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USER'S MANUAL FOR COOL/HEAT DIGITAL THERMOSTAT WITH DEFROSTING

User's Manual – v1.1
www.osakasolutions.com

INTRODUCTION

in this manual there is the necessary information for the proper installation and usage instruction and maintenance of the product, it is recommended to read it carefully and to keep it.
In order to avoid dangerous or hazardous circumstances for people, things or animals due to an irregular operation or the malfunctioning of the thermostat, we remind you that the installation must comply with and be aware of the annexed safety systems, necessary to guarantee the aforementioned safety.
Neither OSAKA SOLUTIONS nor its legal representatives are responsible neither for the inadequate use of the THERMOSTAT nor for the use of it not conforming to the characteristics of the THERMOSTAT.

INDEX

1 – DESCRIPTION OF THE CONTROLLER

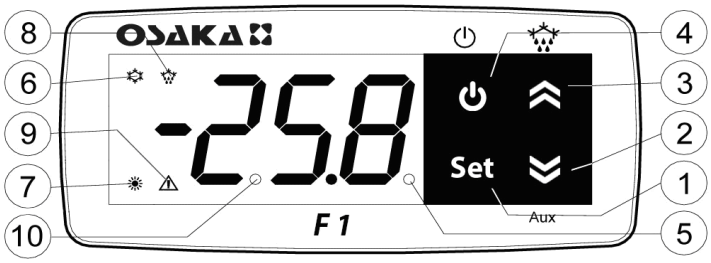
1.1 – GENERAL DESCRIPTION

The F1 is an electronic digital thermostat with a microprocessor adequate for applications of refrigeration and industrial processes, equipped with temperature control with ON / OFF regulation and defrosting control by compressor shutdown by time intervals.

The controller has one relay output and two NTC (10k) temperature probe inputs, of which the second input can be used as a digital input instead of as a probe input.

1.2 – FRONTAL PANEL DESCRIPTION

Panel frontal F 1



1 - "SET" KEY: By pressing and releasing quickly you can change the Set Point.
By pressing for 5 seconds you can access the parameters programming function. This function is used to edit the parameters and to confirm the desired value.
It can be used alongside the "**UP**" key to modify the programming level of the parameters.
Having the keyboard locked, if you press "**SET**" + "**UP**" during 5 seconds the keyboard will be unlocked automatically.

2 – "DOWN" Key:
You can lower the value of the **SET POINT** by pressing it directly without having entered the menu. In the parameters menu you can search the desired parameter and after pressing the selection of the parameter with "**SET**" you lower or select the new value of the parameter.

3– "UP /DEFROST" Key: Pressing it for 5 seconds initiates / stops a cycle of manual defrosting.
In the parameters menu it is used to find the desired parameter and after pressing the selection of the parameter with "**SET"** you increase or select the new value of the parameter.
Having the keyboard locked, if you press "**SET**" + "**UP**" during 5 seconds the keyboard will be unlocked automatically.

4 - ⏻ Key: By pressing and releasing quickly, you'll be allowed to visualize the controller's variables (measured temperature, etc.).
In the programming function it is used to exit the parameters and go back to the normal functioning.
If the parameter "**t.UF**" is programmed it allows you, pressing during 1 second (in the normal functioning mode), to turn-on / turn-off (Stand-by).

5 - Led SET: In the normal functioning mode it turns on when any key is pressed, as an indication that it has been pressed.
In the programming mode it is used to indicate the programming level of the parameters.

6 - Led OUT COOL: It indicates the state of the regulation output (compressor or device of temperature control, solenoid, actuator, etc.). This output is active (lit) and off (off) and disabled signal (flashing)

7 - Led OUT HEAT: Identical to 6, but for the heating function.

8 - Led DEF: It indicates the current state of the defrosting. If the pilot is flashing it indicates that the defrosting is being done.

9 - Led ALARM: It indicates the state of the alarm. ON (lit) OFF (stopped) or ongoing (flashing).

10 - Led Stand-By: It indicates that the controller i son Stand-By mode.

2 - PROGRAMMING

2.1 – QUICK SELECTION OF THE SETPOINT

In the normal programming mode, the Set Point is changed as follows:
By quickly pressing and releasing the SET key the display will show "**SP**" (or "**SPE**") alternating with the programmed value. To modify the desired temperature the "UP" key must be pressed in order to increase the value or "DOWN" to lower it.
However, through the parameter "t.Ed" it is possible to establish that the Set might be changed with the quick procedure of the SET key.
The parameter can undertake a value between oF and 4, which means that:
oF= oF = No Set may be programmed with the quick procedure of the SET key (thus the SET key will not do anything if it is pressed and released)
1=Only the SP can be programmed ("Normal" Set).
2=Only the SPE can be programmed ("Economic" Set).
3=Only the SP can be programmed (if it's active) or the SPE (if it's active)
4=Only the Active Set can be programmed (SP or SPE)

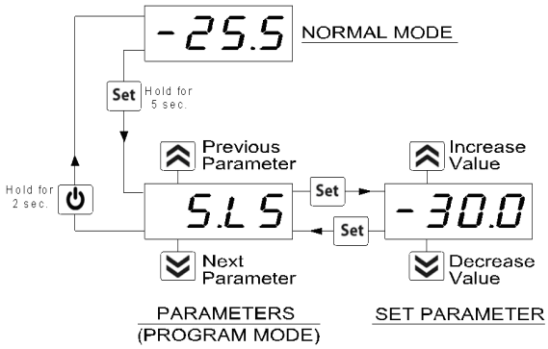
For example, in the case of the parameter "**t.Ed**" = 1, the controller will do as follows:
By pressing the SET key and releasing, the display will show "**SP**" alternating the programmed value.
To modify it, the "UP" key must be pressed to increase the value or the "DOWN" key to lower it.
If only the "SP" (t.Ed = 1) is selected once the desired value is programmed, by pressing the SET key it remains programmed and it exits the quick Set Point change mode.

If the Economic Set Point ("**t.Ed**"=3) is programmed, by pressing and releasing the SET key the display will show "**SPE**" alternating the programmed value.
To modify it the "UP" and "DOWN key must be pressed as well as "SP" to change the Set Point.
Once the desired value is programmed, by pressing the SET key it remains programmed and it exits the quick Set Point change mode.
To exit the Set quick programming, the SET key must always be pressed. Otherwise, if no key is pressed for 10 seconds it will automatically go back to the normal operating mode.

2.2 – STANDARD PROGRAMMING OF THE PARAMETERS

If the password to access the parameters is not activated (default programming), press "**SET**" for 5 seconds, the display then will show the code that identifies the first parameter and with the "**UP** and "**DOWN**" key it will be possible to select the desired parameter.

