5.00 OPERATING PARAMETERS

NAME	MEANING	SETTING *(for PTC std)*
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 … +100 °C
HiS	Maximum value for SET POINT parameter	Range –30 … +154 °C
Act	Thermostat control action: cold/heat	0: cold; 1: heat.
LoA	Low temperature alarm point	Range –50 … +100 °C
HiA	High temperature alarm point	Range –30 … +155 °C
Alr	Alarm mode of operation	0: disabled; 1: enables Hit; 2: enables Lot; 3: enables Hit & Lot.
OFS	Probe offset. Temp. correction factor	Range –9.9 … +9.9 °C
dPt	Defrost pause time	Range 1 ... 254 (see "tis")
ddt	Defrost duration time	Range 0 … 99 (see "tis")
AcY	Anticycling time	Range 0 … 254 (see "tis")
Adi	Alarm delay on power-on	Range 0 … 99 min
unt	Measure unit	0: Celsius 1: Fahrenheit
dio	Digital input	0 … 2 (optional)
tiS	Time scale of defrost and anticycling	0: dPt [h], ddt [m], acy [s]; 1: dPt [m], ddt [s], acy [s]; 2: dPt [h], ddt [m], acy [m]; 3: dPt [m], ddt [s], acy [m];
utd	Update time delay	Range 0 … 60 s
rES	Resolution	0: decimal; 1: unit.
St2	Set point 2 (dio - energy saving)	Limits between «LoS» & «HiS»

6.00 ANOMALIES SIGNALING

MSG	CAUSE	OUTPUT
Lot	Measured temperature is lower than «LoA»	The relay status does not change. The internal buzzer will switch on.
Hlt	Measured temperature is higher than «HIA»	The relay status does not change. The internal buzzer will switch on.
PrF	The probe input line is open or short circuited	The relay will switch off

7.00 PARAMETER DESCRIPTION

SEt – Main Set Point: it's the required temperature.
HYS - 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 - thermostat action: 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 boiler units.
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.
OFS - offset of temperature: it is the variation temperature added or subtracted to the temperature measured by the probe to compensate for any deviation from the real value.
dPt - defrost pause time: it is the time between the start of two consecutive defrost actions (time cycle).
ddt - defrost duration time: it is the duration of the defrost in each cycle. *Set ddt=0 to disable any defrost action.*
AcY - anticycling delay time: it is the minimum time between two successive maneuvers of the main relay (off – on cycle). It is also the delay for the first activation of the relay at the start-up.
Adi - alarm delay initialization: delay between the power-up of the instrument and the arming of the alarms if enabled.
unt – Measure unit: it switches the temperature unit between Celsius and Fahrenheit.
dio - digital input mode operation: (optional) no active.
tiS - scale times: it switches the scale times of the dPt from hours to minutes, ddt from minutes to seconds, acy from seconds to minutes and vice versa.
utd – update time delay: it sets the time delay between two display refreshes.
rES - resolution: it allows to display the measured value with decimal or unitary resolution.
St2 – 2dary set point: No active – it is useful for the energy saving option, combined with the dio parameter.

ATEX Industries srl
Z.I. Ponte Rosso - Via Forgaria, 7
33078 S. Vito al Tagliamento – PN - Italy
Tel.: +39 0434 85183 r.a.
Fax: +39 0434 85338
web: *www.betaelectronics.it*
e-mail*: beta@betaelectronics.it*

Beta electronics

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CE

RD31

The RED LINE SERIES Installation and operating instructions

Temperature controller

by ATEX

1.0 GENERAL DESCRIPTION

The **RD 31** based on the ***PD Program*** is a low-cost controller with OFF-Cycle defrost, specifically designed to control refrigerating static units operating at positive temperatures.
This type of controller is particularly indicated, either for the manufactures of economical refrigeration units or for contractors / end-installers. Applications span from refrigerated cabinets, to displays, wine show cases, bottle coolers, chafing dish, etc.
The controller can support one input PTC type sensor and offers one relay output for the compressor/heater control in order to cool down or to warm up something, simply changing the value of an internal parameter.
The instrument can perform the OFF-cycle defrost function by shutting off the compressor at regular intervals time, which can be programmed from 1 to 99 hours.
On the RD31-50xx and RD31-60xx standard version, the user has the possibility to start/stop manually the defrost cycle, by pushing a front panel key.
Available an On/Off version where the user can switch on and off the controller by pushing the right side front panel key *(the controller can or cannot store the "off" status on its memory – as per order request)* .

This new RD 31 Program controller can work at a decimal point resolution in the range -9.9…+99.9 °C (°F) and automatically switches to unit resolution out of this range.

