

B4U

Display + Power Unit



INTUITIVE CONTROL PANEL FOR REFRIGERATION

USER MANUAL - v1

INTRODUCTION



This manual contains the information necessary for the correct installation and instruction for use and maintenance of the product, it is recommended that you read it carefully and keep it.

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In order to avoid that an irregular operation of the B4U or malfunction can create dangerous situations or damage to people or things or animals, it is recalled that the installation must comply with and take into account the attached security systems, necessary to guarantee said security.

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1 - DESCRIPTION B4U

1.1 - GENERAL DESCRIPTION

The B4U model is an intuitive control panel that combines the Display B4U (Display) plus the Power Unit B4U (power unit). It has a digital microprocessor that can be used for temperature control in refrigeration applications. It is prepared for the ON / OFF control and defrost control, at intervals of time, to reach the temperature or for the continuous operation of the compressor through the compressor stop, electrical resistance or gas inversion / hot cycle.

The B4U has special functions to optimize defrost and functions that can be used to achieve energy savings in the system.

The B4U has up to 4 relay outputs and 5 configurable inputs, of which 3 are for NTC temperature probes and 2 are digital for voltage-free contacts.

The 4 outputs can be used to control the compressor or temperature control device, the anti-fog heater, the evaporator fans and a configurable auxiliary device (light, alarm, etc.)

The 3 temperature probe inputs can be used for cell temperature regulation, for evaporator temperature measurement, for auxiliary temperature measurement (Product temperature, condenser temperature, etc.).

There is always a digital input available on the Power Unit B4U and, as an alternative to the temperature probe inputs Pr2 and Pr3, two other digital inputs can be configured.

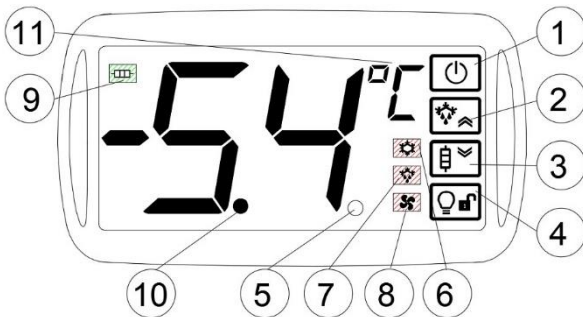
The digital inputs can be configured to perform various functions, such as door signal, defrost commands, selection of a different set of temperature regulation, signaling of an external alarm, activation of a continuous cycle, activation of the auxiliary output, etc.

In addition, the B4U is equipped with a voltage alarm that turns off the outputs when the voltage is too high or too low.

The selection of the functions and the programming of the parameters are carried out through the 4 capacitive keys on the B4U Display.

The connection between the Display B4U and the Power Unit B4U is made using the LIN cable, a small three-pole cable included.

1.2 - DESCRIPTION OF THE B4U DISPLAY AND THE B4U POWER UNIT



1 - ON / OFF key: Pressing for 1 second turns the B4U on / off (Stand-by).

Pressing for 5 seconds together with the LIGHT key (4), allows access to the parameter programming mode.

Pressing for 5 seconds together with the DOWN key (3), allows access to the display mode of the temperature measured by the room probe, the evaporator temperature (P1 and P2) and in addition to the maximum (Ht) and minimum (Lt) temperature recorded by the team. Inside the programming mode by pressing for 3 seconds and releasing, we exit and return to normal operation.

2 - UP / DEFROST key: In normal operating mode, pressing and releasing allows quick access to the Set Point selection and modification mode.

Pressing for 5 seconds allows activating / deactivating a manual defrost cycle.

In the programming and display modes of the temperature measured by the room probe, the evaporator temperature (P1 and P2) and in addition to the maximum (Ht) and minimum (Lt) temperature registered by the equipment, is used to select the parameters and increase the values to be configured.

3 - DOWN / AUX 2 key: In normal operating mode, pressing and releasing allows quick access to the Set Point selection and modification mode.

Pressing for 3 seconds allows activating / deactivating the configured output configured as A2 (anti-fog heating elements).

In the programming and display modes of the temperature measured by the room probe, the evaporator temperature (P1 and P2) and in addition to the maximum (Ht) and minimum (Lt) temperature registered by the equipment, is used to select the parameters and decrease the values to configure.

4 - LIGHT button: Pressing for 2 seconds allows you to manually activate / deactivate the output configured as light (Auxiliary).

Pressed for 5 seconds, together with the Stand-by key (1), it allows access to the parameter programming mode.

In programming mode it is used to access parameter editing and to confirm values.

In programming mode, it can be used in conjunction with the UP key to modify the parameter programming level.

Pressed for 3 seconds when the keypad is locked, allows the keypad to be unlocked.

5 - Led SET: In normal operation mode, lights up when a button is pressed to indicate that it has been pressed.

In programming mode it is used to indicate the level of parameter programming.

6 - Led OUT - COOL: Indicates the status of the regulation output (compressor or temperature control device); output on (on), output off (off), or output failed (flashing).

7 - Led DEF: Indicates that a defrost is being carried out (on) or in a dripping state (intermittent).

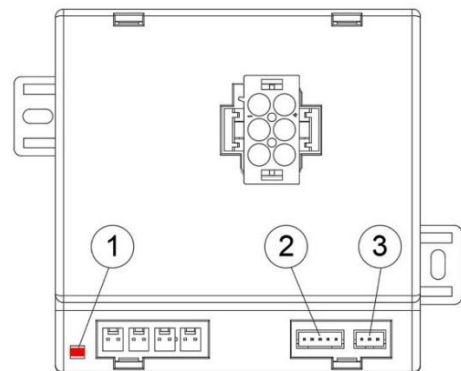
8 - FAN Led: Indicates the status of the evaporator fan output: ON, OFF, or failed (flashing).

9 - Led AUX2: Indicates the activation of the output configured as A2 (anti-fog heating elements).

10 - Led Stand-By / Decimal point: When the B4U is in Stand-By mode, it is the only LED that remains lit. In normal operation it is used as a decimal point separator.

11 - Unit of Measure Led: Indicates the temperature measurement unit in use.

POWER UNIT B4U



1 - Led ON: When it is turned on, for a few seconds, the led shows solid red indicating that the control is starting. Once started, the LED starts to blink between a weak red and a more intense one, indicating the correct operation of the control unit.

2 - TTL communication port: Used to connect to the following devices:

USB Key: to transfer operating parameters to and from the B4U.

Key TTL-RS: for MODBUS communication via RS485.

X2: Remote display that shows the temperature measured by the Pr1 probe.

3 - LIN communication port: used to communicate the Display B4U with the Power Unit B4U.

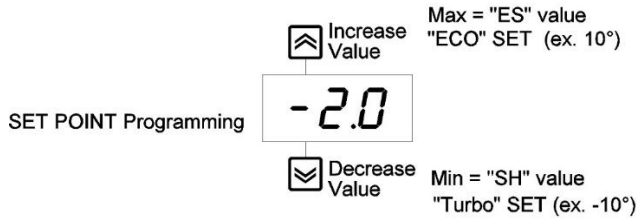
2 - PROGRAMMING

2.1 - QUICK CHANGE OF THE SET POINT IN "NORMAL" MODE

To configure the Set Point in normal mode, press and release the UP or DOWN keys and the screen will display "S1" and the current setting value at that time.

By pressing the UP or DOWN keys again, we will be able to select the new desired value within the limits established by the "SH" and "SE" parameters.

Once the desired value has been selected, press the LIGHT button or wait 3 seconds for the B4U to activate the new set value and return to the normal operating screen.



2.2 - STANDARD PROGRAMMING OF PARAMETERS

To access the B4U parameter menu when the parameter protection is not active, press the ON / OFF + LIGHT keys simultaneously for 5 seconds.



The screen will show the acronyms that identify the first group of parameters ("-SP") and with the UP and DOWN keys we will select the group we want.

Once the desired group of parameters has been selected, press the LIGHT key and the acronyms that identify the first parameter of the selected group will be displayed.

Once inside, with the UP and DOWN keys we will select the desired parameter and press the LIGHT key, the screen will alternately show the initials of the parameter and its value, which we will modify with the UP or DOWN keys.

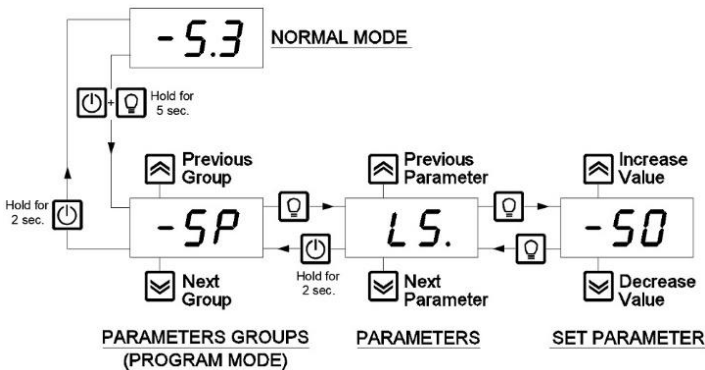
Once the desired value has been established in the parameter, we will press the LIGHT button to memorize the new value and the display will show only the initials of the selected parameter.

Using the UP or DOWN keys, we can select another parameter from the group and modify it as described above.

To exit and select another group of parameters, we must press the ON / OFF key for 1 second and the screen will show the initials of the parameter group.

At this point, it is possible to select another group, access the parameters and modify them as described above.

To exit the parameter menu, do not press any key for approximately 30 seconds or press the ON / OFF key for 2 seconds until exiting the programming mode.



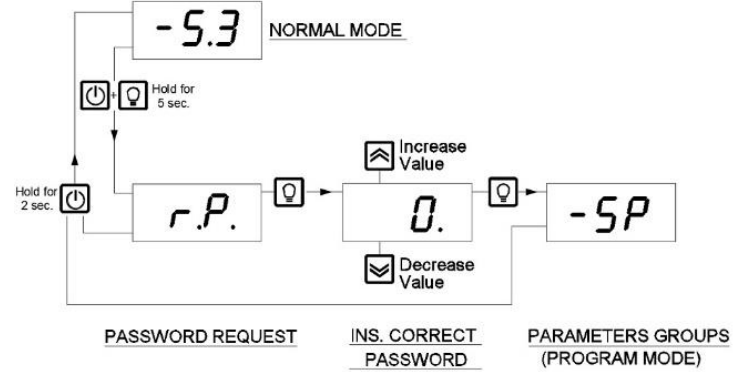
2.3 - PARAMETER PROTECTION THROUGH PASSWORD

The B4U has the function of protecting the parameters by means of a personal password, configuring it in the "PP" parameter within the "-tS" group.

To have this protection available, we will program the desired password number in the "PP" parameter.

Once the protection is activated, to access the parameter menu, press the ON / OFF + LIGHT keys simultaneously for 5 seconds and the display will show "rP", press the LIGHT key and the display will show "0".

At this point, using the UP and DOWN keys we will establish the password value that we programmed and press the LIGHT key to confirm.



If the password is correct, the display will show the initials that identify the first group of parameters "-SP" and it will be possible to program the parameters as already described in the previous section.

Password protection is disabled by setting the parameter "PP" = oF.

Note: If we forget the password to access the parameters, we must carry out the following procedure:

Turn off the power supply to the equipment and power it again while pressing the LIGHT key for 5 seconds. This will give us access to the parameters and, therefore, we can put the new password in the "PP" parameter.

2.4 - PARAMETER PROGRAMMING LEVELS

The factory configuration of the B4U has that password protection acts on all parameters.