Once the desired parameter is selected, press the "**SET"** key and the programmed value in the parameter will show. This programming will be able to be changed by pressing "**UP**" or "**DOWN**" until you reach the desired value. Press "**SET**" to confirm and memorize the value.
By once again going back to the "**UP**" or "**DOWN**" keys, it will be possible to select another parameter and modify it successively.
To exit the programming mode: do not touch any key for 10 seconds or press the ⏻ key for 5 seconds

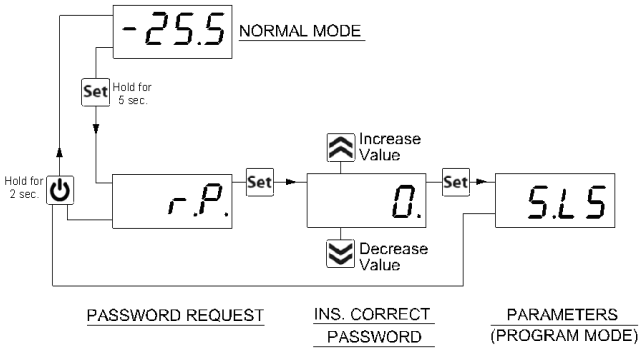


2.3 - PARAMETERS PROTECTION THROUGH PASSWORD

The controller has a parameters protection function through a password code which is configurable in the "**t.PP**" parameter.
In some instances this password is very useful so that there are no erratic manipulations in the controller, if it is desired to activate the password, you only need to put the desired number as the password in the "**t.PP**" parameter, validate it with the SET key and exit the programming.

When the password is programmed, press "**Set**" for 5 seconds to enter the parameters menu, the controller will show the letters: **"r.P"** and by pressing "**Set"** it will show "**0**", then we must select with the "**UP**" and "**DOWN**" keys the value of the correct password and press "**SET**" to have access to the programming parameters.

If the password is correct the display will show the code of the first parameter. The password protection can be deactivated with the parameter "**t.PP**" = oF



***Note:** If the password were to be lost, in order to access the parameters use the following procedure:*
*Turn off the electrical current of the controller and supply it again while pressing the "**SET**" key until the first parameter appears. You will the have access to the parameters and will be able to modify the "**t.PP**" parameter.*

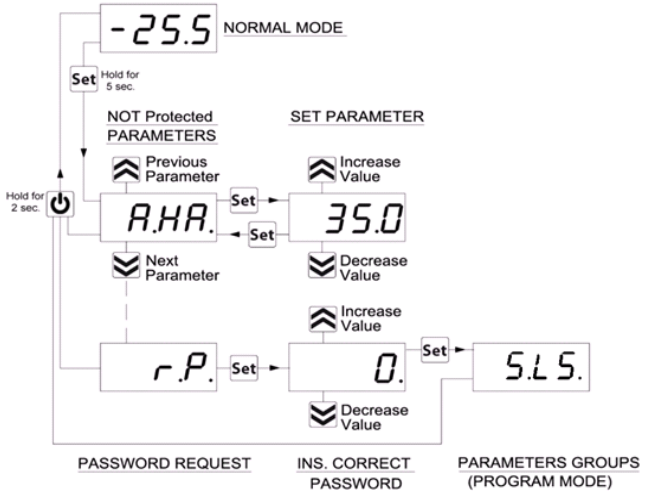
4-CUSTOMIZING PARAMETERS WITH / WITHOUT PASSWORD
The controller allows you to protect only some parameters with password and the other ones without it, so that the user has access to the parameters that he might need, without letting you access the entirety of parameters that belong to the technician or manufacturer.
Method to select the programming level of the parameters:

Access the programming through the password and select the parameter that you want to program without password. If the SET led is flashing it means that the parameter is programmable only with the password, i.e. it is protected. And if the led is lit and fixed it indicates that the parameter has direct access without a password.

To modify the parameter's visibility level keep the **SET** key pressed for 5 seconds, and when the parameter starts flashing, press the **UP** key without releasing the **SET** key, and you will be able to see that the led's state has changed.

The SET led will change its state indicating the new access level to the parameter (protected, flashing led) and (direct access without password, fixed led)

When entering the parameter's menu we will first see the user's level (not protected) parameters) and then the protected ones by introducing the password when the controller shows "**r.P**"



2.5 – RESTORATION OF INITIAL PARAMETERS
The controller has a mode where you can reset all the parameters to the parameters by default from the manufacturer.

To go back to the manufacturer's values or the parameter's values by default you only have to activate the protection through password and once that is activated and when the display shows "**r.P**", enter the password **-48**.

Once the password is confirmed with the SET key, the display will show for 2 seconds **"---".** When the controller resets the parameters, it makes a little testing and puts all the parameters back at their default value.

2.6 – KEYBOARD LOCKING FUNCTION
It is possible to completely block all the keys. This function is useful when the public has access to the control and you want to prevent any handling. The keyboard locking function is activated by programming the "**t.Lo**" parameter to a different OF value. The programmed value in the "**t.Lo**" parameter is the amount of time that the thermostat allows access to the keyboard, thus, after surpassing this amount of time the thermostat will remain blocked.

By pressing any of the thermostat's keys it will show "**Ln**" to inform that the locking is protected (blocked).
To unlock the keyboard press "**SET+UP**" for 5 seconds and the display will show "**LF**" and all the keyboards functions will be operational again.

3- USAGE AND INSTALLATION WARNINGS

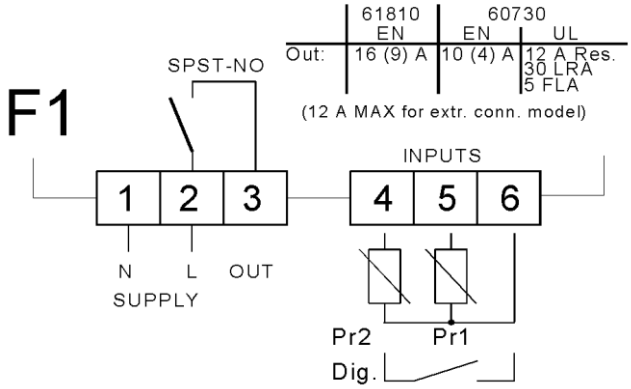
3.1 – USAGE WARNING
The units are manufactured as measurement and regulation devices in compliance with EN60730-1 for a functioning of up to 2000m of altitude.
The use of these controllers in applications that are not specifically subject to the aforementioned law must foresee all necessary measuring and protecting adaptations.
The controllers must be adequately protected and out of reach from liquids, dust, grease and dirtiness. They must only be accessible with the use of a tool or safe system (except the front).
The controllers can NOT be used in environments with a dangerous atmosphere (inflammable or explosive) without adequate protection.
Be reminded that the installer must ensure that the norm for electromagnetic compatibility is respected after the implantation in the equipment's installation, eventually using the right filters if it is needed.
In case of failure or malfunction of the control and measuring controllers that can create dangerous situations or damage to people, things, animals or products (defrost food or change in its ideal state), it is recalled that the facility should be equipped with electronic devices or electromechanical safety and warning system. Protective devices should be placed outside the control and measuring controllers, responding to specific safety requirements that are covered by the norm of the product or that common sense might suggest.
For your own safety, it is highly recommended fulfilling the instructions provided above.

3.2 – MECHANICAL ASSEMBLING
The 78x35mm thermostat's housing is designed to be wall-mounted.
Make a hole of 71x29mm and insert the controller fixing it with the clamps that are included.
It is recommended to place the protection seal to obtain more protection and tightness.
Avoid placing the thermostat in places exposed to high humidity or dust, this can cause condensation or insertion of conductive particles or substances. Ensure that you have an adequate ventilation and avoid installing in indoor sealed boxes or areas where the temperature exceeds the technical specifications of the controller. Avoid installing the cables and power supply together with the probe and install it away from devices that can generate disturbances (electrical noise) such as motors, fans, inverters, automatic gates, contactors, relays, solenoids, etc...

