Microsol
SWP Advanced
c-o-n-n-e-c-t

DIFFERENTIAL THERMOSTAT FOR SOLAR HEATING

Ver. 03

Full Gauge CONTROLS®

⚠ Have this manual in the palm of yout hand through the **FG Finder**.

1. DESCRIPTION

The **Microsol SWP Advanced** c-o-n-n-e-c-t is a differential thermostat for solar heating that controls the water circulation pump through the temperature differential between the solar collector and the pool or thermal reservoir. The controller has functions that prevent overheating and freezing of water in the solar collector. It also has protection for accessing configuration parameters.

The **Microsol Advanced** c-o-n-n-e-c-t line has NFC approximation data transfer technology for configuring and diagnosing your heating system through the exclusive **Microsol** c-o-n-n-e-c-t app.

It is characterized by a unique design for use in residential environments, by the ease of operation with touch keys for easy access to the main features of the controller and by the use of a customized display.

2. APPLICATION

- Solar heating with auxiliary heating system.

3. TECHNICAL SPECIFICATIONS

Power	115Vac ±10%(50/60Hz) or 230Vac ±10%(50/60Hz)
Consumption	3.3VA
Operating Temperature	0 to 50°C (32 to 122°F)
Operating humidity	10 to 90% UR (without condensation)
Sensors	T1: Solar Collector - SB59 Sensor, white cable, Silicone, 1m T2: Thermal reservoir - Sensor SB19, 2.5m
Control temperature	Sensor T1: -20 to 200ºC / -4 to 392ºF Sensor T2: -20 to 105ºC / -4 to 221ºF
Resolution	0.1°C between -10 and 100°C and 1°C in the rest of the range 0.1°F between -10 and 100°F and 1°F in the rest of the range
Control output	PUMP - Relay output, max. 1HP at 220Vac (/HP at 127Vac)
Digital input	Configurable dry contact type
Dimensions	104 x 160 x 34mm (4.09" x 6.30" x 1.34")

4. INTENDED USE

4.1 INTERFACE

1.	Display
2.	Pump indication
3.	NFC area
4.	PUMP key
5.	Increase key
6.	Decrease key
7.	SET key
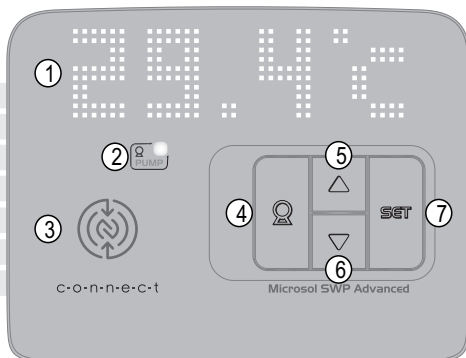
4.2 OUTPUT INDICATION

Each controller output has a colored LED to indicate the state and output mode. The color of the LED indicates the mode selected for the output. The flashing led indicates that the output is on.

Output status of LEDs:
- Off = OFF
- Green = Automatic (AUT)
- Yellow = Manual (MAN)

5. NFC FUNCTIONALITY

NFC is a technology for data exchange and wireless communication. Perform controller setup and verify your data using the **Microsol** c-o-n-n-e-c-t app with a compatible smartphone. For more information, visit the website:

http://microsolconnect.fullgauge.com/ or scan the QRcode with your cell phone.

1 - Bring the cell phone closer to the highlighted NFC position, as shown in image (1). With the cell phone close to it, the controller will beep, signaling that the cell phone has been detected by the controller.

2 - Keep your cell phone close to initiate communication.
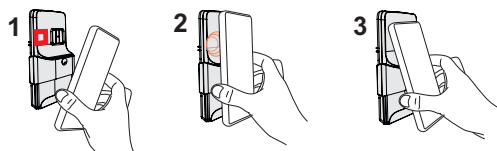
Note: Check the position of the NFC antenna on your cell phone. Using images (2) and (3) as a reference, it is possible to improve performance by bringing the cell phone antenna closer to the highlighted position. The correct approximation with the highlighted NFC position on the controller contributes to an easy and practical use.

