# ASCON TECNOLOGIC

# B05-

## DIGITAL ELECTRONIC REFRIGERATION UNITS CONTROLLER

## OPERATING INSTRUCTIONS

**09/14 - cod.: ISTR_M_B05-_E_01_--**


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## FOREWORD

**This manual contains the information necessary for the product to be installed correctly and also instructions for its maintenance and use; we therefore recommend that the utmost attention is paid to the following instructions and to save it.**



**ASCONT ECNOLOGIC reserves the right to make any formal or functional changes at any moment and without any notice.**

**Whenever a failure or a malfunction of the device may cause dangerous situations for persons, thing or animals, please remember that the plant has to be equipped with additional devices which will guarantee safety.**

**ASCON TECNOLOGIC and its legal representatives do not assume any responsibility for any damage to people, things or animals deriving from violation, wrong or improper use or in any case not in compliance with the instrument's features**

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## 1 - INSTRUMENT DESCRIPTION

### 1 .1 - GENERAL DESCRIPTION

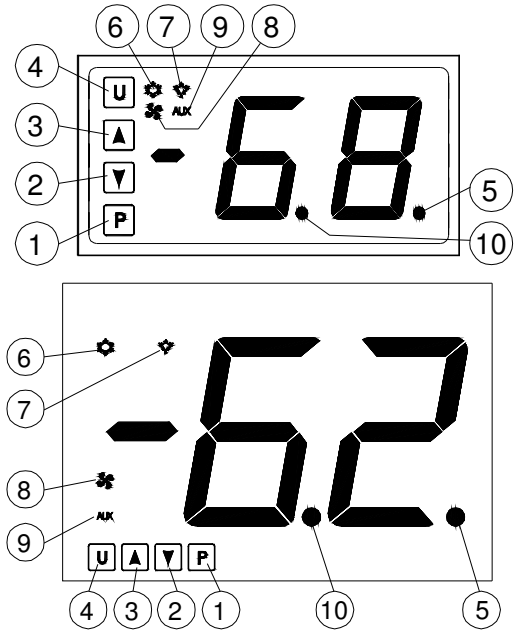
The models **B05** (Supply and outputs unit) and **P03S** or **P05S** (Display unit) are a digital controller system with microprocessor that is typically used in cooling applications that have temperature control with ON/OFF regulation and defrosting control at time intervals, by arrival at temperature or by length of time of continuous compressor operation through stopping the compressor, electric heating or hot gas/cycle inversion.

The appliance has special defrosting optimisation functions and functions to reduce the amount of energy used by the controlled system.

The instrument has up to 4 relay outputs, up to 3 inputs configurable for PTC, NTC and Pt1000 temperature probes or digital inputs.

The 4 outputs can be used to control the compressor or the temperature control device, the defroster, the evaporator fans and a configurable auxiliary device (Light, Alarm, second evaporator, etc.)
The 3 temperature probe inputs can be used to regulate cell temperature, measure evaporator temperature, and measure auxiliary temperatures (e.g. product temperature, condenser temperature, etc.).
One digital input is always available on display unit P03 or P05 and, as an alternative to the Pr2 and Pr3 temperature probe inputs, two other digital inputs can be configured.
The digital inputs can be configured to execute various functions such as cell door signal, defrost commands, selecting a different temperature-regulating set point, reporting an external alarm, activating a continuous cycle, activating the auxiliary output, etc.
The sistem it can also be equipped with an internal buzzer for acoustic notification of alarms and an alarm voltage function that provides to disable the outputs if the mains voltage is too high or too low.
The front of the operator panel is constituted by a large display (h 31 mm for the model P03S and 54 mm for the model P05S) 2 digits with sign -.
The programming of operating parameters is done by 4 capacitive keys **(S-Touch).**
The connection between the two devices B05 and P03S or P05S is via a three poles small cable that also provides power to the operator panel.

### 1.2 - FRONT PANEL DESCRIPTION




**1 - Key P** : Used for setting the Set point (press and release) and for programming the function parameters (hold pressed for 5 sec.)
In programming mode is used to enter in parameters edit mode and confirm the values. In programming mode it can be used together with the UP key to change the programming level of the parameters.
When the keyboard is locked it can be used together with the UP (hold pressed for 5 sec.) key to unlock the keyboard.
**2 - Key DOWN/Aux** : In programming mode is used for decreasing the values to be set and for selecting the parameters. In normal mode it can also be programmed via the parameter "t.Fb" to carry out other functions (hold pressed for 1 sec.) such as activating the Aux output, starting up the continuous cycle, etc. (see functions of keys U and Down).
**3 - Key UP/DEFROST** : In normal mode can be used to start/stop manual defrosting (hold pressed for 5 sec.). In programming mode is used for increasing the values to be set and for selecting the parameters. In programming mode can be used togetherwith key P to change parameters level. Pressed together with the key P for 5 sec. allow the keyboard unlock
**4 - Key U :** Used (press and release) for visualising the instrument variables (measured temperatures etc.). In programming mode can be used to come back in normal mode (hold for 2 sec.). In normal mode it can also be programmed via the parameter "t.UF" to carry out other functions (hold pressed for 1 sec.) such as turning on and off (stand-by) the device, activating the Aux output, starting up the continuous cycle, etc. (see functions of keys U and Down).
**5 - Led SET** : In normal mode it serves to indicate when a key is pressed. In programming mode indicates the programming level of the parameters.
**6 - Led OUT** : Indicate the output status (compressor or temperature control device) when the istrument is programmed for cooling operation; on (on), off (off) or inhibited (flashing).
**7 - Led DEFROST :** Indicates defrosting in progress (on) or drainage time in progress (flashing)
**8 - Led FAN :** Indicates fan output status on (on), off (off) or delayed after defrosting (flashing)
**9 - Led AUX** : Indicates AUX output status on (on), off (off) or inhibited (flashing)
**10 - Led Stand-By:** Indicate the Stand-by status.

On B05 unit there is a single LED that flashes to indicate the correct operation of the control unit.

## 2 - PROGRAMMING

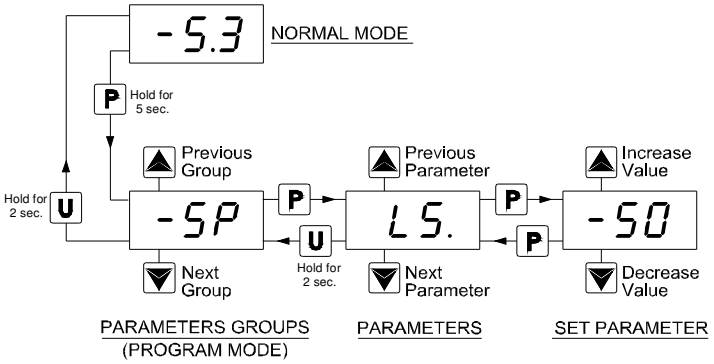
### 2.1 - FAST PROGRAMMING OF SET POINT

Press the key P then release it and the display will show **"SP**" (or **"SE"** or **"SH"**) alternating with the set value.
To change it press the UP key to increase the value or DOWN to decrease it.
These keys increase or decrease the value one digit at a time, but if the button is pressed for more than one second the value increase or decreases rapidly, and after two seconds pressed, the speed increases even more to all the desired valued to be reached rapidly.
However, through par. **"Ed"** is possible to determine whether and which Sets are set with the fast mode bybutton P.
The parameter is programmable with a value between oF and 4 which means that:
oF = Nothing is set with the key P (the P pressed and released has no effect)
1 = can be adjusted only SP (normal)
2 = can be adjusted only SE (economic)
3 = can be adjusted both SP and SE
4 = can be adjusted the active set (SP or SE)
5 = can be adjusted SP and SH ("Turbo" or ind. "Heating")
6 = can be adjusted SP, SE and SH
For example, if the parameter "Ed" = 1 or 3, the procedure is as follows:
Press key P then release it and the display will show **"SP"** alternate value.
To modify press key UP or DOWN to increase the value to decrease.
If there is only the Set Point 1 ("Ed" = 1) once the desired value by pressing the P button to exit the Set programming mode.
If is also programmable the EconomicSet Point ("Ed" = 3) by pressing and releasing the P key again the display will show **"SE"** alternate to the set value.
To modify press key UP or DOWN like Set "SP".
When the desired value is set press the key P to exit from Set Point programming mode.
Exiting the Set mode is achieved by pressing the P key or automatically if no key is pressed for 10 seconds. After that time the display returns to the normal function mode.

### 2.2 - STANDARD MODE PARAMETERS PROGRAMMING

To access the instrument's function parameters when password protection is disable, press the key **P** and keep it pressed for about 5 seconds, after which the display will visualised the code that identifies the first group of parameters (" **-SP** ").

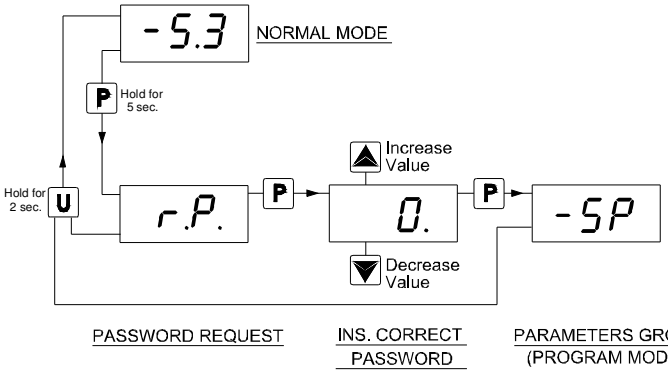
Using the UP and DOWN keys, the desired group of parameters can be selected and pressing the P key, the display will show the first parameter code of the group.
Using the UP and DOWN keys, the desired parameter can be selected and pressing the P key, the display will alternately show the parameter code and its setting that can be changed with the UP and DOWN keys.
Once the desired value has been set, press the key P again: the new value will be memorised and the display will show only the code of the selected parameter.
Pressing the UP and DOWN keys, it is possible to select another parameter and change it as described.
To come back at the group selection mode keep the U key pressed for 1 sec. until will show the code group.
Pressing the UP and DOWN keys, it is possible to select another group of parameters, another parameter and change it as described.
To exit the programming mode, do not press any key for about 30 seconds, or keep the U key pressed for 2 sec. until it exits the programming mode.




*- notes: in the parameters in which the variable is a time value is displayed with the - sign for the least significant part (eg. seconds or minutes), while the most significant (minutes or hours) is shown with a positive value.*

### 2.3 - PARAMETER PROTECTION USING THE PASSWORD

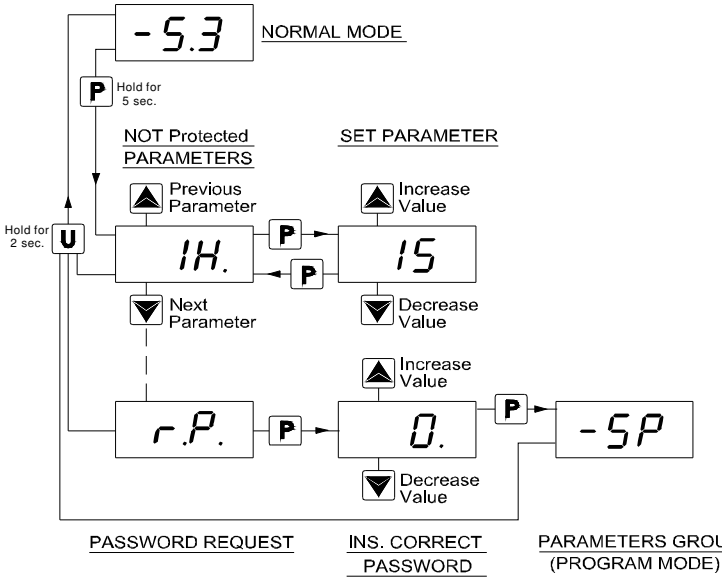
The instrument has a parameter protection function using a password that can be personalised, through the **"PP"** parameter.
If one wishes to have this protection, set the password number desired in the parameter "PP". When the protection is activate, press the P key to access the parameters and keep it press for about 5 seconds, after which the display will show **"r.P"** .
At this point press P, the display show "0", using the UP and DOWN keys, set the password number programmed and press the key P.
If the password is correct, the display will visualise the code that identifies the first group of parameters and it will be possible to program the instrument in the same ways described in the previous section.
Protection using a password can be disabled by setting the parameter "PP" = oF.




***Note:** If the Password gets lost, just swith off and on the instrument supply, push P key during the initial test and keeping the key pressed for 5 seconds.*
*In this way it's possible to have access to all the parameters, verify and modify the par. "PP".*

### 2.4 - CUSTOMIZED MODE PARAMETER PROGRAMMING (PARAMETERS PROGRAMMING LEVEL)

The password protection hides all the configuration parameters behind a factory set password to avoid unwanted changes being made to the programming of the controller.
To make a parameter accessible without having to enter the password when "PP" password protection is activate follows this procedure.
Enter the programming using the Password "PP" and select the parameter which is desired to be accessible with no password protection.
Once the parameter has been selected, if the SET led is blinking, this means that the parameter is programmable by entering the password (it's then "protected") if it's instead on, this means the parameter is programmable without password (not protected).
If you want to change the accessibility of the parameter push P key, keep it pressed and press together also the key UP.
The led SET will change its state indicating the new access level of the parameter (on = not protected; blinking = protected by password).