After enabling the password in the "PP" parameter, we can make certain parameters configurable while the rest are protected by password.

To carry out this action we must follow the following procedure:

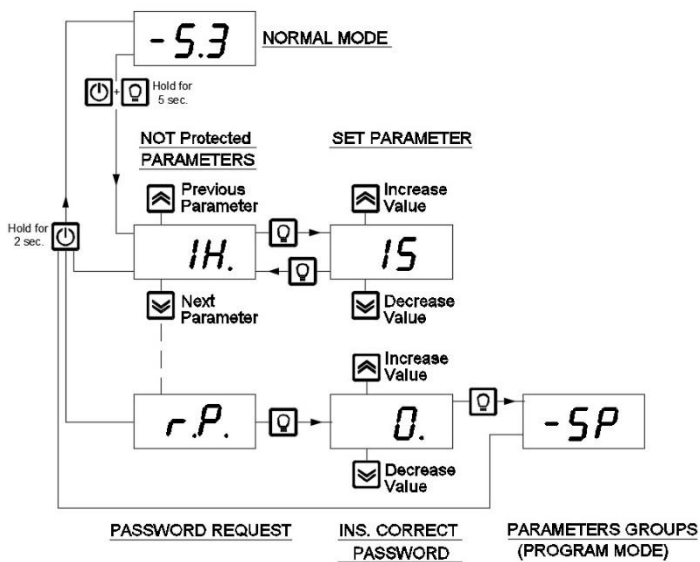
Access the parameter programming by entering the password and select the parameter to configure.

Once we have located the parameter, if the SET LED flashes, it means that the parameter is only configurable by setting the password and therefore it is "protected". Otherwise, if the SET LED is on steady, it means that the parameter can be set even without setting the password and is therefore "unprotected".

To change the condition of the parameter, we will press the LIGHT key and the UP key together.

The SET LED will change its state indicating the new level of accessibility of the parameter (on = unprotected; flashing = protected by password).

In the event that the password is enabled and some parameters are "unprotected", when accessing the parameter programming, all the parameters configured as "unprotected" will be displayed first without any division by groups where we will find the parameter last. "RP" through which it will be possible to access the "protected" parameters.



2.5 - RESET THE FACTORY SETTINGS OF THE PARAMETERS

The B4U allows you to reset the parameters to the factory default values.

To return to the factory values or default values of the parameters, it is enough to activate the password protection and once activated when the display reads "rP" enter the password -48.

Once the password has been confirmed with the LIGHT key, the display will show "---" for 2 seconds when the equipment resets the parameters, does a little test and sets all the parameters to default values.

2.6 - KEYBOARD LOCK FUNCTION

The B4U can fully lock the keyboard.

Such a function is useful when the controller is exposed to the public and you want to prevent tampering.

The key lock function can be activated by programming the "Lo" parameter to any value other than 0F.

The value configured in the "Lo" parameter is time that if the keyboard remains untouched, the keyboard is fully locked automatically.

Therefore if we do not press any key during the time "Lt" the B4U will automatically lock out normal keyboard operation.

When you press any key when the keypad is locked, the display will show "Ln" to indicate that the lock is active.

To unlock the keyboard, we must press the LIGHT key for 8 seconds, after that time the display will show "LF" and all the key functions will be operational again.

2.7 - DISPLAY OF THE VARIABLES

The display normally shows the variable configured in the "dS" parameter, but it is possible to show all the measurement and operating variables by simultaneously pressing the ON / OFF + DOWN keys for 5 seconds. The screen will alternately show the initials that identify the first variable and its value.

With the UP or DOWN keys, we can see all the variables:

"P1" - Pr1 probe measurement

"P2" - Pr2 probe measurement

"P3" - Pr3 probe measurement

"Lt" - Minimum stored temperature Pr1

"Ht" - Maximum stored Pr1 temperature.

If the function related to the power supply voltage alarms is enabled (parameter "LU" or "HU" different from 0F), the variable P5 will also appear.

The maximum values Lt and Ht will not be saved when the power supply fails and can be reset by pressing the ON / OFF key for 3 seconds during the maximum display. After 3 seconds, the display will show "---" for an instant to indicate that the cancellation has occurred and will assume the maximum temperature measured at that instant.

To exit the variables display mode, we will not press any of the 4 keys for approximately 10 seconds.

3 - WARNINGS FOR USE

3.1 - PERMITTED USE

The B4U has been designed as a measuring and regulating device in accordance with EN 60730-1 for operation at altitudes up to 2000m.

The use of the B4U in applications not expressly provided for in the aforementioned standard must include all appropriate protection measures.

The B4U must be adequately protected and out of the reach of liquids, dust, grease and dirt. It must be accessible only with the use of a secure tool or system (except the front one).

The B4U CANNOT be used in environments with a dangerous atmosphere (flammable or explosive) without adequate protection.



If used with the NTC probe that is supplied together with the B4U, it will comply with the EN 13485 standard ("Thermometers to measure the temperature of air and products for the transport, storage and distribution of refrigerated, frozen and frozen food products") with the following designation: [air, S, A, 2, -50 ° C .. + 90 ° C].

Remember that the B4U, when in operation, must be periodically checked by the end user in accordance with the EN 13486 standard. It is recalled that the installer must ensure that the standard regarding electromagnetic compatibility is respected after the implementation in the installation of the equipment, possibly using suitable filters..

In case of failure or malfunction of the B4U that could create dangerous situations or damage to people, things, animals or product (defrosting of food or changes in its ideal state), it is recalled that the installation should be equipped with additional electronic or electromechanical devices to guarantee the security.

4 - INSTALLATION WARNINGS

4.1 - MECHANICAL ASSEMBLY

The POWER UNIT B4U module is designed for installation with fixing by 2 screws.

The DISPLAY B4U panel, with dimensions of 96 x 50 mm, is designed to be paneled.

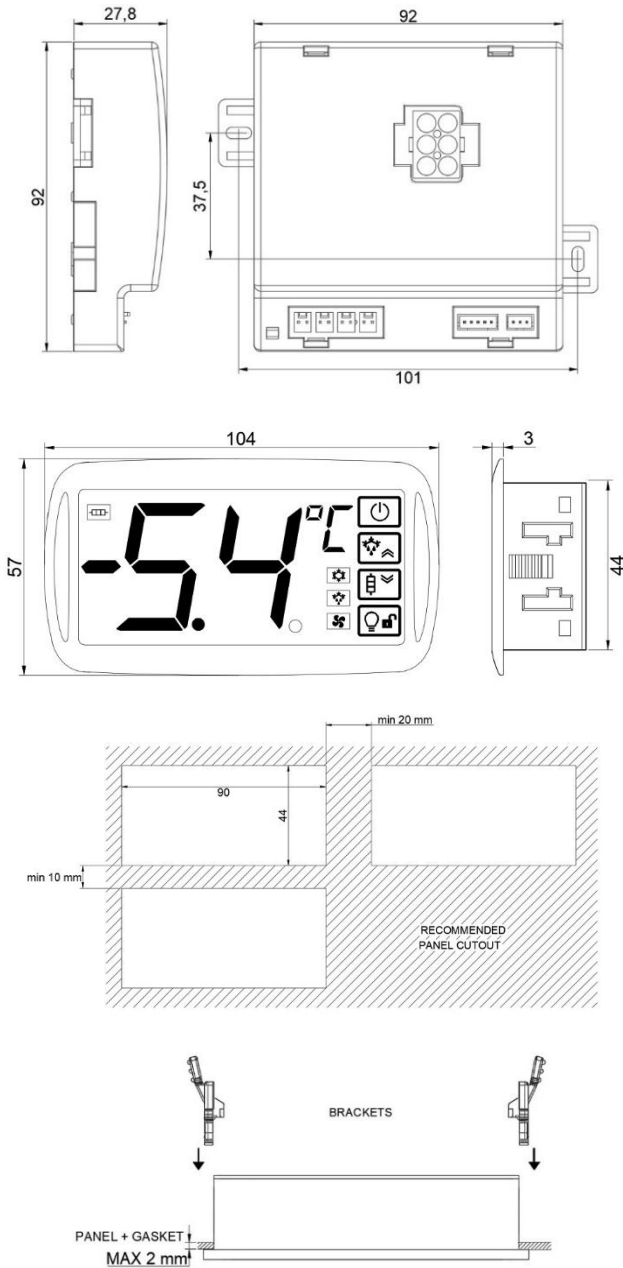
A 90 x 44 mm hole must be made and the DISPLAY B4U must be inserted, fixing it with the special supports provided.

Avoid placing the B4U module in places exposed to high humidity or dirt that may cause condensation or the introduction of conductive parts or substances.

Make sure the B4U has adequate ventilation and avoid installation in containers where other devices are installed that can cause the devices to operate outside of the set temperature limits.

Install the devices as far as possible from sources that can generate electromagnetic disturbances such as motors, contactors, relays, solenoid valves, etc.

4.1.1 - MECHANICAL DIMENSIONS, DRILLING AND FIXING.



4.2 -ELECTRIC CONNECTIONS

Make the connections by connecting a single conductor per terminal and following the diagram shown, verifying that the supply voltage is that indicated on the B4U and that the absorption of the actuators connected to the B4U is not greater than the maximum allowed current.

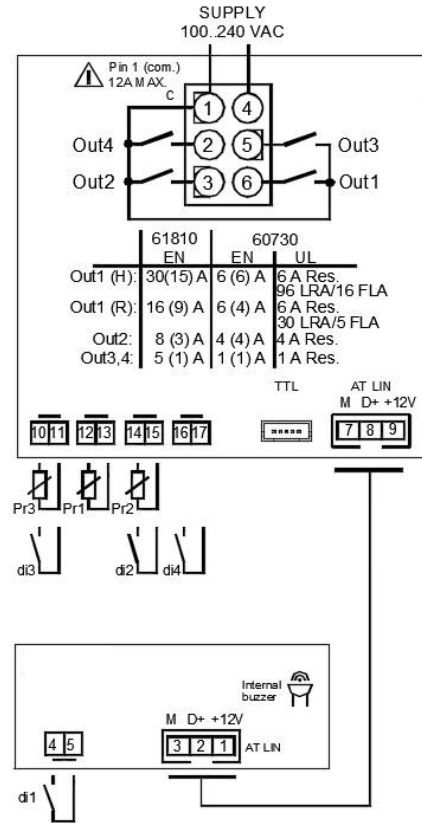
The B4U is designed for permanent connection inside a panel, it is not equipped with a switch or internal overvoltage protection devices. Therefore, it is recommended to install a bipolar switch, marked as the disconnecting device, which interrupts the electrical supply to the appliance. This switch should be placed as close to the B4U as possible and in a place that is easily accessible to the user.

Furthermore, it is recommended to adequately protect all circuits connected to the B4U with devices (eg fuses) suitable for circulating currents.

It is recommended to use cables with insulation that is appropriate for the voltages, temperatures and operating conditions, and to ensure that the cables related to the input sensors are kept away from the power cables to avoid electromagnetic disturbances. If some cables used for wiring are shielded, it is recommended to ground them from one side only.

Before connecting the outputs to the actuators, it is recommended to verify that the set parameters are the desired ones and that the application works correctly to avoid anomalies in the system that could cause damage to people, things or animals.

4.2.1 - ELECTRICAL WIRING DIAGRAM



* Color legend Cable - Strip:

1 - Brown / 2 - White / 3 - Green / 4 - Blue / 5 - Red / 6 - Black.

