1. DESCRIPTION
Differential temperature controller for automation of solar heating systems, MICROsol II plus becomes simple the management of the temperature of the water in the thermal reservoirs and swimming pools, use the energy better.

It acts in the command of the water circulation pump through the differential of temperature between the solar collectors and the thermal reservoir or swimming pool. It is a dedicated instrument that has all its parameters of configuration protected by access code. It makes use of two solar backing outputs, that can be electric, gas, diesel or also to program the filtering of the swimming pool. Solar backing 1 is tied with an schedule that allows the configuration of up to four daily events for each day of the week and solar backing 2 can optionally be configured for functioning in set with the schedule.

It has functions that prevent the water freezing and overheating in the tubings and a clock with a internal battery to guarantee its synchronism, even in the energy lack, per many years. The instrument has serial communication for connection with the SITRAD via Internet.

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

2. APPLICATION
• Solar heating pumping systems

3. TECHNICAL SPECIFICATIONS
• Power supply: MICROsol plus: 115 or 230Vac ± 10% (50/60Hz)
MICROsol II plus: 12 or 24Vac±10c
• Control temperature: Sensor 1: -50 to 200°C / -58 to 392°F
Sensors 2 and 3: -50 to 105°C / -58 to 221°F
• Resolution: 0.1°C between -10 and 100°C and 1°C in the rest of the range
• 1" in all range
• Dimensions: 71 x 28 x 71mm
• Operating temperature: 0 to 50°C / 32 to 122°F
• Operating humidity: 10 to 90% RH (without condensation)
• Sensors: S1 - Sensor of the collectors
S2 - Sensor of the Reservoir/Pool
S3 - Sensor for control of solar backings
• Control outputs: PUMP - Water pump or solenoid - 5(3A)/250Vac 1/8HP
AUXX1 - solar backing 1 - 5(3A)/250Vac 1/8HP
AUXX2 - solar backing 2 - 5(3A)/250Vac 1/8HP

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. ADVANCED SETTINGS
4.1 - To access the options menu
Press the key simultaneouly for two seconds until it appears , then releasing it. When appears press the key (up) and enter the code (123) through keys and. To confirm, press the key. Through the keys and , access the other functions and proceed in the same manner to adjust them. To leave the menu and return to normal operations, press the key (long hit) until appears

4.2 - Options
Up: Access code entry
E: Advanced configuration functions
F: Events planner operating mode
P: Scheduling in the events planner
C: Adjustment of the clock and the day of the week

4.2.1 - Settings parameters

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4.2.1.1 - Parameters description

#1 - Indication of the preferential temperature
It allows the preferential temperature indication to be configured. You may choose between:

- Temperature in the sensor 1
- Temperature in the sensor 2
- Temperature in the sensor 3
- Differential temperature (S1-S2)

#2 - Differential for turning on the water circulation pump
It allows the adjustment of the differential temperature (S1-S2) to activate the water circulation pump. As the solar collectors receive energy, the temperature in sensor S1 increases. When this temperature is at a value established as being above the temperature of sensor S2, the pump is turned on and circulates under the heated water, storing it in the reservoir, for example.

#3 - Differential for turning off the water circulation pump
It allows the adjustment of the differential temperature (S1-S2) to turn off the water circulation pump. With the pump on, the hot water circulates below and cools upwards. After which time, the temperature difference between S1 and S2 tends to decrease. When this difference falls to an established level, the pump is turned off and the water circulation stops.

#4 - Minimum temperature at S1 to switch on the pump
Minimum temperature at sensor 1 to allow switching on the water circulation pump. To deactivate it, just decrement the value until the message OFF is displayed.

#5 - Pump switch on delay
It allows setting the minimum time the pump must be switched off before being switched on again. It prevents switching the pump on and off at short intervals, thus increasing pump's service life. It also defines the delay to switch on the pump after switching on the controller.

#6 - Negative differential (S1-S2) to switch on the pump to dissipate heat
Negative differential (S1-S2) to switch on the water circulation pump. Its allows dissipating heat to reduce any excess temperature in the water tank. To deactivate it, just increment the value until the message OFF is displayed.

#7 - Minimum temperature at S2 to allow activating heat dissipation
Minimum temperature at sensor 2 to allow activating the heat dissipation functions.
4.2.4 - Programming of the events schedule

In this mode, you can enter the values for the time periods for each event. The entry of the data depends on the operating mode configured. You can configure up to four events for each day. For each event, you can configure it to be deactivated, and all you have to do is increase the off time (for example) until the indication appears. It is also possible to configure an event to overlap that it begins in one day and it finishes in the other, and for that you should increase the off time until the option is displayed. If you do not need to use the four events, you can configure it to be deactivated, and all you have to do is increase the off time until the option is displayed. To disable the temperature sensor for the solar backing systems (sensor 3), access the function F03 in the network address displayed. Press to confirm.

