



# MICROSOL R<sub>i</sub>

## DIFFERENTIAL THERMOSTAT FOR SOLAR HEATING

Ver.06



MC SOLRi6-05T-11020

## 1. DESCRIPTION

The **MICROSOL R<sub>i</sub>** is a differential thermostat for solar heating that commands a water circulation pump through the temperature differential that exists between the solar collector panels and the thermal reservoir or pool in solar heating systems.

**MICROSOL R<sub>i</sub>** has functions that improve the absorption of solar energy, prevent the freezing in the pipes during winter and control the overheating.

## 2. TECHNICAL SPECIFICATIONS

- **Power Supply:** MICROSOL Ri → 115/230 Vac ±10% (50/60 Hz)

MICROSOL RiL → 12/24 Vac/dc

- **Temperature control:** -50 to 105°C (\*)

- **Resolution:** 0.1°C

- **Load current:** 16(8)A/250 Vac 1HP

- **Dimensions:** 71 x 28 x 71 mm

- **Operation temperature:** 0 to 50°C

- **Operation humidity:** 10 to 90% RH (without condensation)

(\*) This instrument can measure and control up to 200°C temperatures, since used with silicone cable sensor (ex.: SB59).

## 3. CONFIGURATIONS

### 3.1 - To access the function menu

- Press the key **SET** for 2 seconds until **Fun** appears, release it after that.
- When **Fun** appears, press **SET** (short touch) and insert the access code (123) through the keys **1** and **2**. To confirm press **SET**.
- Through the keys **1** and **2** access the other functions and do the same to adjust them.
- To reset the menu and return normal operation, press **SET** (long touch) until **---** appears.

### 3.2 - Parameters table

| Fun         | Description                                                           | Min          | Max                | Unit | Standard     |
|-------------|-----------------------------------------------------------------------|--------------|--------------------|------|--------------|
| <b>Code</b> | Access code 123 (one hundred and twenty-three)                        | 0            | 999                | -    | 0            |
| <b>Ind</b>  | Preferential indication                                               | <b>d 1 F</b> | <b>e - 3</b>       | -    | <b>e - 2</b> |
| <b>dOn</b>  | Differential (T1-T2) to turn on the pump                              | 1.0          | 40.0               | °C   | 8.0          |
| <b>dOff</b> | Differential (T1-T2) to turn off the pump                             | 1.0          | 40.0               | °C   | 4.0          |
| <b>ICE</b>  | Temperature of anti-freeze (S1) in the collectors to turn on the pump | 2.9          | 10.0               | °C   | 8.0          |
| <b>HE 1</b> | Overheating temperature (S1) to turn off the pump                     | 0.0          | 105 <sup>(*)</sup> | °C   | 90.0         |
| <b>HE 2</b> | Overheating temperature (S2) to turn off the pump                     | 0.0          | 105 <sup>(*)</sup> | °C   | 90.0         |
| <b>HE 3</b> | Overheating temperature (S3) to turn off the pump                     | 0.0          | 105 <sup>(*)</sup> | °C   | <b>nOP</b>   |
| <b>rES</b>  | Cooling (S3)                                                          | <b>OFF</b>   | <b>On</b>          | -    | <b>OFF</b>   |
| <b>HY 2</b> | Overheating temperature hysteresis of S2 sensor                       | 0.1          | 5.0                | °C   | 1.0          |
| <b>HY 3</b> | Overheating temperature hysteresis of S3 sensor                       | 0.1          | 5.0                | °C   | 1.0          |
| <b>OF 1</b> | S1 Display offset                                                     | -5.0         | 5.0                | °C   | 0.0          |
| <b>OF 2</b> | S2 Display offset                                                     | -5.0         | 5.0                | °C   | 0.0          |
| <b>OF 3</b> | S3 Display offset ( ** )                                              | -5.0         | 5.0                | °C   | 0.0          |

(\*) This parameter allows adjustments up to 200°C but to work on these conditions it has to be used with silicone cable sensor (ex.: SB59).

### 3.3 - Parameters description

#### **Code** Access code (123)

This code is required to change configuration parameters, while it is not required to display the parameters.

#### **Ind** Preferential indication (what will be displayed)

- d 1 F** Sensors differential (S1 - S2)
- e - 1** Collector temperature (S1)
- e - 2** The thermal reservoir or pool (S2)
- e - 3** Surface temperature.

The other temperatures can be quickly checked by holding down **1** or **2** keys for a few seconds and then returning automatically to the indication that was selected in **Ind** as preferential.

#### **dOn** Differential of temperature (T1-T2) to turn on the pump

While the solar collectors receive energy, the sensor 1 temperature will increase. When this temperature is higher than the sensor S2 temperature, the pump is turned on and circulates down the heated water, storing in the thermal reservoir, for example.

#### **dOff** Differential of temperature (T1-T2) to turn off the pump

With the pump on, the hot water circulates down and the cold water circle up. Then the difference between S1 and S2 temperature tends to decrease.

When the temperature decreases to a determined value, the pump is turned off, stopping the water circulation.

#### **ICE** Temperature of anti-freeze (S1) in the collectors to turn off the pump

When the collectors temperature (sensor S1) is low (winter nights, ex.), the pump is turned on, periodically, to avoid water from freezing in the hoses. The hysteresis is fixed in 5°C.

To disable this function set the adjustment to the minimum until appears **nOP**.

#### **HE 1** Overheating temperature (S1) to turn the pump off

When temperature in collectors (sensor S1) will be above of a determinable value, the pump is turned off to hinder that the overheated water circulates for the pipes and it damages them (case PVC pipes are used). The fixed hysteresis is in 2°C.