5 - OPERATION

5.1 - ON / STAND-BY FUNCTION

The B4U, once turned on, can take 2 different conditions:

- ON: It means that it works with the normal control functions.
- STAND-BY: It means that the controller does not operate with any control function and the display turns off, the Stand-by LED remains on.

Going from the Stand-By state to the ON state is exactly the same as turning on the B4U with the power supply.

In case of power failure, the B4U returns to the function that was just before the power supply interruption.

The ON / Stand-By function can be selected in the following ways:

- Pressing the ON / OFF key for 1 second.
- Through digital input if parameter "1F / 2F / 3F / 4F" = 7.

5.2 -"NORMAL", "ECONOMIC" AND "TURBO" OPERATING MODE

The B4U allows programming 3 regulation Set Points, one Normal - "S1", one Economy - "SE" and one "Turbo" - "SH".

Associated with each of them is the relative differential (hysteresis) normal - "d", Economic - "Ed" and "Turbo" "Hd".

Note: In the following examples, the Set Point is generically indicated as "SP", in any case, the B4U will act according to the active Set Point.

OPERATION IN "NORMAL-ECONOMIC MODE"

It can be used if necessary by switching to 2 different operating temperatures (eg day / night or weekdays / holidays).

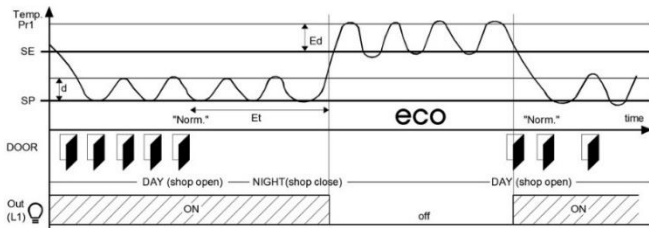
NORMAL / ECONOMY mode can be switched manually:

- Through digital input if parameter "1F / 2F / 3F / 4F" = 6

NORMAL / ECONOMY mode can be switched automatically:

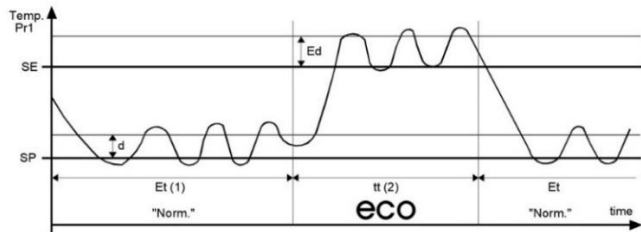
- Through a delay time that elapses since the door is closed (switching from Normal to Economic mode). This time is set in the "Et" parameter.
- When the door is opened, if the Economic Set Point "SE" is active (switching from Economic to Normal mode).

- After closing the door, the time "Et" elapses and the Economic Set Point "SE" is activated; Setting in the parameter "tt" the maximum time that you want to allow operation in Economy mode with the door closed (switching from Economy to Normal mode).



Example of automatic ECONOMIC-NORMAL mode operation. During working hours, the door is opened frequently and the B4U remains in NORMAL mode. After the "Et" time has elapsed and the door has been closed for that time, the B4U switches to ECONOMY mode. As soon as the door is reopened, the B4U returns to normal mode.

For this automatic change function you must use a digital input configured as "1F / 2F / 3F / 4F" = 1, 2 or 3 (door open input). If "Et" = 0F, the change from ECONOMIC mode to NORMAL through digital input (configured as open door) will be disabled. If "tt" = 0F, the change from ECONOMIC mode to NORMAL for the maximum time allowed in ECONOMIC mode with the door closed will be disabled.



(1) - The time Et is reset every time the door is opened. In the case of the example, the door is always closed.
 (2) - Time tt stops when the door is opened and the B4U immediately switches to NORMAL mode. In the case of the example, the door is always closed.

When entering ECONOMY mode, the initials "Ec" will be shown on the display. In the event that the cabinet light is also used (output configured as "L1"), the ECONOMIC mode selection is always associated with the function of deactivating the auxiliary output.

"TURBO-NORMAL-ECONOMIC" MODE OPERATION:

The TURBO mode can be used manually when a rapid decrease in product temperature is needed after the refrigerator is open. Instead, it can be used automatically to allow product temperature recovery at the end of ECONOMY operation.

TURBO mode can be switched manually:

- Through digital input if parameter "1F / 2F / 3F / 4F" = 8

TURBO mode can be switched automatically:

- Exiting ECONOMY mode (only if "HC" = C3)
 - Every time the B4U is started (only if "HC" = C3 and Pr1 greater than SE + Ed).

In order for the TURBO mode to be automatically switched off, the "tC" time must be expired or, if not, manually through the programmed key or digital input, and the B4U will return to normal mode.

When entering TURBO mode, the initials "tr" will appear on the display alternating, every 10 seconds, with the normal screen.

Setting "HC" = C3 the operating cycle is as follows:

When turned on, the B4U automatically goes into the mode it was in before shutting down (Normal or ECO) unless the start-up

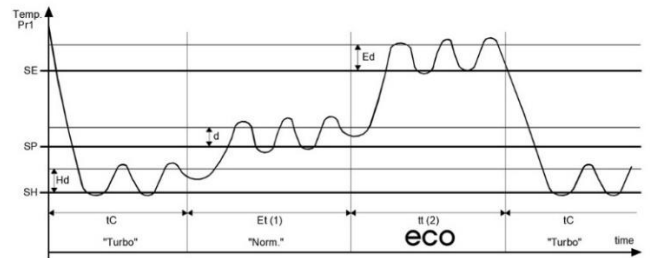
temperature is higher than SE + Ed. In this case, a TURBO cycle is automatically started.

After the time "tC", the B4U automatically switches to NORMAL mode.

If the door is opened frequently, the B4U will switch to NORMAL mode, if instead the door is not opened during the "Et" time, it will automatically switch to ECONOMY mode.

The B4U remains in ECONOMY mode until the door is reopened or, if configured, until the "tt" timeout.

When it exits the ECONOMY mode, the B4U performs a TURBO cycle to recover the temperature of the products, then returns to the NORMAL operating mode, and so on.



(1) - The time Et is reset every time the door is opened. In the case of the example, the door is always closed.
 (2) - Time tt stops when the door is opened and the B4U immediately switches to TURBO mode. In the case of the example, the door is always closed.

5.3 - PROBE INPUTS CONFIGURATION AND DISPLAY

The parameters related to the configuration of the measurement inputs are found in the group "-In". Using the parameter "uP" it is possible to select the temperature measurement unit and the desired measurement resolution (C0 = ° C / 1 °; C1 = ° C / 0.1 °; F0 = ° F / 1 °; F1 = ° F / 0.1 °).

The B4U allows the measurement to be calibrated, which can be used to re-calibrate the equipment, according to the needs of the application, by means of the parameter "C1" (input Pr1), "C2" (input Pr2) and "C3" (input Pr3).

Parameters "P2" and "P3" allow selecting the use of the inputs by the B4U according to the following possibilities:

- = EP - Evaporator probe: the probe functions to control defrosts and evaporator fans.
- = Au - Auxiliary probe: It can be used as a display probe although it is also possible to associate it with temperature alarms (Possibility of using: product probe, anti-freeze probe, etc.)
- = cd - Condenser probe: It can be used as a display probe although it is also possible to associate it with temperature alarms, so that it signals alarms related to condenser malfunction (eg dirty / plugged condenser).
- = dG - Digital input (see digital input functions)

If the input is not used, set "P2 and P3" = 0F in the In folder.

It is not possible to configure the two inputs for the same function. If the two inputs were configured for the same function, only the input with the lower value will act.

Through the "Ft" parameter it is possible to set a software filter relative to the measurement of the input value, so that we can reduce the sensitivity and the rapid variation in temperature (increasing the sampling time).

In addition to this filter, there are 2 other similar filters, but they are used only to show the measurement of the Pr1 probe both for the increase (parameter "du") and for the decrease (parameter "dd") and thus avoid showing a rapid change in temperature.

The filter blocks the maximum reduction displayed at 0.1 ° every "dd" second and the maximum increase displayed every "du" second.

At each connection, the filters are reset naturally.

In order to visualize the filtered measurement of Pr1, we will use the parameter "dS" = F1, otherwise we will program "dS" = P1.

With the parameter "dS" it is possible to establish the standard display of the screen between these options:

- P1:** Measurement of the Pr1 probe.
- P2:** Measurement of the Pr2 probe.
- P3:** Measurement of the Pr3 probe.

SP: the active regulation set point (SP),

Ec: Measurement of the Pr1 probe in normal mode with the initials "Ec" in the display if the controller is in ECONOMIC mode.

F1: Measurement of the filtered Pr1 probe through the parameters "dd" and "du".

oF: Numeric display off (OFF).

If one of the measurements is displayed ("dS" = P1, P2, P3, Ec, F1) the "CU" parameter allows setting an offset that is applied to show only the variable (all regulation controls will always be carried out according to correct measurement of the calibration parameter).

Regardless of what is set in the "dS" parameter, it is possible to view all the measurement and operating variables in a rotating manner, for this see section 2.7 - VARIABLES DISPLAY.

Also remember that the display related to the Pr1 probe can be modified by means of the screen lock function during defrost through the "dL" parameter (see 5.8 - Defrost control).

5.4 - DIGITAL INPUT CONFIGURATION

The parameters related to the configuration of the digital inputs are found in the group "-In".

The B4U Display has 1 digital input for power-free contacts whose function is defined in parameter "1F" and whose action is delayed by the time established in parameter "1t".

On the other hand, the Power Unit B4U can have a digital input whose function is defined in the "4F" parameter plus another 2 power-free digital inputs as an alternative to the measurement inputs Pr2 and Pr3.

To use these inputs as digital, set the relative parameter to "P2" or "P3" = dG.

The configured function that these digital inputs perform is defined in parameters "2F" and "3F".

The action time of digital input 2 can be delayed in parameter "2t" while the action of digital inputs di3 and di4 is instantaneous and cannot be delayed.

Parameters "1F", "2F", "3F", "4F" can be configured for the following operations:

= 0 - Digital input not active

= 1 - Opening of the chamber door through normally open contact: when the input is closed, the B4U alternately displays oP and the variable set in the "dS" parameter. With this operating mode, the action of the digital input also activates the time programmed in parameter "oA", after which the alarm is activated to signal that the door is open.

When the door is opened, if the ECONOMIC mode is activated, the B4U returns to normal operation.

= 2 - Chamber door opening with fan lock through normally open contact: similar to "1F / 2F / 3F / 4F" = 1 but with evaporator fan lock. If open door alarms are generated (after time "oA") the output will be deactivated.

= 3 - Chamber door opening with compressor and fan block and through normally open contact: similar to "1F / 2F / 3F / 4F" = 2 but with fan and compressor block. If open door alarms are generated (after time "oA") the output will be deactivated.

= 4 - External alarm signaling with normally open contact: when the digital input is closed and the alarm is activated, the B4U alternately displays AL and the variable set in the "dS" parameter.

= 5 - External alarm signaling with deactivation of the control output (excluding alarm and light outputs) by normally open contact: when the digital input is closed, all the control outputs are deactivated and the alarm is activated, the B4U displays alternately on the display AL and the variable set in the "dS" parameter.

= 6 - Normal / Economic mode selection with normally open contact: When the digital input is closed, the Economic mode will be selected. When the input is open, Normal mode is selected.

= -1, -2, -3, etc. - Identical functions to the previous ones but with inverse operating logic. Activating when the digital input contact opens.

