

(Etiquette signalétique)

PHRF / CHGF



Pompe à chaleur et groupe d'eau glacée 20 à 85 kW - air / eau
Équipement hydraulique complet intégré - Fluide réfrigérant R 410 A

Heat pump and chiller 20 to 85 kW - Air to water
Complete built-in hydraulic equipment - R 410 A refrigerant

Pompa di calore e refrigeratore d'acqua 20 a 85 kW - aria / acqua
Sezione idronica completa integrata - Fluido refrigerante R 410 A

Bomba de calor y grupo de agua fría 20 a 85 kW - aire / agua
Equipo hidráulico completo integrado - Fluido refrigerante R 410 A

Wärmepumpe und Kaltwassersatz luft- / wassergekühlt - 20 bis 85 kW
Mit eingebauter kompletter Hydraulikausstattung - Kältemittel R 410 A

MARKING

This product marked  conforms to the essential requirements of the Directives:

- Low voltage no. 2006/95/EC.
- Electromagnetic Compatibility no. 2004/108/EC.



NOTE: This symbol mark and recycle system are applied only to EU countries and not applied to the countries in the other area of the world.

Your product is designed and manufactured with high quality materials and components which can be recycled and reused. This symbol means that electrical and electronic equipment, at their end-of-life, should be disposed separately from your household waste.

Please dispose of this equipment at your local community waste collection / recycling centre.

In the European Union there are separate collection systems for used electrical and electronic products.

Please help us to conserve the environment we live in!

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APPLIANCES FILLED WITH R 410 A

R 410 A

- R 410 A is a high-pressure refrigerant (+ 50% in relation to R 22 and R 407 C).
- The compressors approved for operation with this fluid are filled beforehand with polyvinyl ether oil.

MAINTENANCE INSTRUCTIONS

- 1 - Never add oil to the appliance; the compressor is filled with polyvinyl ether (PVE) oil, a special oil which cannot tolerate the presence of other oils.
- 2 - The instruments used for:
 - Filling,
 - Pressure measurements,
 - Emptying under vacuum,
 - Recovering the fluid,must be compatible and only used for the R 410 A fluid.
Note: the pressure taps of the refrigerating circuit are 5/16 SAE (1/2 - 20 - UNF).

- 3 - In the case of a new charge:
 - The charge **must** be undertaken in liquid phase.
 - Use a balance and a dip pipe type R 410 A cylinder.
 - Charge the weight of R 410 A as per the value indicated on the unit's identification plate.
- 4 - In case of leakage, do not complete the charge: recover the remaining refrigerant for recycling and perform a total charge.
Recovery, recycling or the destruction of the fluid must be done in compliance with the laws in force in the country concerned.
- 5 - If the refrigerant circuit is opened, you must:
 - Avoid ambient air from entering the circuit.
 - Replace or install a drier.
 - Perform the "vacuum operation" at a minimum level of **0.3 mbar (static)**.
- 6 - Do not release R 410 A fluid into the atmosphere. This fluid is a fluorinated greenhouse gases, covered by the Kyoto Protocol with a Global Warming Potential (GWP) = 1975 - (CE Directive 842 / 2006).

1 - GENERALITIES

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1.1 - GENERAL SUPPLY CONDITIONS

- Generally speaking, the material is transported at the consignee's risk.
- The consignee must immediately provide the carrier with written reserves if he finds any damage caused during transport.

1.2 - RECOMMENDATIONS

- Prior to all servicing or other actions on the equipment, installation, commissioning, operation, or maintenance, the personnel in charge of these operations shall become familiar with the instructions and recommendations provided in the installation manual of the unit as well as the elements of the project's technical file.
- The personnel responsible for receiving the unit must conduct a visual inspection in order to identify all damage to which the unit may have been subjected during transport: refrigerating circuit, electrical cabinet, chassis and cabinet.
- The unit must be installed, started, maintained, serviced by qualified and authorised personnel, in compliance with the requirements of all directives, laws and regulations and in accordance with standard trade practices.
- During installation, troubleshooting and maintenance operations, the use of pipes as a step: under the stress, the pipe may rupture and the refrigerant may cause serious burns.

1.3 - VOLTAGE

- Before carrying out any operation, check that the voltage indicated on the unit corresponds to the mains voltage.
- Before initiating maintenance or servicing on the installation, check that its power supply is disconnected and locked out.

1.4 - USE OF EQUIPMENT

- This device is designed for heating buildings.



IMPORTANT

This appliance is not designed to be used by people (including children) whose physical, sensory or mental capacities are impaired, or who lack experience or knowledge, unless they are supervised or have received instructions on how to use the appliance by a person who is responsible for their safety. Children must be supervised to ensure that they do not play with the appliance or its accessories.

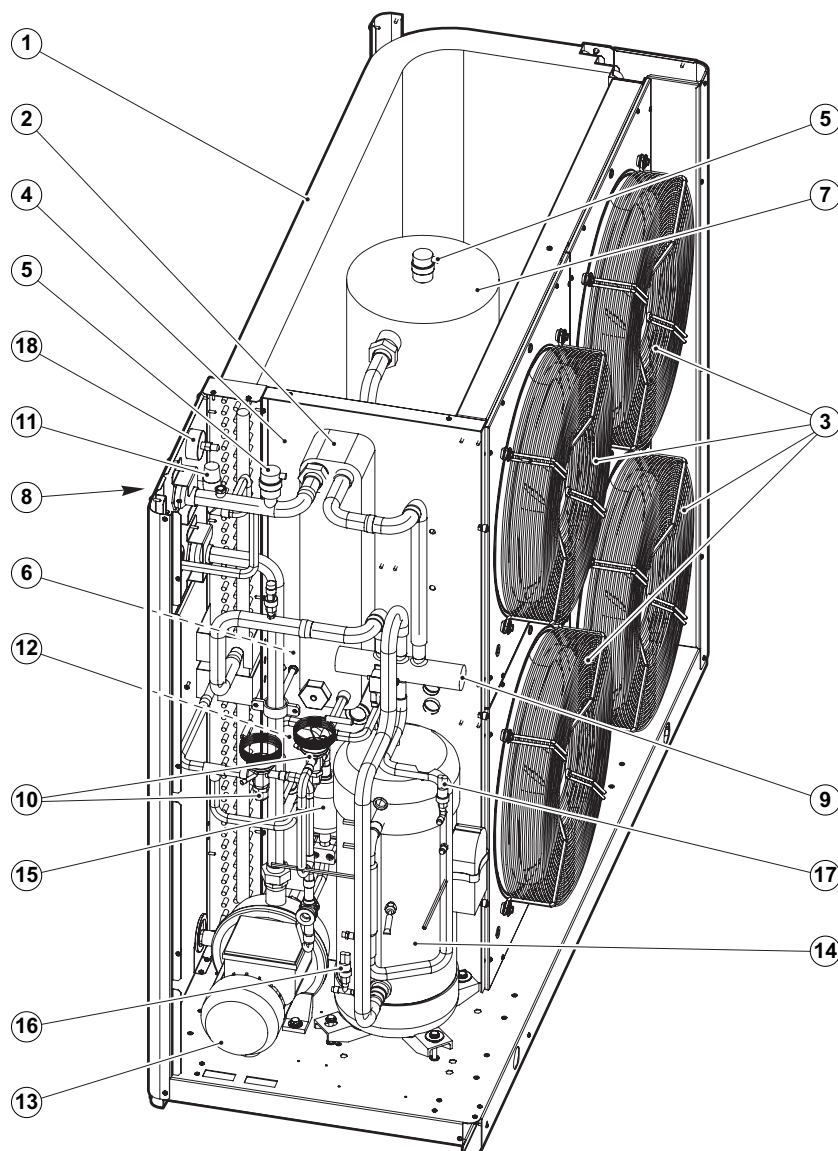
1.5 - OPERATING CONDITIONS

- See the technical characteristics, nominal conditions and operating limits in the 10 12 203 technical instructions, particularly to ensure the correct selection of appliance.

2 - DESCRIPTION OF COMPONENTS

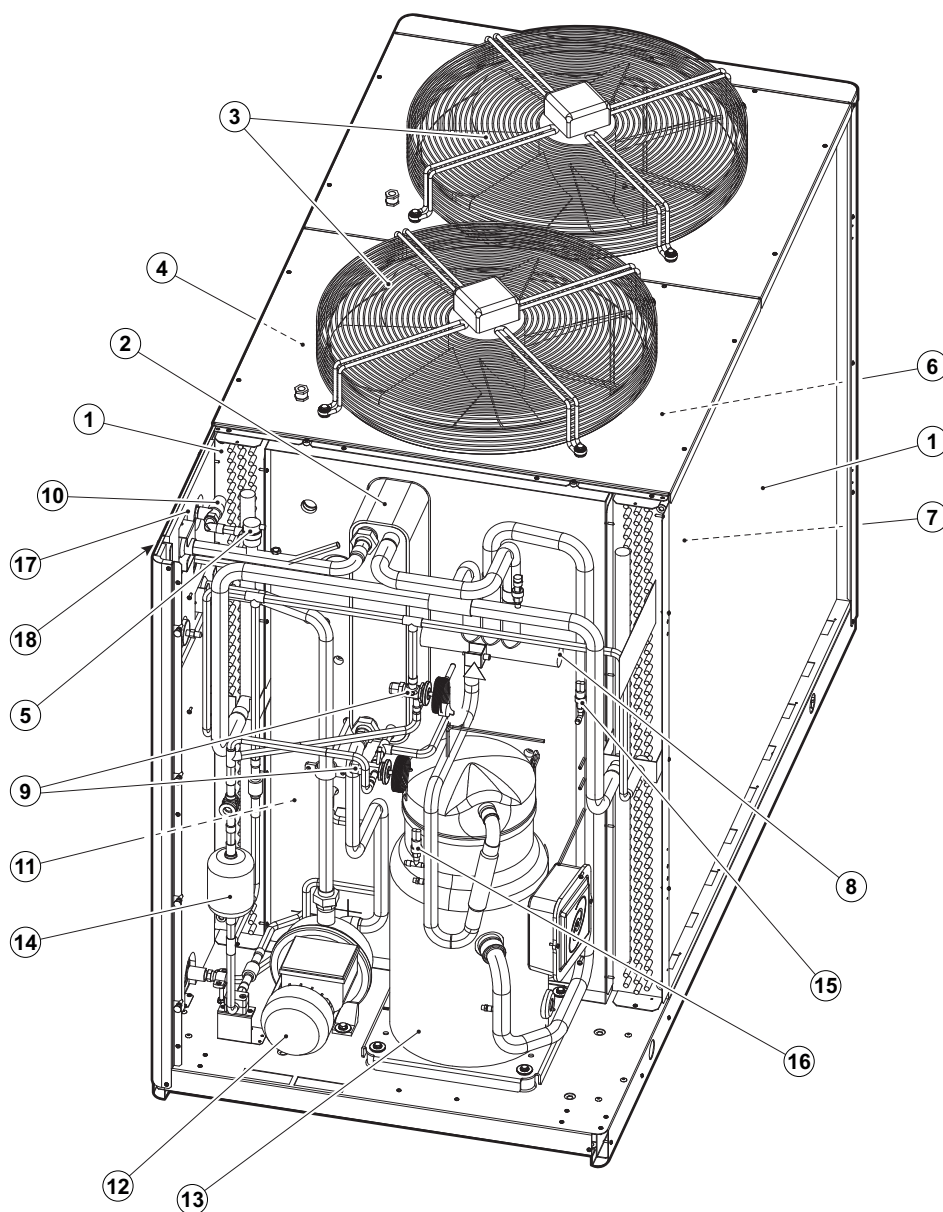
2.1 - CHGF 20-24 / PHRF 23-27

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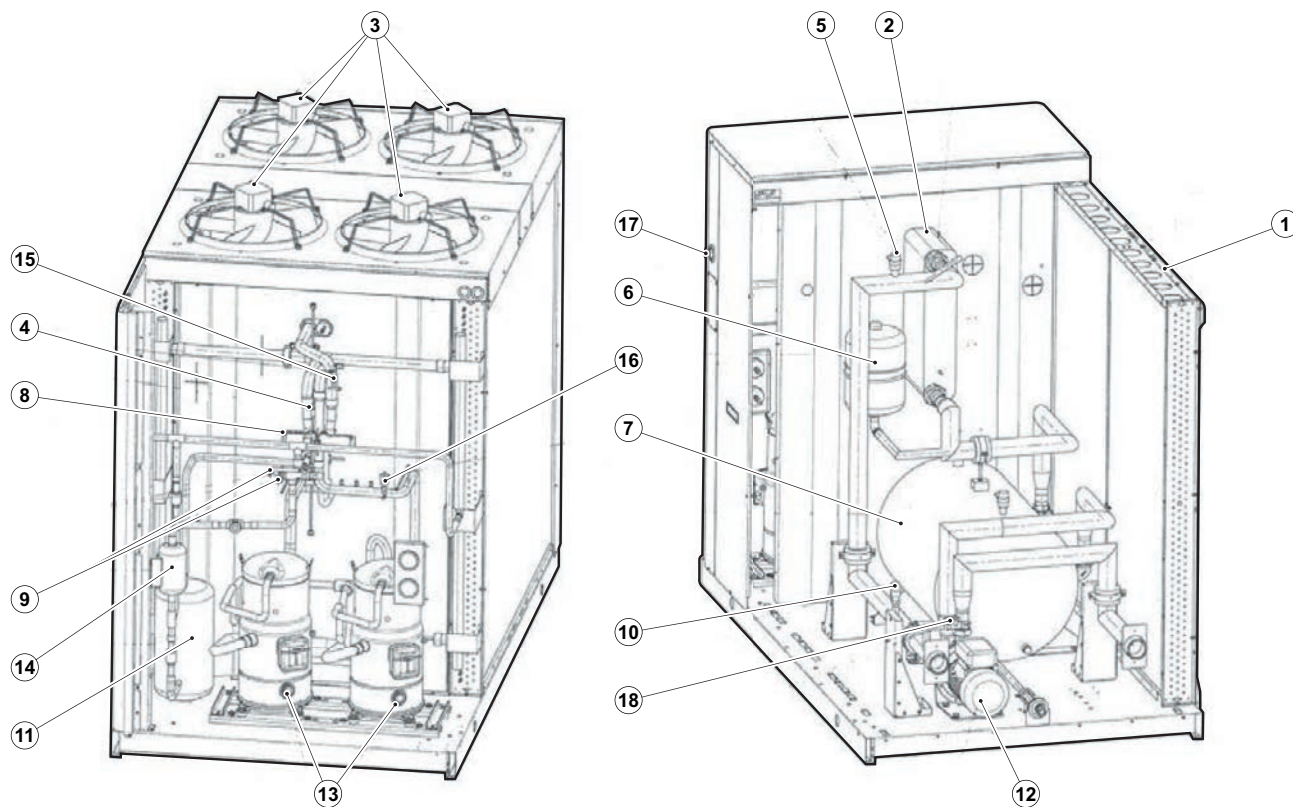
- 1 - R 410 A air source heat exchanger.
- 2 - R 410 A water source heat exchanger.
- 3 - Axial fans.
- 4 - Water differential pressure switch.
- 5 - Automatic air bleeder valve.
- 6 - Expansion vessel.
- 7 - Buffer tank.
- 8 - Fill point.
- 9 - 4-way valve (PHRF).

- 10 - Pressure reducers.
- 11 - Safety valve.
- 12 - Liquid recovery device.
- 13 - Circulation pump.
- 14 - Compressor.
- 15 - Filter dryer.
- 16 - Low pressure switch and pressure tap.
- 17 - High pressure switch and pressure tap.
- 18 - Water pressure gauge.



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- 2 - R 410 A water source heat exchanger.
- 3 - Axial fans.
- 4 - Water differential pressure switch.
- 5 - Automatic air bleeder valve.
- 6 - Expansion vessel.
- 7 - Buffer tank.
- 8 - 4-way valve (PHRF).
- 9 - Pressure reducers.

- 10 - Safety valve.
- 11 - Liquid recovery device.
- 12 - Circulation pump.
- 13 - Compressor.
- 14 - Filter dryer.
- 15 - Low pressure switch and pressure tap.
- 16 - High pressure switch and pressure tap.
- 17 - Water pressure gauge.
- 18 - Fill point.



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- 2 - R 410 A water source heat exchanger.
- 3 - Fans.
- 4 - Water differential pressure switch.
- 5 - Automatic air bleeder valve.
- 6 - Expansion vessel.
- 7 - Buffer tank.
- 8 - 4-way valve (PHRF).
- 9 - Pressure reducers.

- 10 - Safety valve.
- 11 - Liquid recovery device.
- 12 - Circulation pump.
- 13 - Compressor.
- 14 - Filter dryer.
- 15 - Low pressure switch and pressure tap.
- 16 - High pressure switch and pressure tap.
- 17 - Water pressure gauge.
- 18 - Fill point.

3 - HYDRAULIC CIRCUIT DIAGRAM

EVAPORATOR, PUMP AND TANK

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Legend:

VS Safety valve.

EV Evaporator.

PD Differential pressure switch.

MA Water pressure gauge.

VAS Air bleeder valve.

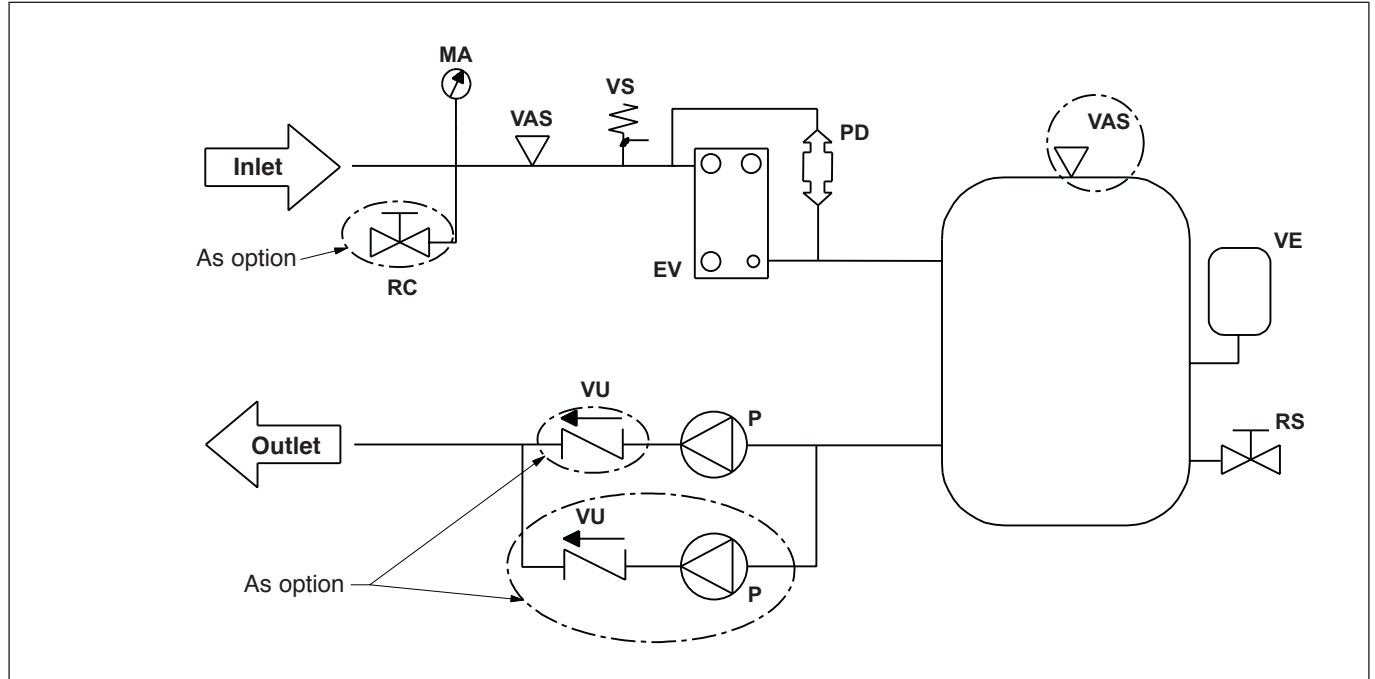
VE Expansion vessel.

