



# MT-531Ri plus

## TEMPERATURE AND HUMIDITY DIGITAL CONTROLLER WITH SERIAL COMMUNICATION

Ver. 01



UL-Underwriters Laboratories

MT531PV01-03T-11051

### 1. DESCRIPTION

**MT-531Ri plus** is an instrument that indicates and controls the environment temperature and humidity, indicated for low and average relative air humidity (from 20 to 85%, without condensation) and temperature of -10 to 70°C. Its sensors of temperature and humidity are joined in an only bulb, that reduces the space in wiring of the installation.

The instrument has serial communication for connection with the SITRAD® via Internet.

Product complies with UL Inc. (United States and Canada).

Producto de conformidad con CE (Unión Europea) y UL Inc. (Estados Unidos y Canadá).

### 2. APPLICATION

- Poultry farm
- Humidifiers/dehumidifiers
- Grains drying
- Laboratories
- Surgical rooms
- Climatized cellars
- Information technology centers

### 3. TECHNICAL SPECIFICATIONS

- Power Supply: MT-531Ri plus - 115 or 230 Vac ±10%(50/60 Hz)  
MT-531RiL plus - 12 or 24 Vac/dc
- Control Temperature: -10 to 70.0 °C (with resolution of 0.1 °C)  
14 to 158 °F (with resolution of 1 °F)
- Control Humidity: 20 to 85%RH (with resolution of 0.1%UR)
- Load current: 5(3)A/250Vac 1/8HP (each output)
- Dimensions: 71 x 28 x 71 mm
- Operation temperature: 0 to 50 °C  
32 to 122 °F
- Operation humidity: 10 to 90% RH (without condensation)

### 4. CONFIGURATIONS

#### 4.1 - Temperature and humidity adjust (SETPOINT):

- Press **SET** for 2 seconds until **SEt** appears, then release it. The indication **TE** and the adjusted temperature for THERM output will appear.
- Use the keys **▼** and **▲** to change the value and then press **SET** to record it.
- Now **HE** and adjusted humidity for HUMID output will appear.
- Use the keys **▼** and **▲** to change the value and then press **SET** again.
- If the parameter F14 is configured as thermostat or humidistat the following message will appear: **TE2** or **HE2**.
- Use the keys **▼** and **▲** to change the value for the AUX output and then press **SET** to record it.

#### 4.2 - Parameters configuration

- Access the function F01 pressing simultaneously the keys **▼** and **▲** for 2 seconds until appearing **F01**, releasing after that. Soon it will appear **F01**, and then press **SET** (short touch).
- Use the keys **▼** and **▲** to enter access code (123) and, when ready press **SET** to confirm.
- Use the keys **▼** and **▲** to access the desired function.
- After selecting the function, press **SET** (short touch) to visualize the value configured for that function.
- Use the keys **▼** and **▲** to change the value, and when ready, press **SET** to memorize the configured value and return to the menu of functions.
- To leave the menu of functions and return to normal operation, press **SET** until appear **--**.

