MT-543Ri plus
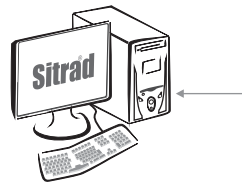
THEE OUTPUT DIGITAL CONTROLLER WITH ALARM, CYCLICAL TIMER AND SERIAL COMMUNICATION

Ver. 03

1. DESCRIPTION

MT-543Ri plus has three outputs of temperature control and a internal buzzer. Because of its versatility, it permits that the second stage works as alarm and the third, besides to work as cyclical timer, it can work with the first stage in systems that need minimum ventilation. Through the serial output RS-485, it permits communication with SITRAD® software.
Product complies with CE (European Union) and UL Inc. (United States and Canada)..

2. APPLICATION

• Blood banks
• Multistage temperature system
• Air conditioning
• Data centers

3. TECHNICAL SPECIFICATIONS

- Power Supply: MT-543Ri plus - 115/230 Vac ±10% (50/60 Hz)
  MT-543RiL plus - 12/24 Vac/dc
- Control Temperature: NTC: -50 to 105 °C (± 0.1°C)
  PT-100: -99 to 300 °C (± 1 °C)
- Dimensions: 71 x 28 x 71 mm
- Operating temperature: 0 to 50 °C
- Operating humidity: 10 to 90% RH (without condensation)
- Load Current: 5(3)A / 250Vac 1/8HP each output

CLASSIFICATION ACCORDING TO IEC60730-2-9 STANDARD:
- Temperature limit of the installation surface: 50°C
- Type of construction: Built-in electronic controller
- Automatic action: Type 1
- Control of pollution: Level 2
- Impulse voltage: 1,5kV
- Temperature for the test of sphere pressure: 75°C and 125°C
- Insulation: Class II

4. PARAMETERS TABLE

Fun	Description	NTC			PT-100		
		Min	Max	Unit	Min	Max	Unit
F01	Access code:123(one hundred and twenty-three)	-	-	-	-	-	-
F02	Offset indication	-5.0	5.0	°C	-5	5	°C
F03	Operation mode of first stage	0	1	-	0	1	-
F04	Minimum setpoint allowed to the end user (first stage)	-50	105	°C	-99	300	°C
F05	Maximum setpoint allowed to the end user (first stage)	-50	105	°C	-99	300	°C
F06	Control differential (hysteresis) of first stage	0.1	20.0	°C	1	40	°C
F07	Minimum delay to turn on the first stage output	1	999	sec.	1	999	sec.
F08	Operation mode of second stage	0	4	-	0	4	-
F09	Minimum setpoint allowed to the end user (second stage)	-50	105	°C	-99	300	ºC
F10	Maximum setpoint allowed to the end user (second stage)	-50	105	°C	-99	300	ºC
F11	Control differential(hysteresis) of second stage	0.1	20.0	°C	1	40	ºC
F12	Minimum delay to turn on the second stage output	1	999	sec.	1	999	sec.
F13	Delay to enable the alarm when the instrument is powered on	1	999	min.	1	999	min.
F14	Alarm Time (on cycle)	1	999	sec.	1	999	sec.
F15	Alarm Time (off cycle)	1	999	sec.	1	999	sec.
F16	Operation mode of third stage	0	2	-	0	2	-
F17	Minimum setpoint allowed to the end user (third stage)	-50	105	°C	-99	300	°C
F18	Maximum setpoint allowed to the end user (third stage)	-50	105	°C	-99	300	°C
F19	Control differential (hysteresis) of third stage	0.1	20.0	°C	1	40	°C
F20	Minimum delay to turn on the third stage	1	999	seg.	1	999	sec.
F21	Time base of third stage cyclical timer	0	1	-	0	1	-
F22	Activation time for third stage cyclical timer	1	999	sec.	1	999	sec.
F23	Cyclical timer on third stage- time on	1	999	-	1	999	-
F24	Cyclical timer on third stage- time off	1	999	-	1	999	-
F25	Operation mode of cyclical timer	0	4	-	0	4	-
F26	Operation mode of Buzzer	0	2	-	0	2	-
F27	Acting point of Buzzer (inferior limit)	-50	105	°C	-99	300	°C
F28	Acting point of Buzzer (superior limit)	-50	105	°C	-99	300	°C
F29	Buzzer time on	1	999	sec.	1	999	sec.
F30	Buzzer time off	1	999	sec.	1	999	sec.
F31	Inhibition time of Buzzer during electrical supply	1	999	min.	1	999	min.
F32	Network equipment address RS - 485	1	247	-	1	247	-

