

## USE AND MAINTENANCE HANDBOOK SPLIT SYSTEM WITH SILENT HOUSING

# TH



# RIVACOLD

MASTERING COLD

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## 2. PURPOSE OF THE MANUAL

The purpose of this manual is to assist operators in placing the condensing unit into operation correctly, as well as to supply advice and explanations about the relevant safety regulations in force within the European Community and to avoid any possible risks caused by incorrect use.

## 3. NORMS FOR GENERAL USE

- For a correct and safe use of the machine, it is necessary to follow the instructions and guidelines stated in this manual since these refer to:
  - ✓ installation methods
  - ✓ machine use
  - ✓ maintenance
  - ✓ placing out of service and disposal.
- *The manufacturer cannot accept any liability for damages resulting from failure to follow the instructions, advice and warnings given in this use and maintenance manual.*
- Read the labels on the machine with care. Do not cover them for any reason and replace them in the event that they become damaged.
- Keep this manual carefully.
- The manufacturer reserves the right to update this manual without any prior notice.
- The machines were designed solely for industrial and commercial refrigeration in a stable seat (the application range is quoted in the company's general catalogue). *They are not intended for any other purpose.* Any other use is to be considered improper and therefore dangerous.
- After removing the packaging, check that every part of the machine is intact; if not, contact the relevant dealer.
- Do not use the machine in atmospheres with inflammable gas or in environments where there is a risk of explosion.
- If an operating fault occurs, switch off the machine.
- Any cleaning or maintenance operations must be carried out by specialist technical staff only.
- Do not wash the unit using direct or pressurised jets of water or with noxious substances.
- Do not use the machine without its safeguards (housing and grid).
- Do not place liquid containers on the units.
- Keep the machine well away from sources of heat.
- In case of fire use a dry-chemical extinguisher.
- Packaging material must be suitably disposed of in accordance with current laws.

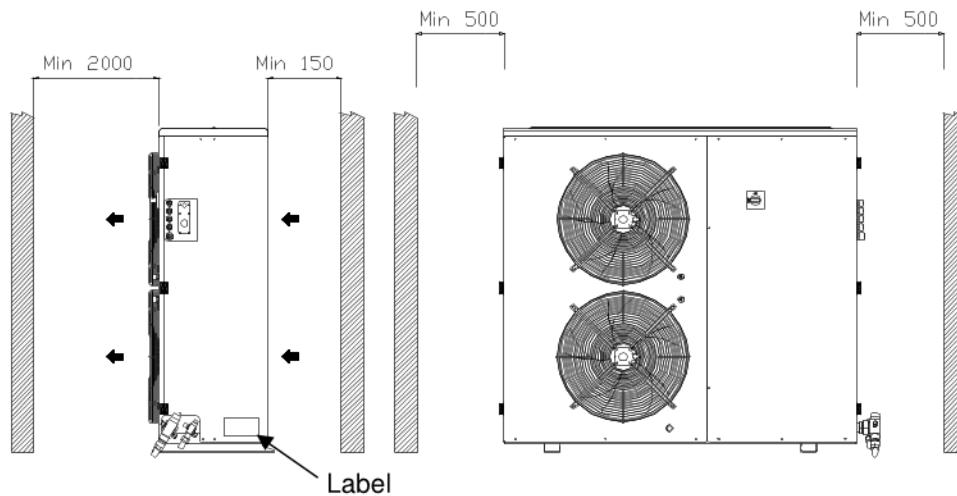
## 3. MACHINE IDENTIFICATION

All machines are equipped with an identification label (the position of which is shown in Drawing. 1) containing the following data:

- Code number
- Serial number
- Electrical input (A)
- Electrical input (W)

- Refrigerant type
- Power supply tension (Volt/Ph/Hz)
- Max. operating pressure value PS HP (high-pressure side) – PS LP (low-pressure side)
- Machine category according to the Directive 97/23EC (PED).

**Drawing. 1**



**Serial number identification:**

- 1<sup>st</sup> and 2<sup>nd</sup> numbers = year of production
- 3<sup>rd</sup> and 4<sup>th</sup> numbers = week number of the year in which the machine was produced
- 5<sup>th</sup>, 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> numbers = progressive number

**4. MACHINE DESCRIPTION**

MH-TH units are condensing units and split systems with silent housing for commercial refrigeration. They have been designed following the style of split air conditioning units of which they keep the main advantages: outside installation, low-noise operation, reduced size.

**5. INSTALLATION**

Before installing, it is necessary to make a layout of the refrigerating system; this must include the following:

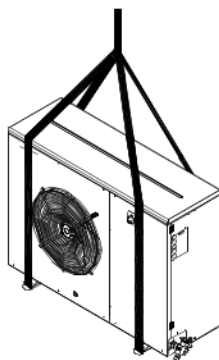
- a) all components of the refrigerating system ( i.e.: condensing unit, evaporator, thermostatic valve, electrical panel, piping dimensions, any safety devices, etc.)
  - b) system location
  - c) piping location
- Installation must only be performed by qualified staff with the necessary technical requirements, according to the country in which the machine is installed.
  - The machine must not be installed in a closed environment where a good air flow is not guaranteed.
  - Leave enough space around the condensing unit for it to be possible to perform maintenance operations in safe conditions.
  - Lift the machine by means of a forklift truck (or other hoisting equipment), using bands or ropes as shown in Drawing. 2.
  - For information about weight, see the table of general features at the end of this manual.
  - The machine must be fixed to the floor in a vertical position only and by passing screw anchors (Fischer) through the relevant holes in the unit frame.

**5. 1 Refrigerating connection**

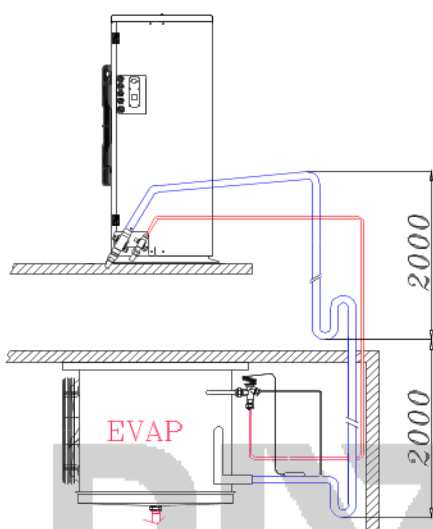
In order to make the connections, suction and liquid line piping with the same diameters as the connections fitted on the machine must be provided (see the table of general features at the end of this manual). These diameters are valid up to a maximum length of 10m. For longer sizes, piping diameters must be of a correct size to guarantee the proper gas speed.

Pipes must be fixed to the wall on bends and welding points and every 1.5m – 2m on straight stretches.

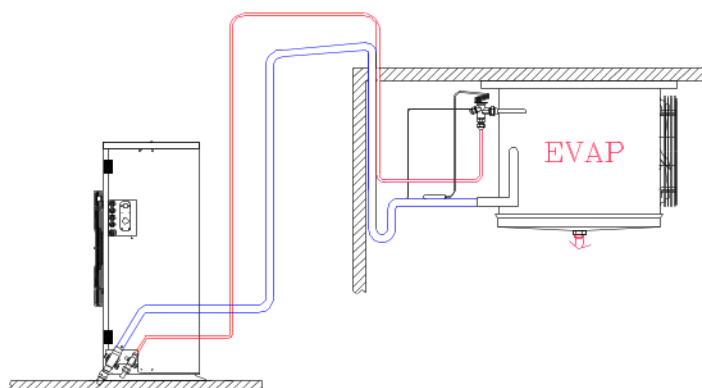
Drawing. 2



Drawing. 3



Drawing. 4



## 5. 2 Suction line insulation

With an evaporating temperature lower than  $-10^{\circ}\text{C}$ , the suction line pipes must be insulated with an anti-condensate pipe that has a thickness of at least 13mm in order to limit its overheating.

## 5. 3 Oil return

All systems must be designed so as to ensure oil return to the compressor.

In the situation shown in Drawing. 3 (condensing unit placed above the evaporator), it is important to fit siphons along the suction line every 2 m of difference in height so as to guarantee oil return to the compressor. In any case, along horizontal stretches it is important for the suction line to have a slope of at least 3% towards the compressor.

## 5. 4 Adding oil

In the majority of installations where all piping is no longer than 10 m, it is not necessary to add oil. However, when the pipes are oversized compared to standard conditions or they are longer than 10m, a small quantity of oil must be added.

## 5. 5 Vacuum

For the correct operation of the refrigerating equipment and the duration of the compressor, it is very important for the vacuum in the system to be set correctly. This will ensure that air and above all, humidity contents are below the permitted values. The introduction of new gas types has meant the use of new polyester-type oils that have high-level hygroscopic characteristics and which require more attention when setting the vacuum. We would advise setting the vacuum on both sides of the circuit. In any case, the target value is a pressure no higher than 5 Pa.

*Important: in order to avoid irreparable damage to the compressor, never start it in vacuum conditions and without the gas charge.*

During the vacuum and charge procedure, remember to energise the solenoid valve coil of the liquid line

**5. 6 Refrigerant charge**

After the vacuum-setting operation, the system must be loaded with the type of refrigerant stated on the label or with one of the alternative types allowed. To charge the refrigerant correctly, we recommend that, after setting the vacuum, you pump part of the refrigerant into the compressor to "break the vacuum". Then start the compressor so that it sucks up the residual part of the refrigerant.

For the correct calculation of the gas charge, connect gauges to the pressure inlets (already fitted). Pressure values must be compatible with the operating conditions of the machines.

*Important: mixtures of refrigerating gas must be charged into the system in their liquid state only.*

Loading operations must be carried out by specialised technicians only.

For charging, recovering or checking the refrigerant, use gloves to protect against low temperatures.

