



Microsol BMP Advanced

SOLAR HEATING DIFFERENTIAL THERMOSTAT



Ver. 02



MCSOLADVNBMP02-03T-17328

1. DESCRIPTION

The **Microsol BMP Advanced** is a differential thermostat for solar heating with three sensors and two outputs, which operate in the water circulation pump control and in thermal support. It is equipped with a clock and an event schedule for economic and rational use of the thermal support, as well as the exclusive Vacation* function that adds protection and energy saving to the solar heating system in low hot water consumption periods.

The controller has functions that avoid overheating and the freezing of the water in the solar collector. It's equipped with access protection to the parameters settings.

The **Microsol Advanced** line is characterized by its unique design for use in residential environments, by the easiness of operation with keys for easy access to the controller's main resources and by the use of the custom display. The display technology employed allows presenting in a complete and simple manner the solar heating system's information, such as: output status, pump operation mode, and sensor position and temperature.

*required patent

2. APPLICATION

-Solar heating with auxiliary heating system

3. TECHNICAL SPECIFICATIONS

- **Power: Microsol BMP Advanced:** 230Vac ±10%(50/60Hz) or version 115Vac ±10%(50/60Hz)

- **Operation temperature:** 0 to 40°C

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

- **Sensors:** The **Microsol BMP Advanced** has 3 sensors:

Sensor T1: Solar Collector – SB59 Sensor, white cable, Silicone, 1m

Sensor T2: Thermal reservoir – SB19 Sensor, black cable, 2,5m

Sensor T3: Support – SB19 Sensor, black cable, 2,5m

- **Control temperature: Sensor T1:** -50 to 200°C / -58 to 392°F

Sensor T2: -50 to 105°C / -58 to 221°F

Sensor T3: -50 to 105°C / -58 to 221°F

- **Resolution:** 0.1°C between -10 and 100°C and 1°C in the remainder of the range 1°F in all of the range

- **Control output:** The **Microsol BMP Advanced** has two relay outputs:

PUMP - Relay output, max. 1HP in 220Vca (½HP in 127 Vca)

AUX - Relay output, max. 16A, resistance

3500W in 220Vca (1750W in 127 Vca)

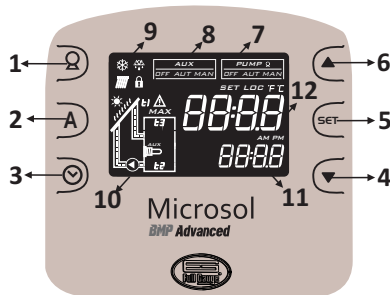
Obs: the sum of the loads should not surpass 24A

- **Dimensions:** 104 x 148 x 32 mm

- **Display:** LCD 2.75" with backlight

4. INDICATIONS AND SCREEN

4.1 PRESENTATION



| | |
|----|--|
| 1 | Pump mode key |
| 2 | Support mode key |
| 3 | Clock key |
| 4 | Lowering key |
| 5 | Set key |
| 6 | Increasing key |
| 7 | Indication of the pump operation mode |
| 8 | Indication of the operation support mode |
| 9 | Controller signals |
| 10 | Representation of the solar heating system |
| 11 | Lower display numbers |
| 12 | Upper display numbers |

4.2 INDICATIONS

| | |
|------------|--|
| SET | In programming, cleared parameter setting |
| LOC | In programming, blocked parameter setting |
| F | Fahrenheit scale temperature Indication |
| C | Celsius scale temperature Indication |
| | Pump turned on due to cooling function |
| | Pump turned on due to antifreeze function |
| | Pump turned on due to vacuum tube function |
| | Pump turned on due to temperature differential (T1-T2) |
| | Pump outlet turned on |

| | |
|-----------|---|
| | Support outlet turned on |
| | Support outlet turned on due to function F21 |
| E1 | T1 Sensor Position - solar collector |
| E2 | T2 Sensor Position - thermal reservoir |
| E3 | T3 Sensor Position - support |
| | Indicates overheating occurrence T1 |
| | Indicates overheating occurrence T2 |
| | Indicates that the maximum differential (T1-T2) for protection against thermal shock in the vacuum tube function has been exceeded. |
| | Indicates sensor error occurrence T1 |
| | Indicates sensor error occurrence T2 |
| | Indicates sensor error occurrence T3 |
| | Function block setting |
| AM | Before noon (standard clock 12pm) |
| PM | After noon (standard clock 12pm) |

5. OPERATIONS FOR DOMESTIC USER

5.1 KEY MAP

The controller has easy-access to user resources. Contains table with description of the following:

