B05B

DIGITAL ELECTRONIC TEMPERATURE CONTROLLER WITH DEFROSTING FUNCTION

OPERATING INSTRUCTIONS

22/01 - Code: ISTR_M_B05B_E_03_--

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PREFACE

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

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 electromechanical devices which will guarantee safety.

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1. INSTRUMENT DESCRIPTION

1.1 General description

The controller **B05B** (Supply and control unit) connected to the **P03CB** or **P34B** Display unit is a **digital controller system** with microprocessor that is typically **used** in **cooling applications** that have **ON/OFF temperature control** and **defrost control** at **time intervals**, by **reaching the temperature** or **continuous time compressor operating** through s**topping the compressor**, **electric heating** or **hot gas/cycle inversion**.

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

The system can **have up to 4 relay outputs** and **up to 5 inputs**, **3** configurable **for NTC** temperature **probes**, and

2 digital inputs for **free of voltage contacts** (1 is on the P03 display panel). 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, etc.)

The **3 temperature probe inputs** can be used to **control the cell temperature**, measure the **evaporator temperature**, and measure an **auxiliary temperature** (e.g. product temperature, condenser temperature, etc.).

One digital input is always available on **the control unit** and, as an **alternative** to **Pr2** and **Pr3** temperature probe inputs, **2 other digital inputs** can be configured; the **P03 display panel** has an additional digital input. **Digital inputs** can be **configured** to **execute various functions** such as **cell door signal**, **defrost commands**, the **selection of a different temperature-control set point**, **reporting an external alarm**, to **activate a continuous cycle**, to **activate the auxiliary output**, etc..

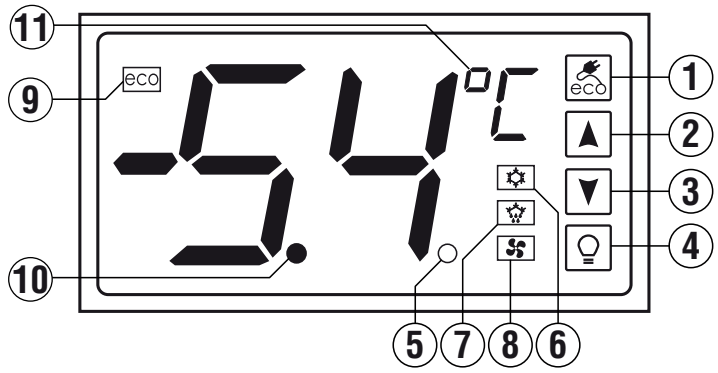
The sistem is also equipped with an **alarm voltage function** that provides to **disable the outputs** if **the mains** voltage is **too high** or **too low**.

The **function selection** and **operating parameters programming** is done by the **4 keys** (mechanical or capacitive) present on the operator panel.

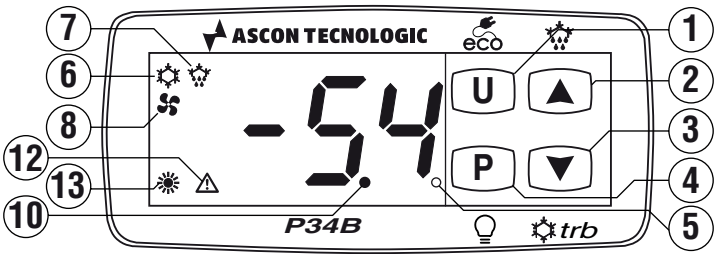
The **connection between** the **B05B** and the display panel **P03CB/P34B** is made via a **thin three poles cable** that also **provides** the **power supply** to the **operator panel**.

1.2 HMI Front Panel description

1.2.1 P03CB Display Unit/Operator Panel

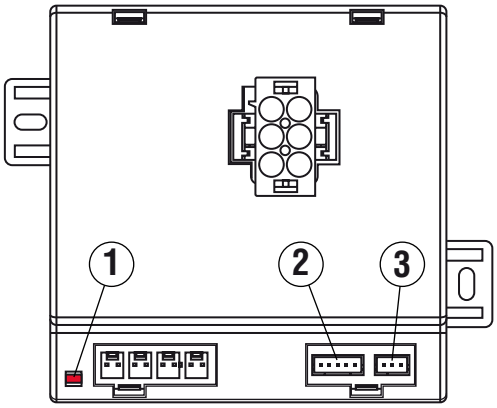


1.2.2 P34B Display Unit/Operator Panel



1. **/U:** Pressed for 1 s enables the *ECO* function or **forces the instrument** in **Standby/Run status** (the function selection is made with parameter *UF*). Pressing /U together with the /P key for 5 s allows to enter in parameter programming mode. Pressing /U together with the ▼ key for 5 s allows to display the instrument variables (measured temperatures etc.). In programming mode /U can be used to return in normal mode.
2. **▲/:** Pressed and released is used to access the Set Point change function and modify the **SP** value. In normal mode (pressed for 5 s) can be used to **start/stop a manual defrost**. In parameter programming or variables display mode is used for selecting the parameters and for increasing the values to be set. In programming mode, if pressed together with the /P key allows to modify the parameters programming level. When pressed together with the /P key for more than 5 s locks/unlocks the keyboard.
3. **▼/** *turbo***:** Pressed and released is used to access the Set Point change function and modify the **SP** value. Pressed for 5 s allows to **enable/disable** a **turbo control mode cycle**. In parameter programming or variables display mode is used for selecting the parameters and for decreasing the values to be set.
4. **/P:** Pressed for 1 s allows to **manually enable/disable** the **Output** configured as "**Light**" (the function selection is made with parameter *Fb*). Pressing /P together with the /U key for 5 s allows to enter in parameter programming mode. In programming mode /P is used to access parameter editing and value confirmation. In programming mode, if pressed together with the ▲/ key allows to modify the parameters programming level. When pressed together with the ▲/ key for more than 5 s locks/unlocks the keyboard.
5. **LED SET:** In normal mode shows when a key is pressed. In programming mode **SET** indicates the programming level of the parameters.
6. **LED** : Indicates the output status (compressor or temperature control device) when the instrument is programmed for **cooling/heating operation (cooling operation for P34)**:
   ON (lit up), **OFF** (turned OFF) or **inhibited** (blinking).
7. **LED :** Indicates that the **defrost** is in **progress** (**ON**) or **drainage time in progress** (blinking).
8. **LED** : Indicates fan evaporator output status **ON** (on), **OFF** (off) or **inhibited** (blinking).
9. **LED eco:** On the **P03** indicates that the **ECO function is enabled**. The **P34** shows the label *Eco* when in *Eco* mode alternated to the normal display.
10. **Decimal Point/Stand by:** When the instrument is placed in Stand by mode, this is the only lighted LED. During the normal operation is the decimal separator.
11. **Engineering Unit LED:** Displays the temperature measurement unit in usage *°C*/*°F* (**P03 only**).
12. **LED ⚠:** On the **P34** shows the **Alarm status** (**ON**), off (**OFF**) and Acknowledged or Lached (**blinking**).
13. **LED :** On the **P34** indicates the output status (compressor or temperature control device) when the instrument is programmed for **heating operation**:
    ON (lit up), **OFF** (turned OFF) or **inhibited** (blinking).

1.3 B05B Control Unit description



1. **LED ON:** This LED shows, blinking, that the Control Unit functions correclty. At Power ON for a few seconds, it blinks faster to indicate that the control is starting, then the blinking frequency slows down.
2. **TTL Port:** This port can be used to connect the following devices:
   - A01 - To transfer the operating parameters to and from the instrument or for USB MODBUS communications;
   - ARS1 - For RS485 MODBUS communications;
   - TVRY - Remote display.
3. **LIN Port:** This port is used to connect the compatible user operator panels.

2. PROGRAMMING

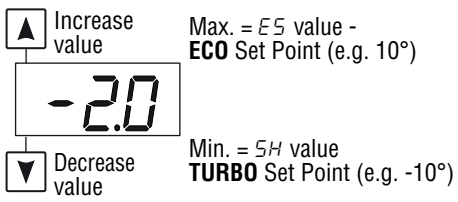
2.1 Fast programming of "Normal" Set Point

The instrument allows to manage, through the Ed parameter, the selection of the Set Point in two different modes:

Ed = **1** The instrument allows to set the **S1** Set Point value within the limits inserted at SH and SE parameters.

In this mode, pressing and releasing the ▲/▼ key the instrument displays the active **S1** Set Point value. While the Set Point value is displayed, pressing the ▲/▼ key again is possible to modify the **S1** value to the desired one. Once the desired value has been selected, press the 💡/P key or wait 10 s after which the instrument makes active the **S1** Set Point value and the display returns to the normal operating mode.

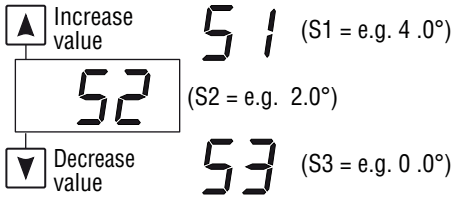
Ed = **1** mode
Set Point Programming



Ed = **2** The instrument allows the selection of the Set Point that is to be set as **active** between one of **3 user preset** Set Points (**S1, S2**, **S3**).

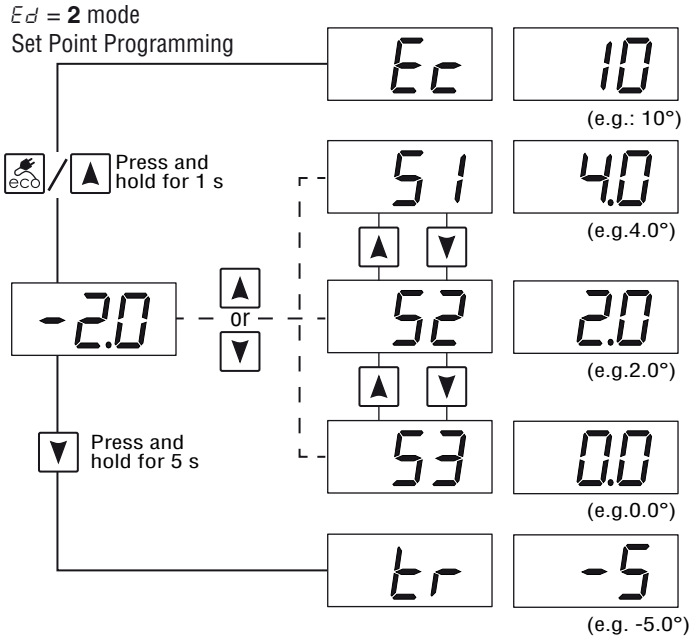
In this mode, pressing and releasing the ▲/▼ key the instrument displays the current active Set Point (**S1, S2**, **S3**) alternated to its value. Pressing the ▲/▼ key again is possible to select which Set Point is to be set as active (**S1, S2**, **S3**). Once selected the active Set Point, press the 💡/P key or wait 10 s after which the instrument makes the selected Set Point active and the display returns to the normal operating mode.

Ed = **2** mode
Set Point Selection

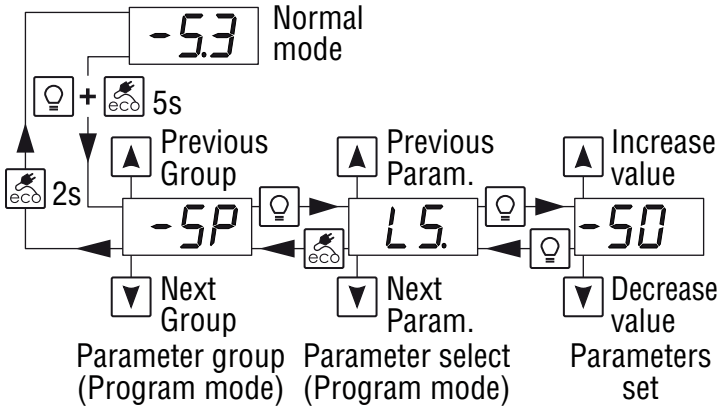


Using the instrument with Ed = **2** is the most practical and simple for the end user who, with the operations described below, can easily select as active one of the 4/5 preset Set Point temperatures (**SE**, **S1**, **S2**, **S3** and **SH**).

Ed = **2** mode
Set Point Programming



2.2 Standard mode parameters programming



To **access the instrument function parameters** when **password protection** is **disabled**, press the eco/U and 💡/P keys together and keep them pressed for about 5 seconds, after which the display shows the code that identifies the first programmable parameters group (-SP). With ▲/▼ keys select the desired group of parameters, then press the 💡/P key, the instrument displays the code that identifies the first parameter of the selected group.

With ▲/▼ keys select the desired parameter, then press the 💡/P key, the instrument shows the code of the selected parameter alternated to its value. Now it is possible to change the parameter value using the ▲/▼ keys and store it pressing the 💡/P key. Once the value is stored, the display returns to show only the parameter code.

With the ▲/▼ keys is now possible to select a different parameter and change its value as described or, with the eco/U key pressed for 1 s, is possible tor return to the parameters

group selection (back of 1 step). At this point it is possible to select a different parameter group.

To exit the programming mode, press no keys for about 30 s or keep the eco/U key pressed for about 2 s.

