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# DIGITAL ELECTRONIC TEMPERATURE CONTROLLER WITH DEFROSTING FUNCTION

# F 10


**USER MANUAL - V1**
**www.osakasolutions.com**

## 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



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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.

## Index

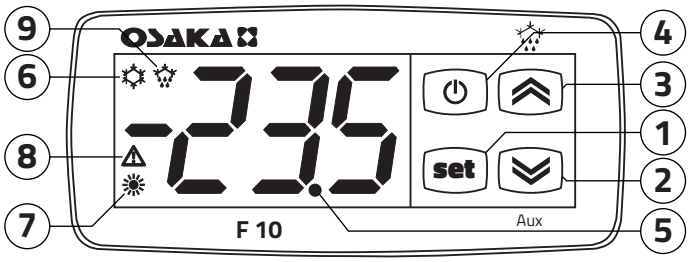


## 1. INSTRUMENT DESCRIPTION

### 1.1 General description

The model **F 10** is a microprocessor based digital electronic temperature controller that is typically used in cooling applications with **ON/OFF temperature control** and **defrost control** with intervals time by **stopping compressor**
The instrument has **1 relay output** and **2 NTC temperature probes** inputs **one of which** can be **configured as digital input**; it can also be equipped with a built-in buzzer for acoustic report of the alarms.

## 1.2 Front panel pescription




1. **set:** Used for setting the Set point (short press) and for programming the function parameters (pressed for 5 s). In programming mode is used to enter in parameters edit mode and confirm the values. In programming mode set can be used together with the ⌃ key to change the programming level of the parameters. When the keyboard is locked, the keys set and ⌃ used together (hold pressed for 5 s), unlock the keyboard.
2. ⌄/AUX: In programming mode is used for decreasing the values to be set and for selecting the parameters. If programmed using the tFb parameter, when it is pressed for 1 s during normal operation mode, it can perform other functions such as the selection of eco mode and so on (see "Functions of keys ⏻ and ⌄/AUX").
3. ⌃/☼: In normal mode (pressed for 5 s) can be used to **start/stop manual defrosting** (☼). In programming mode is used for increasing the values to be set and for selecting the parameters. In programming mode can be used together with set key to change parameters level. Pressed together with the set key for 5 s allows the keyboard unlock.
4. ⏻: Used (short press) for displaying the instrument variables (measured temperatures etc.). In programming mode can be used to return in normal mode (hold for 2 s).
   If programmed using the tUf parameter, when it is pressed for 1 s during normal operation mode allows to turn **ON/OFF** (Stand by) the **control action** or other functions like the **Aux** input control etc. (see "Functions of keys ⏻ and ⌄/AUX").
5. **LED dp/Stand by:** When the instrument is placed in Stand by mode, this is the only lighted LED. During the normal operation is the decimal point In programming mode, while the parameter code is displayed, the dot indicates the parameter protection level: **not protected** (lit up), **protected** (flashing) and **hidden** (turned OFF).
6. **LED** ☼: Indicates the output status (compressor or temperature control device) when the instrument is programmed for **cooling operation**; **ON** (lit up), **OFF** (turned OFF) or **inhibited** (flashing).
7. **LED** ☀: Indicates the output status (compressor or temperature control device) when the instrument is programmed for **heating operation**; **ON** (lit), **OFF** (turned OFF) or **inhibited** (flashing).
8. **LED** ⚠: Indicates the **alarm status**: **ON** (lit), **OFF** (turned OFF) or **silenced** (flashing).
9. **LED** ☼: Indicates that the **defrost** is **in progress**.

# 2. PROGRAMMING

## 2.1 Fast Set point programming

The normal mode to program the setpoint is done by momentarily pressing the set key, the display shows SP (or SPE) alternated to the programmed value.

To change it press the ⌃ key to increase the value or ⌄ to decrease it

These keys increase or decrease the value one digit at a time, but if the button is pressed for more than one second the value increase or decreases rapidly and after two seconds the speed increases even more in order to quickly reach the the desired value.

However, through ted parameter you can determine if and which Set point can be set with the set key rapid procedure.

The parameter can have the following values:

**oF** SP/SPE cannot be changed with the set key rapid procedure (pressing/releasing the set key, nothing happens);
**1** Only SP can be set with this procedure ("normal" Set Point);
**2** Only SPE can be set with this procedure ("economic"/Eco Set Point);
**3** Both SP and SPE can be set with this procedure;
**4** To select the Active Setpoint (SP or SPE).

For example, in case the parameter TEd = **1** or **3**, the procedure is the following:

Press and release the set key, the display shows SP alternated to the Set Point value. To change the Set Point, press the ⌃ key to increase the value or ⌄ to decrease it

If only Set Point 1 is present (TEd = **1**), once the desired value is set, press the set button to exit the fast programming mode.

If also the "Economic" Set Point (TEd = **3**) can be set, pressing and releasing again the set button the display shows SPE alternated to its programmed value.

To change the value use the ⌃ and ⌄ keys as for the SP Set Point value. Once the desired value is correctly set, press the set button to exit the fast Set Point change.

To exit the fast Setpoint programming mode push the set key after the last Set Point has been displayed or pressing no buttons for about 10 s, after which the display returns to normal operation.

## 2.2 Standard mode parameters programming

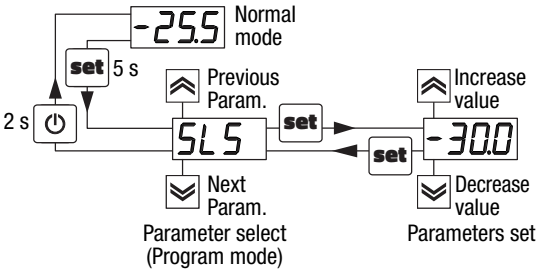
To access the instrument function parameters when password protection is disabled, press the key set and keep it pressed for about 5 seconds, after which the display shows the code that identifies the first programmable parameter

The desired parameter can be selected using the ⌃/⌄ keys, then, pressing the set key, the display shows the parameter code alternated to its value that can be changed with the ⌃ and ⌄ keys.