3.3 – ELECTRICAL CONNECTION
The thermostat is designed for the permanent connection between devices; no switch is equipped with internal devices of potency for over currents or overvoltage. Thus it is recommended to install a general / magnet thermal (circuit breaker) switch as close as possible to the controller and of easy access as a safety measure.
Be reminded that you must use the appropriate wire to the isolation of voltage, current, temperature and electrical normative of the venue. In addition you have to separate the probe signaling wires from the supply and power wires as much as possible so that you can avoid possible electrical noises, electromagnetic inductions, which in some cases could be diminish or voided with RC filters, ferritic, supply, resistors, etc. ... the use of wires with anti-parasitic mesh and this mesh is recommended to connect on one side to take ground

It is recommended to check that the equipment settings are appropriate to the application before connecting wires actuators, loads on the output relays in order to prevent malfunctions or damage.

3.4 – ELECTRICAL WIRING DIAGRAM



4 - OPERATION

4.1 –ON / OFF (STAND-BY) FUNCTION

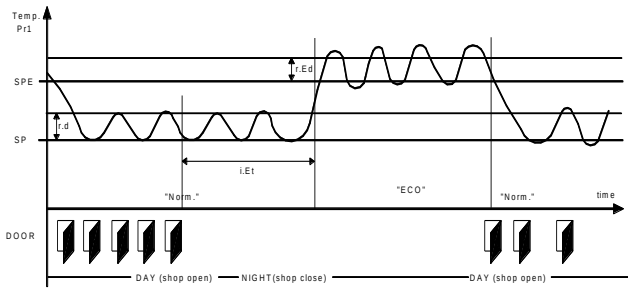
Once the thermostat is supplied it can make 2 states:
-**ON:** it means that the controller is running and acting over the foreseen control function.
-STAND-BY: it means that the controller is not acting, it's stopped. (The display lights the Stand-by led).
To go from the STAND-BY state to the ON state it corresponds exactly to when the controller is connected to the power. If there was a power failure, when the power comes back the system will always be as it was right before the interruption.
The ON/STAN-BY mode can be selected as follows:
-Through pressing the ⏻ key for 3 seconds. It allows the change from being stopped to be running.
-Through pressing the DOWN key for 3 seconds. If the parameter "**t.Fb**"=4.

4.2 – "NORMAL" AND "ECONOMIC" MODE OF OPERATION.

The controller allows you to program two Set Points of regulation, one Normal – "**SP**" and another one Economic – "**SPE**".
Associated to each one of these Set Points, they have a specific (hysteresis) differential, normal – "**r.d**", Economic – "**r.Ed"**.
The commutation between the various modalities can be automatic or manual.

OPERATION OF THE "NORMAL-ECONOMIC" MODE
It can be used in those cases in which it is necessary by commuting to two different operation temperatures (e.g. day/night or work days/holidays).
The NORMAL / ECONOMIC mode can be selected manually
-Through the ON/OFF key if the parameter "**t.UF"** =2.
-Through the DOWN/AUX key is the parameter "**t.Fb**" =2
-Through the digital input if the parameter "**i.Fi**" =6
The NORMAL / ECONOMIC mode can be selected automatically.
-After the delay time "**i.Et**" close the door (commutation from Normal to economic).
-When the door opens, if the SPE Set Point is active through the parameter "**i.Et**" (commutation from Normal to economic).
-When the door closes the SPE Set Point is activated after "**i.Et**" parameter's time has passed. Having the "**i.tt**" time passed keep the door closed, it will change its mode (commutation from Normal to economic).
For this function you must use the digital input configured as "**i.Fi"** =1, 2 or 3.
If "**i.Et**" = oF the selection of the Eco/Norm mode through digital input as a door will be deactivated.
If **"i.tt**" = oF, the change from Eco mode to Normal mode according to the time a door is closed will be deactivated.
The change to the economic mode will be signaled with the message "**Eco**".
If "**i.dS**" = Ec the controller in economic mode will always show "Eco", otherwise it will show the message "Eco every 10 seconds. Always alternating the normal visualization mode programmed in the parameter "**i.dS**".

It will be possible to program the normal **SP** Set Point with a value in between the value programmed in the parameter **"S.LS"** and the value programmed in the parameter **"S.HS"** as long as the "**SPE**" Set Point (being an Economic Set Point) will be possible to program it with a value in between the value programmed in the parameter "**SP**" and the value programmed in the parameter **"S.HS".**



***Note:** In the following examples the Set Point is generally indicated as "SP" and the differential as "r.d", however the controller will usually go according to the Set point and the differential selected as active.*

4.3 – INPUTS AND DISPLAY CONFIGURATION

Through the "**i.uO**" parameter you might choose whether you want to measure the temperature in Celsius (Standard) or Fahrenheit (USA) [**C0**=ºC / 1º (no decimal); **C1**=ºC / 0.1º (with decimal); **F0**= ºF / 1º; **F1**= ºF / 0.1º],
The controller allows you to calibrate probes that can be used to recalibrate, according to the needs of the application, through the parameter "**i.C1**" (Pr1 input), "**i.C2**" (Pr2 input).
The "**i.P2**" parameter allows you to select the use that you want to give to the Pr2 input, in the following way:
= EP – Evaporator Probe
= Au – Auxiliary Probe (Au)
=dG – Digital input (dG)
If the Pr2 input is not being used, program it as "**i.P2**" = oF. If the Pr2 probe is not configured as EP, the functions referring to the evaporator probe will not be able to be used.
Through the "**i.Ft**" parameter it is possible to put a relative software filter to the measurement of the input's value, so that we can diminish the sensitivity and quick temperature variation (by increasing the time).

Through the "**i.dS**" parameter it is possible to establish the normal visualization of the display which can be the measurement of the Pr1 probe (P1), the measurement of the Pr2 probe (P2), the active regulation Set Point (SP), the measurement of the Pr1 probe if the controller is in the normal mode with the message "Eco", if the controller is in Economic (Ec) mode, or even if it is wanted for the numeric display to be turned off (oF).
If it appears one of the measurements ("**i.dS**" = P1, P2, Ec) the parameter "**i.CU**" allows you to put an offset that is applied to show only the variable **(all the controls of regulation will always be done according to the correct measurement of the calibration parameter.)**
Regardless of the value imposed in the "**i.dS**" parameter it is possible to visualize all the measurement's and operation's values by pressing and releasing the ⏻ key
The display will show the code which identifies the variable (read below) alternating it with its value.
The variable shown are as follows:
"Pr1" – Pr1 probe measurement
"Pr2" – Pr2 probe measurement
"Lt" – Memorized Pr1 minimum temperature
"Ht" - Memorized Pr1 maximum temperature

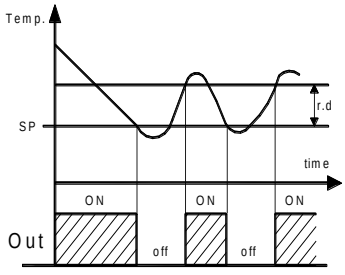
4.4 – DIGITAL INPUT CONFIGURATION

The function for the digital input will be programmed in the "**i.Fi**" parameter and the possible delay will be programmed in the "**i.ti"** parameter. The "**i.Fi**" or digital input can be programmed for:

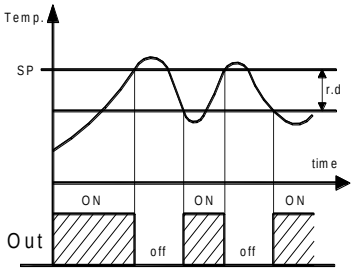
= 0 – Inactive digital input (no function)
= 1 – Opening of the chamber through open contact: when the input closes the controller will show in the display **oP**, alternating it with the variable established in the "**i.dS**" parameter. With this operation mode, the action of the digital input also activates the time programmed in the "**A.oA**" parameter, and after the time is up an alarm will go off to signal that the door is open.
Once the door is open, the controller will go back to its normal operation if it were to be in Eco mode and if the automatic function of the Eco mode were to be activated, through the parameter "**i.Et**".
= 2 – Similar to "**i.Fi** = 1"
= 3 – Opening of the chamber's door with blocking of the control exit through open contact: similar to "**i.Fi** = 1**"** but with exit blocking (control exit). If open door alarms are generated (after the time has passed "**A.oA"**) the exit will be deactivated.
= 4 - Signaling of external alarm with open contact: when the digital contact closes and the programmed time in "**i.ti**" has passed, an alarm will be activated and in the display it will show **AL** alternating it with the variable established in the "**i.dS**" parameter.
= 5 – Signaling of external alarm with the deactivation of the control exit through open contact: When the input closes (and the "**i.ti"** time has passed) the exit control will be deactivated, the alarm will be activated and the controller will show **AL** alternating it with the variable established in the "**i.dS**" parameter.
= 6 – Normal / Economic mode selection with open contact: When the input is closed you will be selecting the Economic mode. When the input is opened, you will be selecting the Normal mode
= 7 – Turn ON / OFF (Stand-by) the controller through open contact: once the input is closed (and after the "**i.ti"** time has passed) the controller will turn on. On the other hand, when the contact opens it switches to Stand-by mode.
= 7 – **DO NOT USE**.
= -1, -2, -3, etc.. – Identical functions to the previous points but with an inverse functionality logic. It activates when the digital input's contact opens.

4.5 – TEMPERATURE REGULATION

The regulation mode of the controllers is an ON/OFF type over the control output according to the measurement of the Pr1 probe, to the active Set Point "**SP**" (or "**SPE**"), to the regulator differential "**r.d**" (or "**r.Ed**") and to the operation mode "**r.HC**".
Referring to the operation mode programmed in the "**r.HC**" parameter, the controller automatically considers the differential with a positive value for a refrigeration control ("**r.HC**" =C) or with a negative value for a heating control ("**r.HC**"=H).



r.HC=C

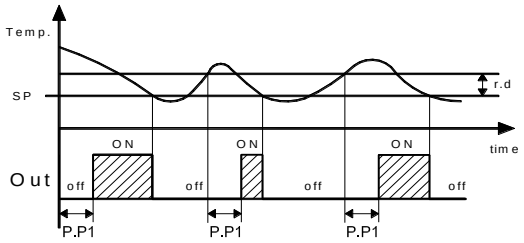


r.HC=H

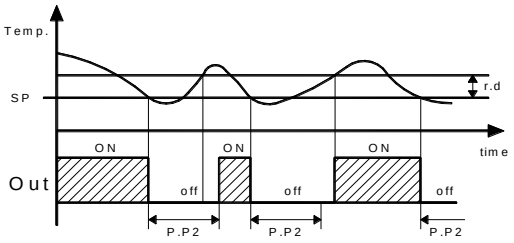
If there was a probe error it is possible for the control output to work cyclically according to the time programmed in the "**r.t1**" and (activation time) and "**r.t2**" (deactivation time) parameter during the error.
By programming "**r.t1**" = oF the output which has a probe error will always remain turned off.
By programming "**r.t1**" to any value and "**r.t2**" = oF the output which has a probe error will remain turned on.
It is reminded that the operation of the temperature regulator can be affected by the following functions:
"Compressor protection", "Starting delay" and "Defrosting"

4.6 – COMPRESSOR PROTECTION AND STARTING DELAY

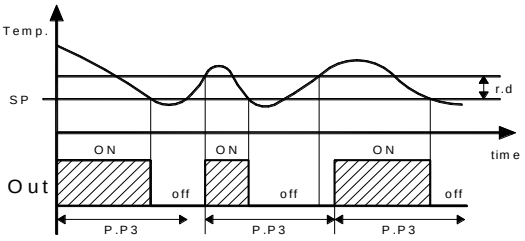
The compressor protection function helps you to avoid pretty frequent starts of the compressor or it can also be useful to make a time control for the relay output destined to an actuator or load.
Such function expects to activate up to 3 types of timing that you can choose according to the appropriate system regulation.
The protection consists in avoiding various starts during the protection time.
The first Time foresees a delay in the activation of the output according to the time programmed in the "**P.P1**" parameter (starting delay).



The second Time expects a delay in the control relay, so that it assures a minimum time in between the stoppage and the start of the relay's parameter: "**P.P2**" (delay after stoppage or minimum stoppage time).



The third Time expects to not allow it to start if it hasn't exceeded the programmed time between consecutive starts. "**P.P3**" parameter (delay after consecutive starts).



If the protection is acting, preventing the start of the relay by the programmed time, the output relay's Led (Cold or hot) will be flashing.
It is also possible to activate a starting delay of the regulation when the power supply reaches the thermostat. "**P.od**" parameter is very appropriate when there are various thermostats so that it doesn't start at the same time as the loads and so that it allows the power line to have a smoother start.
During this delaying phase we will see **od** alternating with the normal programmed visualization.
The "**od"** delay function is deactivated by programming it as = oF.

4.7 – AUTOMATIC DEFROSTING CONTROL

The defrosting can be activated automatically with different options:

- Defrosting by time intervals.
- Defrosting by the temperature of the evaporator.
- Defrosting by continual time of the compressor's operation.

In order to avoid unnecessary defrosting when the temperature of the evaporator is high, the "**d.tS**" parameter establishes the temperature given by the evaporator probe Pr2 (EP) below the temperature of which the defrosting is enabled.
Thus, if the temperature measured in the Pr2 probe (as EP) is higher than the one programmed in "**d.tS**" the defrosting will not be enabled.

4.7.1 – DEFROSTING BY TIME INTERVALS

With the "**d.di**" parameter the time in between the defrosting is configured (the interval of time between finishing one defrosting and the beginning of another one).
It is possible to configure the first defrosting at the start of the controller with a different time interval in the "**d.Sd**" parameter. If you want to make a defrosting in each start of the controller, program the parameter as "**d.Sd**" = oF. If otherwise you do not want to make defrosting at the start of the controller, configure "**d.Sd**" = "**d.di**"

If the parameter "**d.di**" = oF is programmed, the time intervals are disabled and there will only be defrosting when the evaporator probe orders it.
In the "**d.PE**" parameter you can choose the way in which you will finish the defrosting, wither by time or by temperature.

"d.PE" = oF finishing by time.