2.3 Parameter protection using the password

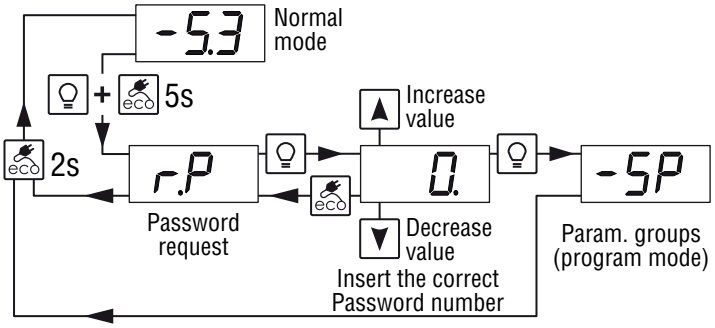
The instrument has a parameter protection function using a password that can be personalised through the PP parameter.

To **protect** the parameters, set the desired **password number** in the parameter PP.

When the protection is active, to access the parameters, press the eco/U and P keys and keep them pressed for about 5 s after which the display shows rP. Now press the P key, the display shows 0, insert the programmed **password number** with ▲/▼ keys then press P again.

If the password is correct the instrument shows the code of the first parameter group and it will be possible to program the instrument in the same way described at the previous paragraph.

The password protection can be disabled by setting PP = **oF**.



Notes: 1. All parameters are configured by default as protected, so that setting the PP password number will protected all parameters.

2. If the **Password gets lost**, just power **OFF** and **ON** the instrument, press P key during the initial test keeping it pressed for 5 s. In this way it is possible to access all the parameters, verify and modify the parameter PP.

2.4 Customized mode parameter programming (parameters programming level)

When the password protection is active, it acts , as default, on all parameters. To make a parameter accessible without having to enter the password when PP password protection is active, use the procedure that follows:

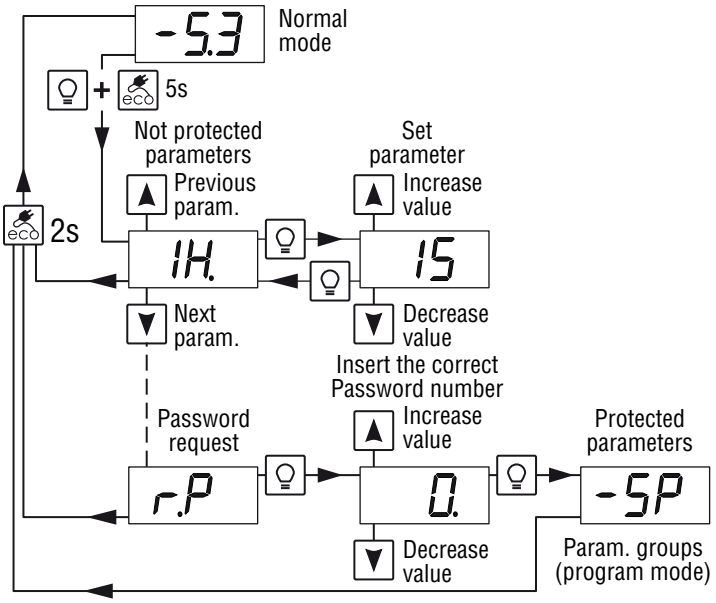
Enter the program mode using the PP password and select the parameter that must be accessible without password protection.

Once a parameter is selected, if the **SET LED blinks** the parameter is programmable by entering the password (is "**protected**"), if instead the **SET LED is steady ON** the parameter is programmable without password (is "**unprotected**").

To change the parameter visibility, press the P key and, while keeping it pressed, press also the ▲/☼ key.

The **SET LED** changes its state indicating the new level of parameter accessibility (**ON** = not protected; **blinking** = password protected).

In case some parameters are not protected, accessing the programming mode the display first shows the not protected parameters, then the rP request (through which will be possible to access the "**protected**" parameters).



2.5 Reset parameters to default value

The instrument allows the reset of the parameters to values programmed in factory as default

To restore the default parameters value set **-48** value at rP password request. Therefore, to make the reset to the default parameters, enable the Password using the PP parameter so that the rP setting is requested, at this point insert **-48** instead of the programmed access password.

Once confirmed the password with the P key the display shows "- - -" for 2 s therefore the instrument resets all the parameters to factory default setting.

2.6 Keyboard lock function

On the instrument it is possible to completely lock the keyboard.

This function is useful when the controller is in an accessible area and the changes must be avoided.

To activate the keyboard lock it is enough to program the parameter Lo to a value different than **oF**. The Lo value is the keys inactivity time after which the keyboard will be automatically locked.

Therefore, pressing no buttons for the time set at Lo, the instrument automatically disable the keys normal functions.

When the keyboard is locked, if any of the key is pressed, the display shows Ln to indicate that the lock is active.

To unlock the keyboard it is enough to contemporarily push P + ▲/☼ keys and keep them pushed for 5 s, after which the label LF appears on the display and all the key functions will be available again.

2.7 Variables display

The display normally shows the variable set at parameter *dS*, but the user can view all the measurement and operating variables by simultaneously pressing the eco/U and ▼/**trb** keys for about 5 seconds after wich the display alternately shows the code that identifies the first viewable variable and its value.

Then with the ▲/▼ keys the user can see all the variables:

P1 Probe **Pr1** measurement;

P2 Probe **Pr2** measurement;

P3 Probe **Pr3** measurement;

LE **Minimum Pr1** stored temperature;

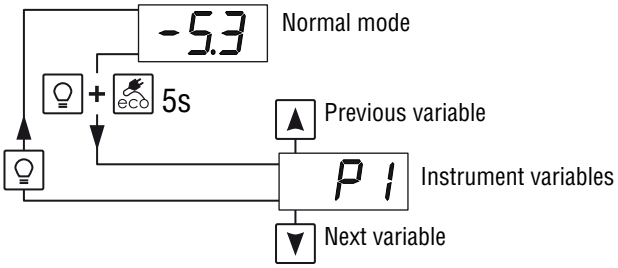
HE **Maximum Pr1** stored temperature.

If the mains voltage alarm function is enabled (*LU* or *HU* other than **oF**), this mode shows also the *P5* variable representing the mains voltage value decreased by 150. The mains expressed in Volt measured by the instrument will therefore be: **V** = **P5 + 150**.

The temperature peak values *LE* and *HE* are not saved in case of power failure and can be reset pressing for about 3 s the eco/U key while showing the peak values *LE*/*HE*.

After 3 seconds the display shows "- - -" for an instant to indicate the deletion and takes as peak temperature the one measured at that moment.

To exit the display variables mode, press no keys for about 10 s or press the ☼/P button.



3. USAGE WARNINGS

3.1 Admitted use

The instrument has been projected and manufactured as a measuring and control device to be used according to EN60730-1 at altitudes operation below 2000 m.

Using the instrument for applications not expressly permitted by the above mentioned rule must adopt all the necessary protective measures.

The instrument **MUST NOT BE USED** in dangerous environments (flammable or explosive) without adequate protections.

The instrument used with NTC 103AT11 probe (identifiable by the printed code "103AT-11" visible on the sensor part) 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, 2, -50°C +90°C].

Remember that the end user must periodically check and verify the thermometers in compliance with standard EN 13486.

The installer must ensure that the EMC rules are respected, also after the instrument installation, if necessary using proper filters.

4. INSTALLATION WARNINGS

4.1 Mechanical mounting [mm]

The B05B Control Unit, is designed for panel mounting using 2 screws.

The P03 display panel in case 96 x 50 mm, is designed for flushing panel mounting. Make a 90 x 44 mm hole and insert the panel, fixing it with the provided special brackets. We recommend that the gasket of the panel is mounted in order to obtain the protection degree as declared.

The P34 display panel in case 78 x 35 mm, is designed for flushing panel mounting. Make a 71 x 29 mm hole and insert the panel, fixing it with the provided special brackets. To obtain the declared protection degree, mount the P34 panel using the screw type bracket (optional).

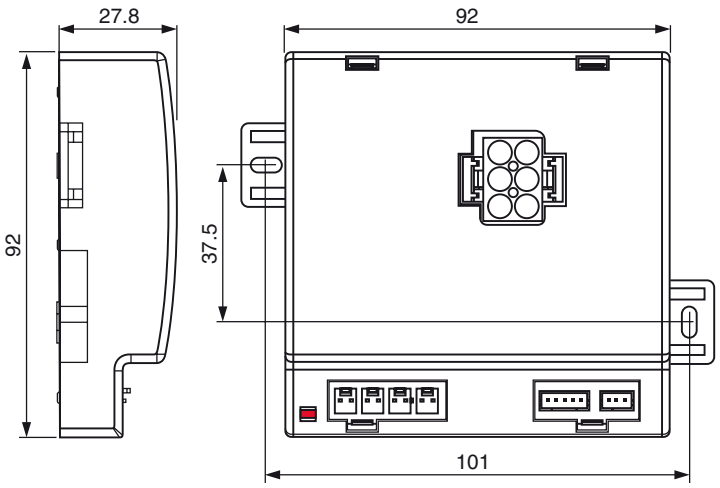
Avoid placing the instrument in environments with very high levels of humidity that may create condensation or dirt that could lead to the introduction of conductive parts or substances into the instruments.

Ensure adequate ventilation to the instrument 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.

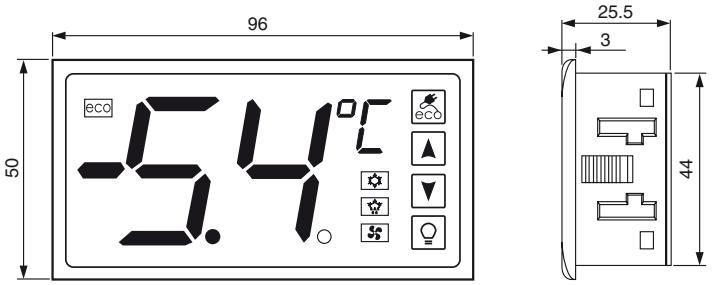
Connect the instrument as far away as possible from sources of electromagnetic disturbances such as motors, power relays, relays, solenoid valves, etc..

4.2 Mechanical dimensions

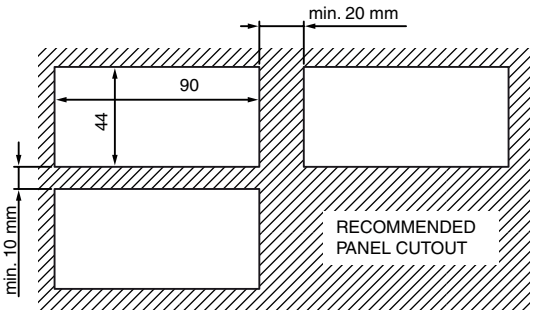
4.2.1 B05B



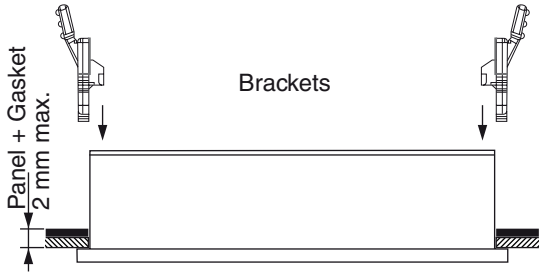
4.2.2 P03C



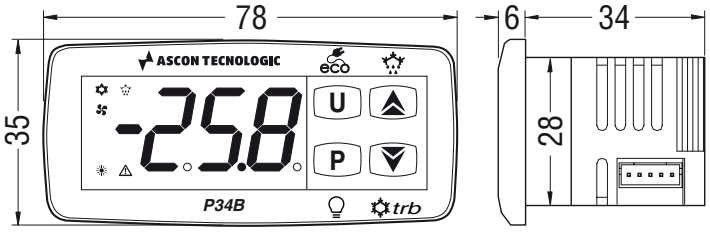
Panel cut-out



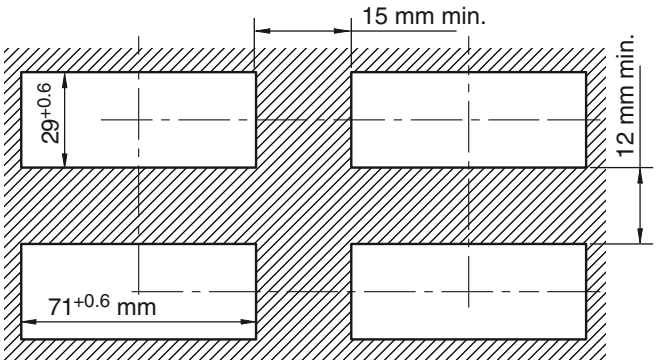
Mounting



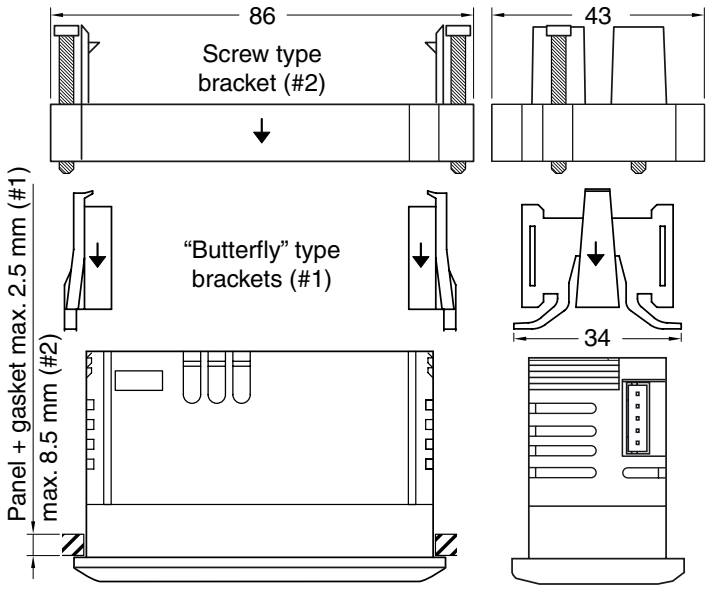
4.2.3 P34



Panel cut-out



Mounting



4.3 Electrical connections

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 current overloads: 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.