In case some parameters are not protected, when one tries to have access at the programming, the display will show all the parameters not protected and the par. **"r.P"** (through which will be possible to have access to the "protected" parameters.)

### 2.5 - RESET PARAMETERS TO DEFAULT VALUE/LEVEL

The instrument allows the reset of the parameters to values programmed in factory as default.
To restore to the values of default the parameters set the value **-48** to "r.P" password request.
Once confirmed the password with the key P the display it shows "---" for 2 sec. therefore the instrument effects the parameters reset..

### 2.6 - KEYBOARD LOCK FUNCTION

On the instrument it's possibile to lock completely the keyboard.
This function is particularly useful when the regulator is reachable by the users and it's desired to avoid any modification.
To activate the keyboard lock it's enough program the par. **"Lo"** to a different value to oF.
The value program to this parameter it is the time of inactivity of the keys afterwhich the keyboard will be locked.
Insofar not pressing any key for the time "t.Lo" the instrument automatically disable the normal functions of the keys.
When the keyboard is lock, if any of the key is pushed, on the display will appear **"Ln"** to indicate the active lock.
To unlock the keyboard it's enough to contemporarily push key P and UP and keep them pushed for 5 sec., afterwhich the label **"LF"** will appear on the display and all the keys functions will be availab-le again.

## 3 - INFORMATION ON INSTALLATION AND USE

### 3.1 - PERMITTED USE

The instrument has been projected and manufactured as a measuring and control device to be used according to EN60730-1 for the altitudes operation until 2000 ms. The use of the instrument for applications not expressly permitted by the above mentioned rule must adopt all the necessary protective measures.
The instrument CANNOT be used in dangerous environments (flammable or explosive) without adequate protection.
The instrument used with NTC 103AT11 probe (identifiable by the printed code "103AT-11" visible on the sensor part) or Pt1000 is compliant with standard EN 13485 ("Thermometers for measuring the air and product temperature for the transport,storage and distribution of chilled, frozen, deep-frozen/quick-frozen food and ice cream") with the following classification: [EN13485 air, S, A, 1,-50℃ +90℃]
Remember that the end user must periodically checks and verify the thermometers in compliance with standard EN 13486.
The installer must ensure that EMC rules are respected, also after the instrument installation, if necessary using proper filters. Whenever a failure or a malfunction of the device may cause dangerous situations for persons, thing or animals, please remember that the plant has to be equipped with additional devices which will guarantee safety.

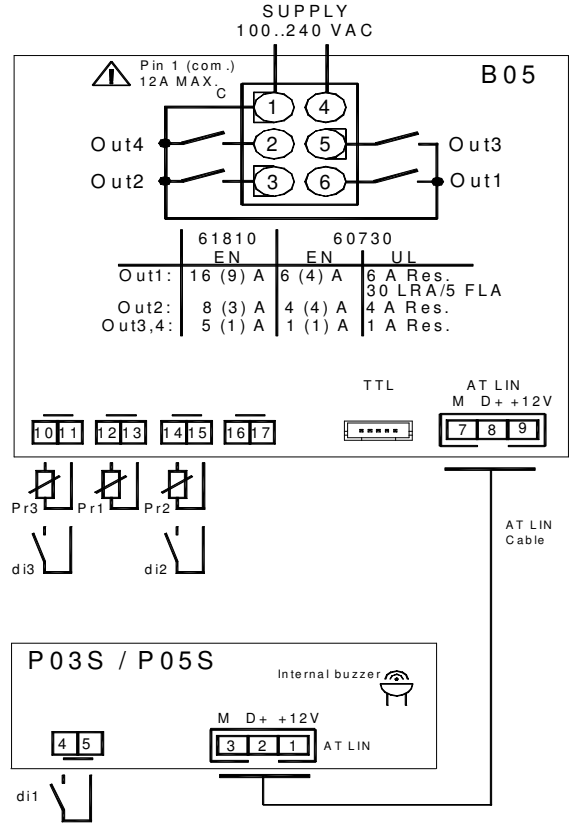
### 3.2 - MECHANICAL MOUNTING

The B05 unit is designed for mounting inside enclosure by 2 screws.
The instrument P03S, in case 96 x 50 mm, and P05S, in case 135 x 97 mm is designed for flush-in panel mounting. Make a hole 90 x 44 mm (P03S) or 124 x 85 mm (P05S) and insert the instrument, fixing it with the provided special brackets.
We recommend that the gasket is mounted in order to obtain the front protection degree as declared.
Avoid placing the B05 unit and internal side of P03S or P05S in environments with very high humidity levels or dirt that may create condensation or introduction of conductive substances into the instrument. Ensure adequate ventilation to the instruments and avoid installation in containers that house devices which may overheat or which may cause the instrument to function at a higher temperature than the one permitted and declared. Connect the instruments as far away as possible from sources of electromagnetic disturbances such as motors, power relays, relays, solenoid valves, etc.

### 3.3 - ELECTRICAL CONNECTION

Carry out the electrical wiring by connecting only one wire to each terminal, according to the following diagram, checking that the power supply is the same as that indicated on the instrument and that the load current absorption is no higher than the maximum electricity current permitted. As the instrument is built-in equipment with permanent connection inside housing, it is not equipped with either switches or internal devices to protect against overload of current: the installation will include an overload protection and a two-phase circuit-breaker, placed as near as possible to the instrument, and located in a position that can easily be reached by the user and marked as instrument disconnecting device which interrupts the power supply to the equipment. It is also recommended that the supply of all the electrical circuits connected to the instrument must be protect properly, using devices (ex. fuses) proportionate to the circulating currents. It is strongly recommended that cables with proper insulation, according to the working voltages and temperatures, be used. Furthermore, the input cable of the probe has to be kept separate from line voltage wiring. If the input cable of the probe is screened, it has to be connected to the ground with only one side. We recommend that a check should be made that the parameters are those desired and that the application functions correctly before connecting the outputs to the actuators so as to avoid malfunctioning that may cause irregularities in the plant that could cause damage to people, things or animals.

### 3.4 - ELECTRICAL WIRING DIAGRAM




## 4 - FUNCTIONS

### 4.1 - ON / STAND-BY FUNCTION

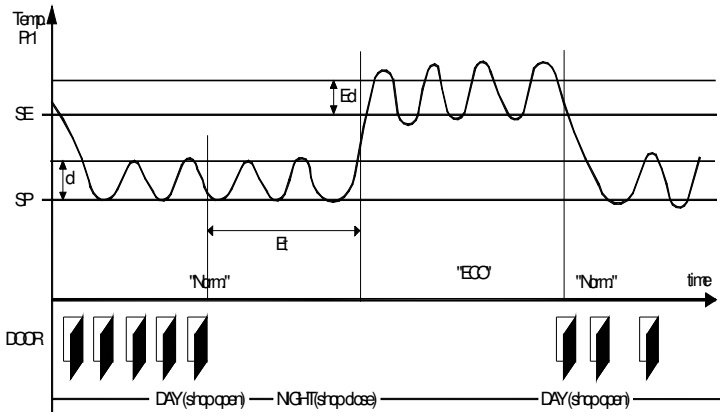
The instrument, once powered up, can assume 2 different conditions:
- ON : means that the controller uses the control functions.
- STAND-BY : means that the controller does not use any control function and the display is turned off except for the Stand-by led.
If there is no power, and then power returns, the system always sets itself in the condition it was in before the black-out.
The ON/Stand-by function can be selected:
- Pressing the key U for at least 1 sec. if the parameter **"UF"** = 3 or 5
-Pressing the key DOWN/AUX for at least 1 sec. if the parameter **"Fb"** = 3 or 5
- using the digital input if the parameter **"xF"** = 7 or 15

### 4.2 - "NORMAL", "ECONOMICAL" AND "TURBO" OPERATING MODES

The instrument can be used to enter up to 3 different regulating set points: Normal - **"SP"**; Economical - **"SE"**; and "Turbo" - **"SH"**.
Associated with each of these is the corresponding differential (hysteresis): normal - **"d"**; Economical - **"Ed";** and "Turbo" - **"Hd"**.
*Switching between the various modes can be automatic or manual*

"NORMAL-ECONOMICAL" MODE OPERATION
Can be used where it is necessary to switch between two different operating temperatures (e.g. day/night or working days/holidays)
NORMAL/ECONOMICAL mode can be selected manually:
– by pressing the U key if parameter **"UF"** = 2
– by pressing the DOWN/AUX key if parameter **"Fb"** = 2
– by a digital input if parameter **"xF"** = 6
NORMAL/ECONOMICAL mode can be selected automatically:
– after the door has been closed for time **"Et"** (switching from Norm. to Eco)
– when the door is opened if the SE set point is active from parameter "Et" (switching from Eco to Norm.)

- after the door has been closed for time **"tt"** since activation of the SE set point from parameter "Et" (switching from Eco to Norm.)

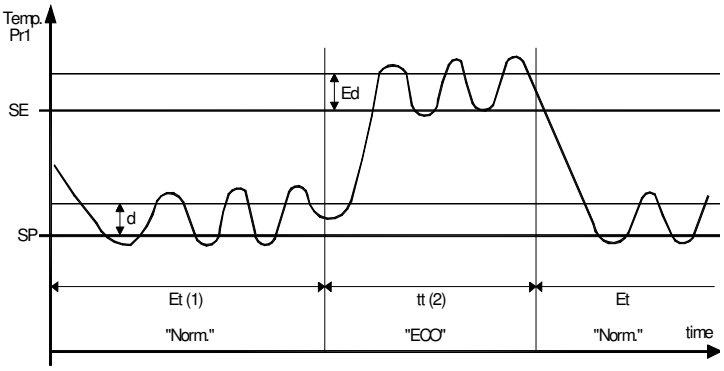



*Example of automatic switching between Eco mode and normal mode. During working hours the door is frequently opened and the controller stays in normal mode. When the door has not been opened for time "Et", the controller switches to Eco mode. As soon as the door is opened again, the controller reverts to normal mode.*

This function requires use of a digital input configured as **"xF"** = 1, 2 or 3 (door open input)

If "Et" = oF, selection of Eco/Norm. mode via the digital input configured as door, is deactivated.

If "tt" = oF, switching the mode from Eco to Normal due to time-out is deactivated.




*(1) – The time Et is reset every time the door is opened. In the case shown, the door is always closed.*

*(2) – The time tt stops when the door is opened and the instrument immediately switches to "normal" mode. In the case shown, the door is always closed.*

When in economical mode, the label **"Ec"** is displayed.

If "dS"= Ec, in economical mode the instrument displays "Ec" all the time. Otherwise the label "Ec" appears approx. every 10 seconds alternating with the normal display set by the "dS" parameter.

Selection of Eco mode is always also combined with the function of turning off the Auxiliary output if used as a window light ("Fo"= 3).

"TURBO – NORMAL – ECONOMICAL" MODE OPERATION

"Turbo" mode can be selected manually:

– by pressing the U key if parameter **"UF"** = 4

– by pressing the DOWN/AUX key if parameter **"Fb"** = 4

– by a digital input if parameter **"xF"** = 8

"Turbo" mode can be selected automatically:

- on leaving Eco mode (only if "HC" = C3)

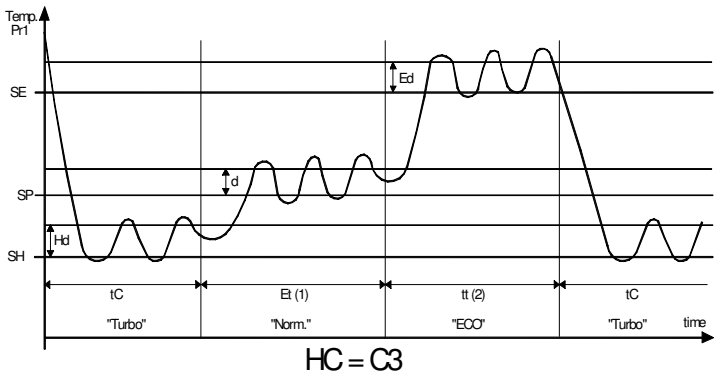
- every time the instrument is switched on (only if "HC" = C3 and Pr1 > SE+Ed)

The instrument quits "turbo" mode automatically at the end of time "tC" or manually using the programmed command (key or digital input) and the instrument always returns to normal mode.

"Turbo" mode can be applied manually, for example when the user wishes to lower the temperature of the products quickly after loading the refrigerator.

However, "Turbo" mode is applied automatically to restore product temperature at the end of economical mode.

