



# Microsol E<sup>Ver.08</sup> DIFFERENTIAL THERMOSTAT FOR SOLAR HEATING

Have this manual in the palm of your hand by FG Finder application.



Protection antifreeze



Protection against overheating



Temperature differential



Functions lockdown



Control functions shutdown



Serial Programming



IP 65 FRONT Protection level



MCSOLEV8-03T-18523

## 1. DESCRIPTION

Differential thermostat for solar heating that controls the water circulation pump based on the temperature differential between the solar panels and the thermal tank or swimming pool.

**Microsol E** has functions to ensure the yield of the heating system, prevent the freezing in the pipes during winter and control superheating. Additionally, it includes an intelligent functions lock system to prevent those unauthorized from changing the control parameters. Diagram for connecting suppressors to contactors.

## 2. SAFETY RECOMMENDATIONS

- Check the controller for correct fastening;
- Make sure that the power supply is off and that it is not turned on during the controller installation;
- Read the present manual before installing and using the controller;
- Use adequate Personal Protective Equipment (PPE);
- For application at sites subject to water spills, install the protecting vinyl supplied with the controller;
- For protection under more critical conditions, we recommend the Ecase cover, which we make available as an optional item (sold separately);
- The installation procedures should be performed by a qualified technician.

## 3. APPLICATIONS

- Pumped solar heating systems

## 4. TECHNICAL SPECIFICATIONS

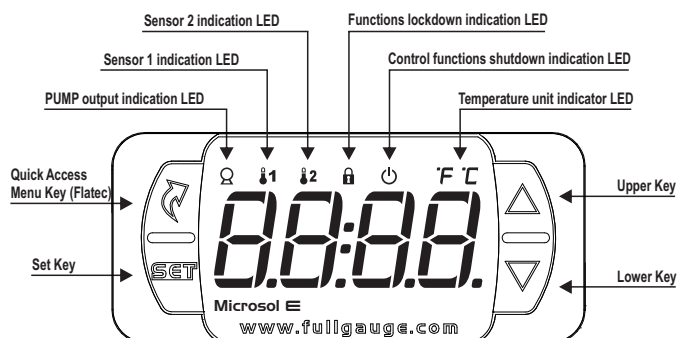
Power Supply	Microsol E: 115 or 230 Vac $\pm 10\%$ (50/60 Hz) Microsol EL: 12 or 24 Vdc or Vac $\pm 10\%$
Approximate consumption	0.8 VA
Setpoint Temperature (°C)	-50 to 105°C (-58 to 221°F)
Operating Temperature	0 to 50°C / 32 to 122°F
Operating humidity	10 to 90% RH (with no condensation)
Maximum current per output	NA - 16A / 2HP NF - 500W / 1/10HP
Protection level	IP 65 (frontal)
Dimensions (mm)	76 x 34 x 77 mm (W x H x D)
Cutout dimensions (mm)	X = 71 $\pm 0.5$ Y = 29 $\pm 0.5$ (see Image V)

(\*) Admissible variation in relation to the voltage rating.

(\*\*) This device can measure and control temperatures of up to 200°C/392°F, when used in conjunction with a SB59 model silicon sensor cable (sold separately).

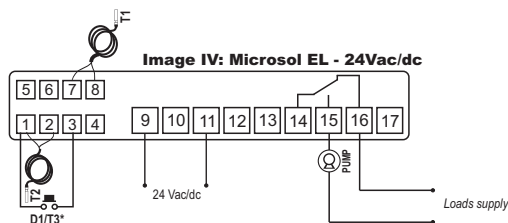
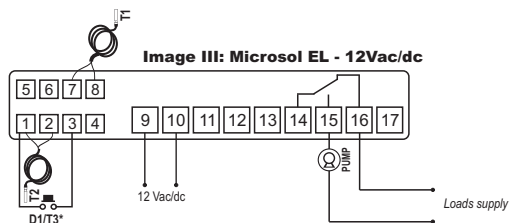
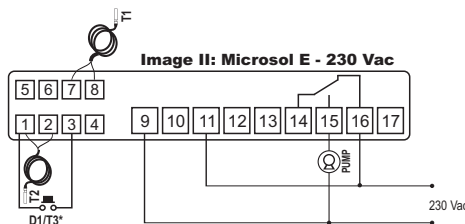
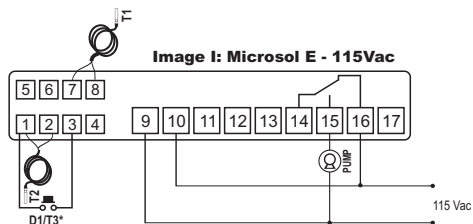
**IMPORTANT:** Only sensors 1 and 2 are included with the product. Sensor 3 may be purchased separately.