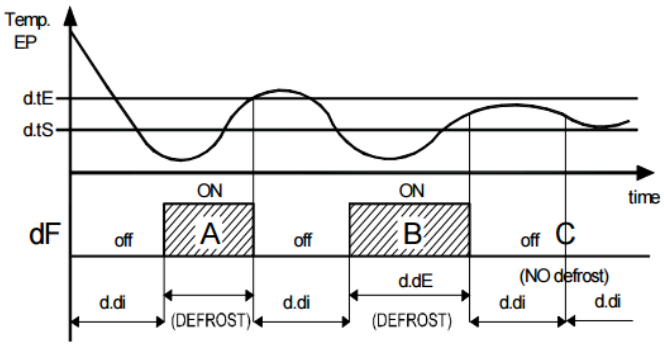
The end of the defrosting is given by the configured time in the "**d.dE**" parameter.
If the parameter "**d.dE**" = oF, the defrosting will be disabled.

"d.PE" = EP finishing by evaporator's temperature.

With the "**d.tE**" parameter the finishing of the defrosting can be according to the evaporator's temperature. When the temperature is not reached in the time selected in the "**d.dE**" parameter, the defrosting finishes because the time is up.
If the temperature measured in the evaporator probe exceeds the chosen temperature in the "**d.tE**" parameter, the defrosting is disabled.

"d.PE" = P1 finishing by the room's temperature.

With the "**d.tE**" parameter the finishing of the defrosting can also be done according to the room's temperature. When the temperature is not reached in the time selected in the "**d.dE**" parameter, the defrosting finishes because the time is up.
If the temperature measured in the room's probe exceeds the chosen temperature in the "**d.tE**" parameter, the defrosting is disabled.
By programming "**d.dE**" = oF the defrosting by time interval or manual defrosting will be disabled.



Defrosting operation example: *the defrosting indicated as A finishes when it reaches the "**d.tE**" temperature, the defrosting B finishes because it reaches the established time without exceeding the "**d.tE**" temperature, the defrosting C doesn't start since it is above the "**d.tS**" temperature, which is the one that enables the defrosting.*
An ongoing defrosting is signaled through the DEF led.

4.7.2 – DEFROSTING BY THE TEMPERATURE OF THE EVAPORATOR.

The controller forces a defrosting cycle when the evaporator's probe (Pr2 probe configured as EP) goes down the value programmed in the "**d.tF**" parameter and the "**d.tS"** delay time has passed in order to guarantee that the evaporator truly is at a very low temperature and it needs a defrosting (this usually is a symptom of a low thermal interchange regarding the normal conditions of operation).
If a delay in the function is not desired, program "**d.St**" = oF, when establishing "**d.tF**" = -99.9 it is as if the function was actually disabled.

4.7.3 – DEFROSTING BY THE CONTINUAL TIME OF THE COMPRESSOR'S OPERATION.

The controller initiates a defrosting when the compressor has been working uninterruptedly for the programmed time in the "**d.cd**" parameter.
Such a function is often used when the compressor works uninterruptedly for long periods of time, which is often a symptom of a low interchange of temperature which is normally cause when the evaporator freezes.
By configuring "**d.cd**" = oF this function will be disabled.

4.7.4 –MANUAL DEFROSTING

To activate a manual defrosting cycle press the "UP" / "DEFROST" key for 5 seconds and the Def led will turn on and the defrosting will start. To interrupt a defrosting cycle while it is ongoing, press the UP key again for 5 seconds.

4.7.5 – INTERVALS AND DURATION OF THE DEFROSTING WITH EVAPORATOR PROBE ERROR

If there was an evaporator probe error, the defrosting will be done with time interval "**d.Ei**" and with a "**d.EE**" duration. If there was a probe error during the passed time for the start of a new defrosting ("**d.di**") or for the finishing of a defrosting ("**d.dE**") in normal conditions, if it were lower than the configured values in the relative parameters under broken probe conditions ("**d.Ei**" equals "**d.di**" in an error state and "**d.EE**" equals "**d.dE**" in an error state) the start or finish of a defrosting with the lower time value.
These functions are available when the evaporator's probe is used, the length of time of the defrosting is usually higher as a safety measure (the evaporator probe allows you to finish the defrosting earlier if the conditions are appropriate).

4.7.6 – LOCKING OF THE DISPLAY DURING THE DEFROSTING

Through the "**d.dL**" and the "**A.dA**" you can establish the behavior of the display during the defrosting.
The "**d.dL**" parameter blocks the last temperature before the defrosting over the display ("**d.dL**"=on) until the finishing of the defrosting and the temperature doesn't go under the value of the last memorized temperature or the condition ["**SP**" + "**r.d**"] or exceeds the locking safety time "**A.dA**". It also allows you to see the letters which indicate the defrosting "**dEF**" ("**dL**"=**Lb**) and after the defrosting is over the letters "**PdF**" which indicate that the defrosting time is over but the cold temperature has not been recovered to the regulation value ["**SP**" + "**r.d**"] or exceeds the locking safety time "**A.dA**".
Another possibility is to indicate the real temperature of the room or cold furniture during the defrosting ("**d.dL**" = oF)

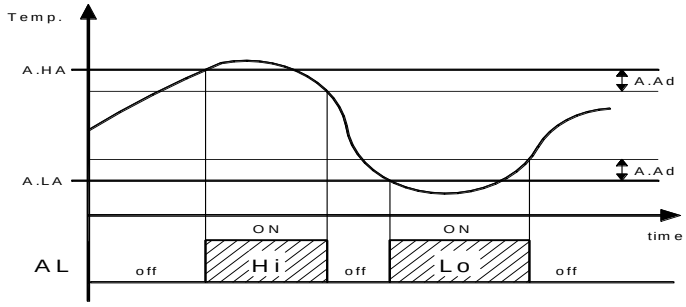
4.8 – ALARM FUNCTIONS

The alarm conditions of the regulator are as follows:
-Probe error: "**E1**", "**-E1**"
-Temperature Alarm: "**Hi**", "**Lo**"
-External Alarm: "**AL**"
-Open door alarm: "**oP**"
Any alarm condition is indicated with the ALARM led whereas the pre-alarm condition (i.e. alarm with delay) is indicated with a flashing led.

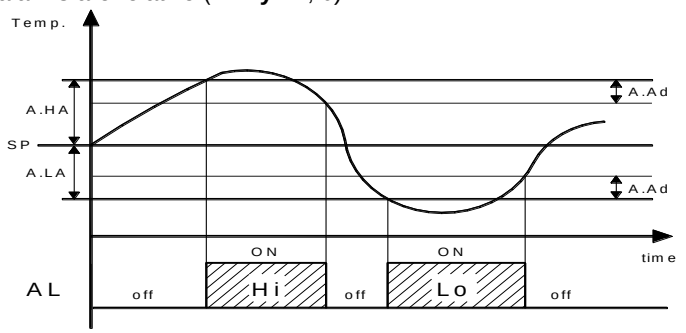
4.8.1 – TEMPERATURE ALARMS

The temperature alarm function works according to the reading of the **Pr1 probe,** and to which type of alarm was programmed, and to the "**A.Ay**" parameter, and to the "**A.HA**" parameter (max. alarm) and to "**A.LA**" (min. alarm) and to the "**A.Ad**" differential (for relative as well as absolute alarm)
Through the "**A.Ay**" parameter it is possible to establish whether the "**A.HA**" and "**A.LA**" alarm sets must be considered absolute or relative in regards to the active Set Point, if the sets must be shown in the display as "**Hi**" (max. alarm) or "**Lo**" (min. alarm) when alarms enter or not.
According to the selected value in the "A.Ay" parameter you can obtain the following functions:
=1: Absolute relating to Pr1 with visualization. Display (**Hi – Lo**)
=2: Relative relating to Pr1 with visualization. Display (**Hi – Lo**)
=3: **DO NOT USE**
=4: **DO NOT USE**
=5: Absolute relating to Pr1 without visualization.
=6: Relative relating to Pr1 without visualization.
=7: **DO NOT USE**
=8: **DO NOT USE**
Through some parameters it is possible to delay the activation, just in case the situation is cancelled and the ideal conditions are recovered without it being an alarm. Those parameters are:
"A.PA" – Delay time when receiving power supply and turning the regulation controller on if it is in an alarm situation.
"A.dA"- Delay time after a defrosting.
"A.At" – Acting delay time of the temperature alarm.