Once the desired value has been set, press the key set again: the new value is stored and the display shows only the code of the selected parameter

Pressing the ⌃ and ⌄ keys, it is possible to select another parameter and change it as described.

To exit the programming mode, press no keys for about 30 s or keep the ⏻ key pressed for 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 tPP parameter

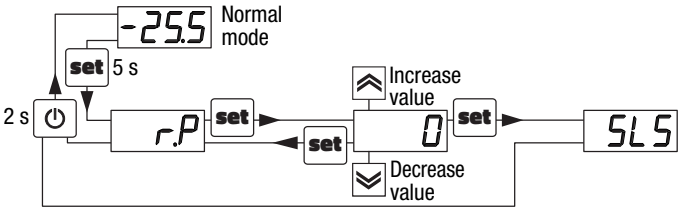
To protect the parameters, set the desired password number in the parameter tPP.

When the protection is activate, press the set key to access the parameters and keep it pressed for about 5 s, after which the display shows r.p.

Press the set key, the display shows 0, using the ⌃/⌄ keys, insert the programmed password number and press the key set again.

If the password is correct the instrument displays the code of the first parameter and it will be possible to program the instrument in the same way described in the previous section.

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




**Note:** If the Password gets lost, just switch OFF and ON the instrument, push set 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 tPP.

## 2.4 Customized mode parameter programming (parameters programming level)

The password hides all the configuration parameters behind a factory set password to avoid unwanted changes to the controller parameters. To make a parameter accessible without having to enter the password when tPP password protection is activate, use the procedure that follows:

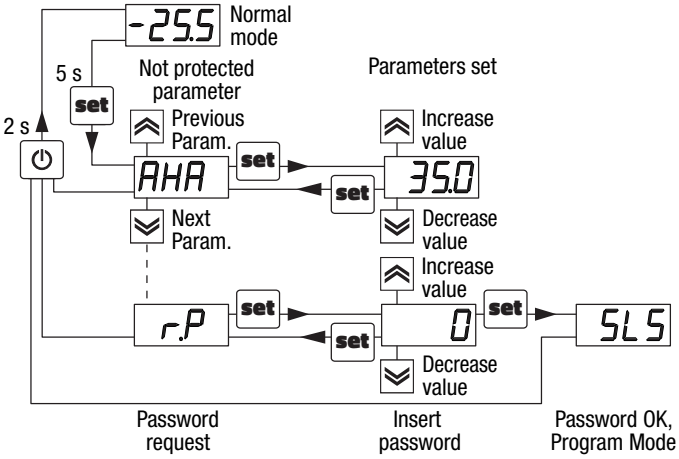
Enter the program mode using the tPP Password and select the parameter that must be accessible (no password protection).

Once a parameter is selected, if the **dp LED flashes** the parameter is programmable by entering the password (is "**protected**"). If the **dp LED is steady ON** the parameter is programmable without password (is "**unprotected**").

To change the parameter visibility, press the set key and keeping it pressed also press the ⌃ button.

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

In case some parameters are not protected, accessing the the programming mode the display first shows the not protected parameters, then the r.p parameter (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 value -48 at r.p password request Therefore, to make the reset to the default parameters, enable the Password using the tPP parameter so that the r.p setting is requested, at this point insert **-48** instead of the programmed access password.

Once confirmed the password with the set 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 program the parameter tLo to a value different from **oF**.

The tLo value is the keys inactivity time after which the keyboard will be automatically locked.

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

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

To unlock the keyboard it is enough to contemporarily push set + ⌃ 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.

# 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 equipment must be adequately protected and away from liquids, dust, grease and dirt. They must be accessible only with the use of a right tool and safety system (except the front).

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

It is recalled that the installer must ensure that the norm for electromagnetic compatibility is respected after implantation in the installation of equipment, eventually using the right filters if

is needed.

In case of failure or malfunction of measuring and control equipment that can create dangerous situations or damage to persons, things, animals or products (defrost food or changes in their ideal state), it is recalled that the facility should be equipped with electronic devices or electromechanical safety and warning system.

They should be placed outside the measuring and control equipments, possible protective devices, responding to specific safety requirements that are covered by the norm of the product or suggest the common sense.

For your own safety, is highly recommended fulfilling the instructions provided above.

The instrument used with NTC-1 (2)-IP68 probe (identifiable by the printed code "NTC-1 (2)-IP68" 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

The instrument, in case 78 x 35 mm, is designed for flush-in panel mounting. Make a 71 x 29 mm hole and insert the instrument, fixing it with the provided special brackets.

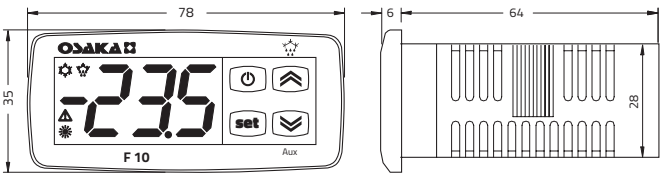
We recommend that the gasket is mounted in order to obtain the front protection degree as declared.