Note: In the event that the digital input is configured for this type of function, the unit will consider the contacts as if they were in parallel (considering this result as an OR function).

5.5 - CONFIGURATION OF THE OUTPUTS AND BUZZER

The parameters related to the configuration of the outputs are contained in the group "-Ou".

The outputs of the B4U can be configured through the parameters "o1", "o2", "o3" and "o4", with the following functions:

= ot - Compressor / Solenoid Control or Cooling Element.

= dF - Control of defrost heaters.

= Fn - Evaporator fans control.

= Au - Auxiliary output control.

= En - Allows the Control of a "silenceable" Alarm device through the normally open and closed digital input during the alarm (See from section 5.10 - ALARM FUNCTIONS).

= AL: Allows the Control of a "non-silenceable" Alarm device through the normally open and closed digital input during the alarm (See from section 5.10 - ALARM FUNCTIONS).

= An: Allows the control of an alarm device with memory function through the normally open and closed digital input during the alarm (See from section 5.10 - ALARM FUNCTIONS).

= -t - Allows the control of a "silenceable" alarm device through a normally closed and open contact in alarm.

= -L - Allows the Control of a "non-silenceable" Alarm device through the normally closed and open digital input during the alarm. (See from section 5.10 - ALARM FUNCTIONS).

= -n - Allows the control of an alarm device with memory function through the normally open and closed digital input during the alarm (See from section 5.10 - ALARM FUNCTIONS).

= on - Allows the control of a device that must be activated whenever the instrument has voltage. If the equipment is in Stand-by, the output will remain deactivated. This control is ideal for lighting showcases, anti-humidity heating elements or other various functions.

= HE - To control a heating device in neutral zone ("r.HC" = nr).

= L1 - Showcase light connected to Normal / Economic mode. The output will turn on when Normal mode is active and turn off when Economy mode is chaotic.

= L2 - Internal camera light. The output is always off and if the digital input is configured as door opening "1F", "2F", "3F" = 1, 2, 3), it will turn on with the door opening.

= -d - Defrost output with normally open contact.

= A2 - Auxiliary output 2 control (Anti-fog resistance).

= oF - No function (output disabled).

If one of the outputs is configured as an auxiliary output ("o1", "o2", "o3" and "o4" = Au), its function must be configured in the "Fo" parameter and may be conditioned by the time programmed in the "You" parameter.

The "Fo" parameter can be configured for the following functions:

= oF - No function

= 1 - Delayed regulation output.

The auxiliary output is activated with the delay programmed in the parameter "tu" with respect to the output configured as "ot". The output will deactivate as soon as the "ot" output is deactivated. This type of operation can be used as control of a second compressor or with a parallel control that is useful for the regulation process. It prevents two devices from starting at the same time, causing high occasional electricity consumption.

= 2 - Activation by LIGHT key or digital input. The output is activated by pressing the LIGHT key or by activating the digital inputs, provided they are configured as ("1F / 2F / 3F / 4F" = 9). The key and digital input functions are bistable, which means that on the first press of the key, the output turns on, while the second press turns off.

The output configured as auxiliary can be turned off automatically after a certain time programmable in the "tu" parameter. With "tu" = oF the output is activated and deactivated manually using the LIGHT key, otherwise, the output, once activated, will automatically deactivate after the programmed time. This function can be used, for example, to control the camera light, anti-fog resistance or other functions.

= 3 - Activation by LIGHT key or digital input even when the B4U is in Stand-By. The output is activated in the same way as "Fo" = 2 even when the B4U is in Stand-By.

If one of the outputs is configured as auxiliary output 2 ("1F / 2F / 3F / 4F" = A2), its activation and deactivation can be managed with the DOWN key and operation can be conditioned by the time set in the parameter "tA" present in group "-tS".

The output configured in this way can be turned off automatically after a certain time programmable in the "tA" parameter. With "tA" = oF, the output is activated and deactivated manually using the DOWN key, otherwise, the output, once activated, will automatically deactivate after the programmed time.

The "Bu" parameter also allows the internal buzzer to be configured:
 = oF - The buzzer is deactivated
 = 1 - The buzzer is activated only to signal alarms
 = 2 - The buzzer is activated briefly only to signal keypad tampering (does not signal alarms)
 = 3 - The buzzer is activated to signal alarms (with continuous sound) and keypad tampering.
 = 4 - The buzzer is activated to signal alarms (with intermittent sound) and keypad tampering.

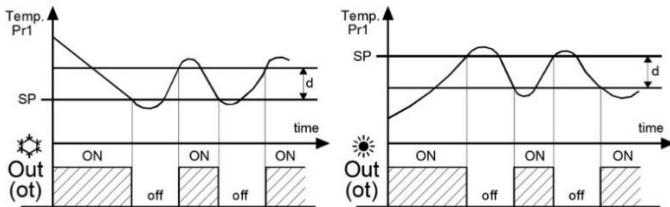
5.6 - TEMPERATURE REGULATION

The parameters related to the temperature control functions are found in the "-rE" folder.

The B4U temperature control is ON / OFF and acts on the outputs configured as "ot" and "HE" depending on the measurement of the Pr1 probe, the active Set Point "S1" (or "SE", " SH "), the control differential " d "(or " Ed ", " Hd ") and the operating mode of the " HC "parameter.

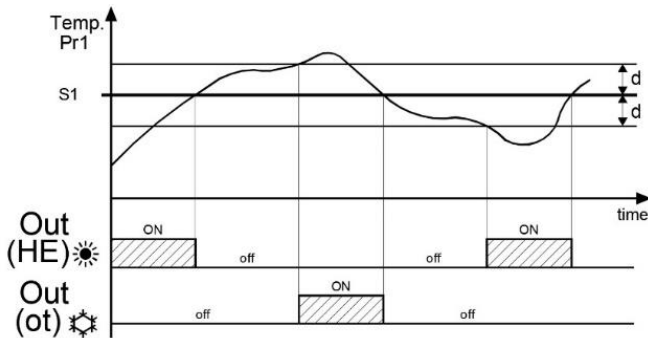
By means of the "HC" parameter it is possible to obtain the following functions:

= C (Cooling) or = H (Heating)



Relative to the operating mode programmed in the "HC" parameter, the equipment automatically considers the differential with a positive value for a Refrigeration control ("HC" = C) or with a negative value for the Heating control ("HC" = H).

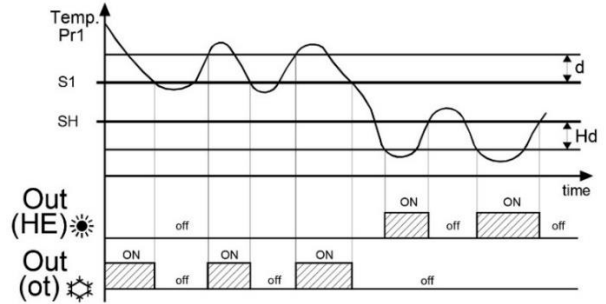
= nr (NEUTRAL ZONE)



In the case of programming the parameter "HC" = nr, the output configured as "ot" works with cooling action (as "HC" = C) while the output configured as "HE" works with heating action.

In this case, the regulation on the outputs can be done through the desired active Set Point "S1", "S2", "S3", "SE", "SH" and the regulation differential ("d" or "Ed" or "Hd") and the B4U automatically considers the cooling action with a positive value and the heating action with a negative value.

= HC (COOLING AND HEATING WITH 2 INDEPENDENT SET POINTS)



If the parameter "HC" = HC is programmed, the output configured as "ot" works with Cooling action (as "HC" = C) while the output configured as "HE" works with Heating action.

In this case, the regulation Set point for the "ot" output will be "SP", "SE", "SH" while for the "HE" output it is through the Set "SH".

The regulation differential for the "ot" output is the active one between "d" or "Ed" or "Hd" is assumed automatically by the B4U to have positive values in the cooling action while for the "HE" output the differential will be "Hd" considered with negative values during the heating action.

In this mode, the activation of the TURBO cycle makes the B4U work with the Neutral Zone and the Set Point SH.

= C3 (Cooling with three automatic modes)

The B4U always works in cooling mode since this programming activates the automatic switching of the three Normal-Economic-Turbo modes.

All the types of protections described in the parameters (P1, P2, P3) always act through the output configured as "ot".

In the event of a probe error, it is possible to make the output configured as "ot" continue to operate cyclically according to the time programmed in parameter "t1" (activation time) and "t2" (deactivation time). When a Pr1 probe error occurs, the B4U proceeds to activate the "ot" output during time "t1" and deactivate it through time "t2", as long as the error remains. When programming "t1" = oF, the output in probe error conditions will be deactivated. Programming "t1" in any value and "t2" = oF, the output in probe error conditions will always be active.

It is recalled that the operation of the B4U through digital inputs can be configured as follows: "Compressor protection and start delay", "defrost", "open door" and "external alarm with output lock".

5.7 - COMPRESSOR PROTECTION FUNCTIONS AND START-UP DELAY

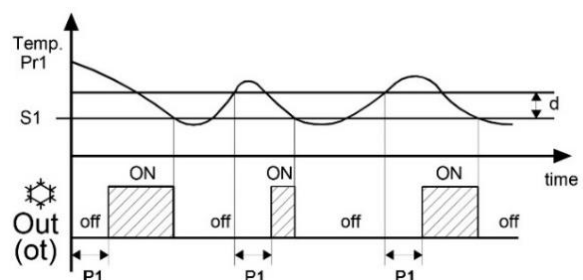
The parameters related to the compressor protection functions are available in the "-Pr" folder.

The compressor protection function helps to avoid very frequent starts of the compressor or it can also be useful to carry out a control in time for the relay output destined to an actuator or load.

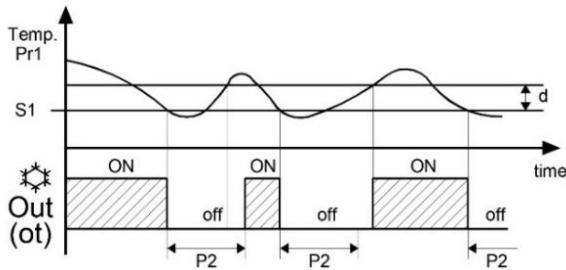
This function allows you to program 3 types of timing in the activation of the output configured as "ot" as appropriate to the regulation system.

The protection consists of preventing several starts during the protection time.

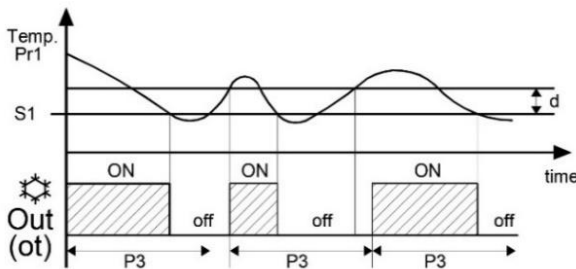
1 - First control (Parameter P1). The first time foresees a delay in the activation of the output "ot" according to the time programmed in the parameter "P1" (start-up delay).



2 - Second control (Parameter P2). The second time foresees a delay of the control relay, in order to ensure a minimum time between the stop and the start of the relay parameter "P2" (delay after switching off or minimum stop time).



3 - Third control (Parameter P3). The third time foresees not allowing starts unless the time programmed in parameter "P3" between consecutive starts has been exceeded (delay after consecutive starts).



If the protection is operating, preventing the operation of the relay for the programmed time, the LED of the relay output will be flashing. Furthermore, by setting a time in the "od" parameter, it is possible to set a delay and avoid the activation of all the outputs after supplying voltage and turning on the B4U. During this delay phase we will display od alternating to the normal programmed display. The "od" delay function is disabled by programming as = oF.

