



△ Have this manual in the palm of your hand through the FG Finder.

Microsol

BMP Advanced

c-o-n-n-e-c-t

DIFFERENTIAL THERMOSTAT
FOR SOLAR HEATING



Ver. 03



MCSOLADVANCNBNMP03-04T-9055
-2507

1. DESCRIPTION

The **Microsol BMP Advanced** c-o-n-n-e-c-t is a differential thermostat for solar heating, with up to four sensors and four outputs, one of which is analog, which control the water circulation pump and the thermal support. It has a clock and event schedule for rational and efficient use of thermal support, in addition to an exclusive Holidays mode that adds protection and energy savings to the SHS (solar heating system) in periods of low hot water consumption. The controller has functions that prevent the water from overheating and freezing in the solar collector, in addition to protecting the access to settings.

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.

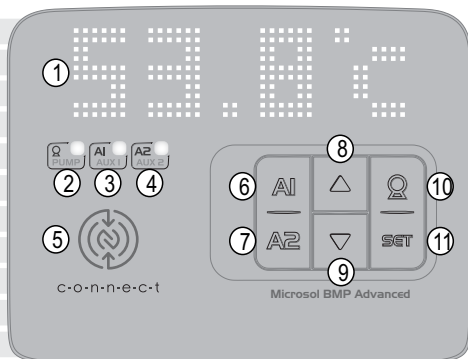
3. TECHNICAL SPECIFICATIONS

Power	115Vac $\pm 10\%$ (50/60Hz) or 230Vac $\pm 10\%$ (50/60Hz)
Consumption	5VA
Operating Temperature	0 to 50°C (32 to 122°F)
Operating humidity	10 a 90% UR (without condensation)
Sensors	T1: Solar Collector – Sensor SB59, white cable, Silicone, 1m T2: Thermal reservoir – Sensor SB19, 2,5m T3: Support – Sensor SB19, 2,5m T4: Support – Sensor SB19, 2,5m Important notice: Only the T1, T2 and T3 sensors come with the product. The T4 sensor can be purchased separately.
Control temperature	Sensor T1: -20 to 200°C / -4 to 392°F Sensor T2: -20 to 105°C / -4 to 221°F Sensor T3: -20 to 105°C / -4 to 221°F Sensor T4: -20 to 105°C / -4 to 221°F
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 220Vca (½ HP at 127 Vca) AUX 1 - Relay output, max. 16A, 3500W resistor at 220Vca (1750W at 127 Vca) AUX 2 - Relay output, max. 5A, 1100W resistor at 220Vca (630W at 127 Vca) Warning: The sum of the loads must not exceed 24A.
Digital input	Configurable dry contact type
PWM / 0-10V output	PWM: 20mA / 500Hz / 10V AN: 0 - 10V / 10mA Configurable PWM output for 0 - 10V output
Dimensions	104 x 160 x 34mm (4.09" x 6.30" x 1.34")

4. INTENDED USE

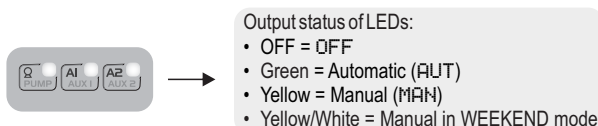
4.1 INTERFACE

- Display
- Pump Indication
- Auxiliary 1 Indication
- Auxiliary 2 Indication
- NFC area
- Auxiliary 1 key
- Auxiliary 2 key
- Up key
- Down key
- PUMP key
- 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.



5. NFC FUNCTIONALITY

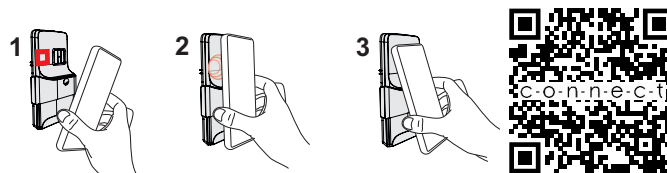
NFC is a technology for data exchange and wireless communication.

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.

Attention! 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.

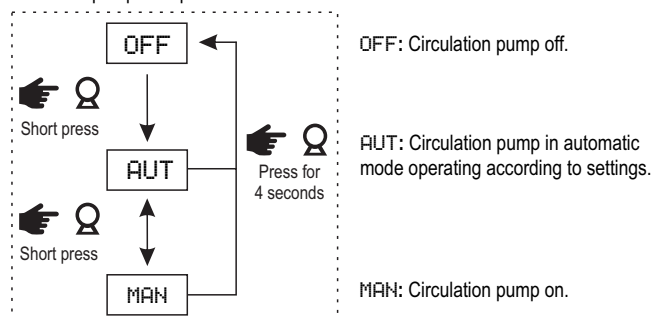
6. OPERATIONS

6.1 KEYMAP


SET	Short press - Access user settings. 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 6.6 Function lock.
▼	Short press - Toggles the temperature display (DIF, T1, T2, T3, T4, TIME). 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).
A1	Short press - Changes auxiliary 1 mode (AUT/MAN/OFF). Long press (4 seconds) - Enables/Disables Weekend mode on auxiliary 1.
A2	Short press - Changes auxiliary 2 mode (AUT/MAN/OFF). Long press (4 seconds) - Enables/Disables Weekend mode on auxiliary 2.
A1+A2	Long press (4 seconds) - Enables/Disables Holidays mode.

