

6.00 PARAMETER LIST

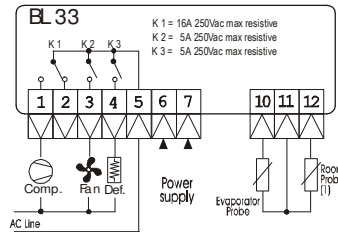
#	MEANING	SETTING
SEt	Main Set Point	Range between «LoS» & «HiS»
HYS	Thermostat differential (Hysteresis)	Range 0 .. 10 °C
LoS	Minimum value for SET POINT parameter	Range -50 .. +55 °C
HiS	Maximum value for SET POINT parameter	Range -50 .. +55 °C
Act	Action Out 1 (optional)	0: cold; 1: heat
OFS	Offset, temperature calibration for probe #1	Range -9 .. +9 °C
OF2	Temperature calibration for probe #2	Range -9 .. +9 °C
AcY	Anticycling time output	Range 0 .. 99 min
LoA	Low limit point of temperature alarm	Range -50 .. +50 °C
HiA	High limit point of temperature alarm	Range -50 .. +50 °C
Alr	Alarm mode of operation	0: disabled; 1: enables Hit; 2: enables Lot; 3: enables Hit & Lot
Adi	Alarm delay at Power ON	Range 0 .. 99 min
Ald	Alarm delay on running time	Range 0 .. 99 min
dPt	Defrost pause time	Range 1 .. 254 hours
ddt	Max. defrost duration time	Range 0 .. 99 min
dEt	Defrost end temperature	Range -35 .. +50 °C
Odd	Operating mode during defrost	0: out 1 always OFF; 1: out 1 always ON.
add	After defrosting delay of output 1 (norm. compressor)	Range 0 .. 99 min
dud	Display up-date temperature after defrost end	Range 0 .. 99 min
unt	Temperature displayed unit	0 = Celsius, 1 = Fahrenheit
Fod	Fan operation mode	0: in parallel with compressor; 1: fan always ON; 2,3: stop during defrost (see text); 4: on during defrost (see text)
FSd	Fan delay at power-on and after defrost end	Range 0 .. 99 min
FSt	Fan start set point temperature.	Range -35 .. +50 °C
CPF	Compressor operating mode for probe failure case (main output)	0: always OFF; 1: always ON; 2: ON/OFF by time
Con	Compressor "ON" time during probe failure	Range 0 .. 99 min
CoF	Compressor "OFF" time during probe failure	Range 0 .. 99 min
dio	Digital input operation mode (optional)	0: disabled; 1: open door alarm; 2: defrost remote activation; 3: Energy saving.
did	Digital input delay (optional)	Range 0 .. 254 sec
utd	Display update time delay	Range 0 .. 60 sec
SI2	Secondary set point (optional)	Range between «LoS» & «HiS»

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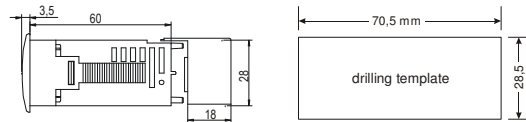
7.00 SPECIFICATIONS

DISPLAY: 3 digit, 13.2 mm, high intensity red;
INPUTS: one or two PTC sensor, semiconductor type;
MEASURING RANGE: -55 ... +55 °C;
ACCURACY AT 25°C: ±0.5 °C + 1 digit;
RESOLUTION: 1 °C;
TIME ACCURACY: ±5%;
OUTPUTS: 1 spdt relay 250Vac 16A max resistive,
+ 2 spdt relay 250Vac 5A max resistive
or 1 spdt relay 250Vac 5A + 1 internal buzzer;
POWER SUPPLY: 12 Vac/dc ±10% or 230 Vac ±10% 50/60 Hz;
ENVIRONMENTAL CONDITIONS:
- operating temperature: -5 ... +50 °C;
- storage temperature: -20 ... +70 °C;
- relative humidity: 30 ... 90 % non condensing;
- no shocks or vibrations;
MECHANICAL DATA:
- plastic housing self extinguishing type UL94V0;
- connections through terminal block for 2.5mm² gauge wire;
- protection degree: IP64 for the frontal panel (enclosure with terminal cover: IP31).

Typical terminal connections (See the label on top of the instrument for the right power supply diagram connection).