Atenttion! Check your smartphone's compatibility with NFC technology.

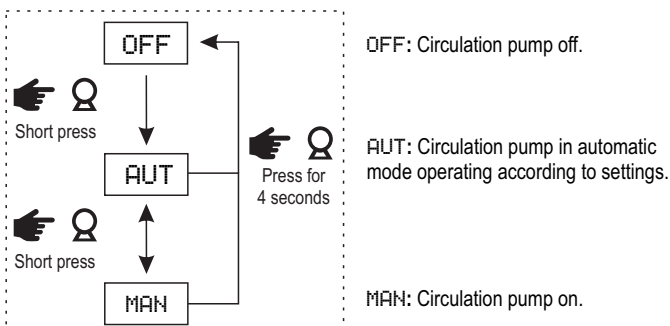|	
NFC ⌐	Indicates the approach of the smartphone compatible with NFC technology. At this point, communication between the controller and the smartphone will be initiated.
▮ ⋯ ▮	Indicates the sending of new parameters to the controller.
▬▬▬▬▬	Indicates updating of data saved in the controller's NFC memory.

6. OPERATIONS

6.1 KEYMAP

SET	**Short press** - User setup access: pool/reservoir heating temperature adjustment. **Long press (4 seconds)** - Access advanced settings.
▲	**Short press -** Checks the status of the function lock. **Long press (4 seconds) -** Enables/Disables Function Lock. *See chapter 6.4 Function lock.*
▼	**Short press -** Toggles the temperature display (DIF, T1, T2). Shows time remaining when in manual mode. **Long press (4 seconds)** - Inhibits audible alarm.
☒	**Short press -** Changes pump mode (AUT/MAN). **Long press (4 seconds) -** Turns off the pump (OFF).

6.2 PUMP OPERATION MODE

OFF: Circulation pump off.

AUT: Circulation pump in automatic mode operating according to settings.

MAN: Circulation pump on.

Attention: In **MANUAL** (MAN) mode the pump kept on, ignoring protection functions (except vacuum tube protection) and temperature sensors.

Note: When **MANUAL** mode (MAN) is selected, the pump remains in this state for the period defined in the function DF.10 - **Pump on** time in manual mode. Afterwards, the controller assumes the Automatic (AUT) mode. If you want to return to Automatic (AUT) mode before this period, press the ☒ Key any time.

6.3 VIEW OTHER TEMPERATURES

To switch between displaying the temperature of the sensors or the differential (T1-T2), briefly press the ▼ key until the desired temperature appears on the display. At each press, the sensor description is briefly displayed, followed by its temperature. The selected temperature will be displayed for 10 seconds. Afterwards, the preferred indication is displayed again, as set in parameter GE.03 - Preferred Indication.

6.4 FUNCTION LOCK

For security reasons and in order to prevent unauthorized persons from changing the controller settings, there is a function lock feature. With this setting activated, the parameters cannot be changed, only viewed, according to the configured protection level. Parameter GE.05 determines which type of locking will be performed. In the lock condition, when trying to change the value of a locked parameter, the message 🔒✗ apears on the display. To enable/disable the functions lock, the ▲ key must be pressed for the time configured in parameter GE.06 - Time for locking functions.

Note: With the function lock active, unauthorized persons will not be able to change the operating mode or parameters of the controller. When there is a need for any changes, just keep pressed the ▲ key to enable/disable this feature.

7. SETTINGS - USER LEVEL

Access the settings menu by pressing the **SET** key (short press). Use the ▲ and ▼ keys to select the desired function. This value can be edited with a short press on the **SET** key. Use the ▲ and ▼ keys to change the value, and when ready, give a short press on the **SET** key to memorize the set value and return to the functions menu.

