

5.00 OPERATING PARAMETERS

DISPLAY	MEANING	SETTING
SET	Main set point	Limits between +LOSt & +HtSs
HYS	Thermostat differential (hysteresis)	Limits 0.8 °C
LoS	Minimum value for SET POINT parameter	Limits -50...150 °C
HIS	Maximum value for SET POINT parameter	Limits -50...150 °C
Act	Thermostat action cold / heat	0 direct (cold); 1:rev (heat)
LoA	Low limit of operation of alarm temperature	Limits -50...150 °C
HtA	High limit of operation of alarm temperature	Limits -50...150 °C
Alr	Alarm mode of operation	0:disabled; 1: enable Ht; 2: enable LoT; 3: enable Ht&LoT
OFS	Offset temperature correction factor	Limits 1...99 Hrs
dPt	Defrost pause time	Limits 0...99 min
dct	Defrost duration time	Limits 0...254 sec
AcY	Anticycling time	Limits 0...60 s
Adi	Alarm delay initialization	0: decimal point; 1: unit
uId	Update time delay	0: Celsius; 1: Fahrenheit
rES	Resolution	Measuring unit
unt		

6.00 PARAMETERS DESCRIPTION

**Set - Main Set Point:** it's the required temperature in the cold room

**HYS - Differential Hysteresis:** it is the value that controls the compressor / heater operation, moving the value of the set point in such a way that the system do not oscillate.

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

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

**Act - Thermostat action :** it describes the way by which the controller manages the controlled variable. 0= direct action, good for refrigerating units, 1= inverse action, usable for boilers units

**LoA - Low operation point of alarm temperature:** it is the limit below of which the system goes in alarm condition indicated by «LoT» displaying.

**HtA - High operation point of alarm temperature:** it is the limit above of which the system goes in alarm condition indicated by «Ht» displaying.

**Alr - Alarm mode of operation:** it is the high and low temperature alarms can be enabled or disabled as required by installer. There are the following possibilities: 0 = all alarms disabled, 1=only high temperature alarm enable, 2 = only low temperature alarm enable, 3 = high and low temperature alarms enabled.

**OFS - Offset of temperature:** it is the 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 elapses between two defrosts.

**dct - Defrost duration time:** it is the time duration of the defrost. **Set dct = 0 to disable off cycle defrost.**

**AcY - Anticycling delay time:** it is the minimum time between two switching-on of the compressor (on - off - on cycle).

**Adi - Alarm delay initialization:** it is the delay between the power-up of the equipment and the arming of the alarms if enabled.

**uId - 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.

**unt - Measuring unit:** it allows to display the temperature and set the instrument in °C or °F.

**NOTE:**  
 1) If you set **dct = 0**, the defrost management is disabled and the controller operates as a normal thermostat.  
 2) If you set **Act = 1**, (heating applications) the controller automatically sets **dct = 0** and hides the parameters **dct** and **dPt**.

7.00 ANOMALIES SIGNALING

MSG	CAUSE	OUTPUT
LoI	Measured temperature is lower than «LoA»	Do not change.
HtI	Measured temperature is higher than «HtA»	Do not change.
PnF	The probe input line is open or short circuited	Off

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RT 31  
DIGICold series

Decimal Point Resolution

Installation and operating instructions

User-friendly temperature controller

by ATEX Spa

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## 1.0 GENERAL DESCRIPTION

The RT31 are low-cost digital series controllers 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 manufacturers of economical refrigeration units or for contractors / end-installers. Applications spans to refrigerated cabinets, displays, wine show cases, bottle coolers, etc.

The controller can support one input PTC type sensor, which can be located, if installed with properly shielded cable, up to 100m from the instrument without resistor. The device offers one relay output for compressor/condenser control.

The instrument can perform the OFF-cycle defrost function by shutting-off the compressor at regular interval time, which can be programmed from 1 to 99 hours.

The user has, also, the possibility to start / stop manually the defrost cycle, by pushing a front panel key.

**This new RT31 controller can perform decimal point resolution in the range -9.9...+99.9 °C and automatically switches to unit resolution out of this range.**

If used for heating applications (act = 1) the parameter dft is automatically set to zero and hidden. In the same way the parameter dft1 will be hidden.