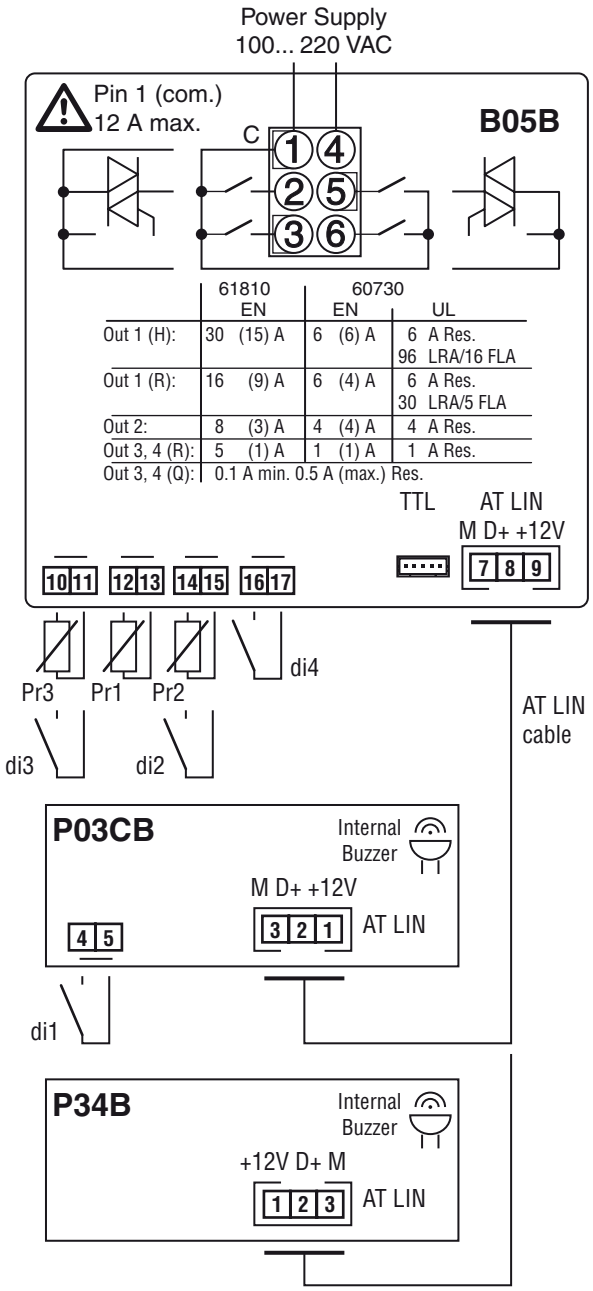
It is strongly recommended that cables with proper insulation, according to the working voltages and temperatures, be used.

Furthermore, the probes input cables must be kept separated

from line voltage wiring. If the iprobes cables are shielded, the shield must to be connected to ground at 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.

4.3.1 Electrical wiring diagram



5. FUNCTIONS

5.1 ON/Stand-by function

Once powered the instrument can assume 2 different conditions:

ON: Means that the controller uses the control functions.

STAND-BY:
Means that the controller uses no control function and the display is turned off except for the Stand-by LED.

The transition between Standby and ON condition is equivalent to power ON the instrument providing the electrical power.

In case of power failure, the system always sets itself in the condition it was in before the black-out.

The ON/Stand-by function can be selected:

– With the key /U pressed for 1 s if UF = **2**;

– Using a Digital Input if parameter ❑F = **7** (where ❑ is the number of the digital input: ❑ = 1 ÷ 4 for P03 or ❑ = 2 ÷ 4 for P34).

5.2 Normal, Economic and Turbo operation

The controller allows to pre-set 5 different control Set Points:

S1, **S2**, **S3** are **Normal** Set Points,

SE is an **Economic** Set Point;

SH is a **Turbo** Set Point.

Associated with each Setpoint there is the relative differential (hysteresis): **Normal** - d, **Economic** - Ed and **Turbo** - Hd.

As explained at paragraph "*2.1 Fast programming of normal Set Point*", the operative **Normal** Set Point is **only 1**, in particular:

S1 if Ed = **1**

or selectable between:

S1, **S2**, **S3** pre-set values if Ed = **2**.

Note: In the examples that follow, the Set Point is generically indicated as **S1**, but the instrument controls the process using the active Set Point.

5.2.1 Normal/Economic operation selection

This function can be used if it is necessary to switch two functional temperatures (eg. Day/Night or week-day/week-end). The Normal/Economic operation can be selected in manual mode:

– Using the /U key if parameter UF = **2**;

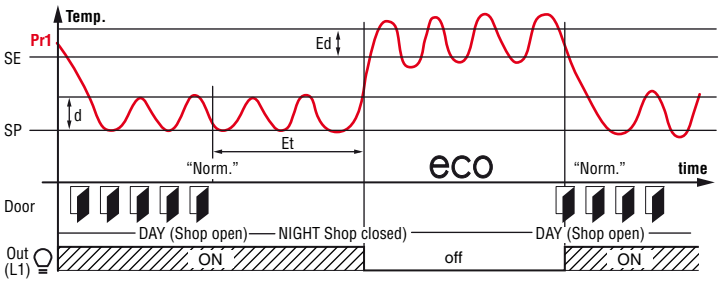
– Using a Digital Input if parameter ❑F = **6** (❑ = DI #).

The Normal/Economic operation can be selected in automatic mode:

– Elapsed the Et time after the door has been closed (Normal/Eco switching).

– At door opening if the Eco function is active (Eco/Normal switching).

– Elapsed the Et time after the door has been closed and from the activation of Eco function (Eco/Normal switching).



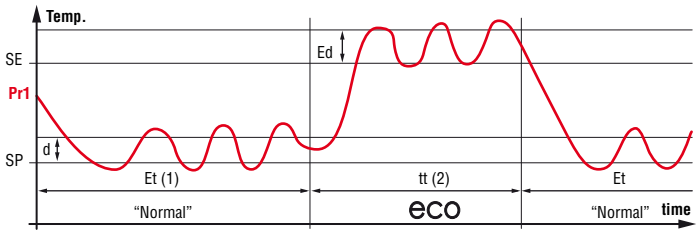
Example of automatic ECO - Normal switching mode. During the **business hours**, when the door is opened frequently and the controller remains in **Normal** mode. After the Et

time has elapsed since the door is no longer opened, the controller switches to **ECO** mode. At the first door re-opening the controller returns to **Normal** mode.

To use this function, it is necessary to set the Digital Input as: ❑F = **1**, **2** or **3** (Open Door input)(❑F = **2** or **3** for P34).

If Et = **oF** the selection between **Eco**/**Normal** modes via a digital input is disabled.

If Et = **oF** the time-out switching from **Eco** to **Normal** mode is disabled.



Switching to Economic mode is pointed out on the P03 by the switching ON of the LED eco or, on the P34, by the label Eco shown on the display alternated, every 10 s, to the normal display.

To the selection of the Eco mode operation is often associated the switching OFF of the output configured as **L1** (shop window light).

5.2.2 Turbo/Normal/Economic operation selection

Turbo mode can be **manually activated** when the temperature of the goods must be lowered after the refrigerator loading phase. Or, it **can be used** to **automatically recover** the **temperature of the products** at the **end** of the **economy mode**.

Turbo mode can be **manually activated** by:

– Holding pressed the ▼/***trb*** key for 5 s;

– A digital input if parameter if ❑F = 8.

The **Turbo** mode can also be **atomatically activated**:

– At the end of the **ECO** phase mode (only if: HC = **C3**);

– At each instrument Power ON ((only if: HC = **C3** and Pr1 > **SE** + **Ed**).

The exit from the **Turbo** mode automatically occurs after the tC time has elapsed or manually via a programmed command (key or digital input); the instrument returns to **normal** mode.

The active **Turbo** mode is pointed out on the display with the label tr alternated, every 10 s, with the normal display.

By setting HC = **C3**, the operating cycle is as follows:

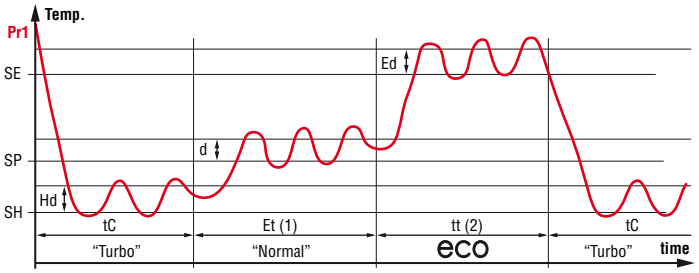
At Power ON, the instrument starts in the same control mode it was in when it has been switched OFF (**Normal** or **ECO**) unless the power ON temperature is Pr1 > **SE** + **Ed**. In this case, a **Turbo** cycle is automatically started.

After the tC time has elapsed, the instrument automatically switches to **Normal** mode.

If the door is opened frequently, the instrument remains in **Normal** mode, but, if it is not open for the time set at Et parameter, it automatically switches to **ECO** mode.

The instrument remains in **ECO** mode until the door is re-opened or, if set, until the tt timeout.

Exiting from the **ECO** mode, the instrument performs a **Turbo** cycle to allow goods temperature recovery after which it returns to normal operation mode and so on.



1. The Et time count is reset at each door opening and in the case shown the door is always closed.
2. The tt time count is stopped at door opening and the instrument immediately switches to **Turbo** mode. In the case shown, the door is always closed.

5.3 Measure and display configuration

All the parameters for configuring the inputs are contained in the - In group.

With the uP parameter it is possible to select the temperature engineering unit and the desired measure resolution (**C0** = °C/1°; **C1** = °C/0.1°; **F0** = °F/1°; **F1** = °F/0.1°).

The instrument allows the measure calibration, which can be used to recalibrate the instrument according to application needs. The calibration is made by using parameters C1 (**Pr1** input), C2 (**Pr2** input) and C3 (**Pr3** input).

Parameters P2 and P3 allow to select the instrument usage of **Pr2** and **Pr3** measure as:

EP **Evaporator Probe:** The probe performs the functions described below in order to control defrosters and evaporator fans;

AU **Auxiliary Probe:** Can be used as a probe for display only but it is also possible to associate it with temperature alarms (possible uses: product probe, anti-freeze probe etc.);

cd **Condenser Probe:** Can be used as a probe for display only, but it is also possible to associate it with temperature alarms to indicate condenser malfunctioning alarms (e.g. dirt/clogged condenser);

dG **Digital Input:** see Digital Input Functions.

If a probe input is not used, set iP❑ = **oF** (❑ is the probe number).

It is not possible set 2 probe inputs for the same function. If two inputs are set for the same function, this is done by the probe with the lower number input.

With Ft parameter can be applied a software filter to the measurement input values in order to decrease the instrument sensibility to rapid temperature changes (increasing the sampling time).

In addition to this filter, there are 2 other similar filters that are used only for probe **Pr1** display for measurement increasing (parameter du) and the decreasing (parameter dd) to avoid displaying rapid temperature variations.

The filter locks the maximum decrement displayed at 0.1° every dd seconds and the maximum increment displayed every du seconds. The filters are reset at Power ON.

In order to display the so filtered **Pr1** masure it is necessary to set parameter dS = **F1** differently program dS = **P1**.

dS parameter can be used to establish what is normally shown on the display:

P1 Probe Pr1 measurement;

P2 Probe Pr2 measurement;

P3 Probe Pr3 measurement;

SP Active Set Point;

Ec Probe **Pr1** measurement when the instrument is in Normal mode and the Ec label only when is in **Eco** mode;

F1 The **Pr1** probe measurement **filtered** through parameters dd and du;

oF Numeric display OFF.

If one of the measurements (dS = **P1**, **P2**, **P3**, **Ec**, **F1**) is displayed, parameter CU allows to set an offset that is to be applied to the variable display only (all adjustment controls will always be in accordance with the correct calibration parameter).

Regardless of what set at parameter dS, all the instrument variables can be displayed as explained at paragraph "*2.7 - Variables display*".

Note: The Pr1 probe display can also be changed by the defrost display lock function set with parameter dL (see the "*Defrost*" function).

5.4 Digital input configuration

All the parameters for configuring the digital inputs are contained in the -In group.

