

Air cooled water chillers Air to water heat pump

With hydronic kit



**SPCA series 6-35 kW cooling
7-41 kW heating**



Interklima®

1.Presentation

The scope of this manual is to provide the customer with all the necessary instructions for the installation, start-up, use and maintenance of the air cooled chillers and air to water heat pumps of the MC series.

It is advisable to have the unit periodically inspected by one of the manufacturer' s service technicians to ensure the unit' s maximum life and reliability

2. Safety precautions

Please read carefully the following text before proceeding with the installation of the unit.



Attention

The installation and maintenance of the unit must be carried out by competent persons who have complete knowledge of the safety regulations valid in the place of installation.



Attention

All electrical connections must be carried out in conformity with local regulations.



Attention

Before attempting any electrical connections indicated on the electrical drawing first make sure that the line electrical characteristics correspond to those indicated on the unit' s label.



Attention

The unit must be earthed in order to avoid any danger in case of insulation problems.



Attention

The electric cables must never be in contact with any refrigeration lines or any moving parts such as fans.



Attention

Before carrying out the installation or any maintenance operation make sure that the general switch is securely open.



Danger

Movement of the unit must be carried out using methods suitable for the unit' s weight.



Danger

Unauthorized persons should never come into contact with the unit.



Danger

Electrical parts should never be touched and any work on electrical parts should not be carried out unless the general switch is open.



Danger

Electrical parts should never be touched and any work on electrical parts should not be carried out in the presence of water or humidity.



Danger

Any operation on any part of the unit that contains refrigerant under pressure should be carried out only by authorized technicians..



Danger

Before connecting the hydraulic circuit make sure that it is absolutely clean and free of any impurities.



Danger

It is absolutely necessary to install a water line filter, if not already mounted on the unit.

3 - Description of the MC units

3.1 - General

The air cooled water chillers and heat pumps are designed for outdoor installation and for long and trouble free operation. All materials and components have been carefully selected from world class suppliers according to the strictest quality criteria. The units of the MC series have undergone exhaustive laboratory testing to ensure the best performance under practically any climatic conditions. The series are particularly adapted for the air conditioning of small to medium residential and commercial installations.

All units of the MC series are equipped with a quiet and efficient scroll compressor and a silent fan, and are thus suitable for installation in residential areas. They are also equipped, as standard, with complete hydraulic kit, comprising circulating pump, buffer and expansion tanks, automatic fill and make up water valve with manometer, safety valve and air vent, facilitating installation. They are also equipped with a highly sophisticated, and yet very easy to use electronic microprocessor control providing a complete range of functions and diagnostics. The units also comply with the most strict safety regulations.

All units are factory assembled electrically wired, refrigerant charged and 100% run tested before delivery to the customer.

3.2 - Inspection upon receipt

Upon receipt of the unit, you should check carefully that the material received corresponds to the delivery note.

Also check the unit to make sure that there are no damages due to transportation or mishandling. In case that there are signs of damage on the unit, the forwarder has to be notified immediately by registered letter. All the necessary quality controls have been incorporated into the manufacturing procedures thus ensuring that all units leave the factory in perfect condition. No responsibility is assumed for any damages that may subsequently occur, due to incorrect handling, storage or transportation of the units.

3.3 - Technical data table

Type		SPCA-06-1	SPCA-08-1	SPCA-08-3	SPCA-10-3	SPCA-13-3	SPCA-17-3	SPCA-22-3	SPCA-26-3	SPCA-35-3
Nominal cooling capacity R22	kw	6	8	8	10	13	17	22	26	35
	RT	1,7	2,3	2,3	2,8	3,7	4,8	6,3	7,4	9,9
	BTU/H	20.455	27.273	27.273	34.091	44.318	57.955	75.000	88.636	119.318
Nominal heating capacity R22	kw	7,4	9,5	9,6	11,8	15,7	20,2	26,2	31,1	41,2
	kcal/h	6.364	8.170	8.256	10.148	13.502	17.372	22.532	26.746	35.432
Construction	Material	Aluminium			Galvanized steel-Electrostatic powder coated					
	Color	Light grey-beige (RAL 9002)								
Compressor		SCROLL								
Quantity		1								
Absorbed power (cooling/heating)	Kw	1,97/2,23	2,31/2,60	2,31/2,60	2,71/3,04	3,99/4,41	4,78/5,30	6,04/6,70	7,23/8,03	10,24/11,34
Nominal operating current	A	9,16/10,34	10,77/12,07	4,25/4,62	4,91/5,35	7,73/8,22	8,50/9,29	11,85/12,59	13,48/14,45	16,02/17,32
Maximum operating current	A	14,80	15,30	5,50	6,60	10,00	11,40	14,6	17,9	25,6
Air heat exchanger		High capacity coil with internally finned tubes and louver fins								
Water heat exchanger		Brazed plate								
Quantity		1								
Water content	L	0,57	0,66	0,66	0,76	1,14	1,33	1,43	1,71	2,38
Total water content	L	15,00	15,50	15,50	18,00	18,00	20,00	34,43	34,71	35,38
Maximum operating pressure bar	Water side	30								
	Refrigerant side	30								
Connections		3/4"	3/4"	3/4"	1"	1"	1"	1 1/4"	1 1/4"	1 1/4"
Nominal water flow	L/h	1.032	1.376	1.376	1.720	2.236	2.924	3.784	4.472	6.020
Maximum unit operating pressure	bar	2,5								

3.3 - Technical data table (continued)

Type		SPCA-06-1	SPCA-08-1	SPCA-08-3	SPCA-10-3	SPCA-13-3	SPCA-17-3	SPCA-22-3	SPCA-26-3	SPCA-35-3
Fan										
Quantity		1					2			
Speed	rpm	920	915	915	920	920	920	925	925	925
Air flow	m³/h	2.600	2.340	2.350	4.100	3.800	4.800	8.600	8.500	8.500
Absorbed power	kw	0,12	0,12	0,12	0,17	0,17	0,26	0,35	0,35	0,35
Nominal operating current	A	0,57	0,57	0,57	0,80	0,80	1,15	1,60	1,60	1,60
Maximum operating current	A	0,63	0,63	0,63	0,90	0,90	1,83	2,10	2,10	2,10
Pump										
Absorbed power	kw	0,15	0,15	0,15	0,19	0,19	0,40	0,60	0,77	0,77
Maximum operating current	A	0,58	0,58	0,58	0,73	0,73	1,95	2,70	3,60	3,60
Available external water head	A	35,80	35,80	33,80	31,30	27,00	60,00			
Electrical characteristics		230-3-50			400-3-50					
Total absorbed power (cooling/heating) Kw		2,24/2,50	2,58/2,87	2,58/2,87	3,07/3,40	4,35/4,77	5,44/5,96	6,99/7,65	8,35/9,15	11,32/12,46
Nominal operating current	A	10,31/11,49	11,85/13,22	5,40/5,77	6,44/6,88	9,26/9,75	11,60/12,39	16,15/16,89	18,68/19,65	21,22/22,52
Maximum operating current	A	16,01	16,51	6,71	8,23	11,63	15,18	19,4	23,6	31,3
Compressor carter resistance power	W	40	40	40	40	40	70	70	70	70
Power cables cross section	mm²	4	4	2,5	2,5	2,5	4	6	6	6
Fuses		25	25	3x16	3x16	3x16	3x25	3X25	3X25	3X25
Voltage operating limits	V	220-240		380-420						
Refrigerant circuit										
Number of circuits		1								
Expansion device		Capillary tubes						Expansion valve		
Refrigerant type		R22 or R407c								
Noise level at 1 m		dba	54	54	54	56	56	57	59	59
Dimensions (mm)	Width		450	450	450	450	450	500	605	605
	Length		1000	1000	1000	1200	1200	1440	1732	1732
	Height		932	932	932	982	982	1002	1202	1202
Shipping weight		kg	100	120	120	140	140	180		

- (1) Cooling capacities are valid for the following conditions : Chilled water 12°C / 7°C
Ambient temperature 35°C
- (2) Heating capacities are valid for the following conditions : Hot water 40°C / 45°C
Ambient temperature 7°C
Ambient rel humidity 80%

3.4 - Refrigerant charge

All units are factory charged with R22 or alternatively with other types of refrigerant. The type and quantity of refrigerant charge is clearly marked on the technical characteristics label on the unit. Quantities of refrigerant charge are given in the table below.

