

(Etiquette signalétique)

## PHTJ 14 / 19



**Pompe à chaleur haute température avec équipement hydraulique  
 (chauffage seulement) - Fluide réfrigérant R 407 C**

**High temperature heat pump with hydraulic equipment  
 (heating only) - R 407 C refrigerant**


**Refrigeratore d'acqua in versione pompa di calore alta temperatura con sezione idronica  
 incorporata (unicamente riscaldamento) - Fluido refrigerante R 407 C**

**Bomba de calor de alta temperatura con equipamiento hidráulico  
 (sólo calefacción) - Fluido refrigerante R 407 C**

**Hochtemperatur-Wärmepumpe mit Hydraulikmodul  
 (Nur Heizen) - Kältemittel R 407 C**

**Bomba de calor alta temperatura com equipamento hidráulico  
 (somente aquecimento) - Fluido refrigerante R 407 C**

## MARKING

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

- Low voltage no. 2006/95/EC.
- Electromagnetic Compatibility no. 89/336 EEC, modified 92/31 and 93/68 EEC.



## SUMMARY

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### APPLIANCES FILLED WITH R 407 C

#### R 407 C

- Fluid R 407 C is not a pure fluid but a blend composed of:
  - 23% R 32 + 25% R 125 + 52% R 134 A.
- The compressors approved for operation with this fluid are filled beforehand with polyalcohol oil.  
Contrary to mineral oil, it is very hygroscopic: it absorbs the humidity of the ambient air very quickly. This can modify its lubricant properties and lead in time to the destruction of the compressor.

#### MAINTENANCE INSTRUCTIONS

- 1 - Never add oil to the appliance; the compressor is filled with polyalcohol 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 407 C fluid.
- 3 - The weight of the refrigerant contained in the storage bottle must be checked constantly. Do not use it from the moment the remaining weight is less than 10% of the total weight.

#### 4 - In the case of a new charge:

- do not use the charging cylinder,
- use a balance and a dip pipe type R 407 C cylinder,
- charge the weight of R 407 C as per the value indicated on the unit's identification plate,
- IMPORTANT: see instruction 3 above.

#### 5 - The charge **must** be undertaken in liquid phase.

- 6 - 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.

#### 7 - If the refrigerant circuit is opened, you must:

- avoid the entry of air into the circuit as much as possible,
- replace the filter drier,
- perform the "vacuum operation" at a minimum level of **0.3 mbar (static)**.

- 8 - Do not release R 407 C fluid into the atmosphere. This fluid is a fluorinated greenhouse gases, covered by the Kyoto Protocol with a Global Warming Potential (GWP) = 1653 - (EC Directive 842 / 2006).

## 1 - GENERALITIES

### 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, cassis 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.



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

- Refer to the technical specifications, the nominal conditions and operating limitations in the technical manual.

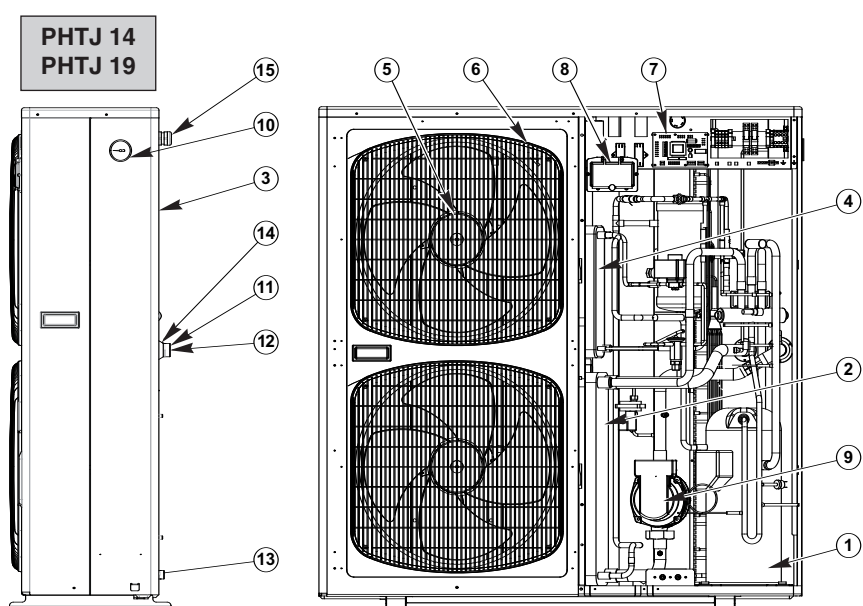
## 2 - PRESENTATION

### 2.1 - DESCRIPTION

- 1 - Sound-proofed hermetic compressor.
- 2 - Plate water heat exchanger.
- 3 - "Plate-Fin" air heat exchanger.
- 4 - Injection circuit exchanger.
- 5 - Fan motor.
- 6 - Fan protection grille.
- 7 - Electrical box.
- 8 - Microprocessor control unit display keyboard.
- 9 - Circulating pump.
- 10 - Pressure gauge.
- 11 - Water inlet connector.
- 12 - Water outlet connector.
- 13 - Filling / drainage of the water circuit.
- 14 - Air vent.
- 15 - Hole for connecting cables.

#### Materials:

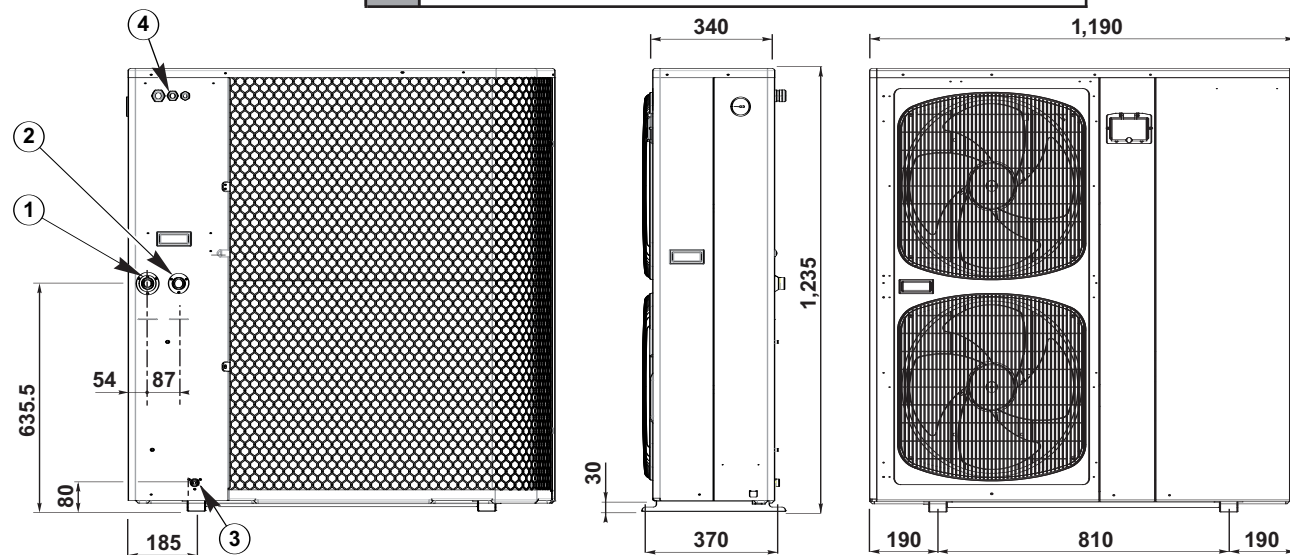
- Copper piping.
- Painted sheet metal cabinet.
- Copper / aluminium air heat exchanger.
- Stainless steel water heat exchanger.
- Plastic grille.



### 2.2 - DIMENSIONS AND WEIGHT

	Weight (kg)
PHTJ 14	141
PHTJ 19	145

1	Water inlet connection 1" (male) with air vent valve
2	Water outlet connection 1" (male)
3	Water circuit fill/drain - 1/2" male
4	Holes for electric cables



### 3 - INSTALLATION

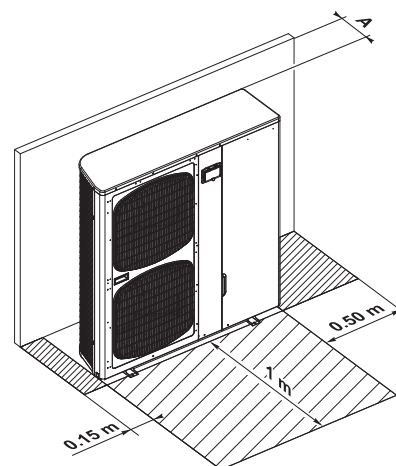
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- Protection index of the unit: IP 24.
- Select the location for the unit on the basis of the following criteria:
  - the unit must be installed outside,
  - the unit must not be installed near the following:
    - . sources of heat,
    - . combustible materials,
    - . return / air intake of an adjacent building.
  - it is necessary to make sure that the free space around the unit is provided (see the minimum dimensions on the drawing opposite),
  - installation must be simple and make maintenance work easy,
  - the unit must be fixed on a hard base and must be protected from risks of flooding,
  - the unit must be raised approximately 100 mm above the ground to facilitate the drainage of condensate from the tank and to prevent it from being encased in ice, of if required to connect the drainage of condensate (see below),
  - use the anti-vibration mountings supplied, making sure that they are not compressed too much when the fastening screws are tightened,
  - due to disturbance which may be caused by the noise, the blown air must not be directed towards surrounding windows,
  - vibrations and noise must not be transmitted to a nearby building,
  - avoid:
    - . exposure to salty air or sulphuric gas,
    - . 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.

