# Full Touch

# XR20T - XR30T - XR60T – XR70T

## (V.1.6)

# INDEX

# 1. IMPORTANT USER INFORMATION

- The ⚡ symbol is intended to alert the user of a non-insultated voltage source within the product area that is sufficiently high to constitute a risk of electric shock to persons.

- The ⚠ symbol is intended to alert the user of important operating and maintenance (servicing) instructions.

- Copeland Controls S.r.l. reserves the right to modify this user's manual at any time without prior notice.

- This manual is an integral part of the product and must always be kept near the device for easy and quick reference. The product cannot be used as a safety device. Please read this manual very carefully be sure you understand the information provided before using the device.

- Verify that the power supply voltage is correct before connecting the device. Do not expose it to water or humidity: use the controller only within the operating limits, avoiding sudden temperature changes and high atmospheric humidity in order to prevent condensation from forming. Recommendations: disconnect all the electrical connections before performing any maintenance task; insert the probe where it cannot be reached by the End User; the device must not be opened; consider the maximum current that can be applied to each relay; make sure that the wires of the probes, of the loads and the electical power supply cables are sufficiently separated from each other, without crossing or intertwining. In case of applications in industrial environments, it may be useful to use the main filters as well as the inductive loads.

- The customer shall bear full responsibility and risk for product configuration in order to achieve the the final installation of the equipment/system. Upon the customer's request and following a specific agreement, Copeland Controls S.r.l. may be present during the start-up of the final machine/application, as a consultant, however, under no circumstances can the company be held responsible for the correct operation of the final equipment/system.

- Since Copeland Controls S.r.l. products are part of a high-level technology, a qualification and a configuration/programming/commissioning stage is required to best use them. Otherwise, these products may malfunction and Copeland Controls S.r.l. cannot be held responsible. The product must not be used in any way that differs from that stipulated in the documentation.

- The device must always be installed inside an electrical panel that can only be accessed by authorised personnel. For safety purposes, the keyboard must be the only part that can be reached.

- The electrical wiring connections must never be modify while the device is being used.

- It is good practice to bear in mind the following indications for all Copeland Controls S.r.l. products:
  - Prevent the electronic circuits from getting wet as contact made with water, humidity or any other type of liquid can damage them. Comply with the temperature and humidity limits specified in the manual in order to store the product correctly.
  - The device must not be installed in particularly hot environments as high temperatures can damage the electronic circuits and/or plastic components forming part of the casing. Comply with the temperature and humidity limits specified in the manual in order to store the product correctly.
  - Under no circumstances is the device to be opened - the user does not need any internal component. Please contact qualified service personnel for any assistance.
  - Prevent the device from being dropped, knocked or shaken as either can cause irreparable damage.
  - Do not clean the device with corrosive chemical products, solvents or aggressive detergents.
  - The device must not be used in applications that differ from that specified in the following document.

⚠

- ***Separate the power supply of the device from the rest of the electrical devices connected inside the electrical panel. The secondary of the transformer must never be connected to the earth.***

- Copeland Controls S.r.l. reserves the right to change the components of its products, even without notice, ensuring the same and unchanged functionality.

# 2. PRODUCT DISPOSAL (WEEE)

In compliance with the Directive 2002/96/EC of the European Parliament and of the Council of January 27th 2003 and to the relative national legislation, please note that:

- There lies the obligation not to dispose of electrical and electronic waste as municipal waste but to separate the waste.
- Public or private collection points must be used to dispose of the goods in accordance with local laws. Furthermore, at the end of the product's life, it is also possible to return this to the retailer when a new purchase is made.
- This equipment may contain hazardous substances. Improper use or incorrect disposal can have adverse effects on human health and the environment.
- The symbol shown on the product or the package indicates that the product has been placed on the market after August 13th 2005 and must be disposed of as separated waste.
- Should the product be disposed of incorrectly, sanctions may be applied as stipulated in applicable local regulations regarding waste disposal.

*Please consider the environment before printing this manual.*

# 3. GENERALITIES

The **XR-T** is a microprocessor-based controller suitable for applications on medium or low temperature ventilated refrigeration units. It has 4 relay outputs to control compressor, fans, light and defrost or auxiliary outputs. The device is also provided with up to 4 NTC, PTC or PT1000 probe inputs. There are up to 2 configurable digital inputs. By using the **HOT-KEY** it is possible to program the device quickly and easily. The controller implements Full Touch technology.

# 4. USER INTERFACE
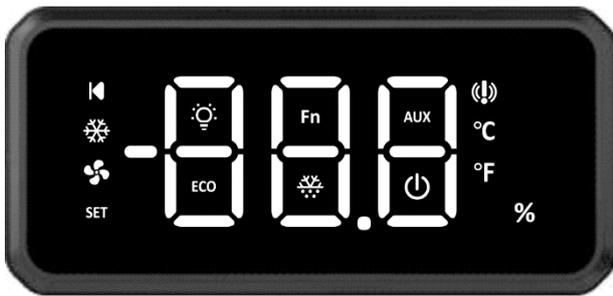
XR-T has a capacitive user interface with Full Touch technology. The whole display area is used to interact with the device. Specific gestures are used to enable or disable functions, browse through screens and operational modes and modify the configuration of the device.

## 4.1 SCREENS

| SCREEN | DESCRIPTION |
|---|---|
| | **Home:** this screen shows temperature value, measurement unit and active alarms only. This is the first screen after power on or after exit from other status |
| | **Virtual Keyboard:** this screen shows available functions. Activated function will blink when this screen is visualized. |
| | **Status Visualization:** This screen shows activated functions and regulation outputs (compressor, ventilators). |
| | **Setpoint Menu:** This screen enables the modification of the Set Point values. |
| | **Temperature Setpoint:** to see and modify the temperature setpoint value. |
| | **Programming Mode:** This screen enables the modification of the parameters. |
| | **Parameter Menu - ALL:** enables the modification of all parameter values. |

| | |
|---|---|
| **GrP** | **Parameter Menu - GrP:** Parameters are grouped as logic function (ex. regulation, defrost, etc.) |
| | **X9:** it is possible to create the label of the parameter to be visualized or modified. |
| **PAS** | **Password menu:** insert the password to see and modify the protected (level Pr2) parameters |
| **inF** | **Info:** To scroll all I/O variables and status (probes, digital inputs, digital outputs, etc.) |
| ⏻ | **Stand-By:** in this condition all outputs are deactivated. |
| **doL** | **HotKey Download:** frame animation is on during download operations (copy from HotKey to the internal memory) |
| **UPL** | **HotKey Upload:** frame animation is on during during upload operations (copy from internal memory to the HotKey) |
| **LoC** | **Device Locked:** V-Swipe from Home screen to lock or unlock the device |
| **UnL** | **Device Unlocked:** V-Swipe from Home screen to lock or unlock the device |
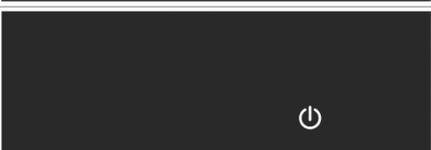
## 4.2 ICONS

| | DESCRIPTION | MODE | FUNCTION |
|---|---|---|---|
| ☼ | **LIGHT** | OFF | Function not available |
| | | FLASH | When in the **Virtual Keyboard** screen: light output ON |
| | | ON | When in the **Virtual Keyboard** screen: light output OFF |
| ❄ | **COMPRESSOR** | OFF | When in the **Loads Info** screen: compressor output OFF |
| | | FLASH | Anti short cycle delay is running |
| | | ON | When in the **Loads Info** screen: compressor output ON |

| | | OFF | When in the **Loads Info** screen: evaporator fan output OFF |
|---|---|---|---|
| | FAN | FLASH | Activation delay is running |
| | | ON | When in the **Loads Info** screen: evaporator fan output ON |
| | | OFF | Function not available |
| | DEFROST | FLASH | When in the **Virtual Keyboard** screen: defrost ON |
| | | ON | When in the **Virtual Keyboard** screen: defrost OFF |
| | | OFF | Function not available |
| AUX | AUX | FLASH | When in the **Virtual Keyboard** screen: AUX output ON |
| | | ON | When in the **Virtual Keyboard** screen: AUX output OFF |
| | | OFF | Function not available |
| ECO | ENERGY SAVING | FLASH | When in the **Virtual Keyboard** screen: energy saving ON |
| | | ON | When in the **Virtual Keyboard** screen: energy saving OFF |
| | | OFF | Function not available |
| Fn | FUNCTION | FLASH | When in the **Virtual Keyboard** screen: function ON (see par. **b2C**) |
| | | ON | When in the **Virtual Keyboard** screen: function OFF (see par. **b2C**) |
| | | OFF | No alarm is active |
| | ALARM | FLASH | |
| | | ON | Some alarm is active |
| °C | Celsius Degree | OFF | Not used |
| | | FLASH | Not used |
| | | ON | Measurement units: Celsius degree |
| °F | Fahrenheit Degree | OFF | Not used |
| | | FLASH | Not used |
| | | ON | Measurement units: Fahrenheit degree |
| | | OFF | |
| | ONOFF | FLASH | |
| | | ON | Only and always ON icon when the device is in standby mode |
| | | OFF | |
| | BACK | FLASH | |
| | | ON | Used to go back to previous levels on the menu tree |
| SET | ENTER | OFF | Save command not available |
| | | FLASH | |
| | | ON | Save command available |

## 4.3 GESTURES

| GESTURE | NAME | HOW-TO | DESCRIPTION |
|---|---|---|---|
| | ONE TAP | Press a specific area of the screen with a finger for 1 sec | **Switch ON / Switch OFF:** when in Virtual Keyboard, use this to turn on/off a specific function. When in Programming mode, use this to select a parameter or a parameter value. |
| | TAP and HOLD | Press any place of the screen with a finger for 1 or 3 sec (depending on par. **bPt**) | **Enter / Save:** use this to enter Programming mode or Parameter menu and to save modifications. When in Virtual Keyboard, use this on the "ONOFF" to switch OFF and ON the device. |
| | H-SWIPE | Drag a finger across the screen, from left to right or from right to left | **Browse:** use horizontal swipe (right to left or left to right) to browse through HOME, Virtual Keyboard and Info View. When in programming mode: use horizontal swipe to browse through parameter menu. |

|  | **V-SWIPE** | Drag a finger across the screen, from top to bottom or from bottom to top (overlapping only one of the digits) | **Modify:** use vertical swipe (from top to bottom or bottom to top) to change a parameter value. |
|---|---|---|---|

## 4.4 HOME BROWSING
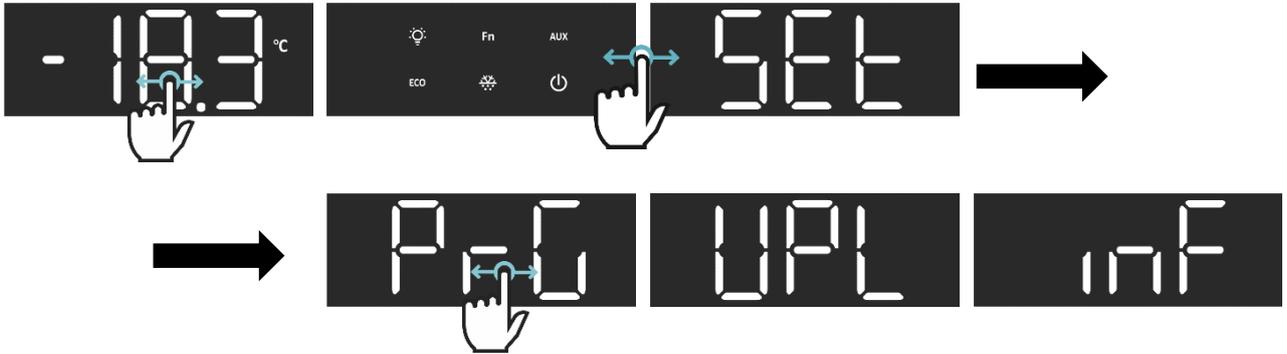


Use H-SWIPE to move through the screens. The logic implements a circular browsing: H-SWIPE to left or to right is possible. A programmable timeout is implemented to return **HOME** from any lateral screen.

## 4.5 STATUS VISUALIZATION
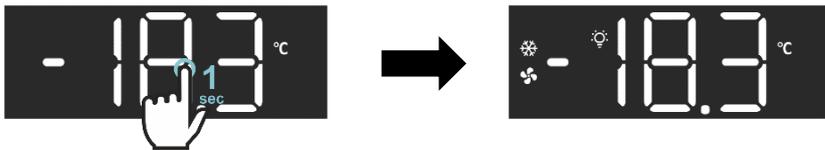


Depending on par. **SC7** it is possible to visualize both the active outputs and functions when in HOME screen. In particular:
- **SC7=n**: active outputs or functions never visualized when in HOME screen
- **SC7=Y**: both active outputs or functions visualized when in HOME screen, for 3 sec, and only after touching the display anywhere.