Unit Size	6	8	10	13	17	26	35
R22 charge gr	1600	1950	2450	3400	4200	6200	8870

3.5 - Operation limits

Water and ambient air temperatures in cooling mode.

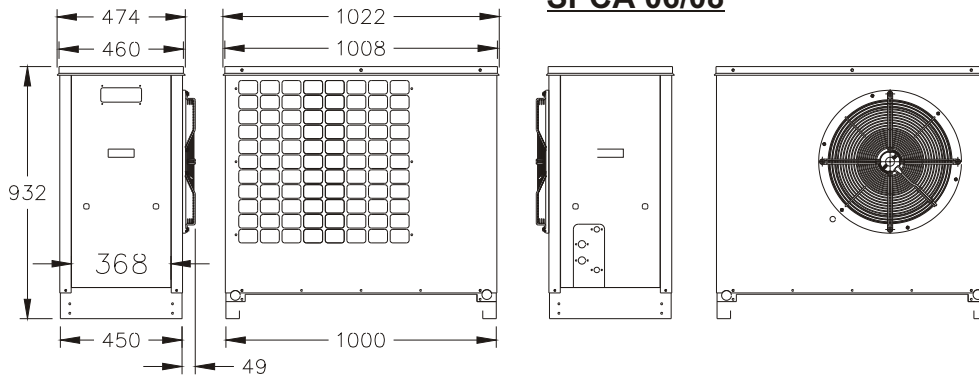
Parameter	Min °C	Max °C
Water outlet temperature	6	15
Water temperature difference	3,5	7
Air inlet temperature	-10	47

Water and ambient air temperatures in heating mode.

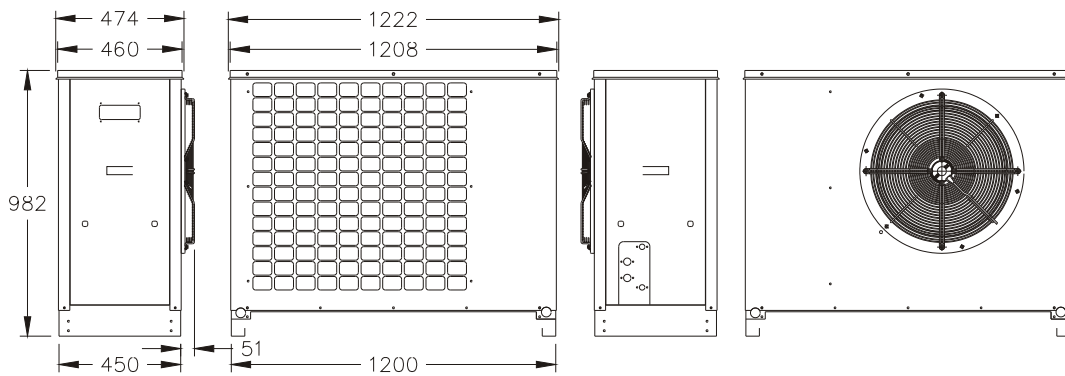
Parameter	Min °C	Max °C
Water outlet temperature	25	55
Water temperature difference	3,5	7
Air inlet temperature	-10	25

4. Dimensions

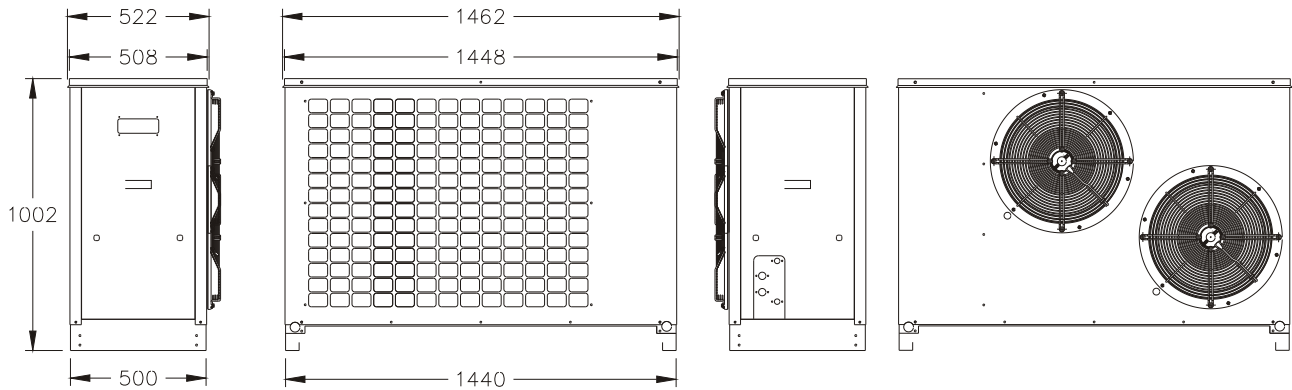
SPCA 06/08



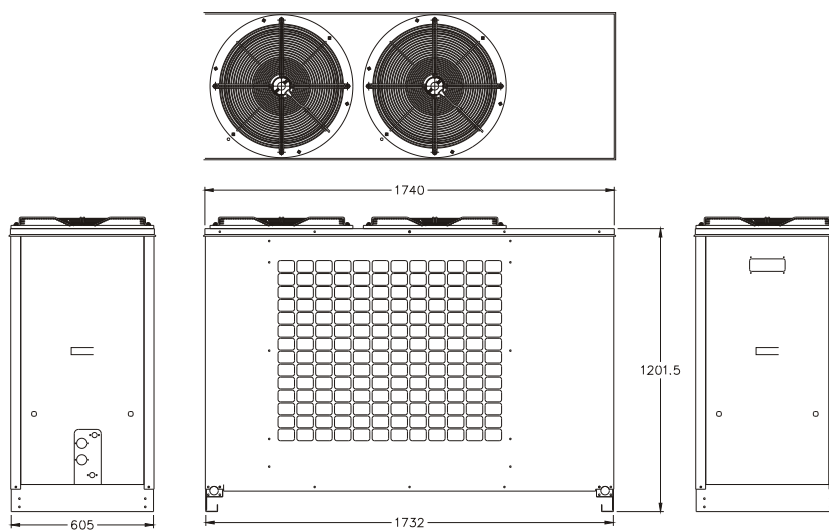
SPCA 10/13



SPCA 17



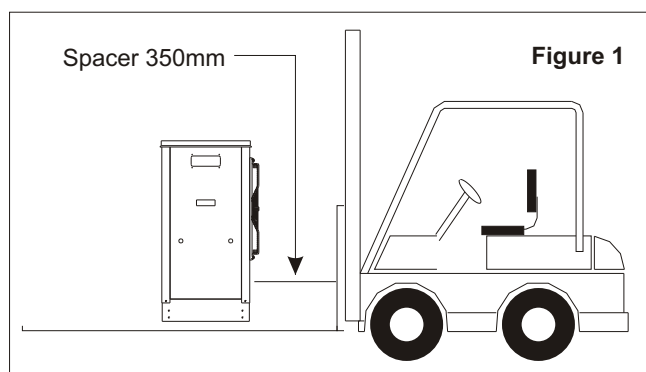
SPCA 22/35



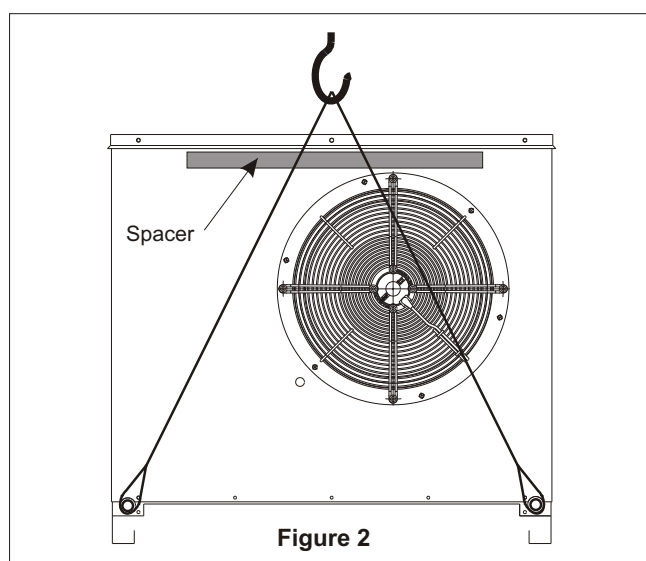
5. Installation instructions

5.1 Handling and positioning

Units should be handled with care during moving and positioning. Do not push the unit on irregular ground. Use a forklift or a crane to place the unit in its final installation position. The base of the unit is specially designed for forklift use. When using a forklift always leave enough space between the unit and the forklift beam, as shown in figure 1. Avoid abrupt forklift movements.