P Pump.

RS Drain valve.

RC Water charge valve.

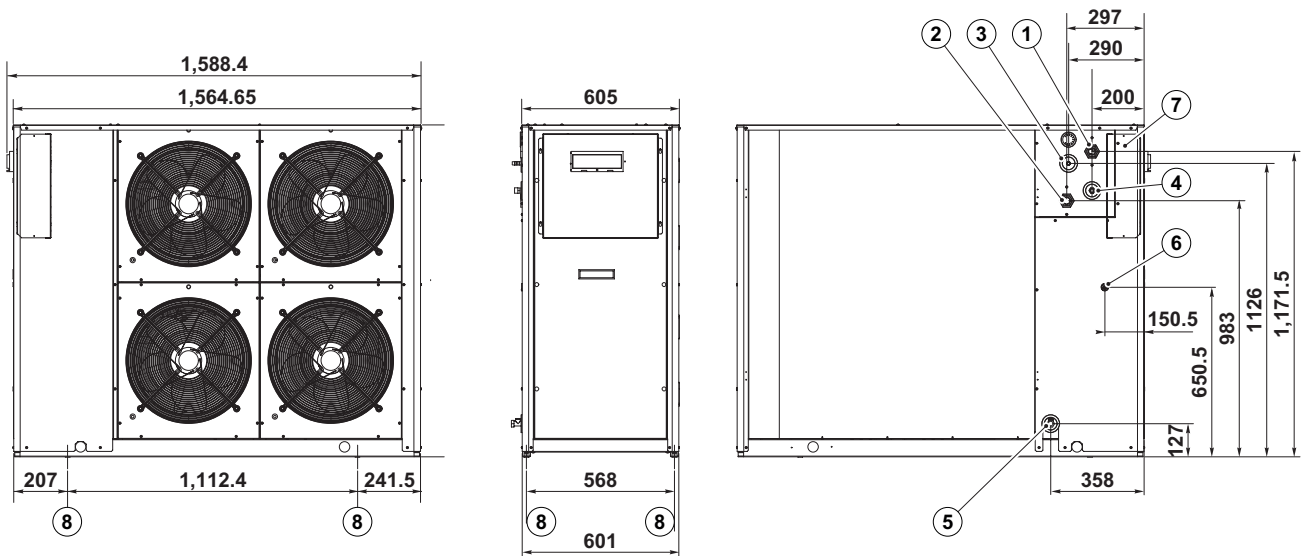
VU Unidirectional valve.



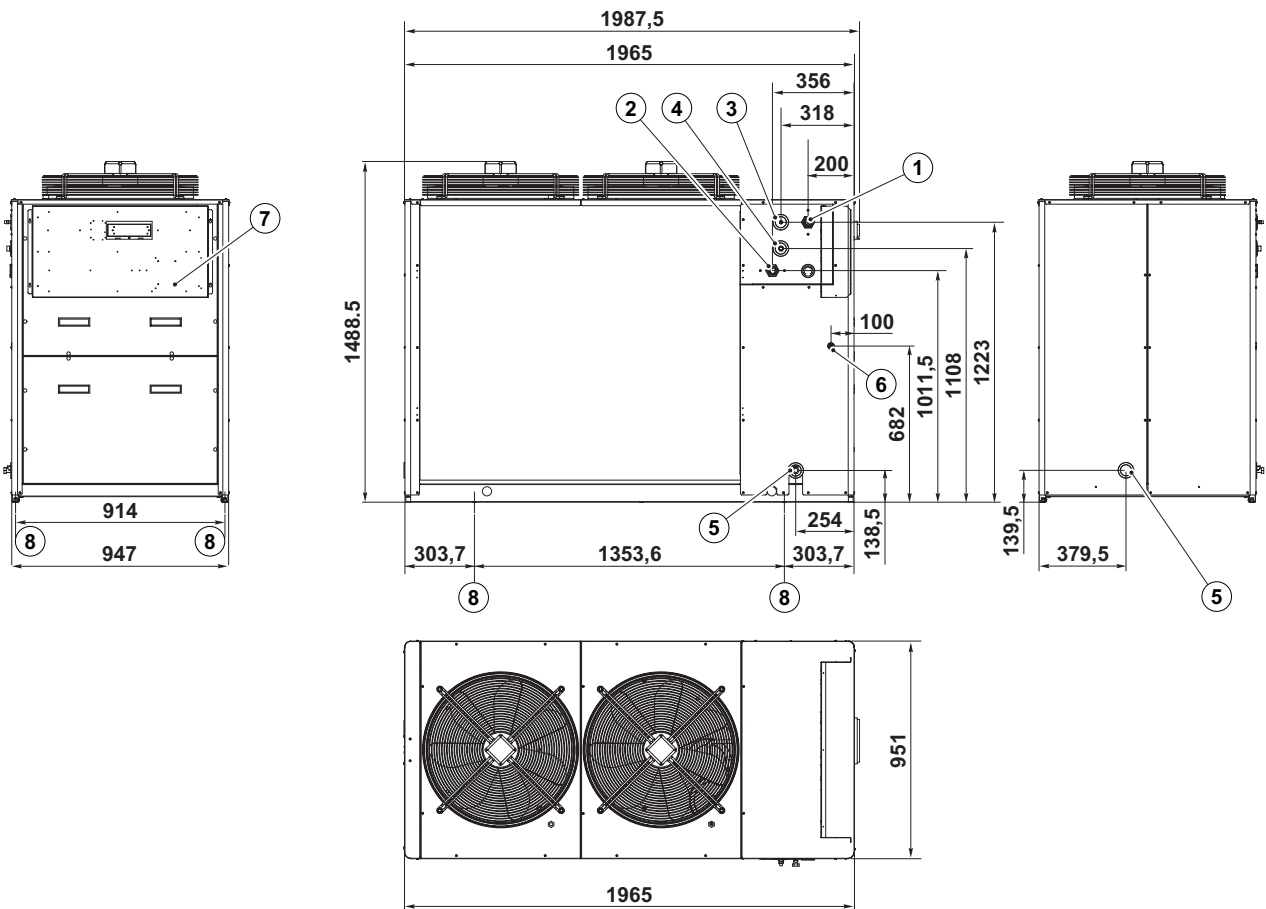
4 - OVERALL DIMENSIONS

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4.1 - CHGF 20-24 / PHRF 23-27

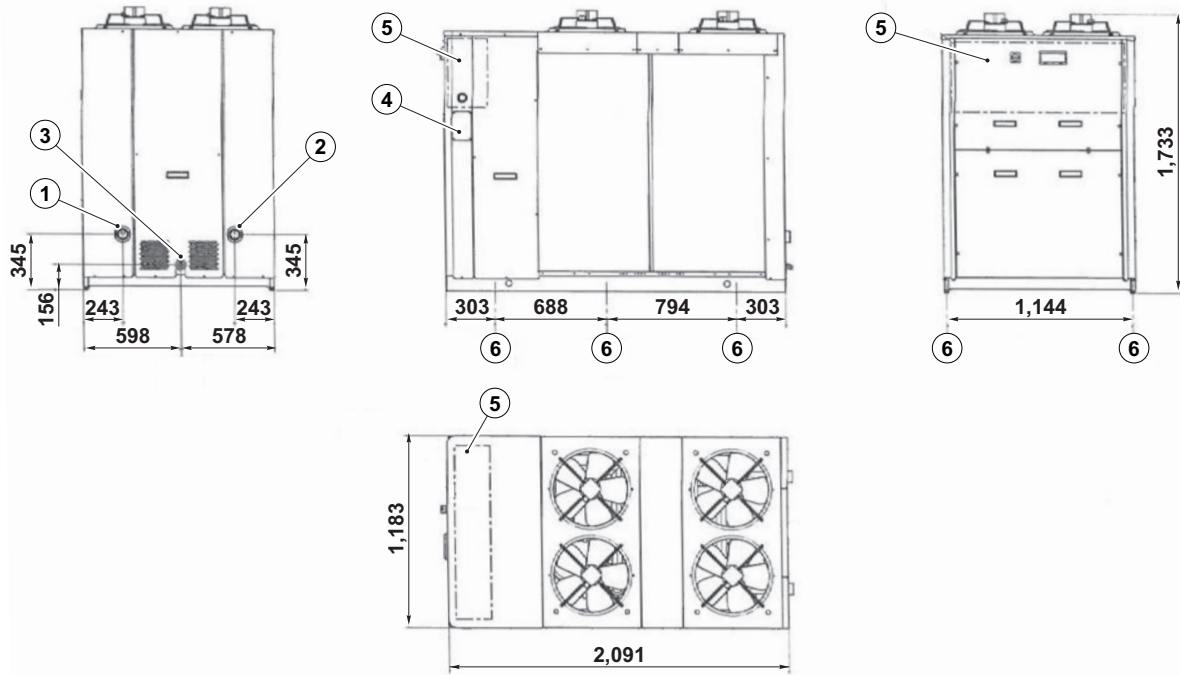


4.2 - CHGF 28-40 / PHRF 32-46



4.3 - CHGF 55-76 / PHRF 60-85

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1 - Water inlet, female 2".

2 - Water outlet, female 2".

3 - Water supply, female 1/2".

4 - Power supply.

5 - Electric box.

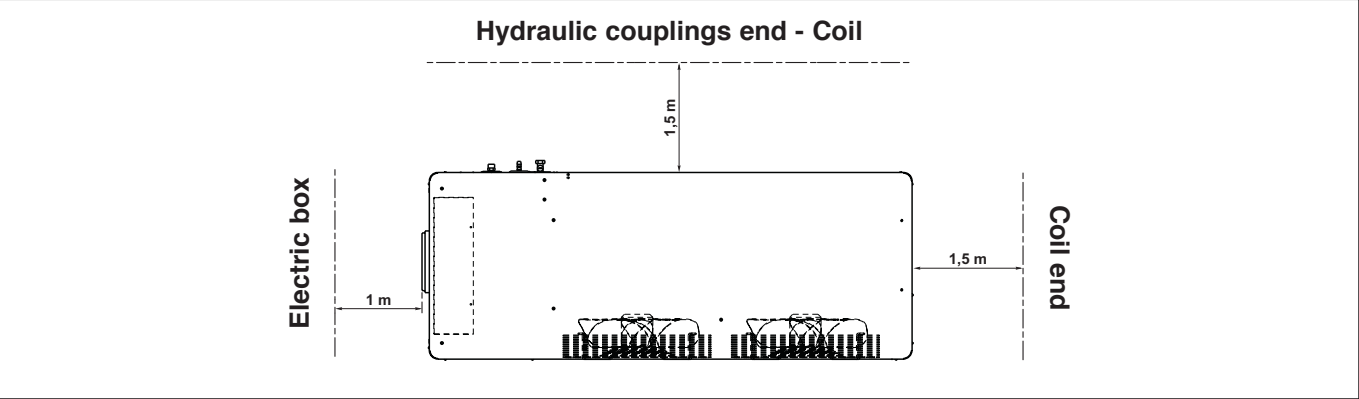
6 - Bearing point.

5 - SPACE REQUIRED FOR INSTALLATION

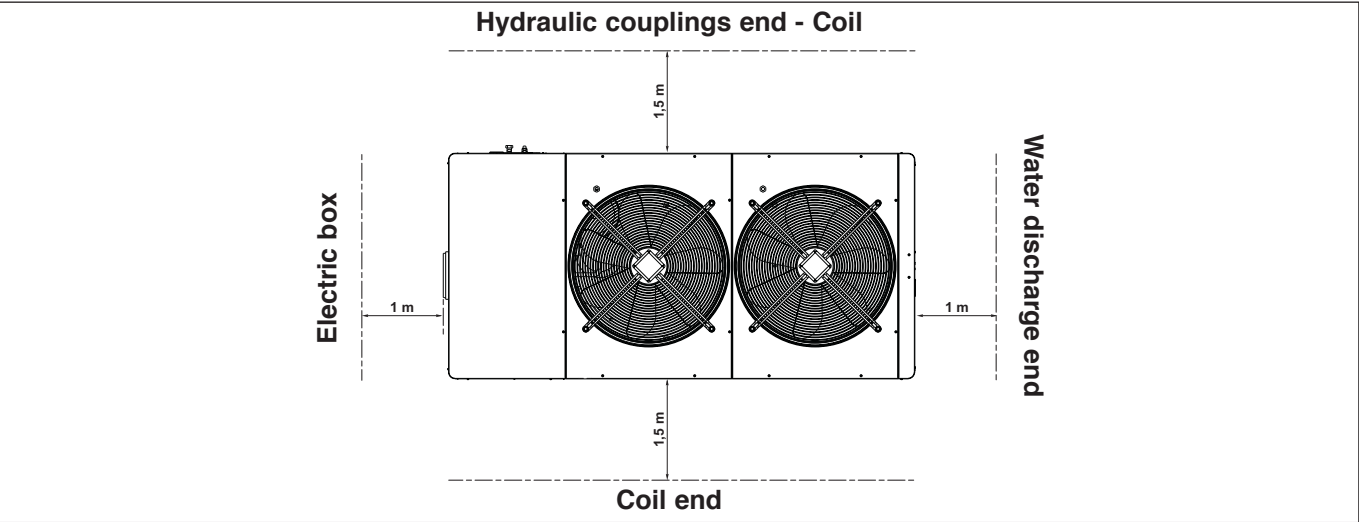
- Prior to all servicing or other actions on the equipment, installation, commissioning, operation, or maintenance, the personnel in charge of these operations shall become familiar with the instructions and recommendations provided in the installation manual of the unit as well as the elements of the project's technical file.
- The personnel responsible for receiving the unit must conduct a visual inspection in order to identify all damage to which the unit may have been subjected during transport: refrigerating circuit, electrical cabinet, chassis and cabinet.
- The unit must not be installed near the following:
 - Sources of heat.
 - Combustible materials.
 - Return / air intake of an adjacent building.
- The unit must be installed, started, maintained, serviced by qualified and authorised personnel, in compliance with the requirements of all directives, laws and regulations and in accordance with standard trade practices.
- During installation, troubleshooting and maintenance operations, the use of pipes as a step: under the stress, the pipe may rupture and the refrigerant may cause serious burns.
- The unit is delivered on a wooden pallet and shrink-wrapped.
- A lift truck may be used to remove the unit from its pallet.
- Handle the unit with care.
- To lift the unit, use the holes provided on the structure in order to position steel gas tubes of 1" diameter, minimum 3 mm thick.
- The tubes must project by at least 250 mm either end for the slinging.
- The weight is shown in the tables of the technical instructions.
- Before installation, verify the following points:
 - The unit must be installed outside in an appropriate location and in compliance with environmental requirements (sound level, integration, etc...).
 - The unit's installation location must be perfectly level and strong enough to support the weight of the unit and must have adequate inundation protection. Caution: the condensates are not connected to a condensate collector.
 - Sufficient space around the unit should be provided in order to facilitate servicing and maintenance operations (see drawing below).
 - Air suction to the coil and fan discharge must not be obstructed, install the unit above the region's average snowfall level.
 - Vibrations and noise must not be transmitted to adjacent buildings. Install the machine on anti-vibration pads and fit hoses on piping elements, as required, if necessary, consult an acoustics specialist concerning the unit's optimum location.

- **AVOID:**
 - Excessive exposure to sea-air or corrosive gases.
 - The proximity of the extractor fan.
 - Projections of mud (next to a roadway or path, for example).
 - Areas where there is strong wind blowing against the unit's air exhaust.
- Protection index of the unit:
 - IP 24: for the electrical equipment.
 - IPXXB: for the mechanical hazards.

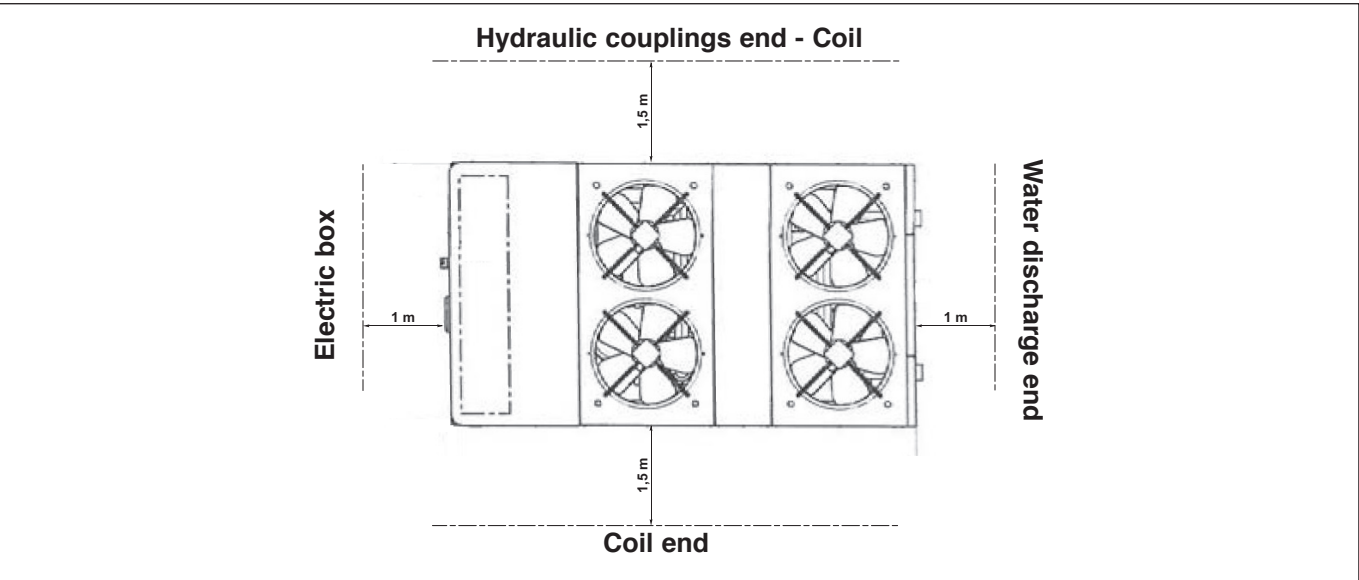
5.1 - CLEARANCE FOR CHGF 20-24 / PHRF 23-27



5.2 - CLEARANCE FOR CHGF 28-40 / PHRF 32-46



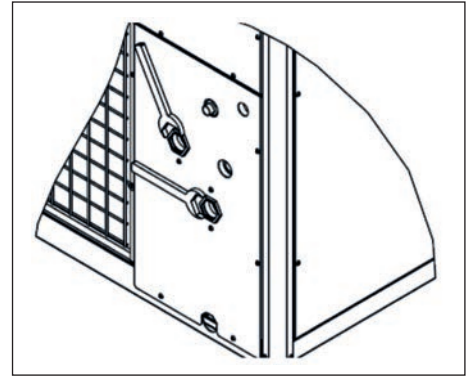
5.3 - CLEARANCE FOR CHGF 55-79 / PHRF 60-85



6 - HYDRAULIC CONNECTIONS

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- The units are provided with a water differential pressure switch, safety valve, water pressure gauge, automatic air bleeder valve and drain valve. They are also provided with a pump, expansion vessel and accumulation tank.
- During the connection operations, hold the hydraulic couplings of the unit fixed using a hex spanner and prevent them from turning so as not to damage the pipes inside the unit (see figure opposite).



- During the hydraulic connection operations, never use naked flames within proximity of or inside the unit.
- You are advised to perform the hydraulic circuit by equipping it with the following components:
 - Stop valves (**VI**) of the unit on the hydraulic pipes, both upstream and downstream to the unit, acting as a shut-off during any maintenance operations.
 - Mechanical filter (**FM**) (**COMPULSORY**) supplied on the inlet pipe of the unit close to it.
 - Mechanical filter (**FM**) and non-return valve (**VNR**), on the supply line upstream to the water charge valve (**RC**).
 - Air bleeder valve at the highest point of the installation.
 - Pipe connected to the safety valve (**VS**) which, if opened directs the jet of water into a direction preventing any risk of physical and material damage (**IMPORTANT**).
 - Vibration damping hoses (**GA**) on the pipes to prevent vibrations being sent to the pipes.