**SC7=ovr**: active outputs or functions always visualized (overlapped) when in HOME screen

## 4.6 STAND-BY MODE
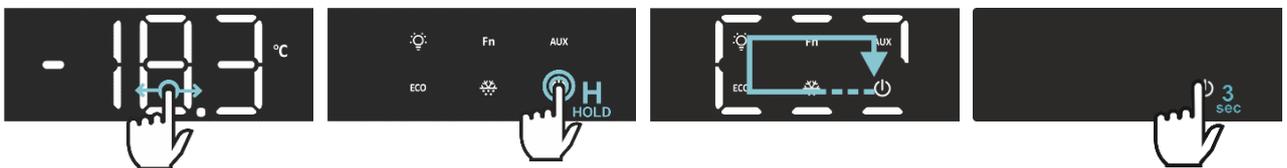


When in **HOME** screen, H-swipe to go to the Virtual Keyboard screen and then touch the **OFF** icon for 3 sec. The beginning of this action will trigger an animation effect (a "snake" moving effect of the frame around the icons). to  All outputs and alarms are deactivated in Stand-by mode.

## 4.7  VIRTUAL KEYBOARD
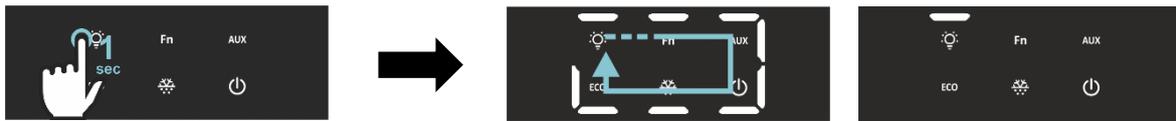


The Virtual Keyboard present some direct access function which can be enabled by touching the relative icon. The activation of any function will trigger an animation effect (a "snake" moving effect on the display) and, at the end, a segment above the function icon (or below, depending on the position of the icon) will be lit.

## 4.8  LOCK AND ULOCK DEVICE



It is possible to lock the device:
- Swiping-up (V-SWIPE) from HOME and then by touching the display anywhere (1 or 3 sec depending on par. **bPt**).
- Activating the "auto lock" function through a timer (par. **SCA**).

When locked, every action on the device will show a "LoC" blinking icon.

It is possible to unlock the device:
Swiping-up (V-SWIPE) from HOME and then by touching the display anywhere (1 or 3 sec depending on par. **bPt**).

## 4.9  SETPOINT MENU
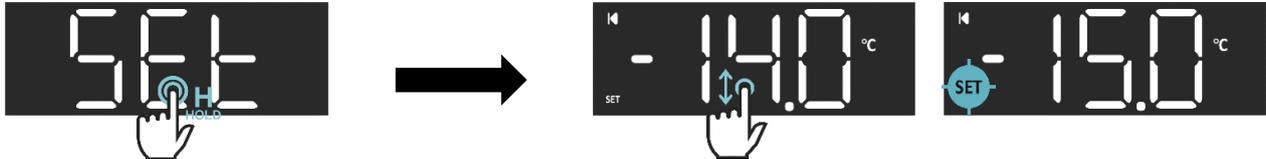


When in **Setpoint Menu SEt**, it is possible to enter the **Temperature Setpoint modification** by touching the display anywhere (1 or 3 sec depending on par. **bPt**). The label indicates that the modification of the temperature set point is enabled.  Adjust the value through some V-SWIPE gestures on the top of every single digit and then confirm the new value by pressing the **SET** icon. Press the **BACK** icon to exit (come back to the **Setpoint Menu**) without saving.

## 4.10 HOTKEY – UPLOAD

a.
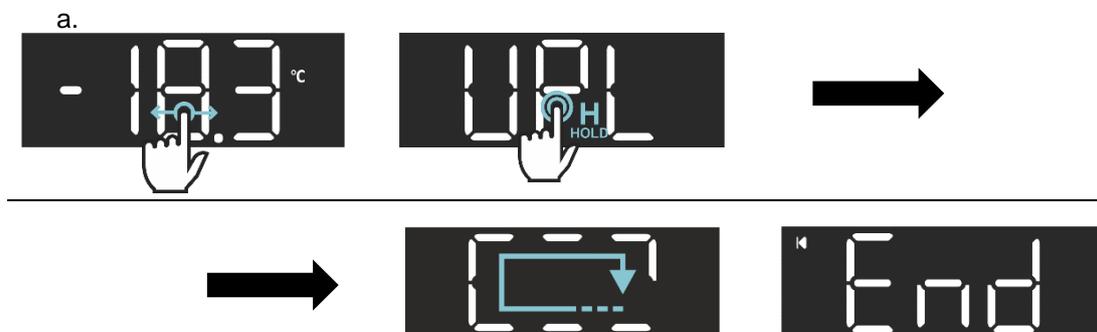


It is possible to use the **HotKey Upload Menu** function to save the current device configuration (parameter values) into the external memory. To do this, follow these instructions:
1. H-swipe to go on the **UPL** screen

2.  Insert the HotKey (on the 5-pin ports on the back of the device)
3.  Touch the the display anywhere (1 or 3 sec depending on par. **bPt**)
4.  The copying procedure will start and will trigger an animation effect (a "snake" moving effect on the display).
5.  At the end of the copying procedure, a message will notify the user that the operation has been competed successfully:
    a.  **End**: all parameters have been copied

**Err**: some error occours during copying operations

## 4.11 HOTKEY – DOWNLOAD
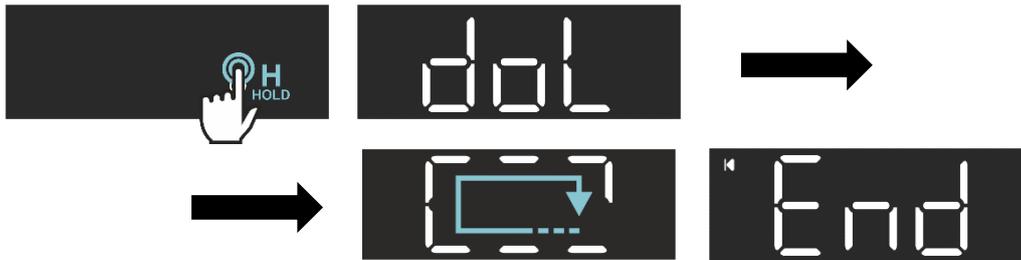


When in **Power-off** or in **Stand-by** mode, it is possible to activate the **HotKey Download Menu** function to copy a new configuration (parameter values) into the current device memory. To do this, follow these instructions:

1.  Insert the HotKey (on the 5-pin ports on the back of the device)
2.  Touch the **OFF** icon for 3 sec
3.  After power-on, the copying procedure will start automatically and will trigger an animation effect (a "snake" moving effect on the display).
4.  At the end of the copying procedure, a message will notify the user that the operation has been competed successfully:
    a.  **End**: all parameters have been copied

**Err**: some error occours during copying operations

## 4.12 INFO MENU
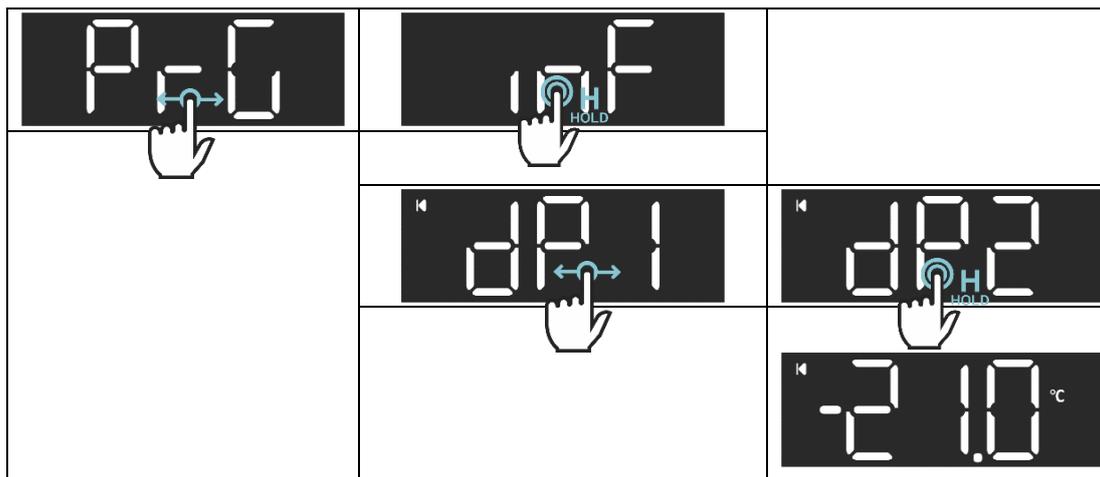


The Info Menu shows the I/O values relative to the "inF" group:

-   **dP1** to **dP4** = probe inputs values
-   **di1** to **di3** = digital inputs status
-   **ro1** to **ro4** = digital outputs status
-   **Ao1**, **Ao2** = analogue output values

## 4.13 PARAMETER MENU
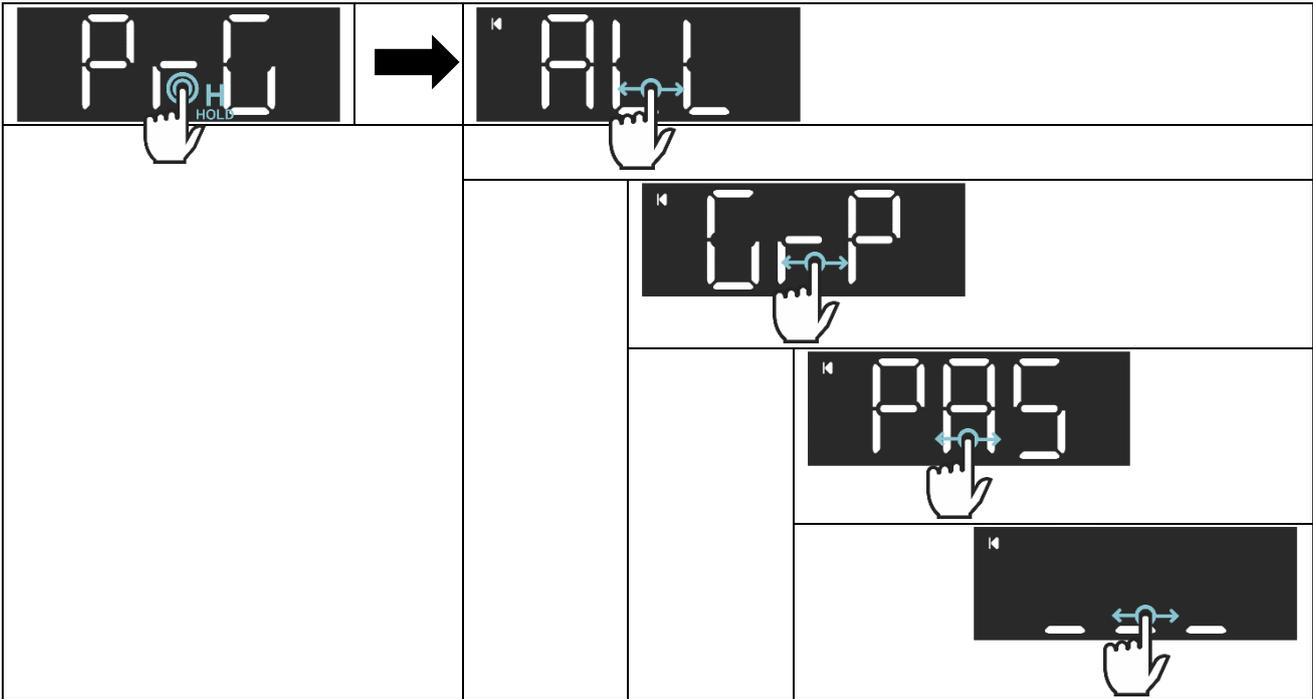


From the PRG screen is possible to unlock the programming menu by touching any area of the display (1 or 3 sec depending on par. **bPt**).

## 4.14 PARAMETER MENU - ALL

From **PrG** screen it is possible to enter the **Parameter Menu - ALL** touching the display anywhere (1 or 3 sec depending on par. **bPt**).
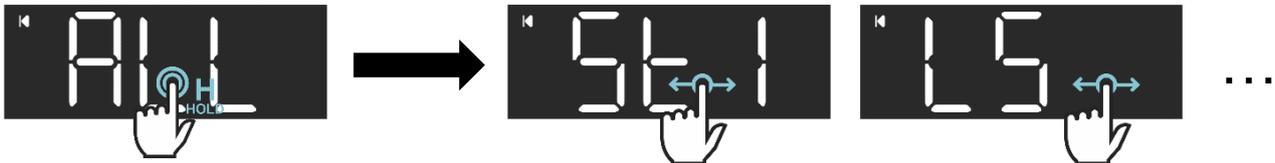


From **Parameter Menu - ALL**, it is possible to enter and browse the list of available parameters by using the H-swipe gesture. All parameters present into level Pr1 are immediately visible. To enter parameters into level Pr2 the password must be inserted.

