



MICROSOL II *plus*

DIFFERENTIAL TEMPERATURE CONTROLLER FOR SOLAR HEATING WITH TWO SOLAR BACKING

Ver.03



MCSOL2V03-03T-11-708

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 solar 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 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).*

*The UL approval is only valid for Microsol II plus models with 115/230Vac power supply.

2. APPLICATION

- Solar heating pumped systems

3. TECHNICAL SPECIFICATIONS

- Power supply: Microsol II plus: 115 or 230Vac \pm 10% (50/60Hz)
Microsol II Lplus: 12 or 24Vac/dc
- 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°F 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(3)A/250Vac 1/8HP
AUX1 - solar backing 1 - 5(3)A/250Vac 1/8HP
AUX2 - solar backing 2 - 5(3)A/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 and simultaneously for two seconds until it appears , then releasing it. When appears press (tap) 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 (long hit) until appears.

4.2 - Options

- Access code entry
- Advanced configuration functions
- Events planner operating mode
- Scheduling in the events planner
- Adjustment of the clock and the day of the week

4.2.1 - Settings parameters

Fun	Description	CELSIUS				FAHRENHEIT			
		Min	Max	Unit	Standard	Min	Max	Unit	Standard
	Indication of the preferential temperature	0	3	-	1	0	3	-	1
	Differential for turning on the water circulation pump	1.0	40.0	°C	8.0	2	72	°F	14
	Differential for turning off the water circulation pump	1.0	40.0	°C	4.0	2	72	°F	7
	Minimum temperature at S1 to switch on the pump	-50.0	200	°C	-50.0	-58	392	°F	-58
	Pump switch on delay	0	999	sec.	0	0	99	sec.	0
	Negative differential (S1-S2) to switch on the pump to dissipate heat	-40.0	0.0	°C	0.0	-72	0	°F	0
	Minimum temperature at S2 to allow activating heat dissipation	0.0	105	°C	105	32	221	°F	221
	Antifreeze S1 to switch on the pump	2.9	10.0	°C	3.0	37	50	°F	37
	Antifreeze hysteresis	0.1	20.0	°C	1.0	1	36	°F	1
	Minimum antifreeze time	0	999	sec.	0	0	999	sec.	0
	Overheating temperature S1 to switch off the pump	0.0	200	°C	90.0	32	392	°F	194
	Overheating hysteresis to switch on the pump	0.1	20.0	°C	1	1	36	°F	1
	Overheating temperature S2 to switch off the pump	0.0	105	°C	105	32	221	°F	221
	Overheating hysteresis to switch on the pump (S2)	0.1	20.0	°C	1.0	1	36	°F	1
	Solar backing 1 operating mode	0	1	-	0	0	1	-	0
	Solar backing 1 temperature setpoint	-50.0	105	°C	35.0	-58	221	°F	95
	Solar backing 1 activation hysteresis	0.1	20.0	°C	1.0	1	36	°F	1
	Minimum value for solar backing 1 temperature setpoint	-50.0	105	°C	-50.0	-58	221	°F	-58
	Maximum value for solar backing 1 temperature setpoint	-50.0	105	°C	105	-58	221	°F	221
	Solar backing 1 manual activation time	0	999	min.	0	0	999	min.	0
	Solar backing 2 operating mode	0	5	-	0	0	5	-	0
	Solar backing 2 temperature setpoint	-50.0	105	°C	30.0	-58	221	°F	86
	Solar backing 2 activation hysteresis	0.1	20	°C	1.0	1	36	°F	1
	Minimum value for solar backing 2 temperature setpoint	-50.0	105	°C	-50.0	-58	221	°F	-58
	Maximum value for solar backing 2 temperature setpoint	-50.0	105	°C	105	-58	221	°F	221
	Solar backing 2 manual activation time	0	999	min.	0	0	999	min.	0
	Cyclic timer on time	1	999	min.	1	1	999	min.	1
	Cyclic timer off time	1	999	min.	1	1	999	min.	1
	Event schedule linking mode	0	3	-	0	0	3	-	0
	Minimum S1 temperature alarm	-50.0	200	°C	-50.0	-58	392	°F	-58
	Maximum S1 temperature alarm	-50.0	200	°C	200	-58	392	°F	392
	S1 temperature indication offset	-5.0	5.0	°C	0.0	-9	9	°F	0
	S2 temperature indication offset	-5.0	5.0	°C	0.0	-9	9	°F	0
	S3 temperature indication offset	-5.0	5.1	°C	0.0	-9	10	°F	0
	RS-485 network address	1	247	-	1	1	247	-	1

4.2.1.1 - Parameters description

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)

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.