5.8 - DEFROST CONTROL

The defrost control mode acts on the output configured as "ot", "dF" and "-d". The parameters related to the defrost control functions are grouped in the "-dF" folder.

The type of defrost that the B4U will carry out is programmed in the "dt" parameter, which can be programmed as:

= **EL** - WITH ELECTRIC HEATING (or also by compressor stop): with this mode, during defrost, the "ot" output remains deactivated while the "dF" output is activated. If the "dF" output is not used, a defrost will be carried out by stopping the compressor.

= **on** - WITH HOT GAS or CYCLE REVERSAL: with this mode, during defrost, the "ot" and "dF" outputs are activated.

= **no** - KEEPING THE REGULATION ON THE COMPRESSOR OUTPUT: with this mode, during defrost, the "ot" output continues to function as temperature regulation while the "dF" output is activated.

= **Et** - WITH ELECTRIC HEATING AND THERMOSTAT: with this mode, during defrost, the "ot" output is deactivated while the "dF" output acts as a thermostatic temperature regulator of the defrost evaporator.

With this selection, the end of the defrost is always the maximum duration time programmed in parameter dE.

During defrost, the "dF" output acts as a temperature regulation control in heating mode with Set = "tE", with a fixed hysteresis of 1 °C and with cooling of the temperature measured by the probe configured as evaporator probe (EP).

In this mode, if the evaporator probe is not enabled or has an error, the defrost acts as in the EL option (therefore, during the defrost, the "dF" output will always remain active).

5.8.1 - START AUTOMATIC DEFROST

Automatic defrosts can occur:

- **By time intervals (regular or dynamic);**
- **By evaporator temperature;**
- **By continuous running time of the compressor.**

In order to avoid unnecessary defrosts, when the evaporator temperature (EP probe) is higher than the one programmed in the "tS" parameter, the defrosts will NOT be activated.

- Defrost at regular time intervals.

Through the parameter "dC" it is possible to set the counting mode at defrost intervals as can be seen below:

= **rt**- At real time intervals. The "di" interval counts the time since the B4U was started.

This mode is the one currently used in refrigeration systems.

= **ct**- At intervals of compressor operation time. The interval "di" is counted as the sum of the operating times of the output ot (output on).

This mode is normally used in refrigeration systems with compressor stop in defrost.

= **cS**- Defrost cycle at each compressor stop. The regulator starts a defrost cycle every time the ot output is deactivated, when the Set Point is reached or at the end of the interval established with the "di" parameter.

If "di" = oF, the defrost is only carried out when the compressor stops.

This mode is only carried out in special machines that, after each cold cycle, need to have the battery free of ice in conditions of maximum efficiency in each cycle of the compressor.

To allow automatic defrost at intervals, after setting the "dC" parameter in the desired way between rt, ct or cS, with the "dE" parameter we will select the time interval between the end of defrost and the beginning of the next one.

In these modes, it is possible to configure the first defrost at the start of the B4U in the "Sd" parameter.

This allows the first defrost to be carried out at a time interval other than "dE".

If you want to perform a defrost at each start-up of the B4U, program the parameter "Sd" = oF. This will make a defrost immediately upon start-up (provided that the conditions established with the "tE" parameters are met).

This allows the evaporator to be permanently in defrost, even when frequent power interruptions occur that could cause the cancellation of several defrost cycles.

If, on the other hand, you want all the defrosts to take place at the same time interval, set "Sd" = "di".

By setting "di" = oF, all defrosts are deactivated (including the first, regardless of the time set in the "Sd" parameter).

- Defrosts by dynamic time intervals

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

To activate the "Defrosts by Dynamic Intervals" function, we must configure the "dC" parameter as desired between rt, ct or cS and the "dd" parameter at any value.

In case of setting "dd" = 0, the defrost intervals are those established by the user and the "Defrosts by Dynamic Intervals" system will be deactivated.

This mode allows you to dynamically reduce the defrost interval time ("di" or "Sd" in the case of being the first defrost), anticipating if necessary the execution of the defrost, all based on an algorithm that detects a drop in the heat exchange performance of the refrigerator.

The algorithm estimates a reduction in heat exchange based on the increase in the temperature difference between Pr1 (chamber control) and the evaporator probe (probe configured as EP). The result is stored by the B4U when the regulation temperature is close to the Set point configuration.

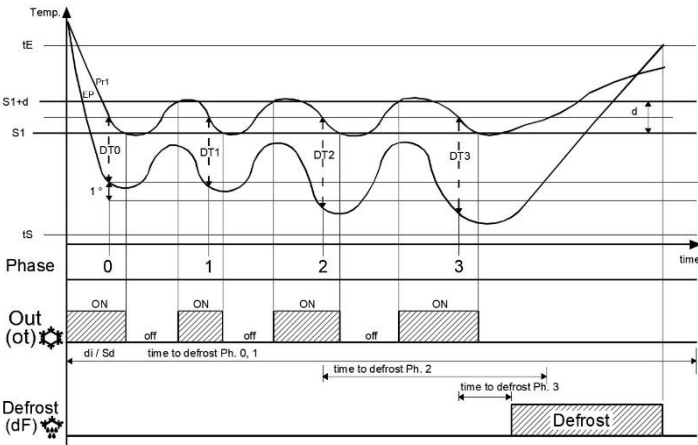
The advantage of defrost by dynamic time intervals is that it allows programming the defrost intervals longer than normal and working in such a way that it is the system conditions that determine whether to anticipate the execution of a defrost if necessary.

If the time entered is too short, it is possible that the "Dynamic Interval Defrosts" do not give them time to act.

If the system is configured correctly, it is possible to avoid many UNNECESSARY defrosts and consequently Energy Savings and Efficiency.

Through the parameter - "dd" - PERCENTAGE OF TIME REDUCTION FOR DEFROST. It is possible to set the percentage of time reduction in which the B4U reduces the times between defrosts if the system conditions require it.

Setting the parameter "dd" = 100% to the first increase in the stored temperature difference (greater than 1 ° C) between the chamber (Pr1) and the evaporator probe (EP), the defrost starts immediately. For correct operation, the B4U needs a first reference value between the temperature difference of the chamber and the evaporator, in this way, all the variations in the active Set Point, in the differential "rd" or in a defrost execution , eliminate this first reference value and any reduction could not be made until the acquisition of a new reference value.



Operation example "dynamic interval defrost system" with reduction "dd" = 40% and end of defrost by temperature.

- Defrost by evaporator temperature.

The B4U activates a defrost cycle when the evaporator temperature (EP probe) falls below the temperature set in parameter "tE" and when the time set in parameter "St" has elapsed to guarantee a defrost when the evaporator reaches a very low temperature which is usually a symptom of low heat exchange compared to normal operating conditions.

When "tE" = oF the function will be disabled.

- Defrost due to continuous compressor operation time.

The B4U activates a defrost cycle when the compressor is activated continuously for time "cd".

This function is used for the continuous operation of the compressor for a long period of time which is usually a symptom. of a low exchange caused by ice on the evaporator.

Programming "cd" = oF the function will be disabled.

4.8.2 - MANUAL DEFROST

To start a manual defrost cycle, keep the UP / DEFROST key pressed for about 5 seconds, if the conditions are correct, the DEF LED will light up and the B4U will carry out a defrost cycle.

To interrupt a defrost cycle in progress, press and hold the UP / DEFROST key for about 5 seconds.

4.8.3 - DEFROST END

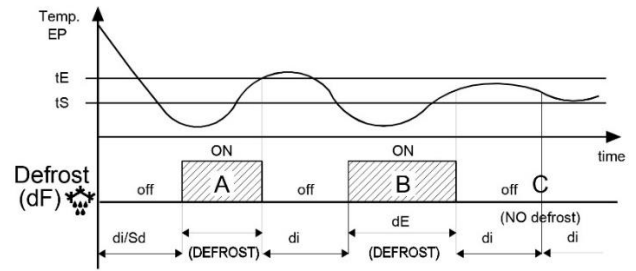
The duration of the defrost cycle can be by time or, if the evaporator probe is used (Pr2 probe configured as EP), by temperature range. If the evaporator probe is not used, the cycle duration is set in the "dE" parameter (by programming "dE" = oF, the interval or manual defrosts will be disabled).

On the other hand, if the evaporator probe is used, the end of the defrost occurs when the temperature measured by this probe set as EP exceeds the temperature set in parameter "tE".

If this temperature is not reached within the time set in parameter "dE", the defrost will be interrupted.

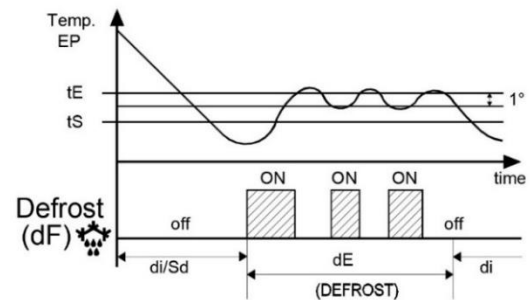
To avoid unnecessary defrosting when the evaporator temperature is high, the "tS" parameter allows setting the temperature referring to the evaporator probe below which the defrosts will be activated.

Therefore, in the indicated modes, if the temperature measured by the evaporator probe (EP) is higher than that set in the "tS" parameter and also in the "tE" parameter, defrosts are prevented.



Examples of completion of defrost:

The defrost shown as A ends when it reaches the temperature "tE". Defrost B ends when time "dE" ends because it does not reach temperature "tE". And defrost C is not activated since the temperature is higher than "tS".



Example of electric defrost with temperature control of the evaporator:

The defrost ends at the expiration of time "dE". During defrost, the output configured as "dF" is activated / deactivated as an ON / OFF temperature controller in a heating function with hysteresis of 1° in order to keep the defrost temperature constant at the value programmed in "tE".

The active defrost is shown on the display when the DEF LED lights up.

At the end of defrost, it is possible to delay the start-up of the new compressor (output "ot") for the time set in parameter "td" to allow the evaporator to drain.

During this delay, the DEF led blinks to indicate the drain status.

5.8.4 - DEFROST INTERVALS AND DURATION IN CASE OF EVAPORATOR PROBE ERROR

In the event of an evaporator probe error, defrosts will be done with "Ei" intervals and with "EE" duration.

In the event that a probe error occurs during the time remaining for a defrost or for a defrost to end, the start or end will occur with respect to the shortest time programmed in the parameter relative to probe error conditions.

These functions are available when the evaporator probes are used, the duration of the defrosts is normally done by programming a time longer than normal as safety (the measured temperature value of the probe offers to finish the first defrost) and, in the If the "Defrost by Dynamic Intervals" function is used, the interval between defrosts is normally programmed with a time greater than the normal time that is normally programmed in the equipment that does not have the function.

5.8.5 - DEFROST SCREEN LOCK

Using the "dL" and "dA" parameters, the behavior of the display is set during a defrost.

The "dL" parameter allows blocking the display of the display in the last temperature measurement of the Pr1 probe ("dL" = on) during the defrost and until the end of the defrost and the Pr1 temperature has not returned to the value of the last reading , or to the value ["SP" + "d"]) or when the time programmed in parameter "dA".

It also allows the display of the acronym "dF" ("dL" = Lb) during the defrost and, after the defrost is finished, the message "Pd" will appear until, after the defrost, the Pr1 temperature has not returned to the set value. the last reading, or to the value ["SP" + "d"] or when the time programmed in parameter "dA" expires.