6.2 PUMP OPERATION MODE

With each press of the **⊗** Key, the water pump operating mode is changed. The water circulation pump can operate in three different modes:

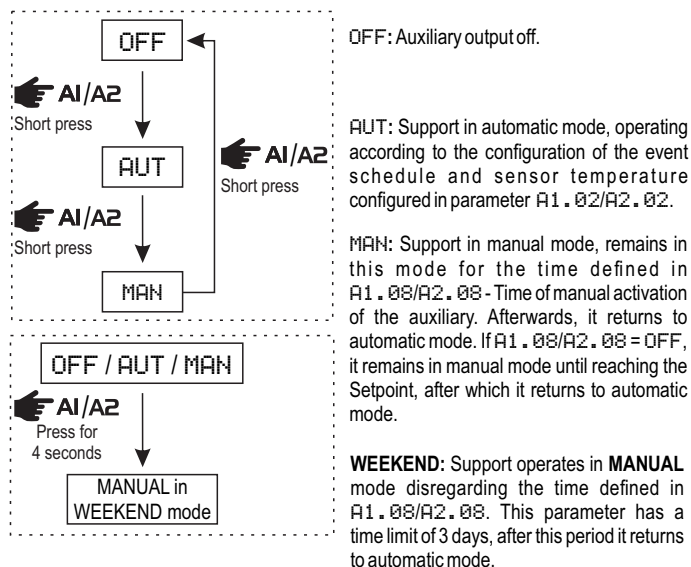


Attention: In **MANUAL** (MAN) mode the pump kept on, ignoring protection functions (except vacuum tube protection) and temperature sensors.

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 AUXILIARY OPERATION MODE

Each short press on the auxiliary key **A1** or **A2** changes the operating mode of the support output between **OFF**, **AUTO** and **MANUAL** modes. By pressing auxiliary key **A1** or **A2** for 4 seconds, Manual is set to Weekend mode.





Note: When **MANUAL** mode is selected, the backup output remains in this state for the period defined in this mode for the time defined in A1.08/A2.08 - Auxiliary 1 and 2 manual activation time. The manual mode is used when you want to eventually heat the thermal reservoir outside the times specified in the event schedule.

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 PARAMETERS TABLE

USER		CELSIUS				FAHRENHEIT			
FUN	DESCRIPTION	MINIMUM	MAXIMUM	UNIT	DEFAULT	MINIMUM	MAXIMUM	UNIT	DEFAULT
A1.SP	Auxiliary 1 temperature setpoint	A1.03	A1.04	°C	45.0	A1.03	A1.04	°F	113.0
A2.SP	Auxiliary 2 temperature setpoint	A2.03	A2.04	°C	45.0	A2.03	A2.04	°F	113.0
SET 	Time and Day Adjustment	See chapter 7.2.2 Time and Day Adjustment							
EUNT	Event schedule adjustment	See chapter 7.2.3 Adjustment of the Events Schedule							
	Back to home screen								

7.2 DESCRIPTION OF PARAMETERS

7.2.1 SETPOINT ADJUSTMENT

By accessing the user settings, you can adjust the SetPoint settings for auxiliaries 1 and 2.


A1.SP - Auxiliary 1 temperature setpoint:

Sets the desired control temperature for auxiliary 1.

A2.SP - Auxiliary 2 temperature setpoint:

Sets the desired control temperature for auxiliary 2.



7.2.2 TIME AND DAY ADJUSTMENT

When accessing the user settings it is possible to adjust the time and day by selecting the SET  parameter with a short press on the **SET** key.

IMPORTANT: The controller has an internal auxiliary source to keep the clock running during a power outage for a minimum of 72 hours. If the controller is turned off for a long period, the ECLO message may be displayed, indicating that the clock is deprogrammed. In this situation, the controller's date and time must be adjusted, keeping it energized for 10 hours so that the auxiliary source is fully recharged.


Note: If the controller is in ECLO (deprogrammed clock), the event schedule is ignored.

7.2.3 ADJUSTMENT OF THE EVENTS SCHEDULE

The **Microsol BMP Advanced** C-o-n-n-e-c-t has a schedule of up to 16 independently configurable events associated with the auxiliary outputs. By accessing the user settings it is possible to access the event schedule by selecting the EUNT parameter with a short press on the **SET** key. To configure an event, you must configure the start, end and control parameters of the event. Use the  and  keys to select between event functions.

6.4 HOLIDAYS MODE

To enable or disable **HOLIDAYS** mode, press the **A1** and **A2** keys simultaneously for 4 seconds until the message HOL (Holidays on) or H. OFF (Holidays off) appears on the display.