### 4.4 - Parameters description

Fun	Description	CELSIUS				FAHRENHEIT			
		Min.	Max.	Unit	Satandar	Min	Max	Unid	Padrão
F01	Access code: 123 (one hundred and twenty-three)	-99	999	-	-	-99	999	-	-
F02	Thermostat operation mode (THERM output)	0 - refrig.	1 - heat	-	0 - refrig.	0 - refrig.	1 - heat	-	0 - refrig.
F03	Minimum setpoint allowed to the user (thermostat)	-10.0	70.0	°C	-10.0	14	158	°F	14
F04	Maximum setpoint allowed to the user (thermostat)	-10.0	70.0	°C	70.0	14	158	°F	158
F05	Control differential (hysteresis) of the thermostat	0	20.0	°C	15	0	36	°F	3
F06	Minimum delay to turn the thermostat output on	0	999	seg.	0	0	999	seg.	0
F07	Humidistat operation mode (HUMID output)	0 - dehum.	1 - hum.	-	1 - hum.	0 - dehum.	1 - umid.	-	1 - hum.
F08	Minimum setpoint allowed to the user (humidistat)	0	100	%RH	0	0	100	%RH	0
F09	Maximum setpoint allowed to the user (humidistat)	0	100	%RH	100	0	100	%RH	100
F10	Control differential (hysteresis) of the humidistat	0	20.0	%RH	5	0	20.0	%RH	5
F11	Minimum delay to turn the humidistat output on	0	999	sec.	0	0	999	sec.	0
F12	Humidity output (time on)	0	999	sec.	5	0	999	sec.	5
F13	Humidity output (time off)	0	999	sec.	5	0	999	sec.	5
F14	Auxiliary output operation mode (AUX)	0	5	-	5	0	5	-	5
F15	Minimum setpoint allowed to the user (AUX output)	0	100	-	0	0	100	-	0
F16	Maximum setpoint allowed to the user (AUX output)	0	100	-	100	0	100	-	100
F17	Control differential (hysteresis) of the AUX output	0	20.0	-	5	0	20.0	-	5
F18	Minimum delay to turn the AUX output on	0	999	sec.	0	0	999	sec.	0
F19	AUX output (time on)	0	999	sec.	5	0	999	sec.	5
F20	AUX output (time off)	0	999	sec.	5	0	999	sec.	5
F21	Low room temperature alarm	-10.0	70.0	°C	-10.0	14	158	°F	14
F22	High room temperature alarm	-10.0	70.0	°C	70.0	14	158	°F	158
F23	Low room humidity alarm	0	100	%RH	0	0	100	%RH	0
F24	High room humidity alarm	0	100	%RH	100	0	100	%RH	100
F25	Minimum delay to turn the AUX output on (alarm mode)	0	999	min.	0	0	999	min.	0
F26	Buzzer operation mode	0	1	-	1	0	1	-	1
F27	Acting point of temperature Buzzer (inferior limit)	-10.0	70.0	°C	-10.0	14	158	°F	14
F28	Acting point of temperature Buzzer (superior limit)	-10.0	70.0	°C	70.0	14	158	°F	158
F29	Acting point of humidity Buzzer (inferior limit)	0	100	%RH	0	0	100	%RH	0
F30	Acting point of humidity Buzzer (superior limit)	0	100	%RH	100	0	100	%RH	100
F31	Buzzer time on	0	999	sec.	1	0	999	sec.	1
F32	Buzzer time off	0	999	sec.	1	0	999	sec.	1
F33	Inhibition time of Buzzer during electrical supply	0	999	min.	0	0	999	min.	0
F34	Display mode	0	2	-	0	0	2	-	0
F35	Temperature display offset	-5.0	5.0	°C	0	-9	9	°F	0
F36	Humidity display offset	-20.0	20.0	%RH	0	-20.0	20.0	%RH	0
F37	Network equipment address RS-485	0	247	-	1	0	247	-	1

Example: Humidification  
 Control = 80% RH \*Time on = 20 sec  
 Hysteresis = 5% RH \*Time off = 10 sec  
 When humidity falls to 75% RH (80 - 5), the humidistat output starts to cycle: 20 sec. on - 10 sec. Off

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

F02 - Thermostat operation mode (THERM output)  
 0 - Refrigeration  
 1 - Heating

F03 - Minimum setpoint allowed to the end user (thermostat)

F04 - Maximum setpoint allowed to the end user (thermostat)  
 It is to prevent that incorrect high or low temperatures be regulated.

F05 - Control differential (hysteresis) of the thermostat  
 It is the difference of temperature (hysteresis) between ON and OFF the THERM output.

F06 - Minimum delay to turn the thermostat output on  
 It is the minimum time that the thermostat will keep turned off, it means, the space of time between the last stop and the next start.

F07 - Humidistat operation mode (HUMID output)  
 0 - Dehumidification  
 1 - Humidification

F08 - Minimum setpoint allowed to the user (humidistat)

F09 - Maximum setpoint allowed to the user (humidistat)  
 Electronic limits whose purpose is prevent that too high or too low setpoint humidities are regulated.

F10 - Control differential (hysteresis) of the humidistat  
 It is the difference of humidity (hysteresis) between turn ON and turn OFF the HUMID output.

F11 - Minimum delay to turn the humidistat output on  
 It is the minimum time that the HUMID output will keep turned off, it means, the space of time between the last stop and the next start.