8.00 Side view and drilling template



9.00 ANOMALIES SIGNALING

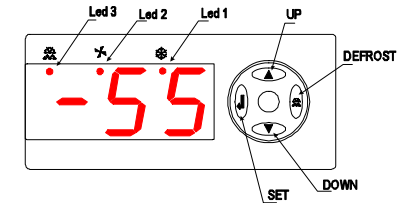
MSG	CAUSE	OUTPUT
Hit blinking	Measured temperature is higher than HiA (max. temp alarm).	*The outputs don't change. The internal buzzer will switch on.
Lot blinking	Measured temperature is lower than LoA (min. temp alarm).	*The outputs don't change. The internal buzzer will switch on.
dOP	If activated (dio = 1), open door alarm.	*Switch off the fan relay. *The other outputs don't change.
PF1	The probe input line 1 is open or short circuited (cold room).	* Compressor operation is according to CPF. *Other outputs don't change.
PF2	The probe input line 2 is open or short circuited (evaporator).	*It assumes a temp. -55°C for the 2 nd probe. *other outputs don't change.

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FRONTAL PANEL LAYOUT AND FUNCTIONS



Installation and operating instructions

BL 3x Series Electronic refrigeration controller with one or two inputs

Rev.: 25-05-2004 Cod.: 00990233

Up: 1) To increase the value of the selected parameter; 2) During defrost operation, to update the probe 1 temperature and to display the temperature of probe 2; 3) To scroll the parameters in SET mode.

Down: 1) To decrease the value of the selected parameter; 2) To scroll the parameters in SET mode; 3) To switch off the alarm buzzer.

Set: To access the parameter menu to view and change the values. It is also the "Enter" key to confirm the new values.

Defrost: Used to start/stop a manual defrost.

1.00 GENERAL DESCRIPTION AND INSTALLATION NOTICE

The BL models of the **BLUE LINE SERIES** are controllers specifically designed to manage refrigerating units operating at positive or negative temperatures. Higher models of the series can also perform defrost cycles and fan control. Can be available controllers with OFF cycle defrost (with compressor switching OFF), or controller with HOT-GAS defrost. The defrost end may be based on fixed time or by the evaporator temperature. The devices can offer up to three relay outputs for compressor, fan and defrost control. It is available, on request, with a built-in transformer to feed it from the main line. The access to the operating parameters can be prevented by a combination of keys. The installation must be done only by specialized personnel in according to the rules in force in the country where the controllers are used. The instrument is conceived for controlling and regulation working not for safety function. It must be installed in a place protected from extreme vibrations, impact, water, corrosive gases, and where temperature and moisture do not exceed the maximum rating levels indicated in the specifications. The same directions are valid for the probe installation.

1.10 THE THERMOSTAT PROBE

The probe must be installed in a place protected from direct air flow particularly far from fans and doors, so a better average temperature of the room will be measured. The probe is not waterproof, it should be placed with its head upward, so that drops would not penetrate into the bulb and damage the sensor. Maintain the length of the electrical wires as short as possible in order to keep the noise picked by them at low level, otherwise a shielded wire will be needed, where the shield will be connected to the ground.

1.20 ELECTRICAL WIRING

We recommend to protect the power supply of the controller from electrical noise, spikes, and especially from voltage surges and drops. This can be easily done following these recommendations:
- separate the power supply of the loads (compressor, heaters, fans, etc) from the power supply of the controller. This can alleviate problems related to voltage dips that can arise during the switch-on of the loads, that may interfere with the controller's microprocessor causing unexpected resets.
- the cables of the probes and the ones of the controller supply or the loads must be separated and not close, to reduce spikes and noise on the sensor. This improves the stability of the reading and it also makes the commutation of the device more accurate.

1.30 CRITICAL ENVIRONMENT

For applications in heavy industrial environment these rules should be followed.
- After having identified the source of noise spikes, it is recommended to apply a line filter to the source in question of the type specifically designed to solve EMC (Electromagnetic compatibility) related problems. Sometimes it may be sufficient an RC type filter, also called «snubber», connected in parallel to the external relay coils, or circuit breakers.
- An independent power supply should be used to power the device in extreme conditions.

1.40 MOUNTING

The controller is a «flush» panel mounted instrument (ext. frontal: 33x75 mm). Leave enough room to avoid compression of the cables (see figures "Side view and drilling").

2.00 HOW THE DEVICE WORKS (overview)

Usually the instrument **BL 32/33** works with two PTC probes; the second sensor generally is located near the evaporator area and it is used to control the defrost function. The main probe is located in the cold room in a place where it can sense the average temperature. This probe makes as the main process variable that activates the compressor output.

2.10 Compressor control (cooler, act=0):

Compressor START temperature: temp S1 ≥ SEt + HyS;

Compressor STOP temperature: temp S1 < SET.

To avoid damages to the compressor it is possible to set an anticycling time against ON – OFF – ON cycles (see “acy” parameter).