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.

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.

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.

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 is displayed.

Minimum temperature at S2 to allow activating heat dissipation

Minimum temperature at sensor 2 to allow activating the heat dissipation functions.

F08 Antifreeze S1 to switch on the pump

It allows setting the temperature for which the collectors start to ice. When the temperature at the collectors (sensor 1) is too low (e.g. winter nighttime), the pump is switched on at regular intervals to prevent the water from freezing and damaging the pipes. To deactivate this function, just decrement the value until the message **nOP** is displayed.

F09 Antifreeze hysteresis

Hysteresis for the antifreeze function to switch off the water circulation pump.

F10 Minimum antifreeze time

Minimum time for which the antifreeze function stays on even if the temperature at sensor 1 returns to the normal value.

F11 Overheating temperature S1 to switch off the pump

It allows setting the overheating temperature of the collectors to switch off the water circulation pump. When the temperature at the collectors (sensor 1) is higher than an adjustable value, the pump is switched off to prevent the overheated water from circulating through the pipes and damaging them (if PVC pipes are used).

F12 Overheating hysteresis to switch on the pump

Overheating temperature hysteresis adjustment for sensor 1 to allow switching on the pump again.

F13 Overheating temperature S2 to switch off the pump (swimming pool temperature)

It allows setting the overheating temperature of the swimming pool to switch off the water circulation pump to avoid uncomfortable thermal conditions.

F14 Overheating hysteresis to switch on the pump (S2)

Overheating temperature hysteresis adjustment for sensor 2 to allow switching on the pump again.

F15 Solar backing 1 operating mode

It allows setting up the operating mode of the solar backing 1 output. The modes are:

- 0** Solar backing 1 working independently from solar backing 2
- 1** Solar backing 1 deactivated when solar backing 2 is activated

When this parameter has the value "1" and the solar backing 2 is activated the controller will display the message AA2. This option is used with solar heating systems containing gas (AUX1 output) and electrical (AUX2 output) heating backups. In this condition when the controller activates the solar backing 2 (electrical heating) it will alert the user that solar backing 1 (gas heating) is not working properly.

F16 Solar backing 1 temperature setpoint

Allows setting the activation temperature for solar backing 1.

F17 Solar backing 1 activation hysteresis

Hysteresis setting for solar backing 1 activation temperature setpoint.

F18 Minimum value for solar backing 1 temperature setpoint

Lower threshold aimed at preventing an exceedingly low temperature setpoint from being adjusted inadvertently for solar backing 1.

F19 Maximum value for solar backing 1 temperature setpoint

Upper threshold aimed at preventing an exceedingly high temperature setpoint from being adjusted inadvertently for solar backing 1.

F20 Solar backing 1 manual activation time

Time for which solar backing 1 stays on when activated manually. After this time solar backing 1 returns to automatic operation.

F21 Solar backing 2 operating mode

It allows setting up the operating mode of the solar backing 2 output. The modes are:

- 0** Cooling thermostat
- 1** Heating thermostat
- 2** Cooling thermostat linked to the event schedule
- 3** Heating thermostat linked to the event schedule
- 4** Cyclic timer with initial state "off"
- 5** Cyclic timer with initial state "off" and linked to the event schedule
- 6** Cooling thermostat for heat dissipation to reduce any excess temperature in the water tank.

F22 Solar backing 2 temperature setpoint

Allows setting the activation temperature for solar backing 2.