To exit the menu and return to normal operation (temperature display) press the **SET** key (long press).

7.1 POOL/RESERVOIR HEATING TEMPERATURE (SENSOR T2)

When accessing user settings, it is possible to adjust the Setpoint configuration.

SP - Pool/reservoir temperature setpoint:
Sets the desired control temperature for the pool/reservoir.

8.1 PARAMETERS TABLE

TECHNICAL		CELSIUS				FAHRENHEIT			
FUN	**DESCRIPTION**	**MINIMUN**	**MAXIMUN**	**UNIT**	**DEFAULT**	**MINIMUM**	**MAXIMUN**	**UNIT**	**DEFAULT**
CODE	Access code	0	9999	-	0	0	9999	-	0
TC.01	Controller language	PORT	ENG	-	PORT	PORT	ENG	-	PORT
TC.02	Temperature unit	°C	°F	-	°C	°C	°F	-	°C
TC.03	Fluid type	WATE	GLYC	-	WATE	WATE	GLYC	-	WATE
TC.04	Estimated pump flow	1	999	l/m	50	1	999	l/m	50
TC.05	Flow unit (volume)	LITER	GALL	-	LITER	LITER	GALL	-	LITER
TC.06	Power unit	kWh	MBTU	-	kWh	kWh	MBTU	-	kWh

8.2 DESCRIPTION OF PARAMETERS

CODE - Access code:
It is necessary when you want to change the configuration parameters. To only visualize the adjusted parameters it is not necessary to insert this code.
Code 231 - Technician
Code 123 - Advanced

TC.01 - Controller language:
Selects the language for displaying messages on the controller:
PORT = Portuguese;
ESP = Spanish;
ENG = English.

TC.02 - Temperature unit:
Selects the controller temperature unit:
°C = Celsius;
°F = Fahrenheit.
Note: When the unit is changed, the controller goes into pause mode and reconfigures the parameters for the new unit, restarting the operation soon after.

TC.03 - Type of fluid:
Informs the type of fluid used in the collector. Information used to estimate the amount of energy absorbed by the solar heating system:
WATE = Water;
GLIC = Propylene glycol solution.

TC.04 - Estimated pump flow:
Informs the estimated flow rate of the pump. Information used to estimate the amount of energy absorbed by the solar heating system.

8. SETTINGS - TECHNICAL LEVEL

Access the installation settings menu by pressing the **SET** key for 4 seconds until CODE appears. Then press the **SET** key again (short press). Use the ▲ and ▼ keys to enter the value of the access code 231, and when ready press the **SET** key again (short press).

Use the ▲ and ▼ keys to select the desired function. With a short press on the **SET** key it is possible to edit its value. Use the ▲ and ▼ keys to change the value and, when ready, give a short press on the **SET** key to memorize the set value and return to the functions menu. To exit the setup menu and return to normal operation, press the **SET** key (long press).

TC.05 - Flow unit (volume):
Defines the desired flow unit to display the estimated energy absorbed by the solar heating system.

TC.06 - Power unit:
Selects the desired energy unit to display the estimated energy absorbed by the solar heating system.

9. SETTINGS - ADVANCED LEVEL

Access the settings menu by pressing the **SET** key for 4 seconds. Then CODE will appear and then press the **SET** key again, short press. Use the ▲ or ▼ keys to enter the access code value, 123, and when ready press the **SET** key again (short press). Use the ▲ or ▼ keys to select the desired function. With a short press on the **SET** key it is possible to edit its value. Use the ▲ or ▼ keys to change the value, and when ready, give a short press on the **SET** key to memorize the set value and return to the functions menu. To exit the menu and return to normal operation (temperature display) press the **SET** key (long press).
When accessing the adjustment of a parameter, the display will be flashing indicating that it is **SET** possible to change the parameter value.