The temperature alarm is enabled at the end of the exclusion and it is activated after the “A.At” time when the temperature measured in the probe exceeds or goes lower than the corresponding max or min alarm sets.
The alarm sets will be the same as the ones programmed in the “**A.HA**” and **“A.LA**” parameters if the alarms are absolute (“**A.Ay**”=1,5)



Or the values will be [”**SP**”+”**A.HA**”] and [”**SP**”+”**A.LA**”] if the alarms are relative (“**A.Ay**”=2, 6).



The temperature alarms of maximum and minimum can be deactivated if we insert the parameters “**A.HA**” and “**A.LA**” = oF.

4.8.2 – EXTERNAL ALARM OF DIGITAL INPUT

The controller can signal an external alarm through the activation of the digital input with the function programmed as “**i.Fi**” = 4 or 5.
The controller signals the alarm through the activation of the ALARM led and the visualization of the label **AL** alternating it with the establish variable in the “**i.dS**” parameter. The mode “**i.Fi**” = 4 doesn’t operate with any action over the control output whereas the mode “**i.Fi**” = 5 foresees the deactivation of the control output in the intervention of the digital input.

4.8.3 – OPEN DOOR ALARM

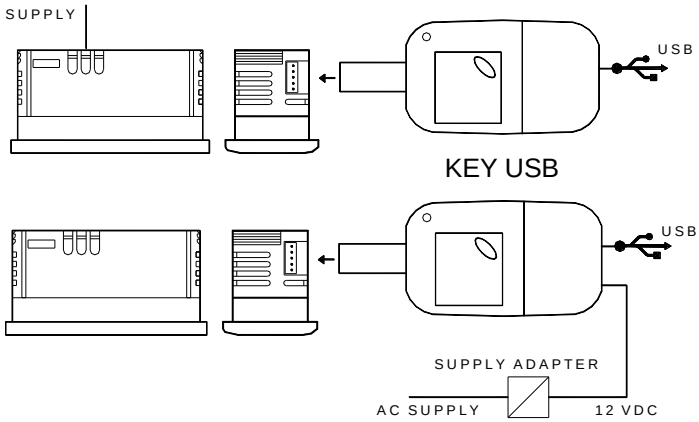
The controller can signal an open door alarm through the activation of the digital input with the function programmed as “**i.Fi**”= 1, 2 or 3.
When the digital input is deactivated, the controller signals that the door is open in the display with the **oP** label alternating it with the established variable in the “**i.dS**” parameter. After the delay programmed in the “**A.oA**” parameter, the controller signals the alarm through the activation of the ALARM led and with the display of the **oP** label.
In the open door alarm’s intervention the disabled output will be reactivated.

4.9 – OPERATING KEY “ ⏻ ” AND “DOWN/AUX”

In addition to its normal functions, two of the controller’s keys can be configured to do other functions. The ⏻ key can be defined with the “**t.UF**” parameter whereas the function of the “**DOWN/AUX**” key is defined with the “**t.Fb**” parameter.
Both parameters have the possibility of being configured to do one of the following functions:
= oF – The key doesn’t have any specific function.
= 1 – DO NOT USE
= 2 – By pressing the key for a few seconds, it is possible to select the rotation of the Normal or Economic (SP/SPE) active operation modality. When the key is pressed, the display will show (flashing) for one second the code of the active set point (“SP” or “SPE”).
= 3 – By pressing the key for some seconds it’s possible to change the controller from an ON state to Stand-by and vice-versa
= 4 – DO NOT USE

4.10 – PARAMETERS CONFIGURATION WITH KEY USB

The controller has a connector that allows you to transfer the operation parameters to the **KEY USB** device, which is equipped with a connector of 5 poles. The KEY USB device is used to program the controllers that must have the same configuration of parameters, or to save a copy of the controller’s programming and be able to transfer it quickly. The **KEY USB** has a USB connection input, which allows connecting it to a PC, with which through the Universal Conf or Osaka Set Up configuration software it is possible to configure the operation parameters.



For more information, please consult the manual of the KEY USB.

5 – PARAMETERS LISTING

“S” Relative parameters to the Set Point

Par.		Description	Range	Def.	Note
1	**S.LS**	Minimum Set Point	-99.9 ÷ HS	-50.0	
2	**S.HS**	Maximum Set Point	LS ÷ 999	99.9	
3	**SP**	Set Point	LS ÷ HS	0.0	
4	**SPE**	Economic Set Point	SP ÷ S.HS	0.0	

“i” Relative parameters to probes and digital inputs

Par.		Description	Range	Def.	Note
5	**i.uP**	Measurement and resolution unit (decimal point). C0= °C With resolution 1° F0= °F With resolution 1° C1 =°C With resolution 0,1° F1 = °F With resolution 0,1°	C0 / F0 / C1 / F1	C1	
6	**i.Ft**	Measuring filter.	oF ÷ 20.0 sec	2.0	
7	**i.C1**	Calibration probe Pr1 (room).	-30 ÷ 30 °C/°F	0.0	
8	**i.C2**	Calibration probe Pr2.	-30 ÷ 30 °C/°F	0.0	
9	**i.CU**	Visualization offset	-30.0 ÷ 30.0 °C/°F	0.0	
10	**i.P2**	Pr2 input usage: oF = No function EP = Evaporator Au = Auxiliary probe dG = digital input	oF – EP – Au – dG	dG	

11	**i.Fi**	Function and logic of the digital input: 0 = No function 1,2 = Door opening 3 = Door opening with door blocking 4 = External alarm 5 = External alarm with exit's deactivation. 6 = Selection in between Normal or Economic mode. 7 = Start / Stop (Stand-by) 8 = **DO NOT USE**	-8 / -7 / -6 / -5 / -4 / -3 / -2 / -1 / 0 / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8	0	
12	**i.ti**	Digital input delay.	oF ÷ 0.01 ÷ 9.59 (min.sec) ÷ 99.5 (min.sec)	oF	
13	**i.Et**	Delay time of economic mode activation when the door is closed oF = disabled function.	oF/ 0.01 ÷ 9.59 (hrs.min.) ÷ 99.5 (hrs.min.x10)	oF	
14	**i.tt**	Maximum time of operation in economic mode. oF = disabled function	oF/ 0.01 ÷ 9.59 (hrs.min.) ÷ 99.5 (hrs.min.x10)	oF	
15	**i.dS**	Variable often shown in the display: P1 = Measuring probe Pr1. P2 = Measuring probe Pr2 Ec = Pr1 Measure in normal mode and Eco message in Eco mode SP= Active Set Point oF = Turned off display	P1 / P2 / P3 / Ec / SP / oF	P1	