 **A1 + A2** → **HOLIDAYS**

Press for 4 seconds


When **HOLIDAYS** mode is enabled:

- Event schedule is ignored, backup outputs remain off, resulting in reduced energy consumption.
- It performs the cooling of the reservoir as programmed in DF. 11 - Temperature in the T3 sensor to turn off the cooling in Holidays mode.



Holidays mode is used to turn off the backups and allow the tank to be cooled through the solar collector when its temperature is lower than the tank, for example, at night. In periods with low or no consumption of hot water and high solar intensity, for example during vacation, holidays or seasons when people stay outside the residence, the reservoir will reach its maximum temperature limit and the solar heating system will be subject to high thermal load.


Note: Changing the support operating mode is blocked by clicking on the auxiliary key **A1** or **A2**, and the message H. ON is shown on the display.



6.5 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.

6.6 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  appears 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.

When selecting EV.01 ... EV.16, with a short press on the **SET** key it is possible to configure the event parameters. Use the  and  keys to select the desired parameter and, with a short press on the **SET** key, it is possible to edit its value. To exit the control parameter setting and return to the previous menu, press the **SET** key for 2 seconds.

STRT: Event start time

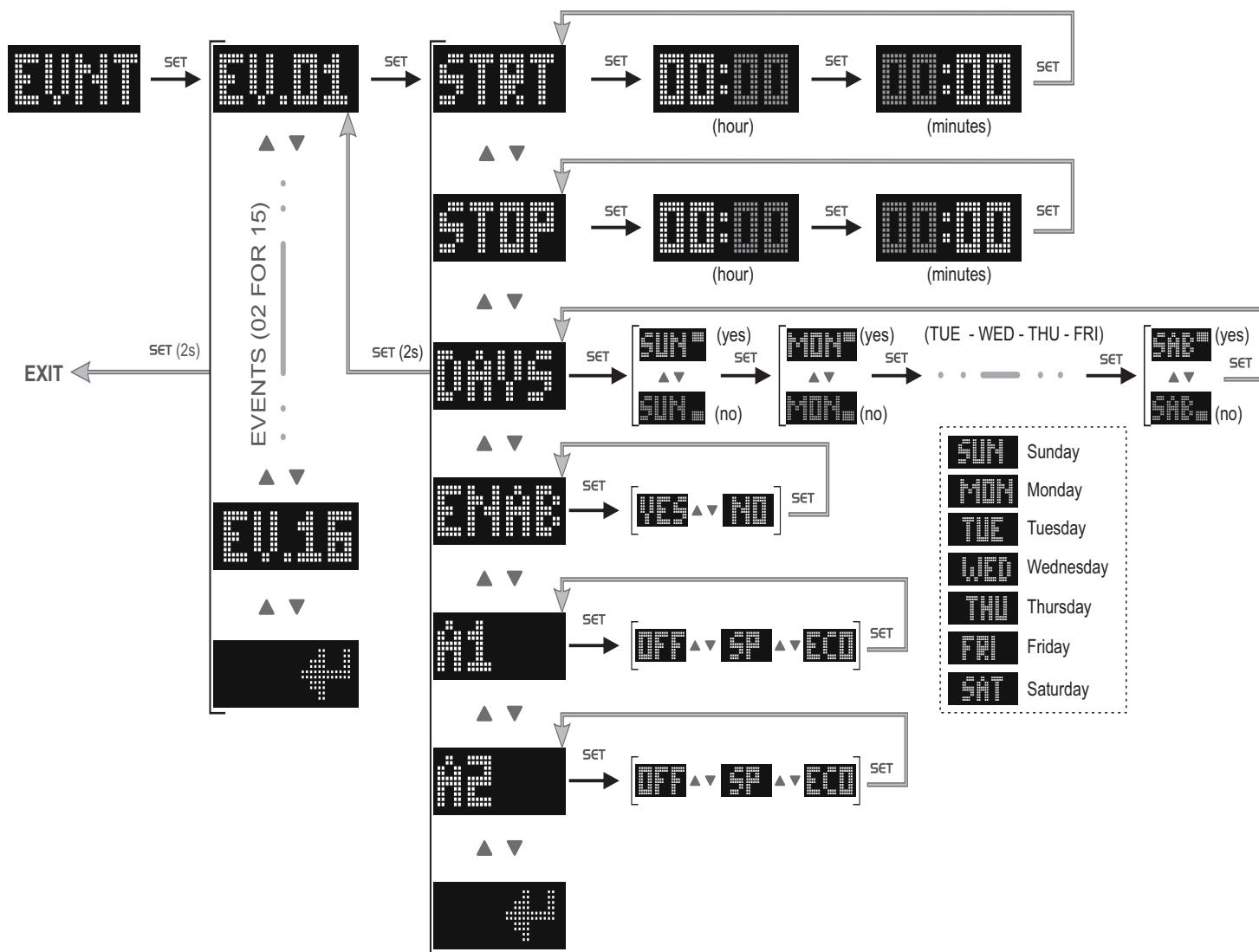
STOP: Event end time

DAYS: Days of the week that the event will take place;

ENAB: Enable/disable event;

A1/A2: Auxiliary output configuration during the event:

- OFF: The auxiliary output is not configured to be controlled during the event;
- SP: The auxiliary output is configured to be controlled during the event. The control uses the Setpoint configured in A1.SP/A2.SP;
- ECO: The auxiliary output is configured to be controlled during the event. The control will be using the Economic Setpoint configured in A1.06/A2.06.