F12 - Humidity output (time on)  
 It allows to adjust the time that HUMID output will keep turned on.

F13 - Humidity output (time off)  
 It allows to adjust the time that HUMID output will keep turned off.  
 Note: F12 and F13 functions control a cyclical program (in seconds) for the humidistat output. This cyclical program allows that pulverized water has time to transform in relative air humidity. To disable this function, adjust then with value "00.0".

F14 - Auxiliary output operation mode (AUX)  
 0 - Refrigeration  
 1 - Heating  
 2 - Dehumidification  
 3 - Humidification  
 4 - Intra-range alarm  
 5 - Extra-range alarm  
 When changing the value of this function the following parameters will be automatically adjusted with their default values: F15, F16, F17 and setpoint for the AUX output.

F15 - Minimum setpoint allowed to the user (AUX output)

F16 - Maximum setpoint allowed to the user (AUX output)  
 Electronic limits whose purpose is prevent that too high or too low setpoint values are regulated. The limits will depend on the operation mode of the output adjusted in F14.

F17 - Control differential (hysteresis) of the AUX output  
 It is the difference of temperature or humidity (hysteresis) between turn ON and turn OFF the AUX output. This function depends on the operation mode of the output adjusted in F14.

F18 - Minimum delay to turn the AUX output on  
 It is the minimum time that the AUX output will keep turned off, it means, the space of time between the last stop and the next start.  
 This time is valid only when AUX output will be configured in the control mode (F14 configured in 0, 1, 2 or 3).

F19 - AUX output (time on)  
 It allows to adjust the time that AUX output will keep turned on.

F20 - AUX output (time off)  
 It allows to adjust the time that AUX output will keep turned off.

F21 - Low room temperature alarm  
 Temperature for activation of the low temperature alarm.

F22 - High room temperature alarm  
 Temperature for activation of the high temperature alarm.

F23 - Low room humidity alarm  
 Humidity for activation of the low humidity alarm.

F24 - High room humidity alarm  
 Humidity for activation of the high humidity alarm.

F25 - Minimum delay to turn the AUX output on (alarm mode)  
 It is the minimum time that the AUX output will keep turned off, it means, the space of time between the last stop and the next start. This time is valid only when AUX output will be configured in the alarm mode (F14 configured in 4 or 5).

F26 - Buzzer operation mode  
 0 - Intra-range alarm  
 1 - Extra-range alarm

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

F29 - Acting point of humidity Buzzer (inferior limit)  
 It is the inferior value of humidity to the buzzer alarm act as the configured Operation Mode of Buzzer (F26).

F30 - Acting point of humidity Buzzer (superior limit)  
 It is the superior value of humidity to the buzzer alarm act as the configured Operation Mode of Buzzer (F26).

F31 - 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.

F32 - 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.

F33 - Inhibition time of Buzzer during electrical supply  
 It is the time were the alarm will kept turned off even if in alarm conditions. It serves to inhibit the buzzer during the time while the system do not reaches the working control temperature.

F34 - Display mode  
 0 - alternated indication of temperature and humidity  
 1 - only indication of temperature  
 2 - only indication of humidity

F35 - Temperature display offset  
 It allows to compensate eventual shunting lines in the reading of temperature proceeding from the exchange of the sensor or cable length alteration.

F36 - Humidity display offset  
 It allows to compensate eventual shunting lines in the reading of humidity proceeding from the exchange of the sensor or cable length alteration.

F37 - Network equipment address  
 This is the device address for communication with Sitrad® software.  
 Note: You cannot have two or more devices with the same address in the network.

## 5. FUNCTIONS WITH FACILITATED ACCESS

### 5.1- Registers of minimum and maximum temperature and humidity

Press **▲**. Will appear **LT** followed for minimum and maximum registered temperatures. After that will appear **HT** and the minimum and maximum registered humidity.  
 Note: To reset the registers, keep pressed **▲** during the visualization of the minimum and maximum registers until appear **F5E**.

### 5.2 - To visualize humidity or temperature

If the F16 function is not in the alternating way of visualization ("0") it's possible visualize temperature or humidity by pressing the **▼** key.