## 5. INDICATORS AND KEYS



## 6. WIRING DIAGRAM

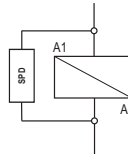
### 6.1. Electrical connections (see Images I to IV)



### Electrical noise suppression filter (sold separately)

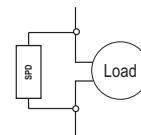
#### Wiring diagram for installation of SPD in magnetic contactor

A1 and A2 are the terminals of the contactor coil.



#### Wiring diagram for installation of SPD in line with loads

For direct drive take in to consideration the specified maximum current.



### 6.2. Connecting the temperature sensor

- Connect the **sensor S1** wires to terminals "7 and 8" / **sensor S2** to terminals "1 and 2" : the polarity is not relevant, if you use **sensor S3**, this must be connected to terminals "1 and 3".
- The sensor cable can be extended up to 200 meters by the user, using a PP2x24AWG cable type.
- For immersion in water, we recommend to use a thermowell, available in the Full Gauge Controls product line (sold separately).

### 6.3. Controller power supply

Use the pins according to table below, considering the set version:

Pins	Microsol E	Microsol EL
9 and 10	115 Vac	12 Vac/dc
9 and 11	230 Vac	24 Vac/dc

### 6.4. Recommendations of IEC60364 standard

- Install overload protectors in the controller supply.
- Install transient suppressors – suppressor filter RC – in the circuit to increase the service life of the controller relay.
- The sensor cables may be together, but not in the same conduit where the power supply of the controller and/or of the loads passes through.

## 7. FASTENING PROCEDURE

- Cut out the panel plate (Image V - item 14) where the controller shall be fastened, with sizes X = 71 $\pm 0.5$  mm and Y = 29 $\pm 0.5$  mm;
- Remove side locks (Image VI - item 14); to do that, compress the central elliptical part (with the Full Gauge Controls logo) and displace the locks backwards;
- Introduce the controller in the notch made on the panel, inwards;
- Place the locks again and then displace them until they compress into the panel, fastening the controller to the housing (see arrow indication in Image VI - item 14);
- Perform the electric installation as described in item 6;
- Adjust the parameters as described in item 8.

**ATTENTION:** for installations requiring liquid tight sealing, the notch sizes for the controller installation should be no more than 70.5x29mm. The side locks should be fastened so that they press the sealing rubber avoiding infiltration between the notch and the controller.

#### Protector vinyl - Image VII (item 14)

This adhesive vinyl is supplied with the instrument in the package.

**IMPORTANT:** Make the application only after completing the electrical connections.

- Retreat the side locks (Image VI - item 14);
- Remove the protective film from the adhesive vinyl face;
- Apply the vinyl over the entire upper part, bending the flaps, as indicated by the arrows - Image VII (item 14);
- Reinstall the locks.