## 2.00 SPECIFICATIONS

**DISPLAY:** 3 digit, 14.2 mm, high intensive red.

**INPUTS:** one PTC sensor, semiconductor type

opt1: 1 digit input N.O. contact

**MEASURING RANGE:** -55°C to 168 °C

**ACCURACY @ 25°C:** +0.5°C, +1 digit

**RESOLUTION:** +1, 1°C plus +0.1 digit in the range -9.9...99.9 °C

+1, 1°C plus +1 digit in the remaining parts of the measuring range

**OUTPUTS:** 1 SPDT relay 250 Vac, 0.16A resistive

**POWER SUPPLY:** 230 Vac ±5%, 10%, 50/60 Hz

opt1: 12Vac / dc ±10%

opt2: 12...24 Vdc/dc ±10-5%

**ENVIRONMENTAL CONDITIONS:**

- ambient temperature -5°C to 50°C

- storage temperature -20°C to 80°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

- connectors through terminal block for 4mm<sup>2</sup> gauge wire.

## 3.00 INSTALLATION

### 3.10 GENERAL

The installation must be done only by specialized personnel 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 THERMOSTAT PROBE

The probe must be installed in a place protected from direct air flow, particularly far from fans and doors, so the average temperature of the room will be measured. If the probe is not waterproof, place it with the head upward, so drops cannot penetrate into the bulb and damage the sensor. Maintain the length of the electrical wires short as possible in order to keep low the noise picked by them, otherwise you will need to use shielded conductor where the shield will be connected to ground.

### 3.12 ELECTRICAL WIRING

We recommend to protect the power supply of the controller from electrical noise, spikes, and specially from voltage surges a dips. This can be easily done following this 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/off the loads, that may interfere with the controller's microprocessor causing unexpected results.
- the cables of the probes, and the ones of the controller supply or the loads must be separate and not close, to reduce spikes and noise on the sensor. This improves the stability of the readings, and also the precise communication of the device.

### 3.13 CRITICAL ENVIRONMENT

For applications in heavy industrial environment the following rules could be valuable.

- After identifying the source of noise / spikes try to apply a line filter for such source of the type specifically designed to solve EMC (Electromagnetic compatibility) related problems. Sometimes, may be sufficient an RC type filter, also called «snubbers», connected in parallel to the external relays coils, or circuit breakers.
- Use an independent power supply to feed the device in extreme cases.

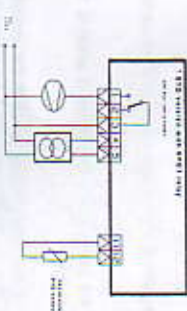
### 3.20 MOUNTING

The model treated is a flushy panel mounted instrument. We recommend to leave on the rear panel enough room to avoid compression or excessive bending of the cables.

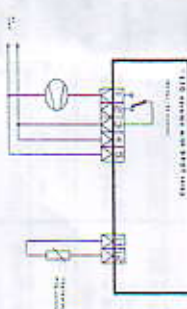
## 3.40 CONNECTIONS

We recommend to use wires of proper gauge, according to the power of the load. In any case do not exceed 4 mm<sup>2</sup> to avoid damage of the connector.

• 12 Vac/dc power supply



• 230 Vac power supply



## 4.00 FRONT PANEL FUNCTIONS

### 4.10 Front panel layout



### 4.20 DISPLAY FUNCTIONS

The display has two digit with and is seven segment type. During normal working it shows the value of the temperature. In alarm condition it shows the proper indication as per alarm signaling.

The two points on the digits light in the following conditions: the first on the right lights during the compressor operation and the one on the left lights during the defrost.

### 4.40 READ /MODIFY FUNCTION OF THE SET POINT

- 1) Press 'SET' and hold for 3s. SET is displayed
- 2) Press 'SET' to view the Set Point, adjust '▲' or '▼'
- 3) Press 'SET' to confirm the data, after 10s the controller leave the set mode and the data will be stored in EEPROM memory.

**WARNING:** don't reset the instrument before leaving set mode, in this case the new settings will be lost.

Note: It is only possible to choose values for the set point inside the «Lds» and «hts» range.