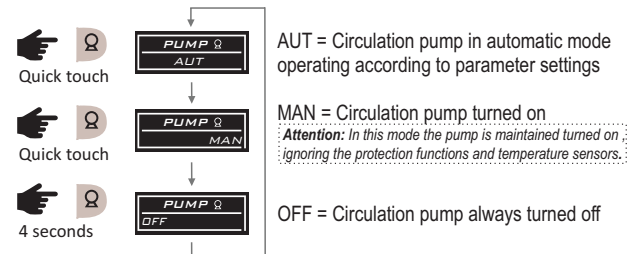
| | |
|------------|--|
| SET | Short touch: support heating temperature set |
| SET | Long touch (4 seconds): access to advanced settings |
| ▲ | Long touch (see F25 parameter): enables/disables function block |
| ▼ | Short touch: switches temperature display (DIF, T1, T2, T3) for 10 seconds |
| Q | Short touch: switches pump mode (AUT / MAN) |
| Q | Long touch (4 seconds): switch off pump (OFF mode) |
| A | Short touch: switches way support mode (AUT / MAN) |
| A | Long touch (4 seconds): enables/disables Vacation support mode (OFF) |
| ⌚ | Short touch: accesses hour and day settings menu |
| ⌚ | Long touch: (4 seconds): accesses settings menu for event schedule |

5.2 SUPPORT HEATING TEMPERATURE (SENSOR T3)

Defines the support operation temperature (T3). To set this parameter, give a short touch on key **SET**. Use keys **▼** or **▲** to set value. To confirm give a short touch on key **SET** and the value will be saved in the controller memory. This parameter can be adjusted between the values defined in the advanced settings for the parameters: **[F17]** - Minimum value for the support temperature and **[F18]** - Maximum value for support temperature.
Note: When the T3 sensor is deactivated in **[F24]**, the support is controlled by the T2 sensor.

5.3 WATER PUMP OPERATION MODE

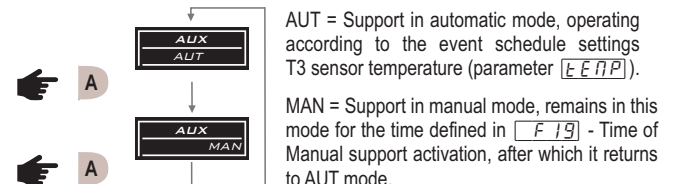
For every touch on key **Q** the water pump operation mode is switched. The water circulation pump between the solar collector and the thermal reservoir can operate in three distinct modes. A description follows:



Obs.: In the pump mode settings, the controller takes on the new mode 5 seconds after its selection. This also is the time necessary for the parameter to be stored in its memory. When the MAN mode is selected (MANUAL), the operation mode remains in this state for the period defined in function **[F19]** - Maximum pump time turned in manual mode. After, the controller takes on the AUT mode (AUTOMATIC). If you wish to return to AUT mode before this period, press the **Q** key at any time.

5.4 SUPPORT OPERATION MODE

On every short touch on the **A** key it is possible to change the support outlet operation mode between MAN and AUT modes.



Obs.: In the support mode settings, the controller takes on the new mode 5 seconds after its selection. This also is the time necessary for the parameter to be stored in its memory. The manual mode is used when one wishes to occasionally heat the thermal reservoir out of the schedules expected in the event schedule. In manual mode, the support outlet remains associated to the T3 sensor temperature through the Support Heating Temperature (parameter [EFP]). In this mode, the controller allows the support outlet to be turned on during the period programmed in parameter [F19].

5.4.1 VACATION MODE

To enable/disable the Vacation mode, the **A** key must be held for 4 seconds.



4 seconds

When enabled:

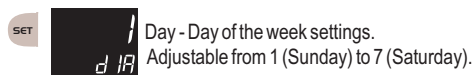
- * The event schedule is ignored, the support outlet is turned off, resulting in energy consumption reduction.
- * Performs the reservoir cooling as programmed in [F10] - temperature on T3 sensor to turn off cooling in Vacation mode.

The Vacation mode is used to turn off support and allow the reservoir to be cooled through the solar collector when its temperature is lower than the reservoir's, i.e.: during the night. In periods with low or no consumption of hot water and high solar intensity, for example, vacation, extended holidays or period away from the residence, the reservoir will reach its higher limit of temperature and the system of solar heating will be subject to high thermal load.

Obs.: In Support mode settings, the controller takes on the new mode 5 seconds after its selection. This also is the time necessary for the parameter to be stored in its memory.