**OBS:** The vinyl is transparent, allowing visualization of the wiring system of the instrument.

### IDENTIFICATION OF SENSORS:

**S1:** Collectors  
**S2:** Reservoir/pool  
**S3\*:** Surface



**IMPORTANT:** Only the sensors 1 and 2 accompany the product, the sensor 3\* can be purchased separately.

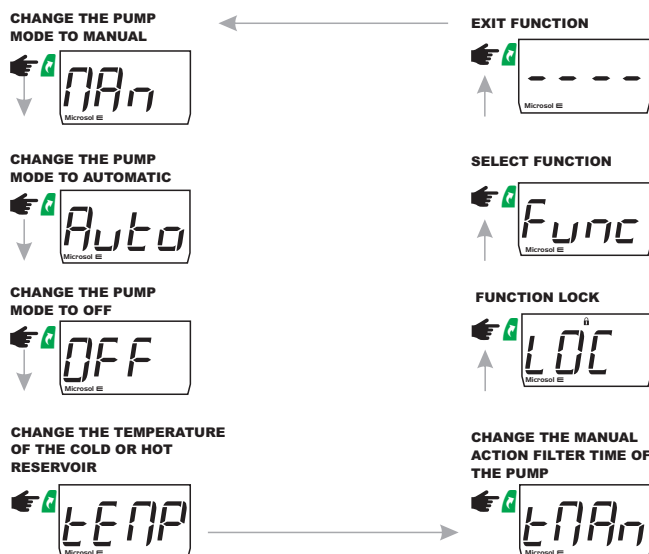
### IMPORTANT

INSTRUMENTS IN THE EVOLUTION SERIES HAVE TWO DIFFERENT TERMINAL SIZES, BUT BOTH ARE COMPATIBLE WITH THE SCREWDRIVER 2.0MM. USING THE APPROPRIATE TOOLS DURING INSTALLATION ENSURES A LONGER LIFE AND THE PROPER OPERATION OF THE PRODUCTS.

## 8. ADJUSTING THE DESIRED TEMPERATURE AND PARAMETERS







### 8.1. Quick Access Menu Map

To access or browse the quick access menu use the  key (quick touch) while the controller is displaying the temperature. With each touch the next function in the list is displayed. To confirm use the  key (quick touch). See chapter 9. for more details. The map of functions is shown below:








### 8.2. List of Key Functions

When the controller is displaying the temperature, the following keys will operate the functions:

	Quick touch: Adjusts the desired pool temperature or thermal reservoir, confirmation of function adjustments.
	Quick touch: display of the minimum and maximum temperature records.
	Pressed 2 seconds: when viewing records, clear history.
	Quick touch: toggles the temperature display momentarily.
	Quick touch: Enter the easy menu.
	Pressed simultaneously: access to the selection of functions.

## 9. BASIC OPERATIONS



### 9.1 Changing the heating temperature of the reservoirs (T2) (TEMP):






Press the  key for 2 seconds until the  message appears. On releasing the key, the currently set temperature will be displayed. Use the  and  keys to alter the value and when you are done, press  to save it. The water pump will switch off when it reaches this temperature to avoid any heat damage.


The temperature can also be changed in the access menu (see the key map in item 8.1).

### 9.2 View other measurements:











The temporary display mode can be activated by pressing the  key for 2 seconds.

In this viewing mode, it is also possible to view other measurements (if available) by pressing the  key or the  key (brief press), depending on the list:




	Time remaining until deactivating manual mode (if manual mode is active)
	Sensor 1 temperature
	Sensor 2 temperature
	Sensor 3 temperature (if available)
	Temperature difference (T1-T2)

The chosen measurement will be displayed for 60 seconds and after the time has expired, it will return to the preferred display (as set in parameter .










### 9.3 Function Lock:



The function lock provides extra security when using this device. When it is enabled the preferred temperatures, the manual action time and other parameters can be viewed, but are not able to be changed ( = 2) or you can just lock the device against changes to the control functions but allow the preferred temperatures and the manual action time to be amendable ( = 1). Use the  key (brief press), and enter the  function in the access menu, confirm by pressing the  key (brief press), the message  will then appear. Next hold the  key for the time set to lock the functions (, until  appears. On releasing the key, the message  will be displayed, indicating that it is locked.