Events 1 and 2 are previously configured with schedules and control parameters as follows:

	Event 1	Event 2
STRT	06:00	17:00
STOP	09:00	22:00
DAYS	Monday to Sunday	Monday to Sunday
EVNT	ENABLED	ENABLED
AUX 1	SP	SP
AUX 2	SP	SP

8.1 PARAMETERS TABLE

TECHNICAL		CELSIUS				FAHRENHEIT			
FUN	DESCRIPTION	MINIMUN	MAXIMUN	UNIT	DEFAULT	MINIMUM	MAXIMUM	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. 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).

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:

POR = 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;

GLYC = 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.

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	MINIMUM	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	70.0	DF. 03	DF. 04	°F	158.0
DF. 06	T2 superheat temperature hysteresis to restart the pump	0.1	20.0	°C	2.0	0.2	36.0	°F	3.6
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	Temperature sensor T3 to turn off cooling in Holidays mode	0.0	105.0	°C	50.0	32.0	221.0	°F	122.0
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<32.0>
DF. 16	Circulation pump type	STD	LIN	-	STD	STD	LIN	-	STD
DF. 17	Differential setpoint (T1-T2) (variable speed pump)	1.0	40.0	°C	10.0	1.0	72.0	°F	18.0
DF. 18	Increment rate (variable speed pump)	1.0	20.0	°C	1.0	1.0	36.0	°F	1.8
DF. 19	Minimum pump speed (variable speed pump)	30	DF. 20	%	30	30	DF. 20	%	30
DF. 20	Maximum pump speed (variable speed pump)	DF. 19	100	%	100	DF. 19	100	%	100
DF. 21	Pump start time at full speed (variable speed pump)	5	300	seconds	10	5	300	seconds	10
A1. 01	Auxiliary 1 operating mode	OFF	REF	-	HOT	OFF	REF	-	HOT
A1. 02	Auxiliary 1 reference temperature sensor	S1	S4	-	S3	S1	S4	-	S3
A1. 03	Minimum temperature setpoint of auxiliary 1 allowed to the user	-20.0	A1. 04	°C	0.0	-4.0	A1. 04	°F	32.0
A1. 04	Maximum temperature setpoint of auxiliary 1 allowed to the user	A1. 03	105.0	°C	105.0	A1. 03	221.0	°F	221.0
A1. 05	Auxiliary 1 temperature setpoint	A1. 03	A1. 04	°C	45.0	A1. 03	A1. 04	°F	113.0
A1. 06	Auxiliary 1 temperature setpoint Economic	A1. 03	A1. 04	°C	40.0	A1. 03	A1. 04	°F	104.0
A1. 07	Auxiliary 1 operating hysteresis	0.1	20.0	°C	1.0	0.2	36.0	°F	1.8
A1. 08	Auxiliary 1 manual activation time	OFF<0>	9999	minutes	120	OFF<0>	9999	minutes	120
A1. 09	Cyclic timer on time / scan time (recirculation)	OFF<0>	9999	seconds	OFF<0>	OFF<0>	9999	seconds	OFF<0>