5.5 TIME AND DAY SETTINGS

In order to access the Time and Day menu, just give a short touch on the key. Through the keys it is possible to navigate among the parameters to view them. In order to edit them press the **SET** key and through the keys update its value. The values will flash in adjustment mode. Confirm the time value with the **SET** key. After the confirmation, adjust the day and confirm with the **SET** key again to exit the adjustment mode.



NOTICE:

The controller has an internal auxiliary power supply to maintain the clock during power failure for at least 72 hours. If the controller remains turned off for a prolonged period of time, it will display the message [ECLD], indicating that the clock is deprogrammed. In this situation the controller's date and time must be set, keeping it energized for 10 hours so that the auxiliary source is fully recharged.

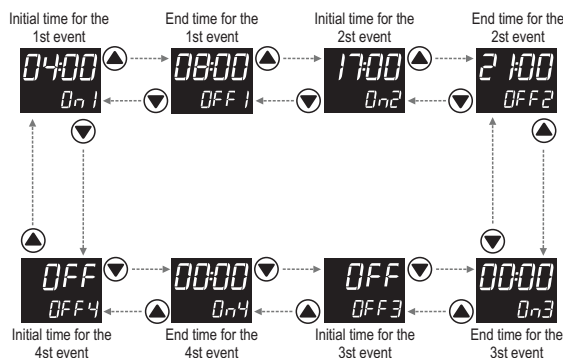
Obs.: In the parameter menu, to leave and return to normal operation (preferential indication of temperature and time) maintain the **SET** key pressed (long touch) until the message [---] appears. When the Fahrenheit temperature scale is selected, the clock acquires the 12h standard, and the AM and PM icons are used for time indication. In this scale, the Time and Day messages of the parameter description are replaced by Time and Day in the controller display.

5.6 EVENT SCHEDULE SETTINGS

To set the event schedule associated to the support outlet, you should hold the key for 4 seconds.

The schedule allows setting up to 4 events for each day of the week, as the programming performed in parameter [F20] - support event schedule operation mode. Each event is comprised by a final and initial schedule.

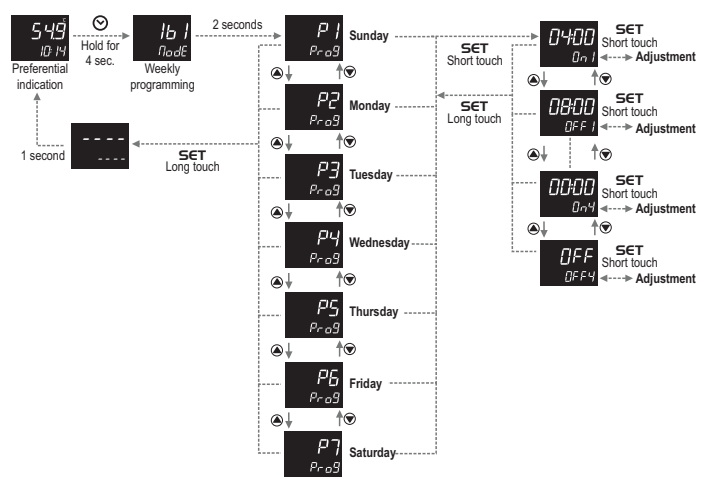
The event schedule gets factory settings in mode [1E7], same events for each day of the week, and the schedules are defined as follows:



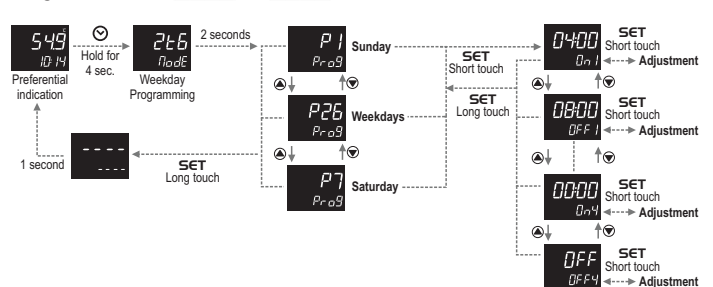
If it is not necessary to use all 4 events, you should set these in the turned off state, by just increasing the final time until [OFF] appears. It is possible to set an event that begins in one day and finishes in another. To do so you should raise the final event time until [Ero] appears and set on the following day the initial event with time on [00:00].