The **P03 operator panel** has 1 digital input (**DI1**) for free of voltage contacts whose function is defined by parameter 1F and whose action is delayed by the time set at parameter 1t.

The **P34 operator panel** has no digital input on-board.

The **B05 controller** always has a digital inputs (**DI4**) whose function is defined by parameter 4F. The B05 controller can also have 2 more digital inputs for free of voltage contacts (**DI2** and **DI3**) as an alternative to **Pr2** and **Pr3** probe inputs.

To use these inputs as digital ones, their relative parameters **P2** or **P3** must be set to dI (**P2**/**P3** = dI). The function performed by these inputs configured as digital is defined by parameters 2F and 3F.

The **DI2** action can be delayed by parameter 2t, while the action of **DI3** and **DI4** is instantaneous and can not be delayed.

The function performed by the instrument at **DI❑** activation is set through parameters 1F, 2F, 3F, 4F:

0. Digital input not active;

1. Cell door opening with NO contact: at input closure the instrument displays alternately oP and the variable set at dS parameter. With this mode of operation, the digital input activates also the time set with parameter oA elapsed which the alarm is activated to warn that the door has been left open. In addition, at door opening, the instrument returns to **Normal** operation if it was in **Eco** mode.

2. Cell door opening with NO contact similar to ❑F = **1**, but with evaporator fans lock. At the intervention of the **Open Door Alarm** (oA), the **evaporator fans** are powerd **ON** again.

3. Cell door opening with NO contact similar to ❑F = **1**, but with compressor and evaporator fans lock. At the intervention of the **Open Door Alarm** (oA), the **evaporator fans** and the **compressor** are powerd **ON** again.

4. External alarm signal with NO contact: at digital input closure the alarm is activated, the instrument alternately displays AL and the variable set at parameter dS;

5. External alarm signal with control outputs disabling (except alarm and light outputs) by NO contact: at digital input closure the the control outputs are disabled, the alarm is activated and the instrument alternately displays the label AL and the variable set at parameter dS;

6. Normal/ECO mode selection with NO contact: at digital input closure the instrument switches to the **ECO** mode operation. When the Digital Input is open, the instrument is in **Normal** operation mode;

7. Instrument Switching ON/OFF (Stand-by) by NO contact: at digital input closure the instrument is switched ON while it is placed in Stand-by when the contact is open;

8. **Turbo** cycle activation command with NO contact: at digital input closure the instrument starts a **turbo** cycle;

9. Remote command of auxiliary output (**AUX**) with NO contact: at digital input closure the instrument activates the auxiliary output as described in the Fo = **2** operating mode of the auxiliary output;

10, 11 - Not used;

12. External Pr alarm with **ot** output disabling with NO contact: at digital input closure the output set as **ot** is disabled, the alarm is enabled and the instrument alternately displays the label PA and the variable set at parameter dS;

13. External HP alarm with **ot** output disabling with NO contact: at digital input closure the output set as **ot** is disabled, the alarm is enabled and the instrument alternately displays the label HP and the variable set at parameter dS;

14. External LP alarm with **ot** output disabling with NO contact: at digital input closure the output set as **ot** is disabled, the alarm is enabled and the instrument alternately displays the label LP and the variable set at parameter dS;

-1, -2, -3, etc. - Features identical to the above but obtained through a NC contact and a reversed logic operation.

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)

5.5 Outputs and Buzzer configuration

All the parameters for configuring the instrument ouputs are contained in the -Ou group.

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 temperature control device (e.g. the compressor). In the case of neutral zone control (HC = **nr**) to control the **cooling** device;

dF To control the defrosting device;

Fn To control the evaporator fans;

Au To control the auxiliary device;

At To control an alarm that can be acknowledged, the output contact is normally open and closed in alarm;

AL To control an alarm that cannot be acknowledged, the output contact is normally open and closed in alarm;

An To control a latched alarm, the output contact is normally open and closed in alarm;

-t To control an acknowledgeable alarm device, the output contact is normally closed and open in alarm;

-L To control an alarm that cannot be acknowledged, the output contact is normally closed and open in alarm;

-n To control a latched alarm, the output contact is normally closed and open in alarm;

On To control a device that must be ON when the instrument is in ON state. The output is therefore disabled when the instrument is not powered or is in stand-by status. This mode can be used to control the shop window lights, the anti fogging resistance or other utilities;

HE To control an heating device in neutral zone control mode (HC = **nr**);

L1 Output of the shop window light managed by **Normal**/**Eco** mode. This output will be ON in **Normal** mode and OFF in **Eco** mode operation;

L2 Output of the light internal to the cell managed by a digital input. This output will be ON when door is open (only if ❑F = **1**, **2**, **3**);

-d Defrost output with NC contact;

oF Output disabled.

If one of the output is configured as **auxiliary** (o❑ = **Au**), the function carried out by auxiliary output is defined by the parameter Fo and the function is conditioned by the time set in parameter to.

The parameter Fo can be configured for the following functions:

oF Auxiliary output not active;

1. Delayed temperature control output. The auxiliary output is activated with a delay from the activation of the **ot** output, the delay can be set with parameter to. The **Aux** 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 excessive current absorption;

2. Activation by digital input: the output is activated by a digital input suitably configured (❑F = **9**). The commands have a toggle function which means that at the first impulse, the output is activated while at the second is disabled. In this mode, the **AUX** output can be turned OFF automatically after a certain time that can be set at parameter to. With to = **oF** the output is activated and deactivated only manually through a digital input. Differently, the output, once activated, is turned OFF automatically after the to time has elapsed. This mode can be used to control the cell light, the anti fogging resistances or other utilities.

The internal buzzer (when present) can be configured by parameter bu for the following functions:

oF Buzzer always disabled;

1. The Buzzer signals the active alarms only;

2. The Buzzer signals the key pressed only (no alarm);

3. The Buzzer signals the active alarms (continuous sound) and the key pressed;

4. The Buzzer signals the active alarms (with intermittent beep) and the key pressed.

5.6 Temperature control

All parameters relative to the temperature control are contained in the -rE group.

The instrument **control** is **ON/OFF** and acts on the **ot** and **HE outputs** depending on the **PR1** probe measuring, the **active Set Point(s)** S1 (or S2, S3, SE, SH), the Histeresys d (or Ed and/or Hd) and the function mode HC.

Through HC parameter is possible to set the following operations:

C Cooling;

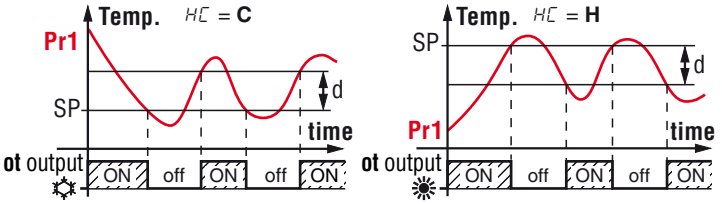
H Heating;

nr Neutral zone;

HC Cooling and Heating with 2 independent Set Points;

C3 Cooling with 3 automatic modes of intervention.

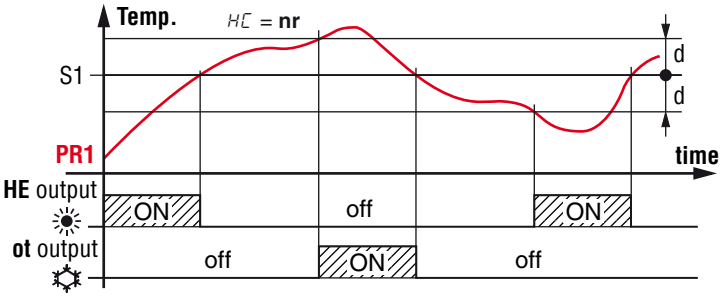
5.6.1 Cooling and Heating (C or H)



Depending on the function mode programmed with parameter HC the differential is automatically considered by the controller with positive values for a **Refrigeration** control (HC = **C**) or negative values for a **Heating** control (rHC = **H**).

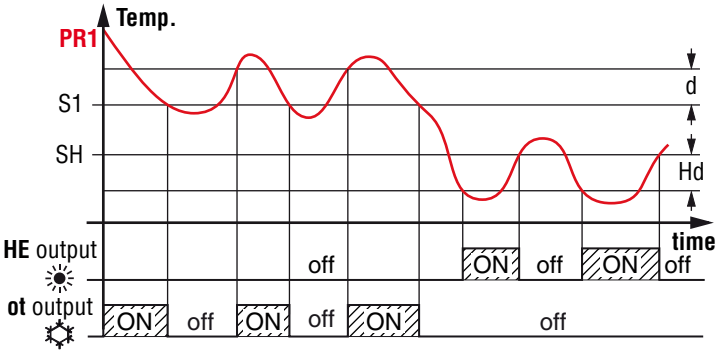
Note: The **P03** display panel has only one LED ☼ to show the Heat or Cool action, while the **P34** has 2 LEDs, one ☀ for the **Heating** action and one ☼ for the **Cooling** action.

5.6.2 Neutral zone (nr)



When HC = **nr**, the output configured as **ot** operates with **cooling** action (such as HC = **C**) while the output configured as **HE** operates with **heating** action (as HC = **H**). In this case, the set point for both outputs is the active one between S1, S2, S3, SE, SH and the intervention differential (d, Ed or Hd) is automatically considered by the controller as positive for the cooling action and negative for the heating one.

5.6.3 Heating and cooling with 2 independent Set Points (HC)



As in the previous case, when HC = **HC**, the output configured as **ot** operates with **cooling** action (such as HC = **C**) while the output configured as **HE** operates with **heating** action (as HC = **H**), but now, the Set Point of the **ot** output is the one **set as active**, while the one of the **HE** output is the **SH** Set Point. The intervention differential for the **ot** output is the active one (d, Ed or Hd) and is considered by the controller as **positive** (because is a **cooling** action) while the intervention differential for the **HE** output is the Hd one and is considered **negative** (because is a **heating** action).

In this functioning mode, the activation of the **turbo** cycle causes the instrument to operate with neutral zone setting with SH Set Point.

5.6.4 Cooling action with 3 auto modes functioning

With this setting, the instrument operates in **Cooling** mode, but with trhe automatic selection of **Normal**-**Eco**-**Turbo** functioning modes (already described).

All time protections **P1**, **P2** and **P3** (described at next paragraph) act only on **ot** output.

In the event of a **probe error**, it is possible to set the instrument so that the output continues working in cycles according to the times programmed with parameter $Et1$ (activation time) and $Et2$ (deactivation time).

If an error occurs on **Pr1** probe the instrument activates the **ot** output for the time $Et1$, then deactivates it for the time $Et2$ and so on whilst the error remains.

Programming $Et1$ = **oF** the **ot** output, in probe error condition, remains **switched OFF**.

Programming instead $Et1$ to any value and $Et2$ = **oF** the **ot** output, in probe error condition remains **switched ON**.

Remember that the temperature control functions can be conditioned by the *Compressor Protections*, *Delay at power ON* and *Defrost functions*, *Open Door* and *External alarm with output locked* from Digital Input.

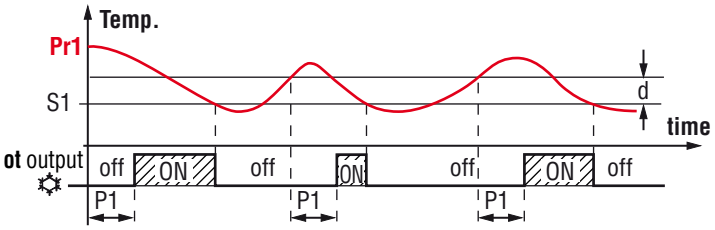
5.7 Compressor protection functions and power-on delay

All parameters relative to the compressor protection function are contained in the $-Pr$ group.

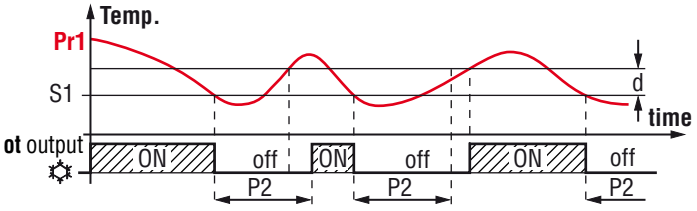
The "**Compressor Protection**" function aims to avoid repeated compressor start-ups controlled by the instrument in cooling applications or otherwise can be used to add a timed control to the control output actuator.

This function foresees 3 time controls on the switching ON of **ot** output (associated with the temperature control request). The protection consists of preventing the **ot** output being switched ON during the protection times set with parameters $P1$, $P2$ and $P3$ and therefore that any activation occurs only after all times are elapsed.

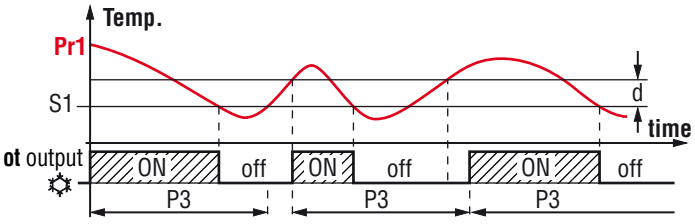
1. First control (parameter $P1$) foresees a delay to **ot** activation (switching-ON delay).