#### DRAINAGE OF condensate

- If necessary, use the accessory part supplied to connect the condensate drainage tube.
- The base has 2 drainage holes (one on each side).
- For condensate drainage, place the splined elbow in one of the holes, depending on the unit's inclination or the preferred side, and plug the other hole with the plastic cover.
- In this case, the tank and the drain line must be protected against freezing risks.

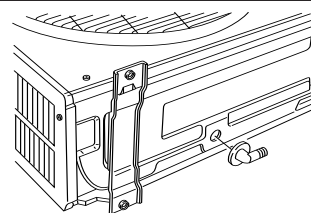
Minimum space above the device: 0.70 m.



	A (m) *
PHTJ 14/19	0.25

\* This dimension does not account for the following cases:

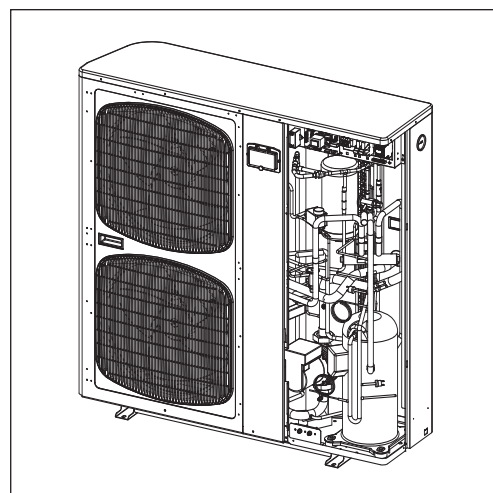
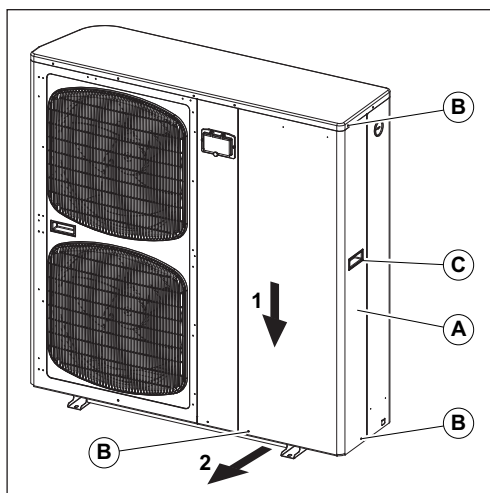
- Installation of the hydraulic filter with shut-off valves positioned behind the unit: provide 0.30 m.
- Installation of a heater unit behind the unit: provide 0.30 m.



### 4 - CONNECTIONS

#### 4.1 - DISASSEMBLY

- To remove side panel A:
  - remove the 3 retaining screws B,
  - lower the panel (1) using the handle C,
  - pull the lower part of the panel toward you (2).



## 4.2 - HYDRAULIC CONNECTION

- Connect the water pipes to the corresponding connections. See Ø and position on page 3.
- Install the hydraulic filter (supplied) on the water intake. Connect it using 2 isolation valves (not supplied) for cleaning purposes.
- Install a shut-off valve (not supplied) if a fill / drainage connection is used.
- **CAUTION:**

**This device is not fitted with an expansion tank or a safety valve.**

These elements must be incorporated into the installation's hydraulic circuit.

For installation of an electric heating module, install this safety valve in direct connection with the module (without isolation valve).

**NOTE:**

"Water connection hose" accessories may be used (refer to the accessories paragraph).

## 4.3 - ELECTRICAL CONNECTION

### 4.3.1 - GENERAL:

- The acceptable voltage variation is:  $\pm 10\%$  during operation.
- The electrical connection conduits must be fixed.
- Use the cable clamps at the rear of the unit and route the wires under the electric panel, at the level of the terminal strips.
- Class 1 unit.
- The electrical installation must comply with the standards and regulations applicable where the unit is being installed (in particular NF C 15-100  $\approx$  IEC 364).

### 4.3.2 - POWER SUPPLY

- The power supply must come from an isolation and electric protection device (not supplied) in accordance with existing regulations.
- Protection must be guaranteed by a **double-pole circuit breaker** for single-phase devices and a **three-pole circuit breaker** for three-phase devices (not supplied). See ratings in the table below.

**Note:**

The unit is designed to be connected to a power supply having a TT neutral regime (neutral to ground) or TN.S regime (to neutral) as per NF C 15-100.

#### POWER SUPPLY CABLE

- **Cross-section:** see table below.
- The sections are given as an indication only. They have to be verified and adapted, if necessary, according to the installation conditions and the standards in force.
- Make the electrical connections to the terminal board as per the electrical diagrams.

#### CURRENTS AND CROSS-SECTIONS

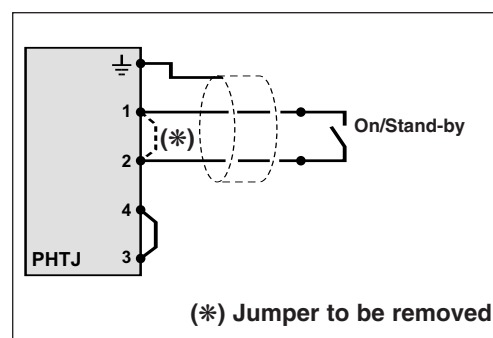
		PHTJ 14 230/1/50	PHTJ 14 400/3N/50	PHTJ 19 400/3N/50
Nominal current	<b>A</b>	27.7	9.9	16.7
Max. current	<b>A</b>	32	13	19.3
Starting current	<b>A</b>	45	64	101
Protection rating	<b>A</b>	40	16	25
Cross-section of power cable		3 G 6 mm <sup>2</sup>	5 G 2,5 mm <sup>2</sup>	5 G 4 mm <sup>2</sup>

**CAUTION:**

**In the case of a three-phase power supply, prior to commissioning the unit, make sure that the phase rotation order is correct. If the rotation order is not respected, the compressor will turn backwards (and make an abnormal noise). To fix this, simply invert the 2 phases.**

### 4.3.3 - CONTROL BY EXTERNAL CONTACT

- The unit can be controlled remotely by connecting a good-quality, potential-free external contact (not supplied) (contact closed = operation authorised, contact open = stand-by).
- The On / Stand-by signal is connected to terminals 1 and 2 of the PCB located in the switch box (remove the existing bridge - see diagram).
- The wiring of this contact must not be routed near power cables in order to avoid electromagnetic disturbances.
- Use shielded cable with twisted pair (shielding grounded on generator side).
- Max. connection cable length: 100 m.
- Minimum wire size: 0.5 mm<sup>2</sup>.



#### 4.3.4 - REMOTE CONTROL

- See paragraph "accessories".

#### 4.3.5 - MISCELLANEOUS

- **Alarm transfer:**

Potential-free changeover contact (2A - 250 VAC max.) available on the unit's terminal strip (terminals 5 (common), 6 and 7 of the printed circuit) for remote signaling. See schematic.

- **In case of alarm:**

- contact open between terminals 5 and 6,
- contact closed between terminals 5 and 7.

## 5 - OPERATION OF "ECH" ELECTRONIC CONTROL

- See the wiring diagrams at the back of the manual.

### 5.1 - 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.

### 5.2 - PRINCIPLE

- The microprocessor controls the operation of the machine and of the associated alarms.

It continuously compares the water temperature measured by the probe **SD1** and the setpoint temperature value entered via the keyboard.

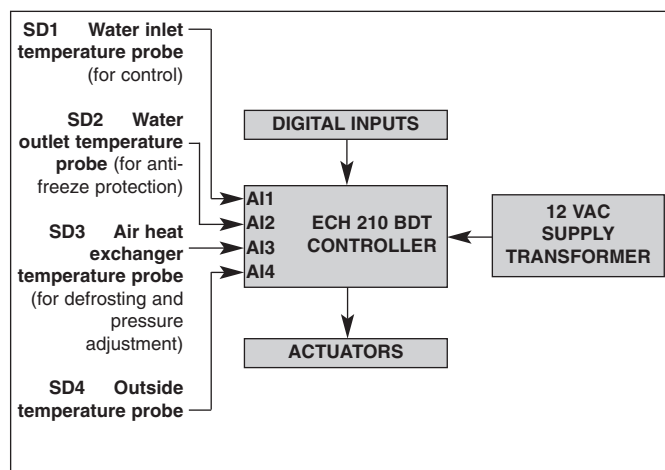
Each operating request produced by the control unit is indicated by the light **(6)** (see below).