**5. 7 Leakage checks**

A system can operate correctly over time and for the entire duration of the compressor only if all instructions for a correct installation are followed. These include the absence of refrigerant leaks. It has been estimated that leaks of 10% of the refrigerant load during 15 years of compressor operation still guarantee a good level of operation of the refrigerating system. With the new types of gas (R134a, R404a and mixtures) the possibilities of refrigerant leaks through welding or connections that have not been carried out correctly increase because of the reduced molecular dimensions of these gas. For these reasons, it is very important that welding is checked for leakage using methods and equipment that are suitable for the type of refrigerant in use.

**5. 8 Crankcase heater**

Whenever the compressor operates in ambient temperatures of less than +5°C, it is compulsory to use a crankcase heater in order to avoid the build-up of liquid in the lower side of the compressor during stoppages. Furthermore, it is necessary to choke the condenser, for example, by reducing its air capacity (i.e.: by means of a speed regulator).

**5. 9 Operating cycles**

- The system has to be sized so as not to have more than 5 on/off cycles per hour.
- The intervention of the Thermal/Amperometric protection device switches off the compressor, which will be started again after the time required for the protection device contacts to be connected.

**5. 10 Operating times**

- The systems must be sized for max. 80% of standard compressor operation.
- 100% compressor operation only occurs in special overload and ambient temperature conditions that are outside of the normal permitted operating limits.

**5. 11 Pressure switches**

- All machines are equipped with HBP safety pressure switches set at max. 28 bar.
- LBP safety pressure switches are set according to the gas in use and the compressor application. We recommend using the value stated in the following table:

	<u>Gas</u>	<u>°C=[bar]</u>	<u>Set</u>	<u>Differential</u>
LBP Application MBP	R404A	-25°C=1.5 bar	3 bar	1.5 bar
(medium temp.)	R407C	-25°C=0,8 bar	2.3 bar	1.5 bar
LBP Application LBP	R404A	-46°C=0 bar	3 bar	3 bar
(low temp.)				

**5. 12 Pressure relief valves on the liquid receiver**

- The machines in risk "category 0" are not equipped with pressure relief valves.
- The machines in risk "category ≥ 1" are equipped with pressure relief valves.

The risk category of each model is stated on its identification label.

**5. 13 Electrical installation**

The electrical installation must be performed by qualified staff with the relevant technical skills according to the requirements of the country where the machine is installed.

- Fit a thermomagnetic switch with a type-C intervention curve (10-15 In) between the power supply line

and the machine-board electrical panel (optional item) and make sure that the mains voltage corresponds to the voltage stated on the machine label. The permitted tolerance is  $\pm 10\%$  of rated voltage. When sizing the differential thermomagnetic switch, take into account the electrical input values stated on the label.

- Important note: the thermomagnetic switch must be placed next to the machine so as to be easily seen and reached by a technician in case of maintenance.
- The section of the power supply cable must be adequate for the power absorbed by the machine, which is stated on the relevant label fixed to the machine itself.
- The law requires that the unit be earthed; therefore, it is necessary to connect it to an efficient earthing system. *No liability whatsoever can be accepted in the event of failure to comply with this requirement or if the electrical system to which the machine is connected does not comply with the regulations in force.*
- For machines with three-phase electrical power, it is necessary to check the rotation direction of the motor fans. If it does not correspond to the one shown by the arrow on the label placed near the fans, it is necessary to switch off the machine and invert two phases of the mains; it is then possible to re-start the machine.
- A mechanical thermostat set at 40°C must be fitted to the evaporator; this will deactivate the heaters in case of overheating. The thermostat bulb must be placed in the fin assembly in the highest position inside the evaporator.

**Important note:** Scroll compressors compress only in one rotation direction. However, three phase compressors will rotate in both directions depending upon the phase connections to T, T2 and T3 terminals. Since there is a 50% possibility of connecting them so that they rotate in the reverse direction, it is **very important to check the correct rotation direction**. This is checked by monitoring the drop in suction pressure and the rise in discharge pressure when the compressor is started. Reverse rotation will produce a sound level that is higher than the one produced by the correct rotation direction and an electrical input that is higher than that quoted in the catalogue. We advise you to fit a protection device for inverse phases, which will operate if the phases are not correctly connected.

## 6. TECHNICAL DATA

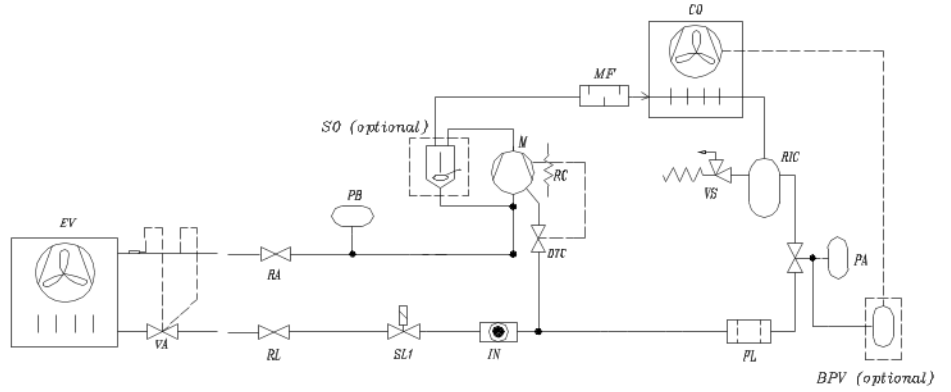
All MH-TH condensing units are supplied in nitrogen pressure. They are provided with safety pressure switches with fixe setting and automatic reset on the HBP line, and with adjustable setting and automatic reset on the LBP line.

The refrigerating diagram of a condensing unit with air-cooled condensation has been included here below:

- Drawing 5: refrigerating diagram with scroll compressor and liquid injection valve (DTC)
- Drawing 6: refrigerating diagram with scroll compressor and capillary injection
- Drawing 7: refrigerating diagram with scroll or reciprocating compressor

**Important note:** Refrigerating diagrams of non-standard units will be supplied separately.

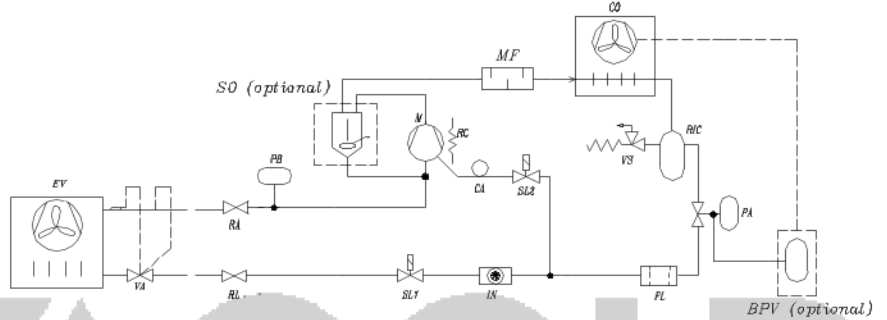
**Drawing 5**



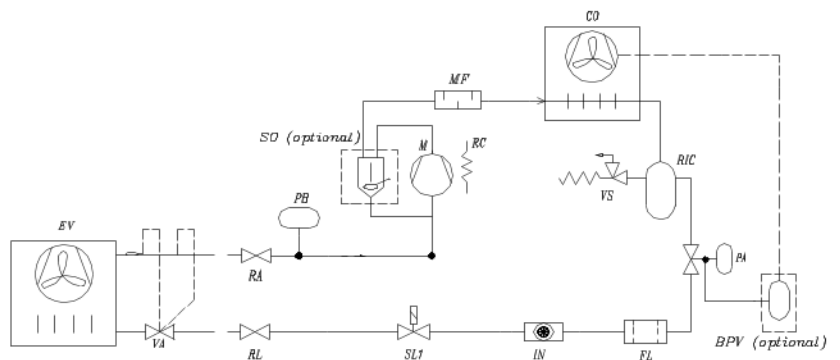
**Key to symbols:**

- M** = Compressor
- CO** = Condenser
- RIC** = Liquid receiver
- RA** = Suction shut off valve
- RL** = Liquid shut off valve
- CA** = Capillary
- SL1** = Liquid solenoid valve
- SL2** = Liquid injection solenoid
- RC** = Crankcase heater
- IN** = Liquid sight-glass
- PA** = High pressure switch (Safety)
- PB** = Low pressure switch (Safety)
- FL** = Drier filter
- VS** = Pressure relief valve
- BPV** = Condenser fan speed variators (Optional)
- DTC** = Liquid injection valve
- EV** = Evaporator
- SO** = Oil separator (optional)
- MF** = Muffler
- VA** = Thermostatic valve (supplied in

**Drawing 6**



**Drawing 7**



**MASTERING COLD**



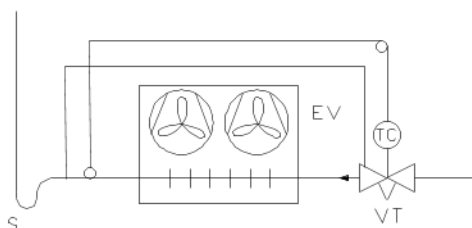
These condensing units can be used in various type of installations:

- For cold rooms
- For refrigerating counters
- For water chillers, etc.

Each condensing unit can be connected to one or more evaporators, of course, always following refrigeration rules. In any case, it is necessary to choose every single component with care. The following section contains examples of refrigerating drawings which complete the refrigerating diagrams shown above.

- Drawing 8 (refrigerating diagram of the evaporating side)

Drawing 8



**Key to symbols:**

- EV** = Evaporator  
**VT** = Thermostatic valve  
**S** = Siphon

## 7. **WIRING DIAGRAM**

The wiring diagram relevant to the part wired by the manufacturer has been placed inside the machine.

Please Note:

The liquid injection solenoid valve (where provided) must open when the compressor is working and it closes in the following conditions:

- When the compressor stops
- During defrost (hot gas)

## 8. **PRESSURE RELIEF VALVE (where provided)**

### 8. 1 **Instructions and limits of use**

**Replacement of the pressure relief valve is suggested whenever**, during discharge, the build-up of component processing and of pipe residues happens to make the shutting of the seal defective.