## 4.15 PARAMETER MENU - GrP

From **Parameter Menu - ALL** menu it is possible to move on the **Parameter Menu - GrP** swiping left (H-swipe gesture). From **Parameter Menu - GrP** it is possible to enter the available group of parameters touching the display anywhere (1 or 3 sec depending on par. **bPt**). It is possible to browse through the available groups of parameters by using the H-swipe gesture. The circular construction of this menu permits to move left or right through the groups. All parameters present into level Pr1 are immediately visible. To enter parameters into level Pr2 the password must be inserted.
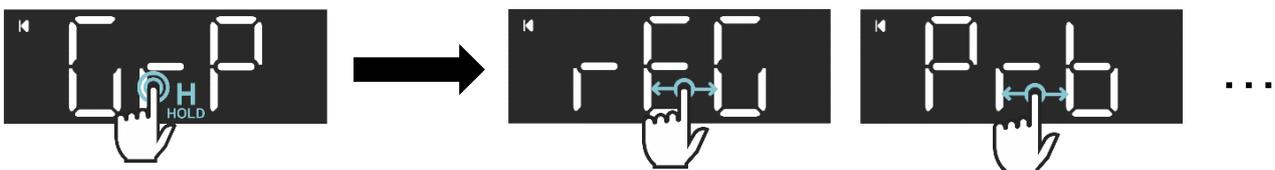
Here are the available groups:
**NOTE:** depending on the configuration, some parameters or entire groups of them could not be available.

| Group Label | Description |
|---|---|
| **rEG** | Main regulation parameters |
| **Prb** | Probe configuration parameters |
| **diS** | Visualization parameters |
| **dEF** | Defrost configuration parameters |
| **FAn** | Evaporator and condenser fan configuration parameters |
| **AUS** | Auxiliary regulator parameters |
| **ALr** | Alarm configuration parameters |
| **oUt** | Digital and analogue output configuration parameters |
| **inP** | Digital input configuration parameters |
| **ES** | Energy saving configuration parameters |
| **Cnt** | Counters, read only values |
| **rtC** | Real Time Clock configuration parameters |
| **E2** | Memory storage management |
| **CoM** | Serial Communication port configuration parameters |
| **Ui** | User Interface configuration parameters |
| **inF** | Information, read only parameters |

## 4.16 PASSWORD MENU
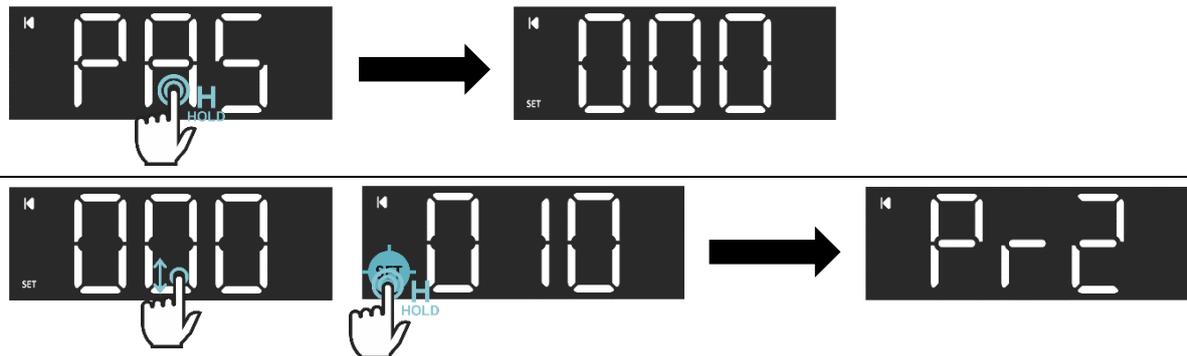


When in the **PAS** menu, it is possible to set the password value by touching the display anywhere (1 or 3 sec depending on par. **bPt**). Use V-swipe on every single digit to modify the value, then confirm the password value pressing the SET icon (1 or 3 sec depending on par. **bPt**).


The inserted value will blink and then the display will show:
- **Pr2** if the password is correct
- **Err** if the password value is wrong

After 2 sec the display will show the **Parameter menu – ALL** with a blinking decimal point to indicate that protected parameters now are editable. Protected parameters will be now editable from all sub menus (ALL, GrP and X9) and until exiting the Programming mode.

## 4.17 X9

Every parameter is normally identified by a unique label that can have two or three alphanumeric characters. When in the "**X9**" Screen, it is possible to create the parameter label by swiping-up every single part of the label itself (first, second and third char). The system is able to drive the user through the available symbols, showing only the available ones to speed up the creation of the label.
For example, if a modification of the "interval between defrosts" parameters is required (label "idF"), these are the steps to follow:

- Enter the **X9** screen
- Swipe-up or down the first char position (lower segment on the left) until char "i" (lowercase) appears

- Move to the second char position (segment in the middle) and swipe-up or down until char "d" appears
- Move on the third char position (segment on the right) and swipe-up or down until char "F" appears
- Enter the par. value by touching the **PRG** icon for 3 sec.
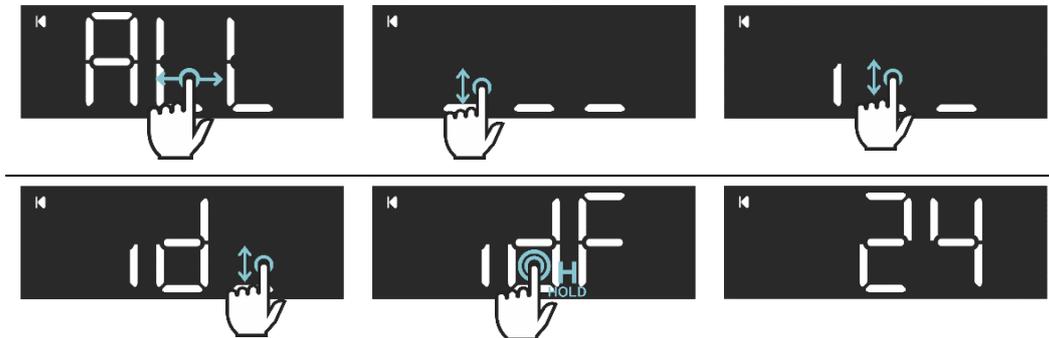


NOTE: pay attention to the upper or lower case when browsing through the available characters.
For simplicity, here is the complete list of available characters: A, b, C, d, E, F, G, H, i, L, M, n, o, P, q, r, S, t, u, V, Y, 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9

# 5. PARAMETER TABLE

Here are the descriptions of the device parameters.
**Note:** Some of these parameters below may not be present in this version; please see the configuration parameter paragraph.

| Pr1 | Parameter present into Pr1 level |
|---|---|
| Pr2 | Parameter present into Pr2 level (gray shaded cells) |

## 5.1 PARAMETER DESCRIPTION

### 5.1.1 Main regulation parameters - rEG

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|---|---|---|---|---|
| SEt | Set Point | LS to US | Range from LS to US. | 3.0 |
| LS | Minimum Set point | [-100.0°C to SET] [-148.0°F to SET] | Define the minimum value for the set point. | -100.0 |
| US | Maximum Set point | [SET to 150.0°C] [SET to 302.0°F] | Define the maximum value for the set point. | 150.0 |
| HY | Compressor regulation differential in normal mode | [0.1°C to 25.0°C] [0.1°F to 45.0°F] | Set point differential. Compressor Cut-IN is T>SET+HY. Compressor Cut-OUT is T<=SET. | 3.0 |
| HYE | Compressor regulation differential in energy saving mode | [0.1°C to 25.0°C] [0.1°F to 45.0°F] | Set point differential in energy saving mode. Compressor Cut-IN is T>SET+HES+HYE. Compressor Cut-OUT is T<=SET+HES. | 3.0 |
| HY1 | Proportional regulation differential in normal mode | [0.1°C to 25.0°C] [0.1°F to 45.0°F] | Used when a second onoff compressor or a variable speed compressor is configured. | 3.0 |
| HYS | Proportional regulation differential in energy saving mode | [0.1°C to 25.0°C] [0.1°F to 45.0°F] | Used when a second onoff compressor or a variable speed compressor is configured. | 5.0 |
| HYd | Deadband output regulation (oAx=db) differential | [0.1°C to 25.0°C] [0.1°F to 45.0°F] | Dead band output (oAx=db) is activated when T<SET-HYd. | 2.0 |
| rAr | Delay between compressor and db output (oAx=db) activation and vice versa | 0 to 255 min | Used to avoid anti short-cycling between compressor (oAx=CPx) and dead band outputs (oAx=db). | 0 |

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|-------|-------------|-------|---------|-------|
| **odS** | Output activation delay at start-up | 0 to 255 min | This function is enabled after the instrument power-on and delays the activation of the outputs. | 0 |
| **AC** | Anti-short cycle delay | 0 to 50 min | Delay between first compressor (CP1) stop and the next restart. | 0 |
| **AC1** | Anti-short cycle delay (2nd compressor) | 0 to 255 min | Delay between second compressor (CP2) stop and the next restart. | 0 |
| **2CC** | Activation mode for 2nd compressor | FUL(0); HAF(1) | FUL=delayed respect to main onoff compressor; HAF=step activation logic, par. HY1 is used. | FUL |
| **rCC** | Enable compressor rotation | n(0); Y(1) | n=compressor 1 is activated always as first; Y= toggle compressor 1 and compressor 2 activation. | no |
| **MCo** | Maximum time with compressor on (0=disabled) | 0 to 255 min | Define the maximum running time for onoff compressors. | 0 |
| **Cdd** | Compressor selection with hot gas defrost | CP1; CP2; 2CC | CP1=only compressor CP1 is activated during any defrost; CP2=only compressor CP1 is activated during any defrost; 2CC=both compressors CP1 and CP2 are activated during any defrost | 2C |
| **rtr** | Regulation percentage=F(P1; P2) (100=P1; 0=P2) | 0 to 100 | Weighted coefficient for double probe (P1 and P2) regulation R=P1*(rtr/100)+P2*(1-rtr/100). If rtr=100: only P1 value is used. If rtr=0: only P2 value is used. | 100 |
| **CCt** | Maximum duration for Pull Down | 0.0 to 23h50min | When this interval ends, the Pull Down function is immediately stopped | 00:00 |
| **CCS** | Pull Down phase differential (SET+CCS or SET+HES+CCS) | [-12.0°C to 12.0°C] [-21.6°F to 21.6°F] | During any Pull Down, the regulation SETPOINT is moved to SET+CCS (in normal mode) or to SET+HES+CCS (in energy saving mode) | 0.0 |
| **oHt** | Threshold for automatic activation of Pull Down in normal mode (SET+HY+oHt) | [0.0°C to 25.0°C] [0.0°F to 45.0°F] | This is the upper limit used to automatically activate the Pull Down function | 10.0 |
| **oHE** | Threshold for automatic activation of Pull Down in energy saving mode (SET+HES+HYE+oHE) | [0.0°C to 25.0°C] [0.0°F to 45.0°F] | This is the upper limit used to automatically activate the Pull Down function in energy saving mode. | 10.0 |
| **Con** | Compressor ON time with faulty probe | 0 to 255 min | Interval with compressor output ON in case of faulty regulation probe. With Con=0 compressor output is always OFF | 10 |
| **CoF** | Compressor OFF time with faulty probe | 0 to 255 min | Interval with compressor output OFF in case of faulty regulation probe. With CoF=0 compressor output is always ON | 15 |

### 5.1.2 Probe configuration parameters – Prb

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|-------|-------------|-------|---------|-------|
| **P1C** | Probe P1 selection | ntC(0); Pt1(1); PtC(2) | ntC= NTC probe; Pt1= PT1000 probe | ntC |
| **P2C** | Probe P2 selection | ntC(0); Pt1(1); PtC(2) | ntC= NTC probe; Pt1= PT1000 probe | ntC |
| **P3C** | Probe P3 selection | ntC(0); Pt1(1); PtC(2) | ntC= NTC probe; Pt1= PT1000 probe | ntC |
| **P4C** | Probe P4 selection | ntC(0); Pt1(1); PtC(2); Cur(3) | ntC= NTC probe; Pt1= PT1000 probe | ntC |
| **ot** | Probe P1 calibration | [-12.0°C to 12.0°C] [-21.6°F to 21.6°F] | Allows to adjust any possible offset of the probe P1. | 0.0 |
| **P2P** | Probe P2 presence | n(0); Y(1) | n = not present; Y = present | yes |
| **oE** | Probe P2 calibration | [-12.0°C to 12.0°C] [-21.6°F to 21.6°F] | Allows to adjust any possible offset of the probe P2. | 0.0 |

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|-------|-------------|-------|---------|-------|
| P3P | Probe P3 presence | n(0); Y(1) | n = not present; Y = present | no |
| o3 | Probe P3 calibration | [-12.0°C to 12.0°C] [-21.6°F to 21.6°F] | Allows to adjust any possible offset of the probe P3. | 0.0 |
| P4P | Probe P4 presence | n(0); Y(1) | n = not present; Y = present | no |
| o4 | Probe P4 calibration | [-12.0°C to 12.0°C] [-21.6°F to 21.6°F] | Allows to adjust any possible offset of the probe P4. | 0.0 |