If you have not entered code 123, the adjustment will be locked and when pressing the ▲ and ▼ keys to change the value of the function, the controller will show the message ▄◆▄ ✕ on the display. With the function lock active, when pressing the ▲ and ▼ keys to change the function value, the controller will display the message ⛰ ✕ on the display and it will not be possible to adjust the parameter.

9.1 PARAMETERS TABLE

ADVANCED		CELSIUS				FAHRENHEIT			
FUN	**DESCRIPTION**	**MINIMUN**	**MAXIMUN**	**UNIT**	**DEFAULT**	**MINIMUN**	**MAXIMUN**	**UNIT**	**DEFAULT**
CODE	Access code	0	9999	-	0	0	9999	-	0
DF.01	Differential (T1-T2) to start the pump	1.0	40.0	°C	8.0	1.0	72.0	°F	14.4
DF.02	Differential (T1-T2) to turn off the pump	1.0	40.0	°C	4.0	1.0	72.0	°F	7.2
DF.03	Minimum T2 (pool/reservoir) superheat temperature setpoint allowed to the user	-20.0	DF.04	°C	-20.0	-4.0	DF.04	°F	-4.0
DF.04	Maximum superheat temperature setpoint T2 (pool/reservoir) allowed to the user	DF.03	105.0	°C	105.0	DF.03	221.0	°F	221.0
DF.05	T2 superheat temperature to turn off the pump	DF.03	DF.04	°C	32	DF.03	DF.04	°F	89.6
DF.06	T2 superheat temperature hysteresis to restart the pump	0.1	20.0	°C	1.0	0.2	36.0	°F	1.8
DF.07	Antifreeze temperature T1 to start the pump	OFF(-20.0)	10.0	°C	8.0	OFF(-4.0)	50.0	°F	46.4
DF.08	Minimum antifreeze time	OFF(0)	600	seconds	60	OFF(0)	600	seconds	60
DF.09	T1 superheat temperature to turn off the pump	0.0	200.0	°C	70.0	32.0	392.0	°F	158.0
DF.10	Pump on time in manual mode	1	720	minutes	360	1	720	minutes	360
DF.11	Enables cooling (T2)	OFF	ON	-	OFF	OFF	ON	-	OFF
DF.12	Minimum temperature T1 to start the pump - scan mode	0.0	105.0	°C	35.0	32.0	221.0	°F	95.0
DF.13	Pump on time - scan mode	OFF(9)	999	seconds	20	OFF(9)	999	seconds	20
DF.14	Pump off time - scan mode	1	999	minutes	30	1	999	minutes	30
DF.15	Maximum differential (T1-T2) for thermal shock protection	OFF(0.0)	200.0	°C	OFF(0.0)	OFF(32.0)	392.0	°F	OFF(0.0)

ADVANCED		CELSIUS				FAHRENHEIT			
FUN	DESCRIPTION	MINIMUN	MAXIMUN	UNIT	DEFAULT	MINIMUM	MAXIMUN	UNIT	DEFAULT
IN.01	Digital input signal type	0	3	-	0	0	3	-	0
IN.02	Digital input operating mode	OFF(0)	7	-	0	OFF(0)	7	-	0
SE.01	T1 sensor indication offset (Offset)	-20.0	20.0	°C	0.0	-36.0	36.0	°F	0.0
SE.02	T2 sensor indication offset (Offset)	-20.0	20.0	°C	0.0	-36.0	36.0	°F	0.0
GE.01	Controller power-on delay (initial delay)	OFF(0)	999	seconds	5	OFF(0)	999	seconds	5
GE.02	Buzzer mode (buzzer)	OFF(0)	2	-	1	OFF(0)	2	-	1
GE.03	Preferential indication	T1	DIF	-	T2	T1	DIF	-	T2
GE.04	Display brightness intensity	ECO	ON	-	ECO	ECO	ON	-	ECO
GE.05	Function lock mode	OFF(0)	6	-	OFF(0)	OFF(0)	6	-	OFF(0)
GE.06	Time for function lock	4	60	seconds	10	4	60	seconds	10