#### **HE 2** Overheating temperature (S2) to turn the pump off

When the temperature in sensor S2 reaches a determinable value, the pump is turned off to prevent thermal discomfort. This function is used in heating systems for pools that do not use the third sensor. The hysteresis can be adjusted from 0,1 to 5,0 °C. (See function **HY 2**).

#### **HE 3** Overheating temperature (S3) to turn the pump off

When the temperature in sensor S3 reaches a determinable value, the pump is turned off to prevent the thermal discomfort. This function is used in heating systems for pools that use the third sensor to measure temperature in surface. The hysteresis can be adjusted from 0,1 to 5,0 °C. (See function **HY 3**).

**Note:** This function also serves to disable sensor S3 (when it is not used), being enough to dislocate the adjustment for maximum until appearing the indication **nOP**.

#### **rES** Cooling

This function only appears if S3 sensor will be qualified. It has the purpose to cool the pool during the night always that overheating temperature of this sensor will be exceeded and the difference of temperature between S1 and S2 to reach -4°C. Then the pump is turned on using the collector as radiator to cool the water of pool.

When the difference (S1-S2) lower or the temperature in the S3 sensor to reset overheating, the pump is off.

#### **HY 2** Overheating temperature hysteresis of S2 and S3 sensors

**HY 3** Case the pump will be off for overheating in sensors S2 or S3, through these functions a time interval can be defined where the pump will keep off.

#### **OF 1** Indication locking of sensors (S1, S2, S3)

**OF 2** It allows to compensate eventual shunting lines in the reading of sensors S1 (collectors), S2 **OF 3** (reservoir) and S3 (surface), proceeding from the exchange of the sensor or alteration of cable length. (It only can be visualized if third sensor will be qualified).

**PS:** To disable the third sensor see explanation in the function **HE 3**.

**IMPORTANT:** The adjusted value in the function **dOn** must be bigger than the value adjusted in the function **dOff**. Thus being, **MICROSOL R<sub>i</sub>** does not allow that invalid adjustments are made similar to guarantee its perfect functioning.

Ex.: Current configuration { **dOn** 10.0°C  
                                      **dOff** 5.0°C } You want to change for { **dOn** 4.0°C  
                                      **dOff** 2.0°C }

First adjust **dOff** for 2.0°C and after soon adjust **dOn** for 4.0°C.

## 4. SIGNALLING

**PUMP** signal the pump status.

**T1** and **T2** indicate which temperature is being displayed.

| T1 | T2 | Indication         |
|----|----|--------------------|
| ●  | ○  | Sensor 1           |
| ○  | ●  | Sensor 2           |
| ●  | ●  | Differential S1-S2 |
| ○  | ○  | Sensor 3           |

While programming, parameters T1 and T2 keep blinking.

If the sensors are disconnected or out of the specified range, a message will appear on the display, indicating the sensor.

**Er 1** Sensor 1 irregular

**Er 2** Sensor 2 irregular

**Er 3** Sensor 3 irregular

If the instrument shows in the display the message **PPP**, it means that was detected some parameter value outside the acceptable range and it needs to be corrected.

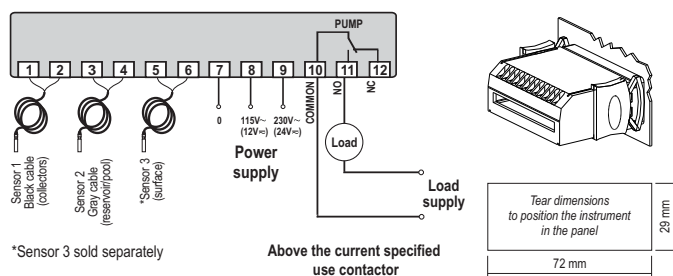
## 5. PARAMETER WITH EASY ACCESS

The **HE 2** setting, if enabled by the user, can be easily accessed by a quick touch on **SET** key.

To enable the easy access mode press **SET** for 15 seconds until appears **On** or **OFF**.

The default mode from factory is "disabled". When used in swimming pools this parameter allows setting the water temperature to turn off the circulation pump, avoiding thermal discomfort.

## 6. WIRING DIAGRAM



|       | MICROSOL Ri | MICROSOL RiL |
|-------|-------------|--------------|
| 7 - 8 | 115V ~      | 12V ~        |
| 7 - 9 | 230V ~      | 24V ~        |

**Note:** The sensors cables length can be increased by the user until 200 meters using the PP 2 x 24 AWG cable. For immersion in water use thermometric well.

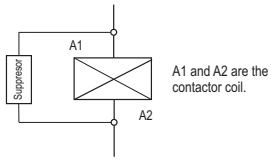
#### IMPORTANT

According to the chapters from the IEC60364 standard:

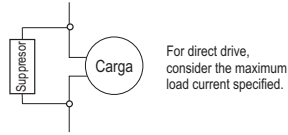
1. Install protectors against over voltage on power supply.
2. Sensor cables and computer signals can be together, however not at the same place where power supply and load wires pass for.
3. Install suppressors of transients (RC filters) in parallel to loads to increase the usefull life of the relays.
4. The withdrawal or substitution of the adhesive panel frontal as well as alterations in the electronic circuit on the part of the user implies in the cancellation of guarantee.

For more information contact our application eng. department through e-mail [support@fullgauge.com](mailto:support@fullgauge.com) or dial +55 51 3475.3308.

#### Wiring diagram of suppresor in contactors



#### Wiring diagram of suppresor linking in loads direct drive



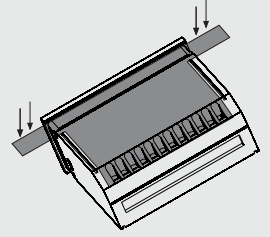
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#### PROTECTIVE VINYL:

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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