To unlock, turn the controller off and then turn it on again with the  key pressed. Keep the key pressed until  is displayed. Keep the key pressed for 10 seconds and, upon releasing the key, the message  will be displayed indicating the functions lockdown is deactivated.

### 9.4 Minimum and Maximum Temperature Record

By pressing the  key or also through the quick access menu (see item 8), the message  will be displayed and then message  indicating the temperature of sensor 1 and the maximum and minimum recorded temperatures immediately after, then the temperature of sensor 2 , do sensor 3  (if enabled), and differential  will be displayed. To erase the current minimum and maximum values, press the  key (quick touch) until the message  is displayed. Press  to confirm.

**Note:** If the  key is pressed while the records are being displayed the values will be reset and the message  will be displayed.

### 9.5 Unit Selection (°C / °F)

To select the units the instrument will use, access the main menu through the quick access menu (), option  or by pressing  and  simultaneously while the temperature is being displayed, and enter function  with the access code  and press . Then select the desired unit  or  using the   keys, and press  to confirm.

**Note:** Whenever the units are changed, the functions configuration returns to the factory default settings so it must be configured again.

### 9.6 Water pump function mode:

To change the water pump function mode use the ,  and  functions on the access menu.

The water circulation pump between the solar collector and the hot or cold reservoirs has three different modes. As follows:



MAN = Pump turned on.





**Warning:** In this mode, the pump remains on and ignores any protection functions and the temperature sensors.



AUTO = The pump operates automatically, in accordance with the set parameters.



OFF = Pump remains off.


















When  (Manual) mode is selected, the pump will operate in this state for the length of time set by the  function - The maximum length of time the pump will remain on in manual mode. After this, the controller switches to  (AUTOMATIC) mode. If you want to switch to  before the end of this period, you can change the operating mode at any time.




**Note 1:** The operating mode of the pump can also be changed via the digital input, by setting the function F14 (Operating mode of the digital input) to option 1.


**Note 2:** In the event of a power cut while the instrument is in MAN mode, it will switch to AUTO on restarting.

## 10. ADVANCED OPERATIONS

### 10.1. Adjustment of the parameters

Access function  by pressing keys  and  simultaneously or through the quick access menu (item 8.1). When  is displayed, press  key (quick touch). Use the keys  or  to enter with access code  and when ready press . Use the keys  or  to access the desired function. After selecting the function, press  key (quick touch) to view the value configured for that function. Use  or  to change the value and press  to save the configured value and return to the functions menu. To leave the menu and return to the normal operating mode (temperature indication), press  (hold down) until  is displayed.

**Note 1:** If the functions lock is active, when pressing the keys  or  the controller will show the message  and will not allow the adjustment of the parameters.


**Note 2:** If no button is touched for 15 seconds after providing the access code and / or after configuring the parameter the controller will return to the operating mode and it will be necessary to enter the access code again in function .