Alternatively if a crane is used, it is advisable to use 2 pipes of suitable length and 1" diameter to lift the unit (Figure 2).



The unit should be installed on a rigid base, preferably made of concrete, or other similar masonry material. In case it is necessary to anchor the unit, use 4 M10 bolts. The position of the relevant holes on the base is shown in figure 3.

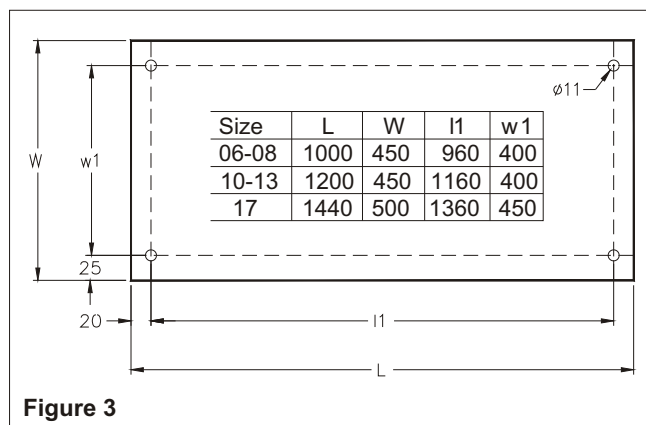


Figure 3

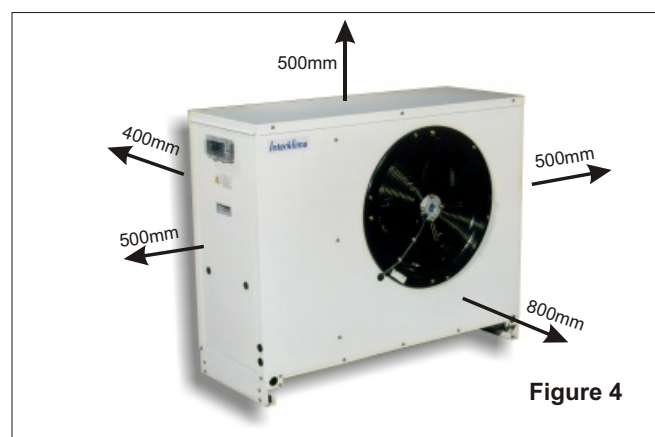


Important

All units of the MC series are air cooled. Air circulation is therefore highly important and should not be obstructed in any way. Any obstacles that interfere with the air flow can dramatically decrease the unit performance or even prevent the unit from functioning altogether, creating situations of unacceptably high pressures.

Axial fans, as those installed on the MC units, are not suitable for high external resistances to air flow. The unit is not suitable for duct or silencer connections.

There are also 2 access doors on both narrow sides of the unit. Enough space should be provided for service purposes. It is, therefore, very important to observe the minimum distances shown in figure 4.

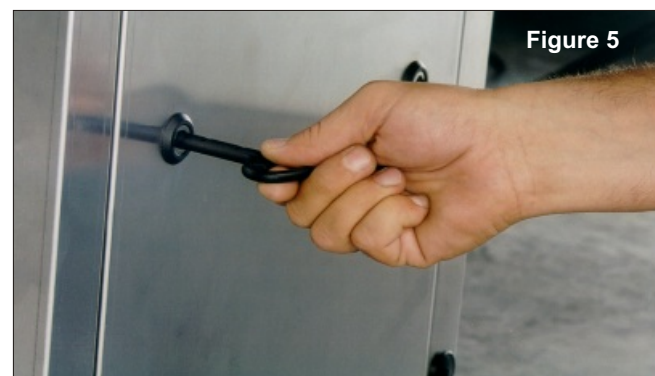


If the unit is installed in a windy area, it must be installed in such a way as to avoid strong winds flowing in opposite direction to the air flow of the unit.

Heat pump models should be installed with a slight inclination of about 1% towards the coil side, to help condensate evacuation.

5.2 Service access

Two side service access panels are provided to ensure easy access to all parts of the unit. These panels are easily removable by means of the special tool supplied with the unit. (Figure 5). In order to further facilitate unit access, the top panel can be easily removed by means of a wrench.





Attention

Always make sure that the general electrical switch of the unit is in the off position before opening the access panels. The main switch can be accessed by lifting the plastic cover on the unit access panel, as shown in figure 6.



Figure 6

5.3 Water connections

Water connections should be made by competent technicians, observing health and safety regulations that apply in the place of installation.

All units are equipped with a complete hydraulic kit as shown in figure 7.

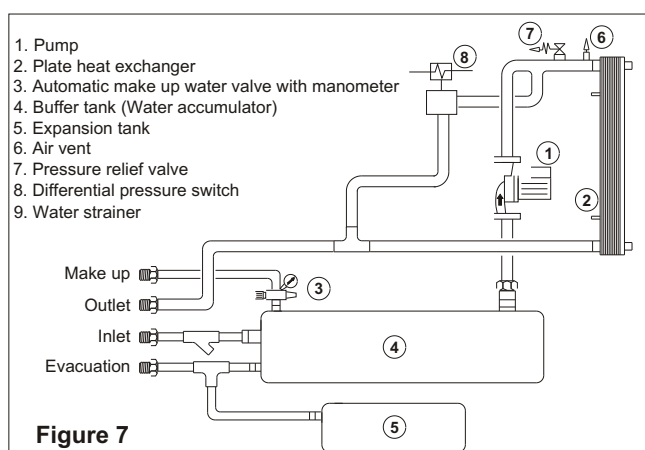


Figure 7

To carry out a successful installation, observe the following:

- On water inlet and outlet install water valves, to permit isolation of the unit. A water valve should also be installed on the water evacuation outlet.
- Connect a fresh water line to the water make-up connection. The units are equipped with an automatic make-up valve to facilitate water make-up in case there is a water loss from the system for any reason.
- Water connections on the unit are clearly marked with the labels Inlet, Outlet, Make-up and Evacuation. The positions of water connections are shown in figure 8.

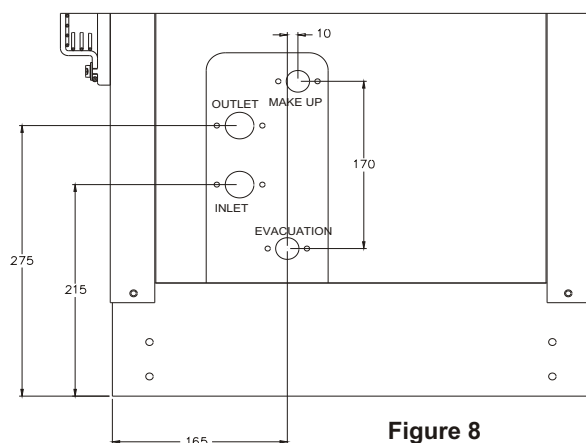


Figure 8

- During filling-up of the system, use the air vent installed in the unit to vent the system (Figure 9). Observe the water pressure on the manometer that is installed on the unit. Water pressure should not exceed 2,5 bar.