Important:

You are advised to check that the diameter of the pipes coming out of and into the unit are not less than that of the hydraulic couplings on the unit.

Important:

Before the winter months, it is important to empty the circuit (or only the chiller) to prevent damage due to freezing or to fill the circuit with a mixture of suitably dosed water and glycol in accordance with the lowest temperature expected (see table opposite):

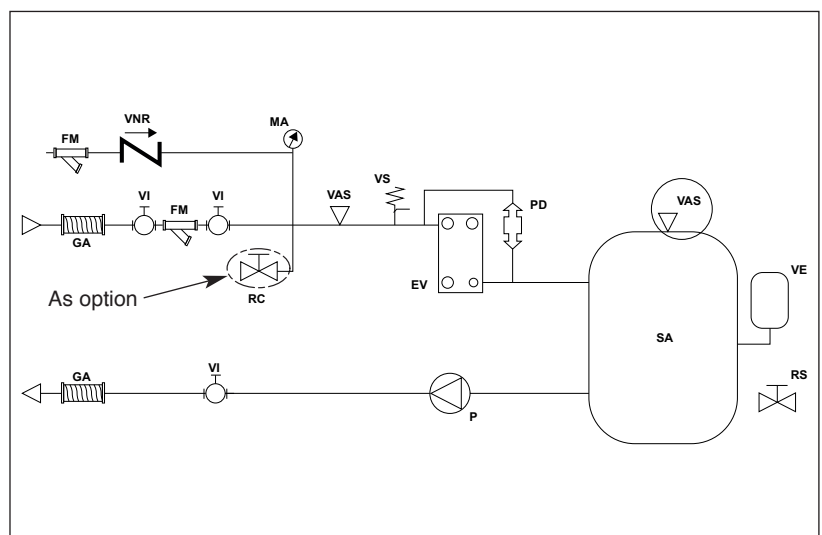
Percentage in weight of ethylene glycol (%)	Freezing temperature of mixture (°C)
0	0
10	-4
15	-8
20	-14
30	-18

• Recommended hydraulic circuit:

- **Failure to install filters** and anti-vibration devices may cause obstruction, ruptures and abnormal noise in which case the manufacturer cannot be held responsible.

Legend:

- EV** Evaporator.
- FM** Mechanical filter (COMPULSORY).
- GA** Anti-vibration hoses (not supplied).
- MA** Water pressure gauge.
- P** Pump.
- PD** Differential pressure switch.
- RC** Water charge valve.
- RS** Drain valve.
- SA** Accumulation tank.
- VAS** Air bleeder valve.
- VE** Expansion vessel.
- VI** Stop valve (not supplied).
- VNR** Non-return valve (not supplied).
- VS** Safety valve.



• Filling the installation:

- Before starting the filling, close the flow valve of the installation.
- Open all the air bleeder valves of the installation, internal units and chiller.
- Open the stop valves of the installation.
- Start filling by slowly opening the water charge valve of the installation.
- When the water starts to come out of the air bleeder valves of the internal units, close these valves and continue to fill until the value of 1.5 bar is reached on the pressure gauge.

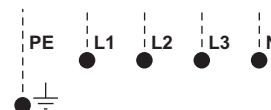
7 - ELECTRICAL CONNECTIONS

7.1 - GENERALITIES

- In all cases, refer to the wiring diagrams supplied with the unit or supplied upon request.
- The acceptable voltage variation is: $\pm 5\%$ during operation.
- The electrical connection conduits must be fixed.
- Short circuit current: 10 kA as per CEI 947-2.
- Class 1 unit.
- Use the holes fitted with grommets for passing cables into the unit.
- Use the stuffing boxes for passing cables into in the electrical box.
- The electrical installation must comply with the standards and regulations applicable where the unit is being installed (in particular NFC 15-100 $\approx$ CEI 364).
- The unit is designed to be connected to a main supply with a TT neutral point connection (as per NF C 15-100).
- Do not alter the internal electrical wiring. Any alteration without prior approval would render the manufacturer's responsibility null and void.

7.2 - POWER SUPPLY

- It is in **400 V three phase + Neutral 50 Hz**, in the electrical box directly across:
 - The main circuit breaker for CHGF 20 / 24 / 28 / 32 / 40 and PHRF 23 / 27 / 32 / 40 / 46 (identified as **IG** in the wiring diagram).
 - The master switch for CHGF 55 / 70 / 76 and PHRF 60 / 77 / 85 (identified as **IG** in the wiring diagram).
- The earth is to be connected across the special terminal $\perp$ placed in the electrical box.



- To access the electric box, the front panel must be taken down.
Introduce the power supply cable into the appliance through the grommet provided for this purpose (see position in § 4).
Make it arrive from underneath.
Use the stuffing box to pass this cable inside the electrical box.
- **The power supply must come from an isolation and electric protection device (not supplied) in accordance with existing regulations.**



Caution:

Before starting the unit, ensure that the phase rotation order is correct. The phase-sequence controller restricts the unit from operating if the 3 supply phases are not in order or if a phase is absent.

- The sizing of the power supply cables is to be ensured by the installer in accordance with the installation conditions and as per current standards.

Cable sizes, indicated below, are given for information purposes.

They are calculated in accordance with NFC 15-100 ($\approx$ CEI 364) with the following hypotheses:

- Maximum current, see table below.
- Multi-pole copper cable with PR insulation.
- Installation in non-ventilated cable duct (installation method No. 41). No other power cable.
- Ambient temperature 40°C.
- Maximum drop in voltage for 100 metres less than 3%.

CHGF model		20	24	28	32	40	55	70	76
Power supply	V-Ph-Hz	400 - 3N + T - 50							
Maximum input current	A	21.7	24	28.6	32.4	36.4	48	57	69
Starting current (*)	A	68	103	87	108	108	117	136	154
Power cable cross section	mm ²	6	10	10	10	10	16	25	35
Protection rating	A	25	32	32	40	40	50	63	80

PHRF model		23	27	32	40	46	60	77	85
Power supply	V-Ph-Hz	400 - 3N + T - 50							
Maximum input current	A	21.7	24	28.6	35.2	36.4	48	57	69
Starting current (*)	A	68	103	86	105	106	117	136	154
Power cable cross section	mm ²	6	10	10	10	10	16	25	35
Protection rating	A	25	32	32	40	40	50	63	80

- The full electrical specifications are given in the technical instructions.
- (*) The starting currents indicated take the electronic starter into account.

7.3 - CONTROL BY EXTERNAL CONTACTS

- The unit can be controlled remotely by connecting two good-quality external potential-free contacts (not supplied):
 - 1 for change-over of the operating mode:
 - Contact closed = Cooling mode (for reversible appliances).
 - Contact open = Heating mode.
 - 1 for the On/Off signal:
 - Contact closed = On.
 - Contact open = Off.

Note:

See § 9.5 for the setting to be adapted.

- The wiring of these contacts must not be routed near power cables in order to avoid electromagnetic disturbances.**
- Min. cross section: 0.25 mm² shielded.
- Maximum length: 20 metres.

Note:

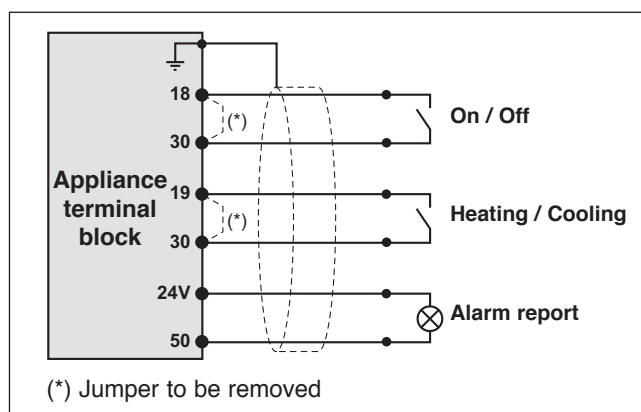
An alarm report in the form of a 24 VAC signal (maximum power 3 VA) is available on the terminal block of the appliance across the "24V" and "50" terminals.

- The control cable should go into the appliance through a grommet (not supplied - drilling to be made).
Make the cable arrive from underneath. It should go into the electrical box through a suitable stuffing box (not supplied - drilling to be made).

The **70250078** remote control (accessory) is provided to perform this function. See relative instructions.

Note:

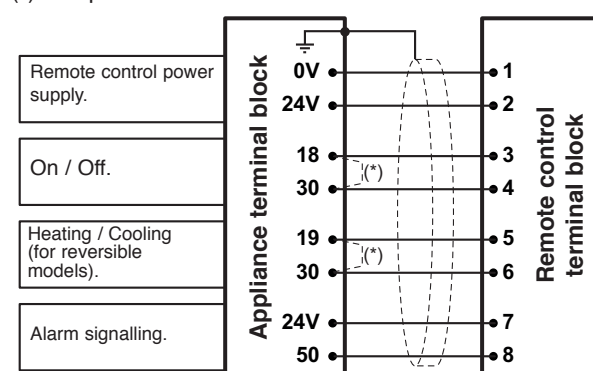
Designed for assembly in sheltered premises (IP 20).



Remote control 70250078



(*) Jumper to be removed



7.4 - REMOTE DISPLAY KEYBOARD

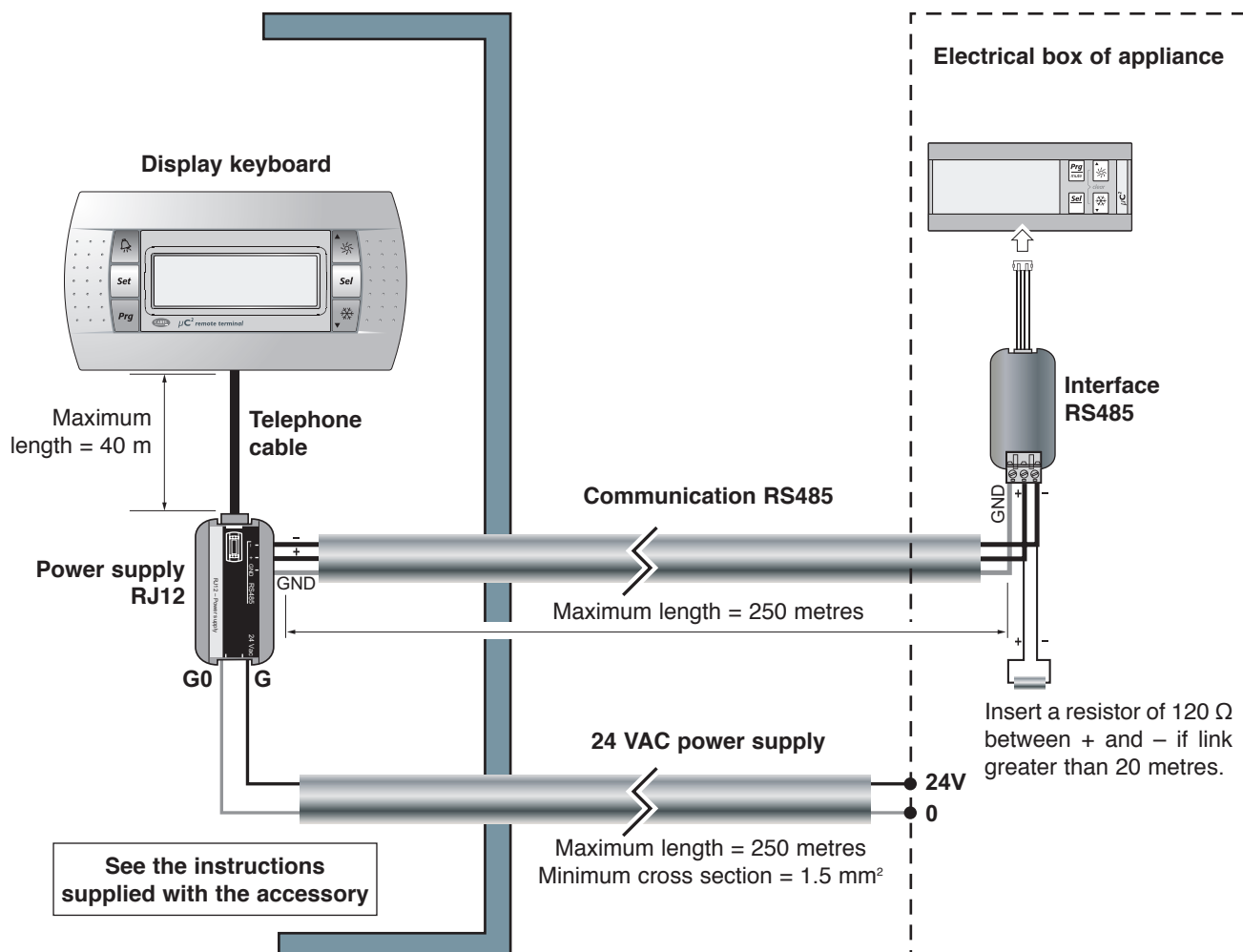
- Accessory **70250079**.

Note:

Designed for assembly in sheltered premises (IP 40).

- Composition:
 - Display keyboard (wall mounted or on the front of an electric panel).
 - Power supply box RJ12.
 - Interface RS485.
 - Telephone cable (2 lengths: 0.80 metre or 3 metres).

Principle:



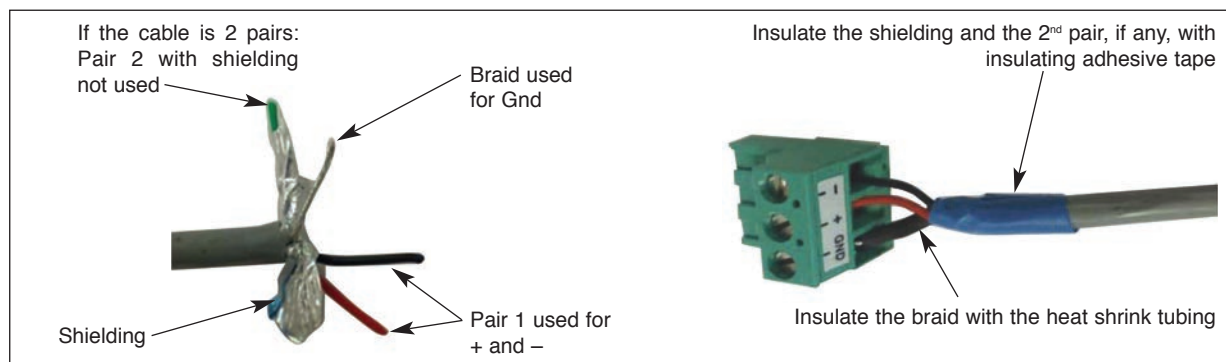
- Specifications of RS485 communication cable:

- Type 1 or 2 twisted pairs, shielded with braid, specific low capacity (< 100 pF/m) and impedance of 120 ohms at 100 kHz.
- Cross section 0.5 mm² / AWG22 (or 20).

Example: "Belden" type 8761 or 8762.

Wiring:

- Use the pair for the connection across + and - terminals.
- Ground braid to be insulated with the heat shrink tubing to be connected to the **Gnd** terminal.



- The connection cables should go into the appliance through a grommet (not supplied - drilling to be made).
Make these cables arrive from underneath.
- They should go into the electrical box through suitable stuffing boxes (not supplied - drillings to be made).

7.5 - RS 485 COMMUNICATION INTERFACE (For MODBUS protocol)

- Please make enquiries with us.



Caution:

The MODBUS protocol is not compatible with the remote display keyboard.

8 - STARTING

IMPORTANT NOTE

**Before carrying out any work on the installation, make sure that it is switched off and that access to it is prevented.
Any work must be carried out by personnel qualified and authorised to work on this type of machine.**

8.1 - CHECK

- That all hydraulic connections are properly tightened and that the hydraulic system functions correctly:
 - Purge the circuits.
 - Position of valves.
 - Hydraulic pressure (1.5 to 2.5 bar).
 - That the water quality:
 - In order for the heat pump to operate under good conditions and provide optimum performance, it is essential to ensure that the system's water circuit is clean. If the water circuit becomes clogged, this will significantly affect the machine's performance. The circuit must therefore be cleaned with suitable products in compliance with current standards as soon as it is installed, both for new and renovation work.
We recommend the use of products which are compatible with all metals and synthetic materials and approved by official bodies.
Recommendations regarding water quality:
 - PH: 7 to 9.
 - TH: 10 to 20°F.
 - Dry material in suspension: < 2 g/l.
 - Granulometry: < 0.4 mm.
 - Chloride: 50 mg/l maximum.
 - Conductivity: 150 to 350 $\mu\text{S}/\text{cm}^2$.
 - Fibre: no fibres or fibril.
- Any disorder which may occur on our machines due to the poor quality of the fluid in the installation will not be covered by the warranty.
- That there are no leaks.
 - That the machine is stable.
 - That the power cables are well fixed to their connection terminals. Terminals that are poorly tightened may cause overheating and malfunctions.
 - That the electric cables are well insulated from any sections of sheet metal or metal parts which could damage them.
 - That electrical wiring is a safe distance from refrigeration lines.
 - That sensor, control and power cables are properly separated.
 - That the machine is earthed.
 - That there are neither tools nor other foreign objects in the unit.

8.2 - STARTING-UP THE UNIT

- Power up the unit.
- Start the unit.



Caution:

As the unit's power supply is three-phase, make sure that the phase rotation order is correct. If the phase order is not respected, the phase order controller prevents the unit from operating and causes an alarm. To fix this, simply invert the 2 phases.

An indicator lamp on the front panel of the phase order controller (identified as "RSF") indicates the status of this controller:

- Indicator lamp steady = correct phase order.
- Indicator lamp blinking = incorrect order phase
or loss of a phase (Threshold = 70% of voltage rating).

8.3 - CHECKS TO BE MADE

- Water flow-rate:

The generator is fitted with 1/4 SAE pressure taps at the inlet and outlet of the unit to measure headloss using a hydraulic pressure gauge. Use the curves to determine the water flow rate (see § 8.4).

Note:

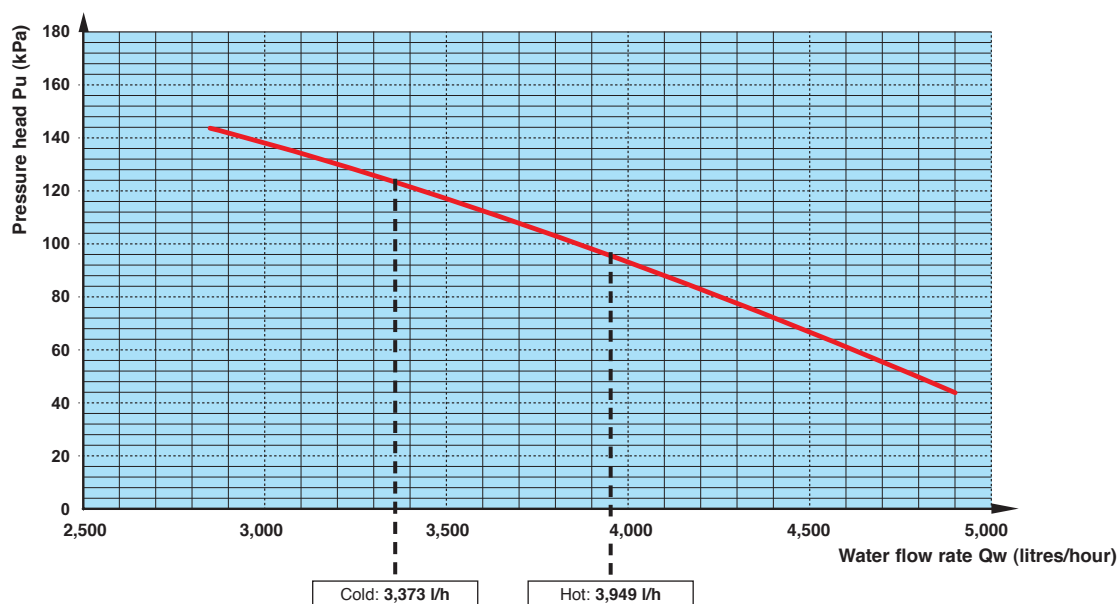
The generator's water output must be ensured at all times (particular attention should be paid in the case of control of the terminal units on 2-way valve).