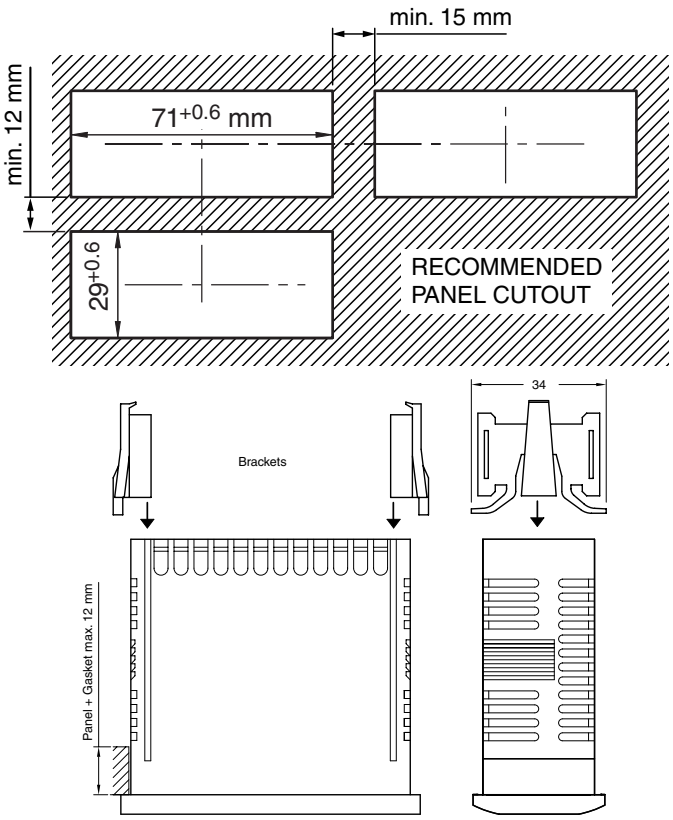
Avoid placing the instrument in environments with very high humidity levels or dirt that may create condensation or introduction of conductive substances into the instrument

Ensure adequate ventilation to the 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..

### 4.1.1 Mechanical dimensions, panel cut-out and mounting [mm]




## 4.2 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

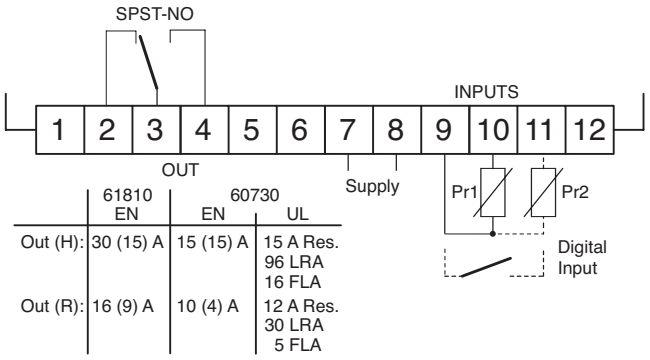
It is also recommended that the supply of all the electrical circuits connected to the instrument must be protect properly, using devices (ex. fuses) proportionate to the circulating currents.

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

Furthermore, the input cable of the probe has to be kept separate from line voltage wiring. If the input cable of the probe is screened, it has to be connected to the ground at only one side.

m 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.

### 4.2.1 Electrical wiring diagram




| | 61810 EN | 60730 EN | 60730 UL |
|---|---|---|---|
| Out (H): | 30 (15) A | 15 (15) A | 15 A Res.<br>96 LRA<br>16 FLA |
| Out (R): | 16 (9) A | 10 (4) A | 12 A Res.<br>30 LRA<br>5 FLA |

## 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 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 pressed for 1 s if tUF = 3;**
- **With the key pressed for 1 s if tfb = 3;**
- **Using the Digital Input if parameter iFi = 7;**

### 5.2 Normal and economic operation

This tool allows to pre-set two different Setpoints, one **Normal** - SP and one **Economic** - SPE.

Associated with each Setpoint there is the relative differential (hysteresis): **Normal** - rd and **Economic** - rEd.

Switching between the two modes can be **automatic** or **manual**.

#### 5.2.1 Normal/Economic operation selection

This function can be used when you need 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 key if parameter tUF = 2;**
- **Using the key if parameter tFb = 2;**
- **Using the Digital Input if parameter iFi = 6.**

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

- **Elapsed the iEt time after the door has been closed (Normal/Eco switching).**
- **At door opening if the SPE Setpoint is activated by iEt parameter (Eco/Normal switching).**
- **Elapsed the itt time after the door has been closed and from the activation of SPE Setpoint by iEt parameter (Eco/Normal switching).**

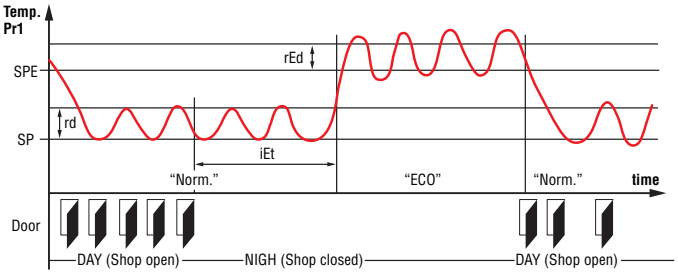
To use this function, it is necessary to set the Digital Input as: iFi = **1**, **2** or **3**.

If iEt = **oF** the selection of Eco/Normal modes via the digital input is disabled.

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

Switching to Economic mode is indicated by the label Eco. When idS = **Ec** the Economic mode is pointed out with a fixed Eco label otherwise the label Eco appears every 10 s alternated to the display set with parameter idS.

The normal Set Point **SP** can be set to a value between the one set with parameter SLS and the one set with parameter SHS while the Economic Set Point **SPE** can be set to a value between the one set with parameter SP and the one set with parameter SHS.




**Note:** In the following examples the Set point is generally indicated as **SP** and the differential as rd however the instrument will act according to the Set Point and the differential selected as active.

### 5.3 Measure and display configuration

With the iuP 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 iC1 (input Pr1) and iC2 (Pr2 input).