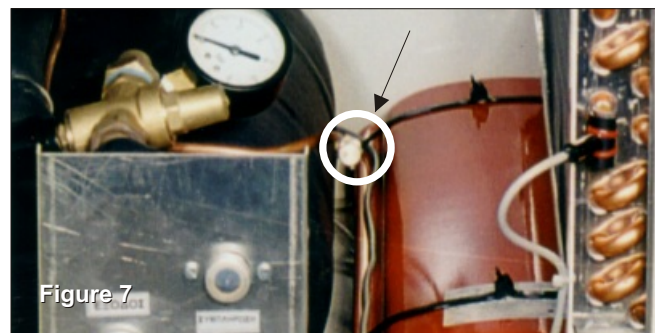


Figure 9

- It is advisable to connect the water inlet and outlet through flexible water tubes, to avoid any vibration transmission to the system.
- Avoid excessive pressure drops in the water system by avoiding unnecessary turns, pipe lifting etc. Good piping design and installation is essential for proper system operation.
- The piping system should be insulated to avoid condensation. If very low ambient temperatures ($<0^{\circ}\text{C}$) and long standby periods are expected, it is advisable to use suitable brines (for example propylene glycol) to avoid water freezing.

Glycol percentages as a function of minimum outside temperatures are given in the following table:

Minimum external temp $^{\circ}\text{C}$	0	-7	-10	-14	-18
Glycol percentage %	10	20	25	30	35

- The unit is operating in closed circuit. Avoid frequent unnecessary water evacuations. Evacuate the unit if very long stand-by periods are expected.



Important

It is not our policy to advise as to water quality. It is, nevertheless, important to advise the customer that excessive impurities in the system can severely impair good unit functioning due to high fouling factor, and can eventually damage the plate heat exchanger or other parts of the unit's hydraulic kit due to scale formation. In case of doubt as to the water quality and the right water treatment it is advisable to consult with a specialized water treatment company.



Important

During pipe connection it is imperative to take care not to deform the unit's piping connections.



Important

Always install a water filter on the return water line, if not already fitted in the unit. After start-up, clean the filter after 6 hours of operation.

5.4 Differential pressure switch

All units are equipped as standard with a differential pressure switch installed across the heat exchanger. This instrument is the principal protection device of the unit. It will stop the unit when it detects reduced water flow caused, for example, by a valve closure or pump damage or water freeze-up etc.

5.5 Residual external pressure

To aid the installer and engineer, figure 10 provides a flow/residual pressure drop chart for all unit sizes, from MC-06 to MC-17.

Figure 10 - Available external water pressure

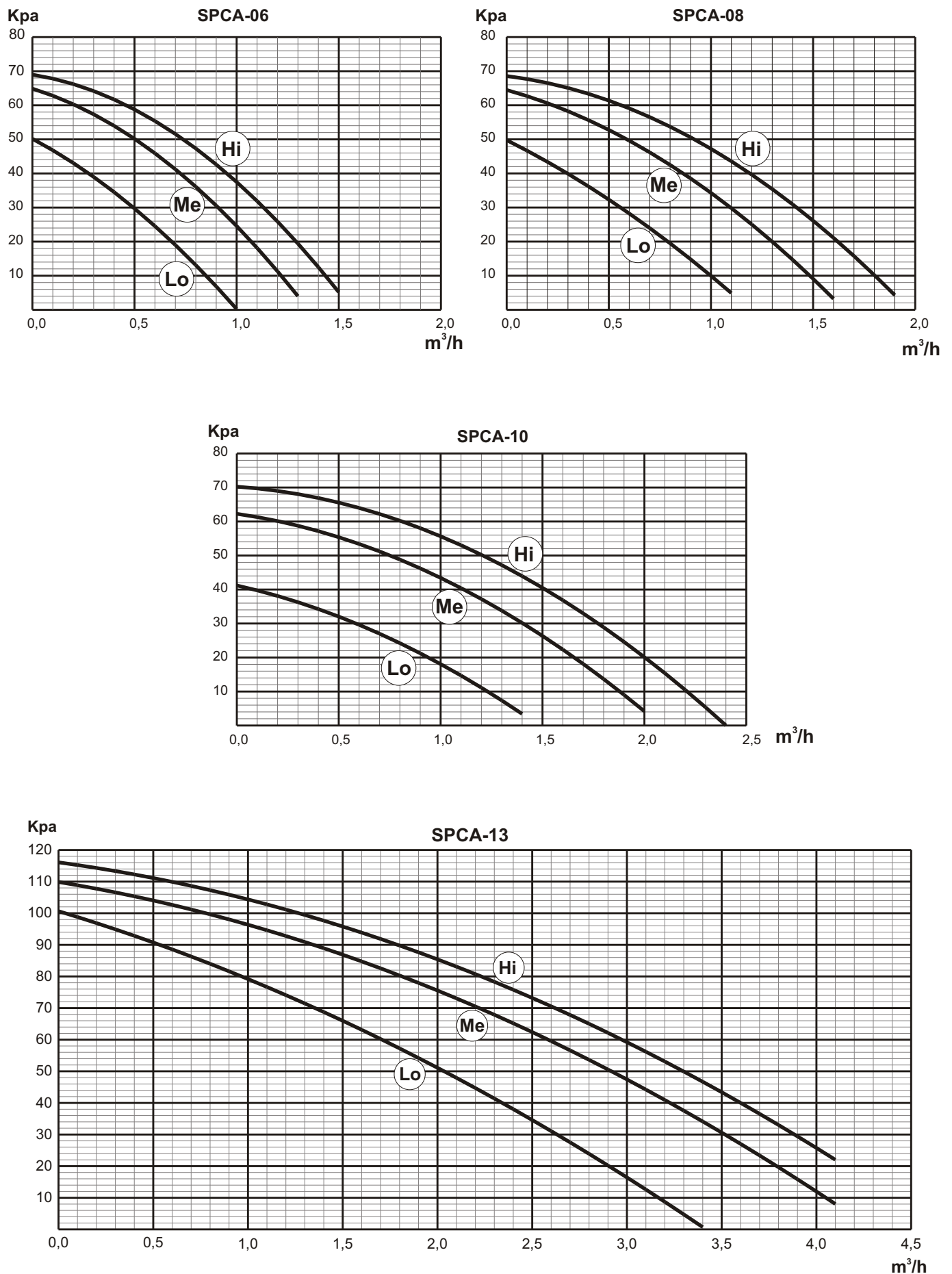
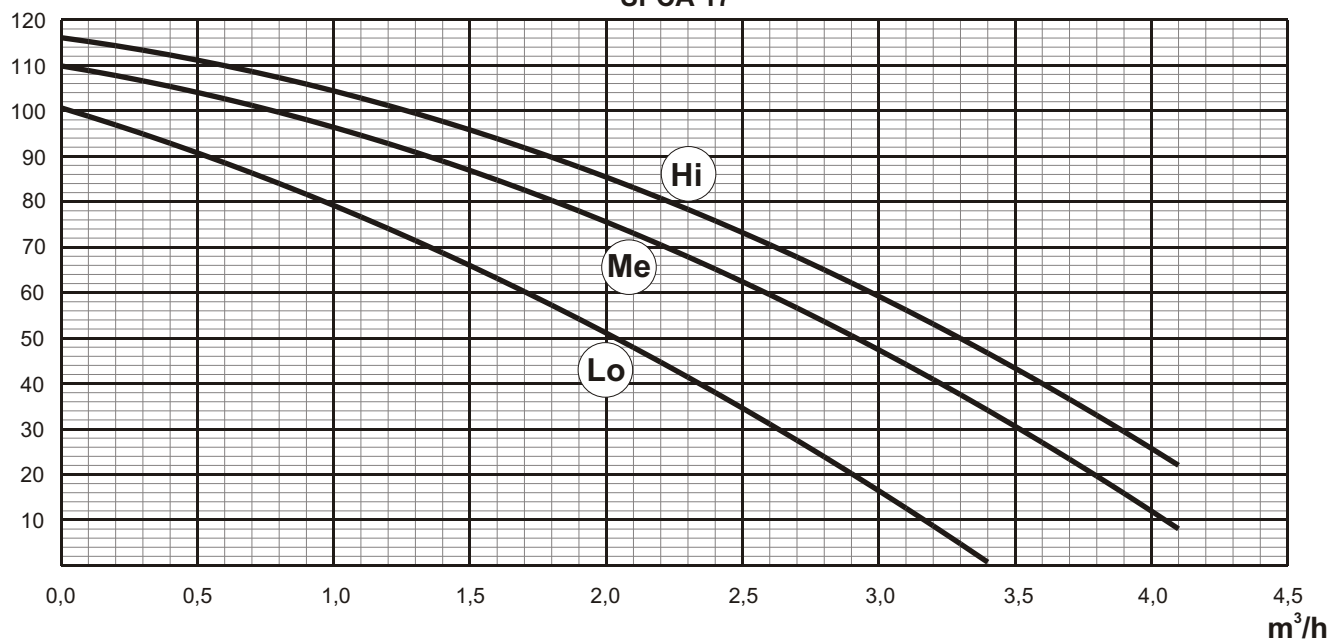