Setting "HC" = C3 gives the following operating cycle:




HC = C3

*(1) - The time Et is reset every time the door is opened and in the case shown the door is always closed.*

*(2) – The time tt stops when the door is opened and the instrument immediately switches to "Turbo" mode. In the case shown, the door is always closed.*

When switched on, the instrument starts in normal mode unless the temperature at switch-on is > SE+Ed. In this case (see fig.) a "Turbo" cycle is automatically initiated.

After time "tC" the instrument automatically enters "Normal" mode.

If the door is opened frequently the instrument stays in "Normal" mode. If however it is not opened for time "Et" it automatically switches to "Eco" mode.

The instrument remains in "Eco" mode until the door is opened again or, if set, until the time-out "tt".

On leaving "Eco" mode the instrument therefore runs a "Turbo" cycle to allow product temperature to be restored, after which it reverts to "Normal" mode and so on.

When "turbo" mode is on, this is indicated by the characters **"tb"** shown on the display, alternating with the normal display.

The Set point "SP" can be set with a value between the programmed value in parameter. **"LS"** and the programmed value in parameter **"HS".**

The Set point "SE" can be set with a value between the programmed value in parameter. **"SP"** and the programmed value in parameter **"HS".**

The Set point "SH" can be set with a value between the programmed value in parameter. **"LS"** and the programmed value in parameter **"SP".**

***Note:*** *in the examples that follow, the Set point is generally indicated as "SP" and the histeresis as "d", how when operating the instrument will work according to the Set point and histeresis selected as actives.*

### 4.3 - MEASURING AND DISPLAY

All the parameters concerning measuring are contained in the group **"-In".**

Via the parameter **"St"** it is possible to select the type of probes that one wishes to use and which can be: thermistores PTC KTY81-121 (**Pt**), NTC 103AT-2 (**nt**) or Pt1000 (**P1**).

Via the parameter **"uP",** it is possible to select the temperature unit of measurement the desired measurement resolution (**C0**=°C / 1° ; **C1**=°C / 0.1° ; **F0**= °F / 1°; **F1**= °F / 0.1°).

The instrument allows the measuring to be calibrated, that can be used for re-calibrating the instrument according to application needs, through the parameters **"C1"** (for the input Pr1),**"C2"** (for the input Pr2) **,"C3"** (for the input Pr3).

The functions carried out by Pr2, Pr3 probes is defined by the parameters **"i.P2", "i.P3"**.

This parameters can be configured for the following functions:

**= EP** - Evaporator probe: used to managing the defrost and the evaporator fans (see relative functions)

**= Au** - Auxiliary Probe: can be used as a display-only probe but it is also possible to assign temperature alarms to it (possible uses: product probe, anti-freeze probe, etc.)

= **cd** - Condenser Probe: can be used as a display-only probe but it is also possible to assign temperature alarms to it in order to give alarms relating to condenser malfunction (e.g. dirty/clogged condenser).

**= dG** - Digital input (see digital inputs functions)
If probe Pr2 and/or Pr3 is/are not used, set the relative parameter **"P2"**and/or **"P3"** = oF.
It is not possible to program more parameters for the same function (priority goes to lowest input).
Using the parameter **"Ft",** it is possible to set the time constant for the software filter for measuring the input values to be able to reduce the sensitivity to measurement disturbances (increasing the time).
In addition to this filter are present two other similar filters but used only for the display of the temperature Pr1 both as regards the increase (par. "du") that the decrease (par. "dd") of the measure to avoid display a rapid temperature change.
The filter blocks the decrease in maximum display to 0.1 ° each "dd" sec. and increase the maximum display each "du" sec ..
Every switch-on the filters are reset.
To see the temperature Pr1 filtered set par. "dS" = F1
Through the parameter **"dS",** it is possible to fix the normal visualisation on the display that can be the measurement of the probe Pr1 (P1), the measurement of the probe Pr2 (P2), the measurement of the probe Pr3 (P3), the active set point value (SP), the label "Eco" when the instrument is in Eco mode (Ec) or it can have the numerical display switched off (oF).
Through the parameter **"CU",** it is possible to program an measure offset that will be applied to the temperature show on the display (only if dS"= P1, P2, P3, Ec, F1).
The normal visualisation on the display is established by par. "dS", but it is possible to visualise all the variables and the highest and lowest Pr1 peak measurement values in rotation by quickly pressing and releasing key **U**.
The display will alternately show the code that identifies the variable and its value.
The variable are:
**"P1"** - Pr1 temperature
**"P2"** - Pr2 temperature ( on/oF state if is progr. as digital input )
**"P3"** - Pr3 temperature ( on/oF state if is progr. as digital input )
"**Lt"** and the lowest Pr1 peak temperature
**"Ht**" and the highest Pr1 peak temperature
If the main voltage alarms are activated in this mode will be displayed the variable **P5** that represents the main voltage with a value decreased of 150 V.
The main voltage tension measured by the instrument will be therefore V = P5 + 150.
If the voltage measure is not correct it is possible to modify it through the par. **"OU"**.
When the instrument is switched off, peak values are always re-set. However, it is also possible to reset these values if the instrument is switched on by using the DOWN key hold for 3 sec. during peak visualization.
The display will show "---" and peak memory will be reset.
The exit of this visualisation mode occurs automatically 15 seconds after the last pressing on the key U.
Please remember that visualisation of the Pr1 probe can be changed by the defrosting display lock function, by using the parameter **"dL"** (see defrost function).

### 4.4 - DIGITAL INPUTS

All the parameters concerning digital inputs are contained in the group **"-In".**
The instrument P03S / P05S
has 1 digital input for voltage free contacts whose function is defined by the parameters **"1F"** and and whose action can be delayed by the time period set in the parameter **"1t".**
In addition, the instrument may have 2 further digital inputs for voltage-free contacts as an alternative to the measurement inputs Pr2 and Pr3.
In order to use these inputs digitally, the user must set the relevant parameter "P2" or "P3" = dG.
The function performed by these digitally configured inputs is defined by the parameters **"2F"** and **"3F"**
The Pr2 digital input action can be delayed by the time period set in the parameter **"2t"** while the action of Pr3 digital input is instantaneous and cannot be delayed.
The parameters **"i.1F" , "i.2F", "i.3F"** can be configured for the following functions:
**= 0** - No function
**= 1** -Cell door opening by contact normally open: on closing the digital input the instrument visualises **oP** and the variable set in parameter "dS" alternately on the display. With this function mode, the action of the digital input also activates the time that can be set in parameter "oA" after which the alarm is activated to signal that the door has been left open.
**= 2** -Cell door opening with fan stop by contact normally open: on closing the digital input the fans are stopped and the instrument visualises **oP** and the variable set in parameter "dS" alternately on the display. With this function mode, the action of the digital input also activates the time that can be set in parameter "oA" after which the alarm is activated to signal that the door has been left open and the fan restart.
**= 3** - Cell door opening with compressor and fan stop by contact normally open: similar to "i.x" = 5 but with fan and compressor stop. At the intervention of the door open alarm alarm compressor and fan restarts.
**= 4** - External alarm signal by contact normally open: on closing the digital input the alarm is activated and the instrument visualises **AL** and the variable set in parameter "dS" alternately on the display.
**= 5** - Signalling of external alarm with disablement of all the control outputs by contact normally open: on closing the digital input all the control outputs are disabled, the alarm is activated and the instrument visualises **AL** and the variable set in parameter "dS" alternately on the display.
**= 6** - Selecting the active set point (SP/SE) with contact normally open: on closing the digital input the temperature set point "SE" is activated. When instead the input is open the set point "SP" is active.
**= 7** - Switching on/switching off (Stand-by) of instrument by contact normally open: on closing the digital input the instrument is switched on while it is placed in Stand-by when opened.
**= 8** - "Turbo" cycle activation command with normally-open contact: closing the input starts a "turbo" cycle.
**= 9** - Remote command of auxiliary output AUX with normally-open contact: closing the input activates the auxiliary output as described in the "Fo" = 2 operating mode of the auxiliary output.
**= 10** - Not used
**= 11** - Not used
**= 12** - External "Pr" alarm notified and "ot" output deactivated by normally-open contact: closing the input deactivates the output configured as "ot" and activates the alarm, and the instrument display shows **Pr** alternating with the variable defined by the "dS" parameter.
**= 13** - External "HP" alarm notified and "ot" output deactivated by normally-open contact: closing the input deactivates the output configured as "ot" and activates the alarm, and the instrument display shows **HP** alternating with the variable defined by the "dS" parameter.
**= 14** - External "LP" alarm notified and "ot" output deactivated by normally-open contact: closing the input deactivates the output configured as "ot" and activates the alarm, and the instrument display shows **LP** alternating with the variable defined by the "dS" parameter.
**= -1, -2, -3, etc.** - Like function with positive values but with function logic reversed (contact normally closed)
*Note: Where multiple digital inputs are configured for the same function, the instrument will treat the contacts as if they were parallel (and consequently regard the result as an OR function).*

### 4.5 - OUTPUTS AND BUZZER CONFIGURATION

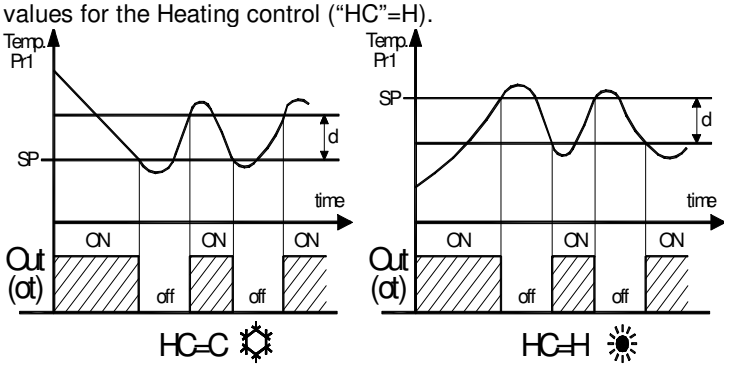
All the parameters concerning outputs configuration are contained in the group **"-Ou".**
The instrument outputs can be configured by the relative parameters **"o1" , "o2", "o3", "o4".**
The outputs can be configured for the following functions:
**= ot** - to control the compressor or however, the temperature control device

**= dF** - to control the defrosting device
**= Fn** - to control the evaporator fans
**= Au** - to control the auxiliary device
**= At** - to control a silenceable alarm device through a contact that is normally open, and then closed when the alarm sounds
**= AL** - to control an alarm that cannot be silenced through a contact that is normally open and closed when the alarm sounds.
**= An** - to control an alarm with a memory function through a contact that is normally open and closed when the alarm sounds.
**= -t** - to control a silenceable alarm device through a contact that is normally closed, and then open when the alarm sounds.
**= -L** - control an alarm that cannot be silenced through a contact that is normally closed and open when the alarm sounds.
**= -n** - to control an alarm with a memory function through a contact that is normally closed and open when the alarm sounds.
**= on** - Output on when the instrument is in on state. This mode can be used to control lights, non-misting resistance on room door or other utilities
**= HE** - to control an heating device in neutral zone control mode ("r.HC" = nr).
**= L1** - Light output managed by Normal / Economy mode.
This output will be on in Normal mode and off in Economy mode operation.
**= L2** - Internal Light output managed by digital input. This output will be on when door is opened (only if "xF"= 1, 2, 3).
**= oF** - Disabled output
The function carried out for auxiliary output (par. desired output = Au) is defined by the parameter **"Fo"** and the function is conditioned by the time set in parameter **"tu".**
The parameter "Fo" can be configured for the following functions:
**= oF** - Auxiliary output not active
**= 1** - Temperature control output delayed with contact normally open: the auxiliary output is activated with delay that can be set on the parameter "tu" compared to the output configured as ot. The output is then turned off at the same time as the ot output is disabled. This function mode can be used as a command for a second compressor or for all other working utilities according to the same ot output conditions, but which must be delayed after the start up of the compressor to avoid excess electricity absorption.
**= 2** - Activation by front key (U or DOWN/AUX) or by digital input : the output is activated by pressing the keys U or DOWN/AUX suitably configured ("UF" or "Fb" = 1), by a digital input suitably configured ("xF" = 9). The commands by keys or digital inputs have a bi-stable function. Which means that when first pressed, the output is activated while the second is disabled. In this mode, the AUX output can be turned off automatically after a certain time that can be set on the parameter "tu". With "tu" = oF the output is activated and deactivated only manually, using the key (U or DOWN/AUX). Differently, the output, once activated, is turned off automatically after the set time. This function can be used, for example, as a cell light command, for non-misting resistance or other utilities.
The internal buzzer (if present) can be configured by par. **"bu"** for the following functions:
**oF** = Buzzer always disable
**1** = Buzzer signal active alarms only
**2** = Buzzer signal key pressed only (no alarm)
**3** = Buzzer signal active alarms and key pressed
**4** = Buzzer signal active alarms (with intermittent beep) and key pressed