OBS: To inhibit the alarms OUT2 and BUZZ press simultaneously ▼ and SET .

F01 - Access code: 123 (one hundred and twenty-three)
To change the parameters is necessary use the access code. It is not necessary to use the access code to visualize the adjusted parameters.

F02 - Offset indication
It allows to compensate eventual shunting lines in the reading of ambient temperature proceeding from the exchange of the sensor or cable lenght alteration.

F03 - Operation mode of first stage
0 - Refrigeration
1 - Heating

F04 - Minimum setpoint allowed to the end user (first stage)

F05 - Máximum setpoint allowed to the end user (first stage)
Electronic limits whose purpose is prevent that too high or too low setpoint temperatures are regulated.

F06 - Control differential (hysteresis) of first stage
It is the difference of temperature(hysteresis) between turn ON and turn OFF the OUT1 output.

F07- Minimum delay to turn on the first stage output
 It is the minimum time that OUT1 will keep turned off, it means, space of time between the last stop and the next start.

F08 - Operation mode of second stage
0 - Refrigeration
1 - Heating
2 - Intra-range alarm
3 - Extra-range alarm
4 - Relative extra-range alarm

F09 - Minimum setpoint allowed to the end user (second stage)

F10 - Maximum setpoint allowed to the end user (second stage)
Electronic limits whose purpose is prevent that too high or too low setpoint temperatures are regulated.
When the second stage (F08) is defined as alarm, the acting points are defined in F09 and F10.

F11 - Control differential(hysteresis) of second stage
It is the difference of temperature(hysteresis) between turn ON and turn OFF the output OUT2.

F12- Minimum delay to turn on the second stage output
It is the minimum time that the output OUT2 will keep turned off, it means, the space of time between the last stop ant the next start.

F13 - Delay to enable the alarm when the instrument is powered on
During this time the alarm is kept turned off waiting that the system reaches the working control temperature.

F14 - Alarm time (on cycle)
It allows to adust the time that OUT2 output will keep turned on. This function acts only with F8 configured as alarm.

F15 - Alarm time (off cycle)
It allows to adust the time that OUT2 output will keep turned off.This function acts only with F8 configured as alarm. To keep the alarm always activated just set "0" in this function.

F16 - Operation mode of third stage
0 - Refrigeration
1 - Heating
2 - Cyclical Timer

F17 - Minimum setpoint allowed to the end user (third stage)

F18 - Maximum setpoint allowed to the end user (third stage)
Electronic limits whose purpose is prevent that too high or too low setpoint temperatures are regulated.

F19 - Control differential (hysteresis) of third stage
It is the difference temperature (hysteresis) between turn ON and turn OFF the output OUT3.

F20- Minimum delay to turn on the third stage
It is the minimum time that the output OUT3 will keep turned off, it means, the space of time between the last stop and the next start.

F21-Time base of third stage cyclical timer
0 - seconds
1 - minutes

F22 - Activation time of third stage cyclical timer
This function depends of F25. Every time that the temperature reach the configured value in SP1 , the configured time in this function is respected, to be activated the cyclical timer after. To activate the timer when SP1 is reached just set "0" in this function.

F23 - Cyclical timer on trird stage- time on
It is the time that the timer will be turned on.

F24 - Cyclical timer on trird stage- time off
It is the time that the timer will be turned off.