Parameter iP2 allows to select the instrument usage of Pr2 measure as:

**Au** Auxiliary probe;

**DG** Digital Input (see the Digital input functions).

If **Pr2** input is not used, set iP2 = **oF**.

Using iFt parameter can be set a software filter for the measuring the input values in order to decrease the sensibility to rapid temperature changes (increasing the sampling time). Through the idS parameter is possible to set the variable normally displayed:

**P1:** **Pr1** probe measurement;

**P2:** **Pr2** probe measurement;

**SP:** Active Set Point;

**EC:** Probe measure if the instrument is in Normal Mode, the label Eco if the instrument is in (**Eco mode**);

**OFF:** If the numerical display must be switched off (**oF**).

When is displayed one of the measures idS = **P1**/**P2**/**Ec** the iCU parameter allows to set an offset that is to be applied only to the displayed variable (all controls will always happen according to the correct temperature value, changed only by the calibration parameters).

Regardless of what is set at idS parameter, all the measurement variables can be shown pressing the key.

The display alternately shows the code that identifies the variable (see below) and its value. The variables are:

**Pr1** Probe 1 measurement;

**Pr2** Probe 2 measurement (on/oFF if Pr2 is a Digital input);

**Lt** Minimum stored Pr1 temperature;

**Ht** Maximum stored Pr1 temperature.

The peak (min./max.) temperature values of Pr1 probe are not stored in case of power failure and can be reset pressing the ⏬ for 3 s elapsed which, the display shows "---" for an instant to indicate that the min./max. values have been erased and the new peak is the temperature read in that moment

The system exits the variable dosplay mode after 15 s from the last ⏻ key pressure.

It is also noted that the **Pr1** probe display can also be changed by defrost display function via the ddL parameter (see the Defrost function).

## 5.4 Digital input configuration

The digital input function is defined using the iFi parameter and the action is delayed for the time programmed with parameter iti. The iFi parameter can be configured for the following functions:

**0.** Digital input not active;

**1.** Cell door opening with NO contact: at input closure (and after the iti) the instrument displays alternately oP and the variable set at idS parameter With this mode of operation of the digital input activates also the time set with parameter AoA 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 and the Eco mode activation was enabled through parameter iEt

**2.** Similar to iFi = **1**;

**3.** Cell door opening with output lock and NO contact: similar to iFi = **1** but with output lock. At alarm door open intervention AoA also the output is re-activated.

**4.** External alarm signal with NO contact: at input closing (and after the iti time) the alarm is activated and the instrument alternately shows on the display: AL and the variable set with parameter idS;

**5.** External alarm signal with Control output disabled and NO contact: at input closing (and after the iti time) the control output is is disabled, the alarm is activated and the instrument shows on the display alternatively AL and the variable set with parameter ids;

**6.** Normal/Economic mode selection with NO contact: at input closing (and after the iti time) the instrument switches to Economic operation mode. Opening the digital input, the instrument returns in Normal operation mode.

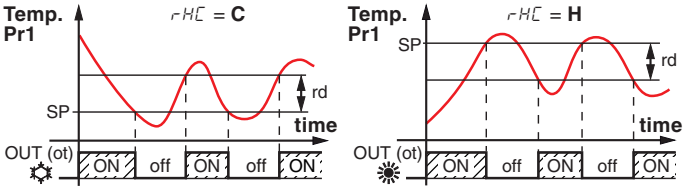
**7.** Instrument On/Off (stand-by) selection with NO contact: at input closing (and after the iti time) the instrument is switched ON while it is placed in Stand-by mode when the digital input is open;

**8.** Do not use;

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

## 5.5 Temperature control

The instrument control is ON/OFF and acts on the output depending on the PR1 probe measuring, the Set Point SP (or SPE), the Histeresys rd (or rEd) and the function mode rHC.




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

In case of probe error it is possible to make the output OUT (relay) work cyclically according to the time programmed in the parameter rt1 (run time) and rt2 (stop time).

If an error occurs on the probe the instrument activates the output for the time rt1, then deactivates it for the time rt2 and so on whilst the error remains.

Programming rt1 = **oF** the output in probe error condition remains switched off.

Programming instead rt1 to any value and rt2 = **oF** the output in probe error condition remains switched ON.

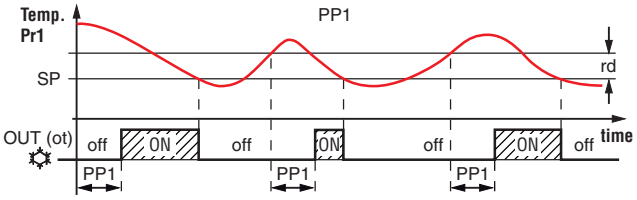
Remember that the temperature regulation function can be conditioned by the *Compressor Protections*, *Delay at power ON* and *Defrost functions*.

## 5.6 Compressor protection function and power-on delay

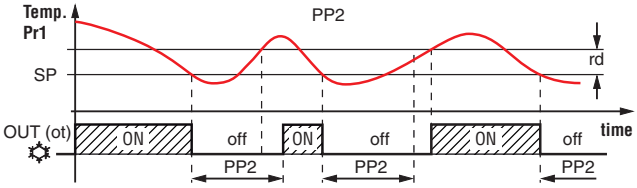
The "**Compressor Protection**" function aims to avoid repeated compressor start-ups controlled by the instrument in cooling applications or otherwise can be used to add a timed control on the actuator control output

This function foresees 3 time controls on the switching ON of the output associated with the temperature control request The protection consists of preventing the output being switched ON during the times set with parameters PP1, pP2 and PP3 and therefore that any activation occurs only after all times are elapsed.