Figure 10 - Available external water pressure (continued)

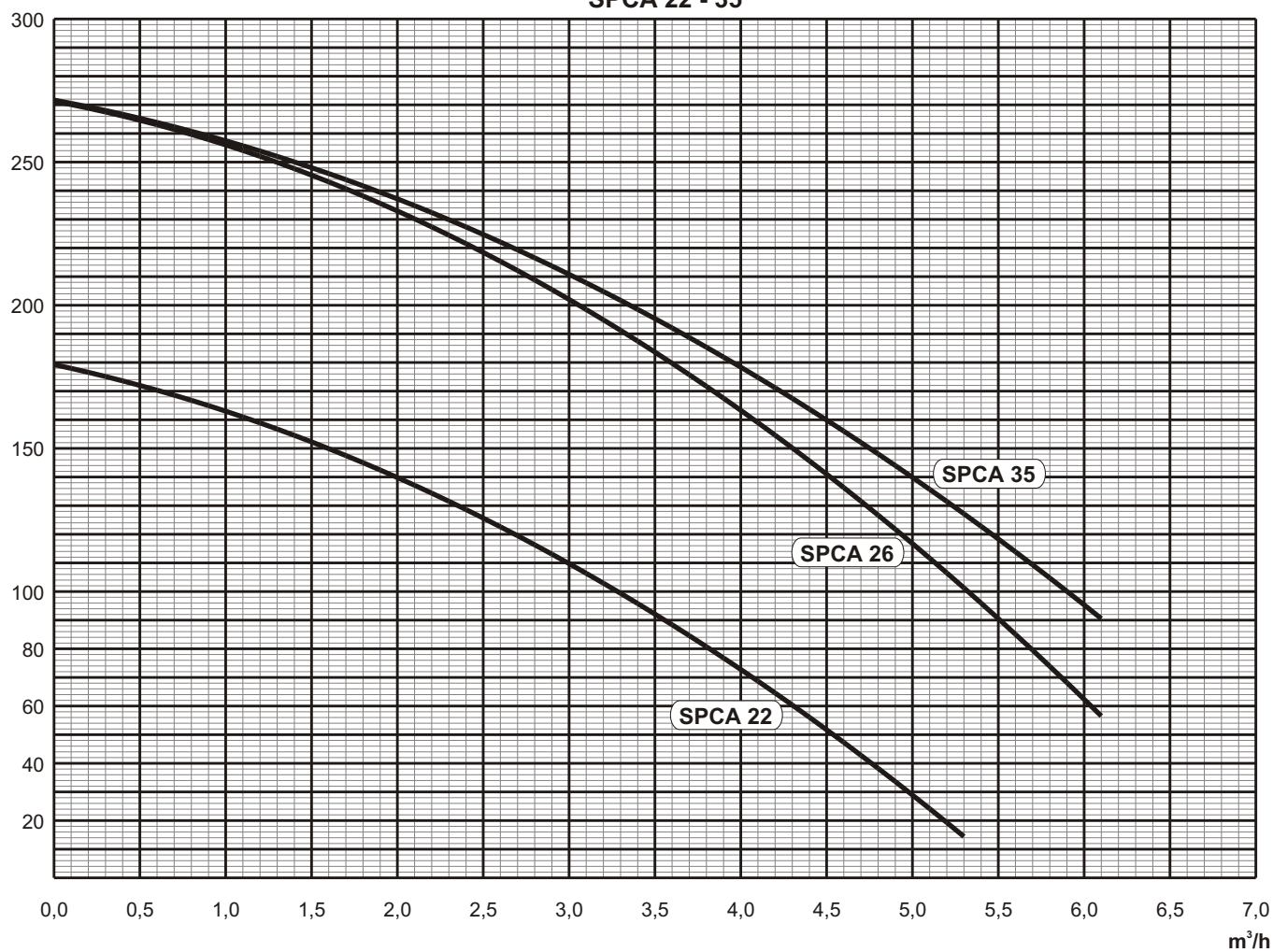
Kpa

SPCA 17



Kpa

SPCA 22 - 35



5.6 Electrical connection

5.6.1 Line connection

Before attempting any electrical connection to the unit, make sure that the electrical network characteristics (i.e. voltage, nr of phases and frequency) match those of the unit, as indicated on the technical characteristics label.

To connect the line do the following :

- First make sure that the main switch of the unit is in the off position

- Open the access door on the electric connections side of the unit, using the special tool supplied with the unit.

- Pass the cable from one of the two cable rubber gaskets that are installed on the machine. To do this, cut a small hole in the rubber (smaller than the diameter of the cable) and then carefully pass through the cable. The rubber will then create a hermetic seal around the cable.

- Connect the cable to the main switch terminals and make sure that the connections are properly tightened. The connections for cable and common are clearly indicated on the unit's electrical panel. (see figure 10, and the wiring diagram that is placed behind the access door).

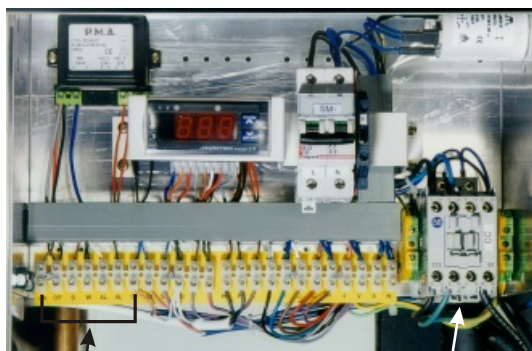


Figure 10



Important

Line voltage should be within +/- 10% of the voltage indicated. Tolerance of the voltage between phases should be less than 3%

5.6.2 Control cable connection

The following options are available for remote control as standard :

- Installation of remote on-off switch.

- Installation of remote summer-winter switch (for heat pump units).

- Installation of remote alarm.

A full remote control panel can be supplied as an option, upon request. (see section on automatic control).

To install the control cables, pass the cables to the inside of the unit using the second rubber gasket, as described above.

Carry out the connections as indicated on the wiring diagram.



Important

Connections for remote on-off and summer-winter are voltage free. Never connect any voltage to those terminals.



Important

Alarm connection is 12 V. Use a 12 V signal lamp or relay if an external alarm is required.



Important

All electrical connections must be made according to the unit's wiring diagram and the applicable local regulations. Cables cross sections indicated on the technical characteristics table are only indicative. Local regulations should always be consulted.



Important

To ground the unit, use the appropriate terminal on the electrical panel.