10.2. Parameters table

Fun	Description	CELSIUS (°C)				FAHRENHEIT (°F)			
		Min	Max	Unit	Default	Min	Max	Unit	Default
<span>[F01]</span>	Access code	0	999	-	0	0	999	-	0
<span>[F02]</span>	Preferred Indicator	1(11)	4(13)	-	2(12)	1(11)	4(13)	-	2(12)
<span>[F03]</span>	Difference (T1-T2) to switch the pump on	-1,0	200	°C	8,0	-1	360	°F	14
<span>[F04]</span>	Difference (T1-T2) to switch the pump off	-1,0	200	°C	4,0	-1	360	°F	7
<span>[F05]</span>	Antifreeze temperature (T1) to switch the pump on	-18(off)	200	°C	8,0	0(off)	392	°F	46
<span>[F06]</span>	Superheating temperature (T1) to switch the pump off	0,0	200	°C	90,0	32	392	°F	194
<span>[F07]</span>	Heating Temperature of the pool/ reservoir (T2) (TEMP)	0,0	200	°C	32,0	32	392	°F	89
<span>[F08]</span>	Maximum time for the pump to be switched on in manual mode	1	999	min.	360	1	999	min.	360
<span>[F09]</span>	Vacuum tube function	0(off)	1(on)	-	0(off)	0(off)	1(on)	-	0(off)
<span>[F10]</span>	Time that the pump is on when the Vacuum tube is functioning	10	999	seg.	20	10	999	seg.	20
<span>[F11]</span>	Time that the pump is off when the Vacuum tube is functioning	1	999	min.	30	1	999	min.	30
<span>[F12]</span>	Minimum temperature (T1) for the pump to switch on when the vacuum tube is functioning	0,0	200	°C	20,0	32	392	°F	68
<span>[F13]</span>	Maximum temperature difference (T1-T2) to protect against thermal shock when the vacuum tube is functioning	0,1	200	°C	50,0	1	360	°F	90
<span>[F14]</span>	Function mode of the digital input	0(off)	4	-	1	0(off)	4	-	1
<span>[F15]</span>	Superheating temperature (T3) required to switch off the pump	0,0	200.1(off)	°C	200.1(off)	32	392(off)	°F	392(off)
<span>[F16]</span>	Chilling	0(off)	1(on)	-	0(off)	0(off)	1(on)	-	0(off)
<span>[F17]</span>	Hysteresis of the superheating temperature in the S2 sensor	0,1	5,0	°C	1,0	1	9	°F	1
<span>[F18]</span>	Hysteresis of the superheating temperature in the S3 sensor	0,1	5,0	°C	1,0	1	9	°F	1
<span>[F19]</span>	Displacement of values (Offset) for sensor T1	-20,0	20,0	°C	0,0	-36	36	°F	0
<span>[F20]</span>	Displacement of values (Offset) for sensor T2	-20,0	20,0	°C	0,0	-36	36	°F	0
<span>[F21]</span>	Displacement of values (Offset) for sensor T3	-20,0	20,0	°C	0,0	-36	36	°F	0
<span>[F22]</span>	Linking the T3 sensor to automatic mode	0(no)	1(yes)	-	0(no)	0(no)	1(yes)	-	0(no)
<span>[F23]</span>	Minimum temperature at T1, required to switch on the pump	-50(off)	200,0	°C	-50(off)	-58(off)	392	°F	-58(off)
<span>[F24]</span>	Delay in powering the instrument	0(no)	999	seg.	0(no)	0(no)	999	seg.	0(no)
<span>[F25]</span>	Function Lock Mode	0	2	-	0	0	2	-	0
<span>[F26]</span>	Function Lock Period	15	60	seg.	15	15	60	seg.	15

10.2.1. Descrição dos parâmetros

F01 - Access Code:

Microsol  has two different access codes:

 Allows changing the advanced parameters.

 Allows choosing the units of temperature: Celsius or Fahrenheit.

F02 - Preferred Indicator:

This function allows you to set your preferred temperature indicator. You can choose between:

 Display Sensor 1 temperature

 Display Sensor 2 temperature

 Display Temperature Difference (T1-T2)


 Display Sensor 3 temperature (if available)

On displaying the temperature difference (T1-T2), both LEDs related to these sensors will be on.

F03 - Differential (T1-T2) to switch the pump on:

As the solar panels receive energy, the temperature in sensor 1 increases. When this temperature is at an ascertainable value above the temperature of sensor 2, the pump is switched on and circulates the heated water down, storing it in the tank for example.


F04 - Differential (T1-T2) to switch the pump off:



Allows configuring the temperature difference in degrees between sensor 1 and sensor 2 for Microsol  to switch on the water circulation pump.

Example:

 = 8.0


 = 4.0

When sensor 1 (panel) is at 35°C and sensor 2 (tank or pool) is at 23°C, the difference will be 12°C. Thus the circulation pump will be on (35-23 = 12 greater than 8). With the pump on, the warm water circulates down and the cold water circulates up. Thus the temperature difference between 1 and 2 decreases. Thus, when the difference between sensor 1 and sensor 2 reaches 4° C (function ), the circulation pump will be switched off (35-31 = 4).