### 5.1.3 Visualization parameters – diS

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|-------|-------------|-------|---------|-------|
| CF | Temperature measurement unit: Celsius; Fahrenheit | °C(0); °F(1) | Select the measurement unit for temperature: °C = Celsius; °F = Fahrenheit | °C |
| rES | Temperature resolution: decimal, integer | dE(0); in(1) | Select the resolution for temperature: dE = decimal; in = integer | dE |
| Lod | Probe default displayed | P1(0); P2(1); P3(2); P4(3); SEt(4); dtr(5) | Px=probe "x"; Set=set point; dtr=probe visualization percentage. | P1 |
| dLY | Temperature display delay (resolution 10 sec) | 0.0 to 20min00sec | Visualization filter used when the temperature increases: the display is updated of 1°C or 1°F after dLY interval. | 00:00 |
| dtr | Probe visualization percentage, F(P1; P2) | 1 to 99 | Setting dtr=1 the display will show this value VALUE=0.01*P1+0.99*P2 | 99 |

### 5.1.4 Defrost configuration parameters – dEF

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|-------|-------------|-------|---------|-------|
| EdF | Defrost mode | rtC(0); in(1) | Define the defrost timed control: in=fixed intervals; rtC=following real time clock | in |
| tdF | Defrost type: electric heating, hot gas | EL(0); in(1) | Define the defrost mode: EL=electrical heaters; in=hot gas | EL |
| dFP | Probe selection for defrost control | nP(0); P1(1); P2(2); P3(3); P4(4) | nP=no probe; Px=probe "x" | P2 |
| dtE | End defrost temperature | [-50.0°C to 50.0°C] [-58.0°F to 122.0°F] | Define the temperature threshold, measured by the evaporator probe (dFP), which causes the end of current defrost cycle | 8.0 |
| idF | Interval between two successive defrost cycles | 0 to 120 hours | Determines the time interval between the beginning of two defrosting cycles. Valid when EdF=in. | 24 |
| MdF | Maximum length of defrost cycle | 0 to 255 min | When dFP=nP (no evaporator probe presence) it sets the defrost duration. When dFP=Px (defrost end based on temperature measured by probe Px) it sets the maximum length for the defrost cycle. If PxP=n (probe not present or not configured) MdF works as defrost duration. | 20 |
| dSd | Start defrost delay | 0 to 999 sec | A fixed delay is applied to any manual defrost activation | 0 |
| StC | Compressor off-cycle before starting any defrost | 0 to 255 sec | Interval with compressor OFF before activating any hot gas defrost cycle | 0 |
| dFd | Displaying during defrost | rt(0); it(1); SEt(2); dEF(3); Coo(4) | rt = show always the real temperature; it = show always the start defrost temperature; SEt = show always the Setpoint value; dEF = show the label "dEF"; Coo = show the label "dEF" during defrost and the label "Coo" after defrost and draining until T>SET+HY | dEF |

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|---|---|---|---|---|
| dAd | Temperature display delay after any defrost cycle | 0 to 255 min | delay before updating the temperature on the display after the end of any defrost. | 0 |
| Fdt | Draining time | 0 to 255 min | during a draining phase the regulation is stopped. | 1 |
| Hon | Drain heater enabled after draining time (par. Fdt) | 0 to 255 min | The relative output will stay on after draining time. Used only after a defrost phase. | 2 |
| dPo | Defrost cycle enebled at stat-up | n(0); Y(1) | Enables a defrost at power on | no |
| HYP | Differential temperature during any pre-defrost phase | [-12.0°C to 12.0°C] [-21.6°F to 21.6°F] | Move the regulation setpoint to the value SET-HYP during dAF interval | 0.0 |
| Pd2 | Defrost output deactivation delay | 0 to 255 sec | Delay the defrost output deactivation | 0 |
| dAF | Pre-defrost time | 0 to 255 min | Interval for pre-defrost function | 0 |
| od1 | Automatic defrost (at the beginning of any energy saving) | n(0); Y(1) | n=function disabled; Y=function enabled | no |
| od2 | Optimized defrost | n(0); Y(1) | n=function disabled; Y=function enabled | no |
| dSt | Temperature sampling time during an optimized defrost (valid only if od2=yes) | 1 to 255 sec | Timed control of the evaporator temperature. Used only with od2=Y | 30 |
| SYd | Tipe of synchronized defrost | nu; SYn; nSY | nu=not used; Syn=synchronized defrost; nSY=desynchronized defrost. | nU |
| dt1 | Differential temperature for latent heating control | 0.1°C to 1.0°C | Timed control of the evaporator temperature. Used only with od2=Y. | 0.1 |
| ErS | Restart regulation after dripping and if SYd=nSY | n(0); Y(1) | n=the controller waits for all controllers to finish their defrost operations before restart regulation. Y=the controller restart regulation after dripping phase, without waiting for the others to finish their defrost operations. | no |

### 5.1.5  Evaporator and condenser fan configuration parameters - FAn

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|---|---|---|---|---|
| FAP | Probe selection for evaporator fan | nP(0); P1(1); P2(2); P3(3); P4(4) | nP=no probe; Px=probe "x" | nP |
| FSt | Evaporator fan stop temperature | [-50.0°C to 50.0°C] [-58.0°F to 122.0°F] | Evaporator fan will stop when the measured temperature (from probe FAP) is T>FSt. | 10.0 |
| HYF | Evaporator fan regulator differential | [0.1°C to 25.0 °C] [0.1°F to 45.0°F] | Evaporator fan will start when the measured temperature (from probe FAP) is T<FSt-HYF. | 2.0 |
| FnC | Evaporator fan operating mode | C_n(0); O_n(1); C_Y(2); O_Y(3) | • Cn = runs with the compressor, duty-cycle when compressor is OFF (see FoF, Fon, FF1 and Fo1 parameters) and OFF during defrost <br> • on = continuous mode, OFF during defrost <br> • CY = runs with the compressor, duty-cycle when compressor is OFF (see FoF, Fon, FF1 and Fo1 parameters) and ON during defrost <br> • oY = continuous mode, ON during defrost | C_n |
| Fnd | Evaporator fan delay after defrost cycle | 0 to 255 min | Delay before evaporator fan activation after any defrosts. | 1 |
| FCt | Differential temperature for cyclic activation of evaporator fans (0=disabled) | [0°C to 50°C] [0°F to 90°F] | Used to reduce anti short-cycling for evaporator fans. | 0 |

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|-------|-------------|-------|---------|-------|
| FSU | Evaporator fan operating mode | Std(0); FoF(1); Fon(2) | Std = standard mode, evaporator fan follows par FnC; Fon = evaporator Fan always on; FoF = evaporator fan always off | Std |
| Ft | Evaporator fan controlled during defrost | n(0); Y(1) | n = evaporator fan follows par. FnC during any defrost; Y = evaporator fan regulator is active during any defrost | no |
| Fon | Evaporator fan ON time in normal mode (with compressor OFF) | 0 to 255 min | Used in normal mode. Interval with evaporator fan forced ON when compressor is OFF. | 5 |
| FoF | Evaporator fan OFF time in normal mode (with compressor OFF) | 0 to 255 min | Used in normal mode. Interval with evaporator fan forced OFF when compressor is OFF. | 10 |
| Fo1 | Evaporator fan ON time in energy saving (with compressor OFF) | 0 to 255 min | Used in energy saving. Interval with evaporator fan forced ON when compressor is OFF. | 5 |
| FF1 | Evaporator fan OFF time in energy saving (with compressor OFF) | 0 to 255 min | Used in energy saving. Interval with evaporator fan forced OFF when compressor is OFF. | 10 |
| Fd1 | Evaporator fan delay | 0 to 255 sec | Delay before activating evaporator fan | 0 |
| Fd2 | Evaporator fan delay after closing door | 0 to 255 sec | Delay before activating evaporator fan and after closing the door | 0 |
| FAC | Probe selection for condenser fan | nP(0); P1(1); P2(2); P3(3); P4(4) | nP=no probe; Px=probe "x" | 10 |
| St2 | Set Point 2 Regulation (for condenser fan) | [-100.0°C to 150.0°C] [-148.0°F to 302.0°F] | Condenser fan will stop when the measured temperature (from probe FAC) is T<St2. | 5 |
| HY2 | Set Point 2 differential (for condenser fan) | [0.1°C to 25.0°C] [0.1°F to 45.0°F] | Condenser fan will start when the measured temperature (from probe FAC) is T>St2+HY2. | 10 |
| FCC | Condenser fan operating mode | C_n(0); O_n(1); C_Y(2); O_Y(3) | • Cn = runs with the compressor and OFF during defrost<br>• on = continuous mode, OFF during defrost<br>• CY = runs with the compressor and ON during defrost<br>• oY = continuous mode, ON during defrost | 0 |
| Fd3 | Condenser fan activation delay | 0 to 255 sec | Delay before activating condenser fan | 0 |
| Fd4 | Condenser fan deactivation delay | 0 to 255 sec | Delay before deactivating condenser fan | 10 |

## 5.1.6  Auxiliary regulator parameters – AUS

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|-------|-------------|-------|---------|-------|
| ACH | Type of control for auxiliary regulator | CL(0); Ht(1) | CL = regulator works as "cooling"; Ht = regulator works as "heating" | CL |
| SAA | Set point for auxiliary regulator | [-100.0°C to 150.0°C] [-148.0°F to 302.0°F] | Define the temperature set point to switch the auxiliary relay. | 5.0 |
| SHY | Auxiliary regulator differential | [0.1°C to 25.0°C] [0.1°F to 45.0°F] | Differential for auxiliary output set point:<br>• ACH=CL, AUX Cut in is [SAA+SHY]; AUX Cut out is SAA.<br>• ACH=Ht, AUX Cut in is [SAA–SHY]; AUX Cut out is SAA. | 2.0 |
| ArP | Probe selection for auxiliary regulator | nP(0); P1(1); P2(2); P3(3); P4(4) | nP = no probe, the auxiliary relay is switched only by the digital input; Px=probe "x". | nP |

| Sdd | Auxiliary regulator disabled during any defrost cycle | n(0); Y(1) | n = the auxiliary relay operates during defrost. Y = the auxiliary relay is switched off during defrost | no |
|---|---|---|---|---|
| btA | Base time for parameters Ato and AtF | SEC; Min | SEC = base time is in second; Min = base time is in minutes. | Sec |
| Ato | Interval of time with auxiliary output ON | 0 to 255 sec/min | Auxiliary output ON time (with base time defined by par. btA) | 0 |
| AtF | Interval of time with auxiliary output OFF | 0 to 255 sec/min | Auxiliary output OFF time (with base time defined by par. btA) | 0 |

## 5.1.7 Alarm configuration parameters - ALr

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|---|---|---|---|---|
| ALP | Probe selection for temperature alarms | nP(0); P1(1); P2(2); P3(3); P4(4) | nP=no probe; Px=probe "x" | P1 |
| ALC | Temperature alarms configuration: relative, absolute | rE(0); Ab(1) | Type of alarm threshold: Ab = absolute; rE = relative (to the Setpoint) | Ab |
| ALU | High temperature alarm | °C[0.0° to 50.0° o ALL to 150.0°] °F[0.0° to 90.0° o ALL to 302.0°] | When this temperature is reached, the alarm is enabled after the ALd delay time.<br>• If ALC=Ab: ALL to 150.0°C or ALL to 302°F.<br>• If ALC=rE: 0.0 to 50.0°C or 0 to 90°F | 150.0 |
| ALL | Low temperature alarm | °C[0.0° to 50.0° o -100.0°C to ALU] °F[0.0° to 90.0° o -148.0°F to ALU] | When this temperature is reached, the alarm is enabled after the ALd delay time.<br>• If ALC=Ab: -100.0°C to ALU or -148°F to ALU.<br>• If ALC=rE: 0.0 to 50.0°C or 0 to 90°F. | -100.0 |
| AFH | Temperature alarm differential | [0.1°C to 25.0°C] [0.1°F to 45.0°F] | Differential for alarm deactivation | 2.0 |
| ALd | Temperature alarm delay | 0 to 255 min | Delay between the detection of an alarm condition and the relative alarm signaling. | 0 |
| dot | Temperature alarm delay with open door | 0.0 to 24min00sec | Delay between the detection of a door open condition and the relative alarm signaling. | 00:00 |
| dAo | Temperature alarm delay at start-up | 0.0 to 24h00min | Delay between the detection of a temperature alarm condition and the relative alarm signaling at power-on. | 00:00 |
| AP2 | Probe selection for 2nd temperature alarm | nP(0); P1(1); P2(2); P3(3); P4(4) | nP=no probe; Px=probe "x". | nP |
| AU1 | Pre-alarm threshold for 2nd temperature alarm (absolute value) | [-100.0°C to 150.0°C] [-148.0°F to 302.0°F] | Warning alarm threshold, message "AU1" is visualized on the display | 150.0 |
| AH1 | 2nd high temperature pre-alarm differential | [0.1°C to 25.0°C] [0.1°F to 45.0°F] | Differential for pre-alarm deactivation. | 2.0 |
| Ad1 | 2nd high temperature pre-alarm delay | 0 to 255 min | Delay between the detection of any pre-alarm condition and the relative alarm signaling | 255 |
| AL2 | 2nd low temperature alarm | [-100.0°C to 150.0°C] [-148.0°F to 302.0°F] | Lower threshold for second temperature alarm. | -100.0 |
| AU2 | 2nd high temperature alarm | [-100.0°C to 150.0°C] [-148.0°F to 302.0°F] | Upper threshold for second temperature alarm. | 150.0 |
| AH2 | 2nd temperature alarm differential | [0.1°C to 25.0°C] [0.1°F to 45.0°F] | Differential for second alarm deactivation. | 2.0 |
| Ad2 | 2nd temperature alarm delay | 0 to 255 min | Delay between the detection of any alarm condition and the relative alarm signaling | 0 |