ADVANCED		CELSIUS				FAHRENHEIT			
FUN	DESCRIPTION	MINIMUN	MAXIMUN	UNIT	DEFAULT	MINIMUM	MAXIMUN	UNIT	DEFAULT
A1.10	Cyclic timer off time / interval between scans	OFF<0>	9999	minutes	OFF<0>	OFF<0>	9999	minutes	OFF<0>
A1.11	Maximum time for auxiliary 1 output on without reaching the setpoint (A1AL)	OFF<0>	9999	minutes	OFF<0>	OFF<0>	9999	minutes	OFF<0>
A1.12	Auxiliary 1 output time off by alarm A1AL	1	9999	seconds	30	30	9999	seconds	30
A1.13	Auxiliary connection type 1	OFF<0>	3	-	OFF<0>	OFF<0>	3	-	OFF<0>
A2.01	Auxiliary 2 operating mode	OFF	REF	-	HOT	OFF	REF	-	HOT
A2.02	Auxiliary 2 reference temperature sensor	S1	S4	-	S3	S3	S1	-	S3
A2.03	Minimum temperature setpoint of auxiliary 2 allowed to the user	-20.0	A2.04	°C	0.0	-4.0	A2.04	°F	32.0
A2.04	Maximum temperature setpoint of auxiliary 2 allowed to the user	A2.03	105.0	°C	105.0	A2.03	221.0	°F	221.0
A2.05	Auxiliary 2 temperature setpoint	A2.03	A2.04	°C	45.0	A2.03	A2.04	°F	113.0
A2.06	Auxiliary 2 temperature setpoint Economic	A2.03	A2.04	°C	40.0	A2.03	A2.04	°F	104.0
A2.07	Auxiliary 2 operating hysteresis	0.1	20.0	°C	1.0	0.2	36.0	°F	1.8
A2.08	Auxiliary 2 manual activation time	OFF<0>	9999	minutes	120	OFF<0>	9999	minutes	120
A2.09	Cyclic timer on time / scan time (recirculation)	OFF<0>	9999	seconds	OFF<0>	OFF<0>	9999	seconds	OFF<0>
A2.10	Cyclic timer off time / interval between scans	OFF<0>	9999	minutes	OFF<0>	OFF<0>	9999	minutes	OFF<0>
A2.11	Maximum time for auxiliary 2 output on without reaching the setpoint (A2AL)	OFF<0>	9999	minutes	OFF<0>	OFF<0>	9999	minutes	OFF<0>
A2.12	Auxiliary 2 output time off by alarm A2AL	1	9999	seconds	30	1	9999	seconds	30
A2.13	Auxiliary connection type 2	OFF<0>	3	-	OFF<0>	OFF<0>	3	-	OFF<0>
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
SE.03	T3 sensor indication offset (Offset)	OFF<-20.1>	20.0	°C	0.0	OFF<-36.2>	36.0	°F	0.0
SE.04	T4 sensor indication offset (Offset)	OFF<-20.1>	20.0	°C	OFF<-20.1>	OFF<-36.2>	36.0	°F	OFF<-36.2>
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	HOURL	T4	-	T3	HOURL	T4	-	T3
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 PARAMETERS DESCRIPTION

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 - Temperature at sensor T3 to turn off cooling in Holidays mode:

Its purpose is to cool the thermal reservoir during the night when the Holidays mode is activated. When the temperature of sensor T3 is higher than the value set in this parameter and meets the internally defined temperature differentials, the pump is turned on using the solar collector as a radiator to cool the water in the pool/reservoir. The hysteresis of this control is fixed and set at 2°C.

Note: When deactivating sensor T3, the temperature of this control is referenced by sensor T2.

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.

DF. 16 - Circulation pump type:

Allows you to select which type of circulation pump will be used in the installation:

STD - standard - ON/OFF relay;

PWM - Pulse Width Modulation pumps;

LIN - linear 0-10V - analog output for variable speed pumps.

DF. 17 - Differential setpoint (T1-T2) (variable speed pump):

It is the differential setpoint configured to calculate the speed of the variable speed pump. When the differential (T1-T2) is greater than this parameter, the pump speed increases according to the increment rate set in DF. 18.

DF. 18 - Increment rate (variable speed pump):

It defines the rate of increase of the variable pump speed when the differential (T1-T2) is greater than the value configured in parameter DF. 17. Pump speed is incremented by 10% whenever the differential (T1-T2) exceeds the increment rate (DF. 18) above the differential setpoint (DF. 17).

DF. 19 - Minimum pump speed (variable speed pump):

Allows you to configure the minimum speed that the variable speed pump will operate when it is turned on.

DF. 20 - Maximum pump speed (variable speed pump):

Allows you to configure the maximum speed that the variable speed pump will operate when it is turned on.

DF. 21 - Pump start time at maximum speed (variable speed pump):

It is the minimum time that the pump will turn on at maximum speed (set in DF. 20) when turned on. After this time, the pump speed is defined by the calculation according to parameters.

A1. 01 - Auxiliary 1 operating mode:

Sets auxiliary 1 operating mode:

OFF = off;

ON = on / cyclic;

HOT = heating thermostat;

REF = refrigeration thermostat.

A1. 02 - Auxiliary 1 reference temperature sensor:

Choose the temperature sensor that will be used to control auxiliary 1.

A1. 03 - Minimum temperature setpoint of auxiliary 1 allowed to the user:

A1. 04 - Maximum temperature setpoint of auxiliary 1 allowed to the user:

These parameters are the lower and upper setting limits for parameter A1. SP.

They are used to lock the temperature setting to the end user to restrict an inappropriate setting. For example, a high value can keep the auxiliary output on for a long time, resulting in high energy consumption.

A1. 05 - Auxiliary 1 temperature setpoint:

Sets the desired control temperature for auxiliary 1.

A1. 06 - Auxiliary 1 Economy temperature setpoint:

Sets the desired temperature for auxiliary 1 when economizer mode is activated. One possible application for economy mode is use on underfloor heating, in order to keep the floor preheated and allow for rapid heating of the space when necessary.

Note: Eco mode is activated by configuring the event schedule.

A1. 07 - Auxiliary 1 operation hysteresis:

Temperature difference to turn on the auxiliary output. Through this function it is possible to define a temperature range within which the output will remain off.