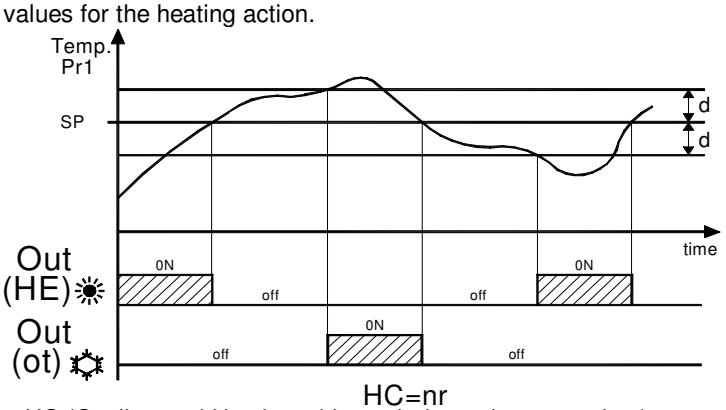
### 4.6 - TEMPERATURE CONTROL

Most of the parameters for temperature control functions are found in the **"-rE"** group.
The instrument's method of regulation is of ON/OFF type acting on the "ot"- and "HE"-configured outputs in response to: the reading of the Pr1 probe; the active set point(s) **"SP"** (or **"SE"** and/or **"SH"**); the intervention differential **"d"** (or **"Ed"** and/or **"Hd"**); and the operating mode **"HC"**.
Via the parameter **"HC"** the following functions can be obtained:
= C (Cooling) or = H (Heating)

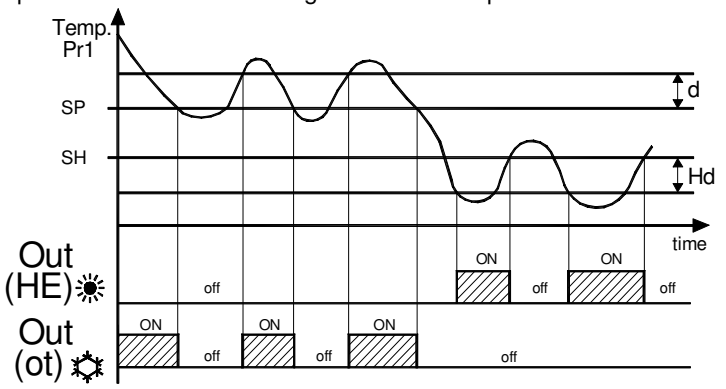
As regards the operating mode programmed in the "HC" parameter, the regulator automatically assumes that the differential has positive values for a Refrigeration control ("HC"=C), negative values for the Heating control ("HC"=H).




= nr (Neutral Zone or Cooling and Heating a single set point)
If the parameter "HC" is programmed such that "HC" = nr the output configured as "ot" operates with a cooling action (as "HC" = C) whereas the output configured as "HE" operates with a heating action. In this case the regulating set point for both outputs is whichever of SP, SE and SH is active, and the intervention differential ("d" or "Ed" or "Hd") is automatically assumed by the regulator to have positive values for the cooling action, negative values for the heating action.




= HC (Cooling and Heating with two independent set points)
Similarly, if the parameter "HC" is programmed such that "HC" = HC, the output configured as "ot" operates with a cooling action (as "HC" = C) whereas the output configured as "HE" operates with a heating action.
In this case the regulating set point for the "ot" output is whichever of SP, SE and SH is active, whereas for the output "HE" the set point is SH.
The intervention differential for the "ot" output will be whichever is active ("d" or "Ed" or "Hd") and the regulator will automatically assume it has positive values (in the case of Cooling) whereas for the output "HE" it will be "Hd" with values assumed to be negative (in the case of Heating).
In this mode, activating the "turbo" cycle causes the instrument to operate with neutral-zone regulation with set point SH.

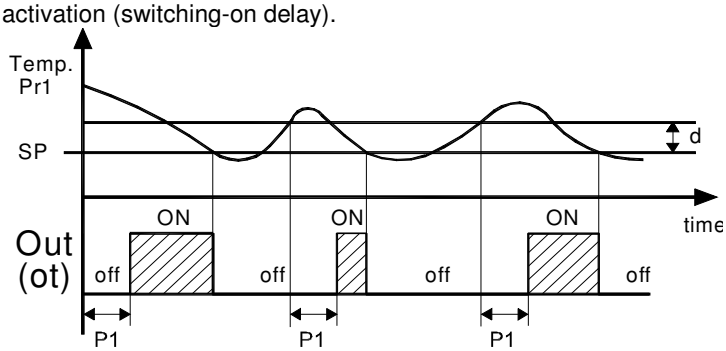



= C3 (Cooling with three automatic modes)
The instrument still cools but this selection activates automatic switching between the three modes, Normal, Eco and Turbo, as already described in the section on operating modes.

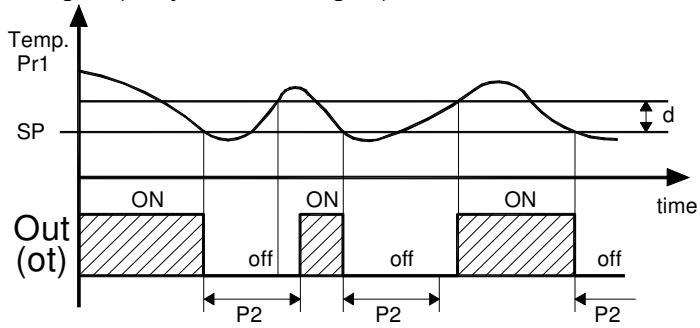
All time protections described in the next paragraph (P1, P2, P3) always act only on the output configured as “ot”.
In the event of probe error, it is possible to set the instrument so that that the output “ot”continues to work in cycles according to the times programmed in the parameter **“t1”** (activation time) and **“t2”** (deactivation time). If an error occurs on the probe the instrument activates the output for the time “t1”, then deactivates it for the time “t2” and so on whilst the error remains. Programming “t1” = oF the output in probe error condition will remain switched off. Programming instead “t1” to any value and “t2” = oF the output in probe error condition will remain switched on.
Remember that the temperature regulation function can be conditioned by the “Compressor Protection and output delay at power-on”, “Defrost”, “Door open” and “external alarm with outputs disable” functions.

### 4.7 - COMPRESSOR PROTECTION FUNCTION AND DELAY AT POWER-ON

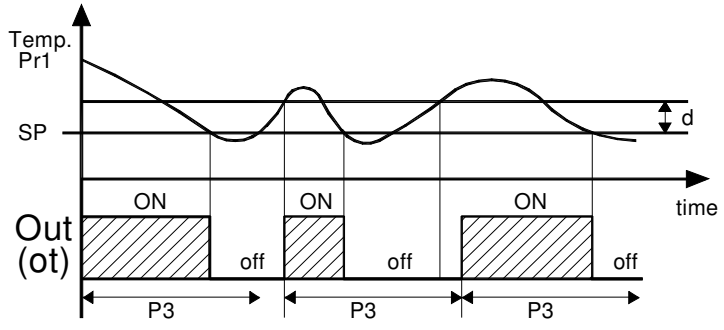
All the parameters concerning compressor protection functions are contained in the group **“-Pr”.**
The function “Compressor Protection” aims to avoid close start ups of the compressor controlled by the instrument in cooling applications.
This function foresees 3 time controls on the switching on of the output configured as “ot” associated with the temperature regulation request.
The protection consists of preventing the output being switched on during the times set in the parameters “P1”, “P2” and “P3” and therefore that any activation occurs only after all the times has finished.
First control (par. **“P1”** ) foresees a delay to the output “ot” activation (switching-on delay).




Second control (par. **“P2”** ) foresees an inhibition to the activation of the output “ot” by a time delay that starts when the output is turning off (delay after switching-off).




Third control (par. **“P3”** ) foresees an inhibition to the activation of the output "ot" by a time delay that starts when the output was turning on last time (delay between switching-on).




During the output inhibition the led OUT blinking.
It is also possible to prevent activation of the output after the instrument is turned on, for the time set in the parameter **“od”**.
During the power on delay phase, the display shows the indication **od,** alternating with the normal visualisation.
All the functions are disabled by relative parameters = oF.

### 4.8 - DEFROST CONTROL

The defrosting control acts on the outputs configured as “ot” and “dF”**.**
All the parameters concerning defrost control are contained in the group **“-dF”.**
The type of defrosting that the instrument must carry out is set by the parameter **“dt”** that can be programmed:
**= EL** - WITH ELECTRICAL HEATING (or BY STOPPING COMPRESSOR): during defrosting, the output “ot” is deactivated while the output “dF” is enabled.
The defrost will be by Stopping compressor if not using the “dF” output
**= in** - WITH HOT GAS or INVERSION OF CYCLE:
during defrosting the outputs “ot” and “dF” are enabled
**= no** - WITHOUT COMPRESSOR OUTPUT CONDITIONING: during defrosting, the output “ot” continuous to operate in order to temperature controller while the output “dF” is enabled.
**= Et** - WITH ELECTRICAL HEATING AND DEFROSTING TEMPERATURE CONTROL: during defrosting, the output “ot” is deactivated while the output “dF” operate as evaporator temperature control. In this mode the defrost lenght is by time-out (time "dE"). During the defrost "dF" output it behaves as an heating mode temperature control with Set = "tE" and fixed differential at 1°C and operate in order to evaporator probe (EP).

#### 4.8.1 - STARTING AUTOMATIC DEFROSTS

The automatic control of defrost occours:
**- By interval times (regular or dynamic)**
**- By Evaporator temperature**
**- By continuous compressor running time**
In order to avoid pointless defrosting the parameter **“tS”** in “dC” = rt, ct, cS mode is foreseen that sets the enablement temperature for defrosting
If the temperature measured by the probe is higher than set in the parameter “tS” the defrosting is inhibited.
**- Defrost by regular interval time**
Counting mode interval and automatic defrost starts is set through the parameter **"dC"** that can be programmed:
**= rt** - intervals with counts the total function time (instrument on)
This mode results that currently used in the refrigerators systems.
**= ct** - intervals with counts only the compressor function time (output “ot” switched on)
Mode typically used in the positive temperature refrigerators system with defrost by stopping compressor.
**= cS** - the instrument carries out a defrosting cycle at each compressor stop (i.e. at each deactivation of the output “ot”) or however at defrost interval end with counts the total function time (instrument on).
If "di" = oF the defrost happens only to the compressor stop.
This mode is used only on particular refrigerator system in which is desired to always have the evaporator to the maximum efficiency conditions every compressor cycle.
The automatic defrost function is activate when at the parameter **“di”** is set the defrost interval time.
The first defrost after swiching on can be set by par. **“Sd”**
This allows to perform the first defrost to a different interval from "di." time.
If it is desired that to every instrument power on a defrost cycle is realized (as long as the conditions set in the parameters “tS” and "tE" apply) program the par. "Sd" = oF.
This allows the evaporator to be permanently defrosted, even when frequent interruptions to power supply occur that may cause the cancellation of the various defrosting cycles.
Instead if is desired all defrost to the same interval program "Sd" = "di."
Automatic defrost function by interval is disable when “di” = oF.
**“Dynamic Defrost Intervals System”.**

If “dd” = 0 the Dynamic defrost is disable.

***Note:*** *For this function is necessary to use the evaporator probe, program “dC” = rt, ct or cS and set “d.dd” = any value (not 0)*

This mode allows to dynamically reduce in progress the defrost interval counting ("di" or "Sd" if is the first defrost), anticipating so the execution of a defrost when it was necessary, in order to an algorithm that allows to notice a decrease performances of refrigerator thermal exchange.

Besides it maintains activates the defrost by evaporator temperature mode that it allows a further possibility of control of the defrost in order to notice a decrease performances of refrigerator thermal exchange.

The algorithm allows to esteem a reduction of thermal exchange in base to the increase of the difference of temperature between Pr1 (controlled temperature) and evaporator (“EP” probe) that is memorized by the instrument in proximity of the Set Point.

The advantage of the “Dynamic Defrost Interval” is the possibility to program a defrost interval time more longer than normal.

The instrument will have the possibility to anticipate the defrost if necessary or to start the cycle after the programmed time.

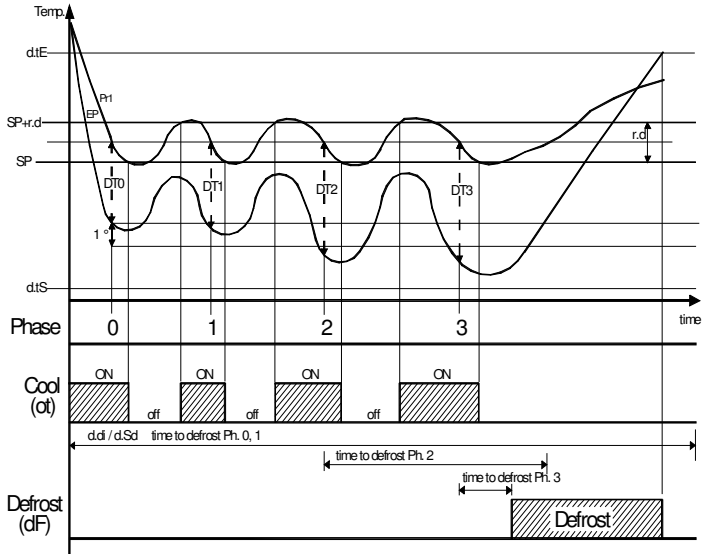
If the system results set correctly is possible to to avoid many non necessary defrosting cycles (and therefore to obtain an energy saving) that could instead happens in the normal operation when, to guarantee with greater certainty the system efficency , the defrost interval is programmed at a too low time.