F23 Solar backing 2 activation hysteresis

Hysteresis setting for solar backing 2 activation temperature setpoint.

F24 Minimum value for solar backing 2 temperature setpoint

Lower threshold aimed at preventing an exceedingly low temperature setpoint from being adjusted inadvertently for solar backing 2.

F25 Maximum value for solar backing 2 temperature setpoint

Upper threshold aimed at preventing an exceedingly high temperature setpoint from being adjusted inadvertently for solar backing 2.

F26 Solar backing 2 manual activation time

Time for which solar backing 2 stays on when activated manually. After this time solar backing 2 returns to automatic operation.

F27 Cyclic timer on time

It allows adjusting the time for which the cyclic timer keeps its output on.

F28 Cyclic timer off time

It allows adjusting the time for which the cyclic timer keeps its output off.

F29 Event schedule linking mode

It allows linking the solar backing outputs to one or more of the four daily events. The possible modes are:

- | | |
|--|---|
| 0 Aux 1 linked to events 1, 2, 3 and 4
Aux 2 linked to events 1, 2, 3, and 4 | 2 Aux 1 linked to events 1 and 2
Aux 2 linked to events 3 and 4 |
| 1 Aux 1 linked to event 1
Aux 2 linked to events 2, 3, and 4 | 3 Aux 1 linked to events 1, 2, and 3
Aux 2 linked to event 4 |

F30 Minimum S1 temperature alarm

Temperature for sensor 1 low temperature alarm indication

F31 Maximum temperature alarm on S1

Indication temperature of high temperature on sensor 1

F32 S1 temperature indication offset

It allows setting sensor 1 (collectors) temperature indication offset.

F33 S2 temperature indication offset

It allows setting sensor 2 (tanks/swimming pool) temperature indication offset.

F34 S3 temperature indication offset

It allows setting sensor 3 (solar backing systems) temperature indication offset.

To disable the temperature sensor for the solar backing systems (sensor 3), access this function in the advanced function menu. Then press the key **▲** successively until the message **nOP** is displayed. Press **SET** to confirm.

After sensor 3 is disabled, solar backing 1 and 2 will be contracted [sic] by sensor 2 (tank/swimming pool).

If the activation of the water pump is linked to sensor 3 and this sensor is disabled, the controller will automatically unlink them.

F35 RS-485 network address

Equipment's network address for communicating with SITRAD® software.

Note: one network must not have different equipment with the same address.

4.2.3 - Events schedule operating mode

In this option, you can choose how the events planner will operate.

1b1 Weekly programming - In this mode, the instrument can configure up to 4 events for every day of the week.

2E6 Programming for business days - In this mode, the instrument keeps the events the same for business days (Monday through Friday), and allows the programming of different events for Saturday and Sunday.

1E7 Daily programming - In this mode, the instrument keeps the events the same for all of the days of the week.

4.2.4 - Programming of the events schedule

In this option, 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, the start and end time are configured through the options **0n1** **0F1** up to **0n4** **0F4**, where:

0n1 Start time for the first event

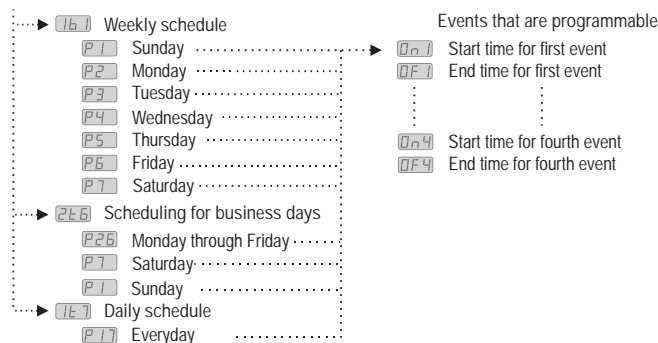
0F1 End time for the first event

⋮

0n4 Start time for the 4th event

0F4 End time for the 4th event

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 (**0F1** for example) until the **0FF** 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 **0F0** appears and adjust an event for the next day to start at 00h and 00min. According to the operating mode configured, the following scheduling possibilities may be presented.