F25 - Operation mode of cyclical timer
0 - Independent timer
1 - Timer started by the first stage setpoint
2 - First stage linked with cyclical timer (Timer starts on)
3 - First stage linked with cyclical timer (Timer starts off)
4 - Cyclical timer output turned on whenever the the first stage output is turned on

F26 -Operation mode of Buzzer
0 - Intra-range alarm (F27 and F28)
1 - Extra-range alarm (F27 and F28)
2 - Relative extra-range to first stage ($SP1$ - F27 and $SP1$ + F28)

F27 - Acting point of Buzzer (inferior limit)
It is the inferior value of temperature to the buzzer alarm act as the configured Operation Mode of Buzzer (F26).

F28 - Acting point of Buzzer (superior limit)
It is the superior value of temperature to the buzzer alarm act as the configured Operation Mode of Buzzer (F26)

F29 - Buzzer time on
It is the time that the Buzzer will be turned on (cycle on). To turn it off the sonore alarm (Buzzer) adjust the value "0" to this function.

F30 - Buzzer time off
It is the time that the buzzer will be turned off (cycle off). To turn the sonore alarm (Buzzer) always on, adjust the value "0" to this function.

F31 - Inhibition time of Buzzer during electrical supply
It is the time were the alarm will kept turned off even if in alarm contitions.
It serves to inhibit the buzzer during the time while the system do not reaches the working control temperature.

F32 - Network equipment address RS - 485
Each controller connected to the RS-485 network must have its own address different from the others so that the computer will be able to identify it.
Attention: To avoid communication problems, make sure that there are no controllers with the same address.

5. CONFIGURATIONS
5.1 - Control temperature adjust (SETPOINT)
- Press SET for 2 seconds until SEt appears ,then release it.
$SP1$ will appear and the temperature will be adjusted for the first stage.
- Use ▼ and ▲ to change the value and, when ready, press SET .
- Adjust in the same way $SP2$ (2nd estage) and $SP3$ (3rd stage).

6. PARAMETERS ALTERATION
- Access function "F01" by simultaneously pressing keys ▼ and ▲ for 2 seconds.
When the message Fun appears release the keys and wait for the $F01$ indication. When the indication appears on the display press the SET key and use ▼ and ▲ to enter the access code (123) When ready press the SET button to confirm.
- Use keys ▼ and ▲ to access the desired function.
- After selecting the function, press SET (press once quickly) to view the value configured for that function.
- Use the ▼ and ▲ keys to change the value and, when ready, press SET to memorize the configured value and return to the function menu.
- To exit the menu and return to the normal operation (temperature indication), press SET (hold it in) until $---$ appears.

7. FUNCTIONS WITH FACILITATED ACCESS
Register of minimum and maximum temperatures
Press ▲, appear the minimum registered temperatures. Soon will apears the the maximum registered temperature.
Note: To reset the registers, keep the key ▲ pressed during the visualization of minimum and maximum registers until rSt to be showed.

8. SIGNALING
OUT 1 - Output 1 turn on
OUT 2 - Output 2 turn on
OUT 3 - Output 3 turn on
BUZZ - Buzzer activated
Err - Detached temperature sensor or outside the specified range

9. SELECTION OF THE SENSOR TYPE
F01 - Access code (312)
It is necessary when it is desired to select the sensor type.
After entering the code 312, use SET to confirm. Access the function SEn and select between ntc for NTC thermistor or $Pt-$ for PT100 sensor.
Everytime that a new sensor is selected the parameters must be adjusted.

9.1 - NTC SENSOR
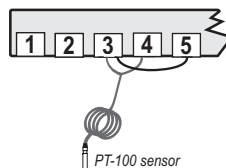It must be connected to the terminals 3 and 4, as showed below:
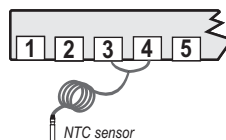
Sensor supplied with the controller.