### 4.50 READ / MODIFY FUNCTION FOR THE PARAMETERS MENU

- 1) Press 'SET' and hold for 10s, code of the first variable 'H5' will appear.
- 2) Press '▲' to view all the codes in forward sequence or '▼' to view all the codes in reverse sequence.
- 3) While a code is displayed press 'SET' to view its content, adjust '▲' or '▼'
- 4) Press 'SET' to confirm the data, after 10s the controller leaves the set mode and the data will be stored in EEPROM memory.

**WARNING:** don't reset the instrument before leaving set mode, in this case the new settings will be lost.

### 4.60 ACTIVATION / DEACTIVATION OF THE DEFROST FUNCTION

Press and hold for 10s '▲'.

Defrost led 3 ON.

### 4.70 LOCK / UNLOCK KEYBOARD

Press and hold the 'SET' and '▲' key at the same time for 10s to lock / unlock the keyboard.

Code displayed for a second: Pof Locked.

Pon Unlocked.

## 5.00 OPERATING PARAMETERS

Factory Settings

↓	DISPLAY	MEANING	SETTING
	SEt	Main set point.	Limits between «LOS» & «HIS».
2	HyS	Thermostat differential (Hysteresis).	Limits 0-8 °C.
-30	LoS	Minimum value for SET POINT parameter.	Limits -50...150 °C.
15	HiS	Maximum value for SET POINT parameter.	Limits -50...150 °C.
0	Act	Thermostat action cold / heat.	0: direct (cold); 1: rev (heat).
N/A	LoA	Low limit of operation of alarm temperature.	Limits -50...150 °C.
N/A	HiA	High limit of operation of alarm temperature.	Limits -50...150 °C.
0	Alr	Alarm mode of operation.	0: disabled; 1: enable HIT; 2: enable LOT; 3: enable HIT&LOT.
0	OFS	Offset, temperature correction factor.	Limits -10...10 °C.
N/A	dPt	Defrost pause time.	Limits 1...99 Hrs.
0	ddt	Defrost duration time.	Limits 0...99 min.
0	AcY	Anticycling time.	Limits 0...254 sec.
N/A	Adi	Alarm delay initialization.	Limits 0...99 min.
10	utd	Update time delay.	0...60 s.
1	rES	Resolution.	0: decimal point; 1: unit.
0	unt	Measuring unit.	0: Celsius. 1: Fahrenheit.

### NOTE:

- 1) If you set **ddt = 0**, the defrost management is disabled and the controller operates as a normal «thermostat».
- 2) If you set **Act = 1**, (heating applications) the controller automatically sets **ddt = 0** and hides the parameters **ddt** and **dPt**.

## 7.00 ANOMALIES SIGNALING

MSG	CAUSE	OUTPUT
LOI	Measured temperature is lower than «LoA».	Do not change.
HI1	Measured temperature is higher than «HiA».	Do not change.
PrF	The probe input line is open or short circuited.	Off.

## 6.00 PARAMETERS DESCRIPTION

**Set - Main Set Point:** it's the required temperature in the cold room.

**HyS - Differential Hysteresis:** it is the value that controls the compressor / heater operation, moving the value of the set point in such a way that the system do not oscillate.

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

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**LoA - Low operation point of alarm temperature:** it is the limit below of which the system goes in alarm condition indicated by «LoT» displaying.

**HiA - High operation point of alarm temperature:** it is the limit above of which the system goes in alarm condition indicated by «Hit» displaying.

**Alr - Alarm mode of operation:** it is the high and low temperature alarms can be enabled or disabled as required by installer. There are the following possibilities: 0 = all alarms disabled, 1=only high temperature alarm enable, 2 = only low temperature alarm enable, 3 = high and low temperature alarms enabled.

**OFS - Offset of temperature:** it is the 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 elapses between two defrosts.

**ddt - Defrost duration time:** it is the time duration of the defrost. **Set ddt = 0 to disable off cycle defrost.**

**AcY - Anticycling delay time:** it is the minimum time between two switching-on of the compressor ( on - off - on cycle).

**Adi - Alarm delay initialization:** it is the delay between the power-up of the instrument and the arming of the alarms if enabled.

**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.

**unt - Measuring unit:** it allows to display the temperature and set the instrument in °C or °F.

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