Otherwise ("dL" = oF), the display will show the temperature measured by the Pr1 probe during a defrost.

5.9 - EVAPORATOR FAN CONTROL

The evaporator fan control works through the output configured as "Fn" depending on certain control states of the B4U and the temperature measured by the evaporator probe (probe configured as "EP").

The parameters related to the fan control functions are found in the "-Fn" folder.

If the evaporator probe is not used or is in error, the output configured as "Fn" is activated only according to the parameters "tn", "tF" and "FE".

With the parameters "tn" and "tF" it is possible to set the behavior of the evaporator fans when the regulation output configured as "ot" (compressor) is deactivated.

When the output "ot" is deactivated, it is possible to make the output configured as "Fn" continue to operate cyclically according to the times programmed in the parameter "tn" (activation time of the evaporator fan at compressor stop) and "tF" (evaporator fan deactivation time at compressor stop).

When the compressor stops, the B4U keeps the evaporator fans on for time "tn", then turns them off for time "tF" and so on until the output "ot" remains off.

When programming "tn" = oF, the "Fn" output will be deactivated when the "ot" output is deactivated (the evaporator fans are off when the compressor is stopped or the fans are running together with the compressor).

By programming "tn" at any value and "tF" = oF, the "Fn" output will remain activated even when the "ot" output is deactivated (the evaporator fans are on when the compressor is stopped).

The "FE" parameter allows setting whether the fans should always be on regardless of the defrost status ("FE" = on) or turn off during defrost ("FE" = oF).

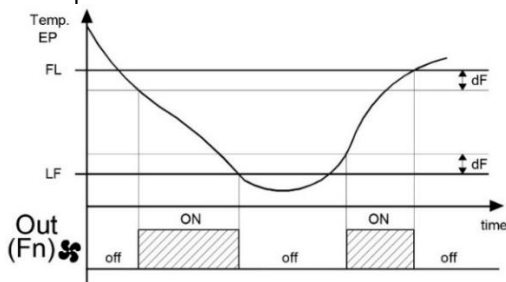
In the latter case, by setting the time in the "Fd" parameter, it is possible to delay the restart of the fans after the end of the defrost.

When this delay is active, the FAN LED flashes to indicate the delay in progress.

When the evaporator probe is used for the fan, it is conditioned by the parameters "tn", "tF" and "FE", and acts as a temperature control.

In fact, it is possible to configure the fans to deactivate when the temperature measured by the evaporator probe is higher than the value programmed in the "FL" parameter (temperature too high) or also when it is lower than the value programmed in the "LF" parameter. (very low temperature).

Associated with these parameters there is a programmable differential in the parameter "dF"



Note: Special attention should be paid to the correct use of the temperature-based fan control functions, since in a typical refrigeration application, the evaporator fan stops due to thermal change.

Remember that the operation of the evaporator fans can also be conditioned by the "door open" function of the digital inputs.

5.10 - ALARM FUNCTIONS

The parameters related to the fan control functions are found in the "-AL" folder.

The B4U alarm conditions are:

- Probe error: "E1", "-E1", "E2", "-E2", "E3", "-E3"
- Temperature alarm: "H1", "L1", "H2", "L2"
- External alarms: "AL", "Pr", "HP", "LP"
- Open door alarm: "oP"

The alarm function acts on the internal buzzer, if it is configured with the "Bu" parameter, and on the desired output, if it is configured with the "o1", "o2", "o3", "o4" parameters.

The buzzer can be configured to signal alarms by setting the parameter "Bu" = 1 or 3 or 4 and always functions as an alarm that can be silenced. This means that, when activated, it can be deactivated by briefly pressing any key.

Alarms can be configured to signal them by configuring the outputs.

The possible alarms that can be configured are the following:

= On - When you want the output to activate in alarm condition and to be able to deactivate (silence) manually by pressing any key on the B4U.

= AL - When the output is desired to activate in alarm condition but cannot be manually deactivated and therefore deactivates only when the alarm condition is canceled (typical application for a light signal).

= An - When you want the output to activate in alarm condition and to remain active even when the alarm condition has ceased (alarm memory). Therefore, deactivation (stored alarm acknowledgment) can only be performed manually by pressing any key when the alarm status has been cleared (typical application for light signal).

= -t - When the operation described as En is desired but with inverse operation logic (output activated in normal condition and deactivated in alarm condition).

= -L - When the operation described as AL is desired but with inverse operation logic (output activated in normal condition and deactivated in alarm condition).

= -n - When the operation described as An is desired, but with inverse operation logic (output activated in normal condition and deactivated in alarm condition).

5.10.1 - TEMPERATURE ALARMS

The B4U has two temperature alarms, each with fully configurable maximum and minimum thresholds.

The temperature alarm functions act according to the measurements of the probes, what is configured in parameters "1y" and "2y", the alarm thresholds programmed in parameters "1H" and "2H" (maximum alarms), "1L" and "2L" (minimum alarms) and the relative differentials "1d" and "2d".

Through the parameters "1y" and "2y" it is possible to program the alarm thresholds "1H", "2H", "1L", "2L" and they must be considered as absolute or relative to the Set Point.

Depending on the desired operation, the parameters "1y" and "2y" can be configured with the following values:

- = 1: Absolute referring to Pr1 with message display (HL).
- = 2: Relative to Pr1 with message display (HL).
- = 3: Absolute referring to Au probe with message display (HL)
- = 4: Relative to Au probe with message display (HL).
- = 5: Absolute referring to cd probe with message display (HL).
- = 6: Absolute referring to Pr1 without message display.
- = 7: Relative to Pr1 without message display.
- = 8: Absolute referring to Au probe without message display.
- = 9: Relative to Au wave without message display.
- = 10: Absolute referring to cd probe without message display.

By means of some parameters it is possible to delay the notification of these alarms. These parameters are:

"1P" and "2P" - are the delay times of the temperature alarms at the start of the B4U, which if there are alarms at start-up, they will wait for the time programmed in these parameters to pass.

If there are no alarm conditions at connection, the relative time "1P" and "2P" will not be taken into account.

"DA" - It is the delay time of temperature alarm 1 during a defrost.

Note: Alarm 1 during defrosts and during time "dA" after the end of defrosts is deactivated, while alarm 2 during defrosts is always activated.

"1t", "2t" - They are the delay time for the activation of temperature alarms 1 and 2.

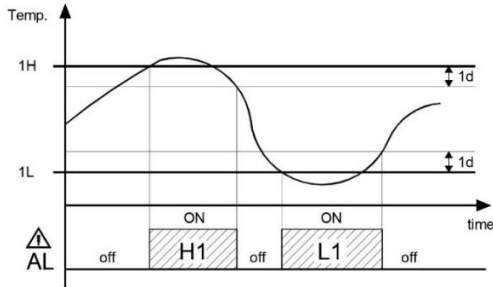
Temperature alarms 1 and 2 are activated when the delay times expire and after the times "1t" and "2t", when the measured temperature of the probe set by the alarm rises above or falls below the respective threshold of maximum and minimum alarm.

Using the parameters "1A" and "2A" it is possible to program the action of the alarms through the regulation outputs and the alarm outputs (buzzer included).

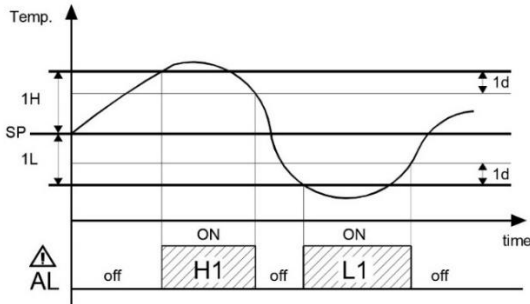
This allows, for example, to intervene directly by deactivating the regulation outputs in the event of temperature alarms, as in probes configured as "Au" (for example "anti-fog" function) or "cd" (for example "dirty condenser function").

By configuring alarms with respect to the same probe, the B4U allows managing pre-alarm signaling (for example not activating the alarm and / or buzzer outputs) or warning alarms (activating the alarm and / or buzzer outputs).

The alarm thresholds can be programmed using the parameters "1H", "2H", "1L" and "2L" if the alarms are absolute ("1y" and "2y" = 1, 3, 5, 7, 9, 10).



Or through the values ["SP" + "1H", "2H"] and ["SP" + "1L", "2L"] if the alarms are relative ("1y" and "2y" = 2, 4, 6, 8).



The maximum and minimum temperature alarms can be disabled by setting the parameters "1H", "2H", "1L" and "2L" = oF.

5.10.2 - EXTERNAL ALARMS OF DIGITAL INPUTS

The B4U can signal external alarms by activating one or more digital inputs configured as "1F / 2F / 3F / 4F" = 4, 5, 12, 13, 14.

At the same time that the configured alarms (buzzer and / or outputs) are signaled, the B4U signals the alarm by showing the alarm acronyms (AL, Pr, HP, LP) alternately with the variable configured in the "dS" parameter.

The mode "1F / 2F / 3F / 4F" = 4 does not perform any action on the control outputs, while the other modes require the deactivation of the output "ot" or of all the control outputs when the digital input is activated.

Alarm	Output "ot" (check)	Other control outputs ("Fn", "dF", "Au", "HE")
AL (4)	Without effect	
AL (5)	OFF	
Pr	OFF	No effects
HP	OFF	No effects
LP	OFF	No effects

5.10.3 - DOOR OPEN ALARM

The B4U can signal an open door alarm by activating the digital input with function programmed as "1F / 2F / 3F / 4F" = 1, 2 or 3.

When the digital input is activated, the equipment signals that the door is open by displaying the acronym "oP" on the display, alternately with the variable set in the "dS" parameter.

After the delay set in the "oA" parameter, the B4U signals the open door alarm by activating the configured devices (buzzer and / or exit), and naturally it will continue to show the initials "oP" on the display.

When the door open alarm intervenes, the normally activated outputs (fans or fans + compressor) are also deactivated.

5.10.4 - VOLTAGE CONTROL ALARM

The parameters related to the voltage control alarm functions are found in the "-UA" folder.

The B4U can automatically deactivate the control outputs when the mains voltage (measured by the B4U through its power supply) is lower or higher than the values configured in the following parameters:

"LU" - Low voltage alarm (expressed in Vx10).

"HU" - High voltage alarm (expressed in Vx10). When the alarm is activated and after the delay programmed in the "Ud" parameter, the B4U deactivates all the control outputs, signals an alarm by activating the configured device (output and / or buzzer) and the initials "HU" are shown on the display. (in case of high voltage alarm) or "LU" (in case of low voltage alarm) alternately with the parameter variable "dS".

If the function related to grid voltage alarms is enabled (parameter "LU" or "HU" other than oF) in the variables display mode, the variable P5 representing the grid voltage will also appear (if the value decreased by 150 V. The mains voltage expressed in volts measured by the B4U will be $V = P5 + 150$).

If the voltage measurement is not correct, it can be changed by scrolling through the "OU" parameter.

5.11 - OPERATION OF THE "ON / OFF" AND "LIGHT" KEYS

By pressing the ON / OFF button for at least 1 second it is possible to change the state of the B4U from on to off and vice versa.

By pressing the LIGHT button for at least 1 second it is possible to activate / deactivate the light output ("L1") or the auxiliary output if it is configured as "Fo" = 2.

5.12 - ACCESSORIES

The B4U is equipped with a TTL communication port with a 5-pole connector that allows the connection of some accessories described below.