9.2 DESCRIPTION OF PARAMETERS

CODE - **Access code:**
It is necessary when you want to change the configuration parameters. To only visualize the adjusted parameters it is not necessary to insert this code.
Code 231 - Technician
Code 123 - Advanced

DF.01 - **Differential (T1-T2) to start the pump:**
Allows you to configure the temperature difference between the solar collector and the thermal reservoir to activate the circulation pump. As the collectors receive energy, the temperature at sensor T1 increases, and when this temperature is a certain value above the temperature at sensor T2, the pump is turned on and the heated water is stored in the thermal reservoir/pool.

DF.02 - **Differential (T1-T2) to turn off the pump:**
Allows you to configure 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 decrease. When this value decreases to a certain value, the pump is turned off and the water circulation is stopped.

DF.03 - **Minimum T2 superheat temperature setpoint (pool/reservoir) allowed to the user:**
Allows you to configure the minimum threshold for the superheat temperature T2 (DF.05).

DF.04 - **Maximum T2 superheat temperature setpoint (pool/reservoir) allowed to the user:**
Allows you to configure the maximum T2 superheat temperature limit (DF.05).

DF.05 - **T2 superheat temperature to turn off the pump:**
This is the maximum desired temperature in the reservoir above which the circulating water pump will not operate. This is a safety measure to protect the hydraulic installation in case of overheating.

DF.06 - **T2 superheat temperature hysteresis to restart the pump:**
If the pump is turned off due to overheating in sensor T2 (DF.05), this function can be used to define a temperature range within which the pump will remain off.

DF.07 - **T1 antifreeze temperature to turn on the pump:**
When the temperature of the collectors (T1) is very low (e.g., on winter nights) the pump is switched on depending on the temperature set in this parameter. The goal is to prevent water from freezing in the solar collector and damaging it. The hysteresis of this control is fixed and set at 2°C.
Note: This function can be turned off by setting it to the minimum value OFF.

DF.08 - **Minimum antifreeze time:**
This minimum pump on time acts as a safety measure to ensure that water circulates through all collectors. Even if the temperature of sensor T1 exceeds the antifreeze temperature (parameter DF.07), the controller respects the time programmed in this parameter. This feature is widely used in large works due to the number of collectors installed.
Note: This function can be turned off by setting it to the minimum value OFF.

DF.09 - **T1 superheat temperature to turn off the pump:**
When the temperature in the collectors (T1) is above the value set in this parameter, the pump is turned off in order to prevent superheated water from circulating through the pipes and damaging them, if PVC pipes are used, for example. The hysteresis of this control is fixed and set at 2°C.

DF.10 - **Pump on time in manual mode:**
It is the time that the pump will remain on in manual mode. After this period, the controller assumes the AUT (automatic) mode.

DF.11 - **Enable cooling (T2):**
Its purpose is to cool the pool/thermal reservoir. Cooling occurs when the temperature of sensor T2 (reservoir) exceeds the heating temperature (parameter SP) and temperature differential conditions exist (cooling: T2 is greater than T1).

DF.12 - **Minimum temperature T1 to turn on the pump - scan mode:**
It is the minimum temperature (T1) required to turn on the pump output depending on the scan mode.

DF.13 - **Pump on time - scan mode:**
It is the time that the pump will remain on in scan mode.
Note: This function can be turned off by setting it to the minimum value OFF.

DF.14 - **Pump off time - scan mode:**
It is the time that the pump will remain off in scan mode.

DF.15 - **Maximum differential (T1-T2) for protection against thermal shock:**
It is the maximum temperature difference between sensors T1 and T2 allowed to start the circulation pump. When enabled, protection against thermal shock is activated, which prevents turning on the circulation pump when the collector temperature is much higher than the thermal reservoir, preventing damage to the solar collector.