By par.**: “d.dd”** - DEFROST INTERVAL PERCENTAGE REDUCTION is possible to establish the percentage of reduction of the remaining time to start defrost when the conditions for the reduction happen.

If par. "dd" = 100% at the first increase of the memorized difference of temperature between cell (Pr1) and evaporator (> 1 °) a defrost start immediately

For correct functioning the instrument needs a first reference value of the temperature difference between cell and evaporator.

Every variation of the value of the Active Set Point, of the differential "d", the start of a continuous cycle or the a defrost execution delete this reference value and any reduction will be performed until the acquisition of a new reference value.




*Example “dynamic defrost intervals system” with a reduction “dd” = 40 % and end defrost by temperature.*

**- Defrost by evaporator temperature**

The instrument starts a defrost cycle when the evaporator temperature (“EP” probe) goes below the **“tF”** programmed temperature for **“St”** programmed time.

This system can be used in heat pump defrost system (in this case the defrosting intervals are usually disabled) or to guarantee a defrost if the evaporator reaches very low temperatures that normally result symptomatic of a bad thermal exchange in comparison to the normal working conditions.

If “tF” = -99.9 the function is disable.

**- Defrost by continuous compressor running time**

The instrument start a defrost cycle when the compressor is turned on continuously for the time **"cd”.**

This function is used because the continuous operation of the compressor for an extended period is usually symptomatic of a bad thermal exchange in comparison to the normal working conditions.

If "cd" = oF the function is disabled.

**4.8.2 - MANUAL DEFROST**

To start up a manual defrosting cycle, press the key UP/DEFROST when it is not in programming mode and keep it pressed for about 5 seconds after which, if the conditions are correct, the led Defrost will light up and the instrument will carry out a defrosting cycle.

To stop a defrosting cycle, press the key UP/DEFROST during a defrost cycle and keep it pressed for about 5 sec.

**4.8.3 -DEFROST ENDS**

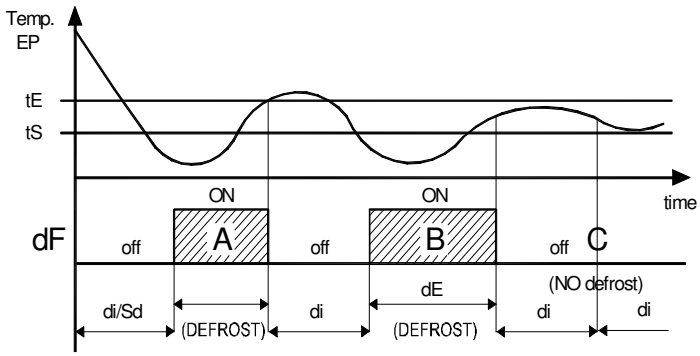
The automatic defrosting cycle can be ended by time or, if an evaporator probe is used (“EP” probe), when a temperature on the evaporator is reached.

If the evaporator probe is not used the duration cycle is set by the parameter **“dE”.**

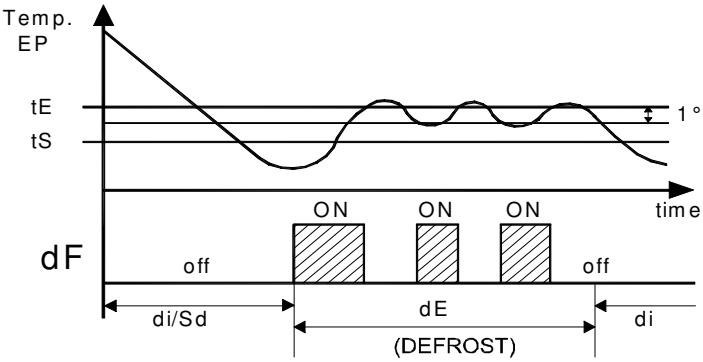
If instead the evaporator probe is used the defrost cycle end when the temperature measured by the evaporator probe exceeds the temperature set in the parameter **“tE”.**

If this temperature is not reached in the time set in the parameter “dE”, defrosting is interrupted.

If the temperature measured by the probe is higher than the temperature set in the parameter "tS" and “tE” the defrosting is inhibited.




***Examples:*** *defrosting A ends due to reaching of temperature “tE”, defrosting B ends at the end of the “dE” time as the temperature “tE” is not reached, defrosting C does not take place as the temperature is higher than “tS”.*




*Example of electric defrost with evaporator temperature control: The defrost end after "dE" programmed time. During defrost the “dF” output switch on/off to control evaporator temperature in heating mode with set point “tE” and 1 °differential (Hysteresis).*

The active defrost is shown on the instrument display with the lighting up of the DEFROST led

At the end of defrosting, it is possible to delay the new start up of the compressor (output “ot”) at the time set in parameter **“td”** to allow the evaporator to drain.

During this delay, the led Defrost flashes to indicate the draining state.

**4.8.4 - DEFROSTS IN EVENT OF EVAPORATOR PROBE ERROR**

In event of evaporator probe error the defrosts occur at intervals **"Ei"** and duration **"EE”.**

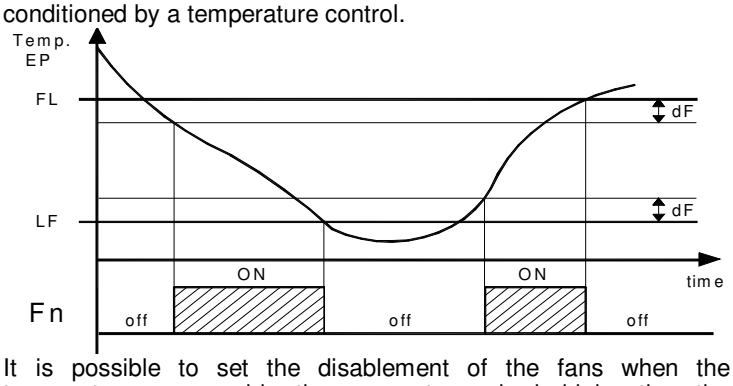
In case an error occurs when the time remaining to the start or the end of defrost it's lower than that normally set the parameters related to error conditions probe, the start or the end take place with the shortest time.
The functions are provided because when the evaporator probe is used the defrost endurance time is usually set longer than necessary (the time "dE" is a security time-out) and in case is used the "Dynamic Intervals Defrost System" the interval is usually set more longer than what is normally programmed into instruments that do not have the function.

**4.8.5 - DEFROST DISPLAY LOCK**

Through par. **"dL"** and **"dA"** it's possible to define the display behaviour during defrost.
The "dL" parameter pemits the display visualization lock on the last Pr1 emperature reading ("dL" = on) during all the defrost cycle until, at the end of defrost, the temperature has not reached the lock value or the value ["SP" + "d"] or is elapsed the time setted on par. "dA".
Or it permits only the visualization of label **"dF"** ("dL" = Lb) during the defrost cycle and, after the defrost, of label **"Pd"** until, at the end of defrost, the Pr1 temperature has not reached the lock value or the value ["SP" + "d"] or is elapsed the time setted on par. "dA".
The display will otherwise ("dL"= oF) continue to visualize the Pr1 temperature measured by the probe during the defrost cycle.

**4.9 - EVAPORATOR FANS CONTROL**

All the parameters concerning fans control are contained in the group **"-Fn".**
The control of the fans on the output configured as "Fn" depending on determined control statuses of the instrument and the temperature measured by the evaporator probe (EP).
In the case that the evaporator probe is not used or in error , the output Fn is activated only depending on the parameters "tn", "tF" and "FE".
The parameters **"tn"** e **"tF"** decides the funs functioning when the output configured as "ot" (compressor) is off.
When output "ot" is off , it is possible to set the instrument so that that the output "Fn" continues to work in cycles according to the times programmed in the parameter **"tn"** (fan activation time) and **"tF"** (fan deactivation time).
When output "ot" is switched off the instrument activates the output "Fn for the time "tn", then deactivates it for the time "tF" and so on whilst the otuput "ot" remains off.
Programming "tn" = oF the output "Fn" in "ot" off condition will remain switched off.
Programming instead "tn" to any value and "tF" = oF the output "Fn" in "ot" off condition will remain switched on.
The parameter **"FE**" instead decides whether the fans must always be switched on independently of the defrosting status ("FE"=on) or switched off during defrosting ("FE"=oF).
In this later case, it is possible to delay the start up of the fans even after the end of the defrosting of the time set in the parameter **"Fd".**
When this delay is active the led FAN flashing to signal the delay in progress.
When the evaporator probe is used the fans, as well as being conditioned by the parameters "tn", "tF and "FE", are also conditioned by a temperature control.




It is possible to set the disablement of the fans when the temperature measured by the evaporator probe is higher than the one set in the parameter **"FL"** (temperature too hot) or when it is lower than the one set in the parameter **"LF"** (temperature too cold).
*Notes: It is necessary to pay attention to the correct use of this fans temperature control functions because in the typical application of refrigeration the stop of the fans evaporator stops thermal exchange.*
The relative differential that can be set in parameter **dF"** is also associated with these parameters**.**
Remember that the fans functioning can be conditioned by the "Door open" function by the digital input.

**4.10 - ALARM FUNCTIONS**

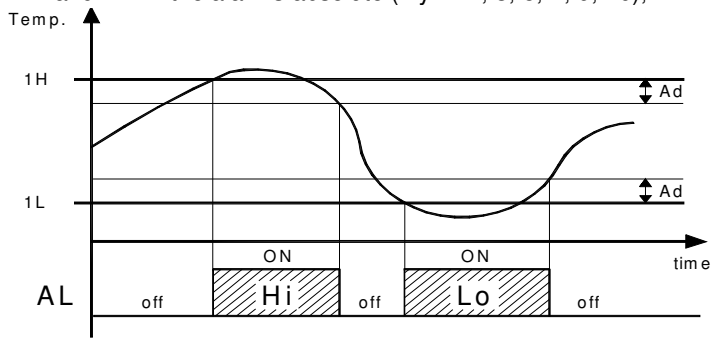
The alarm conditions of the instrument are:
- Probe errors : "**E1", "-E1", "E2, "-E2", "E3", "-E3"**
- temperature alarms: **"H1", "L1", "H2", "L2"**
- External alarm: **"AL", "Pr", "HP", LP"**
- Open door alarm: **"oP"**

The alarm functions of the instrument work on internal buzzer (if present and programmed by par. "o.bu") and on output desired, if configured by the parameters "o1", "o2", "o3" ,"o4",, depending on what is set on the said parameters.
The buzzer (if "o.bu" = 1 or 3 or 4) is activated in alarm and can be disabled (alarm silencing) manually by pressing any key of the instrument.
The possible selections of output parameters for the alarm signalling function are:
**= At** - when one wants the output to be activated in alarm and can be disabled (alarm silencing) manually by pressing any key of the instrument (typical application for sound signal).
**= AL** - when one wants the output to be activated in alarm status but cannot be disabled manually and are therefore only disabled when the alarm status ceases (typical application for a light signal).
**= An** - when one wants the output to be activated in alarm status and that they remain activated even when the alarm has ceased (Alarm memory). Disablement (recognition of memorised alarm) can only be carried out manually by pressing any key when the alarm has ended (typical application for light signal).
**= -t** - when one wants the function described as At but with an inverse function (output activated in normal condition and disabled in alarm status).
**= -L** - when one wants the function described as AL but with inverse logic (output activated in normal conditions and disabled in alarm status).
**= -n** - when one wants the function described as An but with inverse working logic (output activated in normal conditions and disabled in alarm status).