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|-------|-------------|-------|---------|-------|
| **dA2** | 2nd temperature alarm delay at start-up | 0.0 to 24h00min | Delay between the detection of the second temperature alarm condition and the relative alarm signaling at power-on. | 00:00 |
| **bLL** | Compressor OFF due to 2nd low temperature alarm | n(0); Y(1); MAn(2) | n = the compressor continues to work; Y = the compressor is switched off while the alarm is ON; MAn=a device reset (cycle power or stand-by) is required to reset this alarm. | n |
| **AC2** | Compressor OFF due to 2nd high temperature alarm | n(0); Y(1); MAn(2) | n = the compressor continues to work; Y = the compressor is switched off while the alarm is ON; MAn=a device reset (cycle power or stand-by) is required to reset this alarm. | n |
| **SAF** | Differential for anti-freezing control | [-12.0 to 12.0°C] [21.0 to 21.0°F] | Safety control. The regulation is stopped if T<SET+SAF | -1.0 |
| **tbA** | Alarm relay deactivation | n(0); Y(1) | n = it is not possible to deactivate a digital output set as an alarm output; Y = it is possible to deactivate both the buzzer and the digital output set as an alarm output. | no |

## 5.1.8 Digital output configuration parameters – out

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|-------|-------------|-------|---------|-------|
| **oA1** | Relay output oA1 configuration | nu(0); CP1(1); dEF(2); FAn(3); ALr(4); LiG(5); AUS(6); db(7); onF(8); HES(9); Cnd(10); CP2(11); dF2(12); HEt (13); inv(14) | nu=not used; CP1=onoff compressor 1; dEF=defrost; Fan=evaporator fan; ALr=alarm; LiG=light; AUS=auxiliary relay; db=neutral zone; onF=always ON with instrument ON; HES=energy saving; Cnd=condenser fan; CP2=second onoff compressor; dF2=second defrost; HEt=heater control; inV=inverter output; dEH=dehumidifier; HUM=humidifier; SAn=sanitization; EFn=air extraction fan | CP1 |
| **oA2** | Relay output oA2 configuration | nu(0); CP1(1); dEF(2); FAn(3); ALr(4); LiG(5); AUS(6); db(7); onF(8); HES(9); Cnd(10); CP2(11); dF2(12); HEt (13); inv(14) | nu=not used; CP1=onoff compressor 1; dEF=defrost; Fan=evaporator fan; ALr=alarm; LiG=light; AUS=auxiliary relay; db=neutral zone; onF=always ON with instrument ON; HES=energy saving; Cnd=condenser fan; CP2=second onoff compressor; dF2=second defrost; HEt=heater control; inV=inverter output; dEH=dehumidifier; HUM=humidifier; SAn=sanitization; EFn=air extraction fan | dEF |
| **oA3** | Relay output oA3 configuration | nu(0); CP1(1); dEF(2); FAn(3); ALr(4); LiG(5); AUS(6); db(7); onF(8); HES(9); Cnd(10); CP2(11); dF2(12); HEt (13); inv(14) | nu=not used; CP1=onoff compressor 1; dEF=defrost; Fan=evaporator fan; ALr=alarm; LiG=light; AUS=auxiliary relay; db=neutral zone; onF=always ON with instrument ON; HES=energy saving; Cnd=condenser fan; CP2=second onoff compressor; dF2=second defrost; HEt=heater control; inV=inverter output; dEH=dehumidifier; HUM=humidifier; SAn=sanitization; EFn=air extraction fan | FAn |

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|---|---|---|---|---|
| **oA4** | Relay output oA4 configuration | nu(0); CP1(1); dEF(2); FAn(3); ALr(4); LiG(5); AUS(6); db(7); onF(8); HES(9); Cnd(10); CP2(11); dF2(12); HEt (13); inv(14) | nu=not used; CP1=onoff compressor 1; dEF=defrost; Fan=evaporator fan; ALr=alarm; LiG=light; AUS=auxiliary relay; db=neutral zone; onF=always ON with instrument ON; HES=energy saving; Cnd=condenser fan; CP2=second onoff compressor; dF2=second defrost; HEt=heater control; inV=inverter output; dEH=dehumidifier; HUM=humidifier; SAn=sanitization; EFn=air extraction fan | LiG |
| **AoP** | Alarm relay polarity | OP(0); CL(1) | oP = activated by opening the contact; CL = activated by closing the contact. | CL |
| **LoF** | Light output OFF when in stand-by | n(0); Y(1) | n=light output status unchanged after stand-by. Y=light output switched off after stand-by. | no |
| **LAU** | Light output ON after power-on | n(0); Y(1) | n=light output unchanged; Y=light output forced ON. | no |

## 5.1.9  Digital input configuration parameters – inP

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|---|---|---|---|---|
| **ibt** | Base times for digital input 1 | SEC(0); Min(1) | SEC = seconds; Min = minutes. Delay in activating the function linked to the digital inputs. | Sec |
| **i1P** | Digital input 1 polarity | OP(0); CL(1) | oP = activated by opening the contact; CL = activated by closing the contact. | CL |
| **i1F** | Digital input 1 configuration | nu(0); dor(1); dEF(2);  AUS(3); ES(4); EAL(5); bAL(6); PAL (7); Fan(8); HdF(9); onF(10); LiG(11); CC(12); EMt(13); MAP(14) | • nu=not used<br>• dor = door switch function<br>• dEF = defrost activation<br>• AUS = auxiliary output<br>• ES = energy saving mode activation<br>• EAL = external warning alarm<br>• bAL = external lock alarm<br>• PAL = external pressure alarm<br>• FAn = evaporator fan control<br>• HdF = holiday defrost<br>• onF = ON/OFF status change<br>• LiG = light output control<br>• CC = pull down activation<br>• EMt = X-MOD motion detection sensor<br>• MAP = map change, from the one in use to the one not in use<br>• SAn = sanitization<br>• EFn = air extraction fan activation | nU |
| **did** | Digital inputs 1 alarm delay (base time depends on par. ixt) | 0 to 255 min/sec | delay between the detection of an external event and the activation of the relative function. | 0 |
| **i2P** | Digital input 2 polarity | OP(0); CL(1) | oP = activated by opening the contact; CL = activated by closing the contact. | CL |

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|---|---|---|---|---|
| i2F | Digital input 2 configuration | nu(0); dor(1); dEF(2); AUS(3); ES(4); EAL(5); bAL(6); PAL (7); FAn(8); HdF(9); onF(10); LiG(11); CC(12); EMt(13) | • nu=not used<br>• dor = door switch function<br>• dEF = defrost activation<br>• AUS = auxiliary output<br>• ES = energy saving mode activation<br>• EAL = external warning alarm<br>• bAL = external lock alarm<br>• PAL = external pressure alarm<br>• FAn = evaporator fan control<br>• HdF = holiday defrost<br>• onF = ON/OFF status change<br>• LiG = light output control<br>• CC = pull down activation<br>• EMt = X-MOD motion detection sensor<br>• MAP = map change, from the one in use to the one not in use<br>• SAn = sanitization<br>• EFn = air extraction fan activation | nU |
| d2d | Digital inputs 2 alarm delay (base time depends on par. ixt) | 0 to 255 min/sec | delay between the detection of an external event and the activation of the relative function. | 0 |
| nPS | Number of external pressure switch alarms before stopping the regulation | 0 to 15 | after reaching nPS events in the digital input alarm delay (par. dxd), the regulation will be stopped and a manual restart (ON/OFF, power OFF and power ON) will be required | 0 |
| odC | Compressor and fan status after door opening | no(0); FAn(1); CPr(2); F-C(3) | no = no regulation lockout; FAn = Fan OFF; CPr = Compressor OFF; F-C = Compressor and fan OFF | no |
| rrd | Regulation restart after door alarm | n(0); Y(1) | n = no regulation restart if the door is open; Y = when the rrd timer elapses, the regulation restarts even if a door open alarm is ON | no |
| CLi | Light output activation from door input | n(0); Y(1) | n=light output unchanged after door opening; Y=light output activation after door opening. | no |
| LCi | Time with light output forced ON (0=function disabled) | 0 to 255 min | interval with light output ON. 0=function disabled. | 0 |
| n01 | Number of motion detections before activating light output (valid if ixF=EMt) | 0 to 10 | amount of motion detection events before activating light outputs | 0 |
| t01 | Time with light output forced ON after motion detection | 0 to 255 min | interval with light output ON. 0=function disabled. | 0 |
| EMF | Temporary disabling of the light output activation from motion detection. | 0 to 255 min | reading inhibition interval after switching off the light output by means of a button or serial command (valid if ixF=EMt) | 0 |

### 5.1.10 Energy saving configuration parameters ES

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|---|---|---|---|---|
| ErA | Energy saving algorithm | nu(0); bAS(1) | nu=disabled, the energy saving mode activation is by button, real time clock or digital input; bAS=basic algorithm, the energy saving mode activation depends on the the digital input. | nu |
| HES | Temperature differential in energy saving | [-30.0°C to 30.0°C] [-54.0°F to 54.0°F] | Differential to add to the Setpoint during the Energy Saving cycle. | 0 |
| LdE | Light output control in energy saving | n(0); Y(1) | Y = light outputs off when energy saving mode is active | no |

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|---|---|---|---|---|
| StE | Period to switch from normal mode to energy saving mode | 0.0 to 24h00min | if the door stay closed for StE time, the energy saving mode will be activated (is ErA=bAS). NOTE: this will require a door switch to work. | 00:00 |
| EtS | Period to switch from energy saving mode to normal mode | 0.0 to 24h00min | maximum time for energy saving mode (if ErA=bAS). NOTE: this will require a door switch to work. | 00:00 |
| dS | Door opening time to switch from energy saving to normal mode | 0 to 999 sec | the energy saving mode will be immediately deactivated as soon as the door stays open more than the dS time. NOTE: this will require a door switch to work. | 5 |
| nES | Number of motion detections before disabling energy saving (valid if ixF=EMt) | 0 to 255 | Energy saving deactivation through X-MOD motion detection sensor. | 0 |

### 5.1.11 Counters, read only values – Cnt

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|---|---|---|---|---|
| n1H | Number of activations for relay output oA1 (thousands of) - Read Only | --- | Total number of relay oA1 activations. This value is saved into controller memory. | |
| n1L | Number of activations for relay output oA1 (units of) - Read Only | --- | Total number of relay oA1 activations. This value is saved into controller memory. | |
| n2H | Number of activations for relay output oA2 (thousands of) - Read Only | --- | Total number of relay oA2 activations. This value is saved into controller memory. | |
| n2L | Number of activations for relay output oA2 (units of) - Read Only | --- | Total number of relay oA2 activations. This value is saved into controller memory. | |
| n3H | Number of activations for relay output oA3 (thousands of) - Read Only | --- | Total number of relay oA3 activations. This value is saved into controller memory. | |
| n3L | Number of activations for relay output oA3 (units of) - Read Only | --- | Total number of relay oA3 activations. This value is saved into controller memory. | |
| n4H | Number of activations for relay output oA4 (thousands of) - Read Only | --- | Total number of relay oA4 activations. This value is saved into controller memory. | |
| n4L | Number of activations for relay output oA4 (units of) - Read Only | --- | Total number of relay oA4 activations. This value is saved into controller memory. | |
| n7H | Number of total activations of digital input 3 (thousand of) - Read Only | --- | Total number of digital input 3 activations. This value is saved into controller memory. | |
| n7L | Number of total activations of digital input 3 (units of) - Read Only | --- | Total number of digital input 3 activations. This value is saved into controller memory. | |
| n8H | Number of total activations of digital input 2 (thousand of) - Read Only | --- | Total number of digital input 2 activations. This value is saved into controller memory. | |
| n8L | Number of total activations of digital input 2 (units of) - Read Only | --- | Total number of digital input 2 activations. This value is saved into controller memory. | |
| F1H | Number of working hours for relay output oA1 (thousands of) - Read Only | --- | Total number of working hours for relay oA1. This value is saved into controller memory. | |
| F1L | Number of working hours for relay output oA1 (units of) - Read Only | --- | Total number of working hours for relay oA1. This value is saved into controller memory. | |