For example:

If A1.SP = 45 and A1.07 = 1 are set, the auxiliary output will turn off when the temperature reaches 45.0 and turn on again when it drops below 44°C.

A1. 08 - Auxiliary 1 manual activation time:

Used when the user wants to eventually activate the auxiliary output outside the scheduled times in the event schedule. During this time, the auxiliary output is controlled according to its operating mode, for example, linked to the temperature if A1.01 = 2 (heating thermostat) or 3 (cooling thermostat). From manual activation, after the time programmed in this parameter has elapsed, the auxiliary mode returns to AUT (automatic) mode.

Note: This function can be turned off by setting it to the minimum value OFF.

A1. 09 - Cyclic timer on time / scan time (recirculation):

Case A1.01 = ON (on / cyclic):

- Time that auxiliary output 1 will be on.

Case A1.01 = HOT (heating thermostat):

- Time in which the controller will keep the water circulation activated to equalize the water temperature in the barrel.

Note: This function can be turned off by setting it to the minimum value OFF.

A1. 10 - Cyclic timer off time/interval between scans:

Case A1.01 = ON (on / cyclic):

- Time that the auxiliary output will be off;

Case A1.01 = HOT (heating thermostat):

- It is the time interval between the temperature scan triggers.

Note: This function can be turned off by setting it to the minimum value OFF.

A1. 11 - Maximum time for auxiliary 1 output on without reaching the setpoint (A1AL):

It is the time that the auxiliary output can remain on without reaching the auxiliary 1 temperature setpoint. If this time is exceeded, alarm A1AL is activated and the output is turned off, turning on again after the time in A1.12 has elapsed.

Note: This function can be turned off by setting it to the minimum value OFF.

A1. 12 - Auxiliary 1 output time off by alarm A1AL:

Time that the controller will remain with the auxiliary output off while in the A1AL alarm state. After this time has elapsed, new checks are carried out and the auxiliary output is activated again.

A1. 13 - Auxiliary 1 connection type:

It allows turning off auxiliary output 1 according to the status of the other outputs:

OFF = coupling disabled, turns on the auxiliary output 1 independently from the other outputs;

1 = Turns off auxiliary 1 output when the pump is on;

2 = Turn off auxiliary 1 output when auxiliary 2 is on;

3 = Turns off auxiliary 1 output when pump or auxiliary 2 is on.

A2. 01 - Auxiliary 2 operating mode:

Sets auxiliary 2 operating mode:

OFF = off;

ON = on / cyclic;

HOT = heating thermostat;

REF = refrigeration thermostat.

A2. 02 - Auxiliary 2 reference temperature sensor:

Choose the temperature sensor that will be used to control auxiliary 2.

A2. 03 - Minimum temperature setpoint for auxiliary 2 allowed to the user:

A2. 04 - Maximum temperature setpoint of auxiliary 2 allowed to the user:

These parameters serve as lower and upper setting limits for parameter A2.SP. They are used to lock the temperature setting to the end user to restrict an inappropriate setting. For example, a high value can keep the auxiliary output on for a long time, resulting in high energy consumption.

A2. 05 - Auxiliary 2 temperature setpoint:

Sets the desired control temperature for auxiliary 2.

A2. 06 - Economy auxiliary 2 temperature setpoint:

Sets the desired temperature for auxiliary 2 when economizer mode is activated. One possible application for economy mode is use on underfloor heating, in order to keep the floor preheated and allow for rapid heating of the space when necessary.

Note: Eco mode is activated by configuring the event schedule.

A2. 07 - Auxiliary 2 operating hysteresis:

Temperature difference to turn on the auxiliary output. Through this function it is possible to define a temperature range within which the output will remain off.

For example: If A2.SP = 45 and A2.07 = 1 are set, the auxiliary output will turn off when the temperature reaches 45.0 and turn on again when it drops below 44°C.

A2. 08 - Auxiliary 2 manual activation time:

Used when the user wants to eventually activate the auxiliary output outside the scheduled times in the event schedule. During this time, the auxiliary output is controlled according to its operating mode, for example, linked to the temperature if A2.01 = HOT (heating thermostat) or REF (cooling thermostat). From manual activation, after the time programmed in this parameter has elapsed, the auxiliary mode returns to AUT (automatic) mode.

Note: This function can be turned off by setting it to the minimum value OFF.

A2. 09 - Cyclic timer on time / scan time (recirculation):

Case A2.01 = ON (on / cyclic):

- Time that auxiliary output 1 will be on.

Case A2.01 = HOT (heating thermostat):

- Time in which the controller will keep the water circulation activated to equalize the water temperature in the barrel.

Note: This function can be turned off by setting it to the minimum value OFF.

A2. 10 - Cyclic timer off time / interval between scans:

Case A2. 01 = ON (on / cyclic):

Time the auxiliary output will be off.

Caso A2. 01 = HOT (heating thermostat):

It is the time interval between the temperature scan triggers.

Note: This function can be turned off by setting it to the minimum value OFF.