"r" Temperature regulation parameters

Par.		Description	Range	Def.	Note
16	**r.d**	Regulation differential (hysteresis)	0 ÷ 30 °C/°F	2.0	
17	**r.Ed**	Regulation differential (hysteresis) in Eco mode	0.0 ÷ 30.0 °C/°F	2.0	
18	**r.t1**	Output activation time in case the Pr1 probe breaks.	oF ÷ 0.01 ÷ 9.59 (min.sec) ÷ 99.5 (min.sec)	oF	
19	**r.t2**	Output stopping time because of the breaking of the probe.	oF ÷ 0.01 ÷ 9.59 (min.sec) ÷ 99.5 (min.sec)	oF	
20	**r.HC**	Regulation mode: H = Heat C = Cool Nr, HC, C3 = **DO NOT USE**	H / C / nr / HC / C3	C	

"d" Relative parameters to the defrosting

Par.		Description	Range	Def.	Note
21	**d.tE**	Defrosting finishing temperature	- 99.9 ÷ 999 °C/°F	10.0	
22	**d.tS**	Temperature from which the beginning of the defrosting is allowed. If Pr2 is higher tan d.tS it won't start the defrosting.	- 99.9 ÷ 999 °C/°F	2.0	
23	**d.tF**	Temperature that forces the beginning of the defrosting.	- 99.9 ÷ 999 °C/°F	-99.9	
24	**d.St**	Delay in the beginning of a defrosting because of Pr2 evaporator probe	oF/ 0.01 ÷ 9.59 (min.sec) ÷ 99.5 (min.sec.x10)	1.00	
25	**d.dL**	Display locking in the defrosting: oF = not active on = active with last measurement. Lb = active with message ("dEF" in defrosting and "PdF" in post-defrosting)	oF - on – Lb	Lb	
26	**d.cd**	Defrosting starts due to continual operation of the compressor	oF/ 0.01 ÷ 9.59 (hrs.min.) ÷ 99.5 (hrs.min.x10)	oF	
27	**d.dE**	Maximum duration of the defrosting.	oF ÷ 0.01 ÷ 9.59 (min.sec) ÷ 99.5 (min.sec)	30.0	
28	**d.PE**	Probe selection of the finish of the defrosting: **- oF =** finishes by time alone. **- EP =** by Pr2 probe temperature = EP. **- P1 =** by Pr1 probe temperature = room.	oF – EP – P1	EP	
29	**d.di**	Defrosting intervals	oF ÷ 0.01 ÷ 9.59 (hrs.min) ÷ 99.5 (hrs.min)	6.00	
30	**d.Sd**	Defrosting delay when starting. (oF = it allows defrosting when it starts)	oF ÷ 0.01 ÷ 9.59 (hrs.min) ÷ 99.5 (hrs.min)	6.00	
31	**d.Ei**	Defrosting intervals if there is a probe error.	oF ÷ 0.01 ÷ 9.59 (hrs.min) ÷ 99.5 (hrs.min)	6.00	
32	**d.EE**	Duration of the defrosting if there is a probe error	oF ÷ 0.01 ÷ 9.59 (min.sec) ÷ 99.5 (min.sec)	10.0	

"P" Compressor Protection parameters

Par.		Description	Range	Def.	Note
33	**P.P1**	Output delay when starting	oF÷ 0.01 ÷ 9.59 (min.sec) ÷ 99.5 (min.sec.x10)	oF	
34	**P.P2**	Delay after stopping or minimum time of stoppage.	oF ÷ 0.01 ÷ 99.5	oF	
35	**P.P3**	Minimum time after two output connections.	oF ÷ 0.01 ÷ 99.5	oF	
36	**P.od**	Delay of the compressor's start when it gives voltage to the controller.	oF ÷ 0.01 ÷ 9.59 (min.sec) ÷ 99.5 (min.sec)	oF	

"A" Alarm configuration parameters

Par.		Description	Range	Def.	Note
37	**A.Ay**	Temperature alarm type: 1 = Absolute for Pr1 probe with visualization in the display (Hi-Lo). 2 = Relative for Pr1 probe with visualization in the display (Hi-Lo). 3, 4 = **DO NOT USE** 5 = Absolute for Pr1 probe without display's visualization. 6 = Relative for Pr1 probe without display's visualization. 7, 8 = **DO NOT USE**	1 / 2 / 3 / 4 / 5 / 6 / 7 / 8	1	
38	**A.HA**	Alarm set for high temperatures.	oF / - 99.9 ÷ 999 °C/°F	oF	
39	**A.LA**	Alarm set for low temperatures.	oF / - 99.9 ÷ 999 °C/°F	oF	
40	**A.Ad**	Temperature alarm differential.	0 ÷ 30 °C/°F	1.0	
41	**A.At**	Temperature alarm delay.	oF ÷ 0.01 ÷ 9.59 (min.sec) ÷ 99.5 (min.sec)	oF	
42	**A.PA**	Alarms connection delay when turning on.	oF ÷ 0.01 ÷ 9.59 (hrs.min) ÷ 99.5 (hrs.min)	2.00	
43	**A.dA**	Temperature alarm delay after the defrosting and locking of the display during the defrosting.	oF ÷ 0.01 ÷ 9.59 (hrs.min) ÷ 99.5 (hrs.min)	0.05	
44	**A.oA**	Open door alarm delay.	oF ÷ 0.01 ÷ 9.59 (min.sec) ÷ 99.5 (min.sec)	3.00	

"t" – Keyboard configuration parameters.

Par.		Description	Range	Def.	Note
45	**t.UF**	"F" key operation mode. oF = no function 1= **DO NOT USE** 2= Select economic mode. 3= Start / Stop (Stand-by) 4 = **DO NOT USE**	oF / 1 / 2 / 3 / 4	3	
46	**t.Fb**	Down/Aux key operation mode (see "t.UF")	oF / 1 / 2 / 3 / 4	oF	
47	**t.Lo**	Automatic keyboard locking.	oF ÷ 0.01 ÷ 9.59 (min.sec) ÷ 30.0 (min.sec)	oF	
48	**t.Ed**	Set Point visibility with quick procedure with SET key oF = none 1 = SP 2 = SPE 3 = SP and SPE 4 = Active SP 5, 6 = **DO NOT USE**	oF / 1 / 2 / 3 / 5 / 6	1	
49	**t.PP**	Password to access the operational parameters.	oF ÷ 999	oF	

6 – ERROS, MAINTENANCE AND WARRANTY

6.1 – SIGNALING

Error	Reason	Action
E1 -E1	The relative probe can be broken (**E**) or in short-circuit (**-E**), or have a value that is out of the programmed range.	Verify the connection of the probe to the controller and verify the correct operation of the probe (it is useful to have the ohm values of the probes)
EPr	Possible anomaly in the EEPROM memory.	Press the SET key. Turn off and turn on the controller.
Err	Fatal Error of the controller's memory.	Replace the controller or send it for a possible reparation.