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|---|---|---|---|---|
| **F2H** | Number of working hours for relay output oA2 (thousands of) - Read Only | --- | Total number of working hours for relay oA2. This value is saved into controller memory. | |
| **F2L** | Number of working hours for relay output oA2 (units of) - Read Only | --- | Total number of working hours for relay oA2. This value is saved into controller memory. | |
| **F3H** | Number of working hours for relay output oA3 (thousands of) - Read Only | --- | Total number of working hours for relay oA3. This value is saved into controller memory. | |
| **F3L** | Number of working hours for relay output oA3 (units of) - Read Only | --- | Total number of working hours for relay oA3. This value is saved into controller memory. | |
| **F4H** | Number of working hours for relay output oA4 (thousands of) - Read Only | --- | Total number of working hours for relay oA4. This value is saved into controller memory. | |
| **F4L** | Number of working hours for relay output oA4 (units of) - Read Only | --- | Total number of working hours for relay oA4. This value is saved into controller memory. | |

### 5.1.12 Real Time Clock configuration parameters – rtC

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|---|---|---|---|---|
| **HUr** | Hours - Read Only | --- | Real time clock: hour value | |
| **Min** | Minutes - Read Only | --- | Real time clock: minutes value | |
| **dAY** | Day of the week - Read Only | --- | Real time clock: day of the week value | |
| **dYM** | Day of the month - Read Only | --- | Real time clock: calendar day value | |
| **Mon** | Month - Read Only | --- | Real time clock: month value | |
| **YAr** | Year - Read Only | --- | Real time clock: year value | |
| **Hd1** | First day of weekend | Sun(0) to SAt(6); nu(7) | Select the first day of the weekend | Sun |
| **Hd2** | 2nd day of weekend | Sun(0) to SAt(6); nu(7) | Select the second day of the weekend | Sun |
| **iLE** | Energy saving cycle starting time on working days | 0.0 to 23h50min; nu(144) | Select the beginning of the energy saving mode on working days. | 00:00 |
| **dLE** | Energy saving cycle duration on working days | 0.0 to 24h00min | Select the duration of the energy saving mode on working days. | 00:00 |
| **iSE** | Energy saving cycle starting time on weekends | 0.0 to 23h50min; nu(144) | Select the beginning of the energy saving mode on weekends. | 00:00 |
| **dSE** | Energy saving cycle duration on weekends | 0.0 to 24h00min | Select the duration of the energy saving mode on weekends. | 00:00 |
| **dd1** | Sunday defrost | n(0); Y(1) | Enable the Ld1 to Ld6 defrost operation on Sunday | no |
| **dd2** | Monday defrost | n(0); Y(1) | Enable the Ld1 to Ld6 defrost operation on Monday | no |
| **dd3** | Tuesday defrost | n(0); Y(1) | Enable the Ld1 to Ld6 defrost operation on Tuesday | no |
| **dd4** | Wednesday defrost | n(0); Y(1) | Enable the Ld1 to Ld6 defrost operation on Wednesday | no |
| **dd5** | Thursday defrost | n(0); Y(1) | Enable the Ld1 to Ld6 defrost operation on Thursday | no |
| **dd6** | Friday defrost | n(0); Y(1) | Enable the Ld1 to Ld6 defrost operation on Friday | no |
| **dd7** | Saturday defrost | n(0); Y(1) | Enable the Ld1 to Ld6 defrost operation on Saturday | no |
| **Ld1** | 1st defrost starting time | 0.0 to 23h50min; nu(144) | Sets the beginning of the first programmable defrost cycle. | 00:00 |
| **Ld2** | 2nd defrost starting time | 0.0 to 23h50min; nu(144) | Sets the beginning of the second programmable defrost cycle. | 00:00 |

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|---|---|---|---|---|
| **Ld3** | 3rd defrost starting time | 0.0 to 23h50min; nu(144) | Sets the beginning of the third programmable defrost cycle. | 00:00 |
| **Ld4** | 4th defrost starting time | 0.0 to 23h50min; nu(144) | Sets the beginning of the fourth programmable defrost cycle. | 00:00 |
| **Ld5** | 5th defrost starting time | 0.0 to 23h50min; nu(144) | Sets the beginning of the fifth programmable defrost cycle. | 00:00 |
| **Ld6** | 6th defrost starting time | 0.0 to 23h50min; nu(144) | Sets the beginning of the sixth programmable defrost cycle. | 00:00 |

### 5.1.13 Memory storage management – E2

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|---|---|---|---|---|
| **MAP** | Current configuration | C-1(0); C-2(1) | To change configuration (parameter map) used | |
| **LdM** | Restoring default setting | n(0); Y(1) | Select Y and confirm to reload factory default values for the configuration currently used. | |
| **rHA** | MAX and Min values reset for HACCP functions (valid if .eMiMa=1) | n(0); Y(1) | Select Y and confirm to reset the memorized min and MAX temperature values (HACCP function must be enabled). | |

### 5.1.14 Serial Communication port configuration parameters – CoM

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|---|---|---|---|---|
| **Adr** | Serial address for COM1 | 1 to 247 | device address for Modbus communication | 1 |
| **bAU** | Baudrate for COM1 | 9.6(0); 19.2(1); 38.4(2); 57.6(3) | select the correct baudrate for serial communication | 9.6 |
| **PAr** | Parity control for COM1 | no(0); odd(1); EvE(2) | no=no parity control; odd=odd parity control; EvE=even parity control | no |

### 5.1.15 User Interface configuration parameters – Ui

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|---|---|---|---|---|
| **SC0** | Device Lock | n(0); Y(1) | n=device never locked; Y=device can be locked manually or automatically (if par. SCA > 0). When locked, any action on the display will show a "LoC" message. | no |
| **SC5** | User interface timeout | 10 to 255 sec | Timeout for function and menu exit | 60 |
| **SC7** | Active load icons visualization in Home | n(0); Y(1); ovr(2) | n=never visualized; Y=visualized for 3 sec after any touch; over=always visualized | yes |
| **SC8** | Info menu management | n(0); Y(1) | The info menu collect tha status of the I/Os. n=disabled; Y=enabled. | yes |
| **SC9** | "oFF" label in stand-by | n(0); Y(1) | Show the OFF label when in stand-by. OFF label is visualized 1 sec out of 10 sec. | no |
| **SCA** | Timeout for automatic device lock | 0 to 255 min | Timer before automatic device lock. 0=function disabled. | 0 |
| **bPt** | Confirmation time for SET button | S(short)=1sec; L(Long)=3sec | Sets the confirmation time through SET button | 3 |
| **bS** | Alarm Sound Level | 0 to 5 | Buzzer level for alarm indication. 0=buzzer muted; 5=buzzer at maximum. | 3 |
| **b2C** | Button 2 configuration | n(0), Fn1(1); MAP(2) | n=not used; Fn1 = pull down activation; MAP = configuration change | Fn1 |

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|---|---|---|---|---|
| **b3C** | Button 3 configuration | n(0), AUS(1); MAP(2) | n=not used; AUS = auxiliary outrput MAP=configuration change | AUS |
| **b4C** | Button 4 configuration | n(0), ES(1); MAP(2) | n=not used; ES =energy saving; MAP=configuration change | ES |
| **b1F** | Button 1 enabled in stand-by | n(0); Y(1) | The relative function is enable also in stand-by mode | yes |
| **b2F** | Button 2 enabled in stand-by | n(0); Y(1) | The relative function is enable also in stand-by mode | no |
| **b3F** | Button 3 enabled in stand-by | n(0); Y(1) | The relative function is enable also in stand-by mode | no |
| **PSU** | Password for level Pr2 | 0 to 999 | insert a value to protect all the parameters set on the level Pr2 from modification | 0 |

### 5.1.16 Information, read only parameters – inF

| LABEL | DESCRIPTION | RANGE | MEANING | VALUE |
|---|---|---|---|---|
| **dP1** | Probe P1 value - Read Only | --- | Probe 1 real time value | |
| **dP2** | Probe P2 value - Read Only | --- | Probe 2 real time value | |
| **dP3** | Probe P3 value - Read Only | --- | Probe 3 real time value | |
| **dP4** | Probe P4 value - Read Only | --- | Probe 4 real time value | |
| **rSE** | Real regulation Set Point (SET + HES + SETd) - Read Only | --- | Real regulation Setpoint. This value take into consideration other status or function activated such as Energy Saving mode. | |
| **FdY** | Firmware release date: day - Read Only | --- | Official release date | |
| **FMn** | Firmware release date: month - Read Only | --- | Official release date | |
| **FYr** | Firmware release date: year - Read Only | --- | Official release date | |
| **rEL** | Firmware release - Read Only | --- | Official release version | |
| **SUb** | Firmware sub release - Read Only | --- | Official release sub-version | |
| **Ptb** | Parameter map version - Read Only | --- | Official release for parameter map | 2 |

**NOTE:** some parameters are not present in models XR30T and XR60T due to lack of the relevant I/O's.

# 6. REGULATION

The regulation is based on the temperature measured by the thermostat probe (P1) with a positive differential compared to the set point: if the temperature increases and reaches the set point plus differential, the compressor will start. The compressor will stop when the temperature reaches the set point value again. In case of fault because of the thermostat probe, the start and stop of the compressor are timed through parameters **CoF** and **Con**.
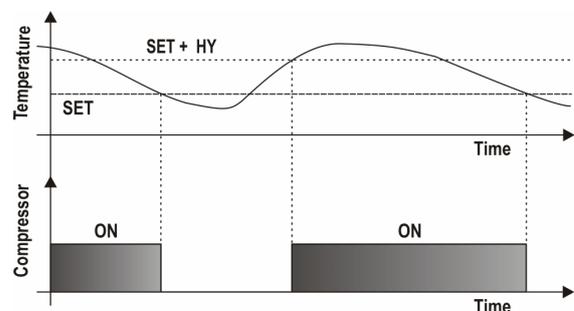


## 6.1  DOUBLE COMPRESSOR REGULATION

The controller can drive double compressor circuits. To do this, a couple of relays need to be properly configured: **oAx=CP1** and **oAy=CP2**.
The second compressor output is activated by following the **2CC** parameter:

- If **2CC=FUL** then in parallel with the relay of the first compressor (**CP1**), with a possible delay as set in the **AC1** parameter. Both compressors are switched off at the same time.
- If **2CC=HAF** then
  - In normal mode: first compressor (CP1) cut-in is **T>SET+HY**, second compressor (CP2) cut-in is **T>SET+HY+HY1**. The delay **AC1** is always respected. The second compressor (CP2) is deactivated when **T<SET+HY**.
  - In energy saving mode: first compressor (CP1) cut-in is **T>SET+HES+HY**, second compressor (CP2) cut-in is **T>SET+HES+HY+HYS**. The delay **AC1** is always respected. The second compressor (CP2) is deactivated when **T<SET+HES+HY**.

With parameter **rCC** it is possible to enable the compressor rotation function: the activation of the first and the second compressor will be alternated to equalize the number of working hours of both of them. In case of hot gas defrost operation, it is possible to select if one or both compressors will be used.

# 7. ENERGY SAVING

The standard SET-POINT (**SET**) is used to maintain the temperature at a certain value when the energy saving status (ES) is not active. On the other hand, when the ES status is active a different SET-POINT (**SET_ES**), higher than the standard one, will be used. The parameter **HES** defines the energy setpoint according to the following formula: **SET_ES = SET + HES**
There are also two different differential values for **SET** and **SET_ES**, which are used for compressor cut-in and cut-out: when ES status is active, the **HYE** parameter will be used instead of the **HY** parameter.

## 7.1  BASIC ENERGY SAVING ALGORITHM

The energy saving status will be always saved in the internal memory to resume previous operation if a power failure occurs. The presence of a door switch to work properly (for example: **i1F=dor**) is required.

### 7.1.1  PARAMETERS INVOLVED

- **ErA:** energy saving algorithm
- **i1F or i2F:** set as door input to monitor the appliance usage
- **StE:** interval to switch from normal to energy saving mode
- **EtS:** interval to switch from energy saving to normal mode
- **HES:** SETPOINT differential when energy saving mode active
- **HYE:** regulation differential when energy saving mode is active
- **dS:** interval for open door detection
- **LdE:** light output controlled by energy saving (OFF when energy saving mode is active)

| FROM | TO | MODE |
|------|-----|------|
| Normal mode | Energy Saving | Activate the ECO function from Virtual Keyboard screen. Door continuously closed for time **StE**. |
| Energy Saving | Normal mode | Activate the ECO function from Virtual Keyboard screen. Controller in ES mode for time **EtS**. If the controller is in ES mode, it returns in Standard mode when the door stays open more than time **dS**. |

**NOTE:** the cycling mode (ES - Normal mode - ES - etc.) works if **i1F=dor**, **EtS** and **StE** are different from zero. If **EtS=0** or **StE=0,** the controller will not change the operating mode, and it will be possible to change from the normal mode to the energy saving mode by using the ES button or by setting **i1F=ES**.