2.20 Fan Control (model BL 33):

The fan can be driven in different modes depending on your needs (see par. Fod). The fan operation also depends from the temperature value of the probe #2 (evaporator probe).

Fan START temperature: temp S2 < FSt.

Fan STOP temperature: temp S2 ≥ FSt + 2°C.

Furthermore, to avoid the circulation of hot air at start up or after defrost it is possible to set the Fsd parameter to delay the fan.

2.30 Defrost control:

The **BL 33** models are provided with the second probe for the evaporator to manage defrost cycles by temperature and they also can have an additional relay output to drive an heater or valve to perform this function. The defrost action will be ended when the evaporator temperature rises the value of the dEt parameter. Anyway the defrost cycles finish by the time set in ddt.

Note: Usually, during a defrost cycle the displayed temperature is not updated (it is updated only if there will an alarm condition).

2.40 Alarm management and fault tolerance:

All the BL controllers show on display the signals of the alarm conditions (see table). You can set and enable the min. and max. temperature (see parameter Alr) alarm set points. This alarm set point must be intended as absolute value, not related to the main Set Point. To prevent alarm signaling, it is possible set alarm delays at start-up and during running time (see parameters Adi and Ald).

Note: if alarm is on, press the “▼” key to switch off the optional internal buzzer.

In case of probe failure the BL controllers display a message (PF1 or PF2). When there is a main probe (#1) failure the compressor can be managed by an emergency routine, to try to keep the temperature close to the desired Set Point.

3.00 DISPLAY FUNCTIONS

The display has tree digits available, of the seven segment type. During normal working it shows the value of the temperature, while in an alarm condition it shows the proper indication as described in the «anomalies signaling» table (9.00).

The three leds have the following functions: led n°3, on the left, blinks during the setting operations and it lights on during the defrost; led n°2 lights when the fan runs; led n°1, on the right, lights when compressor runs.

4.00 HOW TO DISPLAY AND ADJUST THE MAIN AND SECONDARY SET POINT

1) Press “┐” and hold it for 3s, SEt is displayed;

2) Press “┐” to view the Set Point value, adjust it by using “▲” or “▼”;

3) Press “┐” to confirm the data, after few seconds the controller will leave the set mode and the data will be stored in the memory.

WARNING: the instrument must not be reset before leaving the set mode, otherwise the new setting will be lost.

Note: it is only possible to choose values for the set point inside the «Los» and «His» range.

4.10 HOW TO DISPLAY THE EVAPORATOR TEMPERATURE (Not for model BL 31)

Press “▲”: the evaporator temperature (probe #2) will appear on the display.

4.20 HOW TO ACTIVATE MANUALLY A DEFROST CYCLE

Press and hold for 5s the “Defrost” key, the led 3 will lights on and the controller’s outputs will follow the parameters “Odd” and “Fod”.

4.30 HOW TO ADJUST OPERATING PARAMETERS

1) Press “┐” and hold it for 10s, the code of the first variable “HyS” will appear;

2) Press “▲” or “▼” to scroll all the parameter codes;

3) While a code is displayed press “┐” to view its content, adjust it by pressing “▲” or “▼”;

4) Press “┐” to confirm the data, after 10s the controller will leave the set mode and the data will be stored in the memory.

WARNING: the instrument must not be reset before leaving the set mode, otherwise the new setting will be lost.

Note: In every case the controller automatically interrupts any setting operation if any push-button isn’t pressed for at least 10 seconds.

The new values for time parameters will be active only after the start of the following time cycle.

4.40 KEYBOARD LOCKING

Press and hold “┐” + “▼” for 10s, in order to lock and unlock the keyboard.

Code displayed for one second: “Pof” Locked;

“Pon” Unlocked.

When the keyboard is locked it is possible change only the “Set” value.

5.0 GENERAL PARAMETERS DESCRIPTION

SEt - main Set Point: it’s the required temperature in the cold room.

HYS - main differential (hysteresis): the value that controls the compressor/heater operation, moving the value of the set point in such a way that the system does not oscillate.

LoS - low limit of set point: a limit below which it is not possible to move the set point value.

HiS - High limit of set point: a limit above which it is not possible to move the set point value.

Act - main output action (optional): describes the way by which the controller manages the controlled variable. 0: direct/cold action, good for refrigerating units, 1: inverse/heat action, usable for boilers.

OFFS - offset of temperature: it is the variation temperature added or subtracted to the temperature measured by the main probe #1 to compensate for any deviation from the real value.

