

As far as possible remedies are concerned, it is first of all essential to have read the section General warnings and the chapter 3 Safety prescriptions p. 10, to be able to adopt all the necessary precautions. It is also recommended to pay close attention to the operations that you intend to perform: being too confident can also cause serious accidents involving inexperienced persons. In case of breakdowns, please contact a qualified and authorised technician or our customer care.

11 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.

11.1 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.

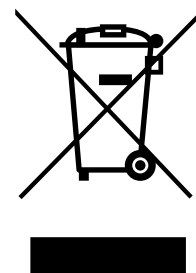
The product is not potentially dangerous for human health and the environment, as it does not contain any harmful substances according to the Directive 2011/65/EU (RoHS), but if disposed of freely in the environment, it might adversely affect the ecosystem.

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.



ATTENTION

Disposing of the equipment freely in the environment or illegally disposing of the equipment are punishable by law.

11.2 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 R454B, 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.

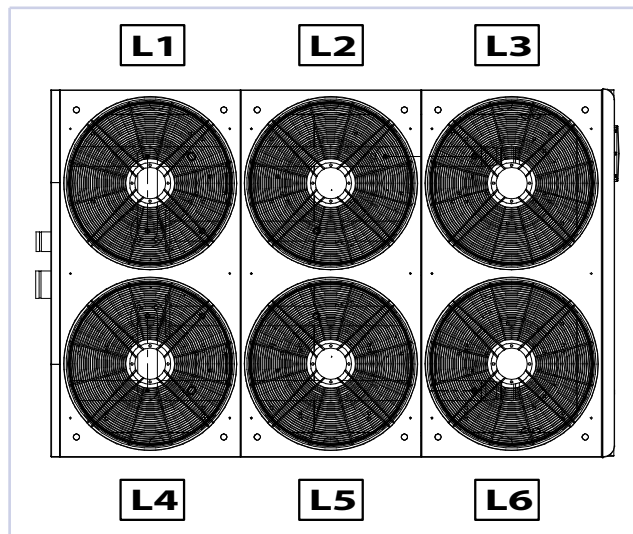
ATTENTION

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 WEIGHT TABLES

The following images show the points of the machine for which the delivery weight has been calculated. Distribution is different depending on the frame and therefore, the size, the unit design

and the presence or absence of hydronic modules. For this reason, it is necessary to identify the dimensional model and frame, to be able to use the following tables.



WARNING

All the weights shown are inclusive of refrigerant charge and water charge in the hydraulic system (very important when making a decision regarding the most suitable support for the unit, especially if it is equipped with a tank). An

approximate weight of the vacuum unit can be calculated by subtracting the weight in kg of the water content shown in the following table. The water content depends on the size, the unit design and the presence or absence of hydronic modules.

GLE C		658	748	818	900	942	1072
Frame		1	2	2	3	3	4
Water content without options	kg	85	98	98	113	113	113
Water content with pumps	kg	85	98	98	113	113	113

GLE H		658	748	818	900	942	1072
Frame		1	A	A	B	B	C
Water content without options	kg	85	98	98	113	113	113
Water content with pumps	kg	85	98	98	113	113	113

GLE F		658	748	818	900	942	1072
Frame		1	2	2	3	3	4
Water content without options	kg	197	228	228	387	387	423
Water content with pumps	kg	197	228	228	387	387	423

12.1 OPERATING WEIGHT

» C version weight distribution - without hydraulic options

Size		C	CL	CQ	C	CL	CQ	C	CL	CQ
		658	658	658	748	748	748	818	818	818
L1	kg	712	734	834	820	842	963	824	846	967
L2	kg	833	899	999	918	984	1105	921	987	1108
L3	kg	842	864	964	934	956	1077	927	949	1070
L4	kg	712	734	834	820	842	963	824	846	967
L5	kg	833	899	999	918	984	1105	921	987	1108
L6	kg	842	864	964	934	956	1077	927	949	1070
L7	kg	-	-	-	-	-	-	-	-	-
L8	kg	-	-	-	-	-	-	-	-	-
Total	kg	4774	4994	5594	5344	5564	6289	5344	5564	6289

Size		C	CL	CQ	C	CL	CQ	C	CL	CQ
		900	900	900	942	942	942	1072	1072	1072
L1	kg	945	968	1110	947	971	1113	882	906	1028
L2	kg	1082	1151	1293	1135	1207	1349	969	1005	1127
L3	kg	1072	1095	1237	1113	1137	1279	906	942	1064
L4	kg	945	968	1110	947	971	1113	843	867	989
L5	kg	1082	1151	1293	1135	1207	1349	882	906	1028
L6	kg	1072	1095	1237	1113	1137	1279	969	1005	1127
L7	kg	-	-	-	-	-	-	906	942	1064
L8	kg	-	-	-	-	-	-	843	867	989
Total	kg	6198	6428	7278	6390	6630	7480	7200	7440	8415