- Pump rotation direction: should a problem occur, invert 2 phases on the pump's power supply.
- **Purge** the hydraulic system, with special attention given to the **pump**.
- Water circuit pressure.
- Filter cleanliness.
- Check the HP and LP and check the intensities on the commissioning sheet.
- Check control system operation.

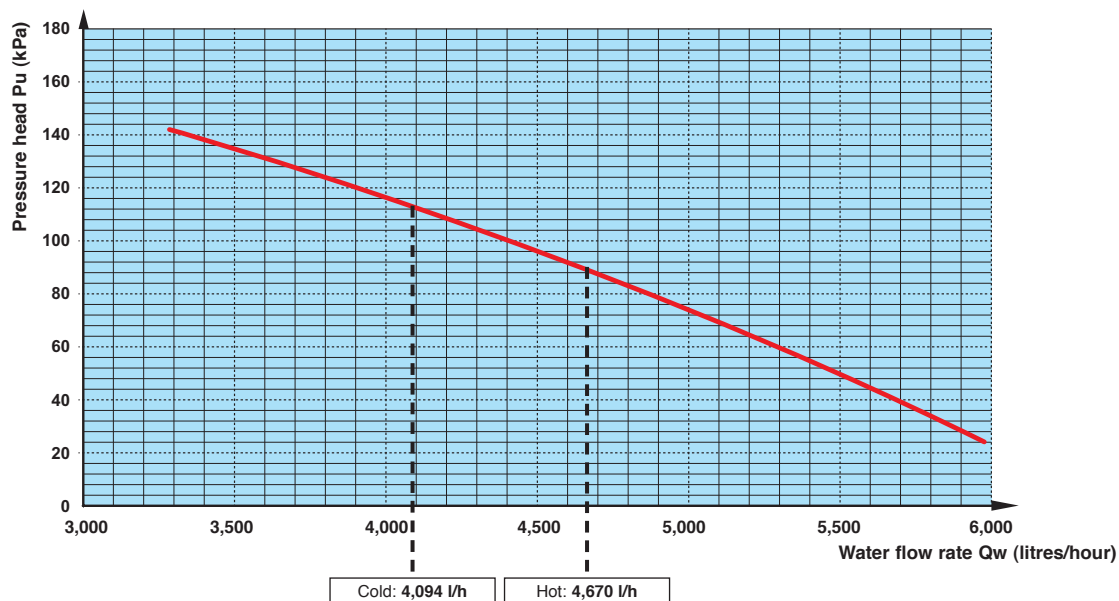
8.4 - PRESSURE HEAD AVAILABLE

- The following diagrams provide the pressure head available of the units (P_u) according to the water flow rate (Q_w), for a water temperature of 10°C. The Y filter (supplied) headlosses are not taken into account.

CHGF 20
PHRF 23

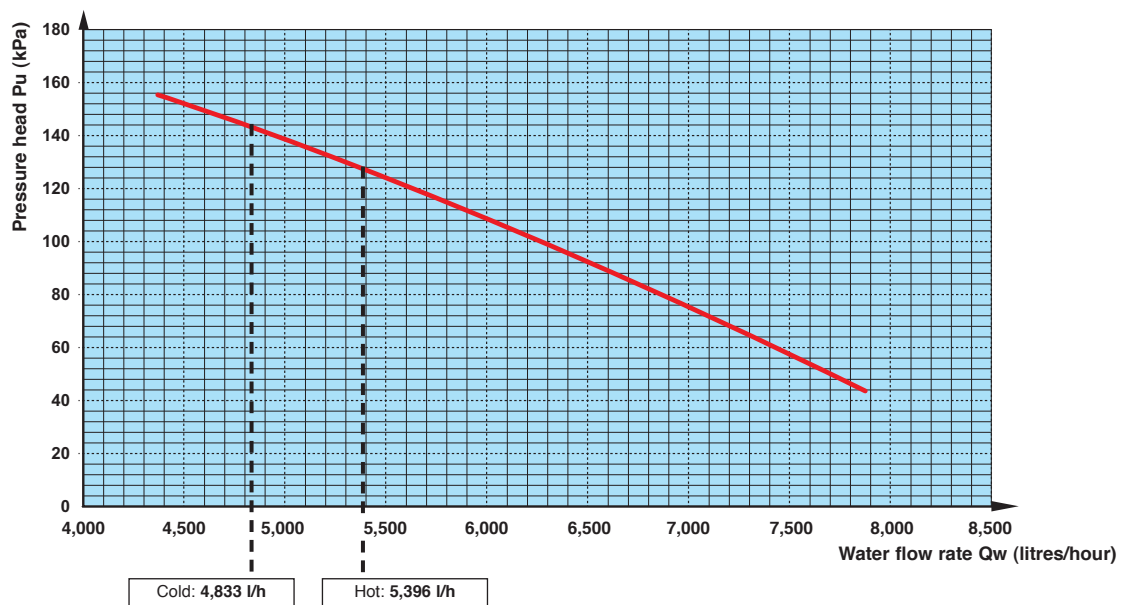


CHGF 24
PHRF 27

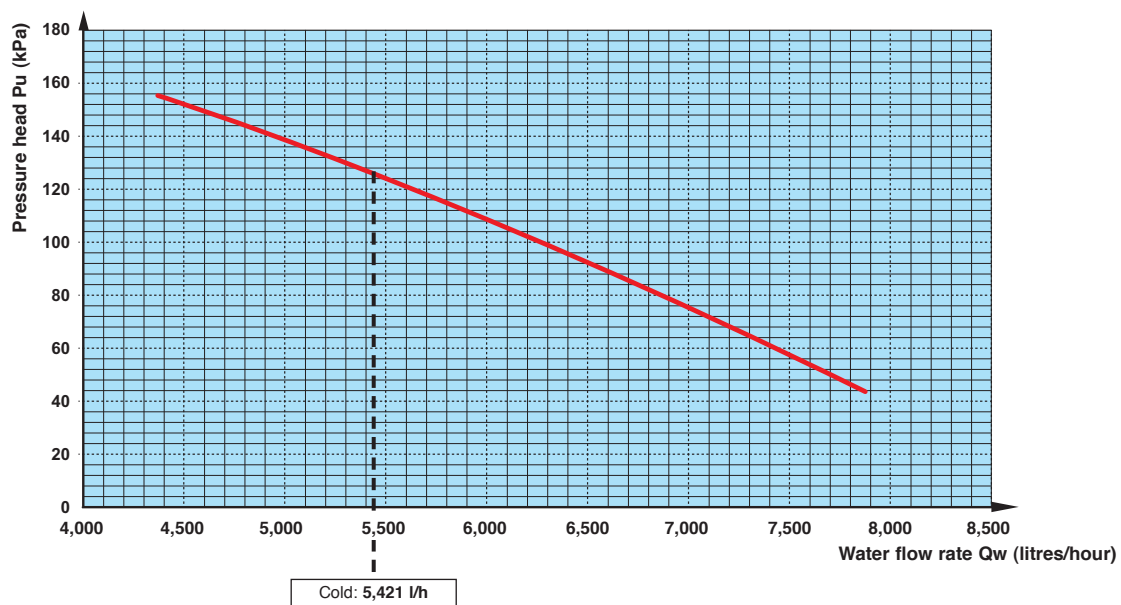


CHGF 28
PHRF 32

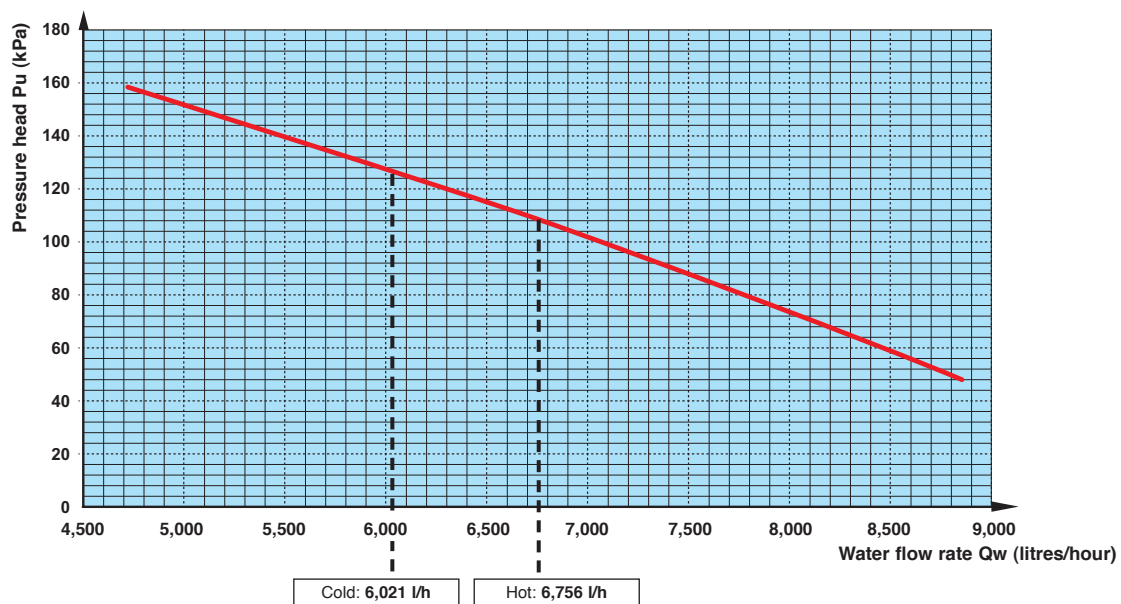
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CHGF 32

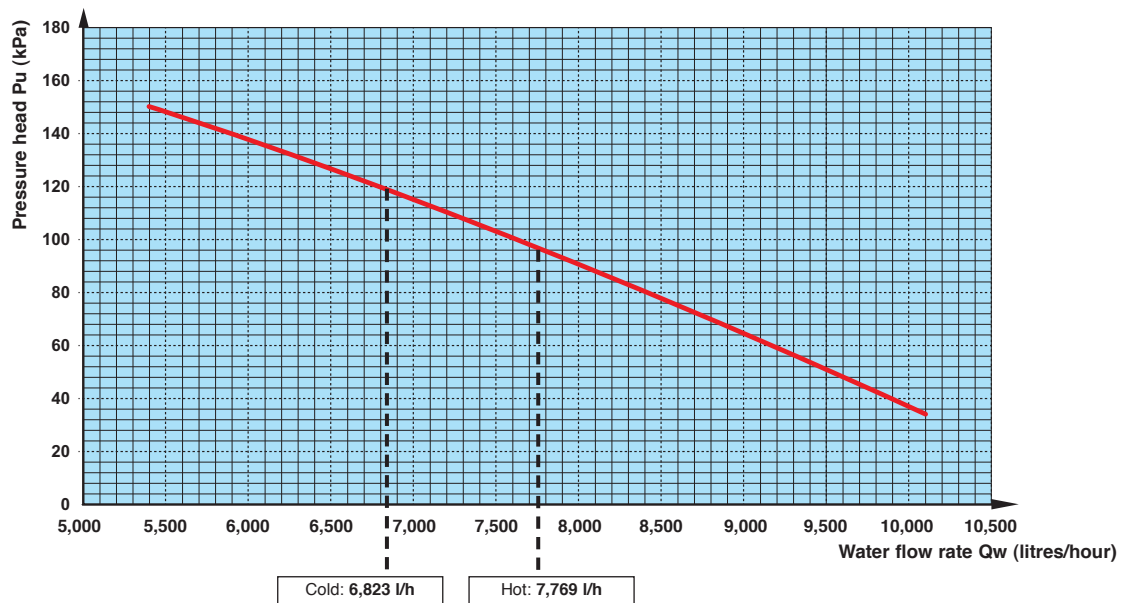


PHRF 40

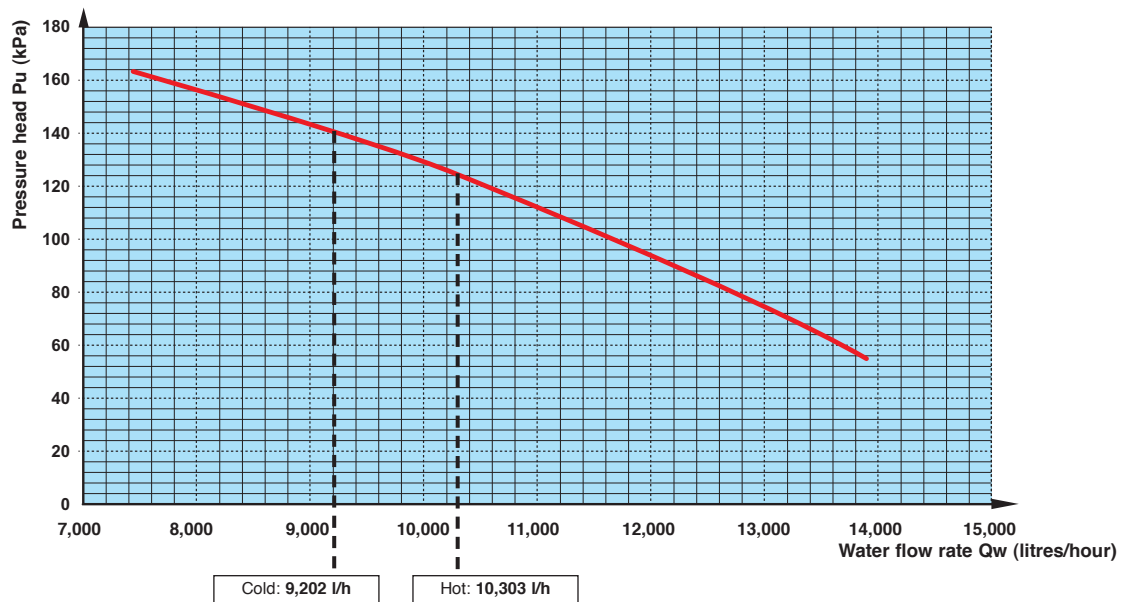


CHGF 40
PHRF 46

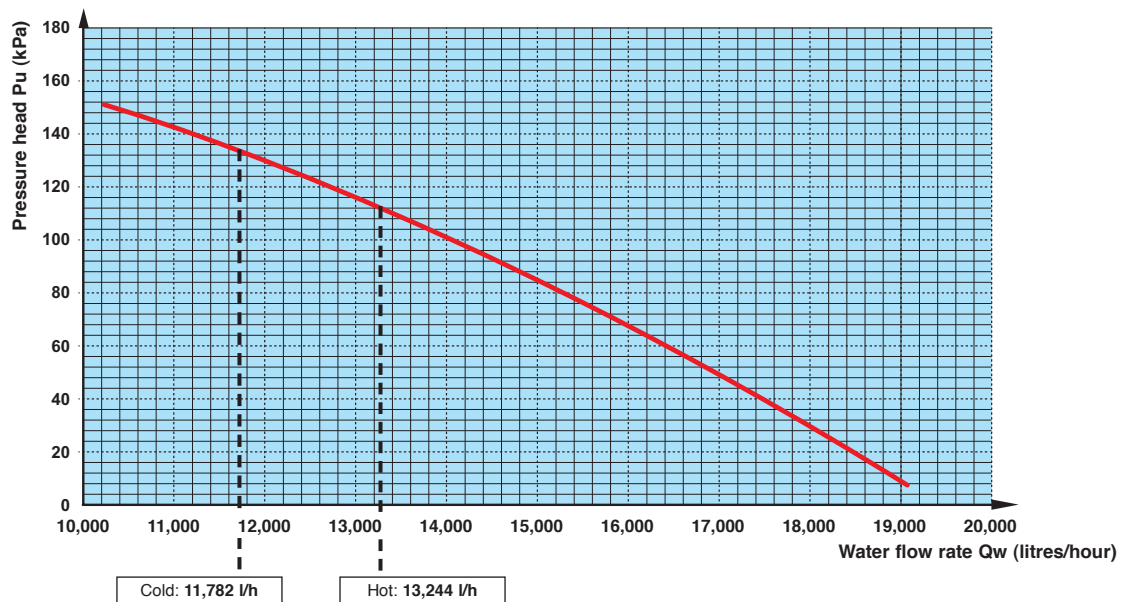
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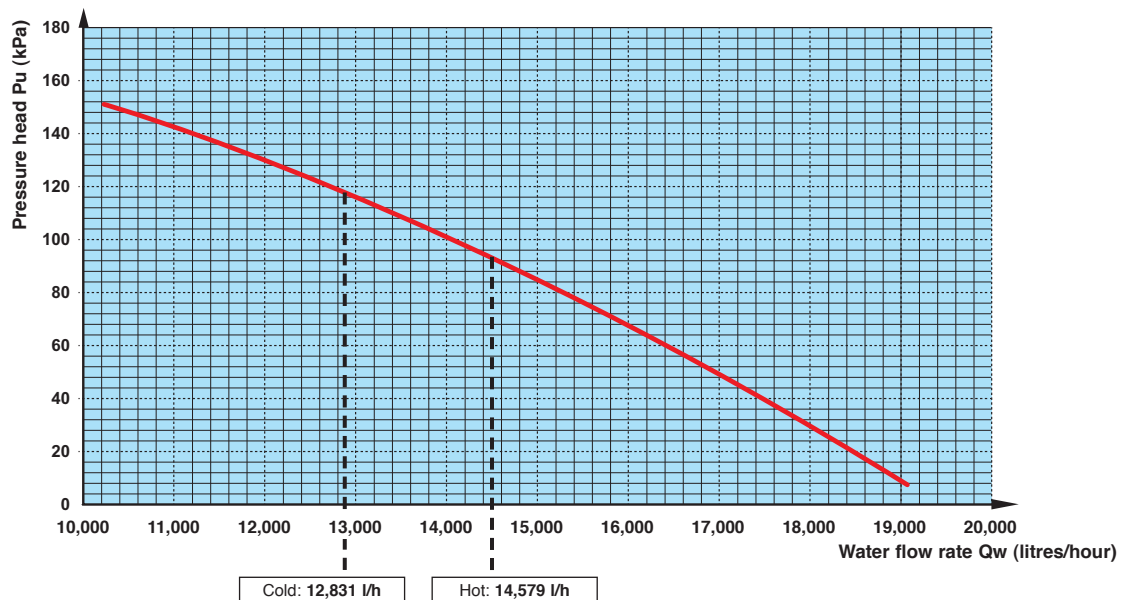


CHGF 55
PHRF 60



CHGF 70
PHRF 77





9 - μC^2SE ELECTRONIC CONTROL

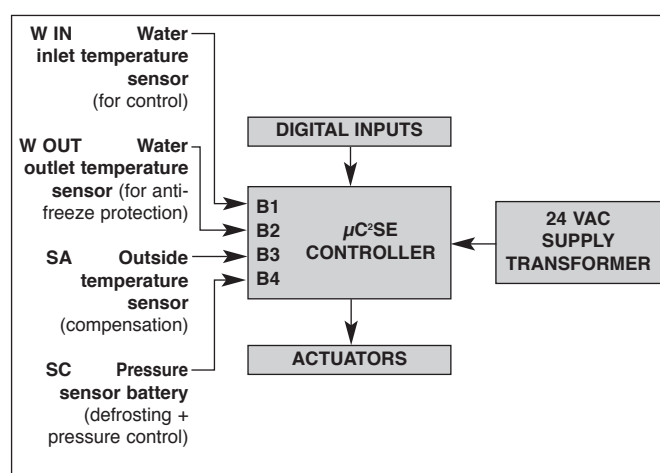
- See wiring diagrams supplied with the machine.

9.1 - DELIVERY STATE

- The control unit is supplied fitted in the machine and factory pre-set.
- All the connections are made except those concerning the available signals or the options.

9.2 - PRINCIPLE

- The microprocessor controls the operation of the machine and of the associated alarms. It continuously compares the water temperature measured by the sensor **W IN** and the setpoint temperature value entered via the keyboard. Each operating request produced by the control unit is indicated by the light (**A**) (see below). This light flashes if a safety delay is in progress. It stays on when the compressor is operating.
- The **control** sensor **W IN** is located on the **water inlet** in the factory.