2. Second control (parameter $P2$) foresees an inhibition to **ot** activation by a time delay that starts when the **ot** output is turned OFF (delay after switching-OFF).



3. Third control (parameter $P3$) foresees an inhibition to **ot** activation by a time delay that starts when the **ot** output was turned ON last time (delay between two switching-ON).



During the output inhibition the LED of the control output blinks. It is also possible to prevent activation of the output after the instrument is turned ON for the time set at parameter od.

During the power ON delay phase, the display shows the indication od, alternated with the normal visualization.

All these functions are disabled if the relative parameters are set to **OFF** (oF).

5.8 Defrost control

All parameters relative to the defrost control are contained in the $-dF$ group.

Defrost control mode normally operates on outputs configured as **ot**, **dF** and **-d**.

The type of defrost that the instrument must carry out is set by parameter dt that can be programmed as:

- EL Electrical heating/stop compressor. With this mode, during defrosting, the **ot** output is **disabled** while is **activated** output **dF**. To get a defrost by compressor stop do not use output **dF**;
- in Hot gas/reverse cycle. With this mode, during defrost, both the **ot** and **df** output is **activated**;
- no Without compressor output condictioning. With this mode, during defrost, **ot** output operates as requested by temperature control, while output **dF** is **activated**;
- Et Electrical heating with evaporator temperature control. With this mode, during defrost, **ot** output is **disabled** while **df** output operates as temperature control of the evaporator during defrost.

With this selection the end of the defrost cycle is always related to dE time. During defrost, output **df** acts as a heating temperature control with Set Point tE and hysteresis = 1°C and with reference to the temperature measured by the probe set as Evaporator Probe (EP).

In this mode, if the the Evaporator Probe is not enabled or in error, defrosting behaves as in EL selection (therefore the output **dF** during defrost must always be activated).

5.8.1 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 unnecessary defrosts **when** the evaporator temperature is **high**, parameter tS allows to set the temperature related to the evaporator probe (configured as EP) under which defrosts are possible.

Defrost by regular interval time

Counting mode interval and automatic defrost starts are set through the parameter dC that can be programmed as:

- rt Intervals with count of the total operating time (instrument ON). This mode results that currently used in

the refrigerators systems.

- *ct* Intervals with count only the compressor opearting time. The *di* interval is counted as the sum of the operating times of the control output (**ot** output switched ON). Mode typically used in the positive temperature refrigerators system with defrost by stopping compressor.
- *cS* Defrost at each compressor stop. The instrument carries out a defrost cycle at all compressor stops (i.e. at each **ot** output deactivation), when the temperature reaches the Set Point or however when elapses the Defrost Interval (*di*) time. If *di* = **oF** the defrost happens only at compressor stop. This mode is used only on particular refrigeration systems in which it is desired to always have the evaporator at maximum efficiency conditions at each compressor cycle.

Set the *dC* parameter to the desired mode between *rt*, *ct* or *cS*, set the desired *di* defrost interval time (the interval between the end of a defrost and the beginning of the next one) to enable automatic defrost at intervals.

The first defrost after Power ON can be set with parameter *Sd*.

This allows to perform the first defrost to a different interval from *di* time.

When is requested that the instrument performs a defrost cycle at all Power ON (as long as the conditions set in the parameter *tE* are satisfied and in the cases describe hereafetr) program parameter *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.

When, instead, is requested that the instrument performs the defrost cycles at the same time interval, set parameter *Sd* = **di**.

Automatic defrost function by interval is disabled when *di* = **oF** including the first, regardless of the time set at *Sd* parameter.

Dynamic Defrost Intervals System

Note: For this function, it is necessary to use the evaporator probe.

By setting parameter *dC* to the desired mode (between *rt*, *ct* or *cS*) and parameter *dd* at any value, the *Dynamic Defrost Intervals System* function becomes operative.

If *dd* = **0** the Dynamic Defrost Intervals System is disabled.

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.

The algorithm allows to estimate the thermal exchange reduction evaluating the increase of **Δt** between **Pr1** (controlled temperature) and **EP** evaporator probe that is stored by the instrument in proximity of the control Set Point.

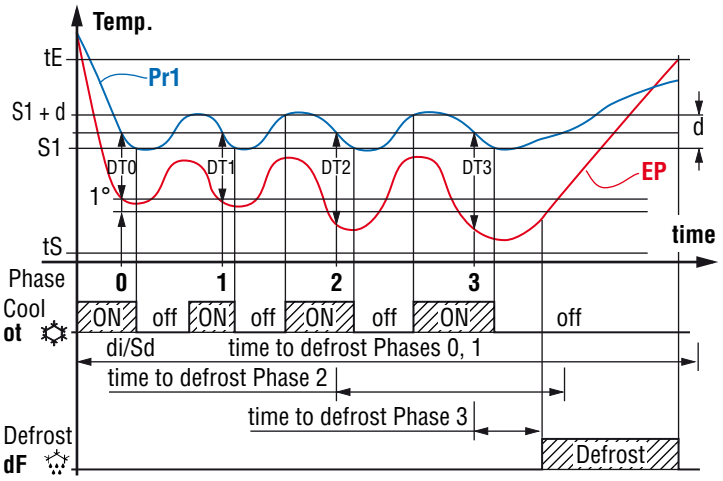
The advantage of the *Dynamic Defrost Interval* is the possibility to program a defrost interval longer than the normal one and allow the instrument to anticipate a defrost when necessary.

If the system results correctly set, it is possible to avoid many non necessary defrosting cycles (and therefore save energy) that could instead happens in normal operation when, to guarantee the system efficiency, the interval set between 2 defrost cycles is too short.

By parameter *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.

Setting parameter *dd* = **100**% at the first increasing of the temperature difference between **Pr1** cell and **EP** evaporator probes (**PR1** - **EP** > 1°) a defrost cycle starts immediately.

To operate correctly, the instrument needs a first reference value of the temperature difference between the cell and the evaporator probes (**PR1** and **EP**) so any variation in the active Set Point, differential control or defrosting operation cancels that reference with the result that the system cannot apply a time reduction until a new reference value is made has ben acquired.



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 temperature programmed at *tF* parameter for the time set at *St*. This system can be used 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.

Setting *tF* = **-99.9** the function is disabled.

Defrost by continuous compressor running time

The instrument start a defrost cycle when the compressor is turned on continuously for the time set at parameter *cd*.

This function is used because the compressor continuous operation for an extended period is usually symptomatic of a bad thermal exchange typically caused by the frost on the evaporator.

Setting *cd* = **oF** the function is disabled.

5.8.2 Manual defrost

To start a manual defrosting cycle, press the key ▲/☼ when the instrument is in Normal mode and keep it pressed for about 5 s after which, if the conditions are correct, the LED ☼ lights up and the instrument performs a defrosting cycle.

To stop a defrosting cycle, press the key ▲/☼ and keep it pressed for about 5 seconds during a defrost cycle.

5.8.3 Defrost ends

The duration of the defrost cycle can be timed or, using the evaporator probe (**Pr2** configured as *EP*), at temperature reaching.

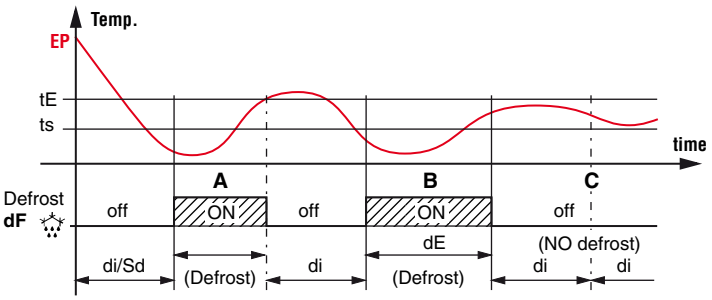
In the event that the evaporator probe is not used the duration of the defrost cycle is set by parameter *dE*. Setting *dE* = **oF** the interval and manual defrosts are disabled.

If instead the evaporator probe is used, the defrost cycle ends when the temperature measured by the *EP* evaporator probe exceeds the temperature set in the parameter *tE*.

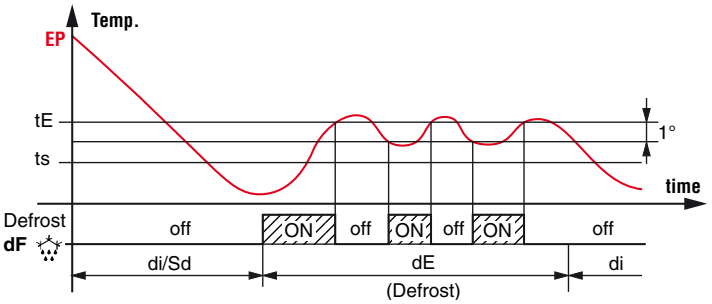
If the *tE* temperature is not reached in the time set at parameter *dE* the defrost cycle is interrupted.

In order to avoid unnecessary defrosts when the evaporator temperature is high, the parameter tS allows to establish the temperature referred to the evaporator probe below which defrosts are possible.

In this way, if the temperature measured by EP probe is higher than the temperature set at parameters tS and tE the defrosts are inhibited.



Defrost end examples: Defrost **A** ends due to the reaching of tE temperature, defrost **B** ends at the end of dE time as the temperature tE has not be reached, defrost **C** does not take place as the temperature is higher than tS.



Example of electric defrost with thermostat: Electric defrost with evaporator temperature control: defrost ends after dE programmed time. During defrost, the dF output switches **ON/OFF** in order to control evaporator temperature in heating mode with set point tE and 1° differential (Hysteresis). The defrost cycle in progress is signaled by the lighting up of the LED ☼.

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

During this delay, the LED ☼ flashes to indicate the draining in progress.

5.8.4 Defrosts in event of evaporator probe error

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

In case a probe error occurs when the time remaining to the start or the end of defrost is lower than those normally set at parameters related to error conditions probe, the start or the end of the defrost takes place with the shortest time.

Those functions are provided when the evaporator probe is used because the defrost duration is normally set longer than necessary as it works as a safety feature (the temperature value measured by the probe causes the defrost to end earlier) 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.

5.8.5 Display lock during Defrosting

Through parameters dL and dR it is possible to define the display behaviour during defrost.

dL = **on**

The dL parameter locks the display during all the defrost cycle at the last **Pr1** probe temperature reading until, at the end of defrost, the temperature has not reached the lock value or the [SP + d] value or is elapsed the time set at parameter dR.

dL = **Lb**

Shows the label dF during the defrost cycle and Pd after the defrost until, at the end of defrost, the **Pr1** temperature has not reached the last reading value or the value [SP + d] or is elapsed the time set on parameter dR.

dL = **oF**

During the defrost cycle the display keeps showing the temperature measured by the **Pr1** probe.

5.9 Evaporator fans control

All the parameters relative to the fans control are contained in the $-Fn$ group.

The **Fn** output evaporator fans control depends on certain control statuses of the instrument and the temperature measured by the **EP** evaporator probe.

In the case the **EP** evaporator probe is not used or in error , the **Fn** output is activated only depending on the parameters tn, tF and FE.

Through parameters tn and tF is possible to force the fans functioning when the **ot** compressor output is OFF.

When **ot** output is OFF, is possible to set the instrument so that the **Fn** output continues working in cycles according to the times programmed at the parameter tn (fan activation time when compressor is OFF) and tF (fan deactivation time when compressor is OFF).

When **ot** output is switched OFF the instrument activates the **Fn** output for the time tn, then deactivates it for the time tF and so on whilst the **ot** output remains OFF.

Setting tn = **oF**, the **Fn** output will be disabled when the **ot** output is deactivated (evaporator fans off with compressor OFF or fans connected to compressor operations).

Programming tn to any value and tF = **oF** the **Fn** output remains switched ON also when **ot** output is OFF.

Parameter FE allows to determine whether the fans must be switched ON independently of the defrost status (FE = **on**) or switched OFF during defrosting (FE = **oF**).

In this latter case it is possible to delay the fans restarting even after the end of the defrost by the time set with parameter Fd. When this delay is active the LED ✣ flashes to point out the delay in progress.

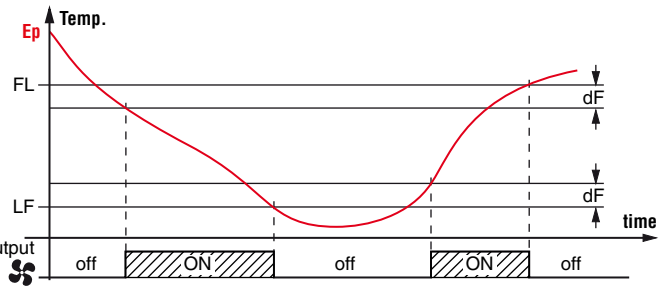
When the **EP** evaporator probe is used the fans, as well as being conditioned by the parameters tn, tF and FE, are also conditioned by a temperature control.

In fact, it is possible to set the fans disabling when the temperature measured by the evaporator probe (**EP**) is higher than the one set at parameter FL (temperature too hot) or even when it is lower than the one set at parameter **LF** (temperature too cold). Associated with these parameters there is also the relative differential that can be set with parameter dF.