» H version weight distribution - without hydraulic options

Size		H	HL	HQ	H	HL	HQ	H	HL	HQ
		658	658	658	748	748	748	818	818	818
L1	kg	758	780	880	581	603	720	597	619	736
L2	kg	852	918	1018	793	826	943	813	846	963
L3	kg	878	900	1000	793	826	943	813	846	963
L4	kg	758	780	880	476	498	615	488	510	627
L5	kg	852	918	1018	581	603	720	597	619	736
L6	kg	878	900	1000	793	826	943	813	846	963
L7	kg	-	-	-	793	826	-	813	846	-
L8	kg	-	-	-	476	498	-	488	510	-
Total	kg	4976	5196	5796	5286	5506	4882	5422	5642	4986

Size		H	HL	HQ	H	HL	HQ	H	HL	HQ
		900	900	900	942	942	942	1072	1072	1072
L1	kg	766	789	947	803	827	985	946	970	1120
L2	kg	1046	1081	1239	1089	1125	1283	1290	1326	1476
L3	kg	1046	1081	1239	1089	1125	1283	1290	1326	1476
L4	kg	627	650	808	653	677	835	774	798	948
L5	kg	766	789	947	803	827	985	946	970	1120
L6	kg	1046	1081	1239	1089	1125	1283	1290	1326	1476
L7	kg	1046	1081	-	1089	1125	-	1290	1326	1476
L8	kg	627	650	-	653	677	-	774	798	948
Total	kg	6970	7200	6420	7268	7508	6656	8600	8840	10040

» F version weight distribution - without hydraulic options

Size		FL 658	FQ 658	F 658	FL 748	FQ 748	F 748	FL 818	FQ 818	F 818
L1	kg	923	1023	901	1055	1176	1033	1065	1186	1043
L2	kg	1049	1149	983	1165	1286	1099	1159	1280	1093
L3	kg	1032	1132	1010	1147	1268	1125	1141	1262	1119
L4	kg	923	1023	901	1055	1176	1033	1065	1186	1043
L5	kg	1049	1149	983	1165	1286	1099	1159	1280	1093
L6	kg	1032	1132	1010	1147	1268	1125	1141	1262	1119
L7	kg	-	-	-	-	-	-	-	-	-
L8	kg	-	-	-	-	-	-	-	-	-
Total	kg	6008	6608	5788	6734	7459	6514	6730	7455	6510

Size		FL 900	FQ 900	F 900	FL 942	FQ 942	F 942	FL 1072	FQ 1072	F 1072
L1	kg	1226	1368	1203	1249	1391	1225	1193	1315	1169
L2	kg	1345	1487	1276	1393	1535	1321	1253	1375	1217
L3	kg	1313	1455	1290	1347	1489	1323	1216	1338	1180
L4	kg	1226	1368	1203	1249	1391	1225	1154	1276	1130
L5	kg	1345	1487	1276	1393	1535	1321	1193	1315	1169
L6	kg	1313	1455	1290	1347	1489	1323	1253	1375	1217
L7	kg	-	-	-	-	-	-	1216	1338	1180
L8	kg	-	-	-	-	-	-	1154	1276	1130
Total	kg	7768	8618	7538	7978	8828	7738	9632	10607	9392

» C - 1 pump version weight distribution

GLE		658	748	818	900	942	1072
L1	kg	48	48	48	51	51	51
L2	kg	48	48	48	51	51	51
L3	kg	24	24	24	26	26	26
L4	kg	72	72	72	77	77	77
L5	kg	72	72	72	77	77	77
L6	kg	36	36	36	38	38	38
L7	kg	-	-	-	-	-	-
L8	kg	-	-	-	-	-	-
Total	kg	300	300	300	320	320	320

» H - 1 pump version weight distribution

GLE		658	748	818	900	942	1072
L1	kg	48	48	48	51	51	51
L2	kg	48	48	48	51	51	51
L3	kg	24	24	24	26	26	26
L4	kg	72	72	72	77	77	77
L5	kg	72	72	72	77	77	77
L6	kg	36	36	36	38	38	38
L7	kg	-	-	-	-	-	-
L8	kg	-	-	-	-	-	-
Total	kg	300	300	300	320	320	320

» F - 1 pump version weight distribution

GLE		658	748	818	900	942	1072
L1	kg	56	56	56	59	59	59
L2	kg	56	56	56	59	59	59
L3	kg	28	28	28	30	30	30
L4	kg	84	84	84	89	89	89
L5	kg	84	84	84	89	89	89
L6	kg	42	42	42	44	44	44
L7	kg	-	-	-	-	-	-
L8	kg	-	-	-	-	-	-
Total	kg	350	350	350	370	370	370