# 8. PULL DOWN FUNCTION

The Pull Down is automatically activated:
- After any defrost cycle
- After power-on if **T>SET+CCS**
- When the regulation probe temperature **T** is:
  - **T>SET+HY+oHt** value in normal mode
  - **T>SET+HES+HYE+oHE** value in energy saving mode

In these cases, a different set-point value (**SET+CCS**) will be used. As soon as the room temperature reaches the **SET+CCS** value, the compressor will stop and the normal regulation will restart.
**NOTE:**
- Pull Down function is disabled when **CCS=0** or **CCt=0**.
- The **CCt** parameter sets the maximum activation time for any pull down. When **CCt** expires, the Pull Down will be immediately stopped and the standard SET-POINT will be restored

# 9. DEFROST OPERATIONS

Any defrost operation can be controlled in the following way:
- **EdF=rtC**: by using an internal real-time clock (only for models equipped with RTC)
- **EdF=in**: timed defrost, in this case a new defrost will start as soon as the idF timer elapses

## 9.1 TIMED OR TEMPERATURE CONTROLLED MODE

Two defrost modes are available: timed or controlled by a temperature probe. A couple of parameters are required to control intervals between defrost cycles (**idF**) and maximum duration (**MdF**). During a defrost cycle it is possible to select some different visualizations by using the par. **dFd**. Available defrost types are:
- **tdF=EL**: with an electric heater
- **tdF=in**: by using hot gas cycle

## 9.2 AUTOMATIC DEFROST

It is possible to automatically start a defrost as soon as the energy saving mode is activated. To do this, set par. **od1=Y**.

## 9.3 OPTIMIZED DEFROST

This function allows to adapt the defrost intervals depending on the real amount of ice on the evaporator surface. This function requires an evaporator probe properly installed on the evaporator surface. A safety interval (2***MdF**) and an upper temperature limit (**dtE**) are used to guarantee that every defrost ends also in case particular conditions should happen. Please set parameters **dtE** and **MdF** according to the average values of your application. As generic note, leave **MdF** equal to the average value and set **dtE** some degrees above the average value

# 10. EVAPORATOR FAN

To enable the evaporator fan management, setting set an evaporator probe is required (par. **FAP**). Here are the involved parameters:
- **FAP**: to select the control probe
- **FSt**: to select the deactivation set point
- **HYF**: differential
- **FnC**: to define the working mode:
    - **C-n:** in parallel with compressor output and stopped during any defrost. When compressor is OFF, they will start a duty-cycle mode (see **FoF**, **Fon**, **FF1** and **Fo1** parameters)
    - **O-n:** always on, stopped during any defrost
    - **C-Y:** in parallel with compressor output and always on during any defrost. When compressor is OFF, they will start a duty-cycle mode (see **FoF**, **Fon**, **FF1** and **Fo1** parameters)
    - **o-Y:** always on
- **Fnd:** activation delay after any defrost

## 10.1 EVAPORATOR FAN AND DIGITAL INPUT

When a digital input is configured as a door switch (**i1F or i2F=dor**) and this digital input is active, evaporator fan and compressor status will depend on par. **odC**:
- **odC=no**: normal regulation
- **odC=FAn**: evaporator fan OFF
- **odC=CPr**: compressor OFF
- **odC=F-C**: compressor and evaporator fan OFF
When **rrd=Y**, the regulation restarts after **d1d** or **d2d** time.

# 11. CONDENSER FAN

To enable the condenser fan management, setting a condenser probe is required (par. **FAC**). Here are the involved parameters:

- **FAC**: to select the control probe
- **St2**: to select the deactivation setpoint
- **HY2**: differential
- **FCC**: to define the working mode:
    - **C-n:** in parallel with compressor output and stopped during any defrost. When compressor is OFF, they will start a duty-cycle mode (see **FoF**, **Fon**, **FF1** and **Fo1** parameters)
    - **O-n:** always ON, stopped during any defrost
    - **C-Y:** in parallel with compressor output and always on during any defrost. When compressor is OFF, they will start a duty-cycle mode (see **FoF**, **Fon**, **FF1** and **Fo1** parameters)
    - **o-Y:** always on

# 12. DIGITAL OUTPUTS

Depending on the model, one or more digital outputs (relays) can be configured with one of the following functionalities.

## 12.1 COMPRESSOR OUTPUT (oAx = CP1)

With **oAx=CP1** the relay operates as the main regulation output.

## 12.2 DEFROST OUTPUT (oAx = dEF)

With **oAx=dEF** the relay operates as a defrost output.

## 12.3 EVAPORATOR FAN OUTPUT (oAx = FAn)

With **oAx=FAn** the relay operates as an evaporator fan output.

## 12.4 ALARM OUTPUT (oAx = ALr)

With **oAx=ALr** the output operates as an alarm output. It is activated every time an alarm happens. Its status depends on the **tbA** parameter: if **tbA=Y**, the output is deactivated by pressing any key.
If **tbA=n**, the alarm output stays on until the alarm condition recovers.

## 12.5 LIGHT OUTPUT (oAx = LiG)

With **oAx=LiG** the relay operates as a light output.

## 12.6 AUXILIARY OUTPUT (oAx = AUS)

The auxiliary output can be managed by digital inputs (**oAx=AUS**, **i1F or i2F=AUS**): the output is switched on and off following the relative digital input status.

### 12.6.1 AUXILIARY REGULATOR

The auxiliary regulator can be used to manage the auxiliary output. Here are the involved parameters:

- **ACH:** type of regulation for the auxiliary relay: **Ht** = heating; **CL** = cooling
- **SAA:** set point for auxiliary relay
- **SHY:** auxiliary relay differential
- **ArP:** probe for auxiliary relay
- **Sdd:** auxiliary output off during defrost

### 12.6.2 TIMED ACTIVATION

The following parameters can be used to define fixed activation and deactivation intervals.

- **btA:** base time for auxiliary output activation and deactivation intervals
- **Ato:** auxiliary activation interval
- **AtF:** auxiliary deactivation interval

### 12.6.3 GENERAL NOTES

if **oAx=AUS** and **ArP=nP** (no probe for auxiliary digital output) the AUX output can be managed:

- by digital input if **i1F=AUS** or **i2F=AUS**

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- by auxiliary button (if set as **AUS**)
- by serial command (Modbus protocol)
- by fixed interval of time if **Ato>0** and **AtF>0** (if **Ato=0** or **AtF=0** the auxiliary output is disabled)

## 12.7 DEAD BAND REGULATION (oAx = db)

With **oAx=db** the output can be used to control a heater element, for example. It is used to implement a dead band regulation. If so:
- **oAx=db** cut in is **SET-HY**
- **oAx=db** cut out is **SET**

## 12.8 ON/OFF OUTPUT (oAx = onF)

When **oAx=onF**, the output is activated when the controller is switched on and deactivated when the controller is switched off.

## 12.9 ENERGY SAVING OUTPUT (oAx = HES)

When **oAx=HES**, the output is activated when the energy saving mode is active and vice-versa.

## 12.10 CONDENSER FAN OUTPUT (oAx = Cnd)

With **oAx=Cnd** the relay operates as a condenser fan output.

## 12.11 SECOND COMPRESSOR OUTPUT (oAx = CP2)

With **oAx=CP2** the relay operates as a second regulation output.

## 12.12 SECOND DEFROST OUTPUT (oAx = dF2)

With **oAx=dF2** the relay operates as second defrost output. This function is available only for special models and normally must be not selected.

## 12.13 HEATER OUTPUT (oAx = HEt)

With **oAx=HEt** the relay operates as a heater output. In this case, it will be used during and after any defrost cycle. The par. **Hon** defines the time the relative output will stay active after the end of a defrost operation.

# 13.  DIGITAL INPUTS

The digital inputs are programmable by using par. **i1F** and **i2F**.

## 13.1 DOOR SWITCH (ixF=dor)

It signals the door status. Some relay outputs can be toggled depending on the **odC** parameter:
- **odC = no** no change
- **odC = FAn** evaporator fan will be switched off
- **odC = CPr** compressor will be switched off
- **odC = F-C** both compressor and evaporator fan will be switched off

Since the door is opened:
- the door alarm is enabled
- the display shows the message "dA"
- the regulation restarts only if **rrd = Y**.

The alarm stops as soon as the external digital input is disabled again. During open door conditions, the high and low temperature alarms are disabled.

## 13.2 START DEFROST (ixF=dEF)

It starts a defrost if all conditions are fulfilled (temperature, delays, etc.). After finishing a defrost, the normal regulation will restart only if the digital input is disabled, otherwise the instrument will wait until the **MdF** safety time is expired.

## 13.3 AUXILIARY OUTPUT (ixF=AUS)

The AUX output (if present and configured) will be enabled / disabled following the status of the relative digital input.

## 13.4 ENERGY SAVING (ixF=ES)

The energy saving mode will be enabled / disabled following the status of the relative digital input.

## 13.5 EXTERNAL WARNING ALARM (ixF=EAL)

It is used to detect an external alarm. It does not lock the regulation.

## 13.6 EXTERNAL LOCK ALARM (ixF=bAL)

It is used to detect any critical external alarm. It locks immediately the regulation.

## 13.7 EXTERNAL PRESSURE ALARM (ixF=PAL)

It is used to detect any pressure external alarm. This signal locks the regulation after detecting **nPS** events in the interval **dxd**.

## 13.8 EVAPORATOR FAN MODE (ixF=FAn)

It is used to control the evaporator fan.

## 13.9 REMOTE HOLIDAY MODE (ixF=HdF)

It is used to force the holiday mode.

## 13.10 REMOTE ONOFF (ixF=onF)

It is used to switch ON and OFF the device remotely.

## 13.11 LIGHT OUTPUT (ixF=LiG)

It is used to control the light output.

## 13.12 PULL DOWN (ixF=CC)

It is used to force a cooling cycle.

## 13.13 MOTION SENSOR DETECTOR (ixF=EMt)

It is used to connect an X-MOD motion sensor. Please note that motion sensor can be connected only to the HOTKEY port, so digital input 2 must be properly configured.

## 13.14 CHANGE CONFIGURATION (ixF=MAP)

It is used to change the controller configuration.

# 14.  ALARM SIGNALLING

| Label | Cause | Outputs |
|-------|-------|---------|
| P1 | P1 probe failure | Compressor output according to **Con** e **CoF** |
| P2 | P2 probe failure | Depends on the relative function |
| P3 | P3 probe failure | Depends on the relative function |
| P4 | P4 probe failure | Depends on the relative function |
| HA | High temperature alarm | Outputs unchanged |
| LA | Low temperature alarm | Outputs unchanged |
| H2 | Second high temperature alarm | Outputs unchanged |
| L2 | Second low temperature alarm | Outputs unchanged |
| dA | Open door alarm | Compressor and fan follows par. **odC** |
| EA | Warning external alarm | Outputs unchanged |
| CA | Lock external alarm | Outputs disabled |
| EE | Internal memory alarm | Outputs unchanged |

## 14.1 ALARM RECOVERY

Probe alarms **P1**, **P2**, **P3** and **P4** are activated some seconds after detecting a fault condition in the relative probe. These alarms are automatically reset some seconds after the relative probe restarts normal operations. Always check the connections (probe – device terminals) before replacing the probe. Temperature alarms **HA**, **LA**, **H2** and **L2** are automatically reset as soon as the temperature is within the normal working range. It is possible to reset the "**EE**" alarm by pressing any button.
The alarms **EA**, **CA** and **dA** are automatically reset as soon as the relative digital input is disabled.

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The internal buzzer can be muted by touching any area of the display and only if parameter **tbA=Y**.

# 15. SERIAL COMMUNICATION

The device supports different baudrates (par. **bAU**) and parity control (par. **PAr**). Please check the serial network to adapt them according to the other devices. The **XJ485CX** serial interface is required to convert the TTL output into an RS485 signal.
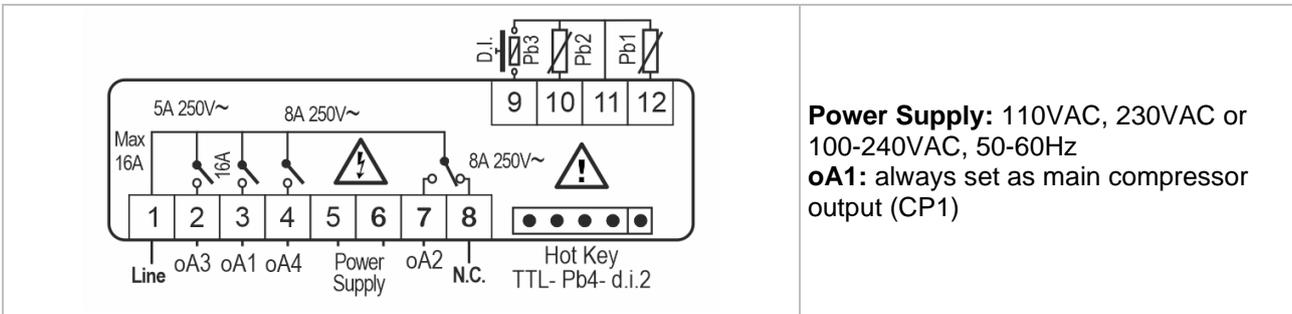
# 16. INSTALLATION AND MOUNTING
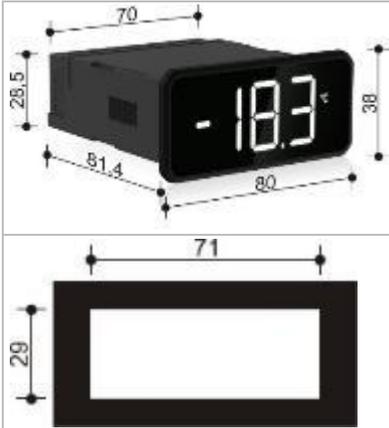
Instrument **XR-T** shall be mounted on vertical panel, in a 29x71 mm hole, and fixed using the special bracket supplied. The temperature range allowed for correct operation is 0 to 60°C. Avoid places subject to strong vibrations, corrosive gases, excessive dirt or humidity. The same recommendations apply to probes. Let air circulate through the cooling holes.