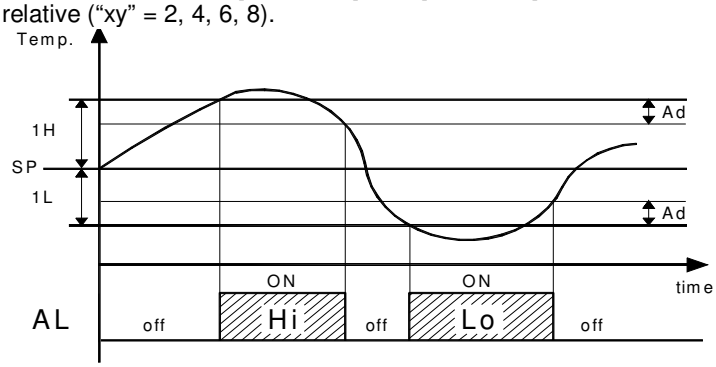
**4.10.1 - TEMPERATURE ALARMS**

The instrument has two fully configurable temperature alarms, each with a maximum and minimum threshold.
The temperature alarm functions act in response to the readings of the probes set in parameters **"1y"** e **"2y"**, alarm thresholds set in parameters **"1H"**, **"2H"** (maxima alarms), **"1L"**, **"2L"** (minima alarms) and the differentials for these, **"1d**, **"2d**"
Via the parameters "1y" and "2y" it is also possible to define whether the alarm thresholds "1H", "2H", "1L", "2L" are absolute or relative to the set point.
Depending on the desired operation, parameters "1y" and "2y" can be given the following values:
= 1: Absolute values based on Pr1 with display of label (H – L)
= 2: Relative values based on Pr1 with display of label (H – L)
= 3: Absolute values based on probe Au with display of label (H – L)
= 4: Relative values based on probe Au with display of label (H – L)
= 5: Absolute values based on probe cd with display of label (H – L)
= 6: Absolute values based on Pr1 without display of label
= 7: Relative values based on Pr1 without display of label
= 8: Absolute values based on probe Au without display of label
= 9: Relative values based on probe Au without display of label
= 10: Absolute values based on probe cd without display of label
Certain parameters also allow the user to delay the enabling and intervention of these alarms.
These parameters are:

**"1P"** and **"2P"**- these are the time periods during which temperature alarms are disabled beginning with instrument start-up if the instrument is in an alarm condition on start-up.
If there are no alarm conditions on start-up, the time period "xP" is ignored.
**"dA"** - this is the time period during which temperature alarms 1 are disabled following the end of a defrost.
*Note: During defrosts, and for time period "dA" after defrosts, alarm 1 is disabled, whereas during defrosts alarm 2 is always enabled.*
**"1t", "2t"** - these are the actuation delay times for temperature alarms 1 and 2.
Temperature alarms 1 and 2 are enabled at the end of the alarm-disabled time periods and activated after time periods "1t" and "2t" when the temperature measured by the probe configured for the alarm rises above or drops below the respective maximum and minimum alarm thresholds.
Via the parameters **"1A"** and **"2A"** it is also possible to define at will the action of the alarms on the regulating output and on the alarm outputs (including buzzer).
This means for example that it is possible to change the regulating output directly, deactivating it if there are temperature alarms on the probes configured as "Au" (e.g. "antifreeze" function) or as "cd" (e.g. condenser "dirty" function).
If both alarms are configured with reference to the same probe, the instrument also allows the user to control pre-alarm notifications (e.g. notifications that do not activate the alarm output and/or the buzzer) and alarm notifications (which do activate the alarm output and/or the buzzer).
The alarm thresholds will be the same as those set in parameters "xH" and "xL" if the alarms absolute ("xy" = 1, 3, 5, 7, 9, 10),




or will be the values ["SP"+"xH"] and ["SP"+"xL"] if the alarms are relative ("xy" = 2, 4, 6, 8).




The maxima and minima temperature alarms can be disabled by setting the relevant parameters "A.Hx" and "A.Lx" = oF.

**4.10.2 - EXTERNAL ALARMS (DIGITAL INPUTS)**

The instrument can notify alarms external to the instrument by activating one or more digital inputs configured with functions programmed as "xF" = 4, 5, 12, 13, 14.
Simultaneously with the configured alarm notification (buzzer and/or output), the instrument notifies the alarm displaying on the display the label defined for the alarm **(AL, Pr , HP, LP)** alternating with the variable defined in parameter "i.dS".
The "i.xF"= 4 mode produces no action on the control outputs whereas the other modes deactivate the "ot" output or deactivate all control outputs when the digital input intervenes.

| Alarm | "ot" output (compr.) | other control outputs ("Fn", "dF", "Au", "HE"). |
|---|---|---|
| AL (4) | unchanged | |
| AL (5) | OFF | |
| Pr | OFF | unchanged |
| HP | OFF | unchanged |
| LP | | |

**4.10.3 - OPEN DOOR ALARM**

The instrument can signal an open door alarm by activating the digital input with the function programmed as "xF" = 1, 2 or 3.
When the digital input is activated the instrument show **oP** and after the delay programmed in parameter **"oA",** the instrument signals the alarm via the activation of the configured alarm output (buzzer/ouput).
At the intervention of the open door alarm the inhibited output will reactivated (fans or fans + compressor).

**4.10.4 - MAIN VOLTAGE ALARMS**

All the parameters concerning the voltage alarm functions are contained in group **"-UA".**
With the voltage alarms function it is possible to disable the control outputs when the main voltage is lower or higher than the values sets to the parameters:
**"LU"** - Low voltage Alarm (expressed in V x 10)
**"HU"** - High voltage Alarm (expressed in V x 10)
At the intervention of the alarm (and after the **"Ud"** time) all the control outputs are disabled, the alarm is activated and the instrument visualises **HU** (High voltage) or **LU** (Low voltage and the variable set in parameter "dS" alternately on the display.
If the main voltage alarms are activated in this mode will be displayed the variable **P5** that represents the main voltage with a value decreased of 150 V.
The main voltage tension measured by the instrument will be therefore V = P5 + 150.
If the voltage measure is not correct it is possible to modify it through the par. **"OU"**.

**4.11 - FUNCTIONING OF KEYS "U" AND "DOWN/AUX"**

All the parameters concerning keyboard functions are contained in the group **"-tS".**
Two of the instrument keys, in addition to their normal functions, can be configured to operate other commands.
The U key function can be defined by the parameter **"UF"** while the DOWN/AUX key function can be defined by the parameter **"Fb"**
Both the parameters have the same possibilities and can be configured for the following functions:
**=oF** - The key carries out no function.
**= 1** - Pressing the key for at least 1 second, it is possible to enable/disable the auxiliary output if configured ("Fo"=2).
**= 2** - Pressing the key for at least 1 second, it is possible to select the mode Economic/Normal in rotation. Once selection has been made, the display will flash the active set point code for about 1 sec. (SP, Ec).
**= 3** - Pressing the key for at least 1 second, it is possible to switch the instrument from the ON status to Stand-by status and vice versa.
**= 4** - Pressing the key for at least 1 sec activates/deactivates a "Turbo" cycle.

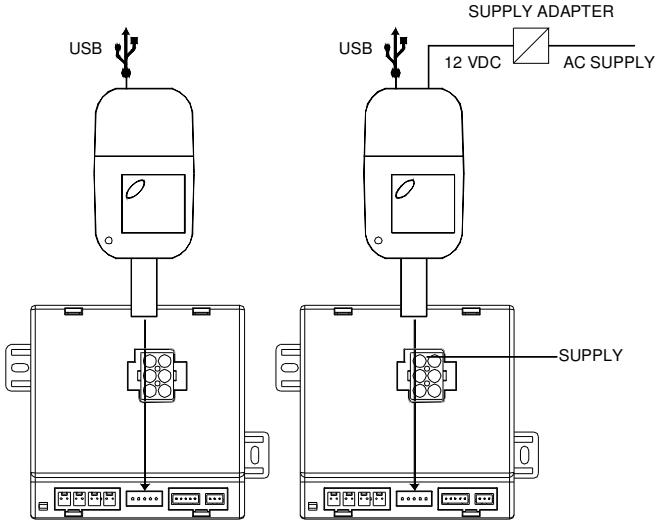
**4.12 - ACCESSORIES**

The instrument is equipped with a connector that allows the connection of some accessories described as follow.

**4.12.1 - PARAMETERS CONFIGURATION BY "A01"**

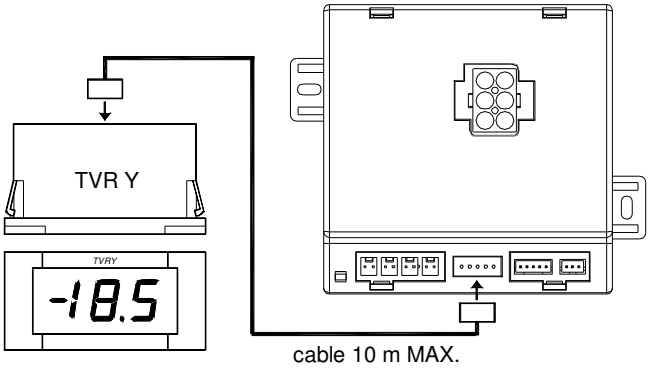
It is possible the transfer from and toward the instrument of the functioning parameters through the device **A01** with 5 poles connector.
This device A01 it's mainly useable for the serial programming of the instruments which need to have the same parameters configuration or to keep a copy of the programming of an instrument and allow its rapid retransmission.
The same device can connect the instrument via USB to a PC and through the proper configuration software tools "TECNOLOGIC UniversalConf", it's possible to configure the operating parameters.
To use the device A01 it's necessary that the device or instrument are being supplied.

For additional info, please have a look at the A01 instruction manual.




### 4.12.2 - "TVRY" REMOTE DISPLAY

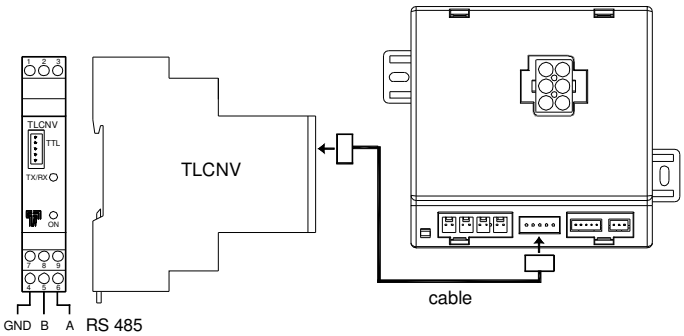
To the instrument it is possible to connect the remote display **TVR Y** through the special cable that can have a maximum length of 10 m. The device TVR Y, directly supplied by the instrument, it allows to visualize the temperature measured by the probe Pr1 through a 2 ½ digit display.
For additional info, please have a look at the TVR Y instruction manual.



cable 10 m MAX.

### 4.12.3 - RS 485 SERIAL INTERFACE BY "TLCNV"

The instrument can be connected by a special cable to the **TLCNV** device (mod. C - TTL/RS485 interface), by means of which it is possible to connect the regulator with a net to which other instruments (regulators of PLC) are connected, all depending typically on a personal computer used as plant supervisor.
Using a personal computer it is possible to acquire all the function information and to program all the instrument's configuration parameters. The software protocol adopted for the instrument is a MODBUS RTU type, widely used in several PLC and supervision programs available on the market (B04/B05 series protocol manual is available on request).
If the instrument is used with TLCNV program by the parameter **"AS"** the station Address.
Set a different number for each station, from 1 to 255.
***Note:*** The baud-rate are fixed at 9600 baud.
TLCNV interface is directly supplied by the instrument.




## 5 - PROGRAMMABLE PARAMETERS TABLE

Here below is a description of all the parameters available on the instrument. Some of them may not be present because depend on the model/type of instrument.

| Par. | | Description | Range | Def. | Note |
|---|---|---|---|---|---|
| | **-SP** | **S. - parameters relative to Set Point** | | | |
| 1 | **LS** | Minimum Set Point | -99 ÷ HS | -50 | |
| 2 | **HS** | Maximum Set Point | LS ÷ 99 | 99 | |
| 3 | **SP** | Set Point | LS ÷ HS | 0.0 | |
| 4 | **SE** | Eco Set Point | SP ÷ HS | 2.0 | |
| 5 | **SH** | "Turbo" Set Point (or ind. Heating Set Point mod. HC ) | LS ÷ SP | -2.0 | |
| | **-In** | **i. -parameters relative to inputs** | | | |
| 6 | **St** | Probes Type<br>Pt = PTC<br>nt = NTC<br>P1 = Pt1000 | Pt / nt / P1 | nt | |
| 7 | **uP** | Unit of measurement and resolution (decimal point)<br>C0 = °C with 1° res.<br>F0 = °F with 1° res.<br>C1 = °C with 0,1° res.<br>F1 = °F with 0,1° res. | C0 / F0 / C1 / F1 | C1 | |
| 8 | **Ft** | Measurement filter | oF / 0.1 ÷ 9.9 ÷ 20 sec | 2.0 | |
| 9 | **C1** | Pr1 Probe Calibration | -30 ÷ -9.9 ÷ 9.9 ÷ 30 °C/°F | 0.0 | |
| 10 | **C2** | Pr2 Probe Calibration | -30 ÷ -9.9 ÷ 9.9 ÷ 30 °C/°F | 0.0 | |
| 11 | **C3** | Pr3 Probe Calibration | -30 ÷ -9.9 ÷ 9.9 ÷ 30 °C/°F | 0.0 | |
| 12 | **CU** | Measure offset on the display | -30 ÷ -9.9 ÷ 9.9 ÷ 30 °C/°F | 0.0 | |
| 13 | **P2** | Pr2 input function:<br>oF = No function<br>EP = Evaporator<br>Au = Aux<br>cd = condenser<br>r1 = Control Probe<br>dG = digital input | oF / EP / Au / cd / r1 / dG | EP | |
| 14 | **P3** | Pr3 input function:<br>oF = No function<br>EP = Evaporator<br>Au = Aux<br>cd = condenser<br>r1 = Control Probe<br>dG = digital input | oF / EP / Au / cd / / r1/ dG | dG | |
| 15 | **1F** | Function and function logic of digital input di1:<br>0 = No function<br>1= Door open<br>2= Door open with fan stop<br>3= Door open with fan and compressor stop<br>4= External "AL" alarm<br>5= External "AL" alarm with deactivation of control outputs<br>6=Selection of active Set Point (SP-SPE) | -14 / -13 / -12 / -11 / -10 / -9 / -8 / -7 / -6 / -5 / -4 / -3 / -2 / -1 / 0 / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 / 11 / 12 / 13 / 14 | 0 | |