According to the set operation mode, the following programming possibilities may be presented:

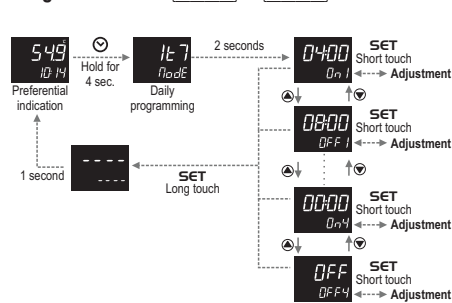
Programmed case [F20] = [1b1]



Programmed case [F20] = [2E6]



Programmed case [F20] = [1E7]



5.7 VIEW OTHER TEMPERATURES

To switch the temperature display of sensor T1, sensor T2, sensor T3 or the differential sensor (T1-T2) give short touches on the key until the desired temperature is displayed. In the upper display numbers the temperature measure is presented and in the lower display numbers, the sensor description.

The selected temperature will be displayed during 10 seconds. After, which the preferential indication is again displayed, as set in parameter [F01] - Preferential Indication.

5.8 FUNCTION BLOCK

For security reasons and in order to avoid unauthorized people changing the controller settings, there is the function block resource. With that setting activated, the parameters cannot be changed, but they can be displayed, however. In the block condition, upon trying to change the value of a parameter the message "[LDC] [0n] no display" will be displayed.

To enable/disable the function block you should hold the key for the time set in parameter [F25] - Time for function block. The icon indicates the block state to the user, in case it is accessed, it indicates that the function block is active.

HINT: with active function block one avoids that children, visitors or curious people change the operation mode or the controller parameters. When some change is needed, just hold the key to enable/disable this resource.

6. ADVANCED OPERATIONS FOR THE INSTALLER (TECHNICAL USE)


6.1 CONTROLLER PARAMETERS CHANGE

Access the settings menu holding the **SET** key for 4 seconds until [Func] appears. After that [Code] will appear and then press once again the **SET** key, short touch. Use the keys to enter the access code value, 123, and when ready press the **SET** key once again (short touch).

Use the keys to select the desired function. With a short touch to the **SET** key it's possible to edit its value. Use the keys to change the value, and when ready give a short touch on the **SET** key to memorize the set value and return to the function menu.

To leave the menu and return to normal operation (temperature indication) hold the **SET** key (long touch) until **---** appears.

Observations:

 - Upon accessing the parameter settings, the upper display will flash and over it the **SET** icon is displayed, indicating that it is possible to change the parameter value.



- If the 123 code has not been inserted, upon accessing the parameter settings the **LOP** icon will be displayed over the upper display, indicating that the setting is locked.



- With active function block, upon pressing the **▲** or **▼** keys to change the function value, the controller will display the **LOC** **0n** message on the screen and it won't be possible to perform the parameter setting.

6.2 TABLE OF PARAMETERS

| Fun | Description | CELSIUS | | | | FAHRENHEIT | | | |
|-------|---|-----------|-------|------|----------|------------|-----|------|----------|
| | | Min | Max | Unit | Standard | Min | Max | Unit | Standard |
| [0dE] | Access code | 0 | 999 | - | 0 | 0 | 999 | - | 0 |
| [F01] | Preferential indication | DIF | T3 | - | T3 | DIF | T3 | - | T3 |
| [F02] | Differential (T1-T2) to turn on the pump | 1.0 | 40.0 | °C | 8.0 | 1 | 72 | °F | 14 |
| [F03] | Differential (T1-T2) to turn off the pump | 1.0 | 40.0 | °C | 4.0 | 1 | 72 | °F | 7 |
| [F04] | Antifreeze temperature (T1) to turn on the pump | no (-19) | 10.0 | °C | 8.0 | no (-2) | 50 | °F | 46 |
| [F05] | Antifreeze minimum time | no (0) | 600 | s | 60 | no (0) | 600 | s | 60 |
| [F06] | Overheating temperature (T1) to turn off the pump | 0.0 | 200 | °C | 90.0 | 32 | 392 | °F | 194 |
| [F07] | Overheating temperature (T2) for turn off the pump | 0.0 | 105 | °C | 70.0 | 32 | 221 | °F | 158 |
| [F08] | Overheating temperature hysteresis (T2) to restart the pump | 0,1 | 20,0 | °C | 1,0 | 1 | 36 | °F | 1 |
| [F09] | Maximum pump on time in manual mode | 1 | 720 | min. | 360 | 1 | 720 | min. | 360 |
| [F10] | Temperature in sensor T3 to turn off cooling in vacation mode | 0.0 | 105 | °C | 105.0 | 32 | 221 | °F | 221 |
| [F11] | Vacuum tube Function | Off | On | - | Off | Off | On | - | Off |
| [F12] | Pump on time in the vacuum tube function | 10 | 999 | s | 20 | 10 | 999 | s | 20 |
| [F13] | Pump off time in the vacuum tube function | 1 | 999 | min. | 30 | 1 | 999 | min. | 30 |
| [F14] | Minimum temperature (T1) to switch the pump on in the vacuum tube function | 0,0 | 105,0 | °C | 20,0 | 32 | 221 | °F | 68 |
| [F15] | Maximum differential (T1-T2) for protection against thermal shock in the vacuum tube function | 0,1 | 70,0 | °C | 30,0 | 1 | 126 | °F | 54 |
| [F16] | Hysteresis of the support temperature (T3) (TEMP parameter) | 0,1 | 20,0 | °C | 1,0 | 1 | 36 | °F | 1 |
| [F17] | Minimum value allowed for setting the support temperature (TEMP parameter) | 0,0 | 105 | °C | 0,0 | 32 | 221 | °F | 32 |
| [F18] | Maximum value allowed for setting the support temperature (TEMP parameter) | 0,0 | 105 | °C | 50,0 | 32 | 221 | °F | 122 |
| [F19] | Time of support manual support activation | no (0) | 600 | min | 120 | no (0) | 600 | min | 120 |
| [F20] | Operation mode for the support event schedule | 1b1 | 1t7 | - | 1t7 | 1b1 | 1t7 | - | 1t7 |
| [F21] | Outlet of the support associated to antifreeze T1 | Off | On | - | Off | Off | On | - | Off |
| [F22] | T1 Sensor indication displacement (Offset) | -5.0 | 5.0 | °C | 0.0 | -9 | 9 | °F | 0 |
| [F23] | T2 Sensor indication displacement (Offset) | -5.0 | 5.0 | °C | 0.0 | -9 | 9 | °F | 0 |
| [F24] | T3 Sensor indication displacement (Offset) | Off(-5.1) | 5.0 | °C | 0.0 | Off(-9) | 9 | °F | 0 |
| [F25] | Time for function block | no (3) | 30 | s | 4 | no (3) | 30 | s | 10 |
| [F26] | Display backlight Intensity (Backlight) | Eco (0) | 10 | - | 8 | 1 | 10 | - | Eco (0) |