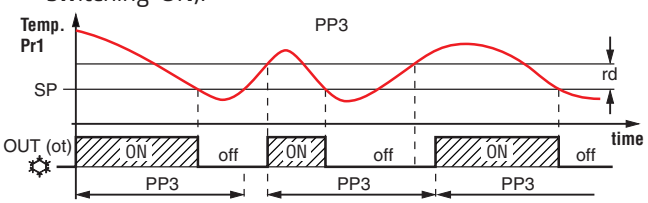
**1.** First control (parameter PP1) foresees a delay to output activation (switching-ON delay).




**2.** Second control (parameter PP2) foresees an inhibition to the activation of the output by a time delay that starts when the output is turning OFF (delay after switching-OFF).




**3.** Third control (parameter PP3) foresees an inhibition to the activation of the output by a time delay that starts when the output was turned ON last time (delay between two switching-ON).




During the output inhibition the LED **OUT** (Cool ☼ or Heat ☀) blinks. It is also possible to prevent activation of the output after the

instrument is turned ON, for the time set in the parameter Pod.

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).

## 5.7 Defrost control

The automatic defrost control is made with the *stopping compressor* method; it occurs by interval times or after a certain time of continuous compressor functionning.

The automatic defrost function is activated when at parameter ddi is set the defrost interval time between 2 defrost cycles.

The first defrost after power on can be set by parameter dSd.

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

When the instrument must perform a defrost cycle at all power ON, set parameter dSd = **oF**.

If all defrost cycles must be performed after the same interval time, program dSd = ddi.

Automatic defrost function is totally disabled when ddi = **oF** (included the first, regardless of the time set at dSd parameter).

The instrument provides to switch OFF the output for the ddE period of time every time expires the ddi time (or dSd in case of first defrost after power ON).

Moreover, the instrument starts a defrost cycle when the compressor is activated continuously for the time dcd.

This function is used as the continuous operation of the compressor for a long period is often and normally a symptom of low heat exchange typically caused by the frost on the evaporator

By setting dcd = **oF** the function is disabled.

### 5.7.1 Manual defrost

To start a manual defrosting cycle, press the key ⏠/☼ when it is not in programming mode and keep it pressed for about 5 s after which, if the conditions are correct, the LED ☼ will light up and the instrument performs out a defrosting cycle.

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

### 5.7.2 Display lock during Defrosting

Through parameters ddL and AdA it is possible to define the display behaviour during defrost

ddL = **on**

The ddL parameter locks the display at the last temperature reading during all the defrost cycle until, at the end of defrost, the temperature has not reached the lock value or the value [SP + rd] or is elapsed the time set at parameter AdA

ddL = **Lb**

Shows the label dEF during the defrost cycle and PdF after the defrost until, at the end of defrost, the temperature has not reached the lock value or the value [SP + rd] or is elapsed the time set on parameter AdA

ddL = **oF**

The display continues showing the temperature measured by the Pr1 probe during the defrost cycle.

## 5.8 Alarm functions

The alarm conditions of the instrument are:

**– Probe errors E1, -E1 and E2, -E2;**

**– Temperature alarms Hi and Lo;**

**– External alarm AL;**

**– Door open oP.**

All active alarms are pointed out on the instrument display lighting up the LED ⚠ and, if configured with parameter obu, also with the internal buzzer

Any active alarm condition is signaled lighting up the LED ⚠, while the acknowledged alarm status is shown by flashing the LED ⚠.

The buzzer (if present) can be configured to point out the alarms by programming parameter obu = **1** or **3** and always acts to signal the acknowlegeable alarms. This means that, when activated, it can be switched OFF by briefly pressing any key.

### 5.8.1 Temperature alarms

The temperature alarm works according to **Pr1** or **AU** probes measurement, the type of alarm set in the parameter AAy the alarm thresholds set in parameters AHA (maximum alarm) and ALA (minimum alarm) and the relative differential AAd.

Through parameter AAy it is possible to set the alarm thresholds AHA and ALA as absolute or relative to the active Set Point, must be related to Pr1 or Au probes and if the message Hi (High alarm) and Lo (Low Alarm) are to be displayed at alarm intervention.

Depending on the desired alarm operating mode, parameter AAy can be set as:

**1** Absolute alarms referred to probe Pr1, displays Hi/Lo;

**2** Relative Alarms referred to probe Pr1, displays Hi/Lo;

**3** Absolute alarms referred to probe Au, displays Hi/Lo;

**4** Relative Alarms referred to probe Au, displays Hi/Lo;

**5** Absolute alarm referred to probe Pr1, displays no labels;

**6** Relative alarm referred to probe Pr1, displays no labels;

**7** Absolute alarm referred to probe Au, displays no labels;

**8** Relative alarm referred to probe Au, displays no labels.

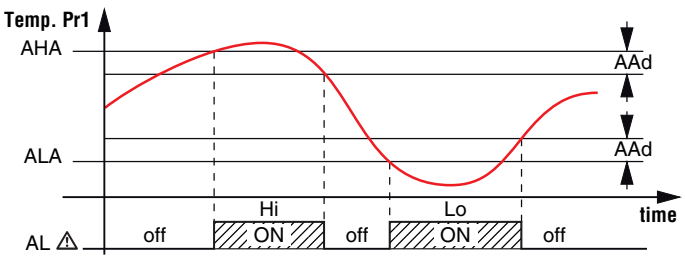
Using some parameters it is also possible to delay the enabling and the intervention of these alarms.

These parameters are:

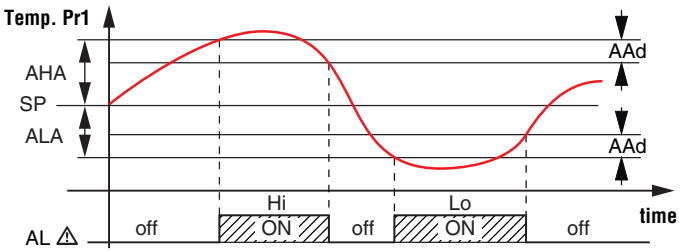
APA Temperature alarm exclusion time on switching ON the instrument if the instrument is in alarm status when it is switched ON. If the instrument is not in alarm status when it is switched on the time APA it is not considered.

