5.00 PARAMETER LIST

#	MEANING	SETTING (for PTC standard)
SEt	Main Set Point	Range between «LoS» & «HiS»
HYS	Thermostat main differential (Hysteresis 1)	Range 0 .. 10 °C
LoS	Minimum value for SET POINT parameter	Range –50 .. HiS (+100) °C
HiS	Maximum value for SET POINT parameter	Range (-30) LoS .. +154 °C
Act	Action main output	0: cold; 1: heat
OFS	Offset, calibration for probe 1	Range –9.9 .. +9.9 °C
AcY	Anticycling time main output	Range 0 .. 254 (see tis)
LoA	Low limit point of temp. alarm	Range –50 .. HiA (+100) °C
HiA	High limit point of temp. alarm	Range (–30) LoA .. +155 °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 period time	Range 1 .. 254 (see tis)
ddt	Defrost duration time	Range 0 .. 99 (see tis)
unt	Temperature displayed unit	0: Celsius; 1: Fahrenheit
dio	Digital input operation mode	0: disabled
did	Digital input delay	Range 0 .. 254 sec
utd	Display update time delay	Range 0 .. 60 sec
rES	Resolution	0: decimal point resolution; 1: unit resolution
tiS	Time scale	0: dPt hours, ddt min., acy sec; 1: dPt min., ddt sec., acy sec.; 2: dPt hours, ddt min, acy min; 3: dPt min., ddt sec., acy min. .
St2	Secondary set point (for "dio")	Range between «LoS» & «HiS»

7.00 ANOMALIES SIGNALING

MSG	CAUSE	OUTPUT
HIt blink	Probe measured temperature is higher than HiA.	The alarm relay will switch-on. The other outputs don't change.
Lot blink	Probe measured temperature is lower than LoA.	The alarm relay will switch-on. The other outputs don't change.
PF1	The probe input line is open or short circuited.	The relay K1 will switch-off. The alarm relay will switch-on.

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 main output. 0: direct/cold action, good for refrigerating units, 1: inverse/heat action, usable for boiler units.

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.

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.

LoA - low operation point of alarm temperature: a limit below which the system goes in alarm: the display blinks «LoT» and the alarm relay/buzzer will switched on.

HiA - high operation point of alarm temperature: a limit above which the system goes in alarm: the display blinks «HiT» and the alarm relay/buzzer will switched on.

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 temp. alarm enabled; 3 = high and low temp. 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 time between the start of two consecutive defrost actions (time cycle). *Note: when a manual defrost is called, the time counter is reloaded to "0".*

ddt - defrost duration time: it is the duration of the defrost action in each cycle. During this interval the compressor is switched-off to allow a deicing process; the display does not update the probe measured temperature. *Set ddt=0 to disable any defrost action.*

unt – Measure 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, not all values will be showed)*

dio - digital input mode operation: *(optional)* no active.

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 (the min update time of the display is 5 sec.). *The switching over of the relay is related only to the acy not to utd values.*

rES - resolution: it allows to display the measured value with decimal or unitary resolution.

tiS - scale times: it switches the scale times of the defrost cycles and of the anticycle delay. Setting tiS=0 the ddt is measured in minutes, dpt in hours and acy in seconds.

St2 – 2dary set point: No active – it is useful for the energy saving option, combined with the dio parameter.

Beta electronics

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ATEX

The RED LINE SERIES
Installation and operating instructions

RD41

Temperature controller

by ATEX

1.0 GENERAL DESCRIPTION

The **RD 41** is a low-cost temperature controller specifically designed to regulate refrigerating static units or heating appliances.

This type of thermostat is particularly indicated, either for the manufactures or for contractors / end-installers. Applications span from refrigerated cabinets, wine show cases, bottle coolers, boilers, etc.

The controller supports one input PTC type sensor and one relay output for the compressor/heater control. On request, it is possible to have an internal alarm buzzer or relay. It can have a built-in transformer to feed it from the main line (230 Vac or 115 Vac) or a switching circuit to connect the instrument to 9..24 Vac/dc.

The instrument can perform the OFF-cycle defrost function by shutting off the compressor at regular intervals time; the user has also the possibility to start/stop manually the defrost cycle, by pushing a front panel key.

To avoid not authorized people change any settings, the access to the operating parameters can be prevented by a combination of keys.

The RD41 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.

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 Omega Rail Din 4 mounting instrument. We recommend to leave on the rear panel enough room to avoid compression or excessive bending of the cables.

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;

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

POWER SUPPLY:
12 Vac/dc ±10%
115 Vac ±10%, 50/60 Hz;
230 Vac ±10%, 50/60 Hz;
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:
- omega DIN rail mount;
- plastic housing self extinguishing type UL94V0;
- connections through terminal block max 2.5mm² gauge wire;
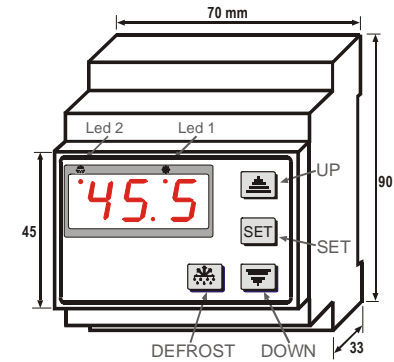- protection degree: IP64 for the frontal panel.

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 mm² to avoid damage of the connector.
See the label close to the terminals of the instrument for the right power supply diagram connection.

RD41-6051
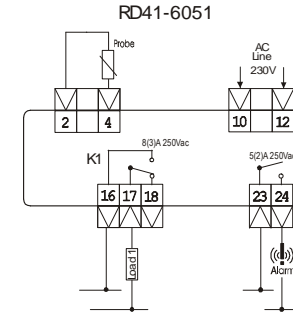
4.00 FRONT PANEL FUNCTIONS
4.10 Front panel layout

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 K1 is operating and led 2 during a defrost cycle. In program mode led 2 blinks.
Note: if alarm is on, press the "▼" key to switch off the optional internal buzzer/relay.

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
Press and hold for 10s the "Defrost" key, the K1 output (compressor) will switch off for the "ddt" time and the led 2 will lights on.

4.60 LOCK / UNLOCK KEYBOARD
Press and hold simultaneously "▼" and "SET" for 10s, in order to lock and unlock the keyboard.
(pay attention to do not modify the set point value, press first " ▼" and then "SET" immediately and keep pressed for 10 seconds).
Code displayed for one second: **Pof** Locked   **Pon** Unlocked
When the keyboard is locked it is possible change only the "Set" value.