2.00 SPECIFICATIONS

DISPLAY: 3 digit, 13.2 mm, high intensity red;

INPUTS: one PTC sensor, KTY81-121 semiconductor type;
opt: PTC 300 sensor, KTY84-130 (polarized);
opt: with 1 digital input N.O. contact;

MEASURING RANGE: -50 … +150 °C (-58 … +302 °F);
(-25 … +270 °C if PTC300 input);

ACCURACY AT 25°C: ±0.5°C (±0.9°F) + 1 digit;

RESOLUTION: 0.1°C (0.2°F) + 1 digit;

TIME ACCURACY: ±5%;

OUTPUTS (max 2): 1 SPDT 8 A, ½ hp 250 Vac relay;
opt. – 1 SPDT 16 A, 1 hp 250 Vac;
opt. – 1 SPST 30 A, 2 hp 250 Vac;
+ opt. 1 SPST alarm relay – 250 Vac 5A res. or buzzer;

POWER SUPPLY: 230 Vac ±10%, 50/60 Hz;
opt.: 115 Vac ±10%, 50/60 Hz; 12 Vac/dc ±10%;
switching 9..24Vac/dc.

ENVIRONMENTAL CONDITIONS:
-operating temperature: –5 … +50 °C;
-storage temperature: –20 … +70 °C;
-relative humidity: 30 … 90 % non condensing;
-no shocks or vibrations;

MECHANICAL DATA:
-rectangular hole panel mounting 70.5 x 28.5 mm;
-plastic housing self extinguishing type UL94V0;
- connections through screw terminal block for max 2.5mm^2 wire (or max 4mm^2 for rigid wire); max current 16 A (max 24 A if 2 hp relay is present).
-protection degree: IP64 for the frontal panel.

3.00 INSTALLATION

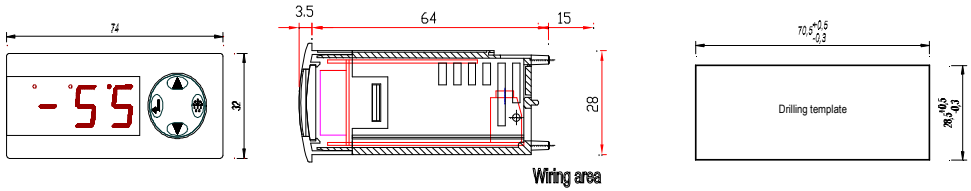
3.10 GENERAL
The installation must be done only by specialized personnel in according to the rules in force in the country where the controllers are used. The instrument is conceived for controlling and regulation working not for safety function. It must be installed in a place protected from extreme 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.

3.11 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.

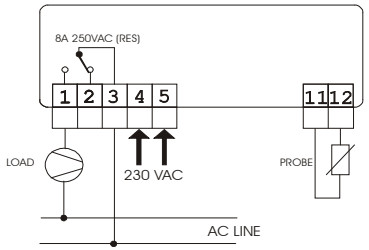
3.12 ELECTRICAL WIRING
We recommend to protect the power supply of the controller from electrical noise, spikes, and especially from voltage surges and drops. This can be easily done following these recommendations:
-separate the power supply of the loads (compressor, heaters, fans, etc) from the power 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.

3.13 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.

3.20 MOUNTING
The controller is a «flush» panel mounted instrument. We recommend to leave on the rear panel enough room to avoid compression or excessive bending of the cables.

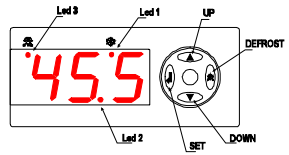


3.30 CONNECTIONS
We recommend to use wires of proper gauge, according to the power of the load; in any case do not exceed 2.5 mm^2 to avoid damage of the connector.
See the label on top of the instrument for the right power supply diagram connection.



4.00 FRONT PANEL FUNCTIONS

4.10 Front panel layout
(standard version RD31-60xx)



4.20 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.
Led 1 lights up while the compressor/heater is operating and led 3 during a defrost cycle. In program mode led 3 is blinking.
Note: if alarm is on, press the " ▼ " key to switch off the optional internal buzzer.

4.30 READ / MODIFY FUNCTION OF THE 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 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: it is only possible to choose values for the set point inside the «Los» and «His» range.

4.40 READ / MODIFY FUNCTION FOR THE PARAMETER MENU
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: the new values for time parameters will be active only after the start of the following time cycle.

4.50 HOW TO ACTIVATE MANUALLY A DEFROST CYCLE *(only for RD31-50xx and RD31-60xx standard – not "OnOff")*
Press and hold for about 5s the "Defrost" key (the right-side pushbutton), the compressor output will switch off and the led 3 will lights on.

4.60 HOW TO SWITCH OFF AND ON MANUALLY THE CONTROLLER *(only for RD31-xxxx "OnOff" version)*
Instead of the "Defrost" key there is an "On/Off" function. Press and hold for 5s the right-side pushbutton, the controller will switch off (display and output). Press again the right-side pushbutton to toggle on the controller, it will resume to measure and regulate the temperature.
The instrument can store or not on its memory the "Off status" as per order request. Memorizing the "Off status" the controller stays off also after a power cut or blackout.

4.70 LOCK / UNLOCK KEYBOARD
Press and hold simultaneously SET and " ▼ " for 10s, in order to lock and unlock the keyboard.
Code displayed for one second: **Pof** Locked **Pon** Unlocked
It is possible to change only the Set point value when the keyboard is locked.