Note: Particular attention should be paid to the proper use of the fan control functions according to the temperature because in a typical refrigeration application the

evaporator fan stops the thermal exchange.

Remember that the fans functioning can be conditioned by the *Door open* function by the digital input.



5.10 Alarm functions

All parameters relative to the alarms are contained in the -AL group.

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 instrument alarm functions work on internal buzzer (if present and programmed by parameter bu) and on the desired output, if configured by the parameters o1, o2, o3, o4 depending on what is set at the indicated parameters.

Note: The **P34** display panel has an alarm LED (⚠) that is ON when the instrument is in alarm.

When present, the buzzer is activated during the alarm (with bu = **1** or **3** or **4**) and can be disabled (alarm silencing/acknowledge) manually by pressing any key of the instrument.

The possible selections of output parameters for the alarm signalling function are:

- At — The output is active in alarm and can be disabled (alarm acknowledge) manually by pressing any key of the instrument (typical application for sound signal);
- AL — The output is active in alarm status, but cannot be disabled manually and is therefore only disabled when the alarm status ceases (typical application for a light signal);
- An — The output is active in alarm status and remains active even when the alarm has expired (Alarm memory); it can be disabled (recognition of a stored alarm) manually by pressing any key when the alarm has expired;
- -t — The same function described as At but with an inverse logic functioning (output active in normal condition and disabled in alarm status);
- -L — The same function described as AL but with an inverse logic functioning (output active in normal conditions and disabled in alarm status);
- -n — The same function described as An but with an inverse logic functioning (output active in normal conditions and disabled in alarm status).

5.10.1 Temperature alarms

The instrument has 2 fully configurable temperature alarms, each with a maximum and minimum threshold.

The temperature alarm functions act in response to the probes readings set at parameters 1y and 2y, alarm thresholds set in parameters 1H, 2H (high alarms), 1L, 2L (low alarms) and their differentials 1d, 2d

With 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 set to the following values:

1. Absolute alarm based on **probe Pr1** temperature with display of the label (H – L);
2. Relative alarm based on **probe Pr1** temperature with display of the label (H – L);
3. Absolute alarm based on **probe Au** temperature with display of the label (H – L);
4. Relative alarm based on **probe Au** temperature with display of the label (H – L);
5. Absolute alarm based on **probe cd** temperature with display of the label (H – L);
6. Absolute alarm based on **probe Pr1** temperature, no label;
7. Relative alarm based on **probe Pr1** temperature, no label;
8. Absolute alarm based on **probe Au** temperature, no label;
9. Relative alarm based on **probe Au** temperature, no label;
10. Absolute alarm based on **probe cd** temperature, no label.

The following parameters allow to delay the enabling and the intervention of these alarms.

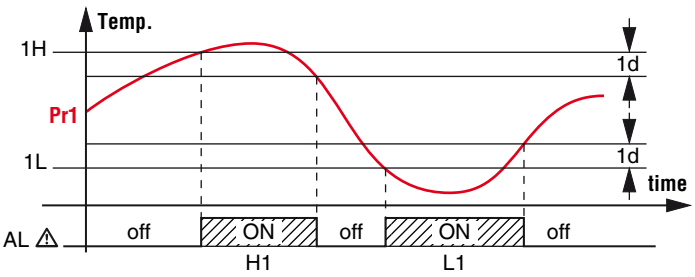
- 1P/2P — Time periods during which temperature alarms are disabled at power ON if the instrument is in alarm condition. If there are no alarm conditions at power ON, ❑P is ignored.
- dA — Time period during which temperature alarm 1 is disabled at the end of a defrost.
  Note: During defrosts and for dA time after defrosts, alarm 1 is disabled, whereas during defrosts alarm 2 is always enabled.
- 1t/2t — Intervention delay for temperature **alarms 1** and **2**.

Temperature **alarms 1** and **2** are enabled at the end of 1P/2P periods and activated after 1t/2t time periods when the temperature measured by the probe configured for the alarm rises above or drops below the respective maximum and minimum alarm thresholds.

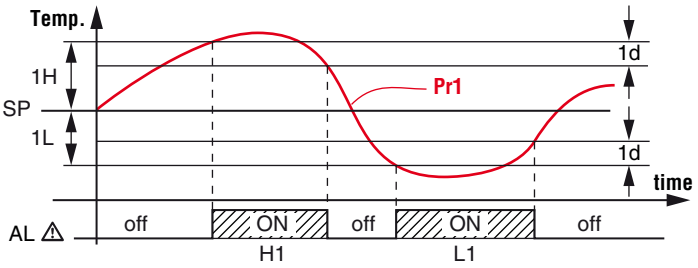
- 1A/2A — These 2 parameters allow to define the action of the alarms on the control and on the alarm outputs (including buzzer). This means for example that it is possible to change the control output directly, deactivating it if there are temperature alarms on the probes configured as Au (e.g. “antifreeze” function) or as cd (e.g. condenser “dirty” function).

If both alarms are configured with reference to the same probe, the instrument allows to control pre-alarm notifications (e.g. notifications that do not activate the alarm output and/or the buzzer) and alarm notifications (that activate the alarm output and/or the buzzer).

The alarm thresholds are the same as those set at parameters ❑H and ❑L if the alarms are absolute (❑y = 1, 3, 5, 6, 8, 10);



or will be the values [SP + ❑H] and [SP + ❑L] if the alarms are relative (❑y = 2, 4, 7, 9).



The high and low temperature alarms can be disabled setting the relevant parameters ❑H and ❑L = **oF**.

5.10.2 External alarms from digital inputs

The instrument can notify alarms external to the instrument by activating one or more digital inputs configured with functions programmed as ❑F = 4, 5, 12, 13, 14.

Simultaneously with the configured alarm notification (buzzer and/or output), the instrument notifies the alarm showing on the display the label defined for the alarm (AL , Pr , HP, LP) alternated to the variable defined at dS parameter.

The ❑F = **4** mode produces no action on the control outputs while the other modes deactivate the **ot** output or all control outputs when the programmed digital input is activated.

Alarm	"ot" output (compressor)	Other control outputs (Fn, dF, Au, HE)
AL (4)	Unchanged	
AL (5)	OFF	
Pr, HP, LP	OFF	Unchanged

5.10.3 Open door alarm

Activating the digital input the instrument can signal an open door alarm with the function programmed as ❑F = 1, 2 or 3.

At digital input activation, the instrument points out that the door is open showing the label oP alternated to the variable set at parameter dS and, after the delay programmed at parameter oA, the instrument signals the alarm by activating the output configured as alarm output (buzzer and/or ouput).

At the open door alarm intervention the inhibited outputs are reactivated (fans or fans + compressor).

5.10.4 Main voltage alarms

All 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 set at parameters:

LU Low voltage Alarm (expressed in Volt x 10);

HU High voltage Alarm (expressed in Volt x 10).

At the intervention of the alarm (and after the Ud delay) the instrument disables all the control outputs, signals the alarm with the configured device (buzzer and/or ouput) and shows the label HU (High voltage) or LU (Low voltage) alternated to the variable set at parameter dS.

If the main voltage alarm function is enabled (parameters LU/HU different than **0**), in the display variable mode will be present also the **P5** entry that represents the main voltage (in the 2 digits models with a value decreased by 150 V; in these models the main voltage measured by the instrument will be therefore **V = value displayed + 150**).

If the voltage measure is not correct it is possible to modify it through an offset that can be set at parameter OU.

5.11 Function of keys eco/U and P

All 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 eco/U key can be programmed through parameter UF to perform the following functions:

oF The key carries out no function;

1. Pressing the key for at least 1 s, is possible to enable/diasable the **ECO** mode. Once the selection has been made, the display shows for about 1 s the active set point code (S1, S2, S3 or EC) alternated to its value. Exiting the **ECO** mode, the instrument returns to the previous active mode;

2. Pressing the key for at least 1 s it is possible to switch the instrument from **ON** to **Stand-by** and vice-versa.

The P key can be programmed through parameter Fb to perform the following functions:

oF The key carries out no function;

1. Pressing the key for at least 1 s, is possible to enable/diasable the **L1** Lamp output or the Auxiliary output if configured as Fo = **2**.

6. ACCESSORIES

The instrument is equipped with a 5-pin TTL communications port that allows the connection of some accessories described below.

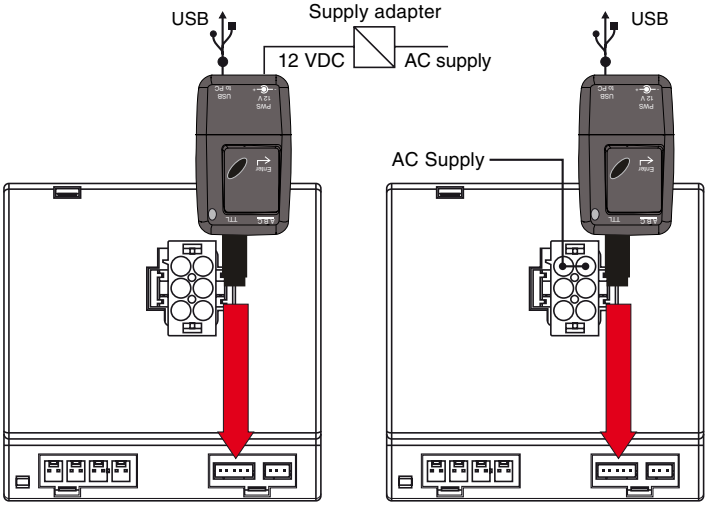
6.1 Parameters configuration by "A01"

Through the 5 poles TTL port it is possible to transfer from and toward the instrument the functioning parameters to the **A01** device.

This device it is mainly usable for the serial programming of some instruments which need to have the same parameters configuration or to keep a copy of the parameters setting of an instrument and allow its rapid retransmission.

The same device allows to connect a PC via USB with which, through the appropriate configuration software for "*AT UniversalConfig*", the operating parameters can be configured.

To use the device **A01** it is necessary that the device or instrument are being supplied directly or through the key.

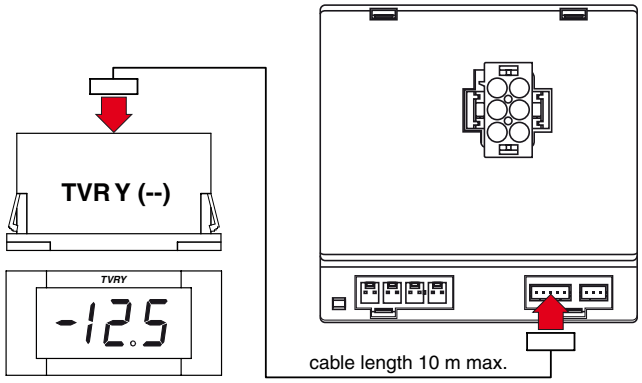


For additional info, please have a look at the **A01** instruction manual.

6.2 TVR Y 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 **TVR Y** device is directly supplied by the instrument, it allows to show the temperature measured by the **Pr1** probe through a 2½ digit display.

For additional info, please have a look at the **TVR Y** instruction manual.



6.3 ARS1 Serial Interface

Through the **ARS1** device (TTL/RS485 interface) and the appropriate TTL cable is possible to connect the controller to a RS485 serial communication network to which other instruments are connected (controller or PLC), typically managed by a personal computer used as plant supervisor.

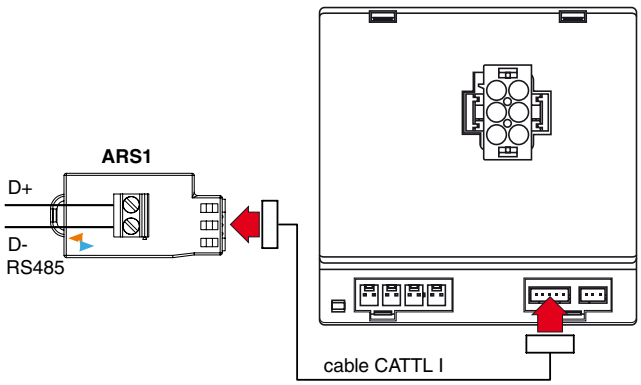
Using a personal computer it is possible to acquire all the function information and to program all the instruments configuration parameters. The software protocol adopted for the instruments is a MODBUS RTU type, widely used in several PLC and supervision programs available on the market.

If the instrument is used in a RS485 network, use the parameter *AS* to set the station Address.

Note: The baud-rate is fixed at 9600 baud.

ARS1 interface is directly supplied by the instrument.

For additional info, please have a look at the **ARS1** instruction manual.



7. PROGRAMMABLE PARAMETERS TABLE

Here below is a description of all the parameters available on the instrument. Some of them may not be present, either due to the fact they depend on the type of instrument or because they are automatically disabled as unnecessary.