9.3 - PRESENTATION

9.3.1 - DISPLAY

- In normal operation, the value displayed relates to the temperature read by the **water inlet** sensor (Control).

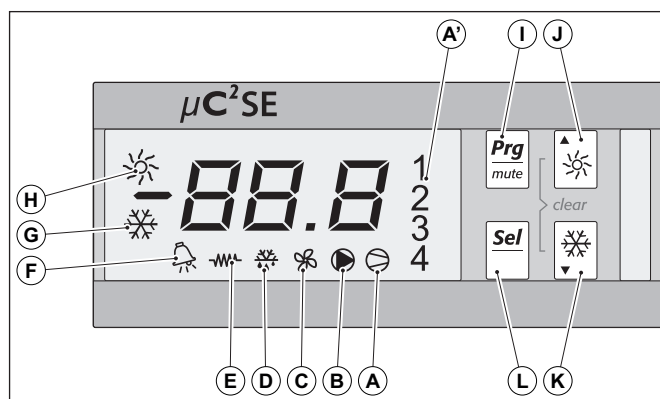
The sensor used as a reference for the display can be changed via parameter **b00**:

0 = Sensor **B1 (W IN)**.

1 = Sensor **B2 (W OUT)**.

2 = Sensor **B3 (SA)**.

4 = Sensor **B4 (SC)**.



LAMPS		MEANING	
Item	Symbol	Stays on	Flashes on
A		Compressor on	
A'	1	Compressor 1 on	Requested, time delay in progress
	2	Compressor 2 on (according to models)	Requested, time delay in progress
B		Circulating pump on	Requested, time delay in progress
C		Ventilation on	
D		Defrosting in progress	Defrosting requested
E		Anti-freeze heating element on	
F		Alarm	
G		Cooling mode	
H		Heating mode	

KEY		MEANING
Item	Symbol	
I		Access to parameters - Return
J		Heating mode selection - Incrementation
K		Cooling mode selection - Decrementation
L		Access to parameters - Selection
J + K	<i>clear</i>	Alarm reset – Hour meter reset

9.3.2 - TEMPERATURE SENSOR

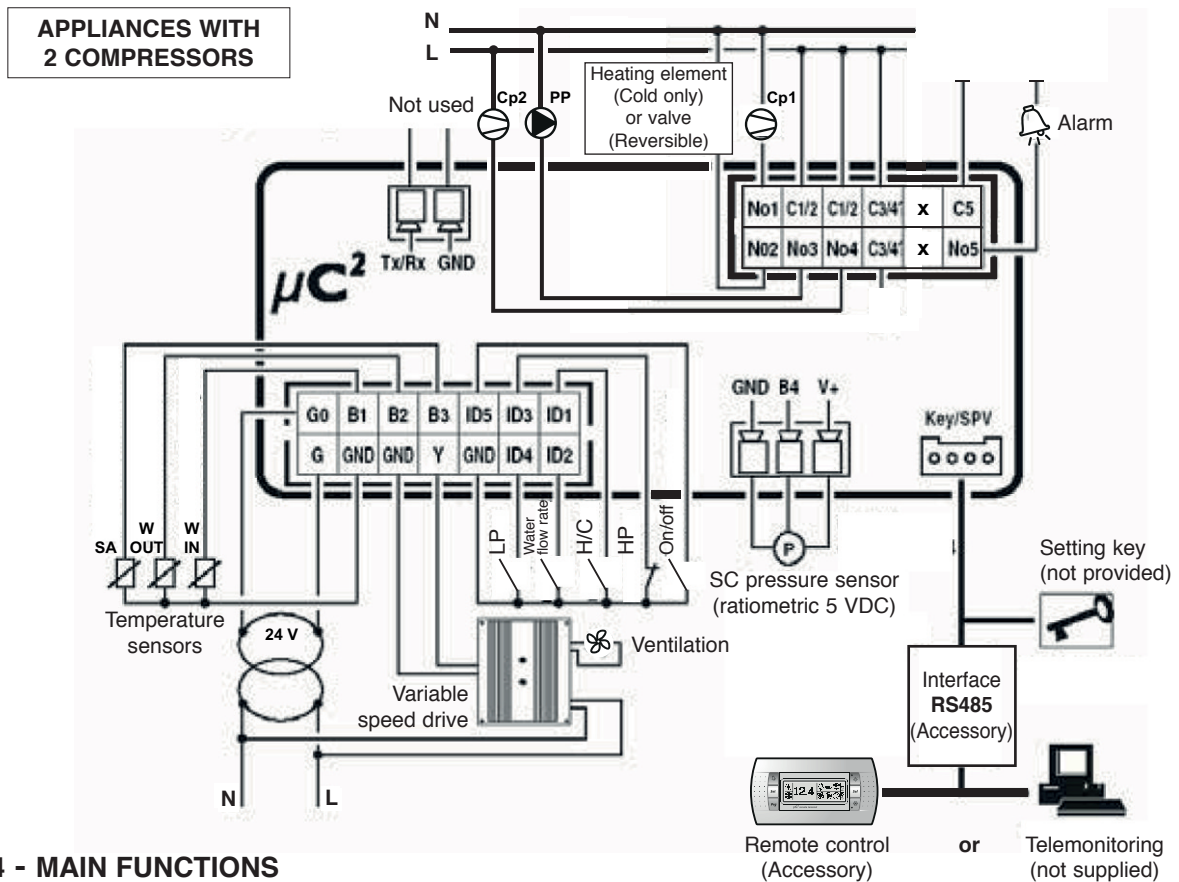
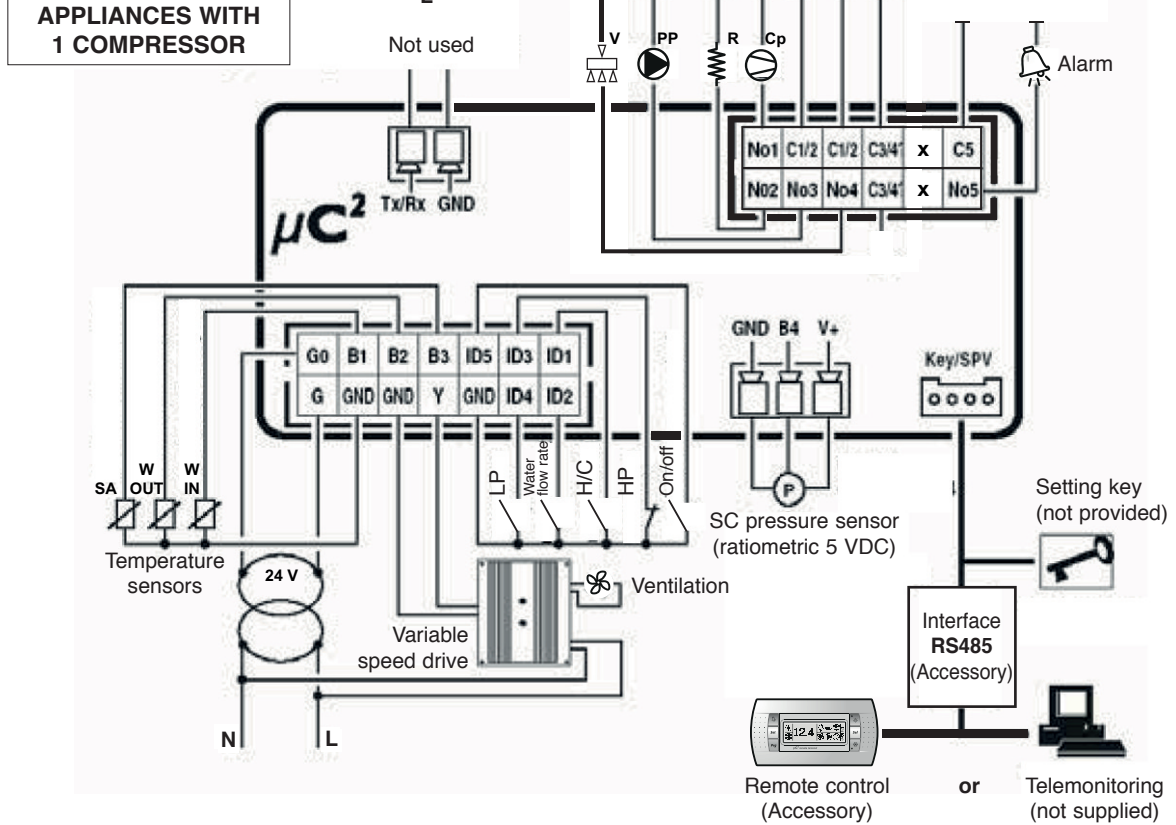
- CTN Typ 10 kΩ at 25°C.

Temperature (°C)	Ohmic value (Ohm)
-20	67,740
-10	42,250
0	27,280
10	17,960
20	12,090
25	10,000

Temperature (°C)	Ohmic value (Ohm)
30	8,310
40	5,820
50	4,160
60	3,020
70	2,220

9.3.3 - CONNECTION PRINCIPLE DIAGRAMS

- Controller shown from rear.

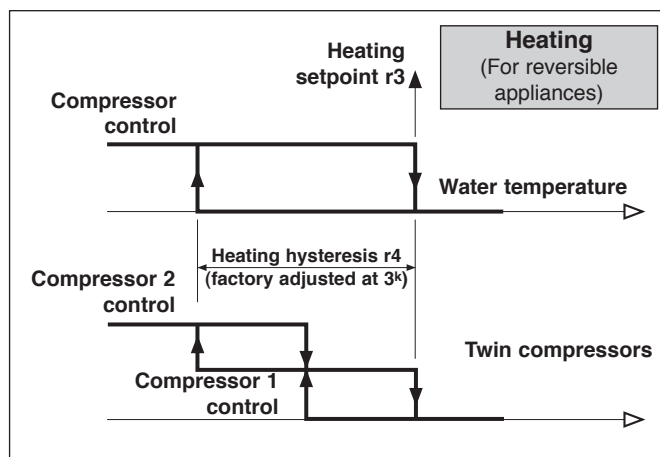
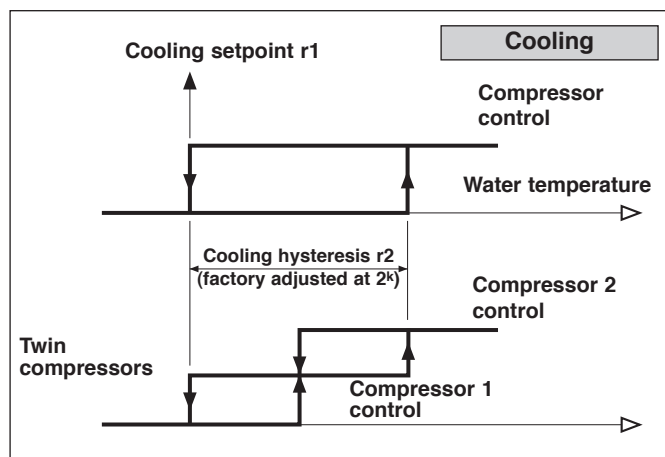


9.3.4 - MAIN FUNCTIONS

- Water temperature control.
- Defrosting (reversible appliances).
- Ventilation speed control.
- Alarm management.
- Water circulating pump control.
- Communication.

9.4 - OPERATING MODES

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- In the factory configuration, the switch of the operating mode is performed by an external contact (not supplied) to be connected to the appliance across terminals **19** and **30**.
 - Contact closed across terminals **19** and **30** = **Cooling**.
 - Contact open across terminals **19** and **30** = **Heating**.

Note:

By setting, it is possible to configure the control in order to have a selection of the operating mode by the and keys of the display. In this case, the external contact connected across terminals **19** and **30** is inactive.

To do this, set parameter **H06** to "0" (Heating / Cooling input deactivated).

See paragraph 9.6 for the procedure to access the parameters.



You are advised to stop the appliance a few minutes before performing a change of operating mode (Heating <--> Cooling).

9.5 - START / STOP OF APPLIANCE

Initial status:

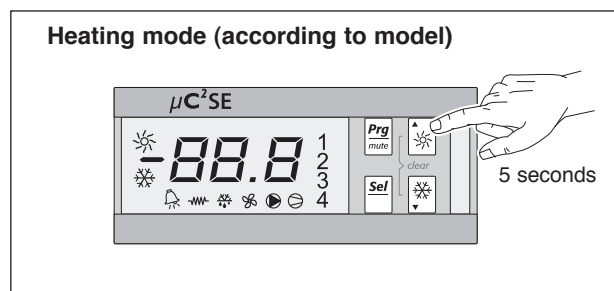
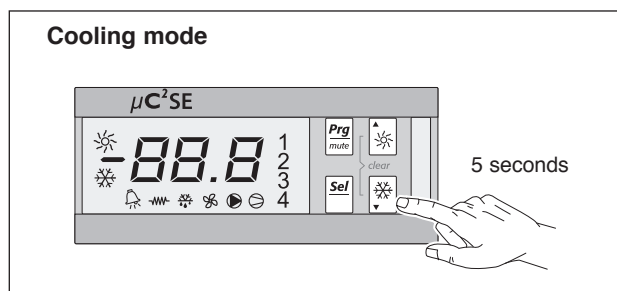
- The appliance is electrically and hydraulically connected and ready to operate.

Note:

On switching on, the controller displays the message "**μC2**" then the version of the programme (e.g. "**2.3**") before displaying the water temperature.

Start / Stop by display keyboard:

- Press the or key according to the mode selected for more than 5 seconds to start the appliance.



- The corresponding or operating mode indicator lamp goes on.
- The circulating pump indicator lamp goes on.
- The compressor indicator lamps go on if required (see diagrams in paragraph 9.4).

Note:

In the case of the operating mode selection via the external contact, see paragraph 9.4, the start can only be performed in the remote selected mode.

- The appliance is stopped by pressing the or key again for more than 5 seconds according to the operating mode.
- The corresponding or operating mode indicator lamp goes out.

Note 1:

The safety time delays may defer the start and/or the stop of the compressor(s).

Note 2:

The stop of the water circulating pump is time delayed by 1 minute after the stop of the compressor.

- **Start / Stop by remote contact:**

- By setting, it is possible to configure the control in order to control the appliance via an external contact (not supplied) to be connected to the appliance across terminals **18** and **30**.
 - Contact open across terminals **18** and **30** = **Off**.
 - Contact closed across terminals **18** and **30** = **On**.
- To do this, set parameter **H07** to "1" (On / Off input activated).
See paragraph 9.6 for the procedure to access the parameters.
- This adjustment is required in the case of the use of a simplified remote control **70250078**.

Note:

With the appliance on with the remote contact closed, it can be stopped via the key of the display keyboard.

Caution:



In this case, the opening followed by the closing of the remote contact will restart the appliance.

9.6 - PARAMETERS - VIEW AND ADJUSTMENTS

9.6.1 - GENERAL

- The parameter cyclic menu (see following diagram) is accessed in two different ways:
 - Either directly by pressing the  key for 5 seconds. This provides limited access to view certain values (temperature, hour meters, etc) and adjustment of the setpoints and control differentials.
 - Or by a password by simultaneously pressing the  and  keys for 5 seconds. According to the password entered, access is then provided to certain adjustment parameters.

- **Setting key function:**



: To select the display in progress.



: To scroll the values displayed.



: To exit the display in progress.



The saving of a parameter change is not made until you leave the menu by pressing the  key.

- **To save the parameters:**

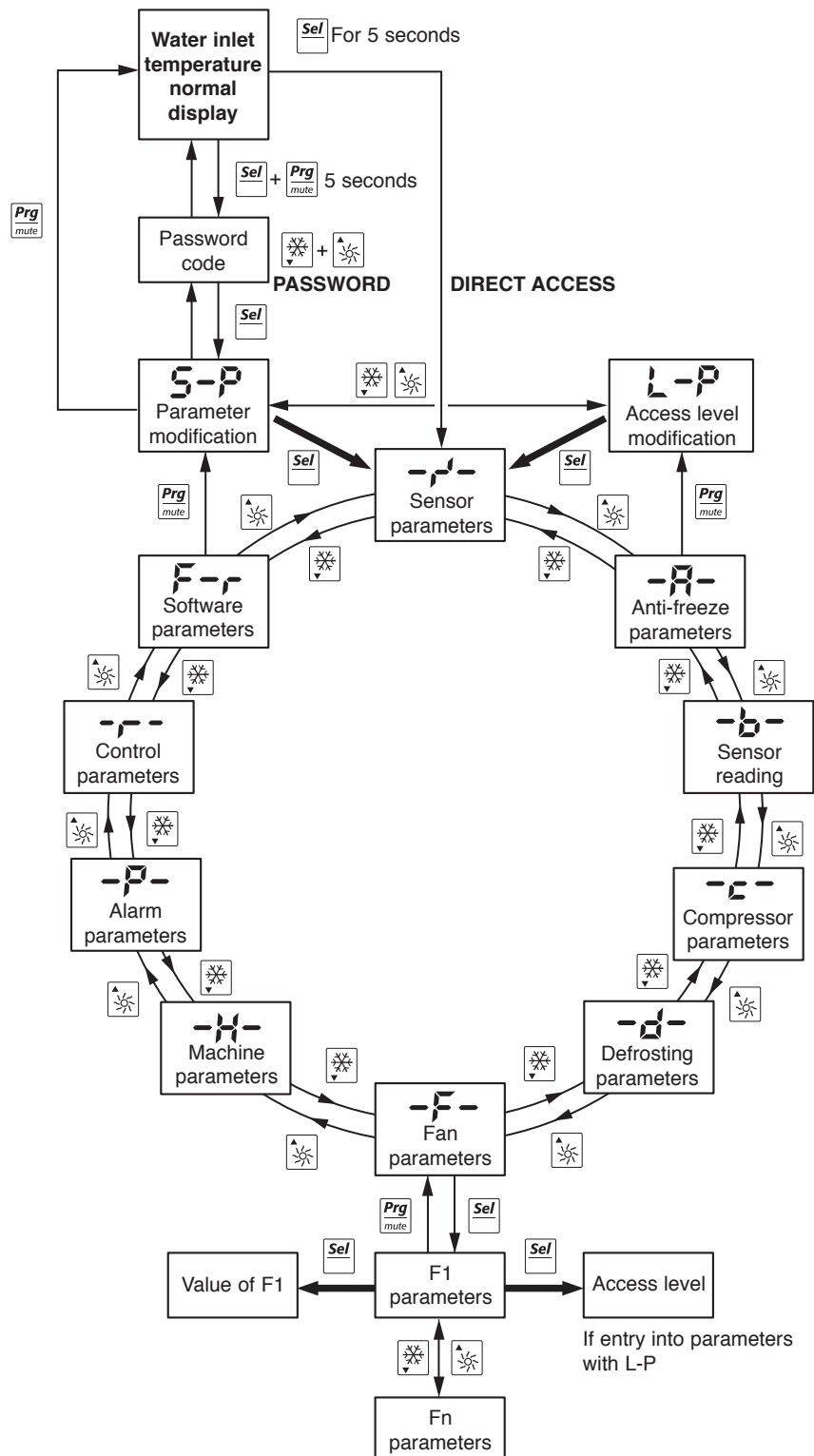
Press  twice, then once to exit the menu.

- **How not to save parameters:**

Do not press any key for 60 seconds until the temperature display returns.

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- Press: + for 5 seconds.
- On display of: , release the + keys.
- With the arrows: and , enter the password.
- Press: to confirm the password.
- Display of: (Set Parameters).
- Press: to enter into the parameters.



9.6.3 - SETPOINT ADJUSTMENT

- Direct access possible via the sub-menu “r” .

Code	Parameters	Adjustment range	Factory adjustment	For reversible units only
r1	Cooling setpoint	9 to 20°C (PHRF) 10 to 20 °C (CHGF)	12°C	
r2	Cooling hysteresis		2°C	
r3	Heating setpoint	25 to 47°C	45°C	
r4	Heating hysteresis		3°C	

- Reminder: Control of water inlet temperature of appliance.