AdA Temperature alarm exclusion time at the end of defrost cycle (and, if programmed, after the draining) or after a continuous cycle.

AAt Temperature alarms delay activation time. Temperature alarms are enabled at the end of the exclusion times and are activated after the AAt time when the temperature measured by the probe exceeds or goes below the respective maximum and minimum alarm thresholds. The alarm thresholds are those set at parameters AHA and ALA when the alarms are set as absolute (AAy = **1**, **3**, **5**, **7**).



or they assume the values [SP + AHA] and [SP + ALA] if the alarms are relative (AAy = **2** and **6**).




The maximum and minimum temperature alarms can be disabled by setting the related parameters AHA and ALA = **oF**.

The temperature alarms are signalled lighting up the alarm LED (⚠) and, if configured, also with the buzzer

### 5.8.2 External alarm from digital input

The instrument can signal an alarm external to the instrument using the digital input setting iFi = **4** or **5**. The instrument signals the alarm turning ON the alarm LED (⚠) and displaying AL label alternated to the variable set with parameter Ids.

Mode iFi = **4** operates no action on the control output, while iFi = **5** deactivates the control output at digital input intervention.

### 5.8.3 Open door alarm

The instrument can signal the open door alarm coondition using the digital input setting iFi = **1**, **2** and **3**. As the Digital input is activated, the instrument signals that the door is open showing on the display the **oP** label alternated to the variable set with parameter ids.

After the delay set with parameter AoA the instrument signals the Open Door alarm with the configured devices (buzzer and/or Output), lighting up the LED ⚠ while showing the **oP** label. At the open door alarm intervention are also re-activated the inhibited outputs (compressor).

## 5.9 Function of keys ⏻ and ⏷

Two of the instrument keys, in addition to their normal functions, can be configured to operate other commands. The ⏻ key function can be defined using the tUF parameter while the ⏷ key via parameter TFb. Both parameters have the same possibilities and can be configured to perform the following functions:

**oF** The key carries out no function;

1. Do not use;
2. Pressing the key for at least 1 s, you can sequentially select a **normal** or **eco** operating mode (SP/SPE).
   A selection has been made the display shows for about 1 s the active set point code (SP or SPE);
3. Pressing the key for at least 1 s is possible to switch the instrument from **ON** to **Stand-by** state and vice-versa;
4. Do not use.

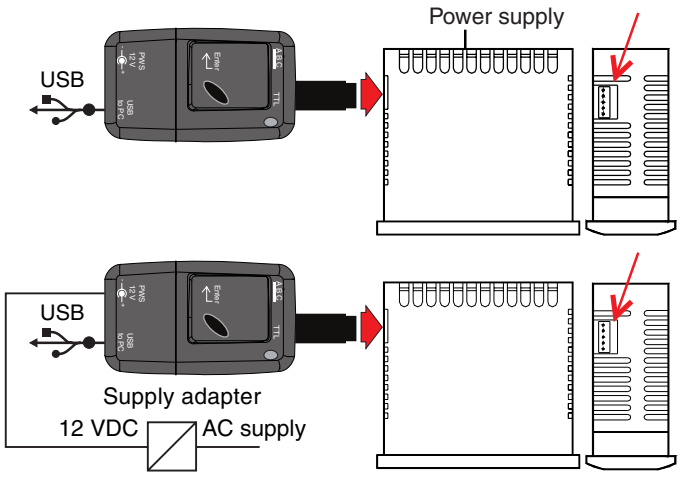
## 5.10 Parameters configuration by "KEY USB"

The instrument is equipped with a connector that allows the transfer from and toward the instrument of the functioning parameters through the device KEY USB with 5 poles connector.


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 "Universal Conf or Osaka Set Up", the operating parameters can be configured.

To use the device KEY USB 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 KEY USB instruction manual.