Before you replace the valve, make sure that the system is not under pressure or at high-level temperature in the area you are operating.

### 8. 2 **Maintenance/inspection and valve setting**

**Warning ! Maintenance is not provided for pressure relief valves. The removal of the cap or tampering with the seal are considered unauthorized modifications of the setting. This will void the manufacturer's guarantee.**

The inspection of the pressure relief valves is reserved to specific Bodies in charge and is regulated by the current laws of the country of installation

### 8. 3 **Expected lifetime**

The pressure relief valve should be checked every 5 years.

## 9. **MAINTENANCE AND CLEANING**

Maintenance and cleaning must be carried out by specialist technicians only.

First of all, make sure that the power supply is disconnected.

- Regularly clean (**at least every month**) the condenser by removing dust and grease. If the environment where the unit is located is very dusty, more frequent cleaning may be necessary.
- **In the event that machine parts need replacing, they have to be replaced by items exactly the same to the originals ones**
- Clean the contacts, fixed and mobile, of all contactors; replace them if they show signs of wear. (**every 4 months**)
- Check that all electric terminals, both on electrical panels and terminal boards, are properly connected; also check carefully that the all fuse elements are correctly clamped. (**every 4 months**)

- Visually check the entire refrigerating circuit, even inside the machines, for any traces of refrigerant leaks, which are signalled by traces of lubricant oil. Intervene in due time and check further in case of doubts.

Checking leaks of cooling gas:

- for systems with  $3\text{kg} \leq \text{load of cooling gas} < 30\text{kg}$  the check must be annual
- for systems with  $30\text{kg} \leq \text{load of cooling gas} < 300\text{kg}$  the check must be six-monthly
- for systems with load of cooling gas  $\geq 300\text{kg}$  the check must be three-monthly
- if a loss is found, it is necessary to intervene immediately and carry out a verification within 30 days to ensure the repair work has been effective.
- Check that refrigerant is flowing regularly by means of the indicator on the liquid line. **(every 4 months)**
- Check the oil level by means of the special indicator (if fitted) placed on the compressor crankcase. **(every 4 months)**
- Carefully check the colour of the element which is sensitive to humidity through the indicator on the liquid line. Green means dry; yellow means humidity. In the event of humidity, stop the machine immediately, replace the filter on the liquid line and replace both the refrigerant and the oil. Repeat this check after 3 days of operation. **(every 4 months)**
- Check the noise level of the compressor. This check must be performed with caution, as it has to be carried out while the system is operating. Check for ticking or vibrations that result from breakdowns or excessive mechanical friction between moving parts. **(every 4 months)**
- **Important note:** At the end of maintenance, replace all previously removed guards (housing and grid).
- Do not remove the pressure relief valve without having previously recovered the gas inside the liquid receiver.

## 10. DISPOSAL

If the machine is placed out of service, it is necessary to disconnect it from the mains. The gas contained inside the system must not be dispersed into the environment. The compressor oil is subjected to differentiated waste collection regulations; therefore, we recommend that you do not dispose of the unit as normal iron scrap but that you use a special collection centre, as per the standards and regulations in force.

## 11. OPTIONAL ITEMS

- **Condenser fan speed variator**

This controls the condenser fan speed according to condensing pressure so as to keep it within set values. It is installed in the high-pressure circuit. The instructions for use are issued together with the technical documents of the machine.

- **Electrical box ( code MH-TH.../12)**

The electrical box is fitted inside the housing and it fully controls the machine functioning by means of an external thermostat ( the relevant wiring diagram is supplied herewith)

- **Phase reverse protection**

This is used to protect the compressor against any damage caused by the incorrect connection of the electrical supply phases.

- **Brackets**

These are used for mounting the MH-TH unit on vertical walls. The two brackets are fixed to the wall at the desired height so as to make them match with the fixing holes of the units. We recommend fitting rubber vibration dampers (not supplied) as well as placing the unit away from the wall as much as possible to allow better air circulation.

Fig. 9 illustrates the assembly procedures together with a table of the data regarding bracket sizes and maximum bracket loads.

- **Oil separator**

When the distance between the condensing unit and the evaporator is more than 10 m, the fitting of an oil separator is recommended. This intercepts the oil driven by the compressed gas and it regularly returns it to the machine crankcase. In this way, the oil separator helps the lubrication of the moving parts of the compressor. Moreover, by removing or reducing the oil film on the exchanging surfaces of the condenser and the evaporator it improves the thermal transmission of those devices.

- **Separate control panel to be installed outside the cold room (electronic control)**

This controls the evaporator (fans and defrosting) as well as enabling the "cold room thermostat" for condensing unit control.

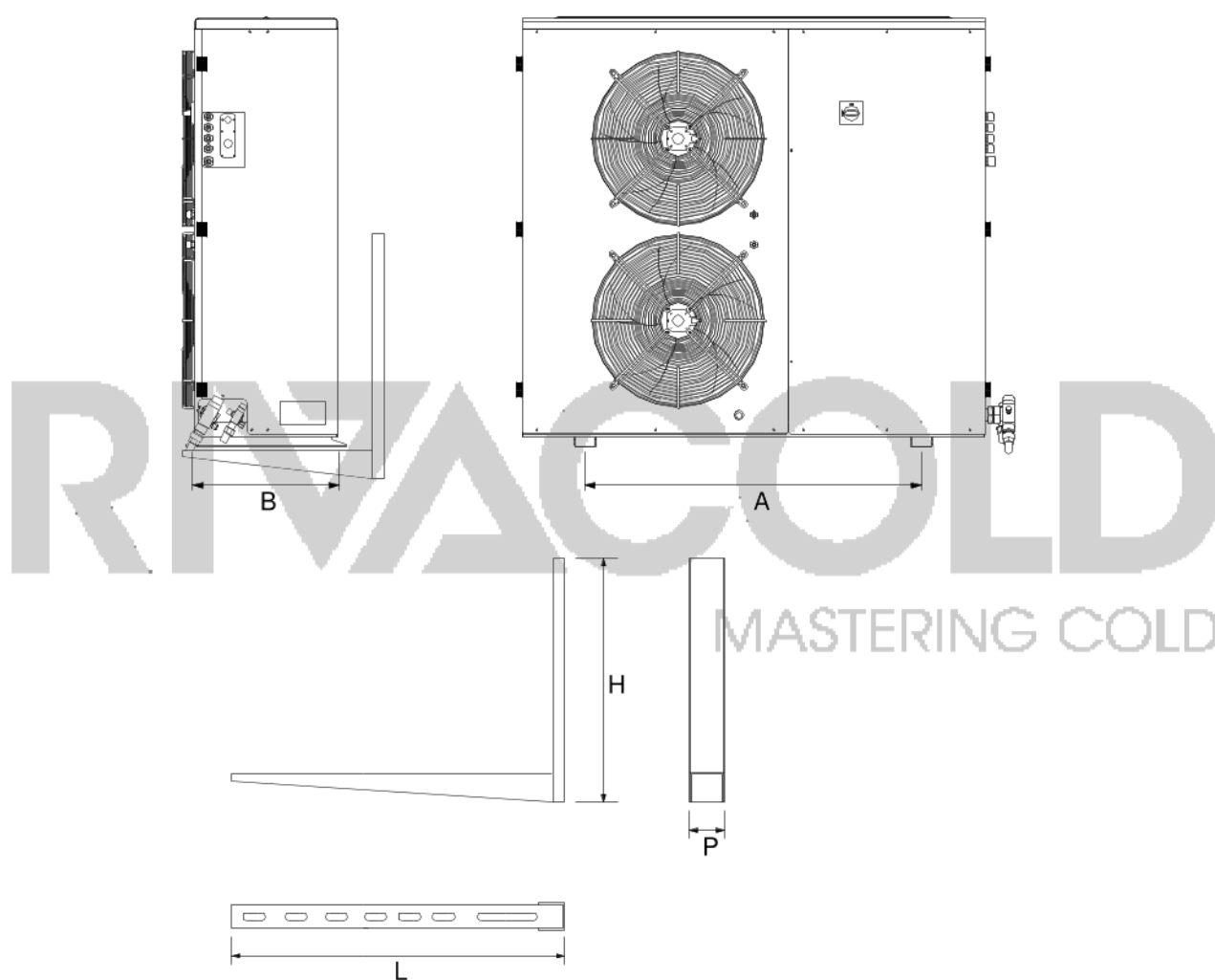
- **Different voltage**

Es: THCM145Z0212

1	230/1/50 Hz
2	400/3/50 Hz

- **Voltage monitor**  
This device is used to protect the refrigerating unit from voltage increases or dips.
- **Differential thermomagnetic switch**  
This device protects against overloads, short circuits and indirect contact.
- **Compressor jacket for scroll compressor (fitted)**

Fig. 9



Condensing unit references				Bracket dimensions				
Code	Max. weight Kg	A mm	B mm	Code	L mm	P mm	H mm	Max. load each Kg
H_135__	65	536	420	MS403/A	645	65	370	120
H_140__	92	676	420					
H_145__	120	826	420					
H_245__	200	946	420					