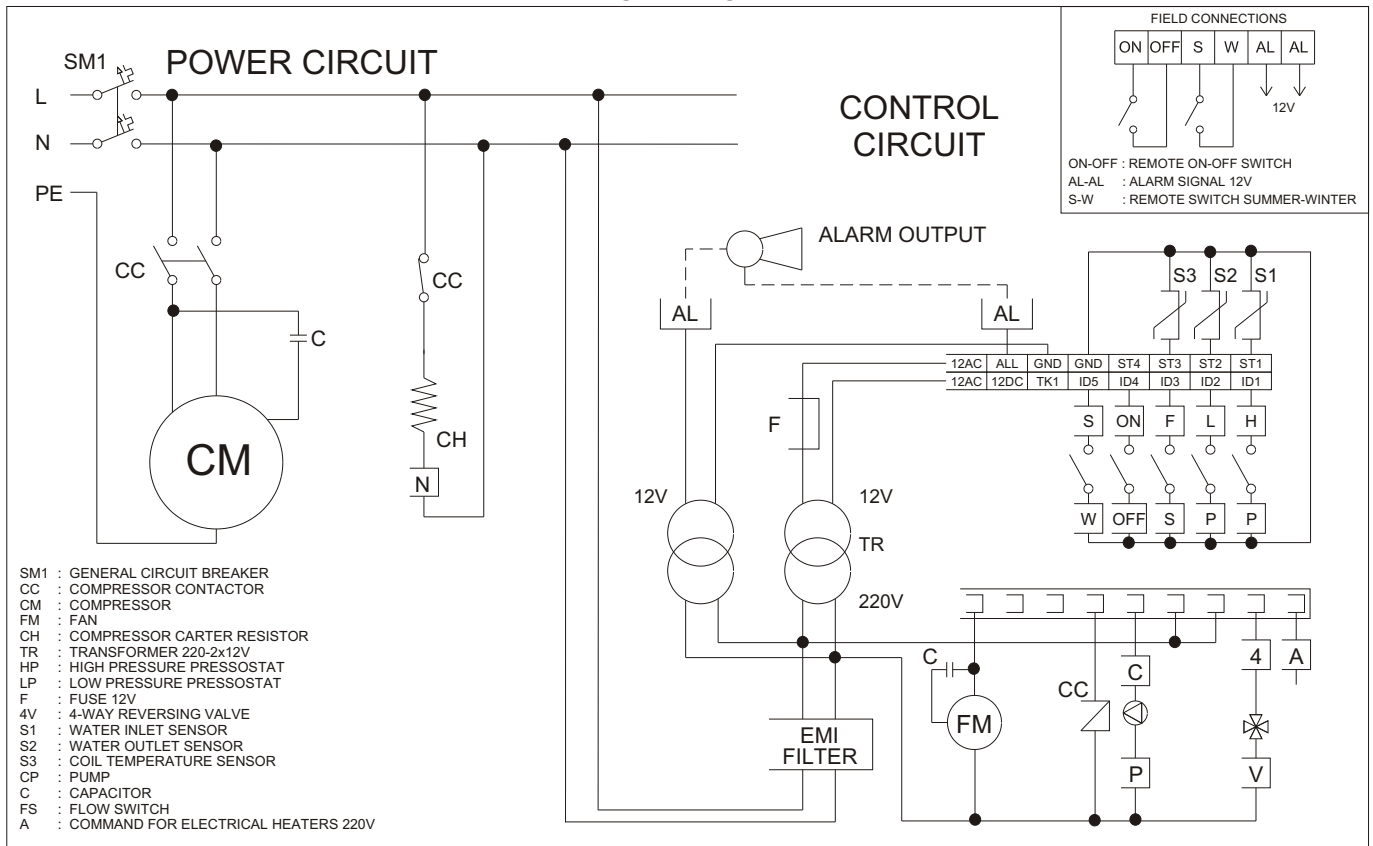


Important

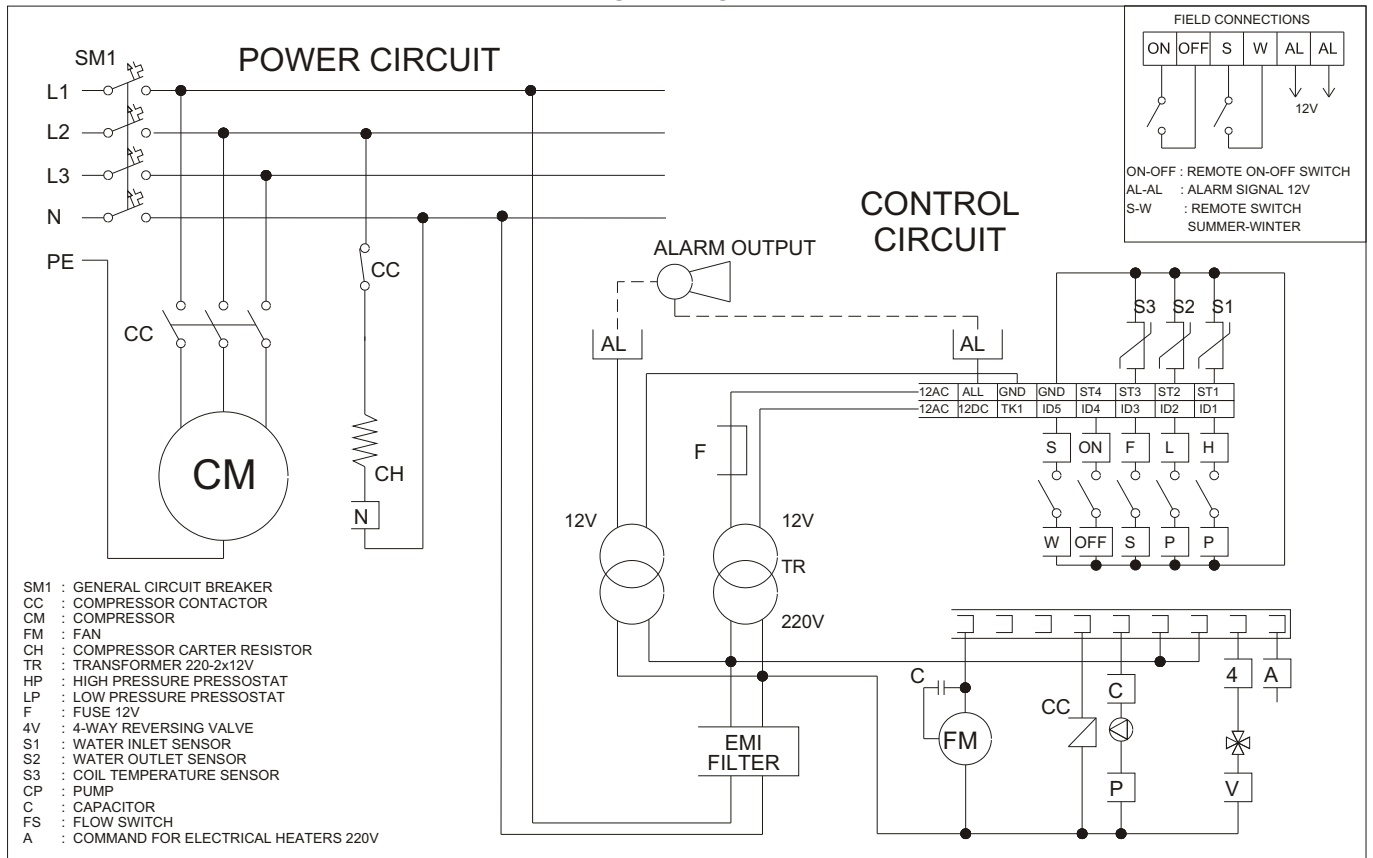
The units are factory programmed for summer - winter switching on the unit keyboard. If external switching is required, parameter H27 has to be manually changed as described in the section covering automatic control.

Typical wiring diagrams

MC-XX-RC-M



MC-XX-RC-T



Note: Always consult wiring diagrams on the unit

6. Automatic control

6.1 Control description

All units are equipped with electronic programmable microprocessor control. This control ensures complete management of all the functions of the unit and also ensures protection of all the unit's basic components as well as full diagnostics so that all possible malfunctions become immediately obvious to the user. The most important features are listed below.

Fully automatic functioning of the unit by means of compressor control via a special algorithm, using water return temperature as the controlled variable.

Full featured protection by controlling high and low compressor pressure, heat exchanger protection against freeze up and water flow detection,

Sophisticated defrost control using time and temperature.

Linear fan speed regulation according to coil temperature or pressure, including fan silent mode operation.