 **IMPORTANT:** The value adjusted in function  must be, mandatorily, greater than that adjusted in the function . Therefore Microsol  does not allow making invalid adjustments in order to ensure its perfect operation.


Ex.: Current configuration:

 : 10.0°C

 : 5.0°C



You want to change it to:

 : 4.0°C


 : 2.0°C

First adjust  to 2.0°C and then adjust  to 4.0°C.



F05 - Antifreeze temperature (S1) to switch the pump on:

When the temperature at the panels (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. The hysteresis is fixed at 2°C (4°F). The minimum time the pump is on is 3 minutes. While the pump is switched on due to the antifreeze, message  is alternated with the default temperature indication. This function can be disabled by adjusting it to the minimum value .

F06 - Superheating temperature (S1) to switch the pump off:

When the temperature at the collectors (sensor 1) is higher than an adjustable value, the pump is switched off to prevent the superheated water from circulating through the pipes and damaging them (if PVC pipes are used). The hysteresis is fixed at 2°C (4°F). When superheating is detected in sensor 1, message  is alternated with the default temperature indication.

F07 - Heating Temperature of the pool/ reservoir (T2) (TEMP)





Set the working temperature of the cold or hot pool/ reservoir (T2). The water pump will switch off when it reaches this temperature to avoid any heat damage. Hysteresis can be adjusted from 0.1 to 5.0 °C (see the  function). When the heating is detected by the T2 sensor, the message  will alternate with the preferential temperature indicator.

F08 - Maximum time for the pump to be switched on in manual mode:

This is the length of time the pump will remain on in manual mode.

After this period, the controller will switch to  (AUTOMATIC).

F09 - Vacuum tube function:

When this function is active, the controller will manage the pump, based on the time set by  and keep the pump switched off for the time set in . For this control to be active, the temperature of the collector (T1) must be over the adjusted value  and within the Maximum difference .

There are some models of vacuum tube collectors where it is not possible to directly measure the collector temperature, as they do not take readings from immersion sensors.

To accurately measure the water temperature at the outlet of the collector, a minimum amount of water must be flowing.

For this, the solar circuit must activate the pump at regular intervals so that the water heated in the collector passes over the T1 sensor.

**Note:** the controller prioritizes the protection settings (overheating), and if they are engaged, ignores the vacuum tube function.

F10 - Time that the pump is on when the Vacuum tube is functioning:

This is the length of time that the pump remains switched on while the vacuum tube function is active.

F11 - Time that the pump is off when the Vacuum tube is functioning:


This is the length of time that the pump remains switched off while the vacuum tube function is active.

F12 - Minimum temperature (T1) for the pump to switch on when the vacuum tube is functioning:

This is the minimum temperature (T1) allowed for the vacuum tube function to be activated.

F13 - Maximum temperature difference (T1-T2) to protect against thermal shock when the vacuum tube is functioning:

This is the maximum allowed difference in temperature between T1 and T2 for the pump to be switched on.

When the vacuum tube function is active, thermal shock protection is activated, which prevents the pump being switched on when the temperature of the collector is much greater than the reservoir. If the difference is greater than the value set for this function, then a visual alarm will be triggered .

F14 - Function mode of the digital input:

 - Digital Input deactivated;

 - Pulsator NO: Change the pump function mode;




 - NO Contact: Activate pump;

 - NC Contact: Activate pump;



 - Temperature sensor (T3)

**NOTE:** When option 1 is activated, the instrument memorizes the current mode, before entering manual. On deactivating manual mode for the digital input, the instrument will go back to this mode. This makes it easier to perform certain manual activities, such as, filtering the reservoir.



F15-Superheating temperature (T3) to switch the pump off:



When the temperature in sensor 3 reaches a configured value the pump is switched off to avoid thermal discomfort. This function is used in swimming pool heating systems with the third sensor to measure the temperature on the water surface. The hysteresis may be adjusted from 0.1 to 5.0°C (see function ). When superheating is detected in sensor 3, message  is alternated with the default temperature indication. This function may be disabled by adjusting it to the maximum value , and thus sensor 3 will be disabled too.