# 17. WIRING DIAGRAMS

## 17.1 XR70T

**Power Supply:** 110VAC, 230VAC or 100-240VAC, 50-60Hz
**oA1:** always set as main compressor output (CP1)

## 17.2 XR60T

**Power Supply:** 110VAC, 230VAC or 100-240VAC, 50-60Hz
**oA1:** always set as main compressor output (CP1)
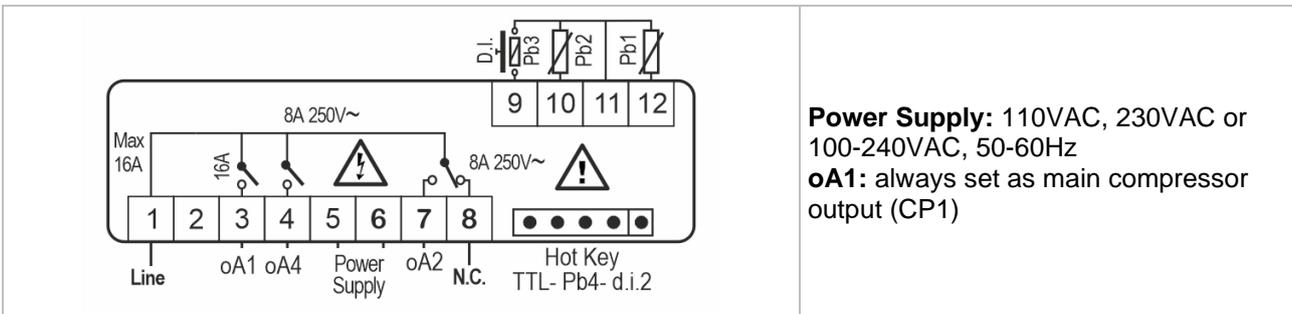
## 17.3 XR30T



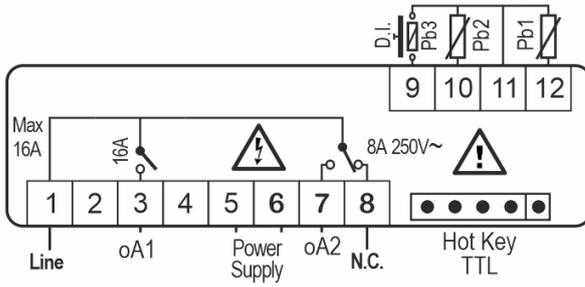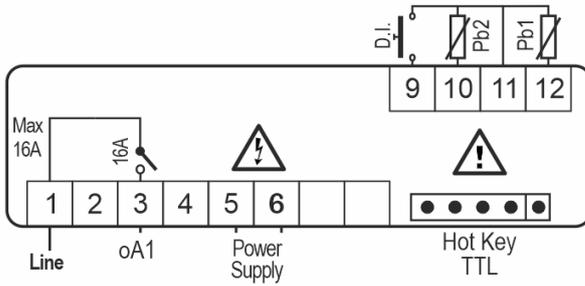**Power Supply:** 110VAC, 230VAC or 100-240VAC, 50-60Hz
**oA1:** always set as main compressor output (CP1)

## 17.4 XR20T



**Power Supply:** 110VAC, 230VAC or 100-240VAC, 50-60Hz
**oA1:** always set as main compressor output (CP1)

# 18. TECHNICAL SPECIFICATIONS

| FEATURES | DESCRIPTION | | |
|---|---|---|---|
| Housing | Self-extinguishing PC | | |
| Dimensions | Front fascia 38x80 mm; case depth 81mm | | |
| Mounting device | Panel, 71x29mm panel cut-out | | |
| **Degree of Protection** | **NEMA – UL 50e** | Indoor use only, Type 1 enclosure | |
| | **IP-IEC/EN 60529** | Front panel: IP66 | Rear Housing: IP00 |
| Power Supply | 230Vac ±10%, 50/60Hz; 110Vac ±10%, 50/60Hz; 100 to 240VAC±10%, 50/60Hz | | |
| Overvoltage Category | II | | |
| Rated Power | 12VAC: 3VA; 110VAC: 4VA; 230VAC: 4VA; 100-240VAC: 3VA | | |
| Rated Impulse Voltage | 2500V | | |
| Display | White display, LED type, 3 digits with decimal point and multi-function icons | | |
| Buzzer | Internal, always present | | |
| Software Class | A | | |
| Terminal blocks / Terminal Connections | Plug-in or screw terminal block, wire section between 0,5 and 2,5 mm$^2$<br>Max tightening force: 0.3 N/m for 3,5mm pitch, 0.4 N/m for 5,0mm pitch | | |
| Data Storing | **Real Time Clock:** Data maintenance up to 6 months with lithium battery. **Other parameters:** internal flash. | | |
| Type of Action | 1.B | | |
| Pollution Degree | 2, non-condensing humidity | | |
| **Ambient Operating Temperature and Humidity** | **IEC/EN** | 0T60°C; 20-85 rH% (non-condensing humidity) | |
| | **UL-CAN/CSA** | -20T60°C; 20-85 rH% (non-condensing humidity) | |
| Shipping and storage temperature | -40T85°C; 20-85 rH% (non-condensing humidity) | | |
| Resistance to Heat | UL 94 V-0 | | |
| Measurement range | **NTC:** -40T110°C, resolution 0.1°C or 1°C (selectable); **PT1000:** -100T150°C, resolution 0.1°C or 1°C (selectable);<br>**PTC:** -50T150°C, resolution 0.1°C or 1°C (selectable) | | |
| Accuracy | ±1% compared to the full scale | | |
| Inputs | Up to 4 NTC, PTC or PT1000 (configurable); Up to 2 voltage free contacts | | |

| | | Nominal | UL | IEC |
|---|---|---|---|---|
| | | **For models: 230V, 110V, 100-240V with OA1 = 16A or 16A Inrush** | | |
| | | Nominal | UL | IEC |
| **Relay Outputs** | oA1 | SPST 16A, 250Vac | Resistive load 12A 230Vac, 50K cycles<br>Motor load 240Vac, 10FLA/60LRA, 30K cycles<br>Pilot Duty B300, 6K cycles | 10(4)A, 230Vac, 100K cycles |
| | oA2 | SPDT 8A, 250Vac | Resistive load 10A (NO), 120/240Vac, 30K cycles<br>Motor load ½ HP (NO), 240Vac, 30K cycles<br>Motor load ¼ HP (NO), 120Vac, 30K cycles<br>Pilot duty B300 (NO), 30K cycles | 8(3)A, 230Vac, 50K cycles |
| | oA3 | SPST 5A, 250Vac | Resistive load 5A, 120/240Vac, 50K cycles<br>Motor load 240Vac, 1.9FLA/11.4LRA, 30K cycles<br>Pilot Duty B300, 30K cycles | 5(1)A, 230Vac, 50K cycles |
| | oA4 | SPST 8A, 250Vac | Resistive load 10A, 120/240Vac, 30K cycles<br>Motor load ½ HP, 240Vac, 30K cycles<br>Motor load ¼ HP, 120Vac, 30K cycles<br>Pilot duty B300, 30K cycles | 8(3)A, 230Vac, 50K cycles |
| | | **For models: 230V, 110V, 100-240V with OA1 = 8A** | | |
| | | Nominal | UL | IEC |
| **Relay Outputs** | oA1 | SPST 16A, 250Vac | Resistive load 10A 230Vac, 30K cycles<br>Motor load ½ HP (NO), 240Vac, 30K cycles<br>Motor load ¼ HP (NO), 120Vac, 30K cycles<br>Pilot Duty B300, 6K cycles | 8(3)A, 230Vac, 50K cycles |
| | oA2 | SPDT 8A, 250Vac | Resistive load 10A (NO), 120/240Vac, 30K cycles<br>Motor load ½ HP (NO), 240Vac, 30K cycles<br>Motor load ¼ HP (NO), 120Vac, 30K cycles<br>Pilot duty B300 (NO), 30K cycles | 8(3)A, 230Vac, 50K cycles |
| | oA3 | SPST 5A, 250Vac | Resistive load 5A, 120/240Vac, 50K cycles<br>Motor load 240Vac, 1.9FLA/11.4LRA, 30K cycles<br>Pilot Duty B300, 30K cycles | 5(1)A, 230Vac, 50K cycles |
| | oA4 | SPST 8A, 250Vac | Resistive load 10A, 120/240Vac, 30K cycles<br>Motor load ½ HP, 240Vac, 30K cycles<br>Motor load ¼ HP, 120Vac, 30K cycles<br>Pilot duty B300, 30K cycles | 8(3)A, 230Vac, 50K cycles |
| | | **For models: 12V with OA1 = 16A or 16A Inrush** | | |
| | | Nominal | UL | IEC |
| **Relay Outputs** | oA1 | SPST 16A, 250Vac | Resistive load 12A 12Vac, 50K cycles | 10(4)A, 230Vac, 100K cycles |
| | oA2 | SPDT 8A, 250Vac | Resistive load 10A 12Vac, 30K cycles | 8(3)A, 230Vac, 50K cycles |

| FEATURES | DESCRIPTION | | | | |
|---|---|---|---|---|---|
| | **oA3** | SPST 5A, 250Vac | Resistive load 5A, 12Vac, 50K cycles | | 5(1)A, 230Vac, 50K cycles |
| | **oA4** | SPST 8A, 250Vac | Resistive load 10A 12Vac, 30K cycles | | 8(3)A, 230Vac, 50K cycles |
| | **For models: 12V with OA1 = 8A** | | | | |
| | | **Nominal** | **UL** | | **IEC** |
| **Relay Outputs** | **oA1** | SPST 16A, 250Vac | Resistive load 10A 12Vac, 30K cycles | | 8(3)A, 230Vac, 50K cycles |
| | **oA2** | SPDT 8A, 250Vac | Resistive load 10A 12Vac, 30K cycles | | 8(3)A, 230Vac, 50K cycles |
| | **oA3** | SPST 5A, 250Vac | Resistive load 5A, 12Vac, 50K cycles | | 5(1)A, 230Vac, 50K cycles |
| | **oA4** | SPST 8A, 250Vac | Resistive load 10A 12Vac, 30K cycles | | 8(3)A, 230Vac, 50K cycles |
| **Maximum ampacity on common terminal "Line" (for oAx)** | 16A | | | | |
| **I/O port** | HOT-KEY: MAX voltage allowed is 5 VDC. DO NOT CONNECT ANY EXTERNAL POWER SUPPLY | | | | |
| **Purpose of control** | Operating control | | | | |
| **Construction of control** | Incorporated control, intended to be used in Class I or Class II equipment | | | | |
| **Approvals** | R290/R600a: relays tested according to IEC EN60079:0 and IEC EN60079:15<br>IEC/EN 60730-1; IEC/EN 60730-2-9<br>UL 60730-1; UL 60730-2-9<br>CAN/CSA E60730-1; CAN/CSA E60730-2-9 | | | | |

# 19.   APPENDIX

## 19.1 TOOLS

### 19.1.1 XH-REP

The XH-REP remote display enables the visualization of a second temperature value. A special cable must be used to connect an XH-REP to the controller (code DD200002 00). The remote display usage will disable the serial communication.

### 19.1.2 X-MOD

The **X-MOD** is a motion detection sensor that allows to detect the proximity of customers or service staff. 5Vdc power supply version must be used. The X_MOD usage will disable the serial communication.

### 19.1.3 WIZMATE

WIZMATE software, used in combination with the XJ485USB, allows to manage the configuration of the controller.

### 19.1.4 HOTKEY

The **HOT-KEY** is used for a quick and easy upload (from device to **HOT-KEY**) or download (from **HOT-KEY** to device) of the parameter map. The 64K version must be used (code **DK00000300**).

### 19.1.5 USB TO RS485 CONVERTER

XJ485USB is an optically isolated converter with 2.5kV maximum voltage isolation on data channels. It has a small plastic box with 2 indication LEDs, RX and TX, to quickly monitor the network communication. Power supply directly from USB port.

## 19.2 EXAMPLE OF MENU NAVIGATION AND PARAMETER MODIFICATION

| | | | | |
|---|---|---|---|---|
| -19.3 ℃ | ... | P-G HOLD | TAP and HOLD anywhere | |
| | | ALL HOLD | **TAP and HOLD anywhere** | |
| | | Set | LS HOLD | **TAP and HOLD anywhere to show the current value of par. "LS"** |
| | | | -14.0 ℃ SET | **V-SWIPE on every single digit to modify** |
| | | | SET -24.0 ℃ | **TAP and HOLD "SET" to save and exit** |

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