4.2.5 - Adjustment of the current time and day of the week

Press the key until the message appears in the visor. Hit key . The settings will appear in the following order: HOURS = MINUTES = DAY OF THE WEEK

Ex.: 12h34min - Friday

5. FACILITATED ACCESS MENU

5.1 - To enter the menu
Press for two seconds until it appears, then release it.

5.2 - Facilitated access menu
Through the keys and access the functions and proceed with the adjustment. To leave the menu and return to normal operation, press (long hit) until appears.
5.2. Functions

- **Shortcut to adjust the parameter F13**
  This shortcut is used when the Microsol II plus is installed to control swimming pools heating systems. In this case the parameter F13 adjusts the maximum comfort temperature of the pool water.

- **Shortcut to adjust the parameter F16**
  Allows the facilitated adjust of the solar backing 1 temperature setpoint.

- **Shortcut to adjust the parameter F22**
  Allows the facilitated adjust of the solar backing 2 temperature setpoint.

- **Water pump start**
  It allows to set the operation mode of the water circulation pump, as follows:
  
  - **OFF**
    - Water pump always OFF
  
  - **ON**
    - Water pump always ON
  
  - **LA**
    - Circulation pump operating in automatic mode and not linked to sensor 3. With this mode the pump is activated only by temperature differential (S1-S2).
  
  - **LC**
    - Circulation pump operating in automatic mode and linked to sensor 3. With this mode the pump is activated by the temperature differential and when at sensor 1 is higher than at sensor 3.

- **Manual activation of solar backing 1**
  With this option the output of solar backing 1 is manually activated. The output is deactivated after the time adjusted in function (F67) expires. Upon entering this function again, the manual activation is overridden and the solar backing 1 returns to automatic operation.
  To disable the manual activation just configure the function (F67) to “000”.

- **Manual activation of solar backing 2**
  With this option the output of solar backing 2 is manually activated. The output is deactivated after the time adjusted in function (F67) expires. Upon entering this function again, the manual activation is overridden and the solar backing 2 returns to automatic operation.
  To disable the manual activation just configure the function (F67) to “000”.

6. QUICK VIEW

6.1 - View other temperatures

To switch between the temperature views for sensor 1, sensor 2, sensor 3 or temperature difference between sensors 1 and 2 (differential temperature), press the respective keys. If the desired temperature is displayed.

- **Sensor 1 temperature**
- **Sensor 2 temperature**
- **Sensor 3 temperature**
- **Differential temperature (S1-S2)**

The selected temperature will be displayed for 15 seconds and then the default indication returns (as per parameter setting).

6.2 - Visualize the current time

Quickly pressing the key enables you to visualize the time set in the controller, the current time will be shown, followed by the minutes and then the day of the week.

Ex.: 12h 43min - Friday

- **Hours**
- **Minutes**
- **Day of the week**

6.3 - View maximum and minimum temperatures

Pressing the key enables viewing the maximum and minimum temperature for each sensor, as well as the maximum and minimum temperature differentials. Upon pressing the key (short touch) the message will be displayed to indicate sensor 1 temperature and then its maximum and minimum temperatures will be displayed, then the temperatures for sensor 2, sensor 3 and differential ( ) will be displayed in sequence.

If the key ( ) is pressed during the visualization, the values will be reset and the message will be displayed.

7. SIGNALING

- **Sensor 1 (collectors) disconnected or out of range**
- **Sensor 2 (reservoir/pool) disconnected or out of range**
- **Sensor 3 (solar backings) disconnected or out of range**
- **Temperature for sensor 1 is freezing**
- **Temperature for sensor 1 is overheated**
- **Temperature for sensor 2 is overheated**
- **Configuration parameters not programmed or out of range**
- **Circulation pump in off manual mode**
- **Circulation pump in on manual mode**
- **Sensor 1 high temperature alarm**
- **Sensor 1 low temperature alarm**
- **Sensor 2 temperature**
- **Sensor 3 temperature**

8. UNIT SELECTION (°C/°F)

To define the unit that the system will use to operate, enter into the functions menu using the access code “231” and confirm it by hitting key . The indication will appear, press or to choose between °C or °F and confirm with key . After selecting the unit the message will appear, and the instrument will return to the function . Whenever the unit is altered, the parameters relating to the temperature must be reconfigured, since they assume “standard” values.

9. WIRING DIAGRAM

Note: The sensor cable length can be increased by the user until 200 meters using PP 2 x 24 AWG cable.

Integrating Controllers, RS-485 Serial Interface and Computer

IMPORTANT

According to the chapters of norm IEC 00364:

1. Install protective against overvoltage on the power supply.
2. Power 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 suppressors (RC filters) parallel to the loads to increase the product life of the relays.

For more information, please contact our Technical Support by e-mail: support@fulgauges.com or by phone +55 51 3475.3308.

Schematic for the connection of supresors to contactors

Schematic for the connection of supresors to direct activation loads

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.