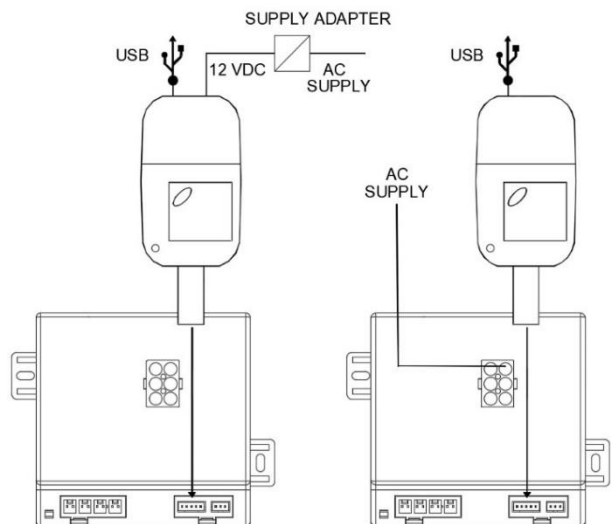
5.12.1 - PARAMETER CONFIGURATION BY "KEY USB"

Via the TTL port and the KEY USB device it is possible to transfer the operating parameters to and from the B4U.

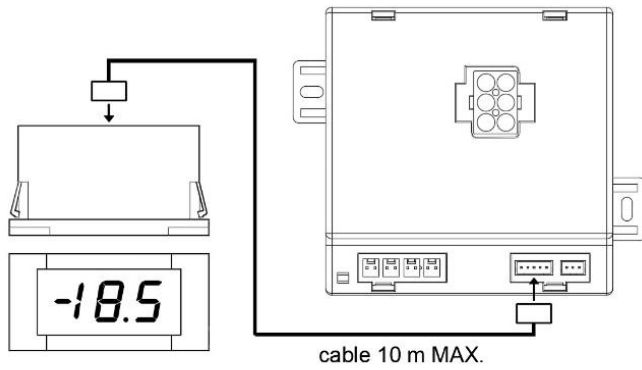
The KEY USB device is used for serial programming of controllers that must have the same parameter settings, or to save a copy of the controller programming for quick transfer to another.

The KEY USB has a USB connection input, which allows connection to a PC, with which, through the Osaka Set Up configuration software, it is possible to configure the parameters.

For more information, consult the user manual.



5.12.2 - SIGNAL DUPLICATOR



The X2 remote display device can be connected to the Power Unit B4U using a special cable that can have a maximum length of 10 meters. The X2 device, powered directly by the B4U, shows the temperature measured by the Pr1 probe through a 2 ½ digit display. For more information, see the user manual of the X2 device.

5.12.3 - RS485 COMMUNICATION WITH "KEY TTL"

Through the KEY TTL device (TTL / RS485 interface) and the appropriate TTL cable, it is possible to connect the B4U to an RS485 serial communication network into which other instruments (regulators or PLC) are inserted and generally connected to a PC with a monitoring system.

Through the PC it is possible to acquire all the operating data and program all the configuration parameters of the B4U.

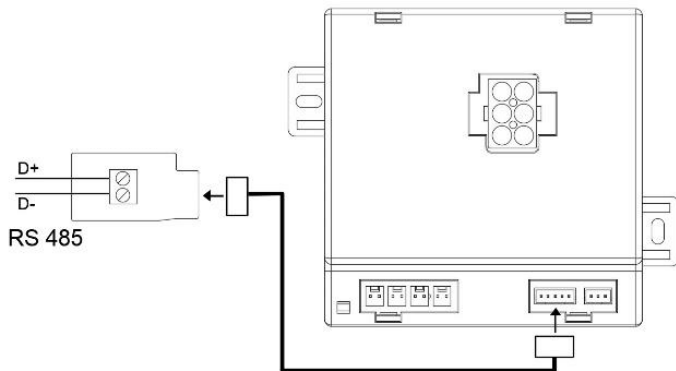
The software protocol adopted by the B4U is of the MODBUS-RTU type widely used in many PLCs and supervision programs available on the market.

If the B4U is used in an RS485 network, program the station address in the "AS" parameter.

The baud rate (baud rate) of the serial link cannot be configured and is fixed at 9600 baud.

The KEY TTL converter is powered directly by the Power Unit B4U.

For more information, see the user manual of the KEY TTL device.



6 - PROGRAMMABLE PARAMETERS TABLE

Description of all the parameters available on the thermostat. Some of them may not be present, either because they depend on the type of thermostat or because they are automatically deactivated as unnecessary.

Param.	Description	Rank	Def	Note
	S. - Parameters Relative to the Set Point			
1	SH Turbo Set Point or Minimum Set point and Superheat Set point in HC mode	-99 ÷ HS	-4.0	
2	SE Economic Set Point (maximum set point)	LS ÷ 99	8.0	
3	S1 Set Point	SE ÷ SH	4.0	

	JIn	i. - Parameters related to inputs		
4	uP	Measurement unit and resolution (decimal point) C0 = ° C with resolution 1 ° F0 = ° F with 1 ° resolution C1 = ° C with 0.1 ° resolution F1 = ° F with 0.1 ° resolution	C0 / F0 / C1 / F1	C1
5	Ft	Measurement filter	oF / 0.1 ÷ 9.9 ÷ 20 sec	2.0
6	C1	Pr1 probe calibration	-30 ÷ -9.9 ÷ 9.9 ÷ 30 ° C / ° F	0.0
7	C2	Probe Pr2 Calibration	-30 ÷ -9.9 ÷ 9.9 ÷ 30 ° C / ° F	0.0
8	C3	Pr3 probe calibration	-30 ÷ -9.9 ÷ 9.9 ÷ 30 ° C / ° F	0.0
9	CU	Display offset	-30 ÷ -9.9 ÷ 9.9 ÷ 30 ° C / ° F	0.0
10	P2	Use of Pr2 input: oF = not used EP = evaporator probe (1) Au = Auxiliary probe cd = condenser probe r1 = do not use dG = digital input	oF / EP / Au / cd / r1 / dG	oF
11	P3	Use of Pr3 input: See P2	oF / EP / Au / cd / r1 / dG	oF
12	1F	Digital input di1 operating logic: 0 = No function 1 = Door opening 2 = Door opening with fan lock 3 = Door opening with fan and compressor lock 4 = External alarm AL 5 = External alarm AL with control output deactivation 6 = Active Set Point Selection (SP-SPE) 7 = On / Off 8 = Run "Turbo" mode 9 = Auxiliary output activation 10 = NOT operational 11 = NOT operational 12 = PrA external alarm with compressor output deactivation 13 = HP external alarm with compressor output deactivation 14 = LP external alarm with compressor output deactivation	-14 / -13 / -12 / -11 / -10 / -9 / -8 / -7 / -6 / -5 / -4 / -3 / -2 / -1 / 0 / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 / 11 / 12 / 13 / 14	0
13	1t	Digital input 1 delay	oF / -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min)	oF
14	2F	Digital input di2 operating logic: see 1F	-14 ... 0 ... 14	0
15	2t	Delay digital input di2	oF / -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min)	oF
16	3F	Operating logic input Pr3 as digital: see 1F	-14 ... 0 ... 14	0
17	4F	Operating logic input Pr4 as digital: see 1F	-14 ... 0 ... 14	2

18	Et	Economy mode activation delay time when the door is closed oF = function disabled	oF / -01 ÷ -59 (min) ÷ 01 ÷ 99 (hrs)	oF	
19	tt	Maximum operating time in economy mode. oF = function disabled	oF / -01 ÷ -59 (min) ÷ 01 ÷ 99 (hrs)	oF	
20	dS	Variable normally displayed on the display: P1 = Pr1 probe measurement P2 = Pr2 probe measurement P3 = Pr3 probe measurement P4 = Pr4 probe measurement Ec = Pr1 measurement in normal mode and Eco message in Eco mode SP = Active Set Point oF = display off F1 = Measurement of probe Pr1 filtered with par. "Du" and "dd"	P1 / P2 / P3 / P4 / Ec / SP / rE / oF / F1	F1	
	jdF	d. - parameters related to defrost control			
21	dt	Defrost type: EL = Electric defrost / compressor stop in = Hot gas defrost / cycle inversion no = No compressor output conditioning Et = Electric / thermostatic defrost	EL / in / no / Et	EL	
22	dC	Defrost start mode rt = at intervals by time when connecting the equipment ct = at intervals per compressor operating time (compressor output activated) cS = Defrost for each compressor stop (compressor output off due to reaching Set + rt interval) cL = Do not use	rt / ct / cS / cL	rt	
23	di	Interval between defrosts	oF / -01 ÷ -59 (min) ÷ 01 ÷ 99 (hrs)	4	
24	Sd	First defrost delay on connection. (oF = Defrost on connection).	oF / -01 ÷ -59 (min) ÷ 01 ÷ 99 (hrs)	4	
25	dd	Percentage reduction at dynamic defrost intervals	0 ÷ 100%	0	
26	dE	Maximum defrost duration (evaporator 1)	oF / -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min)	20	
27	dL	Display lock in defrost: oF = Not active on = active with last measurement Lb = active with message ("dF" in defrost and "Pd" in Post-Defrost)	oF - on - Lb	Lb	
28	tE	Defrost end temperature (evaporator1)	- 99 ÷ -9.9 ÷ 9.9 / 10 ÷ 99 ° C / ° F	5.0	
29	Ei	Interval between defrosts in case of evaporator probe error	oF / -01 ÷ -59 (min) ÷ 01 ÷ 99 (hrs)	4	
30	EE	Defrost duration in case of evaporator probe error	oF / -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min)	20	
31	tS	Temperature from which the defrost starts.	- 99 ÷ -9.9 ÷ 9.9 / 10 ÷ 99 ° C / ° F	2.0	
32	tF	Temperature that forces the start of the evaporator defrost.	- 99 ÷ -9.9 ÷ 9.9 / 10 ÷ 99 ° C / ° F	-99	
33	St	Defrost start delay due to evaporator temperature	oF / -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min)	1	
34	cd	Defrost start by continuous compressor operation	oF / -01 ÷ -59 (min) ÷ 01 ÷ 99 (hrs)	oF	
35	td	Compressor delay after defrost (dripping)	oF / -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min)	02	
	JrE	r. - parameters related to temperature regulation			
36	d	Differential (Hysteresis) of normal mode regulation	0.0 ÷ 9.9 ÷ 30 ° C / ° F	2.0	
37	Ed	Differential (Hysteresis) of Eco mode regulation	0.0 ÷ 9.9 ÷ 30 ° C / ° F	4.0	
38	Hd	Differential (Hysteresis) for Turbo or Heating mode regulation in HC mode	0.0 ÷ 9.9 ÷ 30 ° C / ° F	2.0	
39	t1	Control output activation time ot for probe (Pr1) broken	oF / -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min)	20	
40	t2	Regulation output deactivation time ot for probe (Pr1) broken	oF / -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min)	10	
41	HC	Regulation output / s operating mode: H = Heating C = Cooling nr = Neutral Zone HC = Neutral Zone with independent set C3 = Cooling with 3 automatic modes	H / C / nr / HC / C3	C	
42	tC	Turbo mode duration	oF / -01 ÷ -59 (min) ÷ 01 ÷ 99 (hrs)	01	
	JFn	F. parameters related to evaporator fan control			
43	tn	Fan connection time with ot output (compressor) off	oF / -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min)	5	
44	tF	Fan disconnection time with ot (compressor) output off	oF / -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min)	oF	
45	FL	Upper setpoint fan lock temperature	- 99 ÷ -9.9 ÷ 9.9 / 10 ÷ 99 ° C / ° F	10	
46	LF	Lower setpoint fan lock temperature	- 99 ÷ -9.9 ÷ 9.9 / 10 ÷ 99 ° C / ° F	-99	
47	dF	Differential fan lock	0.0 ÷ 9.9 ÷ 30 ° C / ° F	1.0	
48	FE	Defrost fan operation mode	oF - on	ON	
49	Fd	Fan delay after defrost	oF / -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min)	02	