| | | | | | |
|---|---|---|---|---|---|
| | | 7= Switch on/ off (Stand - by)<br>8= “Turbo" cycle activation<br>9= Remote command of AUX output<br>10= Not used<br>11= Not used<br>12= External "Pr" alarm<br>13= External “HP” alarm<br>14= External “LP” alarm | | | |
| 16 | **1t** | Delay in acquiring digital input di1 | oF/ -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min) | oF | |
| 17 | **2F** | Function and function logic of digital input di2:<br>see “1F” | -14 ... 0 ... 14 | 0 | |
| 18 | **2t** | Delay in acquiring digital input di2 | oF/ -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min) | oF | |
| 19 | **3F** | Function and function logic of digital input Pr3 :<br>see “1F” | -14 ... 0 ... 14 | 0 | |
| 20 | **Et** | Delay to Eco mode with door closed<br>oF = No function | oF/ 0.01 ÷ 9.59 (hrs.min. ) ÷ 99.5 (hrs.min.x10) | oF | |
| 21 | **tt** | Time-out ECO mode.<br>oF = No function | oF/ 0.01 ÷ 9.59 (hrs.min. ) ÷ 99.5 (hrs.min.x10) | oF | |
| 22 | **dS** | Variable visualized normally on display:<br>P1 = meas. probe Pr1<br>P2 = meas. probe Pr2<br>P3 = meas. probe Pr3<br>P4 = meas. probe Pr4<br>Ec = Pr1 in normal mode, Eco in Eco mode<br>SP= Active Set Point<br>rE = No function<br>oF = Display off<br>F1 = meas. probe Pr1 with “du” and “dd” filters | P1 / P2 / P3 / P4 / Ec / SP / rE / oF / F1 | F1 | |
| | **-dF** | **parameters relative to defrosting control** | | | |
| 23 | **dt** | Defrosting Type:<br>EL= Electrical heating/stop. compr.<br>in= hot gas/reverse cycle<br>no= without compr. output condictioning<br>Et= Electrical heating with evaporator tempe-rature control | EL / in / no / Et | EL | |
| 24 | **dC** | Defrosting starting mode:<br>rt = real time intervals<br>ct = “ot” output on time intervals<br>cS = defrost every “ot” switching off (+ rt intervals)<br>cL = not used | rt / ct / cS / cL | rt | |
| 25 | **di** | Defrosting interval | oF/ -01 ÷ -59 (min) ÷ 01 ÷ 99 (hrs) | 6 | |
| 26 | **Sd** | Delay first defrost after power-on (oF = Defrost at power-on) | oF/ -01 ÷ -59 (min) ÷ 01 ÷ 99 (hrs) | 6 | |
| 27 | **dd** | Dynamic Defrost Percentage reduction | 0 ÷ 100 % | 0 | |
| 28 | **dE** | Lenght (max.) of defrost cycle | oF/ -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min) | 20 | |
| 29 | **dL** | Defrost display Lock<br>oF= display free<br>on= Lock on temperature Pr1 before defrost<br>Lb= Lock on label “dF” (during defrosting) and “Pd” (during post-defrosting) | oF - on - Lb | oF | |
| 30 | **tE** | Defrost stop temperature | - 99 ÷ -9.9 ÷ 9.9 / 10 ÷ 99 °C/°F | 8.0 | |
| 31 | **Ei** | Defrosting interval for evaporator probe error | oF/ -01 ÷ -59 (min) ÷ 01 ÷ 99 (hrs) | 6 | |
| 32 | **EE** | Lengh of defrost cycle for evaporator probe error | oF/ -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min) | 10 | |
| 33 | **tS** | Defrost enable temperature | - 99 ÷ -9.9 ÷ 9.9 / 10 ÷ 99 °C/°F | 2.0 | |
| 34 | **tF** | Defrost start temperature | - 99 ÷ -9.9 ÷ 9.9 / 10 ÷ 99 °C/°F | -99 | |
| 35 | **St** | Delay start Defrost by "tF" start temperature | oF/ -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min) | 1 | |
| 36 | **cd** | Delay start Defrost by continuous compressor running time | oF/ -01 ÷ -59 (min) ÷ 01 ÷ 99 (hrs) | oF | |
| 37 | **td** | Compressor delay after defrost (drainage time) | oF/ -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min) | oF | |
| | **-rE** | **parameters relative to temperature control** | | | |
| 38 | **d** | Differential (Hysteresis) | 0.0 ÷ 9.9 ÷ 30 °C/°F | 2.0 | |
| 39 | **Ed** | Differential (Hysteresis) in Eco mode | 0.0 ÷ 9.9 ÷ 30 °C/°F | 4.0 | |
| 40 | **Hd** | Differential (Hysteresis) in Eco mode in “turbo” mode or Heating HC mode. | 0.0 ÷ 9.9 ÷ 30 °C/°F | 1.0 | |
| 41 | **t1** | Output activation time for probe error | oF/ -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min) | oF | |
| 42 | **t2** | Output deactivation time for probe error | oF/ -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min) | oF | |
| 43 | **HC** | Output operating mode:<br>H= Heating<br>C= Cooling<br>nr = Neutral Zone<br>HC =Neutral Zone with ind. Set point<br>C3 = Cooling with 3 aut. switch modes | H / C / nr / HC / C3 | C | |
| 44 | **tC** | Lengh of “turbo” cycle | oF/ -01 ÷ -59 (min) ÷ 01 ÷ 99 (hrs) | oF | |
| | **-Fn** | **parameters relative to evaporator fans control** | | | |
| 45 | **tn** | Fan time activation with ot output (compressor) off | oF/ -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min) | 5 | |

| | | | | | |
|---|---|---|---|---|---|
| 46 | **tF** | Fan time deactivation with ot output (compressor) off | oF/ -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min) | oF | |
| 47 | **FL** | High temperature fan deactivation | - 99 ÷ -9.9 ÷ 9.9 / 10 ÷ 99 °C/°F | 10 | |
| 48 | **LF** | Low temperature fan deactivation | - 99 ÷ -9.9 ÷ 9.9 / 10 ÷ 99 °C/°F | -99 | |
| 49 | **dF** | Differential fan control | 0.0 ÷ 9.9 ÷ 30 °C/°F | 1.0 | |
| 50 | **FE** | Fan status during defrost | oF - on | oF | |
| 51 | **Fd** | Fan delay after defrost | oF/ -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min) | oF | |
| | **-Pr** | **parameters relative to compressor protection and power on delay** | | | |
| 52 | **P1** | Output "ot" delay at switch on | oF/ -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min) | oF | |
| 53 | **P2** | Output "ot" delay after switch off | oF/ -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min) | oF | |
| 54 | **P3** | Output "ot" delay between switching-on | oF/ -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min) | oF | |
| 55 | **od** | Delay outputs at power on | oF/ -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min) | oF | |
| | **-AL** | **Parametri relativi agli allarmi** | | | |
| 56 | **1y** | Temperature alarms 1 Type:<br>1 =Pr1 absolute with label (H - L)<br>2 =Pr1 Relative with label (H - L)<br>3 = "Au" absolute with label (H - L)<br>4 ="Au" Relative with label (H - L)<br>5 = "cd" absolute with label (H - L)<br>6 = Pr1 absolute without label<br>7 = Pr1 relative without label<br>8 = "Au" absolute without label<br>9 = "Au" relative without label<br>10 = "cd" absolute without label | 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 | 1 | |
| 57 | **1H** | High temperature Alarm 1 threshold | oF / -99 ÷ -9.9 ÷ 9.9 / 10 ÷ 99 °C/°F | oF | |
| 58 | **1L** | Low temperature Alarm 1 threshold | oF / -99 ÷ -9.9 ÷ 9.9 / 10 ÷ 99 °C/°F | oF | |
| 59 | **1d** | Alarms H1 and L1 Hysteresis) | 0.0 ÷ 9.9 ÷ 30 °C/°F | 1.0 | |
| 60 | **1t** | Alarms H1 and L1 delay | oF/ -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min) | oF | |
| 61 | **1P** | Temperature Alarms 1 delay at power on | oF/ -01 ÷ -59 (min) ÷ 01 ÷ 99 (hrs) | 2 | |
| 62 | **1A** | Alarms H1 e L1 actions<br>0 = no actions<br>1 = activate alarm outputs<br>2 = disable control outputs (ot e HE) but not activate alarm outputs<br>3 = disable control outputs (ot e HE) and activate alarm outputs | 0 / 1 / 2 / 3 | 1 | |
| 63 | **2y** | Temperature alarms 2 Type:<br>see "1y" | 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 | 3 | |
| 64 | **2H** | High temperature Alarm 2 threshold | oF / -99 ÷ -9.9 ÷ 9.9 / 10 ÷ 99 °C/°F | oF | |
| 65 | **2L** | Low temperature Alarm 2 threshold | oF / -99 ÷ -9.9 ÷ 9.9 / 10 ÷ 99 °C/°F | oF | |
| 66 | **2d** | Alarms H2 and L2 Hysteresis) | 0.0 ÷ 9.9 ÷ 30 °C/°F | 1.0 | |
| 67 | **2t** | Alarms H2 and L2 delay | oF/ -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min) | oF | |
| 68 | **2P** | Temperature Alarms 2 delay at power on | oF/ -01 ÷ -59 (min) ÷ 01 ÷ 99 (hrs) | 2 | |
| 69 | **2A** | Alarms H2 e L2 actions<br>0 = no actions<br>1 = activate alarm outputs<br>2 = disable control outputs (ot e HE) but not activate alarm outputs<br>3 = disable control outputs (ot e HE) and activate alarm outputs | 0 / 1 / 2 / 3 | 1 | |
| 70 | **dA** | Temperature Alarms 1 delay after defrost, and unlock display delay after defrost | oF/ -01 ÷ -59 (min) ÷ 01 ÷ 99 (hrs) | 1 | |
| 71 | **oA** | Alarm delay with door open | oF/ -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min) | 3 | |
| | **-Ou** | **parameters relative to configuration of outputs** | | | |
| 72 | **o1** | OUT1 function:<br>oF= No function<br>ot= Temperature control (compressor)<br>dF=Defrosting<br>Fn= fan<br>Au= Auxiliary<br>At/-t= Silenceable alarm<br>AL/-L= Not silenceable Alarm<br>An/-n= Memorised alarm<br>on = on when instrument switch on<br>HE= Heating (Neutral zone control)<br>2d = Not used<br>L1 = light with economy mode (on with "SP" and off with "SPE")<br>L2 = internal light (off with door closed and on with door opened)<br>-dF = Defrosting NC contact | oF/ot/dF/ Fn/Au/At/ AL/An/ -t/ -L/ -n/on/HE/2d/ L1/L2/-d | ot | |
| 73 | **o2** | OUT2 function:<br>see "o1" | oF/ot/dF/ Fn/Au/At/ AL/An/ -t/ -L/ | dF | |

| | | | | | |
|---|---|---|---|---|---|
| | | | -n/on/HE/2d/ L1/L2/-d | | |
| 74 | **o3** | OUT3 function: see “o1” | oF/ot/dF/ Fn/Au/At/ AL/An/ -t/ -L/ -n/on/HE/2d/ L1/L2/-d | Fn | |
| 75 | **o4** | OUT4 function: see “o1” | oF/ot/dF/ Fn/Au/At/ AL/An/ -t/ -L/ -n/on/HE/2d/ L1/L2/-d | L1 | |
| 76 | **bu** | Buzzer function mode oF = disable 1 = active alarms only 2 = key pressed only 3, 4 = active alarms and key pressed | oF / 1 / 2 / 3 / 4 | 4 | |
| 77 | **Fo** | Function mode auxiliary output: oF= No Function 1= control output “ot” delayed 2= manual activation by key or digital input. | oF / 1 / 2 | oF | |
| 78 | **tu** | Time relative to auxiliary output | oF/ -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min) | oF | |
| | **-tS** | **parameters relative to configuration of the keyboard and serial communication** | | | |
| 79 | **UF** | Function mode key U: oF= No function 1= Auxiliary output command 2= Norm. / Eco mode Selection 3= Switch on/off (Stand-by) 4= “Turbo” cycle command | oF / 1 / 2 / 3 / 4 | oF | |
| 80 | **Fb** | Function mode key Down/Aux: see “UF” | oF / 1 / 2 / 3 / 4 | oF | |
| 81 | **Lo** | Keyboard lock function delay | oF/ -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min) | oF | |
| 82 | **Ed** | Set Visibility with fast procedure by key P: oF = None 1 = SP 2 = SE 3 = SP e SE 4 = Active SP 5 = SP and SH 6 = SP, SE and SH 7 = Direct selection SP, SE and SH (without Sign. label) 8 = Direct selection SP, SE and SH (with Sign. label) | oF / 1 / 2 / 3 / 5 / 6 / 7 / 8 | 4 | |
| 83 | **PP** | Access Password to parameter functions | oF ÷ 999 | oF | |
| 84 | **AS** | MODBUS Station address (for serial communication) | 0 ÷ 255 | 1 | |
| 85 | **du** | Filter display delay increase 0.1 ° temperature Pr1 | oF / 0.1 ÷ 9.9 ÷ 20 sec | oF | |
| 86 | **dd** | Filter display delay decrease 0.1 ° temperature Pr1 | oF / 0.1 ÷ 9.9 ÷ 20 sec | oF | |
| | **-UA** | **parameters relative to main voltage alarm** | | | |
| 87 | **LU** | Low voltage alarm | oF/ 9 ÷ 27 V x 10 | oF | |
| 88 | **HU** | High voltage alarm | oF/ 9 ÷ 27 V x 10 | oF | |
| 89 | **Ud** | Voltage alarms delay | oF/ -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min) | oF | |
| 90 | **OU** | Voltage calibration | -30 ÷ 30 V | 0.0 | |