6.3 PARAMETER DESCRIPTION

[0dE] - Access Code (123):

It is necessary when you wish to change the advanced settings' parameters. To only visualize the set parameters it is not necessary to insert this code.

[F01] - Preferential Indication:

This function allows choosing the temperature that will normally be displayed. You may choose between:

- [dIF] - Differential T1-T2. Shows how many levels is the difference between the solar collectors (T1) and the pool or thermal reservoir (T2).
- [t1] - Collectors' temperature (T1).
- [t2] - Temperature of the thermal reservoir (T2).
- [t3] - Support temperature (T3) (if activated).

[F02] - Differential (T1-T2) to turn the pump on:

Allows configuring the temperature difference between the solar collector and the thermal reservoir to activate the circulation pump. As the collectors receive energy, the temperature in Sensor T1 increases when this temperature is at a determined value above the sensor T2 temperature, the pump is turned on and circulates the heated water, storing it in the reservoir.

[F03] - Differential (T1-T2) to turn off the pump:

It allows setting the temperature difference between the solar collector and the thermal reservoir to turn off the circulation pump. With the pump on, the temperature difference between the collector and the reservoir (T1-T2) tends to reduce. When this value falls to a determined value, the pump is turned off, stopping water circulation.

[F04] - Antifreeze temperature (T1) for turn on the pump:

When the temperature of (T1) collectors is too low (i.e.: winter nights) the pump is turned on, according to the temperature set to this parameter, to prevent the water from freezing in the solar collector and thus damaging them. The hysteresis of this control is fixed and defined at 2.0°C. To disable this function move the setting to the minimum until [no] is displayed.

[F05] - Minimum antifreeze Time:

This minimum time for the pump turned on serves as security, to assure that the water passes through all of the collectors. Even if sensor T1 temperature exceeds the antifreeze temperature (parameter [F04]), the controller respects the time programmed in this parameter. A very used function in large works by the quantity of plates installed. To disable this function dislocate the settings to a minimum until [no] is displayed.

[F06] - Overheating temperature (T1) to turn off the pump:

When the temperature in (T1) collectors is above the value set for this parameter, the pump is turned off in order to prevent the overheated water to circulate through the pipes and thus damage them, in case PVC pipes are used for example. The hysteresis of this control is fixed and defined at 2.0°C.

[F07] - Overheating temperature (T2) to turn off the pump:

This is the maximum temperature desired in the reservoir, above which the water circulation pump will not operate. This is a safety measure to protect the hydraulic installation in case of overheating. The hysteresis of this control is fixed and defined at 2.0°C.