This light flashes if a safety delay is in progress. It stays on when the compressor is operating.

- The **control probe SD1** is located on the **water inlet** in the factory.
- The controller is connected on a printed circuit board on which the inputs and outputs are connected.

On this board:

- 12 V supply transformer,
- the alarm report relay,
- the 230 V circuit fuse (4 A - 250 V - 5x20 - fast - breaking capacity: 1.5 kA).



### 5.3 - PRESENTATION

#### 5.3.1 - DISPLAY KEYBOARD

(1) Key for:

- Local On / Off control,
- access to parameters (in combination with button (2)),
- alarm clearance,
- hour counter reset.

(2) Key for:

- access to parameters (in combination with button (1)).

(3) LED display.

(4) Cooling mode indicator (not used).

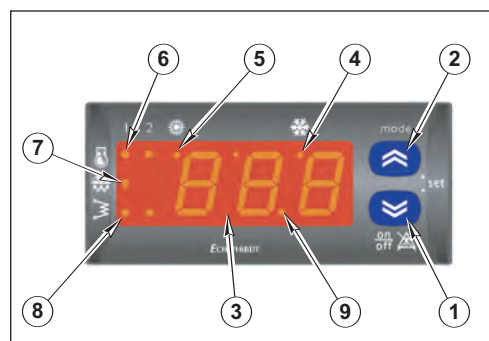
(5) Heating mode indicator.

(6) Compressor on indicator.

(7) Defrosting indicator.

(8) Anti-freeze on indicator.

(9) Decimal point: if illuminated when the operating time is displayed, the value must be multiplied by 100.





### 5.3.2 - CTN TYPE TEMPERATURE PROBE

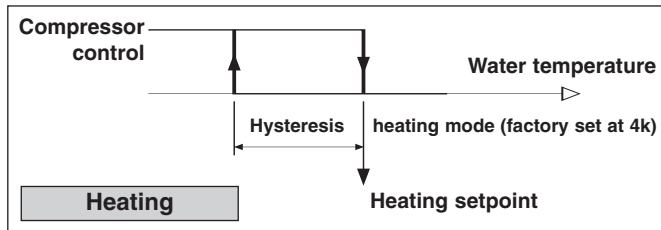
- 10 k $\Omega$  at 25° C.

Temperature (°C)	Ohmic value (Ohm)
-20	67 740
-10	42 450
0	27 280
10	17 960
20	12 090
25	10 000
30	8 313
40	5 820
50	4 161
60	3 021
70	2 229

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### 5.4 - OPERATING MODES

- The machine only operates in heating mode.



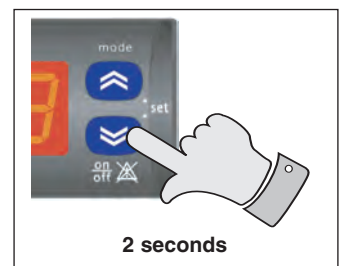
### 5.5 - STARTING

The unit is factory configured for remote control by contacts (see other possibilities in paragraph 4.3.3).

- **Initial condition:**
  - machine hydraulically and electrically connected ready to operate,
  - the remote stand-by contact is open (= stand-by).
- **Turn the installation on:**
  - the display comes on and shows the water temperature (read by the control probe **SD1**). The mode indicator lamps (4) and (5) flash to signal remote stand-by,
  - the unit's circulating pump starts.
- **To start the unit:**
  - close the remote stand-by contact (not supplied) if connected (see paragraph 4.3.3),
    - the Heating (5) indicator lights up.
  - The compressor "ON" indicator light (6) comes on if necessary (see diagram paragraph 5.4). If the light flashes, it means that the compressor is starting required but that a safety delay is in progress. This light stays on when the compressor has started.
- **To stop the unit:**
  - open the remote stand-by contact,
  - the compressor operation indicator lamp (6) goes out and the operating mode indicator lamps (4) and (5) flash,
  - the unit's circulating pump remains in operation.
- **Complete stop:**
  - the unit can be completely stopped with the circulating pump shut-down by pressing and holding the **ON/OFF** button (1) for 2 seconds. The display unit goes blank, only the decimal indicator lamp (9) remains illuminated. This shut-down takes priority.

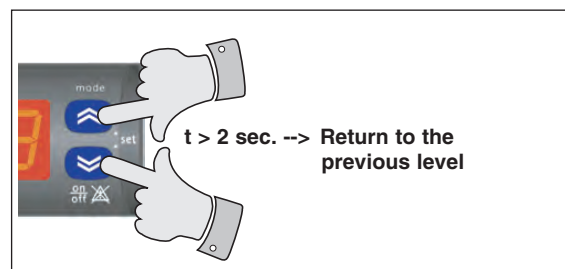
#### Note:

Shut-down of the circulating pump is delayed 1 minute after the compressor stops.

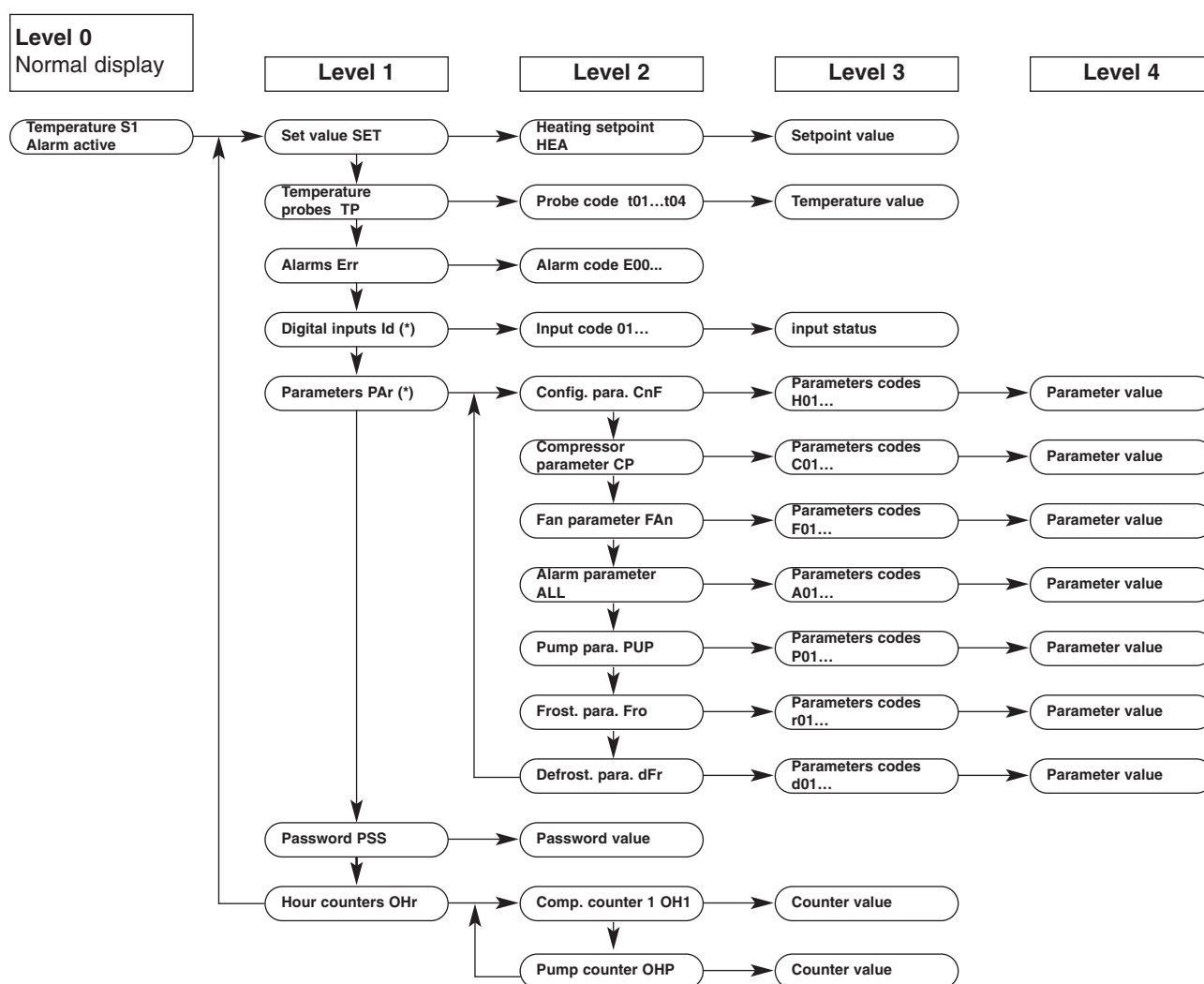


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- Parameter access is structured within a multi-level menu, see the diagram below. Simultaneously pressing the "ON/OFF" (1) and "Mode" (2) buttons for a brief moment (less than 2 seconds) gives access to the next level. Simultaneously pressing for a long moment (longer than 2 seconds) turns you to the previous level.