F16-Chilling:

The purpose is to cool the reservoirs at night whenever the heating temperature (parameter  or  is exceeded and the difference between the collector (T1) and the relevant sensor (T2 or T3) reaches -4.0°C / -7°F (fixed).

The pump is then switched on and uses the collector as a radiator to cool the water in the reservoir.

When the difference (T1-T2) goes below -2.0°C / -4°F (fixed) or the temperature in the relevant sensor (T2 or T3) drops below the heating temperature (parameter  or  the pump will be turned off.

**Note:** When the T3 sensor is active the heating parameter will be based on  and the relevant sensor will be T3. If not, the heating parameter will be based on  and the relevant sensor will be T2.

F17 - Superheating temperature hysteresis of sensor T2:

F18 - Superheating temperature hysteresis of sensor T3:

If the pump is off due to superheating in sensor 2 or sensor 3 this function can define a temperature range within which the pump will remain off.

F19 - Indication offset of sensor T1:

F20 - Indication offset of sensor T2:

F21 - Indication offset of sensor T3:

It allows compensating possible deviations in the temperature reading caused by the replacement of the sensor or changes in the cable length.

**F22 - Linking of sensor T3 to the automatic mode (if sensor 3 is enabled):**  
[n0] - Circulation pump operating in automatic mode and not linked to sensor 3. With this mode the pump is activated only by the temperature differential (T1-T2).  
[YES] - 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.  
**Note:** When the value of this function is [YES] it will return to [n0] when sensor 3 is disabled.

**F23 - Minimum temperature in S1 to activate the pump:**  
Prevents the pump from being turned on when the temperature of the panel (collector) is below the desired temperature, thus preventing warm or cold water from circulating through the system, which would cause higher power consumption.  
**Example:** If the panels are at 27°C and the pool is at 28°C the circulation pump does not need to be activated. This function can be disabled by adjusting it to the minimum value [OFF].

**Note 1:** This function has priority over the other pump activation functions except for the manual activation.  
**Note 2:** When the vacuum tube is active, this function is ignored.

**F24 - Instrument energization delay:**  
With this function enabled, when the instrument is energized, it only works as a temperature indicator remaining with the output off during the defined time. In installations with several units of equipment, configuring different values for the start-up delay time of each instrument, it is possible to avoid demand peaks by activating the loads at different times. This function can be disabled by adjusting it to the minimum value 0 [n0].

**F25 - Function Lock Mode:**  
Enables and configures the Function Lock.  
[0] Function Lock can't be enabled.  
[1] Enables a partial lock, where the control functions are locked, but the preferred temperature [TEMP] and the length of time for manual action [MAN] are still adjustable.  
[2] Functions can be completely locked.

**F26 - Time for functions lock:**  
Allows lockdown of control functions (see item 9.3).  
[15] - [60] - Defines the time in seconds for the controller to activate.

11. INDICATIONS ON THE DISPLAY

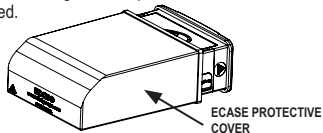
[Err1]	Sensor 1 disconnected or damaged.
[Err2]	Sensor 2 disconnected or damaged.
[Err3]	Sensor 3 disconnected or damaged.
[HE1]	Overheating on Sensor 1.
[HE2]	Overheating on Sensor 2.
[HE3]	Overheating on Sensor 3.
[Flashing LED]	pump on manually.
[LED On]	pump on automatically.
[Flashing LED]	pump switched off by digital input ([F14] = 2 or 3).
[LED On]	pump OFF.
[ICE]	Pump switched on due to defrost function.
[Atub]	Indicates that the maximum difference (S1 to S2) in order to prevent thermal shock when the vacuum tube is operating, has been exceeded.
[LOC] [On]	Function Lock activated.
[LOC] [OFF]	Function Lock deactivated.
[EVAL]	Contact Full Gauge Controls.
[PPPP]	Reset function values.