[F08] - Overheating temperature hysteresis (T2) to restart the pump:

If the pump is off due to overheating in sensor T2 this function can define a temperature range within which the pump will remain off.

Example: application in temperature control of swimming pools.

[F07] = 30.0°C
[F08] = 1.0°C

The swimming pool will be heated through the water circulation pump until sensor T2 temperature reaches 30.0°C. When this value is reached the circulation pump switched off. When the temperature drops to 29.0°C, the swimming pool is heated again (30.0°C - 1.0°C = 29.0°C)

[F09] - Maximum pump on time in manual mode:

It is the time the pump will remain in manual mode. After this period, the controller assumes the AUT (AUTOMATIC) mode.

[F10] - Temperature in sensor T3 to turn off the cooling vacation mode:

Has the purpose of cooling the thermal reservoir during the night, when Vacation mode is activated, whenever the sensor T3 temperature is above the value set in this parameter and the temperature difference between the collector (T1) and the reservoir (T2) reaches -4.0°C (fixed). The pump is then turned on, using the collector as a radiator to cool the swimming pool water. When the differential (T1-T2) lowers below -2.0°C (fixed) or the support temperature (T3) lowers below this parameter's temperature, the pump is turned off. The hysteresis of this control is fixed and defined at 2.0°C.

NOTE: When the T3 sensor in [F24] is deactivated, the temperature of the support is now referenced by sensor T2.

[F11] - Vacuum tube function:

In case this function is enabled, the controller activates the pump for time set in [F12] and keeps the pump off for the time set in [F13]. In order to perform this control, the collector (T1) temperature must be higher than the value set in [F14] and observe the maximum differential set in [F15].

There are models of vacuum tube collectors that do not allow the direct measure of collector temperature, for they do not have a prediction for immersion sensors. For a correct measure of the water temperature at the collector outlet, it is necessary that a minimum water flow occurs. Therefore the solar circuit should activate the pump in regular intervals so that the heated water from the collector reaches the sensor T1.

Obs.: the controller prioritizes the protection settings (overheating), ignoring the vacuum tube function, when they occur.

[F12] - Pump on time in the vacuum tube function:

It is the time the pump will remain on when the vacuum tube function is active.

[F13] - Pump off time in the vacuum tube function:

It is the time the pump will remain off when the vacuum tube function is active.

[F14] - Minimum temperature (T1) to switch the pump on in the vacuum tube function:

It is the minimum temperature (T1) allowed to activate the vacuum tube function.

[F15] - Maximum differential (T1-T2) for protection against thermal shock in the vacuum tube function:

It is the maximum temperature difference allowed between T1 and T2 to switch the circulation pump on. When the vacuum tube function is enabled, the protection against thermal shock is activated, which prevents the circulation pump from being switched on when the collector temperature is much higher than the tank.

[F 16] - Hysteresis of the support temperature (T3) (parameter [E E T P]):

Temperature difference to turn on support. Through this function you may define a temperature interval inside which the support outlet will remain turned off.

For example: if set [E E T P] = [45.0] and [F 10] = [1.0], the support outlet will be turned off when the sensor T3 temperature reaches 45.0°C, and will only turn back on when it falls below 44.0°C (45.0-1.0=44.0).

[F 17] - Minimum value allowed for setting the support temperature:

[F 18] - Maximum value permitted for configure the support temperature:

These parameters serve as lower and higher limits of parameter settings [E E T P] (Support heating temperature). They are used to block the temperature settings, in order to restrain an inadequate setting, for example, a high value may maintain the support outlet turned on for a long time, causing elevated energy consumption.

NOTE: When the T3 sensor in [F 24] is deactivated, the temperature of the support is now referenced by sensor T2.

[F 19] - Time of manual support activation:

Used when the user wishes to occasionally activate the support outlet out of the expected time in the event schedule. From the manual activation, after the time programmed in this parameter has passed, the support mode returns to AUT mode (automatic). To disable this function from dislocating the settings for the minimum until it is displayed [n 0].

[F 20] - Operation mode of the support event schedule:

Defines the operation mode for the event schedule:

[1 6 7] - Weekly Programming - in this mode the instrument can set up to 4 different events for each day of the week.

[2 6 6] - Programming for week days - in this mode the instrument maintains the same events for week days (Monday to Friday) and allows programming different events for Saturday and Sunday.

[1 6 7] - Daily Programming - in this mode the instrument maintains the same events for every day of the week.

NOTE: Upon altering the event schedule mode the controller loads the events with the factory values.