- ### 5.6.2 - PARAMETER ACCESS DIAGRAM



**Note 1:**

Indicator lamps (6), (7), (8) flash when levels 1 and above are accessed.

**Note 2:**

The normal display (level 0) returns automatically after 5 minutes if no buttons are pressed.



### 5.6.3 - SET POINT ADJUSTMENT

- Simultaneously press buttons (1) and (2) for at least 2 seconds, "SET" is displayed.
- Press the 2 buttons again, "HEA" is displayed.
- Simultaneously press the 2 buttons again for 2 seconds. The setpoint value appears. If needed, modify the value with the buttons.
- Press the 2 buttons simultaneously to validate the setpoint.
- Return to the normal display by simultaneously pressing the 2 buttons for more than 2 seconds.

Reminder: control on the installation return temperature.

**Note:** For substitution and boiler overhaul applications, the configuration and parameterisation of each machine are factory-set for optimum operation.

Code	Parameters	Factory setting	Adjustment range
HEA	Heating set point	55° C	20 to 58° C

### 5.6.4 - DISPLAY OF TEMPERATURES, ALARMS, AND HOUR COUNTERS

Accessible directly via the menu, see diagram 5.6.2.

- Temperatures "TP":  
Displays the values indicated by each temperature prob:  
t01: water inlet temperature.  
t02: water outlet temperature.  
t03: Air exchanger temperature.  
t04: outside air temperature.
- Alarms "Err":  
Displays the list of all current alarms (scroll through the alarm messages with buttons (1) and/or (2)).
- Hour counters "OHr":  
Displays the operating time of the compressor ("OH1") and the circulating pump ("OHP"). The counter can be reset by a long press (> 2 seconds) on button (1) when the counter value is displayed.

### 5.6.5 - ACCESS TO THE TECHNICAL PARAMETERS "PAR"

**For qualified personnel after entering the password "PSS". Any incorrect adjustment may lead to serious malfunctions.**

- Go to the "PSS" section in the menu. Briefly and simultaneously press buttons (1) and (2). The "---" message appears. Enter the password using buttons (1) and (2) and validate it by simultaneously pressing buttons (1) and (2). It is now possible to enter the parameters section "PAR".

**CAUTION:**

**After modifying one or more technical parameters, the controller must be turned off then back on again to reset it with its new parameters.**

## 5.7 - ALARMS

- When an alarm occurs:
  - the alarm report is activated,
  - the corresponding code flashes on the display unit. See table,
  - the unit stops if necessary (see table below).

- Remedy the fault.

**IMPORTANT NOTE:**

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

- The alarms are normally reset automatically.
- Caution: the alarms:
  - HP,
  - LP (low pressure),
  - Anti-freeze,
  - Water flow rate,

have an event counter that shifts to **manual** reset if the alarm occurs several times during the last hour.

- The "refrigerating circuit" alarm is reset manually.
- The alarms are reset by briefly pressing the "ON/OFF" button (1).
- When the alarm is cleared:
  - the alarm report is de-activated,
  - the display reverts to normal (not flashing),
  - the machine can re-start (if it was stopped).
- **Special features of the alarm relay:**
  - the potential-free change-over contact (2 A - 230 VAC max.), on the wiring board's terminal strip, originates from the relay located on this board,
  - the relay is actuated in the absence of an alarm (contacts: 5/6 closed and 5/7 open),
  - in the case of alarm or power supply loss, the relay is released (contacts: 5/6 open and 5/7 closed).

## SUMMARY TABLE OF ALARMS

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Alarm	Code	Inhibition delay	Compressor stop	Fan stop	Circulating pump shut-down	Remarks
Fault on probe 1	E40		X	X		
Fault on probe 2	E06		X	X		
Fault on probe 3	E07		X	X		
Fault on probe 4	E42		X	X		Forced circulating pump operation
H.P. (high pressure)	E01		X			
B.P. (low pressure) or maximum discharge temperature	E02	30" at start-up	X	X		
Anti-freeze (water heat exchanger)	E05	60"	X	X		From probe <b>SD2</b> (water outlet). Threshold: 4° C
Water flow rate	E41	10" in operation 30" at start-up	X	X	X If passage reset manual	
Insufficient heat exchange (*)	E44	5 min at start-up + 5 min in operation	X	X		Manual reset. Inactive in anti-freeze phase.
Max. water temperature	E46	30"	X			From probe <b>SD1</b> (water inlet). Threshold: 70° C adjustable (A25)
Configuration error	E45		X	X	X	

(\*) The insufficient heat exchange alarm is activated if the temperature difference between the water inlet and outlet (after the compressor has been operating for a few minutes) is insufficient (coolant charging problem, three-phase compressor running "backwards", jammed switch-over valve, faulty temperature probe, problem on the equipment; etc.).

## 5.8 - SPECIAL OPERATING FEATURES

### • Reduction of water volume:

- the controller uses a self-adapting algorithm that analyses the compressor's operating time and can indicate deviations of the current set point (and the corresponding hysteresis) in case of too short operating times (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. To do this, set the parameter **C08** to **0** in the "**CP**" section of the parameterization menu.

### • Defrosting:

- if the temperature detected by probe **SD3** drops below the frosting temperature (dependent of the outside temperature), a time counter is activated. This counter records the operating time in icing conditions. This status is indicated by the flashing frosting indicator lamp (7),
- after an accumulated operating time of 30 minutes, a defrosting operation is launched (inversion of the refrigerating cycle and shut-down of the fan) until the temperature detected by probe **SD3** rises above the end of frosting temperature threshold. The defrosting phase is indicated by the (steady) illumination of indicator lamp (7).

#### **Note:**

The ventilation can restart after defrosting is completed to prevent excessive pressure build-up.

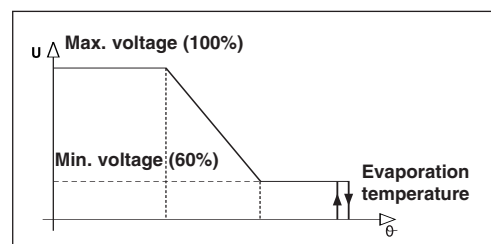
For special climatic conditions, the factory-set time counter value of 30 minutes can be adjusted. To do this, modify parameter **d03** in the defrosting section "**dFr**".

### • Evaporation pressure regulation:

- the ECH controller is equipped with a variable voltage regulator for the fan's power supply,
- based on temperature information (read by the **SD3** probe located on the evaporator), the controller varies the supply voltage of the electric fan according to the diagram opposite.

### • Circulating pump control:

- the pump is actuated when the unit operating or in **stand-by** mode,
- the pump is stopped when the unit is completely **OFF**. The shut-down of the pump is delayed 1 minute after the compressor stops. An anti-freeze device forces pump operation if the outside temperature (probe **SD4**) drops below 0°C,
- an "anti-sticking" device forces pump operation (if stopped) for 3 seconds every 24 hours.



- **Condensate tank heating cord control:**
  - Actuated if the outside temperature (probe **SD4**) drops below 0°C (regardless the unit's operating mode). The "heating element" indicator light **(8)** illuminates.
- **Operating mode selection:**
  - The regulator is configured in the factory for On/Stand-by control using an external contact.
  - In stand-by mode, the circulating pump continues to function.

**Note:**  
It is possible to shut the unit down completely (circulating pump stopped) by pressing the **ON/OFF** button **(1)**.

  - This configuration is adapted to system applications,

- For other applications, complete shutdown ("OFF") by remote contact (instead of **stand-by**) can be achieved by modifying the configuration.  
In the "**CnF**" configuration section, change the parameter **H20** from **7** (remote stand-by) to **4** (remote **OFF**). In the case of **remove "OFF"** complete shut-down, the display is off. Only the decimal indicator lamp **flashes**.  
The stand-by mode is indicated by the extinction of the heating mode indicator lamps.
- **Pre-ventilation:**
  - Generally speaking, in order to condition the air heat exchanger, the fan always starts at full speed a few seconds before the compressor.
- **Anti short-cycle time delays:**
  - The compressor control features a time delay system in order to respect:
    - a maximum number of starts per hour (10),
    - a minimum stop time.
- **Cycle inversion valve:**
  - The valve is actuated during defrost cycles.
- **Control hysteresis:**
  - See the operating diagrams in paragraph 5.4.
  - The factory setting for hysteresis in heating mode is 4k. Modification is possible. To do this, modify parameter **C04** (heating hysteresis) in the compressor section "**CP**".