**12. TROUBLESHOOTING**

	<u>Likely cause</u>	<u>Remedy</u>
<b>A</b>	<p><b><u>The compressor will not start and no humming sound is heard</u></b></p> <ol style="list-style-type: none"> <li>1 No power. Starter relay contacts open.</li> <li>2 Thermal circuit breaker intervention.</li> <li>3 Electrical connections loose or incorrect.</li> </ol>	<ol style="list-style-type: none"> <li>1 Check the line or replace the relay.</li> <li>2 Check the electrical connections.</li> <li>3 Tighten the connections or reconnect wiring according to the wiring diagram.</li> </ol>
<b>B</b>	<p><b><u>The compressor will not start (it makes a humming sound) and the thermal circuit breaker intervenes</u></b></p> <ol style="list-style-type: none"> <li>1 Electrical connections incorrect.</li> <li>2 Low voltage at compressor.</li> <li>3 Faulty start capacitor.</li> <li>4 The relay does not close.</li> <li>5 Electric motor – winding interrupted or in short circuit.</li> </ol>	<ol style="list-style-type: none"> <li>1 Make the connections again.</li> <li>2 Find and remove the cause.</li> <li>3 Find the cause and replace the capacitor.</li> <li>4 Find the cause and replace the relay if necessary.</li> <li>5 Replace the compressor.</li> </ol>
<b>C</b>	<p><b><u>The compressor starts but the relay does not open</u></b></p> <ol style="list-style-type: none"> <li>1 Electrical connections incorrect.</li> <li>2 Low voltage at compressor.</li> <li>3 Relay locked closed.</li> <li>4 Excessive discharge pressure.</li> <li>5 Electric motor – winding interrupted or in short circuit.</li> </ol>	<ol style="list-style-type: none"> <li>1 Check the electric circuit.</li> <li>2 Find and remove the cause.</li> <li>3 Find and remove the cause.</li> <li>4 Find the cause and replace the relay if necessary.</li> <li>5 Replace the compressor.</li> </ol>
<b>D</b>	<p><b><u>Thermal circuit breaker intervention</u></b></p> <ol style="list-style-type: none"> <li>1 Low voltage at compressor (three-phase motor – phase imbalance).</li> <li>2 Thermal circuit breaker faulty.</li> <li>3 Faulty run capacitor.</li> <li>4 Excessive discharge pressure.</li> <li>5 High suction pressure.</li> <li>6 Compressor overheated - hot return gas.</li> <li>7 Electric motor – winding interrupted or in short circuit.</li> </ol>	<ol style="list-style-type: none"> <li>1 Find and remove the cause.</li> <li>2 Check characteristics and replace if necessary.</li> <li>3 Find and remove the cause.</li> <li>4 Check the ventilation and any restrictions or obstructions in the system circuit.</li> <li>5 Check the sizing of the system. Replace the condensing unit with a more powerful one if necessary.</li> <li>6 Check the refrigerant charge; repair any leaks and add gas if necessary.</li> <li>7 Replace the compressor.</li> </ol>
<b>E</b>	<p><b><u>The compressor starts and runs at brief operating cycles</u></b></p> <ol style="list-style-type: none"> <li>1 Thermal circuit breaker.</li> <li>2 Thermostat.</li> <li>3 High-pressure switch intervention due to insufficient condenser cooling.</li> <li>4 High-pressure switch intervention due to excess refrigerant gas charge.</li> <li>5 Low-pressure switch intervention due to insufficient refrigerant gas charge.</li> <li>6 Low-pressure switch intervention due to expansion valve restriction or blockage.</li> </ol>	<ol style="list-style-type: none"> <li>1 See the previous point (thermal circuit breaker intervention).</li> <li>2 Small differential: correct adjustment.</li> <li>3 Check the correct operation of the fan motor or clean the condenser.</li> <li>4 Reduce the refrigerant charge.</li> <li>5 Repair any leaks and add refrigerant gas if necessary.</li> <li>6 Replace the expansion valve.</li> </ol>

<p><b>F</b></p>	<p><b><u>The compressor runs continuously or for long periods</u></b></p> <ol style="list-style-type: none"> <li>1 Insufficient refrigerant gas charge.</li> <li>2 Thermostat contacts blocked in the closed position.</li> <li>3 System insufficiently sized for the charge.</li> <li>4 Excess charge to be cooled or insufficient insulation.</li> <li>5 Evaporator covered with ice.</li> <li>6 System circuit restriction.</li> <li>7 Condenser blocked.</li> </ol>	<ol style="list-style-type: none"> <li>1 Repair any leaks and add refrigerant gas.</li> <li>2 Replace the thermostat.</li> <li>3 Replace the system with a more powerful one.</li> <li>4 Reduce the charge or improve the insulation, if possible.</li> <li>5 Defrost.</li> <li>6 Identify the cause and remove it.</li> <li>7 Clean the condenser.</li> </ol>
<p><b>G</b></p>	<p><b><u>Run capacitor damaged, interrupted or short circuited</u></b></p> <ol style="list-style-type: none"> <li>1 Incorrect run capacitor</li> </ol>	<ol style="list-style-type: none"> <li>1 Replace with a capacitor of the correct type.</li> </ol>
<p><b>H</b></p>	<p><b><u>Starter relay faulty or burnt out</u></b></p> <ol style="list-style-type: none"> <li>1 Incorrect relay.</li> <li>2 Relay fitted in incorrect position.</li> <li>3 Incorrect run capacitor</li> </ol>	<ol style="list-style-type: none"> <li>1 Replace with a relay of the correct type.</li> <li>2 Fit the relay in the correct position.</li> <li>3 Replace with a capacitor of the correct type.</li> </ol>
<p><b>I</b></p>	<p><b><u>Coldroom temperature too high</u></b></p> <ol style="list-style-type: none"> <li>1 Thermostat set too high.</li> <li>2 Undersized expansion valve.</li> <li>3 Undersized evaporator.</li> <li>4 Insufficient air circulation.</li> </ol>	<ol style="list-style-type: none"> <li>1 Adjust the setting.</li> <li>2 Replace the expansion valve with one of a suitable type</li> <li>3 Replace with an evaporator with a larger surface area</li> <li>4 Improve air circulation</li> </ol>
<p><b>L</b></p>	<p><b><u>Suction pipes frosted</u></b></p> <ol style="list-style-type: none"> <li>1 Excessive passage of gas through the expansion valve or valve oversized.</li> <li>2 Expansion valve locked in the open position.</li> <li>3 The evaporator fan motor does not work.</li> <li>4 High gas charge.</li> </ol>	<ol style="list-style-type: none"> <li>1 Adjust the valve or replace it with one of the correct size.</li> <li>2 Clean foreign bodies from the valve and replace if necessary.</li> <li>3 Find the cause and remove it.</li> <li>4 Reduce the charge.</li> </ol>
<p><b>M</b></p>	<p><b><u>Discharge pipe frosted or wet</u></b></p> <ol style="list-style-type: none"> <li>1 Drier filter restriction.</li> <li>2 Valve on the discharge line partially closed.</li> </ol>	<ol style="list-style-type: none"> <li>1 Replace the filter.</li> <li>2 Open the valve or replace it if necessary.</li> </ol>

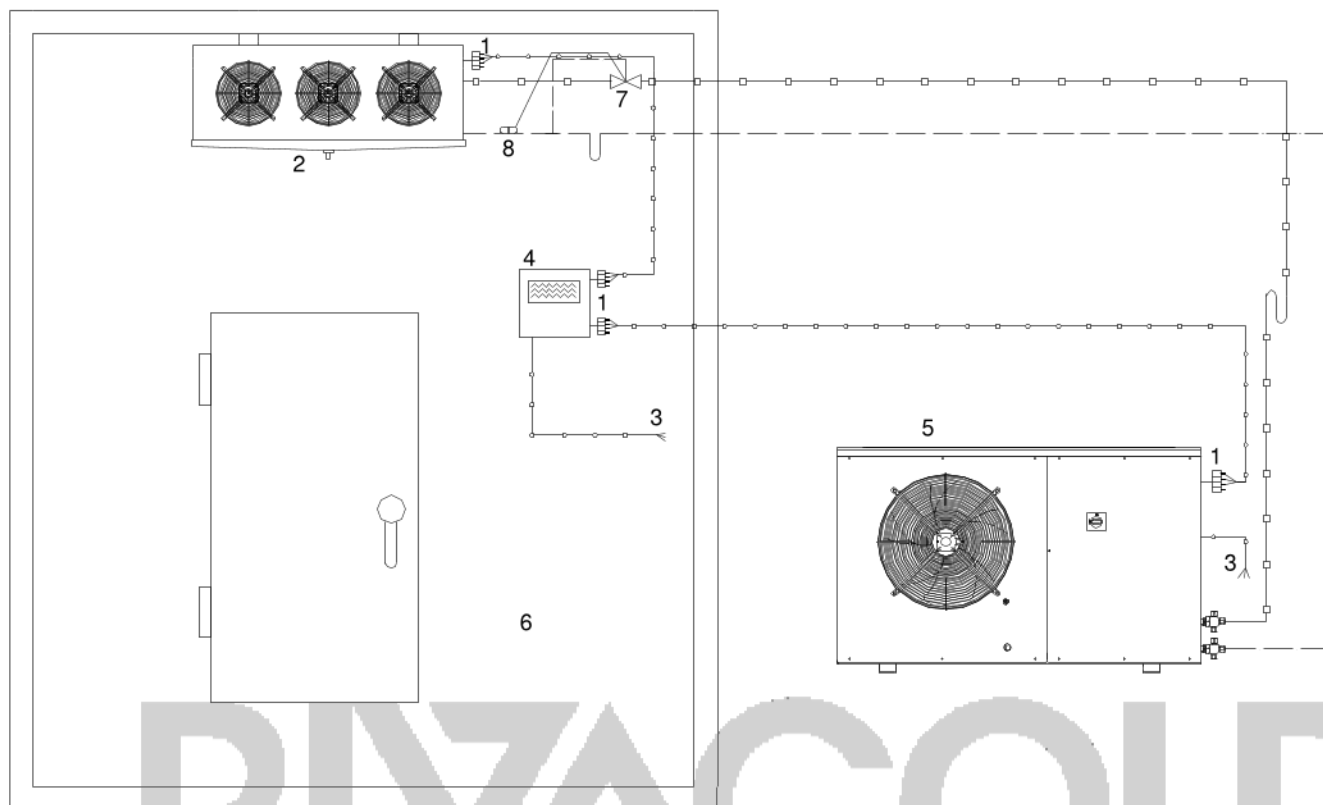
## Schema di collegamento dell'unità TH standard.

Connection diagram for the standard TH unit.