## 6. 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.

| Parameter | | Description | Range | Def. | Note |
|---|---|---|---|---|---|
| 1 | **SLS** | Minimum Set Point | -99.9 ÷ SHS | -50.0 | |
| 2 | **SHS** | Maximum Set Point | SLS ÷ 999 | 99.9 | |
| 3 | **SP** | Set Point | SLS ÷ SHS | 0.0 | |
| 4 | **SPE** | Set Point Eco | SP ÷ SHS | 0.0 | |
| 5 | **iuP** | Unit of measurement and resolution (decimal point) | **C0 -** °C, resolution 1°;<br>**F0 -** °F, resolution 1°;<br>**C1 -** °C, resolution 0.1°;<br>**F1 -** °F, resolution 0.1°. | C1 | |
| 6 | **iFt** | Measurement filter | oF ÷ 20.0 s | 2.0 | |
| 7 | **iC1** | Pr1 Probe Calibration | -30.0 ÷ +30.0°C/°F | 0.0 | |
| 8 | **iC2** | Pr2 Probe Calibration | -30.0 ÷ +30.0°C/°F | 0.0 | |
| 9 | **iCU** | Display offset | -30.0 ÷ +30.0°C/°F | 0.0 | |
| 10 | **iP2** | Input Pr2 usage | **oF -** Unused;<br>**EP -** Evaporator probe;<br>**Au -** Auxliary probe;<br>**dG -** Digital Input. | dG | |
| 11 | **iFi** | Function and logic functioning of the Digital Input (adding the "-" minus sign the logic is inverted) | **0 -** No function;<br>**-2/ -1/1/ 2 -** Open Door;<br>**-3/3 -** Open Door with Output Lock;<br>**-4/4 -** External Alarm;<br>**-5/5 -** External alarm with output disabling;<br>**-6/6 -** Normal/Eco select;<br>**-7/7 -** On/Stand by select;<br>**-8/8 -** Do not use. | 0 | |
| 12 | **iti** | Digital Input Delay | **oF** - Disabled;<br>-1 ÷ -59 (sec) / 1 ÷ 99 (min). | oF | |
| 13 | **iEt** | Eco Mode activation delay at Door closed | **oF** - Disabled;<br>-1 ÷ -59 (min) / 1 ÷ 99 (hrs). | oF | |
| 14 | **itt** | Max. time functioning in Eco Mode | **oF** - Disabled;<br>-1 ÷ -59 (min) / 1 ÷ 99 (hrs). | oF | |
| 15 | **idS** | Variable normally displayed | **P1 -** Probe Pr1 measure;<br>**P2 -** Probe Pr2 measure;<br>**P3 -** Do not use;<br>**Ec -** Measure **Pr1** in Normal mode + **ECO** label when in ECO mode;<br>**SP -** Set Point;<br>**oF -** Display not lit. | P1 | |
| 16 | **rd** | Differential (Hysteresis) | 0.0 ÷ 30.0°C/°F | 2.0 | |
| 17 | **rEd** | Differential (Hysteresis) in ECO mode | 0.0 ÷ 30.0°C/°F | 2.0 | |
| 18 | **rt1** | RUN time of the output OUT (relay) in case of probe rupture Pr1 | **oF** - Disabled;<br>-1 ÷ -59 (sec) / 1 ÷ 99 (min). | oF | |
| 19 | **rt2** | STOP time of the output OUT (relay) in case of probe rupture Pr1 | **oF** - Disabled;<br>-1 ÷ -59 (sec) / 1 ÷ 99 (min). | oF | |
| 20 | **rHC** | Output operating mode | **H -** Heating;<br>**C -** Cooling;<br>**nr -** Do not use;<br>**HC -** Do not use;<br>**C3 -** Do not use. | C | |
| 21 | **dtE** | Defrosting finishing temperature | -99,9 ÷ 999 °C / °F | 10.0 | |
| 22 | **dtS** | Temperature from which the beginning of the defrosting is allowed. | -99,9 ÷ 999 °C / °F | 2.0 | |
| 23 | **dtF** | Temperature that forces the beginning of the defrosting. | -99,9 ÷ 999 °C / °F | -99.9 | |
| 24 | **dSt** | Delay in the beginning of a defrosting because of evaporator probe | **oF** - Disabled;<br>-1 ÷ -59 (sec) / 1 ÷ 99 (min). | 1 | |
| 25 | **ddL** | Display Lock during defrost | **oF** Not active;<br>**on** Active at last measure;<br>**Lb** Active with label (dEF during defrost and PdF at defrost). | Lb | |
| 26 | **dcd** | Defrost activation time for continuous compressor operating | **oF** - Disabled;<br>-1 ÷ -59 (min) / 1 ÷ 99 (hrs). | oF | |
| 27 | **dde** | Defrost duration | **oF** - Disabled;<br>-1 ÷ -59 (sec) / 1 ÷ 99 (min). | 30 | |
| 28 | **dPE** | Probe mode of the end of the defrost: | **oF** - Disabled;<br>**EP** - EP probe temperature;<br>**P1 -** Probe temperature Pr1;<br>oF/EP/P1 | EP | |
| 29 | **ddi** | Defrosting interval | **oF** - Disabled;<br>-1 ÷ -59 (min) / 1 ÷ 99 (hrs). | 6 | |
| 30 | **dSd** | Delay first defrost after power-on | **oF** - Disabled;<br>-1 ÷ -59 (min) / 1 ÷ 99 (hrs). | 6 | |
| 31 | **PP1** | Out delay at switching-on | **oF** - Disabled;<br>-1 ÷ -59 (sec) / 1 ÷ 99 (min). | oF | |
| 32 | **PP2** | Out delay after switching OFF | **oF** - Disabled;<br>-1 ÷ -59 (sec) / 1 ÷ 99 (min). | oF | |
| 33 | **PP3** | Delay between two output switching-ON | **oF** - Disabled;<br>-1 ÷ -59 (sec) / 1 ÷ 99 (min). | oF | |
| 34 | **Pod** | Output delay at power ON | **oF** - Disabled;<br>-1 ÷ -59 (sec) / 1 ÷ 99 (min). | oF | |
| 35 | **AAy** | Temperature Alarm 1 type | **1 -** Absolute for Pr1 with Hi-Lo label;<br>**2 -** Relative to Pr1 with Hi-Lo label;<br>**3 -** Absolute for Au with Hi-Lo label;<br>**4 -** Relative to Au with Hi-Lo label;<br>**5 -** Absolute for Pr1;<br>**6 -** Relative to Pr1;<br>**7 -** Absolute for Au;<br>**8 -** Relative to Au. | 1 | |
| 36 | **AHA** | High temperature Alarm threshold | **oF** - Disabled;<br>-99.9 ÷ +999°C/°F. | oF | |
| 37 | **ALA** | Low temperature Alarm threshold | **oF** - Disabled;<br>-99.9 ÷ +999°C/°F | oF | |
| 38 | **AAd** | Temperature Alarms Differential | 0.0 ÷ 30.0°C/°F | 1.0 | |
| 39 | **AAt** | Temperature Alarms Delay | **oF** - Disabled;<br>-1 ÷ -59 (sec) ÷ 1 ÷ 99 (min). | oF | |
| 40 | **APA** | Temperature Alarms delay at power ON | **oF** - Disabled;<br>-1 ÷ -59 (min) / 1 ÷ 99 (hrs). | 2 | |
| 41 | **AdA** | Temperature Alarms delay and unlock display delay after defrost | **oF** - Disabled;<br>-1 ÷ -59 (min) / 1 ÷ 99 (hrs). | -5 | |
| 42 | **AoA** | Open Door Alarm Delay | **oF** - Disabled;<br>-1 ÷ -59 (sec) / 1 ÷ 99 (min). | 3 | |
| 43 | **tUF** | Key Function | **oF -** No function;<br>**1 -** Do not use;<br>**2 -** ECO Mode selection;<br>**3 -** Switch ON/Switch OFF (Stand-by);<br>**4 -** Do not use. | 3 | |
| 44 | **tFb** | /AUX Key Function | | oF | |
| 45 | **tLo** | Keyboard lock function delay | **oF** - Disabled;<br>-1 ÷ -59 (sec) / 1 ÷ 30 (min). | oF | |
| 46 | **tEd** | Set Point visibility with set key fast procedure | **0** - None;<br>**1** - SP;<br>**2** - SPE;<br>**3** - SP and SPE;<br>**4** - Active SP;<br>**5, 6** - Do not use. | 4 | |
| 47 | **tPP** | Password to Access Parameter functions | **oF** - Disabled;<br>001 ÷ 999. | oF | |