IN.01 - **Digital input signal type:**
Defines the type of digital input signal:
0 = pulse - NO contact;
1 = pulse - NC contact;
2 = switch - NO contact;
3 = switch - NC contact.

IN.02 - **Digital input operating mode:**
Defines the digital input operating mode:
OFF = Digital input disabled;
1 = Toggles between Pump OFF (off) and AUT (automatic);
2 = Toggles between Pump OFF (off) and MAN (manual);
3 = External alarm.

SE.01 - **T1 sensor indication offset (Offset):**
SE.02 - **T2 sensor indication offset (Offset):**
Allows you to compensate for possible deviations in the reading of the T1 and T2 sensors resulting from the change of the sensor or the change in the cable length.

GE.01 - **Delay in controller power on (initial delay):**
Initial delay time to activate the control outputs. By programming a delay time in this parameter, it is possible to avoid high demand peaks in the electrical energy return, causing the output to be activated a few seconds after the energy is restored.

GE.02 - **Buzzer mode (buzzer):**
Choose when the controller will make sounds:
OFF = buzzer disabled;
1 = when pressing keys;
2 = when pressing keys and when alarms occur.

GE.03 - **Preferred indication:**
Allows you to choose the information that will normally be shown on the display:
T1 = collector temperature (T1);
T2 = temperature of the thermal reservoir (T2);
DIF = temperature differential (T1 - T2).

GE.04 - **Display brightness intensity:**
Sets the display brightness intensity operating mode:
ON = display always on at maximum intensity;
ECO = output Indication off and low brightness display after 5 minutes idle.

GE.05 - **Function lock mode:**
Enables partial or total locking of functions adjustment:
OFF = Blocking disabled - access to parameters released for adjustment;
1 = Controller = partial locking / NFC = locking disabled;
2 = Controller = full locking / NFC = locking disabled;
3 = Controller = locking disabled / NFC = partial locking;
4 = Controller = lock disabled / NFC = full lock;
5 = Controller = partial locking / NFC = partial locking;
6 = Controller = full lock / NFC = full lock.
Full lock: all parameters locked.
Partial locking: controller allows changing user parameters.

GE.06 - **Tempo para bloqueio das funções:**
Defines the time that the ▲ key must be pressed to lock/unlock parameter changes.

10. SIGNALS

10.1 SYSTEM

ERT1	**- Reason:** Sensor 1 disconnected or out of specified range. **- Measures:** Check connections and sensor operation.
ERT2	**- Reason:** Sensor 2 disconnected or out of specified range. **- Measures:** Check connections and sensor operation.
PPPP	**- Measures:** Contact the technician responsible for the installation.
ECAL	**- Measures:** Contact the technician responsible for the installation.
ENFC	**- Reason:** NFC memory error. **- Measures:** Contact the technician responsible for the installation.
EEAL	External alarm on.

10.2 CONTROL

HT1	- T1 overheating.
ICE	- Pump on due to antifreeze function.
SCAN	- Pump on due to scan function.
PTV	- Pump off due to vacuum tube protection.

11. INSTALLATION

11.1 ELECTRICAL CONNECTIONS

⚠ **Product installation must be carried out by a qualified technical professional.** ⚠

YES The controller MUST be installed:
- In an indoor and dry environment;
- Away from electromagnetic fields;
- In a ventilated place, free from flammable liquids and gases;
- Protected by a circuit breaker of the appropriate specification for the installed load.

NO The controller MUST NOT be installed:
- In a humid environment;
- Exposed to the sun or rain;
- In saunas, engine rooms or bathrooms.

Failure to comply with the warnings will cause loss of warranty, material and/or physical damage.