Schéma de connexion de le systema TH standard.

Esquema de conexión de la unidad TH estándar.

Anschlusschema der Einheit TH Standard.



- 1 = **Morsettiera**/Terminal board/Plaque à bornes/Tablero de bornes/Klemmleiste  
 2 = **Evaporatore**/Evaporator/Évaporateur/Evaporador/Verdampfer  
 3 = **Cavo di alimentazione**/Power lead/Câble d'alimentation/Cable de alimentación/Stromkabel  
 4 = **Quadro fronte cella**/Cold room control panel/Boîte de controle chambre froide/Cuadro frontal cámara/Fernschalttafel  
 5 = **Unità condensatrice**/Condensing unit/Groupe de condensation/Unidad condensadora/Verflüssigungssätze  
 6 = **Cella frigorifera**/Coldroom/Chambre froide/Celda frigorífica/Kühlzelle  
 7 = **Valvola termostatica**/Thermostatic valve/Vanne thermostatique/Válvula termostática/Thermostatventil  
 ° = **Bulbo valvola termostatica**/Thermostatic valve bulb/Bulbe detendeur/Bulbo valvola termostatica/Kegel-

—□—□— **Linea del liquido**/Liquid line/Ligne du liquide/Línea del líquido/Flüssigkeitsleitung

----- **Linea di aspirazione**/Suction line/Ligne d'aspiration/Línea de aspiración/Ansaugleitung

—○—○— **Collegamento elettrico**/Wiring/Branchement électrique/Conexión

**TABELLA CARATTERISTICHE (SERIE MH)/TECHNICAL FEATURES (MH RANGE)**  
**TABLEAU CARACTÉRISTIQUES (GAMME MH)**  
**TABLA CARACTERÍSTICAS (GAMA MH)/ KENNZEICHEN TABELLE (MH REIHE)**

Codice Code	Gas	Tensione Voltage	MBP	LBP	In	Imax	Ø attacchi Ppe fittings		Peso Weight	Rumore (dbA) Noise (dbA)	Categoria PED PED Category
							D	S			
									Kg	10m	
HCM145Z0212	R404A	400/3/50	●		6.20	6.80	10	22	101	43	1
HCM145Z0312	R404A	400/3/50	●		7.13	7.80	10	22	107	43	1
HCM245Z0212	R404A	400/3/50	●		8.24	9.60	12	22	136	47	1
HCM245Z1212	R404A	400/3/50	●		10.17	11.60	12	22	137	47	1
HCM245Z0312	R404A	400/3/50	●		12.81	13.60	12	22	144	48	1
HCL140Z0212	R404A	400/3/50		●	5.71	6.50	10	22	88	43	1
HCL140Z0312	R404A	400/3/50		●	6.53	7.50	10	22	92	44	1
HCL145Z0212	R404A	400/3/50		●	7.07	8.80	12	22	112	44	1
HCL145Z1212	R404A	400/3/50		●	8.77	10.80	12	22	113	45	1
HCL145Z0312	R404A	400/3/50		●	11.55	12.80	12	22	120	45	1
HCL245Z0212	R404A	400/3/50		●	13.99	17.70	16	28	195	49	2
HCL245Z0312	R404A	400/3/50		●	18.54	23.90	16	28	200	49	2
HUM135Z0111	R404A	230/1/50	●		2.55	4.20	10	12	53	33	1
HUM135Z1111	R404A	230/1/50	●		3.03	4.44	10	12	53	33	1
HUM135Z2111	R404A	230/1/50	●		3.50	5.90	10	12	54	33	1
HUM135Z0211	R404A	230/1/50	●		3.49	6.90	10	12	64	35	1
HUM135Z0212	R404A	400/3/50	●		1.84	2.45	10	12	63	35	1
HUM135Z1211	R404A	230/1/50	●		4.26	7.40	10	16	65	36	1
HUM135Z1212	R404A	400/3/50	●		2.04	3.28	10	16	63	36	1
HUM140Z0211	R404A	230/1/50	●		5.23	10.60	10	16	81	38	1
HUM140Z0212	R404A	400/3/50	●		2.43	4.43	10	16	79	38	1
HUM140Z1211	R404A	230/1/50	●		5.99	11.10	10	16	82	40	1
HUM140Z1212	R404A	400/3/50	●		3.11	4.45	10	16	80	40	1
HUM140Z0311	R404A	230/1/50	●		8.08	15.90	10	16	85	41	1
HUM140Z0312	R404A	400/3/50	●		3.83	5.30	10	16	84	41	1
HUM140Z2312	R404A	400/3/50	●		3.97	6.79	10	16	91	42	1
HUM145Z0212	R404A	400/3/50	●		4.81	8.90	10	22	102	45	1
HUM145Z0312	R404A	400/3/50	●		7.11	10.01	10	22	109	48	1
HUM245Z0212	R404A	400/3/50	●		7.11	13.60	12	22	141	52	2
HUM245Z1212	R404A	400/3/50	●		8.15	15.60	12	28	141	53	2
HUM245Z0312	R404A	400/3/50	●		8.99	16.80	12	28	148	53	2
HUL135Z0111	R404A	230/1/50		●	3.52	4.70	10	12	53	31.5	1
HUL135Z2111	R404A	230/1/50		●	3.70	5.42	10	12	62	33	1
HUL135Z2112	R404A	400/3/50		●	1.48	2.40	10	12	60	33.5	1
HUL135Z3111	R404A	230/1/50		●	3.00	6.56	10	12	62	34	1
HUL135Z0211	R404A	230/1/50		●	4.47	7.77	10	12	65	38	1
HUL135Z0212	R404A	400/3/50		●	1.77	3.22	10	12	65	37	1
HUL135Z1211	R404A	230/1/50		●	5.87	10.00	10	16	65	40	1
HUL135Z1212	R404A	400/3/50		●	2.47	3.65	10	16	65	38	1
HUL140Z0212	R404A	400/3/50		●	3.33	4.40	10	16	90	41	1
HUL140Z1212	R404A	400/3/50		●	4.06	5.50	10	16	90	42	1
HUL145Z0212	R404A	400/3/50		●	5.73	10.61	12	22	116	45	2
HUL145Z1212	R404A	400/3/50		●	7.28	14.80	12	22	118	46	2

**Legenda/Key/légende/leyenda/legende**

In = corrente normale di funzionamento / Normal operating current / Courant normal de fonctionnement / normale Betriebsspannung

Corriente normal de funcionamiento

Imax = corrente massima di funzionamento / Maximum operating current / Courant maximal de fonctionnement

Corriente máxima de funcionamiento / Daten Verdichtereinheit

**TABELLA CARATTERISTICHE (SERIE TH)/TECHNICAL FEATURES (TH RANGE)**  
**TABLEAU CARACTÉRISTIQUES (GAMME TH)**  
**TABLA CARCTERÍSTICAS (GAMA TH)/ KENNZEICHEN TABELLE (TH REIHE)**

Codice Code	Gas Gas	Tensione Voltage	MBP	LBP	In	Imax	Ø attacchi Pipe fittings		Peso Weight	Rumore (dbA) Noise (dbA)	Categoria PED PED Category
							D	S			
									Kg	10m	
THCM145Z0212	R404A	400/3/50	●		7.55	8.15	10	22	137	43	1
THCM145Z0312	R404A	400/3/50	●		8.93	9.60	10	22	153	43	1
THCM245Z0212	R404A	400/3/50	●		9.54	10.90	12	22	183	47	1
THCM245Z1212	R404A	400/3/50	●		12.12	13.55	12	22	198	47	1
THCM245Z0312	R404A	400/3/50	●		15.41	16.20	12	22	223	48	1
THCL140Z0212	R404A	400/3/50		●	7.06	7.85	10	22	121	43	1
THCL140Z0312	R404A	400/3/50		●	7.88	8.85	10	22	128	44	1
THCL145Z0212	R404A	400/3/50		●	8.87	10.60	12	22	158	44	1
THCL145Z1212	R404A	400/3/50		●	10.57	12.60	12	22	159	45	1
THCL145Z0312	R404A	400/3/50		●	12.85	14.10	12	22	165	45	1
THCL245Z0212	R404A	400/3/50		●	15.94	19.65	16	28	254	49	2
THCL245Z0312	R404A	400/3/50		●	21.14	26.50	16	28	275	49	2
THUM135Z0111	R404A	230/1/50	●		2.96	4.61	10	12	61	33	1
THUM135Z1111	R404A	230/1/50	●		3.44	4.85	10	12	63	33	1
THUM135Z2111	R404A	230/1/50	●		4.18	6.58	10	12	66	33	1
THUM135Z0211	R404A	230/1/50	●		4.24	7.65	10	12	77	35	1
THUM135Z0212	R404A	400/3/50	●		2.59	3.20	10	12	80	35	1
THUM135Z1211	R404A	230/1/50	●		5.01	8.15	10	16	78	36	1
THUM135Z1212	R404A	400/3/50	●		2.79	4.03	10	16	80	36	1
THUM140Z0211	R404A	230/1/50	●		5.98	11.35	10	16	96	38	1
THUM140Z0212	R404A	400/3/50	●		3.18	5.18	10	16	98	38	1
THUM140Z1211	R404A	230/1/50	●		6.89	12.00	10	16	103	40	1
THUM140Z1212	R404A	400/3/50	●		4.01	5.35	10	16	105	40	1
THUM140Z0311	R404A	230/1/50	●		9.43	17.25	10	16	114	41	1
THUM140Z0312	R404A	400/3/50	●		5.18	6.65	10	16	117	41	1
THUM140Z2312	R404A	400/3/50	●		5.32	8.14	10	16	124	42	1
THUM145Z0212	R404A	400/3/50	●		6.16	10.25	10	22	138	45	1
THUM145Z0312	R404A	400/3/50	●		8.91	11.81	10	22	155	48	1
THUM245Z0212	R404A	400/3/50	●		8.41	14.90	12	22	188	52	2
THUM245Z1212	R404A	400/3/50	●		10.10	17.55	12	28	202	53	2
THUM245Z0312	R404A	400/3/50	●		11.59	19.40	12	28	226	53	2
THUL135Z0111	R404A	230/1/50		●	3.63	4.81	10	12	61	31.5	1
THUL135Z2111	R404A	230/1/50		●	4.11	5.83	10	12	69	33	1
THUL135Z2112	R404A	400/3/50		●	1.89	2.81	10	12	72	33.5	1
THUL135Z3111	R404A	230/1/50		●	3.41	6.97	10	12	70	34	1
THUL135Z0211	R404A	230/1/50		●	4.95	8.25	10	12	74	38	1
THUL135Z0212	R404A	400/3/50		●	2.25	3.70	10	12	77	37	1
THUL135Z1211	R404A	230/1/50		●	6.62	10.75	10	16	78	40	1
THUL135Z1212	R404A	400/3/50		●	3.22	4.40	10	16	81	38	1
THUL140Z0212	R404A	400/3/50		●	4.23	5.30	10	16	115	41	1
THUL140Z1212	R404A	400/3/50		●	5.41	6.85	10	16	123	42	1
THUL145Z0212	R404A	400/3/50		●	7.08	11.96	12	22	152	45	2
THUL145Z1212	R404A	400/3/50		●	9.08	16.60	12	22	164	46	2