# 7. PROBLEMS, MAINTENANCE AND WARRANTY

## 7.1 Notifications

### 7.1.1 Error messages

| Error | Reason | Action |
|---|---|---|
| E1 -E1<br>E2 -E2 | 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 |
| epr | Internal EEPROM memory error | Press (set) key |
| err | Fatal memory error | Replace the instrument or ship to factory for repair |

### 7.1.2 Other messages

| Message | Reason |
|---|---|
| od | Delay at power-on in progress |
| Ln | Keyboard locked |
| Hi | Maximum temperature alarm in progress |
| Lo | Minimum temperature alarm in progress |
| AL | Digital Input alarm in progress |
| oP | Door Open |
| dEF | Defrost in progress with d.dL = Lb |
| PdF | Post-defrosting in progress with d.dL = Lb |
| Eco | Eco Mode in progress |

## 7.2 Cleaning

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

## 7.3 Warranty and Repairs

This device has a guarantee in form of repair or replacement by manufacturing defects in materials of 12 months from the date of purchase.

OSAKA SOLUTIONS automatically void this guarantee and is not liable for any damages deriving from:

- Use, installation, or use and handling undue, others than those described above and, in particular, differs from the safety requirements established by the regulations.
- Use in applications, machines or electrical panels that do not provide adequate protection against liquids, dust, grease and electric shocks to the installation conditions made.
- The inexperienced handling, and / or alteration of the product.
- The installation / use in applications, machines or electrical panels do not comply with the valid norm.

In case of defective product under warranty or out of that period, it should contact the post sales service to perform the necessary steps. Request document repair "RMA" (by mail or fax) and complete it, is necessary send the RMA and the device to SAT OSAKA by method prepaid.

## 7.4 Disposal

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

# 8. TECHNICAL DATA

## 8.1 Electrical characteristics

**Power supply:** 230 VAC, 115 VAC, 12 VAC/VDC ±10%;

**AC frequency:** 50/60 Hz;

**Power consumption:** about 3 VA;

**Inputs:** **2 inputs** for **temperature probes**:
**NTC** (103AT-2, 10 kW @ 25°C);
1 free of voltage digital input as an alternative to input Pr2;

**Output:** 1 relay output SPST-NO:

| | EN 61810 | EN 60730 | UL 60730 |
|---|---|---|---|
| Out1 (H) - SPST-NO - 30A - 2HP 250V, 1HP 125 VAC | 30 (15) A | 15 (15) A | 15 A Res., 96 LRA, 16 FLA |
| Out1 (R) - SPST-NO - 16A - 1HP 250V, 1/2HP 125 VAC | 16 (9) A | 10 (4) A | 12 A Res., 30 LRA, 5 FLA |

12 A max. for those with removable terminal model;

**Relay output Electrical life:** 100000 operations;

**Action type:** Type 1.B (EN 60730-1);

**Overvoltage category:** II;

**Protection class:** Class II;

**Isolation:** Reinforced insulation between the low voltage parts (type C or D power supply and relay output) and front panel; Reinforced insulation between the low voltage parts (type C or D power supply and relay output) and the extra low voltage section (inputs), No insulation between type F power supply and inputs.

## 8.2 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:** 78 x 35 mm, depth 64 mm;

**Weight:** about 150 g;

**Mounting:** Incorporated flush in panel (thickness max. 12 mm) in a 71 x 29 mm hole;

**Connections:**

**Inputs:** fixed or removable screw terminal block for 0.2 ÷ 2.5 $mm^2$/AWG 24 ÷ 14 cables;

**Power supply and Outputs:** fixed or removable screw terminal block or Faston 6.3 mm for 0.2 ÷ 2.5 $mm^2$/ AWG 24 ÷ 14 cables;

**Protection degree:** IP65 (NEMA 3S) mounted with gasket;

**Pollution degree:** 2;

**Operating temperature:** 0 ÷ 50°C;

**Operating humidity:** < 95 RH% with no condensation;

**Storage temperature:** -25 ÷ +60°C.

## 8.3 Functional features

**Temperature Control:** ON/OFF mode;
**Defrost control:** Interval cycles by stopping compressor;
**Measurement range:** NTC: -50 ÷ +109°C/-58 ÷ +228°F;
**Display resolution:** 1° or 0.1° (range -99.9 ÷ +99.9°);
**Overall accuracy:** ±(0.5% fs + 1 digit);
**Sampling rate:** 130 ms;
**Display:** 3 Digit Red or Blue (optional), height 17.7 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),
Control 37/2005/CE (EN13485 air, S, A, 2, -50°C +90°C with probe NTC 103AT11).