[F 21] - Support outlet associated to the antifreeze T1:

When enabled, it has the purpose to assure minimum temperature in the thermal reservoir, for when it is necessary to perform the antifreeze function ([F 04]). The support outlet is activated whenever the (T3) support temperature is lower than the [F 04] setting (antifreeze temperature) + 20.0°C (fixed). The hysteresis of this control is fixed and defined at 2.0°C.

For example, if set [F 04] = [30.0], the support outlet will turn on when the temperature (T3) is lower than 28.0°C and will turn off when higher than 30.0°C.

NOTE: This function turns on the independent support outlet of the support mode or the event schedule.

[F 22] - Displacement of T1 sensor indication (Offset):

[F 23] - Displacement of T2 sensor indication (Offset):

[F 24] - Displacement of T3 sensor indication (Offset):

It allows compensating eventual deviations in T1 sensor reading (collector), T2 (reservoir) or T3 (support), originating from the sensor change or from cable length alteration.

NOTE: Sensor T3 may be disabled by adjusting this function to the Minimum value [0 F F]. After sensor T3 is disabled, the backup system will be controlled by sensor T2 (tank/swimming pool).

[F 25] - Time for function block:

Defines the time that the ▲ key to block/unblock the parameter alterations should be held down. For further explanations, see article 5.8 – Function Block.

To disable this function move the setting to the minimum until it is displayed [n 0].

[F 26] - Display backlight Intensity (Backlight):

If the value adjusted in this function is the minimum [E C 0], the intensity of the backlight of the display will decrease to the minimum value (1) if no key is pressed for 5 seconds. If any key is pressed, the intensity will increase to (8).

6.4 UNIT SELECTION

To define the temperature unit with which the instrument is going to operate you should access the [C o d e] function (see article 6.1 to find out how to access this function), insert the 231 code and press the SET key. The user may select the unit by pressing the keys ▲ or ▼, where the messages [0 C] or [0 F] are alternated. Press the SET key to confirm the desired unit. Next the message [- - -] will be displayed and the T or F icons corresponding to the unit will be turned on.

Obs.: While changing the unit, the controller carries the factory values in its parameters, [F R C], being necessary to perform their setting.

7. SIGNALS

E r t 1 - **Motive:** Sensor 1 disconnected or out of the specified range.
E r r - **Corrective measures:** Check the connections and sensor operation.

E r t 2 - **Motive:** Sensor 2 disconnected or out of the specified range.
E r r - **Corrective measures:** Check the connections and sensor operation.

E r t 3 - **Motive:** Sensor 3 disconnected or out of the specified range.
E r r - **Corrective measures:** Check the connections and sensor operation.

E C L 0 - **Motive:** Dis-programmed clock due to prolonged energy absence.
E r r - **Corrective measures:** Adjust time and day, see article 5.5.

N A n - **Motive:** Manual support activation with parameter settings [F 13] = [n 0].
O F F - **Corrective measures:** Set parameter value F13 - Time of manual support activation.

P P P P - **Corrective measures:** Contact the technician responsible for installation.
E r r

E C A L - **Corrective measures:** Contact the technician responsible for installation.
E r r

Obs.: In the occurrence of any error information the controller signals the user, flashing the display's backlight shortly, in order to grab attention.

8. INSTALLATION

8.1 ELECTRICAL CONNECTIONS

A qualified technician must perform the installation of the device.

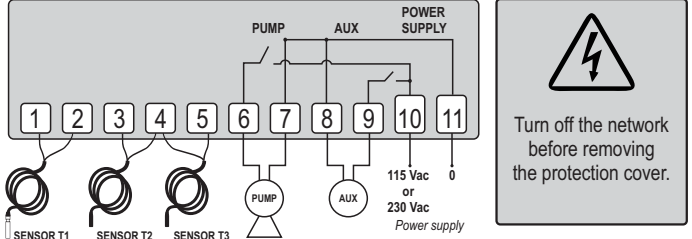
DOs The controller **MUST** be installed:

- indoors, in a dry environment;
- away from electromagnetic fields;
- in a ventilated place, free from flammable liquids and gases;
- protected by a circuit breaker of appropriate specification for the installed load.

DON'Ts The controller **MUST NOT** be installed:

- in wet places;
- exposed to sunlight or rain;
- in saunas, machine rooms or bathrooms.

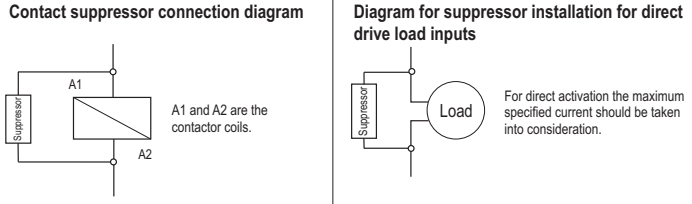
Failure to not comply the warnings will cause loss of warranty, equipment and / or physical damage.