Example: modification of r3:

- Press  for 5 seconds until  is displayed.
- Press the down  arrow twice until  is displayed.
- Press .
- Display of parameter r01 .
- With the  and  arrows, display the parameter r03 .
- Press  to display the value of the parameter.
- With the  and  arrows, change the values of the parameter.
- Press  to confirm.
- Press  three times to exit the setting menu.

9.6.4 - DISPLAY OF TEMPERATURES, PRESSURES AND HOUR METERS

- TEMPERATURES / PRESSURES: DIRECT access possible via the sub-menu “b” .

-  = Water inlet temperature (°C).
-  = Water outlet temperature (°C).
-  = Outside temperature (°C).
-  = Pressure (bar) of refrigerating circuit, air exchanger end.

• **Note:**

In normal display, these values can be accessed by briefly pressing the  or  key.

- HOUR METERS: DIRECT access possible via the sub-menu “C” .

-  = Compressor 1 hour meter.
-  = Compressor 2 hour meter.
-  = Circulating pump 1 hour meter.
-  = Circulating pump 2 hour meter.



• **Caution:**

The value displayed is to be multiplied by 100.

• **Note:**

An hour meter is reset by simultaneously pressing the  and  keys when the value of the meter is displayed.

9.7 - ALARMS

- When an alarm occurs (see table below):
 - The corresponding code flashes on the display unit.
 - The unit stops if necessary.
 - The alarm report is active, if any.
- Remedy the fault.



Caution:

All work must be carried out by qualified, experienced personnel.

- The alarm reset is either automatic or manual (see table below).
- The alarms are reset manually by simultaneously pressing the  and  keys for 5 seconds.
- When the alarm is cleared:
 - The alarm report is de-activated.
 - The display reverts to normal (no flashing).
 - The machine can re-start (if it was stopped).
- Special features of the alarm report:**
 - Available on the terminal block of the appliance in the form of a signal in 24 VAC (maximum 3 VA).
- Summary table of alarms:**

Code	Alarm	Time delay disable	Compressor stop	Fan stop	Circulating pump stop	Alarm report	Reset	Comment
E1	Sensor 1 fault		X	X		X	Auto.	Water inlet sensor.
E2	Sensor 2 fault		X	X		X	Auto.	Water outlet sensor.
E3	Sensor 3 fault		X	X		X	Auto.	Outside sensor.
E4	Sensor 4 fault		X	X		X	Auto.	Pressure sensor.
HP1	High Pressure (+ thermal protection devices)		X	X		X	Manu.	Forcing ventilation 1 minute in Cold mode.
LP1	Low Pressure	10 seconds on start	X	X		X	Manu.	
A1	Anti-freeze (water exchanger)		X	X		X	Manu.	From sensor 2 (water outlet) Threshold = 3 °C Differential = 3 K.
FL	Water flow rate (+ phase order)	5 seconds in established rate	X	X	X	X	Auto. then Manu.	5 automatic restarts of the circulating pump before manual reset.
EPr EPb	Error EEPROM						Auto.	
ELS	Low supply voltage						Auto.	Correct operation is not guaranteed.
EHS	High supply voltage		X	X	X		Auto.	
EL1	Interference on supply						Auto.	Causes switch of fans to maximum speed.
DF1	Defrosting too long						Auto.	Reset by correct defrost cycle.
L	Low thermal load						Auto.	Check the volume of water of the installation.
Hc1 Hc2	Maintenance						Manu. (*)	Alarm based on compressor(s) operating time.
On remote display keyboard								
OFF LINE	Communication							Communication problem with controller.

(*) By reset of hour meter(s).

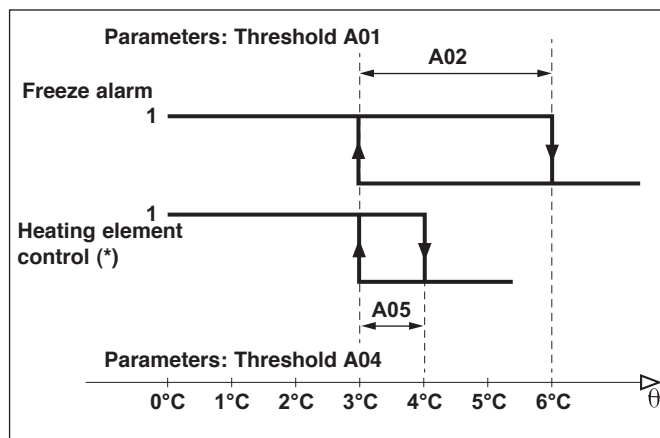
9.8 - OPERATING FEATURES

9.8.1 - ANTI-FREEZE PROTECTION OF WATER CIRCUIT

- 2 functions performed:
 - Heating element control (on water exchanger, pump body and tank).
 - Anti-freeze alarm stopping the machine.
- Operating diagram (see opposite).

The adjustment of these thresholds can be modified on request according to the conditions of use of the machine.

(*) For reversible appliances with 2 compressors, the heating elements are controlled by a separate thermostat (factory adjustment = 3°C, hysteresis = 3°) in the electrical box of the appliance.

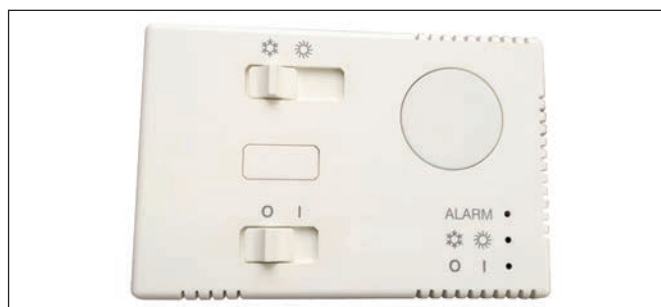


9.8.2 - CIRCULATING PUMP CONTROL

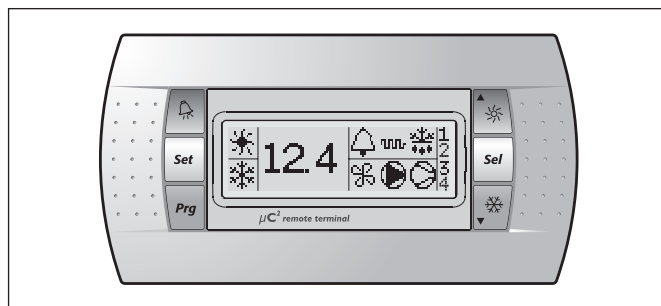
- The pump is controlled as soon as the appliance is started.
- The pump stops when the appliance is stopped after a time delay (1 minute after the stop of the compressor).

9.8.3 - REMOTE CONTROLS

- 2 possibilities:
 - **Simplified control 70250078:**
 - Uses the control inputs by On / Off and Hot / Cold contacts.
 - The control alarm report controls an indicator lamp on the remote control.
 - See connection diagram in paragraph 9.3.
 - See the instructions supplied with the control.
 - Designed for assembly in sheltered premises (IP 20).



- **Remote display keyboard 70250079:**
 - The functions are identical to those of the display keyboard on the front of the appliance.
 - The remote display keyboard uses the communication link of the control (*).
 - See connection diagram in paragraph 9.3.
 - See the instructions supplied with the remote display keyboard.
 - Designed for assembly in sheltered premises (IP 40).



 : Alarm clear.

 : Access to parameters.

Note:

The **H23** parameter must be set at "0" (= CAREL protocol) in order for the remote display keyboard to operate correctly.

(*) No MODBUS protocol with the remote display keyboard.

9.8.4 - POWER CUT

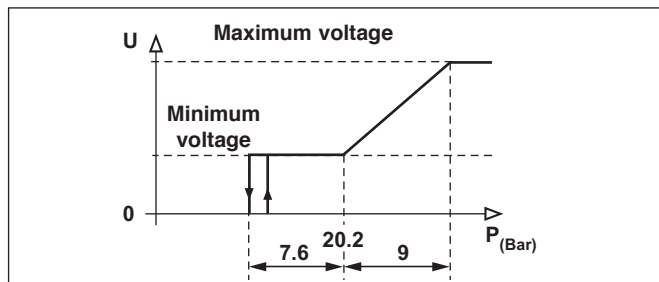
- If the power is cut to the control circuits, the electronic control unit returns to the operating mode it was in before the power was cut and the parameters are still stored in memory when the power is restored.

9.8.5 - PRESSURE CONTROL

- The applicable is **factory fitted** with a special voltage variation board directly controlled by the electronic control.
- From pressure information (taken by the sensor on the air exchanger circuit), the control varies the power supply voltage of the motor and fan assembly according to the following diagrams.

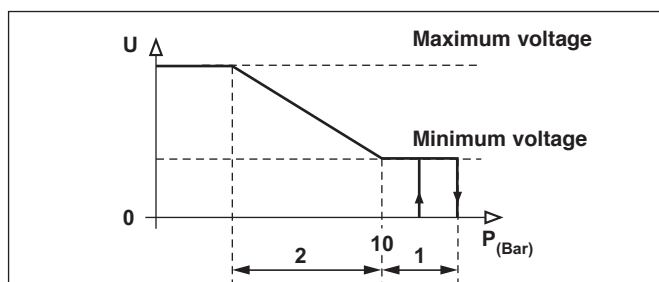
• COOLING MODE:

Condensation pressure control



• HEATING MODE:

Evaporation pressure control



9.8.6 - DEFROSTING (Heating mode only)

- If the pressure measured by the sensor on the air exchanger circuit is less than 4.5 bar (for at least 60 seconds), a defrosting operation is started (change-over of refrigerating cycle and stop of ventilation). This defrosting lasts until the pressures goes back up to 28 bar. During the defrosting, the corresponding indicator lamp goes on and the “d1” message is displayed. This defrosting operation is limited over time (maximum 6 minutes).
- If a defrost finishes with this time delay, the “dF1” alarm is displayed. It is cleared if the next defrosting cycle is performed normally.

A further defrost cannot start before 20 minutes.

Note 1:

The compressor is stopped at the start and end of a defrosting cycle.

Note 2:

The appliance is adjusted for optimum defrosting operation. It may be required to alter these adjustments for specific operating conditions. Please make enquiries with the after-sales service.

9.8.7 - CYCLE INVERSION VALVE

- For reversible appliances.
- The valve is actuated in heating mode.

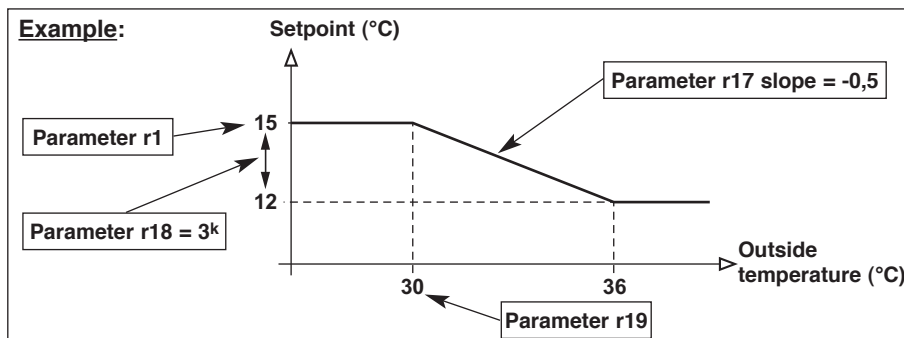
9.8.8 - ANTI SHORT-CYCLE TIME DELAYS

- The control of the compressor(s) has a time delay system in order to adhere to:
 - A minimum operating time (150 seconds).
 - A minimum stopping time (60 seconds).
 - A minimum time between 2 starts (6 minutes).
- Appliances with twin compressors:
 - A start of the 2nd compressor, if any, is deferred by 10 seconds.
 - An automatic “FIFO” switching device is provided to equalise the operating time of the compressors.

9.8.9 - "DYNAMIC" SETPOINTS

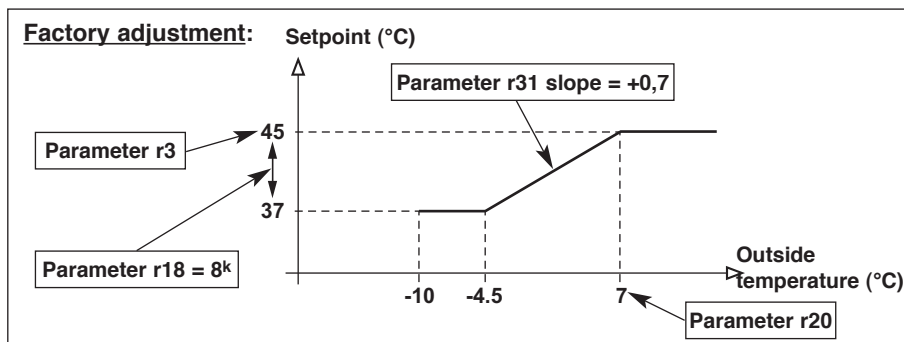
• Cooling mode:

By way of special adjustment, an automatic compensation system of the cooling setpoint according to the outside temperature can be activated. The control is adjusted in the factory so as not to have any variation in the setpoint.



- **Heating mode:**

The control is factory adjusted to have the appliance operate within its operating limits when the outside temperature drops.



9.8.10 - REDUCTION OF WATER VOLUME

- The controller has an auto-adaptive algorithm which analyses the operating times of the compressor and can induce an alteration of the temperature control hysteresis in the event of operating time which is too short (in order to extend the operating times).
- For special applications, in which case the dimensioning of the unit and the circuit are carefully designed, this function can be deactivated. In order to do this, set parameter **r27** to "0" in the "-r-" control section of the adjustment menu.

9.8.11 - MAINTENANCE ALARM

- An alarm threshold on the compressor(s) operating time can be adjusted via parameter **C14**.
- This threshold is expressed in hundreds of hours.
- By default, this parameter is set at "0" (function deactivated).

9.8.12 - COMMUNICATION

- The control can be connected to a supervision system thanks to the **communication interface RS485 MODBUS Protocol accessory 70250080** (Please make enquiries with us for the list of communication addresses and specifications).



Important:

- This accessory must be used without the remote display keyboard.
- The ("Hardware" and "Software") supervision system is not supplied.

In this case, parameter **H23** must be set at "1" (MODBUS).

Also complete parameter **H10**: Series address.

9.8.13 - MISCELLANEOUS PARAMETERS

- Calibration of the values read by the sensors:
 - /13 : Input **B1** (**W IN**).
 - /14 : Input **B2** (**W OUT**).
 - /15 : Input **B3** (**SA**).
 - /16 : Input **B4** (**SC**).
- Measurement units:
 - /23 : 0 = degrees Celsius (default value).
 - 1 = degrees Fahrenheit.
- Software programme version: **H99**.

10 - OPERATING LIMITS

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The following graphs show the continuous operating limits according to the water outlet temperature of the unit and the outside air temperature.

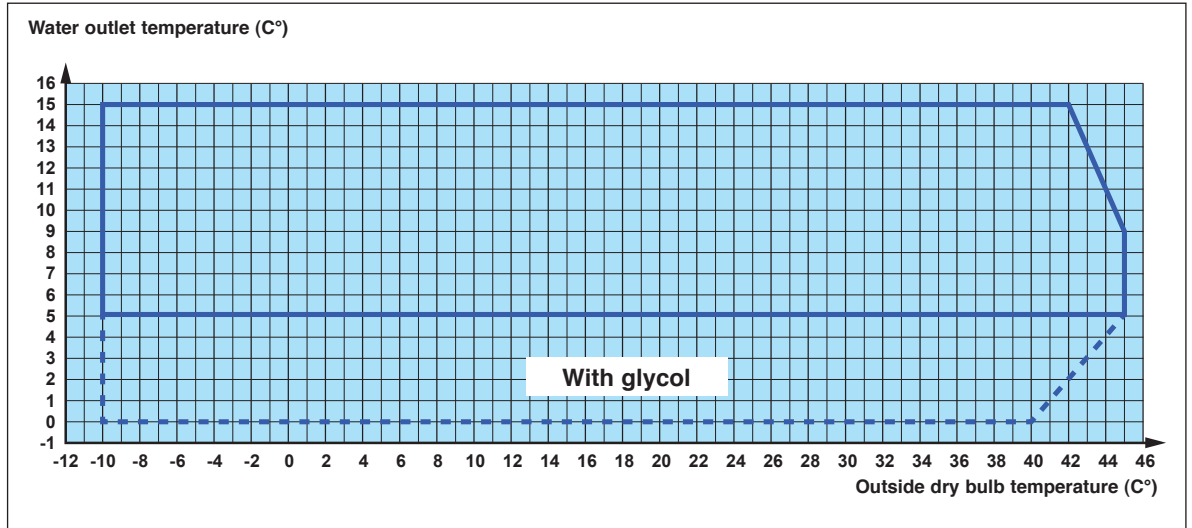


Caution:

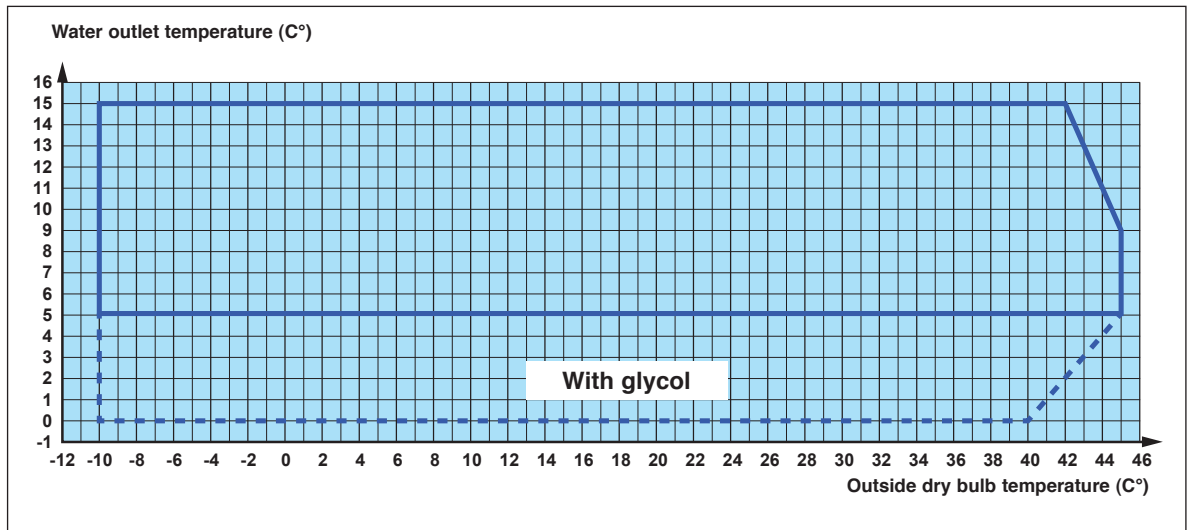
The units are designed to operate when the water and air temperatures are below the limits laid down. The unit may incur irreparable damage beyond these limits.

10.1 - OPERATING LIMITS IN CHILLER OPERATING MODE

CHGV 20/76

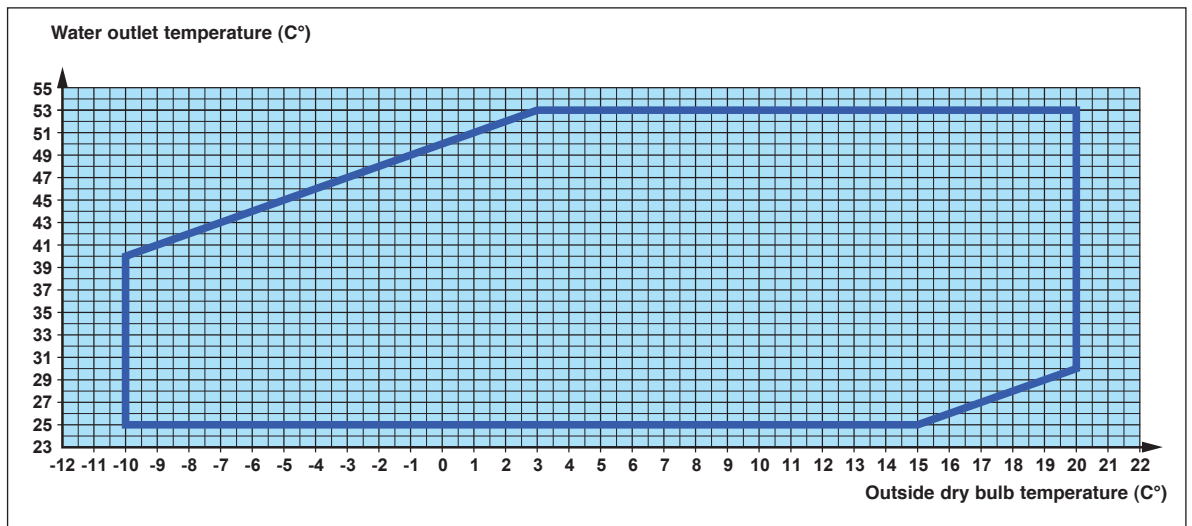


PHRF 23/85



10.2 - OPERATING LIMITS IN HEAT PUMP MODE

PHRF 23/85



11 - CONTROL AND SAFETY DEVICES

All these devices are factory adjusted and tested prior to delivery of the unit.