OF2 - offset for probe #2: it is the variation temperature added or subtracted to the temperature measured by the probe #2 to compensate for any deviation from the real value.

AcY - anticycling delay time: it is the minimum time between two successive output maneuvers (off – on cycle): when the output is switched-off, the controller wait at least “AcY” minutes to switch on the relay. It is also the delay for the first activation of the relay K1 at the start-up.

LoA - low operation point of alarm temperature: a limit below which the system goes in alarm and simultaneously the display shows «LoT».

HiA - high operation point of alarm temperature: a limit above which the system goes in alarm and simultaneously the display shows «Hit».

Alr - alarm mode of operation: the high and low temperature alarms can be enabled or disabled as required by the installer. The available options are: 0 = all alarms disabled; 1 = only high temperature alarm enabled; 2 = only low temperature alarm enabled; 3 = high and low temperature alarms enabled.

Adi - alarm delay initialization: delay between the power-up of the instrument and the arming of the alarms if enabled.

Ald - alarm delay during running time: it is the elapsed time between the trigger of an alarm and the effective displayed state.

dPt - defrost pause time: it is the pause time between two defrost cycles. During this time the main outputs work normally. Note: when a manual defrost is called, the time counter is reloaded to “0”

ddt - defrost duration time: it is the time elapsed during the defrost. Usually during this interval the compressor is switched-off to allow a deicing process. If ddt = 0 the defrost function is disabled.

dEt - defrost end temperature: it is the temperature, measured by evaporator probe (if present), that determines the defrost process end. Anyway, the defrost will be ended by time (see ddt), even if the evaporator temperature doesn’t reach the programmed value.

Odd - compressor behavior during defrost: you can select the operation mode according to your needs.

0: outputs 1 (compressor) OFF during defrost (normal case); 1: output 1 forced ON during defrost (used in hot gas defrosting).

add - compressor start delay after defrost: it is also known as “dripping time”. After a defrost cycle, the compressor will be maintained inoperative to assure dripping of possible water still present in the evaporator. During defrost dripping time, the fan may be turned off with a proper Fsd time.

dud - delay up-date display: it allows to delay the updating of the displayed temperature after a defrost cycle. Remember that during a defrost cycle the displayed temperature is not updated.

unt - displayed unit: it switches the temperature unit between Celsius and Fahrenheit (internal calculations are made in Celsius and then converted to Fahrenheit – there are rounding errors).

Fod - fan operating mode: the operator can select the behavior of fan according to his needs (if Fan is armed as per Fst). **0)** Fan runs in parallel with the compressor; **1)** The fan is always ON; **2)** The fan is OFF during defrost, otherwise is always ON; **3)** The fan is OFF during defrost, otherwise is in parallel to the compressor; **4)** The fan is ON during defrost, otherwise is in parallel to the compressor.

Fsd - fan delay at start-up and after defrost: it is the delay time at start-up and after a defrost cycle to avoid the hot air circulation in the cold room at power-up and after defrost. This time begins from the end of the defrost action.

FSt - fan start set point: it is the value of the temperature that determines the arming of the fan. In fact the fan is turned ON only when the temperature measured by the evaporator probe (probe #2) drops below this set point. *Note:* for security reasons both parameters FSt and Fsd interacts. In this way the fan is armed when the temperature is lower than FSt and triggered after the delay time set in Fsd, afterwards the behavior follows the Fod parameter.

CPF - compressor behavior with probe failure: In case of probe failure, the thermostat output works according to the setting of this parameter, until the defect is removed.

There are the following possibilities: 0 = the compressor output is always OFF; 1 = the compressor output is always ON ; 2 = the outputs are turned ON and OFF by an “emergency routine”; according to the settings of parameters “Con” and “COF”.

Con - compressor ON time: it is the time of compressor “ON” in case of probe failure, if parameter CPF = 2.

CoF - compressor OFF time: it is the time of compressor “OFF” in case of probe failure, if parameter CPF = 2.

dio - digital input operation mode (optional): in the instruments with this option included, it allows to operate the digital input in different ways. Modes: 0) Disabled; 1) If the cold room’s door is open more than “did” the instrument gives an alarm indication (dOP in the display) and switch-off the fan relay; 2) Allows the activation of the defrost remotely, you can add an external timer to achieve a precise defrost timerization; 3) With this function you can modify the SET point simply with an external contact. The active set point will be SET2 instead of SET.

did - digital input delay (optional): it is the time elapsed between the activation of the digital input and the effective action.

utd – update Time delay: it is the time delay that determines the display updating of the temperature.

St2 - secondary set point (optional): it is the temperature value required for the Energy Saving Mode (see dio param.).