NOTE: The length of the sensor cable can be increased by the user up to 200 meters using PP 2 x 24 AWG cable. The sensor with white cable must be installed in the solar collector, it supports a temperature of 200 ° C.

8.2. 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.



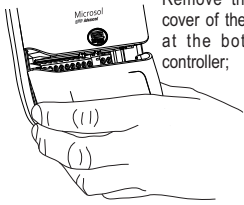
Suppressors on offer from Full Gauge Controls

8.3 SUPERIMPOSED INSTALLATION

1. Remove the protective cover of the connections at the bottom of the controller;
2. Push the bottom openings necessary for the passage of cables;
3. Attach the controller to the wall using the screws and plugs;
4. Make the electrical connections of the controller;
5. Place the protective cover of the electrical connections and secure it with the screw;
6. For a better finish install X system type channels to run cables;

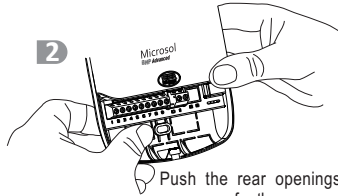
8.4 INSTALLATION OF 4x2 BOX

1



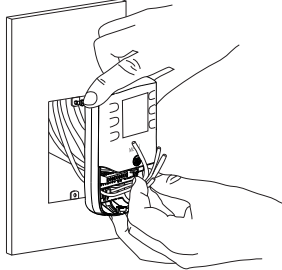
Remove the protective cover of the connections at the bottom of the controller;

2



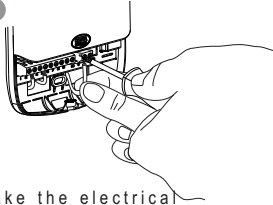
Push the rear openings necessary for the passage of cables;

3



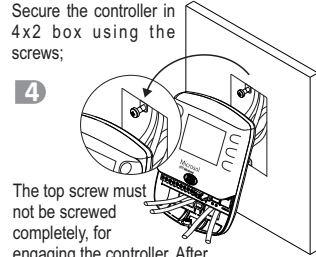
Route the cables through the openings as controller connections;

5



Make the electrical connections of the controller;

4

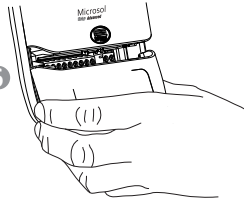


Secure the controller in 4x2 box using the screws;

The top screw must not be screwed completely, for engaging the controller. After fitting the controller on the top screw, secure it with the lower screw;

Place the protective cover of the electrical connections and secure it with the screw.

6



ENVIRONMENTAL INFORMATION

Packaging:

The materials used in the packaging of Full Gauge products are 100% recyclable. Try to perform disposal through specialized recyclers.

Product:

The components used in Full Gauge controllers can be recycled and reused if disassembled by specialized companies.

Disposal:

Do not incinerate or dispose the controllers that have reached the end of their service as household garbage. Observe the laws in your area regarding disposal of electronic waste. If in doubt, please contact Full Gauge Controls.

WARRANTY - FULL GAUGE CONTROLS

Products manufactured by Full Gauge Controls, as of May 2005, have a two (02) year warranty, as of the date of the consigned sale, as stated on the invoice. They are guaranteed against manufacturing defects that make them unsuitable or inadequate for their intended use.

EXCEPTIONS TO WARRANTY

The Warranty does not cover expenses incurred for freight and/or insurance when sending products with signs of defect or faulty functioning to an authorized provider of technical support services. The following events are not covered either: natural wear and tear of parts; external damage caused by falls or inadequate packaging of products.

LOSS OF WARRANTY

Products will automatically lose its warranty in the following cases:

- The instructions for assembly and use found in the technical description and installation procedures in Standard IEC60364 are not obeyed;
- The product is submitted to conditions beyond the limits specified in its technical description;
- The product is violated or repaired by any person not a member of the technical team of Full Gauge Controls;
- Damage has been caused by a fall, blow and/or impact, infiltration of water, overload and/or atmospheric discharge.

USE OF WARRANTY

To make use of the warranty, customers must send the properly packaged product to Full Gauge Controls together with the invoice or receipt for the corresponding purchase. As much information as possible in relation to the issue detected must be sent to facilitate analysis, testing and execution of the service.

These procedures and any maintenance of the product may only be provided by Full Gauge Controls Technical Support services in the company's headquarters at Rua Júlio de Castilhos, 250 - CEP 92120-030 - Canoas - Rio Grande do Sul - Brasil

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