A2. 11 - Maximum time for auxiliary 2 output on without reaching the setpoint (A2AL):

It is the time that the auxiliary output can remain on without reaching the auxiliary 2 temperature setpoint. If this time is exceeded, the A2AL alarm is activated and the output is turned off, turning on again after the time in A2. 12 has elapsed.

Note: This function can be turned off by setting it to the minimum value OFF.

A2. 12 - Auxiliary 2 output time off by alarm A2AL:

Time the controller will remain with the auxiliary output off while in the A2AL alarm state. After this time has elapsed, new checks are carried out and the auxiliary output is activated again.

A2. 13 - Attachment type of auxiliary 2:

It allows turning off auxiliary output 2 according to the status of the other outputs:

OFF = coupling disabled, turns on the auxiliary output 2 independently from the other outputs;

1 = Turns off auxiliary 2 output when the pump is on;

2 = Turn off auxiliary 2 output when auxiliary 1 is on;

3 = Turns off auxiliary 2 output when pump or auxiliary 1 is on.

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 = Enables/disables auxiliary 1 MAN (manual) mode;

4 = Enables/disables auxiliary 2 MAN (manual) mode;

5 = Enables/disables auxiliary 1 and auxiliary 2 MAN (manual) mode;

6 = Enables/disables Holidays mode;

7 = External alarm.

SE. 01 - T1 sensor indication offset (Offset):

SE. 02 - T2 sensor indication offset (Offset):

SE. 03 - T3 sensor indication offset (Offset):

SE. 04 - T4 sensor indication offset (Offset):

Allows you to compensate for possible deviations in the reading of the T1, T2, T3 or T4 sensors resulting from the change of the sensor or the change in the cable length.

Note: Sensors T3 and T4 can be disabled by setting this function to the value OFF.

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:

TIME = clock;

T1 = collector temperature (T1);

T2 = temperature of the thermal reservoir (T2);

DIF = temperature differential (T1 - T2);

T3 = support temperature (T3) (if enabled SE. 03);

T4 = support temperature (T4) (if enabled SE. 04).

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 - Time for locking functions:

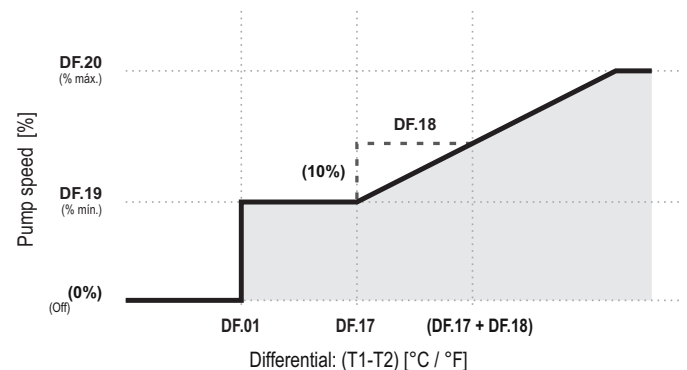
Defines the time that the  key must be pressed to lock/unlock parameter changes.

10. VARIABLE SPEED PUMP

The PWM/0-10V terminal (see chapter 12.1 - Electrical Connections) is a speed control output for use with high efficiency pumps. It is possible to set the controller to use variable speed pumps by selecting the pump type in parameter DF. 16. Parameters DF. 17, DF. 18, DF. 19, DF. 20 and DF. 21 are settings for controlling the pump's operating speed.

If the pump is on due to the temperature difference (T1-T2) being greater than the value set in DF. 01, the pump will start at maximum speed (determined by DF. 20) for the time determined in DF. 21. After this initial period, the pump starts operating at the minimum speed determined by DF. 19. The pump speed is increased by 10% (with maximum limit determined by DF. 20) whenever the differential (T1-T2) exceeds the rate of increase determined in DF. 18 above the differential setpoint DF. 17.

Speed control chart: (T1-T2) x Speed



11. SIGNALS

11.1 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.
ERT3	- Reason: Sensor 3 disconnected or out of specified range. - Measures: Check connections and sensor operation.
ERT4	- Reason: Sensor 4 disconnected or out of specified range. - Measures: Check connections and sensor operation.
ECLO	- Reason: Clock deprogrammed due to prolonged power outage. - Measures: Adjust time and date.
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.

A1AL

- Auxiliary 1 alarm on.

A2AL

- Auxiliary 2 alarm on.

EEAL

- External alarm on.

11.2 CONTROL

HT1

- T1 overheating.

HT2

- T2 overheating.

ICE

- Pump on due to antifreeze function.

SCAN

- Pump on due to scan function.

PTU

- Pump off due to vacuum tube protection.

12. INSTALLATION

12.1 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.

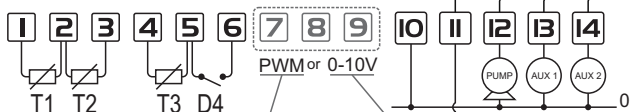
Failure to comply with the warnings will cause loss of warranty, material and/or physical damage.