## 6 - ACCESSORIES

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### 6.1 - WATER CONNECTION HOSES

- Length 1 m, insulated, female:
  - Ø 1" code **70600055** for PHTJ 14 and 19.

### 6.2 - REMOTE CONTROL

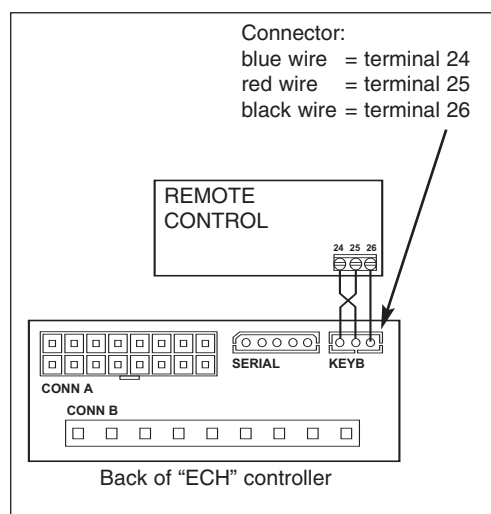
- Code **70250055**.
- The functions and display are exactly the same as those on controller.
- The only difference concerns the buttons  and  which are separated by the "ON/OFF" and "Mode" buttons.
- Reminder: the parameters are accessed by simultaneously pressing the "ON/OFF" and "Mode" buttons.
- The controller is designed to be installed inside sheltered rooms.**

- Connection:
  - the control is delivered with a connecting it to the "ECH" controller,
  - to extend the link, max. length: 100 meters, use twisted pair shielded cable with a cross section of at least 0.5 mm<sup>2</sup> (shielding of the ground on unit side).

#### CAUTION:

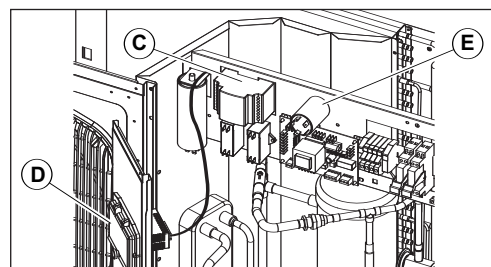
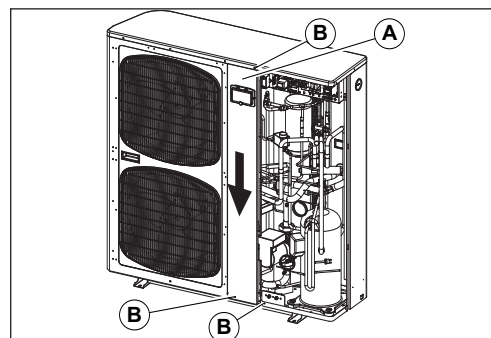
**Do not route this cable near power cables.**

**The operation must take performed with the unit's power supply off and locked out.**

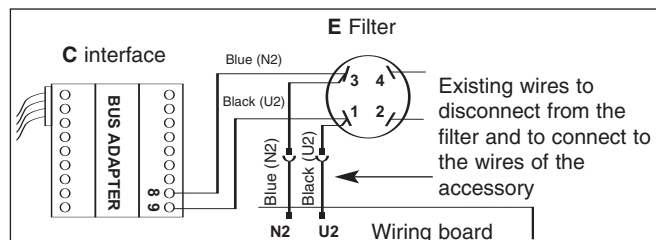


### 6.3 - RS 485 COMMUNICATION INTERFACE (MODBUS protocol)

- Code **70250056**.
- After removing the side panel, also remove the front panel **A** (remove the three retaining screws **B** and pull the panel downwards).
- Secure the communication interface **C** on the left-hand side of the electric panel.
- Connect the cable (supplied) between the communication interface **C** and the controller **D**.
- Connect the module's 230 VAC power supply in the following manner with the black and blue wires delivered with the accessory.



- Connection of the communication bus and protocol detail: refer to the corresponding technical file.



## 7 - 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.

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### 7.1 - CHECK

- That hydraulic connections are properly tight and that the hydraulic circuit functions correctly:
  - purge of circuits,
  - position of valves,
  - hydraulic pressure (2 bar).
- 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 probe, control and power cables are properly separated.
- That the machine is earthed.
- That there are neither tools nor other foreign objects in the units.

### 7.2 - 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: 6 to 9                          | - Chloride: 50 mg/l maximum                         |
| - TH: 10 to 20°F                      | - Conductivity: 50 to 500 $\mu\text{S}/\text{cm}^2$ |
| - Dry material in suspension: < 2 g/l | - Resistivity: 1 to 10 k $\Omega$                   |
| - Granulometry: < 0.4 mm              | - Fibre: no fibres                                  |

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 TECHNIBEL warranty.

### 7.3 - STARTING-UP THE UNIT

- Power up the unit.
- Turn the water on.
- Start the appliance (see paragraph 5).

#### CAUTION:

**On three-phase units, make sure that the phase rotation order is correct. If the rotation order is not respected, the compressor will turn backwards (and make an abnormal noise). To fix this, simply invert the 2 phases.**

### 7.4 - CHECKS TO BE MADE

- Water flow-rate.
- The generator is equipped with 1/4 SAE pressure taps at the circulator inlet and outlet, to enable the pressure drop to be measured using a hydraulic pressure gauge. Use the circulator curves in paragraph 10 to find the water flow rate.

#### Note:

**In order for the device to operate correctly, there must be a constant flow of water. It must correspond to the data given in the circulator graphs (in paragraph 10), particularly for the high temperature application (water outlet greater than 55° C).**

- Hydraulic circuit pressures.
- Control system operation.
- Sealing of the cooling circuit (according to the decree of 7th May 2007).

#### IMPORTANT:

**If antifreeze is added (monopropylene glycol), a minimum rate of 15% to 20% is needed to avoid any risk of corrosion.**

- The LP pressure switch cuts at 0.5 bar.
- The HP pressure switch cuts at 29 bar.

## 8 - MAINTENANCE INSTRUCTIONS

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### IMPORTANT NOTE

- Before carrying out any work on the installation, make sure that it is switched off and that access to it is prevented.
- Also check the discharge of the compressor capacitor for the single-phase voltages.
- 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.

### 8.1 - MAINTENANCE

All equipment must be properly maintained in order to provide optimum performance over time. Faulty maintenance can result in the cancellation of the product guaranty. Depending on the products, maintenance operations consist in the cleaning of filters (air, water), internal and external exchangers, casings, and the cleaning and protection of condensate tanks. Treating odours and the disinfection of room surfaces and volumes also contributes to the cleanliness of the air breathed by users.

- 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 (according to the order of 7th May 2007).
  - 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.).

### 8.2 - GENERATOR SHUT-DOWN DURING WINTER

- 2 possibilities:
  - 1) Drain the unit and **disconnect the power supply**.
  - 2) Unit full of water and **power on**: as the unit is equipped with an antifreeze device which actuates the water circulating pump when the temperature drops below zero, it is imperative to ensure that the water can circulate within the unit.

## 9 - TROUBLESHOOTING

- All maintenance and servicing operations on the refrigerating circuit must be conducted in accordance with standard trade practices and safety rules: recovery of the refrigerant, inert shielded (nitrogen) brazing, etc...
- All brazing operations must be conducted by qualified welders.
- For equipment loaded with R 407 C, refer to the specific instructions at the beginning of the installation manual.
- This unit is equipped with pressurised equipment, for example piping.  
Use only genuine parts listed in the spare parts list for replacing defective refrigeration components.
- Pipes may only be replaced by copper tubing in compliance with standard NF EN 12735-1.
- Leak detection, in the case of pressure testing:
  - Never use oxygen or dry air, as the risk of fire or explosion is present.
  - Use dehydrated nitrogen or a nitrogen and refrigerant mix indicated on the manufacturer's plate.
  - For units equipped with pressure gauges, the test pressure must not exceed the gauges' maximum allowable pressure rating.
- All part replacement with other than genuine parts, all modifications of the refrigerating circuit, all replacement of refrigerant by a fluid other than that indicated on the manufacturer's plate, all use of the unit outside the application limits defined in the documentation, shall result in the cancellation of PED EC marking compliance which shall fall under the liability of the individual who carried out these modifications.
- The technical information, relative to the safety requirements of the various applicable directives, is indicated on the manufacturer's plate of the unit and mentioned on the 1<sup>st</sup> page of this manual.