12. GLOSSARY

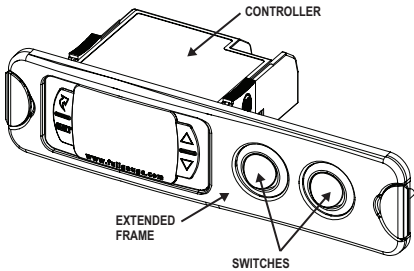
- °C: Temperature in Celsius degrees.
- °F: Temperature in Fahrenheit degrees.
- Auto: Automatic.
- LOC: Blocked.
- No: No.
- OFF: Turned off/disabled.
- ON: Turned on, enabled.
- SET: (as in "Setting") (setting or configuration).
- Vac: Electrical voltage (volts) of alternating current.
- Vdc: Electrical voltage (volts) of direct current.
- Yes: Yes.

13. OPTIONAL ITEMS - Sold Separately

**Ecase protective cover**  
It is recommended for the Evolution line, keeps water from entering the back part of the instrument. It also protects the product when the installation site is washed.

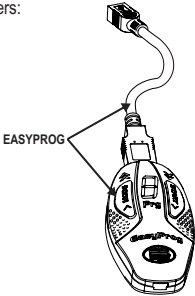


**Extended frame**  
It allows the installation of Evolution line controllers with sizes 76 x 34 x 77 mm in various situations, since it does not require precision in the notch of the instrument fitting panel. The frame integrates two switches of 10 Amperes that may be used to actuate interior light, air curtain, fan, and others.



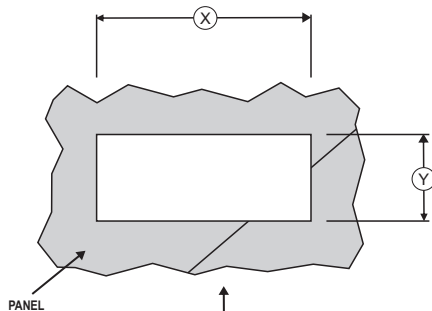
**EasyProg - version 2 or higher**  
It is an accessory that has as its main function to store the parameters of the controllers. At any time, you can load new parameters of a controller and unload them on a production line (of the same controller), for example. It has three types of connections to load or unload the parameters:

- **Serial RS-485:** It connects via RS-485 network to the controller (only for controllers that have RS-485).
- **USB:** It can be connected to the computer via the USB port, using Sitrad's Recipe Editor.
- **Serial TTL:** The controller can be connected directly to EasyProg by the TTL Serial connection.



14. ANNEXES - Reference Images

Image V



ImageVI

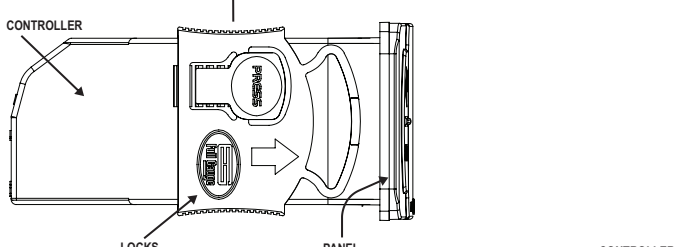
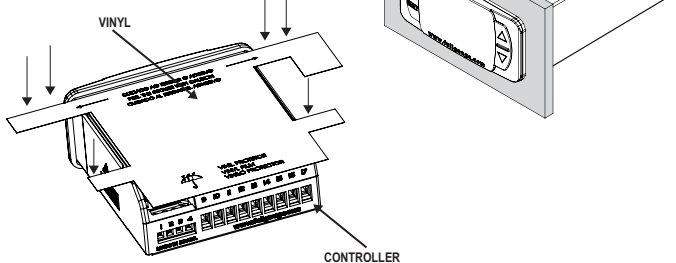


Image VII







#### 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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