T1 - SENSOR T1 (WHITE CABLE)

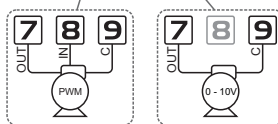
T2 - SENSOR T2 (RESERVOIR)

T3 - SENSOR T3 (SUPPORT)

D4 - DIGITAL INPUT OR T4 SENSOR



Note: The sensor with or white cable must be installed in the solar collector, as it supports the temperature of 200°C.



IMPORTANT: Check power according to the product model.



ATTENTION! Before removing the protective cover, disconnect the mains from the controller.



ATTENTION! The sum of the loads must not exceed 24A.

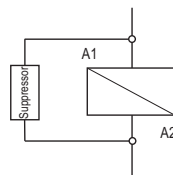
Note: The sensor cable length can be extended by the user up to 200 meters using PP 2 x 24AWG cable.

12.2 IMPORTANT

According to chapters of the NBR 5410 standard:

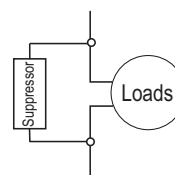
- 1: Install surge protectors in the supply.
- 2: Sensor and serial communication cables can be together, but not in the same conduit through which electrical power and load activation pass.
- 3: Install transient suppressors (RC filter) in parallel with the loads, in order to increase the life of the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

Connection diagram of suppressors in contactors



A1 and A2 are the contactor coil terminals.

Connection diagram of suppressors in direct drive loads

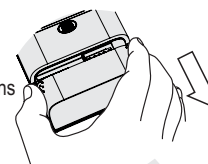


For direct activation, take into account the specified maximum current.

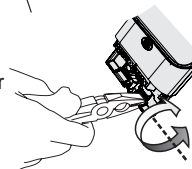
Full Gauge Controls offers suppressors for sale

12.3 OVERLAY INSTALLATION

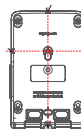
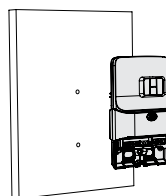
- 1 Remove the protective cover from the connections on the bottom of the controller.



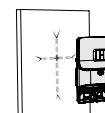
- 2 Detach the openings at the bottom necessary for the cables to pass through.



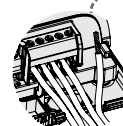
- 3 Fix the controller to the wall using screws and wall plugs.



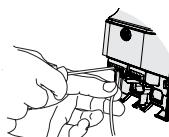
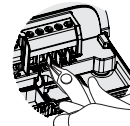
To find the position of the first hole, mark 4 points on the wall using the indications on the product as a reference.



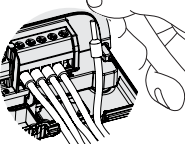
- 4 Make the electrical connections of the controller



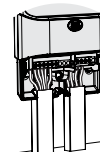
The power supply and load activation connections are protected by mechanical barriers.



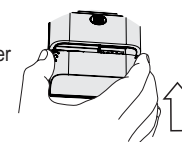
For the use of eyelet-type terminals, the barriers can be removed using cutting pliers.



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

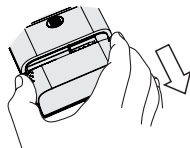


- 6 Position the electrical connection protection cover and secure it with the screw (included in the package).

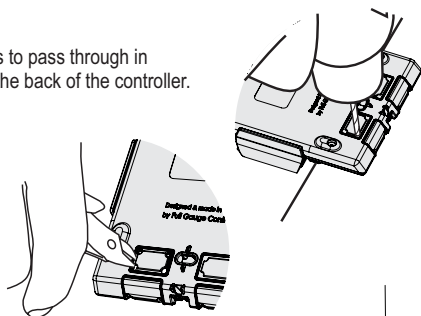


12.4 4X2 BOX INSTALLATION

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



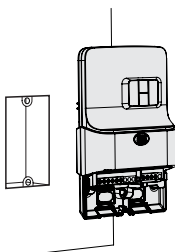
- 2 Make openings for cables to pass through in the indicated regions on the back of the controller.



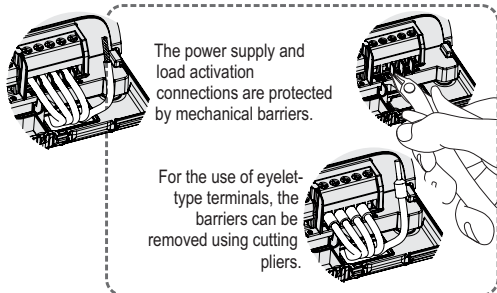
Route the cables through the openings as per the controller connections.

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

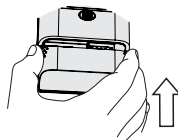
The top screw must not be fully screwed in, in order to allow the controller to fit in. After attaching the controller to the upper screw, secure it with the lower screw.



- 4 Make the electrical connections of the controller



- 5 Position the electrical connection protection cover and secure it with the screw (included in the package).



13. 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:

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

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.

©Copyright 2022 • Full Gauge Controls® • All rights reserved.