GB

11.1 - TEMPERATURE CONTROL DEVICE

- The compressor(s) control according to requirements, is performed by way of a sensor at the inlet of the water exchanger. This device is managed by the electronic control (see details in § 9).

Adjustment values:

Control device	Setpoint	Minimum	Maximum	Differential
Cooling mode Water inlet temperature	12	9 (PHRF) 10 (CHGF)	20	2
Heating mode Water inlet temperature	45	25	47	3

11.2 - SAFETY DEVICES

- High pressure switch:**

The high pressure switch is provided to stop the operation of the compressor when the discharge pressure exceeds the tripping threshold of 42 bar.

- Safety valve on refrigerant circuit:**

The safety valve is activated in the event of incorrect operation of the high pressure switch as well as fire. Tripping threshold: 45 bar.

Caution:

The safety valve is in the housing of the compressor inside the unit. Never access the internal parts of the unit before having cut out the power supply.

- Low pressure switch:**

The low pressure switch is provided to stop the operation of the compressor when the suction pressure goes below the tripping threshold of 2 bar.

- Anti-short cycle (compressor):**

This device is built into the electronic control and prevents too frequent Starts / Stops of the compressor. See details in § 9.8.8.

- Anti-freeze safety device:**

This device is built into the electronic control and protects the water circuit in the event of an excessive drop in the water outlet temperature (threshold: 3°C). It stops the compressor and actuates the heating elements (exchanger, circulating pump, tank). See § 9.8.1.

Note: For reversible appliances with 2 compressors, the heating elements are controlled by a separate thermostat (Threshold: 3°C).

- Water differential pressure switch (water flow rate):**

The water differential pressure switch stops the appliance in the event of an excessive drop in the water flow rate to prevent ice from forming (in chiller operation) and to protect it from excessive condensation temperatures (in heat pump operation). Adjustment threshold: 0.05 bar.

- Water circuit safety valve:**

The water safety valve opens when the hydraulic circuit pressure exceeds the tripping threshold of 4 bar in order to protect the unit from the risk of damage.

- Phase order controller:**

The phase order controller prevents the unit from operating if the phase order is not correct or in the event of a failure of one of the phases (Threshold = 70% of voltage rating).

11.3 - SOFT START FOR COMPRESSOR

- Each compressor supply line is fitted as standard with an electronic soft starter.

This type of starter generates an acceleration ramp allowing for a quick start and a reduction in starting current.

- 2 LED indicator lamps on the front panel indicate the status of the starter:

- LED1 and LED2 indicator lights:

● = ON steady.

☀ = ON blinking.

● = OFF.



LED1

LED2

Meaning	LED1	LED2
Starter on	●	●
Starting order	☀	☀
Acceleration ramp	●	●
Operation	☀	●
Network or charge failure	☀	☀

12 - MAINTENANCE INSTRUCTIONS

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IMPORTANT NOTE

- Before doing any work on the machine, make sure that it is switched off and locked out, with special attention given in the case of a tank with supplementary heating (different power supplies).
- Any work must be carried out by personnel qualified and authorised to work on this type of machine.
- Prior to all maintenance and servicing on the refrigerating circuit, one must first shut down the unit then wait a few minutes before installing temperature or pressure sensors. Certain equipment, such as the compressor and piping, may reach temperatures above 100°C and high pressures may lead to serious burns.

- Check for the correct operation of the safety devices (pressure switches and safety valves) on a periodical basis and that there are no refrigerant leaks.

After the first start up, periodical inspections should be performed according to the frequencies and in the modes laid down by the national regulations in force.

In order to guarantee correct operating conditions of the unit and obtain the performance and levels of safety provided for, a certain amount of checks should be performed on a regular basis. Some of them can be performed by the user, others require operations from a qualified technician.

- **Checks by the user:**

The operations and checks described in this chapter can be carried out without difficulty by the user taking a minimum of precautions.

- Remove any built up dirt on the battery or its protection grid (leaves, paper, etc., to be carried out every month).

Caution:

Be extremely careful when conducting operations near aluminium finned batteries to prevent any risks of getting cut.

- Check the filling of the water circuit on the corresponding pressure gauge, it should show pressure of approximately 1.5 bar (monthly check).
- Check that the pipe of the water safety valve is securely fixed.
- Check there are no water leaks on the hydraulic circuit (monthly check).
- If prolonged shut-down of the unit is scheduled, discharge the water (or other fluids) in the pipes and the circuit of the unit. This operation is vital in the event when an ambient temperature lower than the freezing point of the fluid used is expected during the shut-down period (operation to be carried out at the end of the season of use). Drain the unit and the part of the circuit exposed to the risk.

- **Checks and maintenance entrusted to qualified personnel:**

- **Carry out the following operations at least once a year** (the frequency depends on the installation and operating conditions):
 - Check for leaks on the refrigerating circuit.
 - Check for traces of corrosion or oil stains around the refrigerating components.
 - Inspect the composition and the condition of the coolant and check that it does not contain traces of refrigerating fluid.
 - Cleaning the exchangers.
 - Checking the wear parts.
 - Checking the operating instructions and points.
 - Check the safety devices: particularly check that the high and low-pressure controllers are properly connected on the refrigerating circuit and that they disengage the electrical circuit if triggered.
 - De-dusting the electrical equipment cabinet.
 - Checking that the electrical connections are secure.
 - Checking the earth connection.
 - Check the hydraulic circuit (clean the filter, water quality, purge, flowrate, pressure, etc...).
 - Verification of the unit's safety valve (and that of the tank, if any).

13 - RECYCLING

- When the unit has reached the end of its scheduled service life, when it must be dismantled or replaced, proceed as follows:
 - The refrigerant gas contained inside it must be recovered by a qualified technician and handed over to a collection centre.
 - The lubrication oil of the compressor must be recovered by a qualified technician and handed over to a collection centre.
 - The structure and different components that cannot be reused must be disposed of through waste collection: this operation particularly applies to copper, aluminium and steel and significant quantities of metal in the unit. All these operations are aimed at facilitating the collection, disposal and recycling procedures as well as minimizing the impact on the environment.

14 - TECHNICAL CHARACTERISTICS

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CHGF model		20	24	28	32	40	55	70	76
Power supply	V-Ph-Hz	400-3N-50							
Cooling capacity (EN 14511)	kW	19.95	24.19	28.60	32.00	40.26	55.37	70.63	76.94
EER (EN 14511)		2.66	2.87	3.16	3.05	3.06	2.95	2.94	2.76
Power consumption (EN 14511)	kW	7.49	8.42	9.05	10.5	13.14	18.79	24.04	27.92
Maximum power consumption	kW	13.6	14.5	18.3	18.9	22.4	27	32.3	39.4
Maximum input current	A	21.7	24	28.6	32.4	36.4	48	57	69
Starting current ****	A	68	103	87	108	108	117	136	154
Number of compressors / circuit		1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	2 / 1	2 / 1	2 / 1
Refrigerant charge	kg	4.23	5.8	7.5	7.5	10.8	12,8	16,3	16,3
Low / high pressure switch	bar	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42
Number of axial fans		4	4	2	2	2	4	4	4
Air flow rate	m ³ /h	9,990	9,307	16,276	16,276	15,776	24,930	24,354	24,354
Water flow rate	L/h	3,373	4,094	4,833	5,421	6,823	9,391	12,006	13,089
Diameter of hydraulic couplings	Inch	1.25	1.25	1.25	1.25	1.25	2	2	2
Water headloss	kPa	51	49	40	51	43	56	55	64
Pressure head available	kPa	123	116	143	126	119	138	128	114
Water capacity excluding option	Litres	4	4	6	6	6	7	11	12
Expansion vessel	Litres	5	5	8	8	8	8	8	8
Tank capacity	Litres	50	50	125	125	125	125	125	125
Height	mm	1,300	1,300	1,485	1,485	1,485	1,735	1,735	1,735
Length	mm	1,565	1,565	1,990	1,990	1,990	2,091	2,091	2,091
Depth	mm	600	600	950	950	950	1,183	1,183	1,183
Sound power	dB(A)	71	72	73	73	75	81	81	81
Sound pressure at 10 metres	dB(A)	43	44	45	45	47	53	53	53
Weight packed *	kg	274	288	405	429	489	645	692	786
Net weight (excluding packaging) *	kg	259	273	383	407	467	633	680	774
Minimum water capacity of system **	Litres	70	85	100	110	140	190	245	265
Maximum water capacity of system ***	Litres	145	145	231	231	231	231	231	231

(*) Weight for model with pump and tank.

(**) If the water volume of the system is below the minimum, a buffer tank must be installed.

(***) If the water volume of the system is above the maximum, an additional expansion vessel is required.

(****) Starting current accounting for the electronic starter (current limiter).

- Cooling capacity: outside air temperature 35°C, water temperature 12°C - 7°C.
- Sound power measured in compliance with the standards ISO 3741 - ISO 3744 and EN 29614-1.
- Sound pressure measured at a distance of 10 metres and 1.5 metres from the ground in free field conditions (fan end).
- The maximum power consumption is the power consumption of the mains power supply required for the unit to operate.
- The maximum input current is the current level at which the internal protective devices of the unit are tripped. It is the maximum allowable current per unit. This value must never be exceeded and must be used to size the line.

PHRF model		23	27	32	40	46	60	77	85
Power supply	V-Ph-Hz	400-3N-50							
Cooling capacity (EN 14511)	kW	19.55	23.68	27.99	34.84	39.46	54.27	69.25	75.41
EER (EN 14511)		2.61	2.83	3.09	2.94	3	2.89	2.88	2.7
Cold power consumption (EN 14511)	kW	7.49	8.38	9.06	11.86	13.14	18.8	24.05	27.93
Heating capacity (EN 14511)	kW	22.57	26.83	30.80	38.67	44.07	59.12	75.67	83.97
COP (EN 14511)		3	3.2	3.24	3.23	3.27	3.11	3.17	3.08
Hot power consumption (EN 14511)	kW	7.52	8.38	9.52	11.97	13.47	18.98	23.87	27.23
Maximum power consumption	kW	13.60	14.50	18.30	21.80	22.40	27	32.30	39.40
Maximum input current	A	21.7	24	28.6	35.2	36.4	48	57	69
Starting current ****	A	68	103	87	108	108	117	136	154
Number of compressors / circuit		1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	2 / 1	2 / 1	2 / 1
Refrigerant charge	kg	4.23	5.80	7.50	7.80	10.80	12.80	16.30	16.30
Low / high pressure switch	bar	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42
Number of axial fans		4	4	2	2	2	4	4	4
Air flow rate	m ³ /h	9,990	9,307	16,276	16,276	15,776	24,930	24,354	24,354
Water flow rate, cold only	L/h	3,373	4,094	4,833	6,021	6,823	9,202	11,782	12,831
Heat pump water flow rate	L/h	3,949	4,670	5,396	6,756	7,769	10,303	13,244	14,579
Diameter of hydraulic couplings	Inch	1.25	1.25	1.25	1.25	1.25	2	2	2
Water headloss (cold only)	kPa	51	49	40	41	43	56	55	64
Water headloss (heating)	kPa	69	62	49	50	54	60	59	71
Pressure head available (cold only)	kPa	123	116	143	130	119	138	128	114
Pressure head available (heating)	kPa	97	95	128	113	99	130	110	100
Water capacity excluding option	Litres	4	4	5.5	5.5	5.5	7	11	12
Expansion vessel	Litres	5	5	8	8	8	8	8	8
Tank capacity	Litres	50	50	125	125	125	125	125	125
Height	mm	1,300	1,300	1,485	1,485	1,485	1,735	1,735	1,735
Length	mm	1,565	1,565	1,990	1,990	1,990	2,091	2,091	2,091
Depth	mm	600	600	950	950	950	1,183	1,183	1,183
Sound power	dB(A)	71	72	73	73	75	81	81	81
Sound pressure at 10 metres	dB(A)	43	44	45	45	47	53	53	53
Weight packed *	kg	283	295	406	466	495	660	702	792
Net weight (excluding packaging) *	kg	268	280	384	444	473	648	690	780
Minimum water capacity of system **	Litres	105	125	140	175	205	270	345	380
Maximum water capacity of system ***	Litres	145	145	231	231	231	231	231	231

(*) Weight for model with pump and tank.

(**) If the water volume of the system is below the minimum, a buffer tank must be installed.

(***) If the water volume of the system is above the maximum, an additional expansion vessel is required.

(****) Starting current accounting for the electronic starter (current limiter).

- Cooling capacity: outside air temperature 35°C, water temperature 12°C - 7°C.
- Heating capacity: outside air temperature 7°C (dry bulb) and 6.2°C (wet bulb) water temperature 40°C - 45°C.
- Sound power measured in compliance with the standards ISO 3741 - ISO 3744 and EN 29614-1.
- Sound pressure measured at a distance of 10 metres and 1.5 metres from the ground in free field conditions (fan end).
- The maximum power consumption is the power consumption of the mains power supply required for the unit to operate.
- The maximum input current is the current level at which the internal protective devices of the unit are tripped. It is the maximum allowable current per unit. This value must never be exceeded and must be used to size the line.

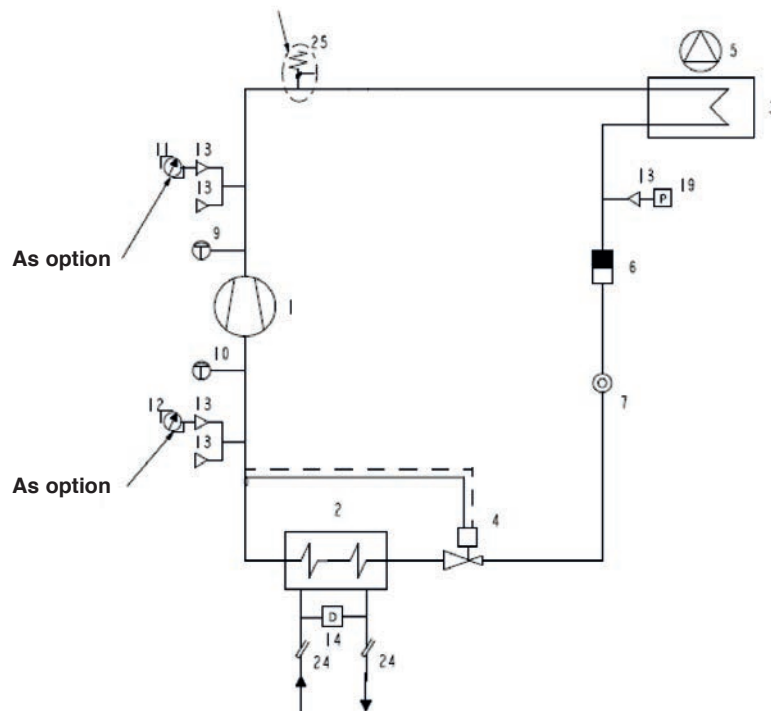
15 - COOLING DIAGRAMS

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Legend of diagrams		
Nr.	Component	Symbol
1	Compressor	
2	Evaporator	
3	Condenser	
4	Thermostatic expansion valve	
5	Electric fan	
6	Filter	
7	Liquid indicator lamp	
8	Solenoid valve	
9	High pressure switch	
10	Low pressure switch	
11	High pressure gauge	
12	Low pressure gauge	
13	Service tap	
14	Differential pressure switch	
15	Unidirectional valve	

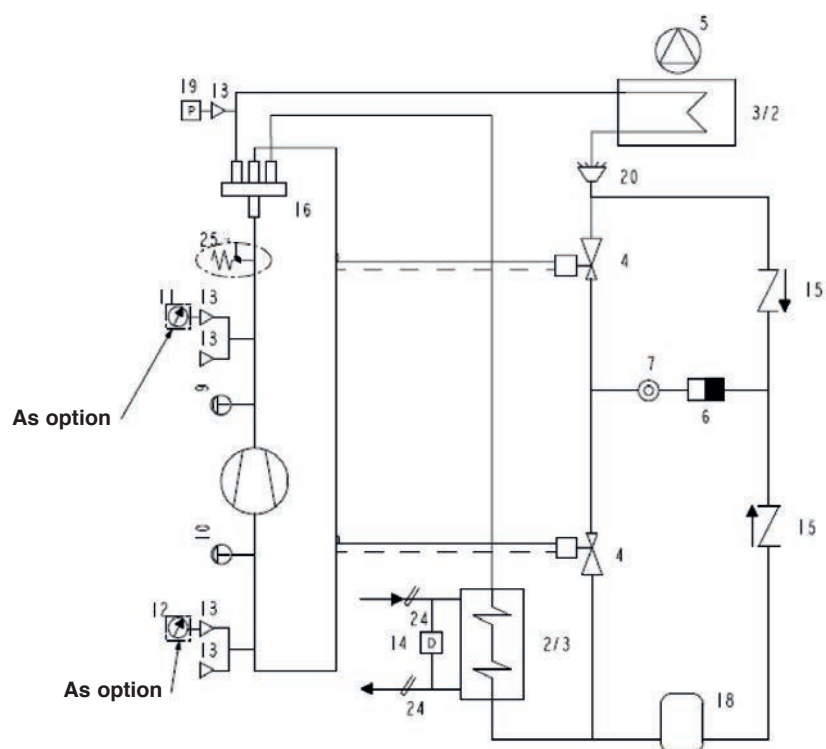
Legend of diagrams		
Nr.	Component	Symbol
16	4-way valve	
17	Liquid separator	
18	Liquid recovery device	
19	Pressure transducer	
20	Directional control valve	
24	Sensor housing	
25	Safety valve	