**Legenda/Key/légende/leyenda/legende**

In = corrente normale di funzionamento / Normal operating current / Courant normal de fonctionnement / normale Betriebsspannung  
 Corriente normal de funcionamiento

Imax = corrente massima di funzionamento / Maximum operating current / Courant maximal de fonctionnement  
 Corriente máxima de funcionamiento / Daten Verdichtereinheit



**TABELLA COMPONENTI /COMPONENTS TABLE  
TABLEAU COMPOSANTS  
TABLA COMPONENTES/ BESTANDTEILE TABELLE**

Split System	Condensing Unit	Evaporator		Thermostatic valve			Drain heater	Separate control panel - outside the cold room
		Code	Code	Orifice	Connectors	Valve support		
THCM145Z0212	HCM145Z0212	RC325-45ED	TES2/CODS	ORIF04/CODS	068-208100	-	RES2000	56203001
THCM145Z0312	HCM145Z0312	RC425-61ED	TES2/CODS	ORIF04/CODS	068-208100	-	RES2000	56203001
THCM245Z0212	HCM245Z0212	RCM23506ED	TES2/CODS	ORIF05/CODS	068-208100	-	RES3000	56203001
THCM245Z1212	HCM245Z1212	RCM33506ED	TES2/CODS	ORIF06/CODS	068-208100	-	RES3000	56203001
THCM245Z0312	HCM245Z0312	RCM43506ED	TES5N	ORIF1	-	TE5-S	RES3000	56203001
THCL140Z0212	HCL140Z0212	RC325-33ED	TES2MOP50S	ORIF03/CODS	068-208100	-	RES2000	56203001
THCL140Z0312	HCL140Z0312	RC325-45ED	TES2MOP50S	ORIF03/CODS	068-208100	-	RES2000	56203001
THCL145Z0212	HCL145Z0212	RC425-61ED	TES2MOP50S	ORIF03/CODS	068-208100	-	RES2000	56203001
THCL145Z1212	HCL145Z1212	RC425-61ED	TES2MOP50S	ORIF04/CODS	068-208100	-	RES2000	56203001
THCL145Z0312	HCL145Z0312	RCM23508ED	TES2MOP50S	ORIF04/CODS	068-208100	-	RES3000	56203001
THCL245Z0212	HCL245Z0212	RCM33508ED	TES2MOP50S	ORIF05/CODS	068-208100	-	RES3000	56203001
THCL245Z0312	HCL245Z0312	RCM43508ED	TES2MOP50S	ORIF06/CODS	068-208100	-	RES3000	56203001
THUM135Z0111	HUM135Z0111	RSV1200405ED	TES2/CODS	ORIF00/CODS	068-208100	-	RES2000	56201024
THUM135Z1111	HUM135Z1111	RSV1200605ED	TES2/CODS	ORIF01/CODS	068-208100	-	RES2000	56201024
THUM135Z2111	HUM135Z2111	RSV2200405ED	TES2/CODS	ORIF01/CODS	068-208100	-	RES2000	56201024
THUM135Z0211	HUM135Z0211	RSV2200405ED	TES2/CODS	ORIF01/CODS	068-208100	-	RES2000	56201024
THUM135Z0212	HUM135Z0212	RSV2200405ED	TES2/CODS	ORIF01/CODS	068-208100	-	RES2000	56201024
THUM135Z1211	HUM135Z1211	RSV2200405ED	TES2/CODS	ORIF01/CODS	068-208100	-	RES2000	56201024
THUM135Z1212	HUM135Z1212	RSV2200405ED	TES2/CODS	ORIF01/CODS	068-208100	-	RES2000	56201024
THUM140Z0211	HUM140Z0211	RSV2200605ED	TES2/CODS	ORIF02/CODS	068-208100	-	RES2000	56201024
THUM140Z0212	HUM140Z0212	RSV2200605ED	TES2/CODS	ORIF02/CODS	068-208100	-	RES2000	56201024
THUM140Z1211	HUM140Z1211	RC225-25ED	TES2/CODS	ORIF02/CODS	068-208100	-	RES2000	56201024
THUM140Z1212	HUM140Z1212	RC225-25ED	TES2/CODS	ORIF02/CODS	068-208100	-	RES2000	56203001
THUM140Z0311	HUM140Z0311	RC325-33ED	TES2/CODS	ORIF03/CODS	068-208100	-	RES2000	56201024
THUM140Z0312	HUM140Z0312	RC325-33ED	TES2/CODS	ORIF03/CODS	068-208100	-	RES2000	56203001
THUM140Z2312	HUM140Z2312	RC325-33ED	TES2/CODS	ORIF03/CODS	068-208100	-	RES2000	56203001
THUM145Z0212	HUM145Z0212	RC325-45ED	TES2/CODS	ORIF03/CODS	068-208100	-	RES2000	56203001
THUM145Z0312	HUM145Z0312	RC425-61ED	TES2/CODS	ORIF04/CODS	068-208100	-	RES2000	56203001
THUM245Z0212	HUM245Z0212	RCM23506ED	TES2/CODS	ORIF04/CODS	068-208100	-	RES3000	56203001
THUM245Z1212	HUM245Z1212	RCM33506ED	TES2/CODS	ORIF05/CODS	068-208100	-	RES3000	56203001
THUM245Z0312	HUM245Z0312	RCM43506ED	TES2/CODS	ORIF06/CODS	068-208100	-	RES3000	56203001
THUL135Z0111	HUL135Z0111	RSV1200405ED	TES2MOP50S	ORIF0X/CODS	068-208100	-	RES2000	56201024
THUL135Z2111	HUL135Z2111	RSV1200405ED	TES2MOP50S	ORIF00/CODS	068-208100	-	RES2000	56201024
THUL135Z2112	HUL135Z2112	RSV1200405ED	TES2MOP50S	ORIF00/CODS	068-208100	-	RES2000	56201024
THUL135Z3111	HUL135Z3111	RSV1200405ED	TES2MOP50S	ORIF00/CODS	068-208100	-	RES2000	56201024
THUL135Z0211	HUL135Z0211	RSV1200605ED	TES2MOP50S	ORIF01/CODS	068-208100	-	RES2000	56201024
THUL135Z0212	HUL135Z0212	RSV1200605ED	TES2MOP50S	ORIF01/CODS	068-208100	-	RES2000	56201024
THUL135Z1211	HUL135Z1211	RSV2200405ED	TES2MOP50S	ORIF01/CODS	068-208100	-	RES2000	56201024
THUL135Z1212	HUL135Z1212	RSV2200405ED	TES2MOP50S	ORIF01/CODS	068-208100	-	RES2000	56201024
THUL140Z0212	HUL140Z0212	RC225-25ED	TES2MOP50S	ORIF02/CODS	068-208100	-	RES2000	56203001
THUL140Z1212	HUL140Z1212	RC325-33ED	TES2MOP50S	ORIF03/CODS	068-208100	-	RES2000	56203001
THUL145Z0212	HUL145Z0212	RC325-45ED	TES2MOP50S	ORIF03/CODS	068-208100	-	RES2000	56203001
THUL145Z1212	HUL145Z1212	RC425-61ED	TES2MOP50S	ORIF03/CODS	068-208100	-	RES2000	56203001

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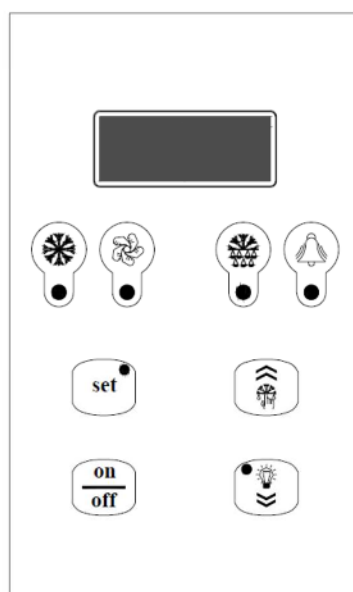
Via Sicilia, 7 - Fraz. Montecchio - 61022 Vallefoglia (PU) - Italy









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## Control panel description