## 6 - PROBLEMS, MAINTENANCE AND GUARANTEE

### 6.1 - SIGNALLING

| Error | Reason | Action |
|---|---|---|
| **E1 -E1 E2 -E2 E3 -E3** | The probe may be interrupted (E) or in short circuit (-E), or may measure a value outside the range allowed | Check the correct connection of the probe with the instrument and check the probe works correctly |
| **EP** | Internal EEPROM memory error | Press key P |
| **Er** | Fatal memory error | Replace the instrument or ship to factory for repair |

**Other Signalling:**

| Message | Reason |
|---|---|
| **od** | Delay at power-on in progress |
| **Ln** | Keyboard lock |
| **H1** | Maximum temperature alarm 1 in progress |
| **L1** | Minimum temperature alarm 1 in progress |
| **H2** | Maximum temperature alarm 2 in progress |
| **L2** | Minimum temperature alarm 2 in progress |
| **AL** | Digital input alarm in progress |
| **Pr** | Digital input alarm PrA in progress |
| **HP** | Digital input alarm HP in progress |
| **LP** | Digital input alarm LP in progress |
| **oP** | Door opened |
| **dF** | Defrosting in progress with “d.dL”=Lb |
| **Pd** | Post-defrosting in progress with “d.dL”=Lb |
| **Ec** | Eco mode active |
| **tr** | “turbo” mode active |
| **HU** | High voltage alarm |
| **LU** | Low voltage alarm |

### 6.2 - CLEANING

We recommend cleaning of the instrument only with a slightly wet cloth using water and not abrasive cleaners or solvents.

### 6.3 - GUARANTEE AND REPAIRS

The instrument is under warranty against manufacturing flaws or faulty material, that are found within 12 months from delivery date.
The guarantee is limited to repairs or to the replacement of the instrument. The eventual opening of the housing, the violation of the instrument or the improper use and installation of the product will bring about the immediate withdrawal of the warranty’s effects.
In the event of a faulty instrument, either within the period of warranty, or further to its expiry, please contact our sales department to obtain authorisation for sending the instrument to our company. The faulty product must be shipped to ASCON TECNOLOGIC with a detailed description of the faults found, without any fees or charge for ASCON TECNOLOGIC, except in the event of alternative agreements.

## 7 - TECHNICAL DATA

### 7.1 - ELECTRICAL DATA

Power supply: 100...240 VAC +/- 10%
Frequency AC: 50/60 Hz
Power consumption: 4 VA approx. (without Loads connected)
Input/s: B05: 3 inputs for temperature probes: PTC (KTY 81-121, 990Ω @ 25 °C) or NTC (103AT-2, 10KΩ @ 25 °C) or Pt1000

(1000 Ω @ 0° C); 2 digital inputs for free voltage contacts (alternatively to 2 temperature inputs): P03/P05: 1 digital input for free voltage contacts.
Output/s: up to 4 main voltage relay outputs

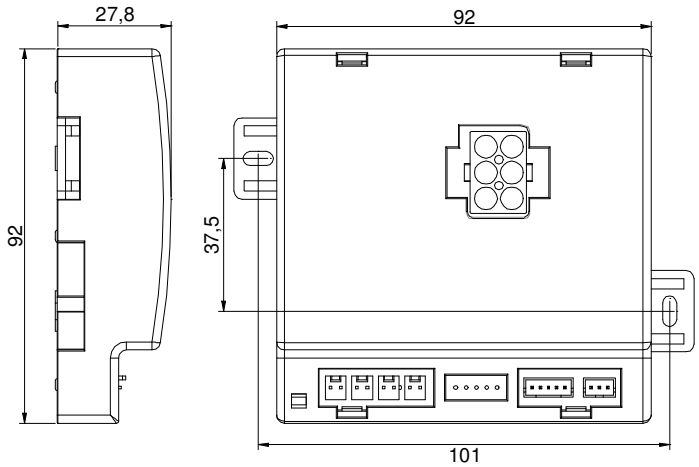
| | EN 61810 | EN 60730 | UL 60730 |
|---|---|---|---|
| Out 1 SPST-NO - 16A - 1HP 250V | 16 (9) A | 6 (4) A | 6 A Res., 30 LRA, 5 FLA |
| Out 2 SPST - 8A - 1/2HP 250 V | 8 (3) A | 4 (4) A | 4 A Res.,12 LRA, 2 FLA |
| Out 3 SPST - 5A - 250 V | 5 (1) A | 1 (1) A | 1 A Res. |
| Out 4 SPST - 5A - 250 V | 5 (1) A | 1 (1) A | 1 A Res. |

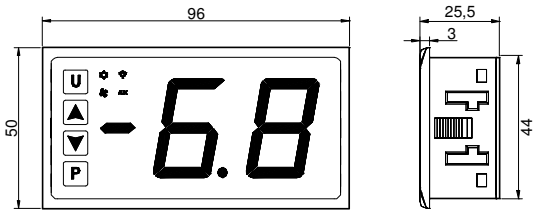
**Common (pin 1): 12 A Max.**
Electrical life for relay outputs: 30K op. (EN60730)
Action type: type 1.B (EN 60730-1)
Overvoltage category: II
Protection class : Class II
Insulation: Reinforced insulation between the low voltage part (supply and relay outputs) and front panel; Reinforced insulation between the low voltage section (supply and relay outputs) and the extra low voltage section (inputs).

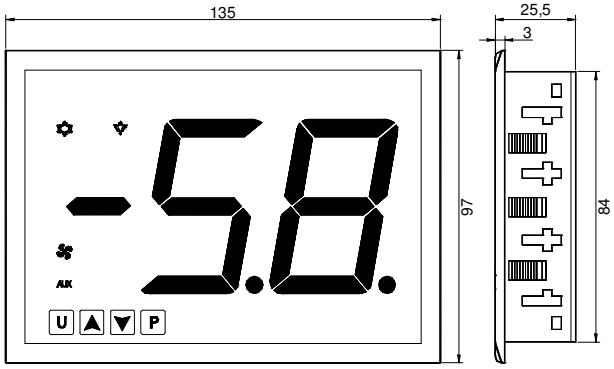
### 7.2 - MECHANICAL DATA

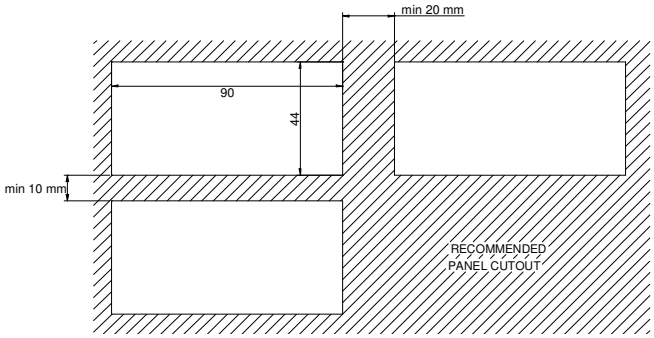
Housing: Self-extinguishing plastic, UL 94 V0
Heat and fire resistance category: D
Ball Pressure Test secondo EN60730: acessible parts 75 °C; support live parts 125 °C
Dimensions P03: 96 x 50 mm, depth 22,5 mm
Dimensions P05: 135 x 97 mm, depth 22,5 mm
Dimensions B05: 92 x 92 mm, depth 27,8 mm
Weight P03: 70 g approx.
Weight P05: 135 g approx.
Weight B05: 130 g approx.
Mounting P03: Incorporated Flush in panel (2 mm max) in 90 x 44 mm hole
Mounting P05: Incorporated Flush in panel (2 mm max) in 124 x 85 mm hole
Mounting B05: Incorporated Enclosure
Connections P03, P05: mini extractable connectors
Connections B05 (supply and outputs) : 6 poles AMP MATE-N-LOK .250 " type connector
Connection P03/P05 -B05: 3 m MAX by 3 poles cable
Pollution situation: 2
Operating temperature: 0 T 60 °C
Operating humidity: < 95 RH% without condensation
Storage temperature: -25 T 60 °C

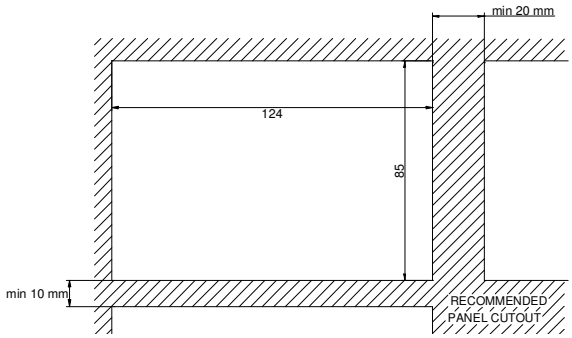
### 7.3 - MECHANICAL DIMENSIONS, PANEL CUT-OUT AND MOUNTING [mm]

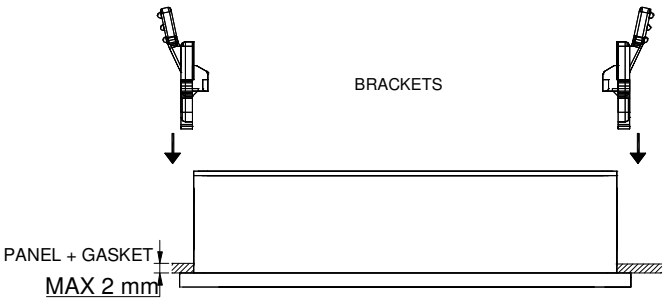



### 7.4 - FUNCTIONAL FEATURES

Temperature Control: ON/OFF mode
Defrost control: interval cycles or at evaporator temperature by Electric Heating /stopping compressor or hot-gas / reverse cycle
Measurement range: NTC: -50...99 °C / -58...99 °F; PTC: -50...99 °C / -58 ... 99 °F; Pt1000: -99...99 °C / -99 ... 99 °F
Display resolution: 1 ° or 0,1° (in range -9.9 ..9.9 °)
Overall accuracy: +/- (0,5 % fs + 1 digit)
Sampling rate: 800 ms
Display: 2 Digit h 31 mm (P03) or h 54 mm (P05), Red (Blu as option)
Software class and structure : Class A

Compliance: Directive 2004/108/CE (EN55022: class B; EN61000-4-2: 8KV air, 4KV cont.; EN61000-4-3: 10V/m; EN61000-4-4: 2KV supply and relay outputs, 1KV inputs; EN61000-4-5: supply 2KV com. mode, 1 KV\ diff. mode; EN61000-4-6: 3V);
Directive 2006/95/CE (EN 60730-1, EN 60730-2-9);
Regulation 37/2005/CE (EN13485 air, S, A, 1,- 50°C +90°C with probe NTC 103AT11 or Pt1000 class B or better).

**7.5 - INSTRUMENT ORDERING CODE**

**Display Unit:**
**P03S-** / **P05S-  a b c d e ff gg**

**a: BUZZER**
**B** = Buzzer
**-** = (No)

**b : DISPLAY**
**-** = (Standard Red)
**B** = Blu

**c, d, e : INTERNAL CODES**
**ff, gg : SPECIAL CODES**

**Control Unit:**
**B05- a b c d e f g h i j kk ll**

**a : POWER SUPPLY**
**H** =Supply 100...240 VAC

**b : OUT1**
**R** = Relay SPST-NO 16A
**-** = (No)

**c : OUT2**
**R** = Relay SPST-NO 8A
**-** = (No)

**d : OUT3**
**R** =Relay SPST-NO 5A
**-** = (No)

**e : OUT4**
**R** = Relay SPST-NO 5A
**-** = (No)

**f, g, h, i, j : INTERNAL CODES**
**kk, ll : SPECIAL CODES**

**Connection cable Display-Control:**
**0,8 m = CALIND080--**
**1,2 m = CALIND120--**
**3,3 m = CALIND330--**