Possibility for remote on-off (Provided on terminal block, see field connections in wiring diagram).

Possibility for remote summer-winter (Provided on terminal block, see field connections in wiring diagram). To install remote summer-winter you have to change parameter H27 as described later in this section.

Automatic recording of operating hours, separately for the compressor and the pump. To access this feature refer to the operating instructions that follow.

All above options are provided as standard. There are further features of the electronic control that can be supplied upon request. Below there is a list of these options.

Full featured remote keyboard, that can be easily connected to the unit by means of a special connector (supplied with the keyboard) and a 3 wire cable having a minimum wire cross section of 0,5 mm. The maximum cable length is 100 m. See user interface section for connection details.

Automatic summer - winter changeover. It is necessary to install an extra outside temperature sensor and set the parameter H27 to enable this feature.

Connection to building management systems via modbus. As this involves a slightly different type of control it should be known to the factory together with the order.

Dynamic made set point. It is possible to program the unit so as to enable the dynamic set point feature. This can be programmed to operate either via a 4-20 mA proportional signal according to user setting or by means of an outdoor sensor. The special algorithm built into the control adjusts the unit set point according to the external request.

The unit control has more than 150 programmable parameters. All units are factory programmed and ready for operation. In case of accidental erasure of the unit's program for any reason, it can be easily reprogrammed by means of a special copy card that is connected to the control board. All parameters are instantly uploaded to the control from the copy card.



Caution

This operation must be carried out only by technical service authorized by the manufacturer.

6.2 User interface

The interface on the front panel of the instrument can be used to carry out all the operations connected to the use of the instrument, and in particular to:

- Set operating mode
- Respond to alarm situations
- Check the state of resources

Keyboard

Front panel of the instrument



Keys

Mode Selects operating mode:



If the heating mode is enabled, each time the key is pressed the following sequence occurs:
Stand-by - cooling heating stand by

If heating mode is not enabled:
Stand-by cooling stand by

In menu mode, this key acts as a SCROLL UP or UP key (increasing value).

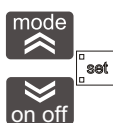
On-off - Reset Alarms

Resets alarms, and turns the instrument on and off.
Press once to reset all manually reset alarms not currently active.



Hold down the key for 2 seconds to turn the instrument from on to off or vice versa. When it is off, only the decimal point remains on the display. In menu mode this key acts as a SCROLL DOWN or DOWN key (decreasing value).

Mode on-off - key combination



Pressing the “mode” and “on-off” keys at the same time.

If you press both keys at the same time and then release within 2 seconds, you will move one level deeper in the display menu.

If you press both keys for more than 2 seconds you will move one level up.

If you are currently viewing the lowest level in the menu and you press both keys and release within 2 seconds, you will go up one level.

2 Displays

The device can provide information of all kinds on its status, configuration, and alarms through a display and leds on the front panel.

2.1 Display

Normal display shows:

Regulation temperature in tenths of degrees celsius with a decimal point, or in degrees fahrenheit without a decimal point.

The alarm code, if at least one alarm is active. If multiple alarms are active, the one with greater priority will be displayed, according to the Table of Alarms.

If temperature control is not analogue and depends on the status of a digital input (ST1 or ST2 configured as digital inputs), the “On” or “Off” label will be displayed, depending on whether temperature control is active or not.

When in menu mode, the display depends on the current position; labels and codes are used to help the user identify the current function.

Decimal point: when displaying hours of operation, indicates that the value must be multiplied x 100.



2.2 Led

Led 1 compressor 1.



ON if compressor 1 is active

OFF if compressor 1 is off

BLINK if safety timing is in progress

Compressor 2 (or capacity step) led



ON if compressor (capacity step) is on

OFF if compressor (capacity step) is off

BLINK if safety timing is in progress



Defrost led

ON if defrosting is in progress
OFF if defrosting is disabled or has been completed
BLINK if timing is in progress (defrost interval)



Electrical heater/boiler led

ON if the internal anti-freeze electrical heater or boiler is on
OFF if the internal anti-freeze electrical heater or boiler is off



Heating led

ON if the device is in heating mode



Cooling led

ON if the controller is in cooling mode

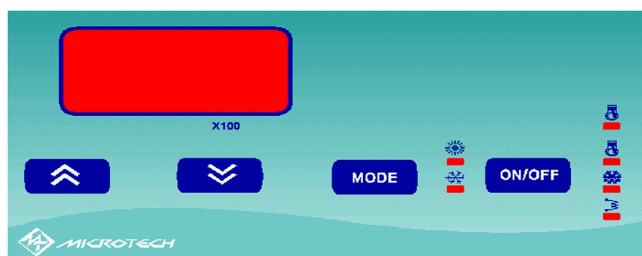
If neither the HEATING led nor the COOLING led is on, the controller is in STAND-BY mode

Remote Keyboard

3 Remote keyboard

The remote keyboard on the display is an exact copy of the information displayed on the instrument, with the same leds;

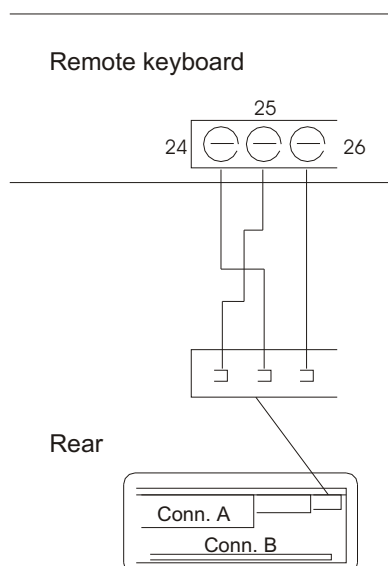
Remote keyboard



It performs exactly the same functions as those described in the display section.
The only difference is in use of the UP and DOWN keys (to increase and decrease value), which are separate from the MODE and ON/OFF keys.

Connection with the controller is illustrated below:

Connection



Refrigerant and hydraulic circuits

Typical arrangement of refrigerant circuit with capillary tubes

LEGEND

- 1. Scroll compressor
- 2. Plate HE
- 3. Coil
- 4. Suction accumulator
- 5. 4-way valve
- 6. Check-valve
- 7. Expansion device (Capillary)
- 8. Biflow LL filter dryer

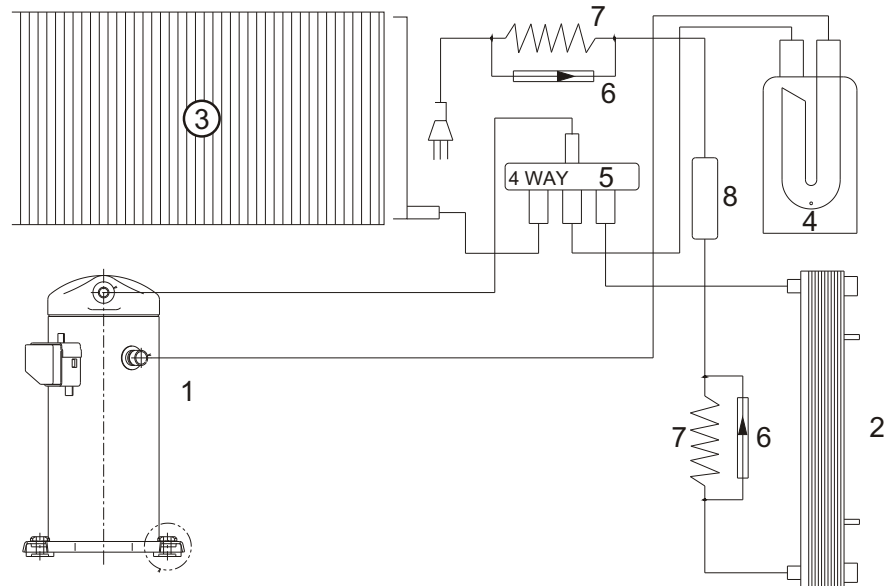


Diagram 1

Typical arrangement of refrigerant circuit with restrictors

LEGEND

- 1. Scroll compressor
- 2. Plate HE
- 3. Coil
- 4. Suction accumulator
- 5. 4-way valve
- 6. Expansion device (Restrictor)
- 7. Biflow LL filter dryer