	<p>Green "COMPRESSOR" LED</p> <p>OFF: The compressor is off</p> <p>LIT: The compressor is operating.</p> <p>BLINKING: The switch on request is pending (delays or protective devices activated)</p>
	<p>Green "FANS" LED</p> <p>OFF: The fans are off</p> <p>LIT: The fans are operating</p> <p>BLINKING: The switch on request is pending (delays or protective devices activated)</p>
	<p>Green "DEFROSTING" LED</p> <p>OFF: Defrosting is not activated</p> <p>LIT: Defrosting is in progress</p> <p>BLINKING: Manual defrosting is in progress; a defrosting request is pending (delays or protective devices activated); network synchronised (master/slave) defrosting</p>
	<p>Yellow "ALARM LED"</p> <p>OFF: No alarm is in progress</p> <p>LIT: A serious alarm is in progress (and alarm relay activated)</p> <p>BLINKING: A non-serious alarm is in progress or a serious alarm has been silenced (alarm relay deactivated)</p>
	<p>"SETPOINT" key + "SETPOINT/REDUCED SET" green LED</p> <p>LIT: The setpoint is displayed</p> <p>BLINKING: The reduced set is activated</p> <p>ENTER" key: This is used to set the setpoint, to access the programming menu, and to view the machine status (if held down for 1 second); to enter the programming mode, this key must be held down for 5 seconds.</p>
	<p>"UP" key: This is used to command manual defrosting (if held down for more than 5 seconds) as well as to increase the value of the parameter being displayed and to scroll forwards through the menu list.</p>
	<p>"ON/OFF" key: This is used as a manual on-off control, to confirm a parameter value and it also allows you to return to the previous menu. To switch the machine on or off, hold this key down for more than 5 seconds.</p>
	<p>"DOWN" key: This is used to command the lights manually (if held down for 1 second); it also decreases the value of the parameter being displayed and scrolls back through the menu list.</p>

## 2 Switching on/off

When the machine is energised, the display will read OFF and show the coldroom temperature alternately. To switch the Blocksystem on (off), hold down the "ON/OFF" key on the front of the machine for more than 5 seconds.

## 3 Coldroom temperature adjustment

The temperature ranges within which the Blocksystem can operate are as follows:

	Minimum	Maximum
High Temperature (HBP)	+2	+10
Medium Temperature (MBP)	-5	+5
Low Temperature (LBP)	-25	-15

The temperature adjustment setpoint can be accessed directly for display or adjustment purposes.

- Press and release SETPOINT: the display will read "SET" (the procedure is slightly different if there are alarms in progress; see the machine status display paragraph)
- Press SETPOINT: the green SET LED will switch on and the Setpoint value will be displayed
- Press UP or DOWN to set the new value
- Press SETPOINT or ON/OFF (or wait for the 5-second timeout) to confirm the value (the SET LED will switch off and the display will read "SET")
- Press ON/OFF (or wait for the 5-second timeout) to return to the normal display mode

## 4 How to vary parameters

Blocksystem operation is governed by parameters that have been stored in the memory of the electronic control unit by the manufacturer (see the parameters table). These factory settings should not be varied unless strictly necessary and in all cases, such operations are only to be carried out by qualified staff.

Parameters are not only divided by function, they are also divided according to their security/accessibility levels:

level 0      Setpoint parameters      direct access (see paragraph 7.3)

level 1      frequently used parameters      access without password (see paragraph 7.5)

Parameters can be varied as follows:

- from the keyboard
- via LAN network (Master/Slave)
- via Supervision network

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## 5 How to vary level 1 parameters

- hold down SET for 5 seconds until the display reads "reg" (adjustment parameters)
- press UP or DOWN until the required menu appears on the display
- press SET to access the menu; the code number for the first parameter in the selected menu will appear
- press UP or DOWN until the required parameter appears
- press SET to view the value of the parameter
- press UP or DOWN to set the required value
- press SET to confirm the value and return to the parameters list; press ON/OFF to confirm the value and return to the menu list
- press ON/OFF to pass from the parameters list to the menu list
- press ON/OFF again to exit the editing procedure,

If no key is pressed for more than 15 seconds, any value shown on the display will be stored in the memory for the relevant parameter and there will be a forced exit from the parameters variation procedure.

## 6 Machine status display

- press and release SET: the display will read "SEt" or "AAL" if there are any alarms in progress
- press UP or DOWN until the required status is displayed
  - AAL alarms in progress (if present)
  - SEt setpoint
  - Pb1 coldroom temperature probe value
  - Pb2 evaporator temperature probe value
  - Pb3 probe 3 value (if present)
  - Out relay outputs status
  - InP digital inputs status
- press SET to view the value
- For alarm status, output status or input status, press UP or DOWN to scroll through the alarms in progress, the outputs or the inputs,
- press SET or ON/OFF (or wait for the 5-second timeout) to return to the status list
- press ON/OFF (or wait for the 5-second timeout) to return to the normal display mode

Code	Level	Descr.	Range	Unit	MBP	LBP	HBP
		List of <b>-PPS</b> passwords					
PPA		Parameters access password Entering a pre-set password will give access to protected parameters	0 ... 255		-	-	-
		List of <b>-rEG</b> adjustment parameters					
SEt	0	Setpoint	LSE ... HSE	°C [°F]	2	-18	5
diF	1	Differential temperature > setpoint + diff. -> adjustment On temperature ≤ setpoint -> adjustment Off	0.1 ... 50.0	°C [°F]	2	2	2
		List of <b>-Pro</b> probe parameters					
CA1	1	Probe 1 calibration	The value assigned to this parameter is added to (positive value) or taken away from (negative value) the temperature detected by the probe	°C [°F]	0	0	0
CA2	1	Probe 2 calibration			0	0	0
CA3	1	Probe 3 calibration			0	0	0



Code	Level	Descr.	Range	Unit	MBP	LBP	HBP	
List of <b>-CPr</b> compressor parameters								
Ont	1	Compressor ON time in the event of probe failure	In the event of an adjustment probe error, the compressor is enabled in cyclical mode with set operation and off times. In particular: Ont=0: the compressor remains off Ont>0 and OFt=0: the compressor remains on	0 ... 60	min	15	15	15
OFt	1	Compressor OFF time in the event of probe failure		0 ... 60	min	15	15	15
dOn	1	Compressor activation delay The time, starting from the switch on request, after which the compressor is effectively activated. In the event of network control in sequential mode, this represents the activation delay from compressor to compressor	0 ... 250	sec	0	0	0	
dOF	1	Minimum compressor OFF time The time, starting from the moment of deactivation, for which it is not possible to restart the compressor	0 ... 60	min	3	3	3	
dbi	1	Delay between switch on times The time, starting from the moment of previous activation, for which the compressor cannot be restarted.	0 ... 60	min	0	0	0	
OdO	1	Outputs delay at power-on (compressor, fans, defrosting) This is used to delay the enabling of adjustments after the instrument has been switched on for a set amount of time. The transition from stand-by to machine activated (ON command from the keyboard) bypasses this delay	0 ... 60	min	3	3	3	
List of <b>-dEF</b> defrosting parameters								
dtY	1	Defrosting type 0 = heating element: ends at temperature or after maximum safe time (timeout) 1 = hot gas: ends at temperature or after maximum safe time (timeout) For defrosting using a heating element, there is a 1 second delay between the compressor switching off and the defrosting relay being triggered	0,1		0	0	0	
dit	1	Defrosting interval The maximum time (from start to start) between two consecutive defrosting cycles. When this time expires, a defrosting cycle is enabled (cyclical defrosting). The timer is reset at each defrosting request (even if not cyclical). 0 = cyclical defrosting disabled	0 ... 250	h	6	6	6	
dct	1	Defrosting interval count mode 0 = counts if the compressor is operating 1 = counts all the time	0,1		1	1	1	
dOH	1	Defrosting start delay at power-on The time, as from when the instrument is switched on, for which any defrosting requests are frozen (manual defrosting excluded)	0 ... 250	min	0	0	0	
dEt	1	Defrosting timeout When the set time expires, defrosting is in any case ended, even if the defrost end temperature has not been reached, passing on to the drip phase	1 ... 250	min	30	30	15	
dSt	1	Defrost end temperature The probe 2 temperature above which defrosting is ended. If, at the start of a defrosting cycle, the temperature is greater than that set, no defrosting will be carried out. In the event of a probe 2 malfunction, the defrosting cycle will in any case terminate after reaching a time limit	-50.0 ... 199.0	°C [°F]	15	15	10	
dS2	1	Defrost end temperature for the second evaporator The probe 3 temperature above which defrosting for the second evaporator is ended. If, at the start of a defrosting cycle, the temperature is greater than that set, no defrosting will be carried out. In the event of a probe 3 malfunction, the defrosting cycle will in any case terminate after reaching a time limit. <b>This function is only enabled if P01=3o4, Co4=3 and CP0=2 (alarm relay used for second evaporator defrosting and probe 3 used to detect the temperature of the second evaporator). In this case, the dripping phase will begin after the defrosting cycles of both evaporators have ended.</b>	-50.0 ... 199.0	°C [°F]	10	10	10	
dPO	1	Defrosting at power-on 0 = disabled 1 = defrosting when the instrument is switched on	0,1	flag	0	0	0	
List of <b>-FAn</b> fan parameters								
FSt	1	Fans switch off temperature	probe2 ≥ FSt: fans off Fot ≤ probe2 < (FSt – FAd): fans on probe2 < (Fot – FAd): fans off	-50.0 ... 199.0	°C [°F]	8	-5	50
Fot	1	Fans switch on temperature		-50.0 ... 199.0	°C [°F]	-50	-50	-50
FAd	1	Fans switch on and off differential		1.0 ... 90.0	°C [°F]	2	2	2
Fdt	1	Post-dripping time The time after the dripping phase, during which the fans remain switched off	0 ... 60	min	1	2	0	
dt	1	Dripping time The time after a defrosting cycle during which the compressor and the evaporator are stopped in order to favour evaporator dripping	0 ... 60	min	2	2	0	