-SP Set Point Parameters Group

Parameter		Hex. address	Description	Range MODBUS R/W	Range (display)	Default (display)	Note
1	SH	2800	Turbo Set Point (min. Set Point) and Heating Set Point (in HC mode)	-99 ÷ HS		-5.0	
2	SE	2801	ECO Set Point (max. Set Point)	LS ÷ 99		10	
3	S1	2802	Set Point 1	SE ÷ SH		4.0	
4	S2	2803	Set Point 2	SE ÷ SH		2.0	
5	S3	2804	Set Point 3	SE ÷ SH		0.0	

- In Digital Input Parameters Group

Parameter		Hex. address	Description	Range MODBUS R/W	Range (display)	Default (display)	Note
6	uP	2806	Mesurement unit and resolution (decimal point position)	0 = C0 1 = F0 2 = C1 3 = F1	C0 °C with resolution 1°; F0 °F with resolution 1°; C1 °C with resolution 0.1°; F1 °F with resolution 0.1°.	C1	
7	Ft	2807	Measurement filter	oF OFF 0.1 ÷ 9.9 ÷ 20 s		2.0	
8	C1	2808	Probe **Pr1** Calibration (control)	-30.0 ÷ 30.0°C/°F	-30 ÷ -9.9 ÷ 9.9 ÷ 30°C/°F	0.0	
9	C2	2809	Probe **Pr2** Calibration	-30.0 ÷ 30.0°C/°F	-30 ÷ -9.9 ÷ 9.9 ÷ 30°C/°F	0.0	
10	C3	280A	Probe **Pr3** Calibration	-30.0 ÷ 30.0°C/°F	-30 ÷ -9.9 ÷ 9.9 ÷ 30°C/°F	0.0	
11	CU	280C	Measure offset (display only)	-30.0 ÷ 30.0°C/°F	-30 ÷ -9.9 ÷ 9.9 ÷ 30°C/°F	0.0	
12	P2	280D	Probe **Pr2** input function	0 = oF 1 = EP 2 = Au 3 = cd 4 = r1 5 = dG	oF No function; EP Evaporator; Au Aux; cd Condenser ; r1 Control Probe; dG digital input.	EP	
13	P3	280E	Probe **Pr3** input function			oF	
14	iF	2810	**DI1** digital input function and logic function (not present in the P34 display panel)	-14 ÷ 14	0 No function; 1 Door open; 2 Door open with fan stop; 3 Door open with fan and compressor stop; 4 External **AL** alarm; 5 External **AL** alarm with control outputs stop; 6 Selection of active Set Point (SP-SPE); 7 Switch ON/OFF (Stand - by); 8 **Turbo** cycle activation; 9 Remote command of **AUX** output; 10 Not used; 11 Not used; 12 External **Pr** alarm; 13 External **HP** alarm; 14 External **LP** alarm.	0	
15	it	2811	Delay in acquiring **DI1** digital input	0 oF 0.01 ÷ 99.59 (min. s)	oF No delay -01 ÷ -59 (s) ÷ 01 ÷ 99 (min)	oF	
16	2F	2812	**DI2** digital input function and logic function	-14 ÷ 14	See **14** (iF) parameter options	0	
17	2t	2813	Delay in acquiring **DI2** digital input	0 oF 0.01 ÷ 99.59 (min. s)	oF No delay -01 ÷ -59 (s) ÷ 01 ÷ 99 (min)	oF	
18	3F	2814	**DI3** digital input function and logic function	-14 ÷ 14	See **14** (iF) parameter options	0	
19	4F	2815	**DI4** digital input function and logic function	-14 ÷ 14	See **14** (iF) parameter options	2	
20	Et	2816	Delay to **Eco** mode with door closed	0 oF 0.01 ÷ 99.59 (h. min)	oF No delay -01 ÷ -59 (min) ÷ 01 ÷ 99 (h)	02	
21	tt	2817	Time-out **Eco** mode	0 oF 0.01 ÷ 99.59 (h. min)	oF No time-out -01 ÷ -59 (min) ÷ 01 ÷ 99 (hrs)	oF	

Parameter		Hex. address	Description	Range MODBUS R/W	Range (display)	Default (display)	Note
22	dS	2818	Normally displayed variable	0 = P1 1 = P2 2 = P3 3 = P4 4 = Ec 5 = SP 6 = rE 7 = oF 8 = F1	P1 **Pr1** Probe measure; P2 **Pr2** Probe measure; P3 **Pr3** Probe measure; P4 **Pr4** Probe measure; Ec **Pr1** value in normal mode, Eco in **Eco** mode; SP Active Set Point; rE No function; oF Display off; F1 **Pr1** Probe measure with **du** and **d**" filters.	F1	

-dF Defrost Control Parameters Group

Parameter		Hex. address	Description	Range MODBUS R/W	Range (display)	Default (display)	Note
23	dt	2819	Defrost Type	0 = EL 1 = in 2 = no 3 = Et	EL Electrical heating/stop. compr.; in Hot gas/reverse cycle; no Without compressor output condictioning; Et Electrical heating with evaporator temperature control.	EL	
24	dC	281A	Defrost start mode	0 = cL 1 = rt 2 = ct 3 = cS	cL Not to be used; rt Real time intervals; ct "ot" output on time intervals; cS Defrost every **ot** switching off (+ rt intervals).	rt	
25	di	281B	Defrost interval	0 oF 0.01 ÷ 99.59 (h min)	oF No interval; -01 ÷ -59 (min) ÷ 01 ÷ 99 (h)	6	
26	Sd	281C	First defrost delay at power-on	0 oF 0.01 ÷ 99.59 (h min)	oF No delay; -01 ÷ -59 (min) ÷ 01 ÷ 99 (h)	6	
27	dd	281D	Dynamic Defrost Percentage reduction	0 ÷ 100 %	0 ÷ 100%	0	
28	dE	281E	Max. lenght of defrost cycle	0 oF 0.01 ÷ 99.59 (min. s)	oF No timed/manual defrosts; -01 ÷ -59 (s) ÷ 01 ÷ 99 (min)	20	
29	dL	281F	Defrost display Lock	0 = oF 1 = on 2 = Lb	oF Display free; on Locked on temperature **Pr1** before defrost; Lb Locked on label dF (during defrost) and Pd (during post-defrost).	oF	
30	tE	2820	Defrost stop temperature	-99.9 ÷ 999.0°C/°F	- 99 ÷ -9.9 ÷ 9.9/10 ÷ 99°C/°F	8.0	
31	Ei	2821	Defrost interval for evaporator probe error	0 oF 0.01 ÷ 99.59 (h.min)	oF No interval -01 ÷ -59 (min) ÷ 01 ÷ 99 (h)	6	
32	EE	2822	Lengh of defrost cycle for evaporator probe error	0 oF 0.01 ÷ 99.59 (min.s)	oF Length = 0 -01 ÷ -59 (s) ÷ 01 ÷ 99 (min)	10	
33	tS	2823	Defrost enable temperature	- 99.9 ÷ 999.0°C/°F	- 99 ÷ -9.9 ÷ 9.9/10 ÷ 99°C/°F	2.0	
34	tF	2824	Defrost start temperature	- 99.9 ÷ 999.0°C/°F	- 99 ÷ -9.9 ÷ 9.9/10 ÷ 99°C/°F	-99	
35	St	2825	Delay start Defrost by tF start temperature	0 oF 0.01 ÷ 99.59 (min.s)	0 No delay -01 ÷ -59 (s) ÷ 01 ÷ 99 (min)	1	
36	cd	2826	Delay start Defrost by continuous compressor running time	0 oF 0.01 ÷ 99.59 (h.min)	0 No delay -01 ÷ -59 (min) ÷ 01 ÷ 99 (h)	oF	
37	Fd	2827	Compressor delay after defrost (drainage time)	0 oF 0.01 ÷ 99.59 (min.s)	0 No delay -01 ÷ -59 (s) ÷ 01 ÷ 99 (min)	oF	

-rE Temperature Control Parameters Group

Parameter		Hex. address	Description	Range MODBUS R/W	Range (display)	Default (display)	Note
38	d	282A	Differential (Hysteresis)	0 ÷ 30.0°C/°F	0.0 ÷ 9.9 ÷ 30°C/°F	2.0	
39	Ed	282B	Differential (Hysteresis) in **Eco** mode	0 ÷ 30.0°C/°F	0.0 ÷ 9.9 ÷ 30°C/°F	4.0	
40	Hd	282C	Differential (Hysteresis) in **Eco**, **Turbo** or **Heating** in HC mode	0 ÷ 30.0°C/°F	0.0 ÷ 9.9 ÷ 30°C/°F	1.0	
41	t1	282D	Output activation time for probe error	0 oF 0.01 ÷ 99.59 (min.s)	0 No activation time -01 ÷ -59 (s) ÷ 01 ÷ 99 (min)	oF	
42	t2	282E	Output deactivation time for probe error	0 oF 0.01 ÷ 99.59 (min.s)	0 No deactivation time -01 ÷ -59 (s) ÷ 01 ÷ 99 (min)	oF	
43	HC	282F	Output operating mode	0 = H 1 = C 2 = nr 3 = HC 4 = C3	H Heating; C Cooling; nr Neutral Zone; HC Neutral Zone with independent Set point; C3 Cooling with 3 automatic switch modes.	C	
44	tC	2830	Lengh of Turbo cycle	0 oF 0.01 ÷ 99.59 (h.min)	oF Not available -01 ÷ -59 (min) ÷ 01 ÷ 99 (h)	01	

-Fn Evaporator Fans Control Parameters Group

Parameter		Hex. address	Description	Range MODBUS R/W	Range (display)	Default (display)	Note
45	En	2831	Fan activation time with **ot** output (compressor) OFF	0 oF 0.01 ÷ 99.59 (min.s)	0 No activation time -01 ÷ -59 (s) ÷ 01 ÷ 99 (min)	5	
46	EF	2832	Fan deactivation time with **ot** output (compressor) OFF	0 oF 0.01 ÷ 99.59 (min.s)	0 No deactivation time -01 ÷ -59 (s) ÷ 01 ÷ 99 (min)	oF	
47	FL	2833	High temperature fan deactivation	- 99.9 ÷ 999.0°C/°F	- 99 ÷ -9.9 ÷ 9.9/10 ÷ 99°C/°F	10	
48	LF	2834	Low temperature fan deactivation	- 99.9 ÷ 999.0°C/°F	- 99 ÷ -9.9 ÷ 9.9/10 ÷ 99°C/°F	-99	
49	dF	2835	Differential fan control	0 ÷ 30.0°C/°F	0.0 ÷ 9.9 ÷ 30°C/°F	1.0	
50	FE	2836	Fan status during defrost	0 = oF 1 = on	oF Fan OFF on Fan ON	oF	
51	Fd	2837	Fan delay after defrost	0 oF 0.01 ÷ 99.59 (min.s)	0 No delay -01 ÷ -59 (s) ÷ 01 ÷ 99 (min)	oF	

-Pr Compressor Protection and Power ON Delay Parameters Group

Parameter		Hex. address	Description	Range MODBUS R/W	Range (display)	Default (display)	Note
52	P1	2838	**ot** output activation delay	0 oF 0.01 ÷ 99.59 (min.s)	0 No delay -01 ÷ -59 (s) ÷ 01 ÷ 99 (min)		
53	P2	2839	**ot** output inibition time after output power OFF	0 oF 0.01 ÷ 99.59 (min.s)	0 Not active -01 ÷ -59 (s) ÷ 01 ÷ 99 (min)		
54	P3	283A	**ot** output time between 2 output power ON	0 oF 0.01 ÷ 99.59 (min.s)	0 Not active -01 ÷ -59 (s) ÷ 01 ÷ 99 (min)		
55	od	283B	Outputs delay at power ON	0 oF 0.01 ÷ 99.59 (min.s)	0 No delay -01 ÷ -59 (s) ÷ 01 ÷ 99 (min)		

-AL Alarms Parameters Group

Parameter		Hex. address	Description	Range MODBUS R/W	Range (display)	Default (display)	Note
56	1y	283C	Temperature alarms 1 Type	1 ÷ 10	1 **Pr1** absolute with label (H - L); 2 **Pr1** Relative with label (H - L); 3 **Au** absolute with label (H - L); 4 **Au** Relative with label (H - L); 5 **cd** absolute with labe (H - L); 6 **Pr1** absolute without label; 7 **Pr1** relative without label; 8 **Au** absolute without label; 9 Au relative without label; 10 **cd** absolute without label.	1	
57	1H	283D	High temperature Alarm 1 threshold	-100.0 oF -99.9 ÷ 999°C/°F	0 Not active -99 ÷ -9.9 ÷ 9.9/10 ÷ 99°C/°F	oF	
58	1L	283E	Low temperature Alarm 1 threshold	-100.0 oF -99.9 ÷ 999°C/°F	0 Not active -99 ÷ -9.9 ÷ 9.9/10 ÷ 99°C/°F	oF	
59	1d	283F	Alarms H1 and L1 Hysteresis	0.0 ÷ 30.0°C/°F	0.0 ÷ 9.9 ÷ 30°C/°F	1.0	
60	1t	2840	Alarms H1 and L1 delay	0 oF 0.01 ÷ 99.59 (min.s)	0 No delay -01 ÷ -59 (s) ÷ 01 ÷ 99 (min)	oF	
61	1P	2841	Temperature Alarms 1 delay at power ON	0 oF 0.01 ÷ 99.59 (h.min)	0 Not active -01 ÷ -59 (min) ÷ 01 ÷ 99 (h)	2	
62	1A	2842	Alarms H1 e L1 action	0 ÷ 3	0 No actions; 1 Activate alarm outputs; 2 Disable control outputs (**ot** e HE) but not activate alarm outputs; 3 Disable control outputs (**ot** e HE) and activate alarm outputs.	1	
63	2y	2843	Temperature alarms 2 Type	1 ÷ 10	See **56** (1F) parameter options	3	
64	2H	2844	High temperature Alarm 2 threshold	-100.0 oF -99.9 ÷ 999°C/°F	0 Not active -99 ÷ -9.9 ÷ 9.9/10 ÷ 99°C/°F	oF	
65	2L	2845	Low temperature Alarm 2 threshold	-100.0 oF -99.9 ÷ 999°C/°F	0 Not active -99 ÷ -9.9 ÷ 9.9/10 ÷ 99°C/°F	oF	
66	2d	2846	Alarms H2 and L2 Hysteresis)	0.0 ÷ 30.0°C/°F	0.0 ÷ 9.9 ÷ 30°C/°F	1.0	
67	2t	2847	Alarms H2 and L2 delay	0 oF 0.01 ÷ 99.59 (min.s)	0 No delay -01 ÷ -59 (s) ÷ 01 ÷ 99 (min)	oF	
68	2P	2848	Temperature Alarms 2 delay at power on	0 oF 0.01 ÷ 99.59 (h.min)	0 Not active -01 ÷ -59 (min) ÷ 01 ÷ 99 (h)	2	