T1 - SENSOR T1 (WHITE CABLE)
T2 - SENSOR T2 (RESERVOIR)

1 2 3 4 5 6 10 11 12 13
T1   T2   D4   0 230 Vac or 115 Vac PUMP
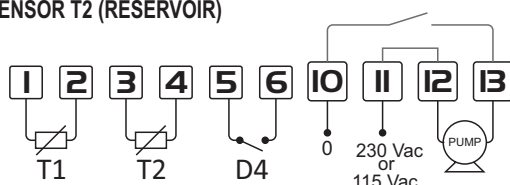
Note: The sensor with or white cable must be installed in the solar collector, as it supports the temperature of 200ºC.

IMPORTANT: Check power according to the product model.

⚡ **ATENTTION!** *Before removing the protective cover, disconnect the mains from the controller.*

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

11.2 IMPORTANT

According to chapters of the NBR 5410 standard:
1: Install surge protectors in the supply.
2: Sensor and serial communication cables can be together, but not in the same conduit through which electrical power and load activation pass.
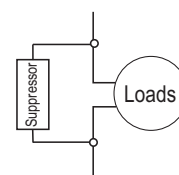**3:** Install transient suppressors (RC filter) in parallel with the loads, in order to increase the life of the relays.

Connection diagram of suppressors in contactors

A1
A2
Suppressor
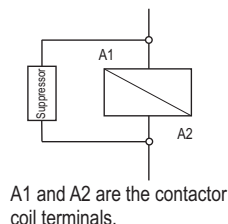
A1 and A2 are the contactor coil terminals.

Connection diagram of suppressors in direct drive loads
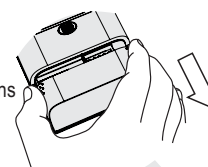
Suppressor
Loads

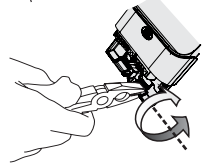For direct activation, take into account the specified maximum current.

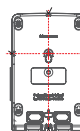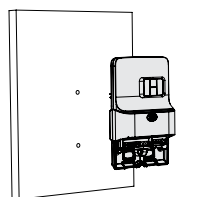**Full Gauge Controls offers suppressors for sale**

11.3 OVERLAY INSTALLATION

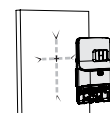① Remove the protective cover from the connections on the bottom of the controller.

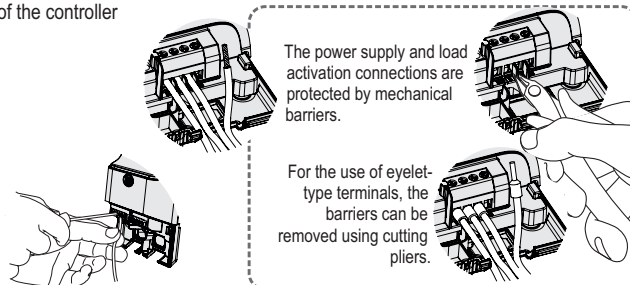② Detach the openings at the bottom necessary for the cables to pass through.

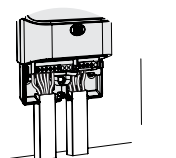③ Fix the controller to the wall using screws and wall plugs.

To find the position of the first hole, mark 4 points on the wall using the indications on the product as a reference.

④ Make the electrical connections of the controller

The power supply and load activation connections are protected by mechanical barriers.

For the use of eyelet-type terminals, the barriers can be removed using cutting pliers.

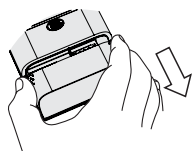⑤ For a better finish, install wire channels (20x10mm).

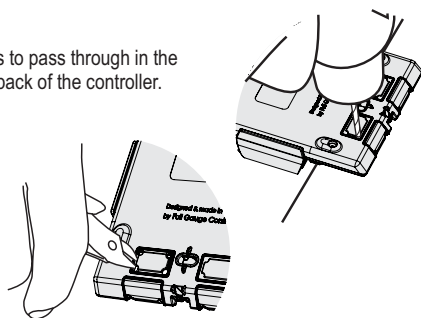⑥ Position the electrical connection protection cover and secure it with the screw (included in the package).
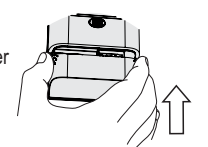
11.4 4X2 BOX INSTALLATION

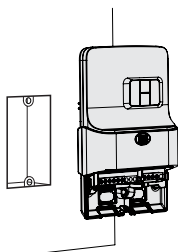1 Remove the protective cover from the connections on the bottom of the controller.