## 6. SIGNALLING

Led THERM on - Thermostat output on  
 Led HUMID on - Humidistat output on  
 Led AUX on - Auxillar output on  
 Led BUZZ on - Buzzer activated

**EE** - Irregular temperature sensor

**EE** - Irregular humidity sensor

**PPP** - Invalid configuration parameters;

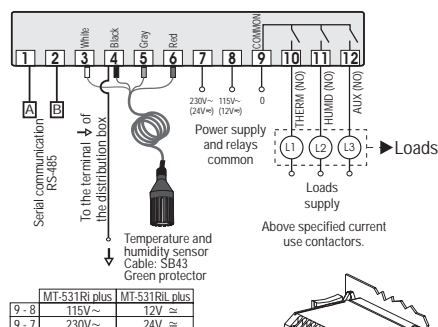
- In this situation the outputs are turned off;

- Check which parameters have invalid data and correct them to return to normal operation.

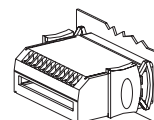
## 7. SELECTION OF THE UNIT (C° / F°)

In order to define the unit that the instrument will operate in, enter function "F01" with the access code "231" and confirm with the **SET** key. Press the **▲** key and the indication **U<sub>01</sub>** will appear. Press **SET** to choose between **0C** or **0F** and confirm. After selecting the unit the **F01** message will appear, and the instrument will return to the function "F01". Every time that the unit is changed, the parameters should be reconfigured, since they assume the "standard" values.

## 8. WIRING DIAGRAM

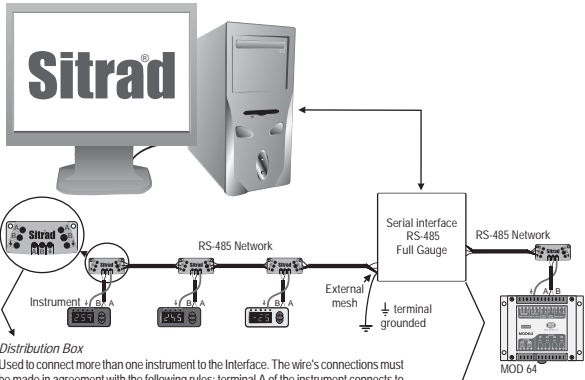


- (L1) - Contactor  
- Solenoid
- (L2) - Dehumidicator  
- Humidificator  
- Contactor  
- Solenoid
- (L3) - Dehumidificator  
- Humidificator  
- Contactor  
- Solenoid  
- Alarm



Dimension of the clipping for setting of the instrument in panel  
 72 mm  
 29 mm

Integrating Controllers, RS-485 Serial Interface and Computer



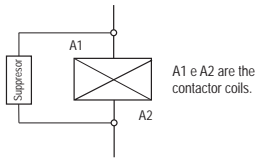
**Distribution Box**  
Used to connect more than one instrument to the Interface. The wire's connections must be made in agreement with the following rules: terminal A of the instrument connects to the terminal A of the distribution box, that must be connected with the terminal A of the Interface. Repeat the action for terminals B and ↓, being ↓ the cable shield. The terminal ↓ of distribution box must be connected to the respective terminals ↓ of each instrument.

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

**IMPORTANT**

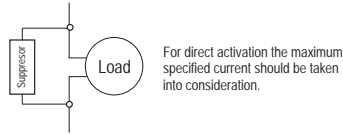
According to the chapters from the IEC60364 standard:  
 1: Install protectors against over voltage on power supply  
 2: Sensor cables and computer signals can be together, however not at the same place where power supply and load wires pass for  
 3: Install suppressor of transient in parallel to loads to increase the usefull life of the relays  
 For more information contact our application eng. department through e-mail support@fullgauge.com or dial +55 51 3475.3308.

Wiring diagram of suppressors in contactors



A1 e A2 are the contactor coils.

Wiring diagram of suppressor for direct drive



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

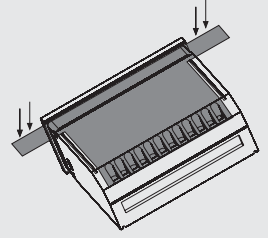
Note: The sensor cable lenght can be increased by the user until 200 meters using 4 x 0,20mm² cable.



**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.



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