Display indication	Reason
od	Delay at the start after power supplying the controller.
Ln	Locked keyboard.
Hi	High temperature alarm
Lo	Low temperature alarm.
AL	Ongoing digital input alarm.
oP	Open door
dEF	Active defrosting, it shows if "**d.dL**" =Lb
PdF	Defrosting finished, recovering cold if "**d.dL**" = Lb
Eco	Economic mode selected.

6.2 – CLEANING
It is recommended to clean the controller with a wet cloth alone. Do not use soap nor any other neutral detergent.

6.3 – WARRANTY AND REPAIRING
The controller has a warranty that takes form either in reparation or in replacement, if the error is due to a manufacturing defect in materials which are up to 12 months old from the purchasing date. OSAKA SOLUTIONS will automatically make void this warranty and will not be held accountable for possible damage that may result from:

- The use, installation or handling which is inappropriate or different than the one written here, and specially when is differs from the safety requirements established by the regulation.
- The usage in applications, machines or electrical panels that do not provide adequate protection against liquids, dust, grease and electric shocks in the conditions of mounting.
- The inexperienced handling, and / or alteration of the product.
- The installation / use in applications, machines or electrical panels that do not comply with the valid norm.

If the product has a defect during the warranty time or outside of aforementioned time, you should contact the after-sales service to go through the appropriate procedure. Request a repairing document “RMA” (by email or fax) and fill it. It is necessary to send the RMA and the controller to the SAT OSAKA with prepaid shipping.

7 – TECHNICAL DATA

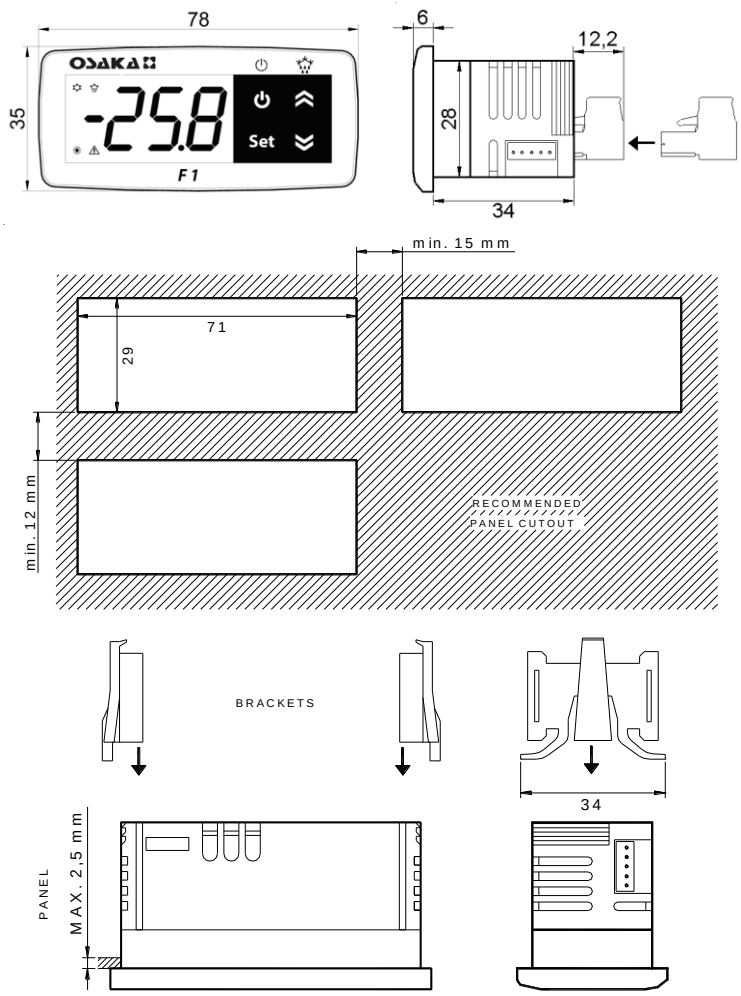
7.1 – ELECTRICAL FEATURES
Supply: 115 or 230 VAC +/- 10%
AC Frequency: 50/60 Hz
Consumption: 2 VA
Input: 2 inputs for NTC (103AT-2, 10 K Ω @ 25 °C) temperature probes; 1 digital input by free voltage contact as an alternative option to the 2 probe inputs.

Output - 16A - 1HP 250V, 1/2HP 125 VAC	16 (9) A	10 (4) A	12 A Res., 30 LRA, 5 FLA

Electrical life relay output: 100000 op. in compliance with EN 60730
Supply: Type 1.B in compliance EN 60730-1
Overvoltage category: II
Device’s class: Class II
Isolation: Isolated by piece low voltage (power 115/230 V and relay outputs); and part low voltage inputs; electrically isolated between output and supply.

7.2 – MECHANICAL FEATURES
Body: Self-extinguishing UL 94 V0 plastic.
Category of resistance to heat and fire: D
Dimensions: 78 X 35 mm, depth. 34 mm or 42.2 according to the terminal block.
Weight: 105 g approx.
Installation: on panel, recessed 71x29mm
Connection: Inputs: Cable of 0,14…4,5mm^2 / AWG 28...16;
Supply and output: 0,2…2,5 mm^2 / AWG 24...14
Sealing degree: IP65 (NEMA 3S) with sealing gasket
Operating room temperature: 0 T 50 ° C
Operating humidity: <95% RH non-condensing
Storage and transportation temperature: -25 ° C T 60

7.3 – MECHANICAL DIMENSIONS, HOLES, AND MOUNTING



7.4 – FUNCTIONAL FEATURES
Temperature regulation: ON/OFF
Defrosting control: By intervals due to the stoppage of the compressor.
Measuring range: -50…109ºC / -58…228 ºF.
Display resolution: 1º or 0,1º (range -99.9…99.9 ºC)
Total accuracy: +*- (0,5% fs + 1 digit)
Average speed time (without filter): 130 ms.
Display: 3 red digits h 15,5mm.
Software class structure: Class A
Time maintenance of the internal clock without power supply: Around four hours.
Compliance: 2004/108/CE (EN55022: class B; EN61000-4-2: air 8KV, contact 4KV.; EN61000-4-3: 10V/m; EN61000-4-4: power supply 2KV relay output, 1KV inputs; EN61000-4-5: common power supply 2KV, 1 KV\ differential mode; EN61000-4-6: 3V); Directive 2006/95/CE (EN 60730-1, EN 60730-2-9).Regulation 37/2005/CE (EN13485 air, S, A, 2,- 50°C +90°C if it is used with NTC probe 103AT11).

Termostato Digital MINI Profundidad 32×74 (x35) mm para Refrigeración

- Termostato Digital MINI Profundidad para Refrigeración
- Tamaño Estándar, Profundidad Reducida 32×74 (x35) mm
- Frío / Descarches por paro de compresor
- 2 Entradas tipo NTC (-50.0/+110.0 °C)
- 1 Entrada Digital
- 1 Salida Relé de control conmutado (16A)
- ON / OFF (Descarches por paro de compresor)
- Display ROJO de alta nitidez 33% más grande
- Punto Decimal
- Frontal IP65 – 67
- Nuevo Teclado IP – Fabricado en goma, más fino, cómodo y con mayor respuesta al tacto
- Tecla STAND BY
- Conectores Extraíbles "CLIC"
- Alimentación 230 VAC
- Programación muy sencilla
- Conexión a KEY USB
- Opción de Display AZUL