Parameter		Hex. address	Description	Range MODBUS R/W	Range (display)	Default (display)	Note
69	2A	2849	Alarms H2 e L2 actions	0 ÷ 3	See **62** (1A) parameter options	1	
70	dA	284A	Temperature Alarms 1 delay after defrost, and unlock display delay after defrost	0 oF 0.01 ÷ 99.59 (h.min)	0 No delay -01 ÷ -59 (s) ÷ 01 ÷ 99 (min)	1	
71	oA	284B	Alarm delay with door open	0 oF 0.01 ÷ 99.59 (min.s)	0 Not active -01 ÷ -59 (min) ÷ 01 ÷ 99 (h)	3	

-ou Outputs Configuration Parameters Group

Parameter		Hex. address	Description	Range MODBUS R/W	Range (display)	Default (display)	Note
72	o1	2850	OUT1 function	0 = oF 1 = ot 2 = dF 3 = Fn 4 = Au 5 = At 6 = AL 7 = An 8 = -t 9 = -L 10 = -n 11 = on 12 = HE 13 = 2d 14 = L1 15 = L2 16 = -d	oF No function; ot Temperature control (compressor); dF Defrosting; Fn Fan; Au Auxiliary; At Silenceable alarm; AL Not silenceable Alarm; An Stored alarm; -t Silenceable alarm with inverse logic (Output open in alarm); -L Not silenceable Alarm with inverse logic (Output open in alarm); -n Stored alarm with inverse logic (Output open in alarm); on ON when instrument switch on; HE Heating (Neutral zone control); 2d Not used; L1 Light with economy mode (on with **SP** and off with **SPE**); L2 Internal light (off with door closed and on with door opened); -dF Defrosting NC contact.	ot	
73	o2	2851	OUT2 function			dF	
74	o3	2852	OUT3 function			Fn	
75	o4	2853	OUT4 function			L1	
76	bu	2854	Buzzer function mode	0 oF 1 ÷ 4	oF Disable; 1 Active alarms only; 2 Key pressed only; 3 Active alarms and key pressed; 4 Active alarms (intermittent).	4	
77	Fo	2855	Auxiliary output function mode	0 oF 1 ÷ 2	oF No Function; 1 **ot** control output delayed; 2 Manual activation by key or digital input.	oF	
78	tu	2856	Time relative to auxiliary output	0 oF 0.01 ÷ 99.59 (min.s)	oF Disable; -01 ÷ -59 (s) ÷ 01 ÷ 99 (min)	oF	

-tS Keyboard Configuration and Serial Communications Parameters Group

Parameter		Hex. address	Description	Range MODBUS R/W	Range (display)	Default (display)	Note
79	UF	2857	Function mode ECO/(U) key	0 oF 1 ÷ 2	oF No function; 1 Direct Eco mode Selection (+ if configured shop light power OFF); 2 Switch on/off (Stand-by).	1	
80	Fb	2858	Function mode ☼/(P) key	0 oF 1	oF No function; 1 Enable ☼ for Light command (**L1** and **Au** with Fo = **2**).	1	
81	Lo	2859	Automatic keyboard lock function delay	0 oF 0.01 ÷ 29.59 (min.s) **30 dc** Keyboard lock at door closed	**oF** Disabled -01 ÷ -59 (s) ÷ 01 ÷ 29 (min) **30 dc** Keyboard lock at door closed	oF	
82	Ed	285A	Set Point change	0 oF 1 ÷ 2	oF None; 1 Direct selection of **P1** Set Point value between SH and SE limits; 2 Direct selection of Active Set Point between the 3 pre-set Set Points (**S1**, **S2** and **S3**) using the ▲/▼ keys.	2	
83	PP	285B	Access Password to parameter functions	0 oF 1 ÷ 99	oF No password; 1 ÷ 999	oF	
84	AS	285D	MODBUS address (for serial communications)	0 oF 1 ÷ 99	oF Not used; 1 ÷ 255	1	
85	du	285E	Display delay when **Pr1** temperature increases by 0.1°	0 oF 1 ÷ 25.5 s	0 No delay 0.1 ÷ 9.9 ÷ 25 s	oF	
86	dd	285F	Display delay when Pr1 temperature decreases by 0.1°	0 oF 1 ÷ 25.5 s	0 No delay 0.1 ÷ 9.9 ÷ 25 s	oF	

-UA Mains Alarm Configuration Parameters Group

Parameter		Hex. address	Description	Range MODBUS R/W	Range (display)	Default (display)	Note
87	LU	287D	Low voltage alarm	8 oF 9 ÷ 27 V x 10	0 Alarm disabled 9 ÷ 27 V x 10	oF	
88	HU	287E	High voltage alarm	8 oF 9 ÷ 27 V x 10	0 Alarm disabled 9 ÷ 27 V x 10	oF	
89	Ud	287F	Voltage alarms delay	0 (oF) / 0.01 ÷ 99.59 (min.s)	0 No delay -01 ÷ -59 (s) ÷ 01 ÷ 99 (min)	oF	
90	OU	2880	Voltage calibration	-30 ÷ 30 V	-30 ÷ 30 V	0.0	

8. PROBLEMS AND MAINTENANCE

8.1 Notifications

8.1.1 Error messages

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 probe connection with the instrument and check that the probe works correctly
EP	EEPROM memory error	Press the [light]/[P] key
Er	Fatal memory error	Replace the instrument or ship to factory for repair

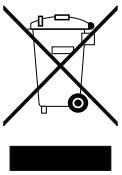
8.1.2 Other messages

Message	Reason
od	Delay at power ON in progress
Ln	Keyboard lock
H1	High temperature alarm 1 in progress
L1	Low temperature alarm 1 in progress
H2	High temperature alarm 2 in progress
L2	Low temperature alarm 2 in progress
AL	Digital input alarm in progress
Pr	Digital input **Pr** alarm in progress
HP	Digital input **HP** alarm in progress
LP	Digital input **LP** alarm in progress
oP	Door open
dF	Defrost in progress with dL = **Lb**
Pd	Post-defrost in progress with dL = **Lb**
Ec	**Eco** mode active
tr	**Turbo** mode active
HU	High voltage alarm
LU	Low voltage alarm

8.2 Cleaning

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

8.3 Disposal



The appliance (or the product) must be disposed of separately in compliance with the local standards in force on waste disposal

9. WARRANTY AND REPAIRS

The instrument is under warranty against manufacturing flaws or faulty material, that are found within 18 months from delivery date. The warranty 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 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.

10. TECHNICAL DATA

10.1 Electrical characteristics

Power supply: 100 ÷ 240 VAC ±10%;
AC frequency: 50/60 Hz;
Power consumption: about 4 VA;
Inputs:
B05B **3 inputs** for **temperature probes**:
NTC (103AT-2, 10 kΩ @ 25°C);
3 free of voltage digital inputs (DI4 always present) 2 as an alternative to inputs Pr2 (DI2) and Pr3 (DI3);
P03 1 free of voltage digital input (DI1);
P34 No digital inputs;
Output: Up o 4 outputs: Relays or 2 relays and 2 SSR:

	EN 61810	EN 60730	UL 60730
Out1 (H) - SPST-NO - 30 A - 2 HP 250 V	30 (15) A	6 (6) A	6 A Res., 96 LRA, 16 FLA
Out1 (R) - SPST-NO - 16 A - 1 HP 250 V	16 (9) A	6 (4) A	6 A Res., 30 LRA, 5 FLA
Out2 - SPST-NO - 8 A - 1/2 HP 250 V	8 (3) A	4 (4) A	4 A Res., 12 LRA, 2 FLA
Out3: SPST - 5A - 250 V	5 (1) A	1 (1) A	1 A Res.
Out 3: SSR 2A/250 V	0.1 A (min.) 0.5A (max.) resistive		
Out4: SPST - 5A - 250 V	5 (1) A	1 (1) A	1 A Res.
Out 4: SSR 2A/250 V	0.1 A (min.) 0.5A (max.) resistive		

Common pole for Power supply (Pin 1): 12 A max.;
Relay output Electrical life: 30000 operations as for EN 60730;
Action type: Type 1.B (EN 60730-1);
Overvoltage category: II;
Device class: Class II;
Isolation: 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).

10.2 Mechanical characteristics

Housing: Self-extinguishing plastic, UL 94 V0;
Heat and fire resistance category: D;
Ball Pressure Test as described in EN60730: accessible parts 75°C; support live parts 125°C;
Dimensions: **B05B**: 92 x 92 mm, depth 27.8 mm,
P03: 96 x 50 mm, depth 22.5 mm,
P34: 78 x 35 mm, depth 34 mm;
Weight: **B05B**: about 130 g,
P03: 90 g,
P34: 44 g;
Mounting: **B05B**: Insidea panel with 2 screws,
P03: Incorporated flush in panel (thickness max. 2 mm) in a 90 x 4 mm hole,
P34: Incorporated flush in panel (thickness max. 8.5 mm) in a 71 x 29 mm hole;
Connections: **B05 power supply and outputs:** 6 poles AMP MATE-N-LOK .250 type connector;
Connections between B05B and P03/P34: 3 m max. by 3 poles cable with mini removable connectors;
Pollution degree: 2;
Operating temperature: 0 ÷ 60°C;

Operating humidity: < 95 RH% with no condensation;
Storage temperature: -25 ÷ +60°C.

10.3 Functional features

Temperature Control: ON/OFF mode;
Defrost control: Interval cycles or evaporator temperature by Electric Heating or Hot-gas/Reverse cycle or by Stopping compressor;
Measurement range: NTC: -50 ÷ +999°C/-58 ÷ +99°F;
Display resolution: 1° or 0.1° (range -9.9° ÷ +9.9°);
Overall accuracy: ±(0.5% fs + 1 digit);
Sampling rate: 800 ms;
Display: **P03**: 2 Digit Red (Blue/White opt.), height 34 mm;
P34: 3 Digit Red (Blue/White opt.), height 15.5 mm;
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/air, S, A, 1, -50°C +90°C with probe NTC 103AT11).

11. INSTRUMENT ORDERING CODE

11.1 B05B Instrument Code

MODEL
B05B - = Controller

a: POWER SUPPLY
H = 100... 230 VAC

b: OUTPUT 1 (OUT 1)
H = Relay SPST-NO 30A-AC1 (for resistive loads)
R = Relay SPST-NO 16A-AC1 (for resistive loads)
- = No OUT1

c: OUTPUT 2 (OUT 2)
R = Relay SPST-NO 8A-AC1 (for resistive loads)
- = No OUT2

d: OUTPUT 3 (OUT 3)
R = Relay SPST-NO 5A-AC1 (for resistive loads)
Q = SSR 2A Output
- = No OUT3

e: OUTPUT 4 (OUT 4)
R = Relay SPST-NO 5A-AC1 (for resistive loads)
Q = SSR 2A Output
- = No OUT4

B05B	-	a	b	c	d	e	f	g	h	i	j	kk	ll

11.2 P03CB Display Unit Code

MODEL
P03CB = Display unit

a: BUZZER
B = Buzzer
- = Not present

b: DISPLAY
R = Red (standard)
B = Blu
W = White

P03CB	-	a	b	c	d	e	f	g	hh	ii

c, d, e, f, g: RESERVED CODES; **hh, ii**: SPECIAL CODES

11.3 P34B Display Unit Code

MODEL
P34B = Display unit with mechanical keys
P34SB = Display unit with sensitive touch

a: BUZZER
B = Buzzer
- = Not present

b: DISPLAY
I = Red Display + red icons (standard)
B = Blue Display + red icons
T = White Display + red icons

P34B	-	a	b	c	d	e	f	g	hh	ii

c, d, e, f: RESERVED CODES; **hh, ii**: SPECIAL CODES