15.1 - CHGF 20 / CHGF 24

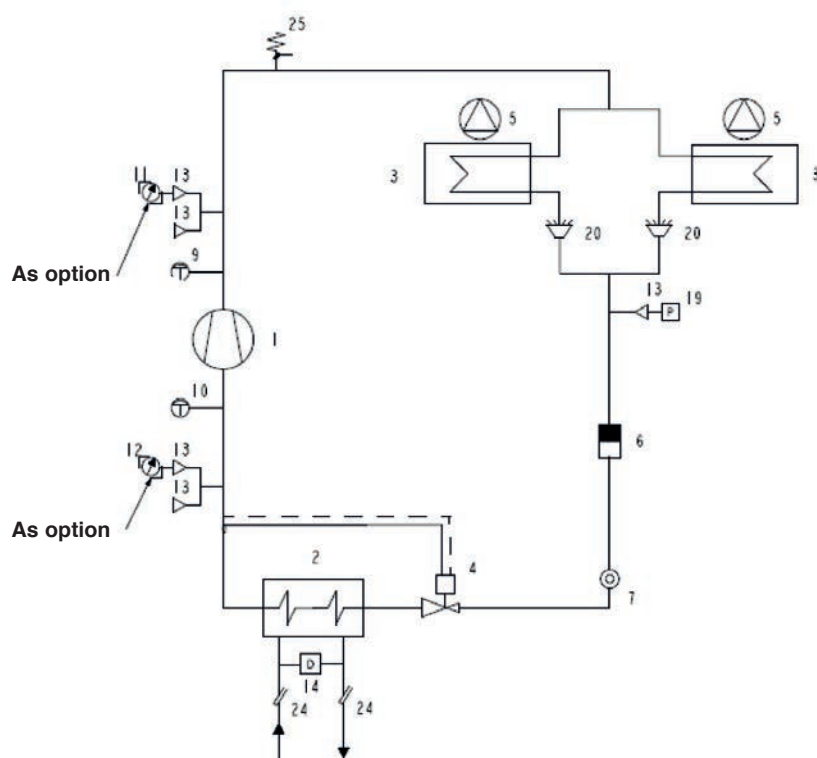


15.2 - PHRF 23 / PHRF 27

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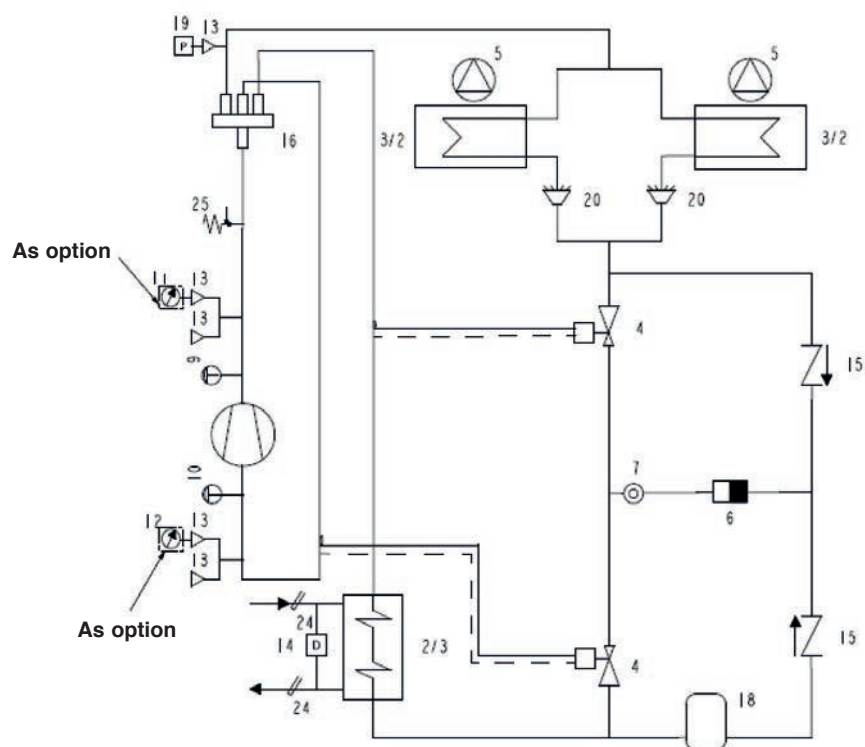


15.3 - CHGF 28 / CHGF 32 / CHGF 40

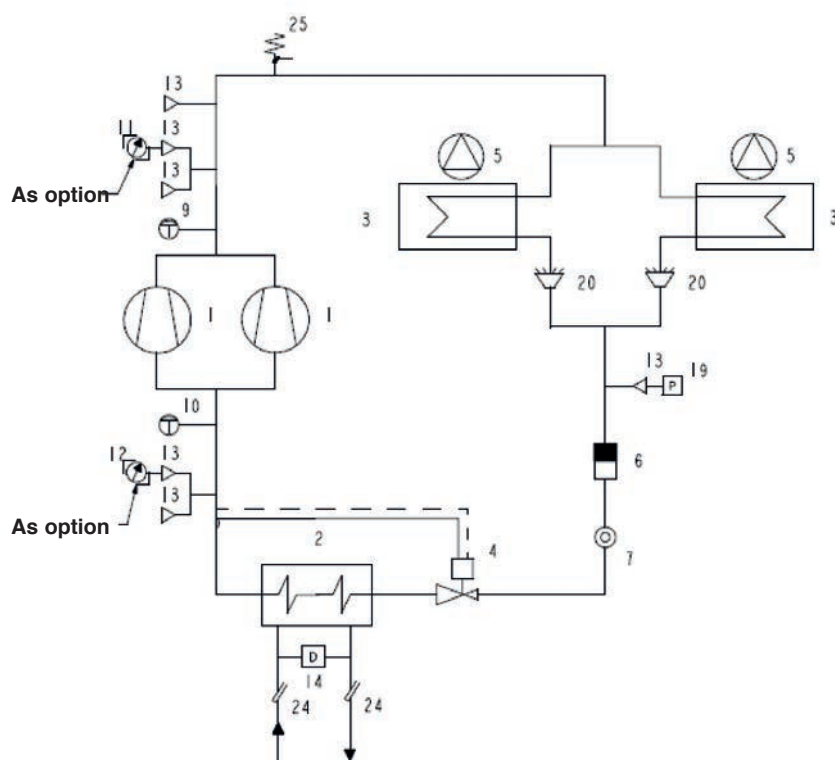


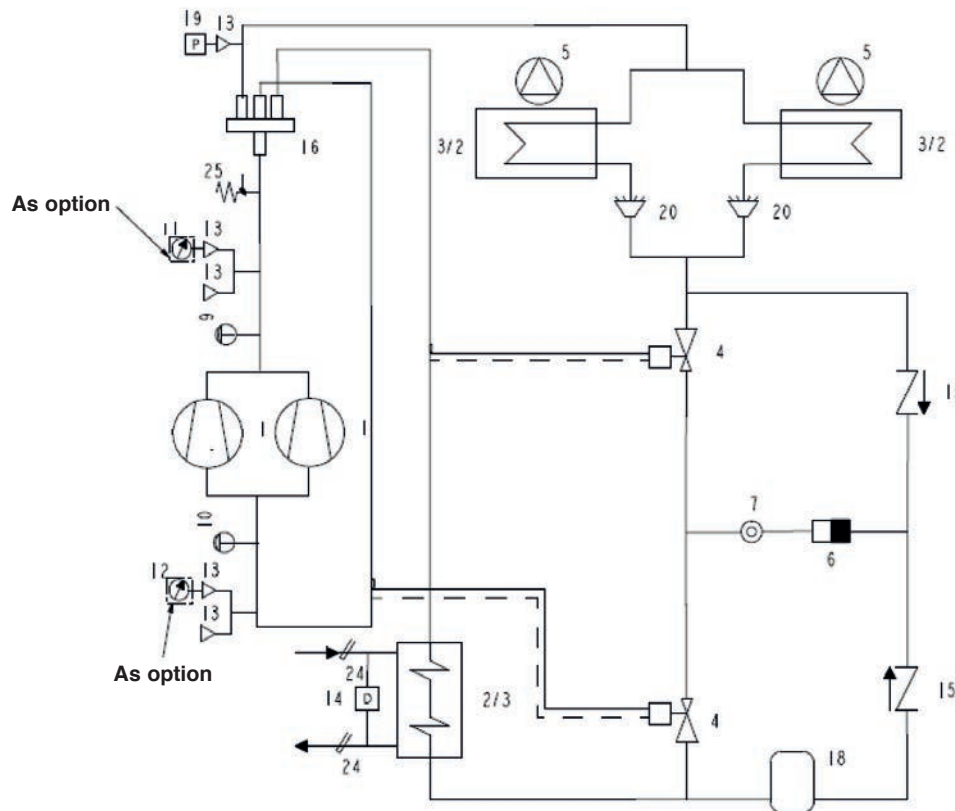
15.4 - PHRF 32 / PHRF 40 / PHRF 46

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15.5 - CHGF 55 / CHGF 70 / CHGF 76





Problems	Cold	Hot	Operation competence U = User T = Qualified technician	Message on controller if any	Possible cause	Operation
A The unit does not start.	X	X	T	ELS EHS (FL)	No power. Faulty connection. Incorrect voltage.	Check for presence and value of voltage. Check the order of the phases.
	X	X	T	FL	Water flow rate problem.	Check the operation of the water circulating pump, pressure switch, bleed the circuit. Check the closing of the water flow rate contact (terminals 16/30).
	X	X	U	Flashing icon	Time delay in progress.	Wait a few minutes.
	X	X	T	E1	Faulty control sensor.	Check and change the sensor if required.
	X	X	U		No control signal from compressor.	Temperature installation. Check the setpoint adjustment.
	X	X	T	A1	Anti-freeze safety device.	Check the water flow rate. Check the water temperature. Check the adjustment of the anti-freeze threshold.
	X	X	T	E2	Faulty anti-freeze sensor.	Check and change the sensor if required.
	X	X	T		Opening of master circuit breaker	Check there are no short circuits on wiring and windings of pump, fan, compressor and transformer motors.
	X	X	T	LP1 HP1	LP or HP pressure switch.	See points D and E .
	X	X	T	HP1	Faulty compressor.	See point B .
B The compressor does not start.	X	X	T	HP1	Faulty compressor.	Change the compressor.
	X	X	T		Compressor contactor open.	Check the control circuit. Check the operation of the contactor.
	X	X	T		Compressor circuit breaker open.	Operation of compressor in critical conditions or insufficient charge in circuit. Check the operating conditions comply with the limits provided for. Leak of refrigerant: see point G . Check the current.
C The compressor starts but stops repeatedly.	X	X	T	LP1	LP pressure switch.	See point E .
	X	X	T		Compressor contactor.	See point B .
	X	X	U		Setpoint and differential adjustment values	Change the values based on the data shown in the tables.
	X	X	T		Insufficient refrigerant charge.	See point G .
	X	X	T	L	Insufficient thermal load or water volume.	Check.

Problems	Cold	Hot	Operation competence U = User T = Qualified technician	Message on controller if any	Possible cause	Operation
D The compressor does not start due to action from the HP pressure switch.	X	X	T	HP1	Pressure switch out of operation.	Check and change the pressure switch if required.
	X	X	T	HP1	Refrigerant charge.	Check. Adjust the refrigerant charge.
	X		U	HP1	Finned battery blocked or dirty.	Remove obstacles. Clean battery.
	X		T	HP1	Faulty fan.	See point F.
		X	T	HP1	Water flow rate problem.	Check the circulating pump. Check the hydraulic circuit.
	X	X	T	HP1	Pollution in refrigerating circuit.	Clean the circuit and redo the charge.
	X	X	T	HP1	Refrigerant filter clogged.	Check and change the filter if required.
E The compressor does not start due to action from the LP pressure switch.	X	X	T	LP1	Pressure switch out of operation.	Check and change the pressure switch if required.
	X	X	T	LP1	Refrigerating circuit charge.	Check the charge. Look for leak. Adjust the charge.
		X	U	LP1	Finned battery blocked or dirty.	Remove obstacles. Clean battery.
	X		T	LP1	Water flow rate problem.	Check the circulating pump. Check the hydraulic circuit.
		X	T	LP1	Frost on evaporation battery.	See point O.
		X	T	LP1	Faulty fan.	See point F.
	X	X	T	LP1	Refrigerant filter clogged.	Check and change the filter if required.
	X	X	T	LP1	Incorrect operation of expansion valve.	Check the operation of the expansion valve and change if required.
	X	X	T	LP1	Humidity in the refrigerating circuit.	Change the filter.
F The fans do not start.	X	X	T		Operating conditions.	Check the operating conditions.
	X	X	T	HP1 LP1	No voltage on fan.	Check the control circuit (circuit breaker / variable speed drive).
	X	X	T	HP1 LP1	Ventilation circuit breaker open.	Check the state of the fan and air temperature during operation of the unit. Check the current.
	X	X	T	HP1 LP1	Fan motor faulty.	Check and change the motor and fan assembly if required.
	X	X	T	HP1 LP1	Electrical connections loose.	Check and tighten connections.
G Insufficient refrigerant charge.	X	X	T	LP1	Leak on refrigerating circuit.	Look for leak. Adjust the charge.
I Frost on liquid line after the filter.	X	X	T	HP1 LP1	Dryer filter clogged.	Change the filter.

Problems	Cold	Hot	Operation competence U = User T = Qualified technician	Message on controller if any	Possible cause	Operation
L The unit operates but never stops.	X	X	T		Insufficient refrigerant charge.	See point G.
	X	X	U		Incorrect adjustment of setpoint.	Check the adjustment.
	X	X	T		Excessive thermal load.	Reduce the thermal load.
	X	X	T		The compressor does not provide the thermal power provided for.	Check and change the compressor if required.
	X	X	T		Dryer filter clogged.	Change the filter.
M The unit operates normally but at insufficient power or in another mode.	X	X	T		Insufficient refrigerant charge.	See point G.
	X	X	T		4-way inversion valve faulty.	Check the operation of the valve and change if required.
N Frost on suction pipe of compressor.	X	X	T		Incorrect operation of expansion valve.	Check the operation of the expansion valve and change if required.
	X	X	T		Water flow rate problem.	Check the circulating pump. Check the hydraulic circuit.
	X	X	T		Insufficient refrigerant charge.	See point G.
	X	X	T		Dryer filter clogged.	Change the filter.
O The defrosting cycle does not trip.		X	T		4-way inversion valve faulty.	Check the operation of the valve and change if required.
		X	T	E4	Problem on pressure sensor. Adjustment of parameters.	Check the pressure sensor. Adjust the parameters.
P Abnormal noise from unit.	X	X	T		Compressor noisy.	Check and change the compressor if required.
	X	X	T		Vibration of panels.	Fix correctly.

17 - START-UP DATA SHEET

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CHGF / PHRF				
Code:				
Serial Number:				
Started by:		Company:	Site:	Date:
Voltage measured on unit	V	L1-L2	L2-L3	L3-L1
FAN 1				
Measured amperage	A/phase	L1	L2	L3
FAN 2				
Measured amperage	A/phase	L1	L2	L3
FAN 3				
Measured amperage	A/phase	L1	L2	L3
FAN 4				
Measured amperage	A/phase	L1	L2	L3
COMPRESSOR 1				
Measured amperage	A/phase	L1	L2	L3
COMPRESSOR 2				
Measured amperage	A/phase	L1	L2	L3
PUMP				
Amperage	A/phase	L1	L2	L3
Circuit breaker thermal setting	A			
SENSORS				
Water temperature setpoint	Cooling:	Heating:		
Water temperature control sensor positioned in:	Inlet		Outlet	
TEMPERATURES (°C) / PRESSURES (bar)				
Outside temperature				
Water type	Pure	Glycol	% Glycol	
Water inlet, generator				
Water outlet, generator				
Water circuit pressure				
Water flow rate				
Δ T:				
Suction, compressor				
Discharge, compressor				
Inlet, thermostatic expansion valve				
Outlet, thermostatic expansion valve				
Condensing pressure				
Evaporating pressure				
Superheating = (Compressor suction temperature - Evaporating temperature) = 7 to 8°C				
Sub-cooling = (Condensating temperature - Expansion valve inlet temperature) = 3 to 5°C				

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F REMARQUE : Ce symbole et ce système de recyclage s'appliquent uniquement aux pays de l'UE. Ils ne s'appliquent pas aux pays des autres régions du monde.

GB NOTE: This symbol mark and recycle system are applied only to EU countries and not applied to the countries in the other area of the world.

I NOTA : Questo simbolo e il sistema di riciclaggio sono validi soltanto per i paesi dell'Unione Europea e non sono validi per i paesi nel resto del mondo.

E NOTA : Este símbolo y el sistema de reciclaje solamente son para países de la UE y no son aplicables a países de otras áreas del mundo.

D HINWEIS : Dieses Symbol und Recycle-System gelten nur für Länder der Europäischen Union, nicht für andere Länder der Welt.

F Votre produit est conçu et fabriqué avec des matériels et des composants de qualité supérieure qui peuvent être recyclés et réutilisés.

En fin de vie, il doit être éliminé séparément des ordures ménagères.

Nous vous prions donc de confier cet équipement à votre centre local de collecte/recyclage.

Dans l'Union Européenne, il existe des systèmes sélectifs de collecte pour les produits électriques et électroniques usagés.

Aidez-nous à conserver l'environnement dans lequel nous vivons !

Les appareils contiennent fréquemment des matières qui, si elles sont traitées ou éliminées de manière inappropriées, peuvent s'avérer potentiellement dangereuses pour la santé humaine et pour l'environnement.

Cependant, ces matières sont nécessaires au bon fonctionnement de votre appareil ou de votre machine. Pour cette raison, il vous est demandé de ne pas vous débarrasser de votre appareil ou machine usagé avec vos ordures ménagères.

GB Your product is designed and manufactured with high quality materials and components which can be recycled and reused.

At end of lifetime, it should be eliminated separately from your household waste.

Please dispose of this equipment at your local community waste collection/recycling centre.

In the European Union there are separate collection systems for used electrical and electronic products.

Please help us to conserve the environment we live in!

Some equipments contain substances that are considered dangerous to the environment and human health if they are disposed of carelessly.

These substances, however, are required for your apparatus or machine to work properly. For this reason, it is requested that it not be disposed of with other household waste at the end of its service life.

I Il vostro prodotto è stato costruito da materiali e componenti di alta qualità, che sono riutilizzabili o riciclabili.

Alla fine della sua vita utile deve essere smaltito separatamente dai rifiuti domestici.

Vi preghiamo di smaltire questo apparecchio in un centro di raccolta differenziata locale.

Nell'Unione Europea esistono sistemi di raccolta differenziata per prodotti elettrici ed elettronici.

Aiutateci a conservare l'ambiente in cui viviamo!

Gli apparecchi contengono spesso dei materiali che, se trattati od eliminati in modo non adeguato, possono dimostrarsi potenzialmente pericolosi per la salute umana e per l'ambiente.

Tuttavia, questi materiali sono necessari per il corretto funzionamento del vostro apparecchio o della vostra macchina. Per questo motivo, si richiede di non eliminare il proprio apparecchio o macchina usata assieme ai rifiuti domestici comuni.

E Los productos están diseñados y fabricados con materiales y componentes de alta calidad, que pueden ser reciclados y reutilizados.

Al final de su ciclo de vida, no se debe desechar con el resto de residuos domésticos. Por favor, deposite su viejo aparato en el punto de recogida de residuos o contacte con su administración local.

En la Unión Europea existen sistemas de recogida específicos para residuos de aparatos eléctricos y electrónicos.

Por favor, ayúdenos a conservar el medio ambiente!

Los aparatos a menudo contienen materiales que, si son tratados o eliminados de forma inadecuada, pueden convertirse en potencialmente peligrosos para la salud humana y para el medio ambiente.

No obstante, estos materiales son necesarios para el buen funcionamiento de su máquina. Por esta razón, le rogamos encarecidamente que al final de la vida útil de su aparato, no lo tire junto con la basura doméstica, sino que lo recicle adecuadamente.

D Ihr Produkt wurde entworfen und hergestellt mit qualitativ hochwertigen Materialien und Komponenten, die recycelt und wiederverwendet werden können.

Am Ende ihrer Nutzungsdauer muss er getrennt vom Hausmüll eliminiert werden sollen.

Bitte entsorgen Sie dieses Gerät bei Ihrer örtlichen kommunalen Sammelstelle oder im Recycling Centre.

In der Europäischen Union gibt es unterschiedliche Sammelsysteme für Elektrik- und Elektronikgeräte.

Helfen Sie uns bitte, die Umwelt zu erhalten, in der wir leben!

Die Geräte enthalten häufig Bestandteile aus bestimmten Werkstoffen, die bei einer nicht ordnungsgemäßen Behandlung oder Entsorgung eine Belastung für die menschliche Gesundheit und Umwelt darstellen.

Diese Werkstoffe sind jedoch für die korrekte Funktionsweise Ihres Gerätes oder Maschine notwendig. Daher bitten wir Sie, Ihr(e) ausgediente(s) Gerät/Maschine nicht in den Hausmüll zu geben.

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Par souci d'amélioration constante, nos produits peuvent être modifiés sans préavis.
Due to our policy of continuous development, our products are liable to modification without notice.
Per garantire un costante miglioramento dei nostri prodotti, ci riserviamo di modificarli senza preavviso.
En el interés de mejoras constantes, nuestros productos pueden modificarse sin aviso previo.
Unsere Produkte werden laufend verbessert und können ohne Vorankündigung abgeändert werden.

Technibel

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