NTC sensor

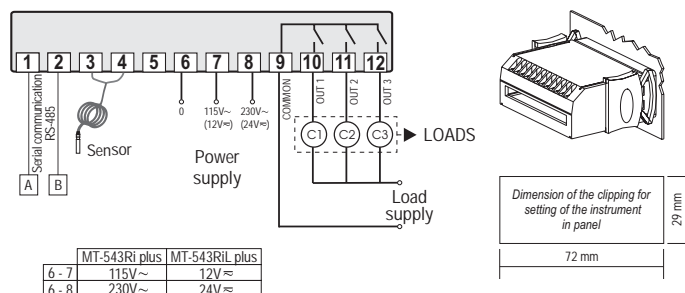### 9.2 - PT-100 SENSOR
It must be connected to the terminals 3 and 4 and with the terminals 3 and 5 interconnected, as showed below:

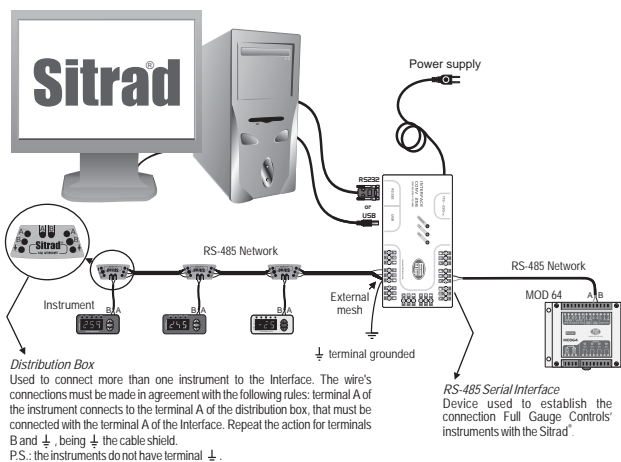*Sensor not supplied with the controller.*

PT-100 sensor

10. WIRING DIAGRAM

LOADS

Serial communication RS-485

Sensor

Power supply

Load supply

Dimension of the clipping for setting of the instrument in panel

72 mm
29 mm

	MT-543Ri plus	MT-543RiL plus
6 - 7	115V~	12V ≈
6 - 8	230V~	24V ≈

Note: The length of the sensor cable may be increased by the user up to 200 meters, using a PP 2 x 24 AWG cable. For immersion in water, use thermometric well.

Integrating Controllers, RS-485 Serial Interface and Computer

Power supply

RS232

USB

RS-485 Network

External mesh

RS-485 Network

MOD 64

Instrument

terminal grounded

Distribution Box
Used to connect more than one instrument to the Interface. The wire's connections must be made in agreement with the following rules: terminal A of the instrument connects to the terminal A of the distribution box, that must be connected with the terminal A of the Interface. Repeat the action for terminals B and ⏚, being ⏚ the cable shield.
P.S.: the instruments do not have terminal ⏚ .

RS-485 Serial Interface
Device used to establish the connection Full Gauge Controls' instruments with the Sitrad®.

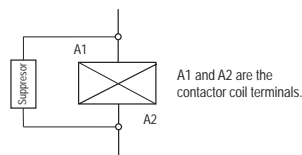### IMPORTANT
According to the chapters of norm IEC 60364:
1: Install protector against overvoltage on the power supply
2: Sensor cables and signal cables of the computer may be joined, but not in the same electric conduit through which the electric input and the activation of the loads run
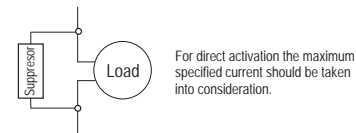3: Install transient suppresors (RC filters) parallel to the loads as to increase the product life of the relays.
For more information, please contact our Technical Support by e-mail: support@fullgauge.com or by phone +55 51 3475.3308

Schematic for the connection of supresors to contactors

A1 and A2 are the contactor coil terminals.

Schematic for the connection of supresors to direct activation loads

Load

For direct activation the maximum specified current should be taken into consideration.

PROTECTIVE VINYL:

This adhesive vinyl (included inside the packing) protects the instruments against water drippings, as in commercial refrigerators, for example.
Do the application after finishing the electrical connections.

Remove the protective paper and apply the vinyl on the entire superior part of the device, folding the flaps as indicated by the arrows.