» C - 1 pump version weight distribution with full inertial tank

GLE		658	748	818	900	942	1072
L1	kg	352	352	352	357	357	357
L2	kg	656	656	656	664	664	664
L3	kg	328	328	328	332	332	332
L4	kg	376	376	376	383	383	383
L5	kg	680	680	680	689	689	689
L6	kg	340	340	340	345	345	345
L7	kg	-	-	-	-	-	-
L8	kg	-	-	-	-	-	-
Total	kg	2730	2730	2730	2770	2770	2770

» H - 1 pump version weight distribution with full inertial tank

GLE		658	748	818	900	942	1072
L1	kg	352	352	352	357	357	357
L2	kg	656	656	656	664	664	664
L3	kg	328	328	328	332	332	332
L4	kg	376	376	376	383	383	383
L5	kg	680	680	680	689	689	689
L6	kg	340	340	340	345	345	345
L7	kg	-	-	-	-	-	-
L8	kg	-	-	-	-	-	-
Total	kg	2730	2730	2730	2770	2770	2770

» F - 1 pump version weight distribution with full inertial tank

GLE		658	748	818	900	942	1072
L1	kg	360	360	360	365	365	365
L2	kg	664	664	664	672	672	672
L3	kg	332	332	332	336	336	336
L4	kg	388	388	388	395	395	395
L5	kg	692	692	692	701	701	701
L6	kg	346	346	346	351	351	351
L7	kg	-	-	-	-	-	-
L8	kg	-	-	-	-	-	-
Total	kg	2780	2780	2780	2820	2820	2820

» C - 2 pumps version weight distribution

GLE		658	748	818	900	942	1072
L1	kg	132	132	132	142	142	142
L2	kg	132	132	132	142	142	142
L3	kg	66	66	66	71	71	71
L4	kg	132	132	132	142	142	142
L5	kg	132	132	132	142	142	142
L6	kg	66	66	66	71	71	71
L7	kg	-	-	-	-	-	-
L8	kg	-	-	-	-	-	-
Total	kg	660	660	660	710	710	710

» H - 2 pumps version weight distribution

GLE		658	748	818	900	942	1072
L1	kg	132	132	132	142	142	142
L2	kg	132	132	132	142	142	142
L3	kg	66	66	66	71	71	71
L4	kg	132	132	132	142	142	142
L5	kg	132	132	132	142	142	142
L6	kg	66	66	66	71	71	71
L7	kg	-	-	-	-	-	-
L8	kg	-	-	-	-	-	-
Total	kg	660	660	660	710	710	710

» F - 2 pumps version weight distribution

GLE		658	748	818	900	942	1072
L1	kg	148	148	148	158	158	158
L3	kg	74	74	74	79	79	79
L4	kg	148	148	148	158	158	158
L5	kg	148	148	148	158	158	158
L6	kg	74	74	74	79	79	79
L7	kg	-	-	-	-	-	-
L8	kg	-	-	-	-	-	-
Total	kg	740	740	740	790	790	790

» C - 2 pumps version weight distribution with full inertial tank

GLE		658	748	818	900	942	1072
L1	kg	443	443	443	453	453	453
L2	kg	754	754	754	764	764	764
L3	kg	377	377	377	382	382	382
L4	kg	443	443	443	453	453	453
L5	kg	754	754	754	764	764	764
L6	kg	377	377	377	382	382	382
L7	kg	-	-	-	-	-	-
L8	kg	-	-	-	-	-	-
Total	kg	3150	3150	3150	3200	3200	3200

» H - 2 pumps version weight distribution with full inertial tank

GLE		658	748	818	900	942	1072
L1	kg	443	443	443	453	453	453
L2	kg	754	754	754	764	764	764
L3	kg	377	377	377	382	382	382
L4	kg	443	443	443	453	453	453
L5	kg	754	754	754	764	764	764
L6	kg	377	377	377	382	382	382
L7	kg	-	-	-	-	-	-
L8	kg	-	-	-	-	-	-
Total	kg	3150	3150	3150	3200	3200	3200

» F - 2 pumps version weight distribution with full inertial tank

GLE		658	748	818	900	942	1072
L1	kg	459	459	459	469	469	469
L2	kg	770	770	770	780	780	780
L3	kg	385	385	385	390	390	390
L4	kg	459	459	459	469	469	469
L5	kg	770	770	770	780	780	780
L6	kg	385	385	385	390	390	390
L7	kg	-	-	-	-	-	-
L8	kg	-	-	-	-	-	-
Total	kg	3230	3230	3230	3280	3280	3280

12.2 MODULES WEIGHTS

WARNING

The modules weight values must be added to the standard weight values of the standard version.



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