	JPr	P. parameters related to compressor protection and on-delay		
50	P1	Regulation output activation delay ot	oF / -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min)	oF
51	P2	Deactivation after disconnection of the control output ot	oF / -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min)	oF
52	P3	Minimum time after two connections of the control output ot	oF / -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min)	oF
53	od	Delay actuation output to connection	oF / -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min)	oF
	JAL	A. - parameters related to alarms		
54	1y	Temperature alarm type 1: 1 = Absolute referring to Pr1 with message display (H - L) 2 = Relative to Pr1 with message display (H - L) 3 = Absolute referring to Au probe with message display (H - L) 4 = Relative to Au probe with message display (H - L) 5 = Absolute referring to dc probe with message display (H - L) 6 = Absolute referring to Pr1 without message display 7 = Relative to Pr1 without message display 8 = Absolute referring to Au probe without message display 9 = Relative to Au probe without message display 10 = Absolute referring to dc probe without message display	1/2/3/4/5/6/7/8/9 /10	1
55	1H	Alarm setpoint for high temperature 1	- 99 ÷ -9.9 ÷ 9.9 / 10 ÷ 99 ° C / ° F	oF
56	1L	Low temperature alarm setpoint 1	- 99 ÷ -9.9 ÷ 9.9 / 10 ÷ 99 ° C / ° F	oF
57	1d	1H and 1L alarm hysteresis	0.0 ÷ 9.9 ÷ 30 ° C / ° F	1.0
58	1t	Alarm delay 1H and 1L	oF / -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min)	oF
59	1P	Temperature alarm 1 delay time on connection	oF / -01 ÷ -59 (min) ÷ 01 ÷ 99 (hrs)	2
60	1A	Action of the 1H and 1L alarms on the regulation and alarm outputs. 0 = none 1 = activate alarm output only 2 = deactivate regulation output (ot and HE) and do not activate alarm output 3 = deactivate regulation output and activate alarm output	0/1/2/3	1
61	2Y	Temperature alarm type 2: see "1y"	1/2/3/4/5/6/7/8/9 /10	3

62	2H	High temperature alarm setpoint 2	- 99 ÷ -9.9 ÷ 9.9 / 10 ÷ 99 ° C / ° F	oF
63	2L	Low temperature alarm setpoint 2	- 99 ÷ -9.9 ÷ 9.9 / 10 ÷ 99 ° C / ° F	oF
64	2d	2H and 2L alarm hysteresis	0.0 ÷ 9.9 ÷ 30 ° C / ° F	1.0
65	2t	Alarm delay 2H and 2L	oF / -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min)	oF
66	2P	Temperature alarm delay time 2 on connection	oF / -01 ÷ -59 (min) ÷ 01 ÷ 99 (hrs)	2
67	2A	Action of alarms 2 on the regulation and alarm outputs. 0 = none 1 = activating alarm output only 2 = deactivating regulation output (ot and HE) and not activating alarm output 3 = deactivating regulation output and activating alarm output	0/1/2/3	1
68	dA	Temperature alarm 1 delay time after defrost and display lock in defrost	oF / -01 ÷ -59 (min) ÷ 01 ÷ 99 (hrs)	1
69	oA	Door open alarm delay	oF / -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min)	3
	JOu	O. - parameters related to the configuration of the outputs		
70	o1	OUT1 output configuration: oF = No Function ot = Temperature control (compressor) dF = Defrost (1) Fn = Fan Au = Lights on through the front LIGHT Button At / -t = Stoppable alarm AL / -L = Non-stop alarm An / -n = memorized alarm on = output activated when the device is on HE = Heating control (Neutral zone control) 2d = Not operational L1 = Showcase light with economic function (on with "SP" and off with "SPE") L2 = Internal light (OFF with door closed and ON with door open) -d = output dF denied A2 = Activation of the Anti-fog heating element through the DOWN / AUX 2 button on the front	oF / ot / dF / Fn / Au / At / AL / An / -t / -L / -n / on / HE / 2d / L1 / L2 / -d / A2	ot
71	o2	OUT2 output operation configuration: see "o1" A2 = Activation of the Anti-fog resistance through the DOWN / AUX 2 button on the front	oF / ot / dF / Fn / Au / At / AL / An / -t / -L / -n / on / HE / 2d / L1 / L2 / -d / A2	A2
72	o3	OUT3 output operation configuration: see "o1" Au = Switching on the lights through the LIGHT button on the front	oF / ot / dF / Fn / Au / At / AL / An / -t / -L / -n / on / HE / 2d / L1 / L2 / -d / A2	Au

73	o4	OUT4 output operation configuration: See "o1"	oF / ot / dF / Fn / Au / At / AL / An / -t / -L / -n / on / HE / 2d / L1 / L2 / -d / A2	Fn	
74	bu	Buzzer operation oF = deactivated 1 = for alarm only 2 = keyboard only 3 = activated for alarms and keypad	oF / 1/2/3/4	1	
75	Fo	Auxiliary output operating mode oF = No Function 1 = Output ot delayed 2 = Manual activation of key or digital input or by time clock 3 = Manual activation of the keyboard - digital input although in Standby	oF / 1/2/3	3	
76	Tu	Time relative to auxiliary output	oF / -01 ÷ -59 (min) ÷ 01 ÷ 99 (hrs)	oF	
	JtS	t. - Parameters related to the keyboard and serial communication			
78	Lo	Automatic keypad lock	oF / -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min)	10	
79	PP	Access password to operating parameters with subdivisions into folders	oF ÷ 99	oF	
80	AS	Device address for MODBUS serial communication	0 ÷ 99	1	
81	du	Temperature display increment delay filter	oF / 0.1 ÷ 9.9 ÷ 20 sec	oF	
82	dd	Temperature display decrease delay filter	oF / 0.1 ÷ 9.9 ÷ 20 sec	oF	
83	tA	Time relative to auxiliary output A2	oF / -01 ÷ -59 (min) ÷ 01 ÷ 99 (hrs)	oF	
	JUA	U. - Parameters related to voltage alarms			
84	LU	Low voltage alarm	oF / 9 ÷ 27 V x 10	9	
85	HU	High voltage alarm	oF / 9 ÷ 27 V x 10	25	
86	Ud	Voltage alarm delay	oF / -01 ÷ -59 (sec) ÷ 01 ÷ 99 (min)	oF	
87	OU	Voltage measurement calibration	-30 ÷ 30 V	0	

7 - ERRORS, MAINTENANCE AND WARRANTY

7.1 - SIGNALS

7.1.1 - Error messages:

Indication on Display	Reason
od	Start-up delay after powering device
Ln	Locked keyboard
H1	High temperature alarm
L1	Low temperature alarm
H2	Second high temperature alarm
L2	Second Low Temperature Alarm
Pr	Digital input Pr alarm
AL	Digital input alarm in progress
oP	Open door
dE	Defrost active, indication if "d.dL" = Lb

Ec	Economic modality selected
tr	Turbo mode activated
Hu	Grid overvoltage alarm
LU	Low voltage drop alarm in the network.

7.1.2 - Other signs:

Error	Reason	Action
E1 - E1 E2 - E2 E3 - E3	The relative probe may be broken (E) or shorted (-E), or it may have a value that is outside the programmed range.	Check the connection of the probe with the device and verify the correct functioning of the probe. (it is useful to have the ohm values of the probes)
EP	Possible anomaly in the EEPROM memory	Press the SET key. Turn the device off and on
Err	Fatal Device Memory Error	Replace the device or send it in for possible repair

7.2 - CLEANING

It is recommended to clean the B4U only with a cloth slightly dampened with water or a non-abrasive detergent and that does not contain solvents.

7.3 - WARRANTY AND REPAIRS

This B4U has a warranty in the form of repair or replacement, for manufacturing defects in materials, within 12 months from the date of purchase.

OSAKA SOLUTIONS will automatically void said warranty and will not

will be liable for possible damages arising from:

- The use, installation or improper manipulation or manipulation other than those described and, in particular, that differ from the safety prescriptions established by the regulations.
- The use of applications, machines or panels that do not guarantee adequate protection against liquids, dust, grease and electric shocks in the assembly conditions carried out.
- Inexperienced handling / and / or alteration of the product.
- Installation / use in applications, machines or panels that do not comply with the regulations of the current law.

In the event of a defective product within the warranty period or outside this period, it is necessary to contact the after-sales service to carry out the appropriate procedures. Request repair document "RMA" (by email or FAX) and fill it in. It is necessary to send the RMA and the B4U to SAT OSAKA freight prepaid.

7.4 - DISPOSAL

The B4U (or the product) must be collected separately in accordance with current local regulations regarding disposal.

8 - TECHNICAL DATA

8.1 - ELECTRICAL CHARACTERISTICS

Feeding: 100..240 VAC +/- 10%

AC frequency: 50/60 Hz

Consumption: approximately 4 VA

Tickets: POWER UNIT B4U: 3 inputs for NTC temperature probes (103AT-2, 10 K Ω at 25 ° C) of which 2 can be digital for power-free contacts;

DISPLAY B4U: 1 digital input for voltage-free contacts.

Departures: up to 4 relay voltage outputs.

Common power supply (pin 1): 12 A Max.

Electrical life relay outputs: 30K op. according to 60730

Action: type 1.B according to 60730-1

Overvoltage category: II

Protection class: Class II

Isolation: reinforced between the low voltage parts (power supply and relay outputs) and the front panel; Reinforced between low voltage parts (power supply and relay outputs) and very low voltage parts (inputs).

8.2 - MECHANICAL CHARACTERISTICS

Container: UL 94 V0 self-extinguishing plastic.

Heat and fire resistance category: D

Dimensions DISPLAY B4U: 96 x 50 mm, depth. 22.5 mm

Dimensions POWER UNIT B4U: 92 x 92 mm, depth 27.8 mm

Weight Display B4U: about 70 g

Weight Power Unit B4U: about 130g

Installation Display B4U: Device to be incorporated through a recessed panel (maximum thickness 2 mm) in the 90 x 44 mm hole.

Installation Power Unit B4U: Device to be incorporated into the panel.

B4U Display Connections: removable mini connectors.

Power Unit B4U connections (power supply and outputs): removable 6-pole AMP MATE-N-LOK .250 "removable connector

Connection Display B4U - Power Unit B4U: 3 m MAX. Through the cable with removable mini-connectors.

Pollution degree: 2

Ambient operating temperature: 0... 60 ° C

Operating ambient humidity: less than 95% RH non-condensing

Transport and storage temperature: -25... 60 ° C.

8.3 - FUNCTIONAL CHARACTERISTICS

Temperature control: ON / OFF

Defrost control: by intervals or by temperature with electric heating mode, gas reversal / hot cycle, for compressor stop.

Measuring range: -50 ... 99 ° C / -58 ... 99 ° F

Screen resolution: 1 ° or 0.1 ° (in the range of -9.9 ... 9.9 °)

Total precision: +/- (0.5% fs + 1 digit)

Sampling time measurement: 800 ms.

Screen: 2 white digits (optional blue) h 31 mm (DISPLAY B4U).

Software class and structure: A class

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