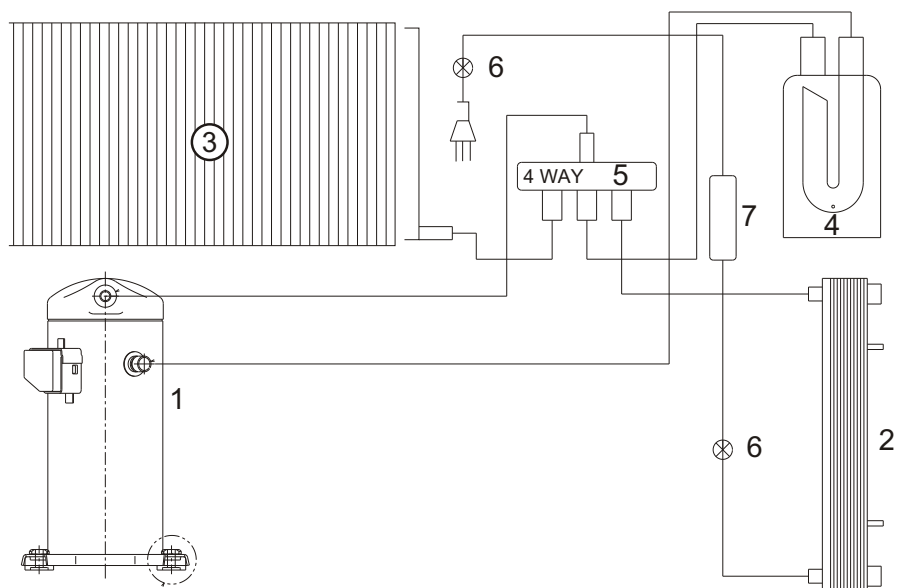


Diagram 2

7. Operation instructions





7.1 Before start up

Before turning the unit on please observe the following :

- Put the general switch to the ON position.
- It is advisable to leave the unit with the general switch in the ON position for several hours before turning the unit on to allow the compressor' s carter resistance to preheat the oil and separate any refrigerant from it.

7.2 Starting and operating the unit

To successfully and safely operate the unit please read carefully the following instructions.

- To start the unit** press and hold down the key  for 2 seconds to turn the unit from "off" to "on" and vice versa. When the unit is "off" the control displays a red dot or E00 if there is a remote on-off contact and it is in the "off" position. When the unit is "on" the display shows the return water temperature.
- If you have a heat pump model you can select cooling or heating mode by means of the key . Pressing this key you will cycle through stand-by-cooling-heating-stand-by modes. When the unit is set for cooling operation the LED below the the symbol  is lit on the screen, and when in heating mode the LED below symbol  is lit.
- To change set points** press and hold down momentarily both keys. When the screen displays "Set" , repeat to enter the next level. By scrolling up and down the labels "Coo" and "HEA" appear in sequence. To change the cooling set point, when the display is "Coo", press again momentarily and simultaneously both keys to enter the next level. The factory setting (12 °C) appears on the screen. To change scroll up or down.
When you have the desired value on screen press and hold down both key for 2 seconds to accept and return to the previous level. Scroll until the label "HEA" appears on the screen and repeat the above procedure to change the heating set point. When finished return to the first level by pressing and holding down both keys for 2 seconds, as described in paragraph 6.2 (User interface)
- To display other useful temperatures** of the system, go to level 1 as described above and scroll down until the label "tp" is displayed on the screen. Repeat the procedure to step one level down. Scrolling down you will see the labels t01,t02,t03. When the screen displays t02 go to the next level to see the value of leaving water temperature. Repeat the same procedure for t03 to see the coil surface temperature.
- The unit is factory set for summer winter changeover from the unit' s keyboard. If you install a **remote summer-winter contact** you have to change parameter H27 to reconfigure the unit for remote summer winter switching. To do this press both keys momentarily to go to the next level. Scroll down until the label "Par" displays on the screen. Press again both keys to enter the next level and scroll until the screen displays "Cnf". Repeat to enter the next level. When H27 appears on screen repeat to go one level down.
Change the value of this parameter from 0 to 1. Accept and repeat the above described procedure (hold both keys down for 2 seconds repeatedly) until you return to the first level.
- When remote summer winter switching is applied, the unit is in **cooling mode when the contact is closed and in heating mode when it is open**.



Extremely important

If the unit is 3-phase you have to make sure that the compressor rotates in the right direction. This is because scroll compressors are dependent on the direction of rotation. If the direction of rotation is not the right one you will notice the following:

-Abnormal compressor noise.

-Incorrect pressures, because the compressor cannot build the right discharge pressure, so high and low pressure are almost equal.

This situation is very easily corrected by reversing the 2 line connections.

8 - Maintenance

Any maintenance or service operation on the units should be carried out by authorized and competent technical personnel.

In case of repetitive actions of one or more safety devices and alarms it is necessary to analyze the problem in depth, find the cause for it and eventually eliminate it.

The simple and robust construction of the refrigerant circuit prevent the majority of possible problems appearing, as this is the most delicate part of the unit. It is, therefore, not necessary to execute any preventive maintenance action on the unit, as long as it is properly operating, without any indications of malfunctions.

We, nevertheless, suggest some preventive maintenance actions, so as to ensure that the unit continues to perform at all times at a high level.

These actions are of a routine character :

- Check the various operating and safety set points of the unit to verify that they have the correct values.
- Check all electric and control voltages to verify that they have the correct values.
- Check the water flow, and clean the water filter.
- Check all the temperatures of the system and verify that they are within normal limits.

Long shut down periods

Should the unit be shut down for a long period, do the following :

- Put the general switch in the OFF position.
- If the shut down is for the winter period and there is no glycol in the water system, completely drain the unit to prevent ice formation.

Components servicing

- Fan bearings are permanently lubricated and require no servicing.
- No service of the refrigerant circuit parts is required.
- No service for the hydraulic parts is required **except regular cleaning of the water filter.**
- The air to refrigerant heat exchanger (coil) requires regular cleaning. Use water spray with a detergent solution at very low water pressure.

9 - Trouble shooting

Table of alarms and possible causes and actions

Code	Meaning	Possible cause	Action
E00	Remote ON-OFF	Remote On - Off is open	Set remote contact to ON position
E01	Compressor high pressure (manual reset)	1. Obstructed air flow to condenser 2. Head pressure control misadjusted 3. Faulty high pressure set point 4. Excessive refrigerant charge 5. Fan malfunction 6. Excessively dirty condenser 7. Operation outside limits 8. Low water flow (winter cycle) 9. Dirty water strainer (winter cycle)	1. Remove obstacles 2. Check fan regulation set points 3. Increase set point 4. Remove excess charging 5. Check fan motor condition and connections 6. Clean condenser coil 7. Operation limits should be observed. 8. Adjust water flow. Consult charts (page 8) 9. Clean water strainer
E02	Compressor low pressure (auto reset, unless it reaches 4 events per hour).	1. Low water flow 2. Evaporator dirty 3. Clogged refrigerant filter 4. Low condensing pressure 5. Lack of refrigerant	1. Adjust water flow. Consult charts (page 8) 2. Clean chemically 3. Replace filter 4. Check fan regulation set points 5. Check for leaks. Repair and replace refrigerant
E05	Anti freeze (auto reset until it reaches 2 events per hour)	1. Low water flow	1. Adjust water flow. Consult charts (page 8)
E06	Probe ST2 (water outlet) fault	Occurs when probe ST2 is shorted or cut or probe limits are exceeded.	Check and possibly replace probe ST2
E07	Probe ST3 (condenser coil) fault	Occurs when probe ST3 is shorted or cut or probe limits are exceeded.	Check and possibly replace probe ST3
E11	High temperature (condenser coil probe) manual reset	As in E01	As in E01
E12	Low temperature (condenser coil probe) auto reset unless number of events exceeds 4	As in E02	As in E02
E41	Flow switch	No water flow	Check differential press switch, pump and water system