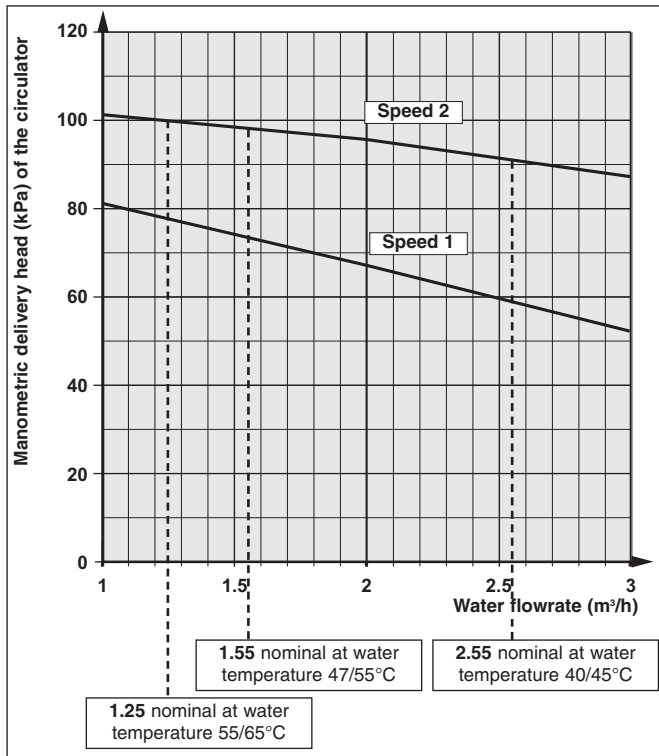
## 10 - CIRCULATOR CURVES

**Note:** The water flow is selected according to the maximum water outlet temperature at which the pump will operate (depending on the application).

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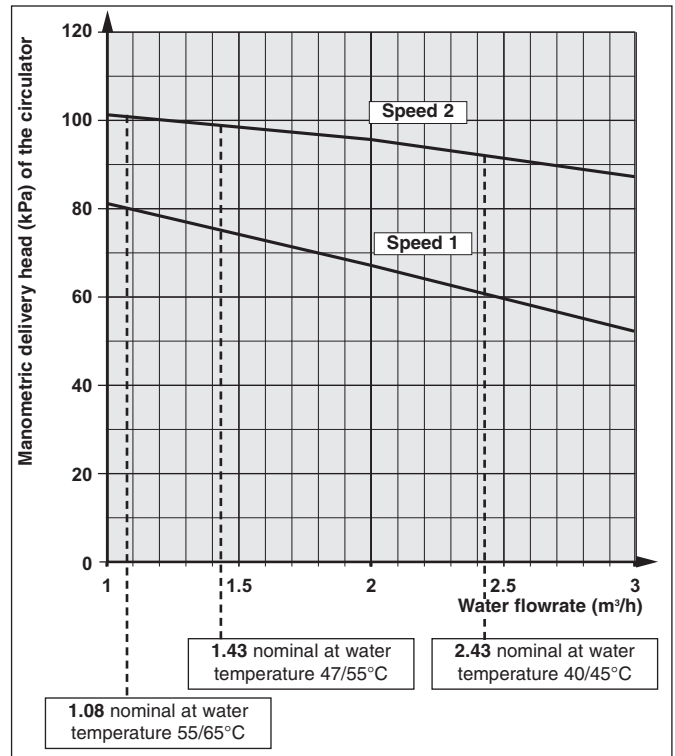
PHTJ 14  
single

CIRCULATOR SXM 32 - 80



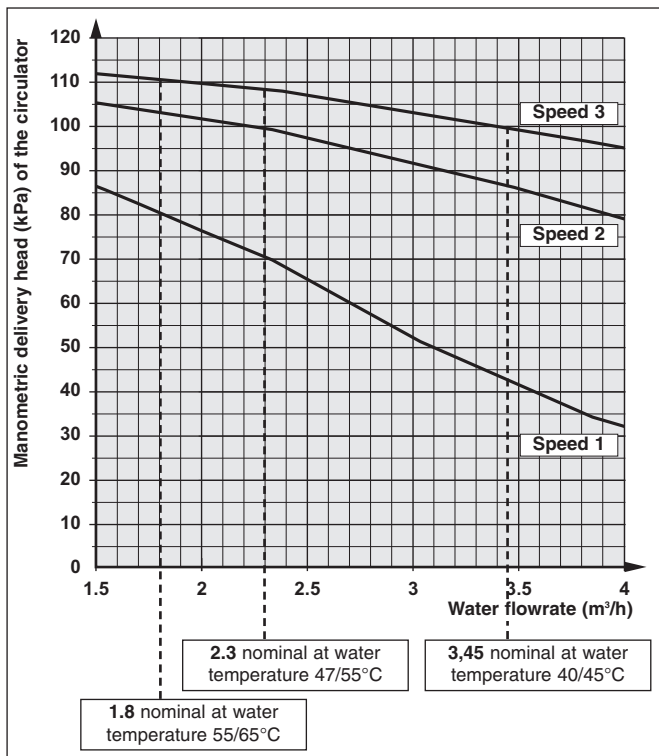
PHTJ 14  
three

CIRCULATOR SXM 32 - 80



PHTJ 19

CIRCULATOR SXM 32 - 80 OEM



# 11 - PRESSURE TABLES

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PHTJ 14

		Low pressure			High pressure		
		Water outlet temperature			Water outlet temperature		
		45° C	55° C	65° C	45° C	55° C	65° C
Outdoor dry bulb temperature (°C)	-16	1.31	1.34		19.04	23.30	
	-15	1.40	1.43		19.04	23.30	
	-14	1.49	1.52		19.03	23.30	
	-13	1.57	1.60		19.03	23.30	
	-12	1.66	1.69	1.76	19.03	23.30	28.18
	-11	1.74	1.77	1.84	19.03	23.30	28.14
	-10	1.83	1.86	1.93	19.03	23.29	28.12
	-9	1.96	1.99	2.06	19.02	23.29	28.10
	-8	2.08	2.11	2.18	19.02	23.29	28.10
	-7	2.18	2.24	2.31	19.02	23.29	28.10
	-6	2.28	2.35	2.42	19.02	23.29	28.09
	-5	2.34	2.46	2.53	19.02	23.29	28.09
	-4	2.41	2.57	2.64	19.01	23.29	28.08
	-3	2.47	2.68	2.75	19.01	23.29	28.07
	-2	2.54	2.78	2.86	19.01	23.29	28.07
	-1	2.60	2.89	2.97	19.01	23.29	28.06
	0	2.67	3.00	3.08	19.01	23.28	28.05
	1	2.73	3.11	3.19	19.00	23.28	28.05
	2	2.85	3.22	3.30	19.00	23.28	28.04
	3	3.04	3.40	3.47	19.04	23.28	28.03
	4	3.28	3.58	3.64	19.09	23.28	28.01
	5	3.52	3.77	3.81	19.13	23.28	28.00
	6	3.74	3.95	3.98	19.17	23.28	27.98
	7	3.90	4.08	4.15	19.18	23.28	27.97
	8	4.03	4.22	4.28	19.17	23.22	27.95
	9	4.14	4.29	4.41	19.14	23.17	27.94
	10	4.21	4.37	4.54	19.10	23.11	27.92
	11	4.28	4.45	4.67	19.06	23.05	27.90
	12	4.35	4.53	4.80	19.03	23.00	27.89
	13	4.43	4.61	4.93	18.99	22.94	27.87
	14	4.50	4.68	5.06	18.95	22.89	27.85
	15	4.57	4.76	5.19	18.92	22.83	27.83
	16	4.64	4.84	5.32	18.88	22.77	27.82
	17	4.71	4.92	5.45	18.84	22.72	27.80
	18	4.79	5.00	5.58	18.80	22.66	27.78
	19	4.86	5.07	5.71	18.77	22.61	27.77
	20	4.93	5.15	5.80	18.73	22.55	27.75
	21	4.98	5.20	5.85	18.73	22.54	27.71
	22	5.03	5.24	5.88	18.73	22.52	27.67
	23	5.09	5.29	5.90	18.72	22.51	27.63
	24	5.14	5.33	5.92	18.72	22.49	27.59
	25	5.19	5.38	5.94	18.72	22.48	27.55
	26	5.24	5.42	5.96	18.72	22.47	27.51
	27	5.29	5.47	5.98	18.72	22.45	27.47
	28	5.34	5.52	6.00	18.72	22.44	27.43
	29	5.40	5.56	6.01	18.71	22.42	27.39
	30	5.45	5.61	6.03	18.71	22.41	27.35
	31	5.50	5.65	6.05	18.71	22.40	27.31
	32	5.55	5.70	6.07	18.71	22.38	27.27
	33	5.60	5.74	6.09	18.71	22.37	27.23
	34	5.65	5.79	6.11	18.71	22.36	27.19
	35	5.71	5.84	6.13	18.70	22.34	27.15
	36	5.76	5.88	6.15	18.70	22.33	27.11
	37	5.81	5.93	6.17	18.70	22.31	27.07
	38	5.86	5.97	6.19	18.70	22.30	27.03
	39	5.91	6.02	6.2	18.70	22.29	26.99
	40	5.96	6.06	6.22	18.70	22.27	26.95
	41	6.02	6.11	6.24	18.69	22.26	26.91
	42	6.07	6.15	6.26	18.69	22.24	26.87
	43	6.12	6.20	6.28	18.69	22.23	26.83