Code	Level	Descr.	Range	Unit	MBP	LBP	HBP
dFd	1	Fans deactivated during defrosting 0 = fans activated (operation set from FPt) 1 = fans deactivated	0,1	flag	1	1	0
FCO	1	Fans activated with compressor off 0 = fans deactivated 1 = fans activated (operation set from FPt) 2 = fans in duty cycle operation	0 ... 2		0	0	0
Fon	1	Fans ON time during duty cycle operation (FCO=2)	1 ... 60	min	15	15	15
FoF	1	Fans OFF time during duty cycle operation (FCO=2)	1 ... 60	min	15	15	15
List of <b>-ALr</b> alarm parameters							
AFd	1	Temperature alarm threshold differential This sets the re-entry temperature threshold after a high- or low-temperature alarm condition	1.0 ... 90.0	°C [°F]	2	2	2
HAL	1	Maximum alarm threshold Above this value (absolute or referred to the setpoint) an alarm is triggered If the reference is relative, the unmarked value is added to the setpoint	-50.0 ... 199.0	°C [°F]	10	10	10
LAL	1	Minimum alarm threshold Below this value (absolute or referred to the setpoint) an alarm is triggered If the reference is relative, the unmarked value is subtracted from the setpoint	-50.0 ... 199.0	°C [°F]	-10	-10	-10
PAO	1	Temperature alarm delay at power-on	0 ... 10	h	4	4	4
dAO	1	Temperature alarm delay after defrost The time, starting from the end of the dripping phase, during which no alarm is signalled. In the event of contemporaneous network defrosting, the time refers to the defrosting end command	0 ... 999	min	60	60	60
OAO	1	Temperature alarm delay after door closure The time, after the door is closed again and during which no alarm is signalled	0 ... 10	h	0	0	0
dAt	1	Defrosting alarm timeout enabling This enables the signalling of any defrosting end due to the maximum time limit being reached (timeout). 0 = signal disabled 1 = signal enabled	0,1	flag	0	0	0
List of <b>-diS</b> display parameters							
ndt	1	Decimal point display 0 = display without decimal point 1 = display with decimal point.	0,1	flag	1	1	1
ddl	1	Display during the defrosting phase 0 = normal display (as set from the ddd par.) 1 = freezes the temperature value displayed at the start of defrosting until the end of defrosting and the reaching of the setpoint 2 = "dF" until the end of defrosting and the reaching of the setpoint <b>The ddl parameter can be controlled only if the standard display (ddd par.) includes the adjustment probe (probe 1 or network probe)</b>	0,1,2		0	0	0
Ldd	1	Defrosting display block timeout The time, starting from the end of defrosting (end of dripping phase), after which the normal display is in any case restored	0 ... 255	min	6	6	6
dro	1	°C or °F selection 0 = °C 1 = °F This selection only affects temperature measurements. The values of the parameters concerning temperature maintain their current values and therefore, they must be varied manually to adapt them to the Fahrenheit scale.	0,1	flag	0	0	0
List of <b>-CnF</b> configuration parameters							
LOC(*)	1	Keyboard lock 0 = keyboards disabled 1 = main terminal keyboard enabled 2 = secondary terminal keyboard enabled 3 = keyboards enabled (the first to request a service has precedence until completion)	0 ... 3		1	1	1
rEL	1	Software release A read-only value that identifies the software version	0.0 ... 99.9		-	-	-
List of <b>-LAn (**)</b> network parameters							
dEA	1	Supervision network address (for Master only) The address to be set on each master must take into account the number of slaves present in the LAN network preceding it: "dEA"="dEA[previous master]"+"L01[previous master]" +1 The Supervision network address for a Slave is "dEA[master]"+"L00")	1 ... 199		1	1	1

(\*) Note : To release the keypad, hold down "SET" and "ON/OFF" together for at least 5 seconds.

(\*\*) Note : The "LAN" network parameter only serves in the event of MASTER/SLAVE or REMOTE CONTROL operation

## 8. ALARM SIGNALS

In the event of an alarm, the card normally activates the following:

- the relevant alarm code is shown on the display. In particular, the control alternates the alarm code and the temperature that is normally shown on the display; if there is more than one alarm, they are displayed in succession, alternated with the temperature
- the alarm LED is switched on
- the alarm relay is triggered.

For some alarms and signals, the LED and/or relay are not triggered. The table below gives a detailed description for each alarm and the relevant actions undertaken.

Pressing any button will deactivate the relay (if triggered) and the LED will blink, while the alarm code will remain on the display. The LED will switch off and the alarm code will disappear only when the cause behind it has ceased. The alarm codes are listed in the table below:

Code displayed	Description/Control	LED enable	Relay enable	Reset Mode
E1	cold room probe temperature error if a probe is used for adjustment, the compressor will be activated cyclically and defrosting cycles will be disabled; if a balanced network probe is enabled, adjustment will continue, bypassing the malfunctioning probe	yes	yes	automatic when the condition ceases
E2	End defrosting probe error defrosting will end due to timeout	yes	yes	automatic when the condition ceases
E3	3 <sup>rd</sup> probe error (condenser temperature) the associated controls are disabled	blink.	no	automatic when the condition ceases
	3 <sup>rd</sup> probe error (2nd evaporator temperature) defrosting will end due to timeout	yes	yes	
	heat alarm (*) adjustment is disabled	yes	no	automatic when the condition ceases
	HP pressure switch alarm (*) adjustment is disabled	yes	no	automatic when the condition ceases
	LP pressure switch alarm (*) adjustment is disabled	yes	no	automatic when the condition ceases
E4	repeated heat alarm adjustment is disabled permanently	yes	yes	at switch on
E5	repeated HP pressure switch alarm adjustment is disabled permanently	yes	yes	at switch on
E6	repeated LP pressure switch alarm adjustment is disabled permanently	yes	yes	at switch on
LO	low temperature alarm	yes	yes	automatic when the condition ceases
HI	high temperature alarm	yes	yes	automatic when the condition ceases
EE	data saving alarm default parameters are loaded	yes	yes	at power-on or after the parameter has been stored to memory
Ec	condenser cleaning alarm	blink.	no	automatic when the condition ceases
Er	network alarm (**)	yes	yes	automatic when the condition ceases
Ed	defrosting timeout alarm	blink.	no	automatic at the start of the next defrost

Od	door open timeout alarm normal operation is enabled again	blink.	no	automatic when the condition ceases
nx	slave x alarm (on master only)	yes	progr.	automatic when the condition ceases
Ux	slave x not connected (on master only) the slave is not controlled	blink.	no	automatic when the condition ceases
u0	master not connected (on slave only) the slave is released from the network and operates autonomously	blink.	no	automatic when the condition ceases
dx	slave x download failed(on master only)	blink.	no	manual or automatic when the condition ceases

(\* ) There is no reading on the display.

(\*\*) Network alarms are where, subsequent to programming, the alarm command is communicated from the master to all network devices, in the event that the alarm relay is triggered on the master itself

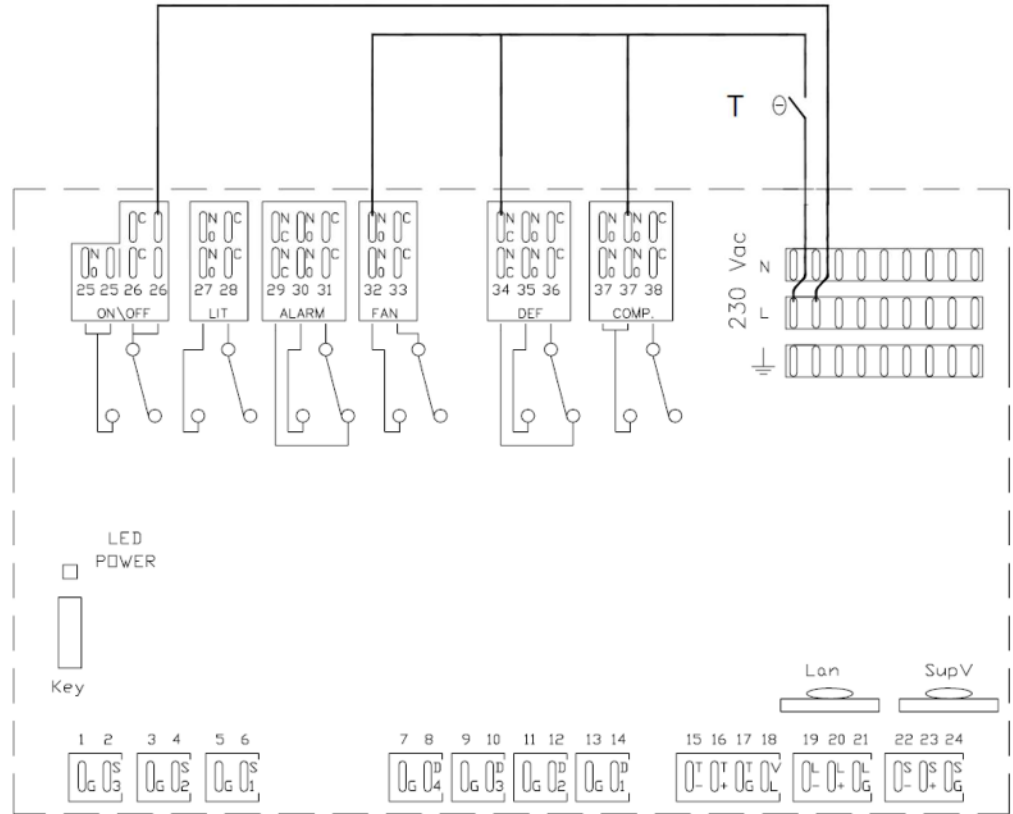
During operation, in specific conditions the following signals are displayed:

Code displayed	Description	Notes
OFF	unit in stand-by (operation disabled)	remains until the next ON command
dF	defrosting in progress	see par. "ddl"
dFu	defrosting not performed	displayed for 2 seconds when the defrosting command is not performed because the evaporator temperature is already above the defrosting end temperature (parameter dst)
uM	master unit	at switch on, the network configuration of the unit is displayed
uSx	slave x unit	
Cn	terminal/control connection interrupted	the terminal is not receiving data from the control

If the terminal/control connection does not operate correctly at switch on, the terminal display will read "88,8" and the LEDs will all be switched off.

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Key:  
T = Thermostat



# RIVACOLD

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