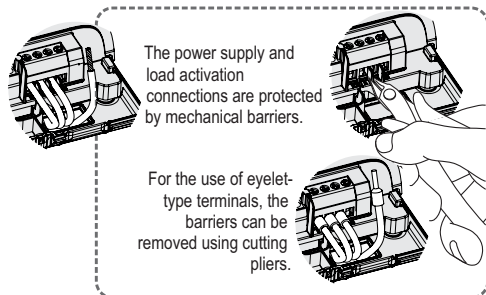2 Make openings for cables to pass through in the indicated regions on the back of the controller.

Route the cables through the openings as per the controller connections.

3 Fix the controller in the 4x2 box with screws.

The top screw must not be fully screwed in, in order to allow the controller to fit in. After attaching the controller to the upper screw, secure it with the lower screw.

4 Make the electrical connections of the controller

The power supply and load activation connections are protected by mechanical barriers.

For the use of eyelet-type terminals, the barriers can be removed using cutting pliers.

5 Position the electrical connection protection cover and secure it with the screw (included in the package).
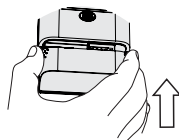
12. WARRANTY AND ENVIRONMENT

ENVIRONMENTAL INFORMATION
PACKAGE:
The materials used in the packaging of Full Gauge products are 100% recyclable. Try to dispose of it through specialized recycling agents.

PRODUCT:
Disposal

DISPOSAL:
Do not burn or dispose of household controllers that reach the end of their life. Obey existing legislation in your region regarding the disposal of electronic waste. If in doubt, contact Full Gauge Controls.

WARRANTY TERM - FULL GAUGE CONTROLS

The products manufactured by Full Gauge Controls after May 2005, have a warranty period of 10 (ten) years directly with the factory and 01 (one) year with accredited resellers, counted from the date of sale included on the invoice. After this year with resellers, the guarantee will continue to be valid if the instrument is sent directly to Full Gauge Controls. The products are guaranteed in case of manufacturing failure that makes them unsuitable or improper for the applications for which they are intended. The warranty is limited to the maintenance of instruments manufactured by Full Gauge Controls, disregarding other types of expenses, such as indemnity due to damage caused to other equipment.

EXCEPTIONS TO WARRANTY
The warranty does not cover transport and/or insurance costs for sending products with defects or malfunctions to Technical Assistance. The following events are also not covered: natural wear of parts, external damage caused by drops or improper packaging of products.

LOSS OF WARRANTY
The product will automatically lose its warranty if:
- The instructions for use and assembly contained in the technical description and the installation procedures present in Standard NBR5410 are not observed;
- It is subjected to conditions beyond the limits specified in its technical description;
- It is violated or repaired by a person who is not part of Full Gauge's technical team;
- The damage is caused by a fall, blow and/or impact, water infiltration, overload and/or atmospheric discharge.

WARRANTY USE
To take advantage of the warranty, the customer must send the product properly packed, together with the corresponding purchase invoice, to Full Gauge Controls. Shipping costs for products are borne by the customer. It is also necessary to send as much information as possible regarding the detected defect, allowing us to streamline the analysis, testing and execution of the service.
These procedures and the eventual maintenance of the product will only be carried out by Full Gauge Controls' Technical Assistance, at the Company's headquarters - Rua Júlio de Castilhos, 250 - CEP 92120-030 - Canoas - Rio Grande do Sul - Brazil.