## Low pressure

## High pressure

		Water outlet temperature			Water outlet temperature		
		45° C	55° C	65° C	45° C	55° C	65° C
Outdoor dry bulb temperature (°C)	-16	1.31	1.34		18.74	22.72	
	-15	1.40	1.43		18.74	22.72	
	-14	1.49	1.52		18.73	22.72	
	-13	1.52	1.59		18.73	22.72	
	-12	1.56	1.63		18.73	22.72	
	-11	1.59	1.66		18.73	22.72	
	-10	1.63	1.70	1.74	18.73	22.71	27.53
	-9	1.71	1.78	1.86	18.72	22.71	27.54
	-8	1.78	1.85	1.98	18.72	22.71	27.55
	-7	1.82	1.93	2.09	18.72	22.71	27.56
	-6	1.92	2.02	2.21	18.72	22.73	27.58
	-5	1.98	2.11	2.32	18.72	22.75	27.59
	-4	2.05	2.20	2.44	18.71	22.77	27.61
	-3	2.11	2.29	2.55	18.71	22.79	27.62
	-2	2.18	2.37	2.67	18.71	22.81	27.64
	-1	2.24	2.46	2.78	18.71	22.83	27.65
	0	2.29	2.55	2.90	18.71	22.84	27.67
	1	2.35	2.64	3.01	18.70	22.86	27.68
	2	2.47	2.73	3.13	18.75	22.88	27.70
	3	2.66	2.90	3.24	18.84	22.90	27.76
	4	2.90	3.08	3.36	18.94	22.92	27.82
	5	3.14	3.26	3.47	19.03	22.94	27.88
	6	3.36	3.43	3.59	19.12	22.96	27.94
	7	3.52	3.60	3.87	19.18	22.98	28.00
	8	3.63	3.72	3.99	19.17	22.92	27.94
	9	3.75	3.85	4.11	19.14	22.87	27.88
	10	3.86	3.97	4.22	19.10	22.81	27.82
	11	3.98	4.09	4.34	19.06	22.75	27.76
	12	4.09	4.22	4.46	19.03	22.70	27.70
	13	4.20	4.34	4.58	18.99	22.64	27.63
	14	4.32	4.46	4.70	18.95	22.59	27.57
	15	4.43	4.58	4.81	18.92	22.53	27.51
	16	4.55	4.71	4.93	18.88	22.47	27.45
	17	4.66	4.83	5.05	18.84	22.42	27.39
	18	4.77	4.95	5.17	18.80	22.36	27.33
	19	4.89	5.08	5.29	18.77	22.31	27.27
	20	5.00	5.20	5.40	18.73	22.25	27.20
	21	5.03	5.23	5.43	18.73	22.24	27.17
	22	5.06	5.26	5.46	18.73	22.22	27.14
	23	5.10	5.28	5.49	18.72	22.21	27.11
	24	5.13	5.31	5.52	18.72	22.19	27.08
	25	5.16	5.34	5.55	18.72	22.18	27.05
	26	5.19	5.37	5.57	18.72	22.17	27.02
	27	5.22	5.40	5.60	18.72	22.15	26.99
	28	5.26	5.42	5.63	18.72	22.14	26.96
	29	5.29	5.45	5.66	18.71	22.12	26.93
	30	5.32	5.48	5.69	18.71	22.11	26.90
	31	5.35	5.51	5.72	18.71	22.10	26.87
	32	5.38	5.54	5.75	18.71	22.08	26.84
	33	5.42	5.56	5.78	18.71	22.07	26.81
	34	5.45	5.59	5.81	18.71	22.06	26.78
	35	5.48	5.62	5.84	18.70	22.04	26.75
	36	5.51	5.65	5.86	18.70	22.03	26.72
	37	5.54	5.68	5.89	18.70	22.01	26.69
	38	5.58	5.70	5.92	18.70	22.00	26.66
	39	5.61	5.73	5.95	18.70	21.99	26.63
	40	5.64	5.76	5.98	18.70	21.97	26.60
	41	5.67	5.79	6.01	18.69	21.96	26.57
	42	5.70	5.82	6.04	18.69	21.94	26.54
	43	5.74	5.85	6.08	18.69	21.93	26.50

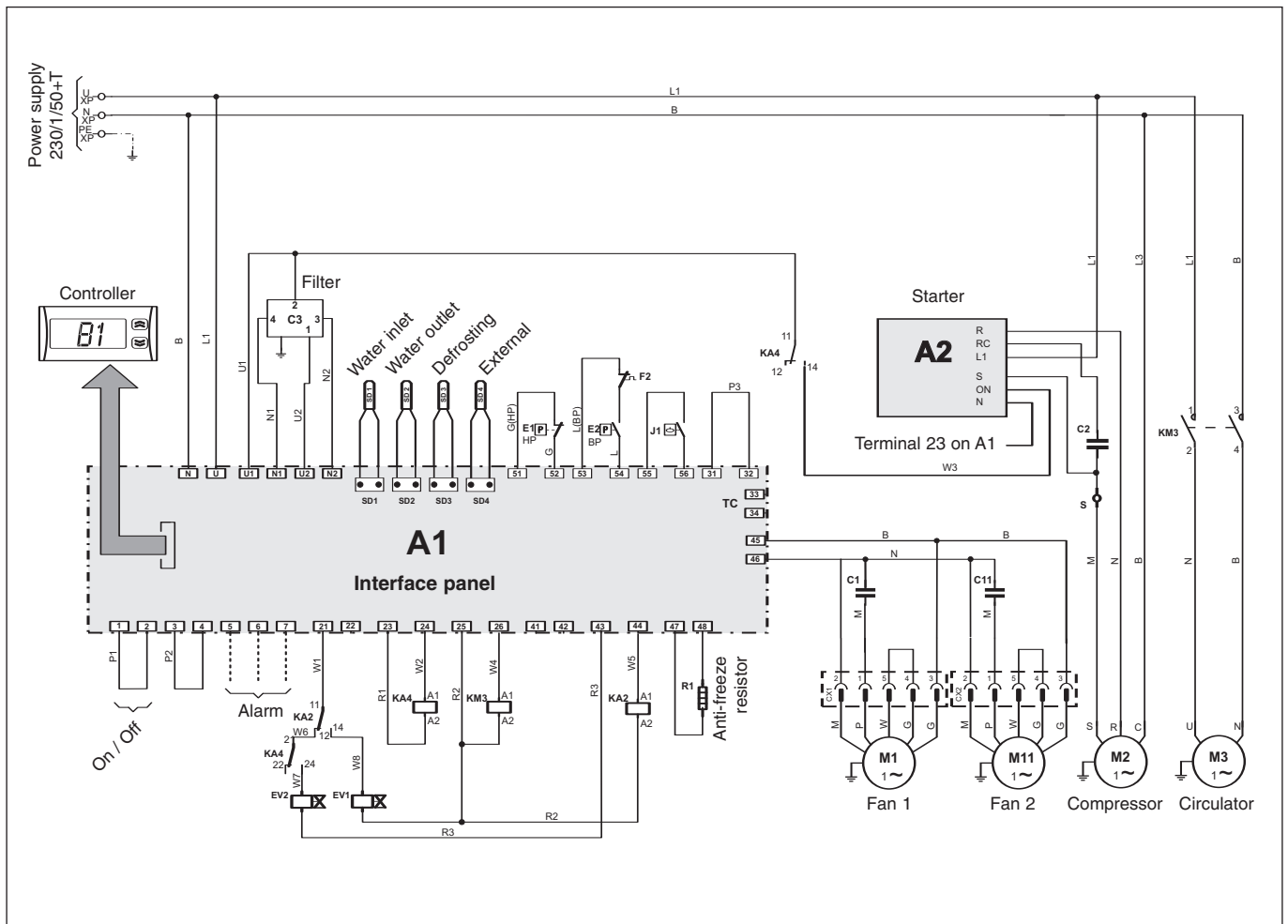
## 12 - WIRING DIAGRAMS

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Symbols of the components					Colours of the wires		
<b>A1</b>	Interface panel	<b>EV1</b>	Electrovalve (reversal)	<b>M2</b>	Compressor	<b>B</b>	Blue
<b>A2</b>	Compressor starter	<b>EV2</b>	Electrovalve (injection circuit)	<b>M3</b>	Circulating pump	<b>G</b>	Grey
<b>A3</b>	Fan speed control			<b>R1</b>	Anti-freeze resistor (accessory)	<b>M</b>	Brown
<b>B1</b>	Controller	<b>F2</b>	Safety thermostat			<b>L</b>	Purple
<b>C1</b>	M1 capacitor	<b>J1</b>	Water differential pressure switch	<b>SD1</b>	Water inlet probe	<b>P</b>	Pink
<b>C11</b>	M11 capacitor			<b>SD2</b>	Water outlet probe	<b>N</b>	Black
<b>C2</b>	M2 capacitor	<b>KM2</b>	Contactor compressor	<b>SD3</b>	Condensation or defrosting temperature probe	<b>R</b>	Red
<b>C3</b>	Filter	<b>KM3</b>	Circulator contactor			<b>W</b>	White
<b>E1</b>	High pressure switch	<b>M1</b>	Fan	<b>SD4</b>	Outside air probe		
<b>E2</b>	Low pressure switch	<b>M11</b>	Fan				