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

Press the key **▲** until the message **CL0** appears in the visor.

Hit key **SET**. The settings will appear in the following order:

HOURS ➡ MINUTES ➡ DAY OF THE WEEK

Ex.: 12h43min - Friday

12h Hours

43' Minutes

5 Day of the week

5. FACILITATED ACCESS MENU

5.1 - To enter the menu

Press **SET** for two seconds until it appears **SEL**, then release it.

Through the keys **▼** and **▲** access the functions and proceed with the adjust of them. To leave the menu and return to normal operation, press **SET** (long hit) until **---** appears.

5.2 - Functions

F13 Shotcut 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.

F16 Shotcut to adjust the parameter F16

Allows the facilitated adjust of the solar backing 1 temperature setpoint.

F22 Shotcut to adjust the parameter F22

Allows the facilitated adjust of the solar backing 2 temperature setpoint.

PPP 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

Run Circulation pump operating in automatic mode and not linked to sensor 3. With this mode the pump is activated only by the temperature differential (S1-S2).

Run Circulation pump operating in automatic mode and linked to sensor 3. With this mode the pump is activated by the temperature differential and when the temperature at sensor 1 is higher than that at sensor 3.

RR1 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 F20 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 F20 to "000".

RR2 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 F26 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 F26 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 till 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 F01 parameter setting).

6.2 - Visualize the current time

Quickly pressing the key , you can 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.: 12h43min - 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

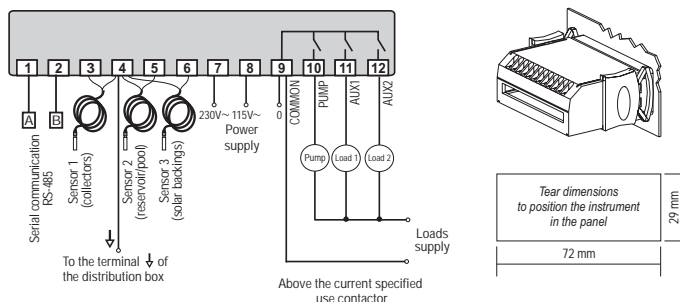
Sensor 1 low temperature alarm

Solar backing 2 activation alarm

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: or 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.

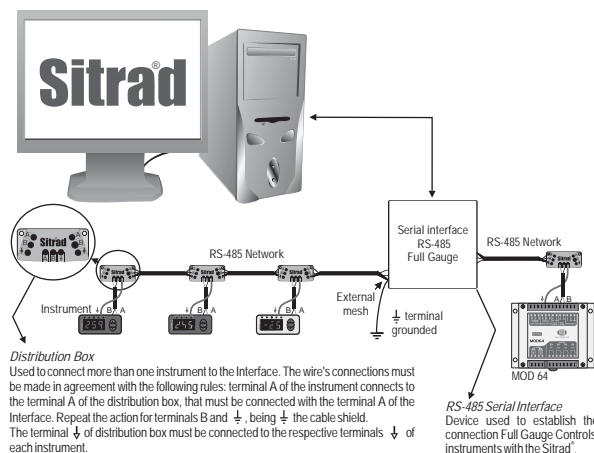
9. WIRING DIAGRAM



	MICROSOL II plus	MICROSOL II L plus
9 - 8	115V ~	12V ≈
9 - 7	230V ~	24V ≈

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 60364:

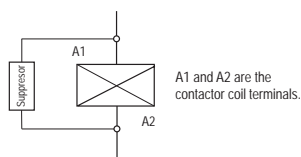
1: Install protector against overvoltage on the power supply.

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 suppressors (RC filters) parallel to the loads as to increase the product life of the relays.

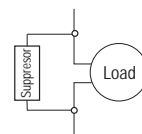
For more information, please contact our Technical Support by e-mail: support@fullgauge.com or by phone +55 51 3475.3308.

Schematic for the connection of suppressors to contactors



A1 and A2 are the contactor coil terminals.

Schematic for the connection of suppressors to direct activation loads



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.