### ELECTRICAL DIAGRAM - PHTJ 14 - 230/1/50

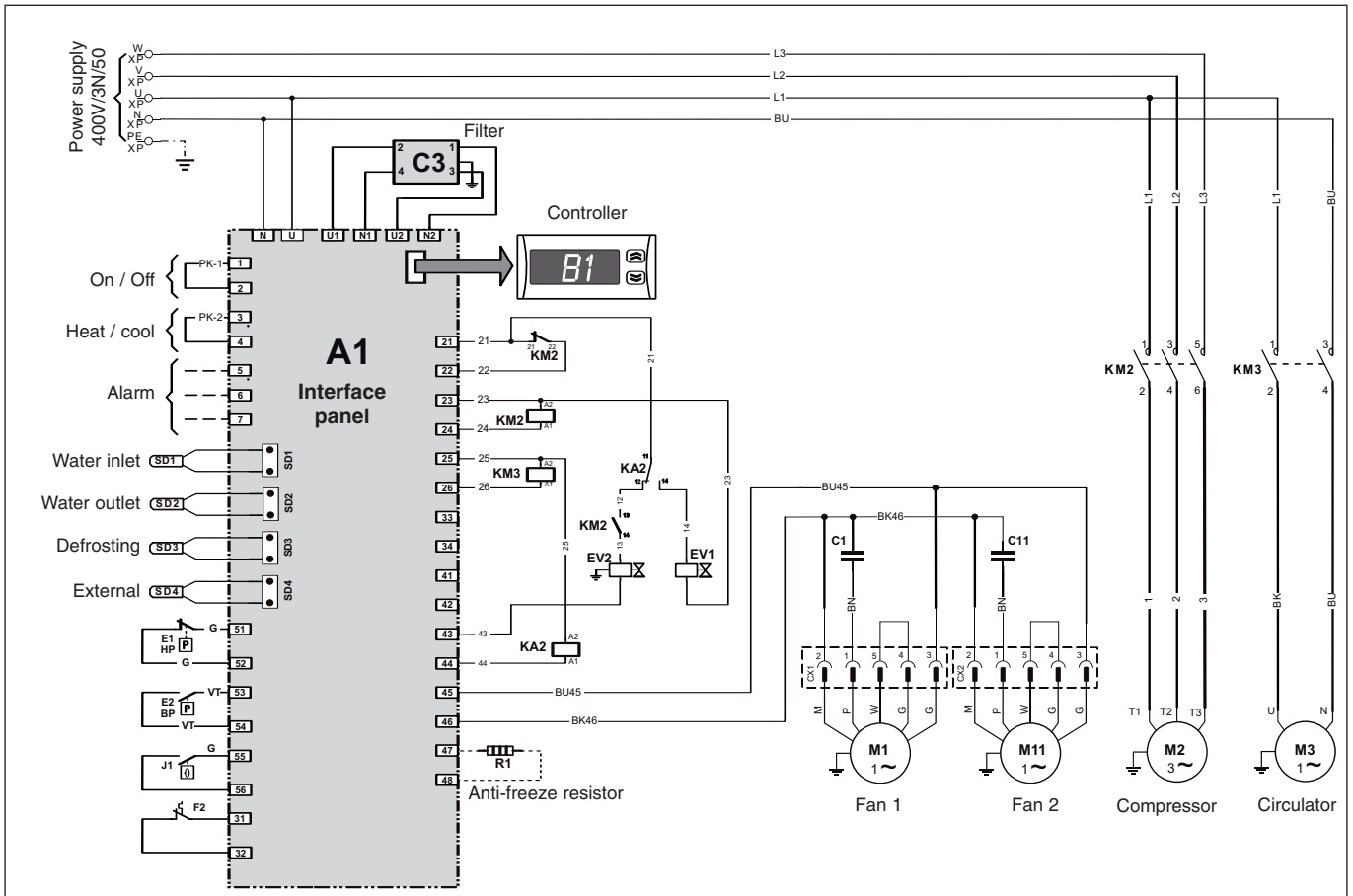
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# ELECTRICAL DIAGRAM - PHTJ 14 - 400/3N/50

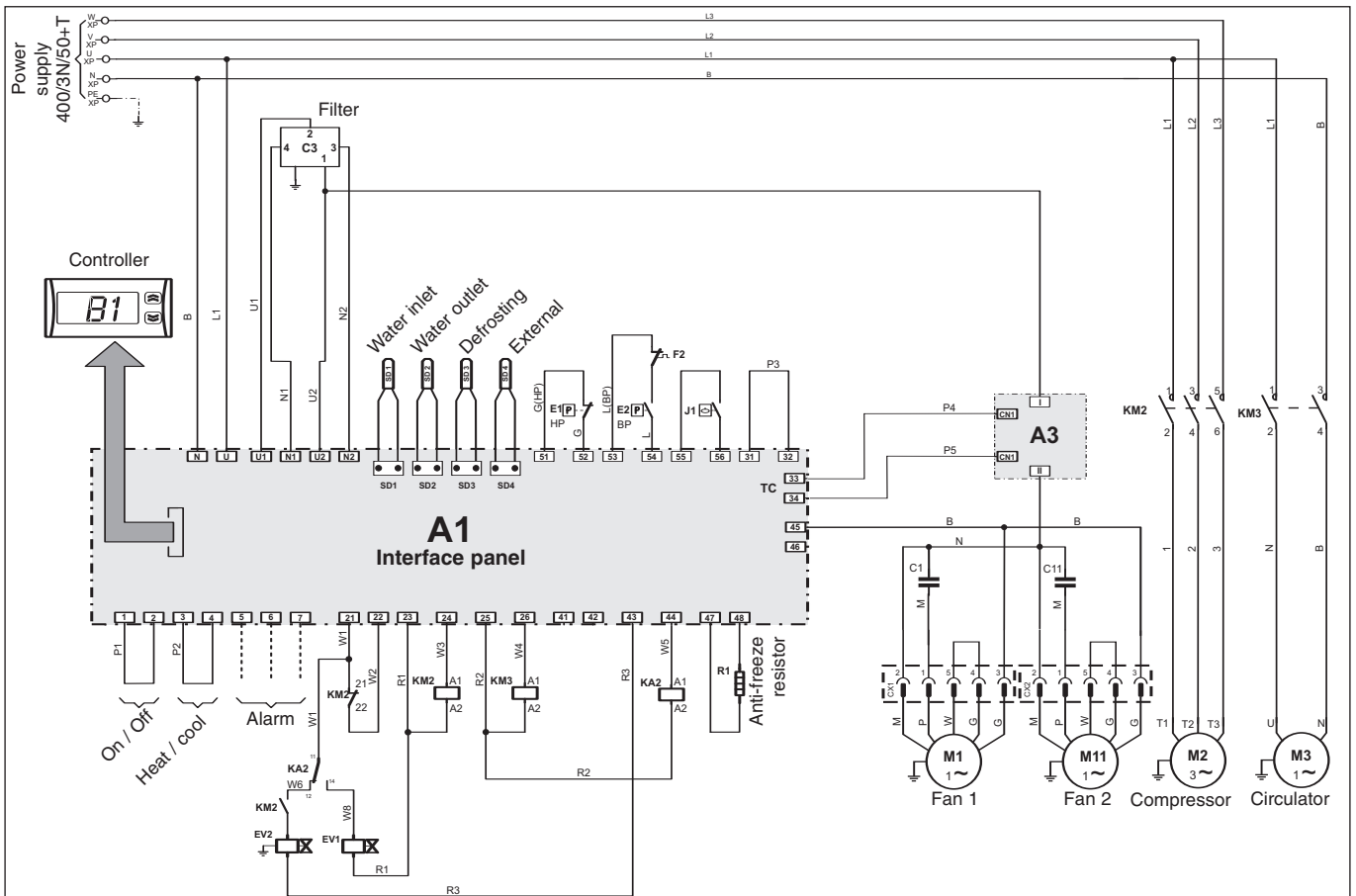
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# ELECTRICAL DIAGRAM - PHTJ 19 - 400/3N/50

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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.

Com o objectivo de uma melhoria constante, os nossos produtos podem ser modificados sem aviso previo.

**Technibel**

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