1. DESCRIPTION

The **Microsol *RST Advanced*** is a digital thermostat with control logic for heating or cooling. The unit is equipped with a clock, events schedule for rational and economical use of the controlled load, and protected access to configuration parameters. It features the Holiday function which saves on power consumption during periods when the system is idle.

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

2. APPLICATION

- Heating systems for thermal reservoirs
- Floor heating
- Air conditioning

3. TECHNICAL SPECIFICATIONS

- **Power: Microsol *RST Advanced***: 230Vac +-10%(50/60Hz) or version 115Vac +-10%(50/60Hz)
- **Operation temperature:** 0 to 40ºC
- **Operation humidity:** 10 to 90% UR (without condensation)
- **Sensors:** The **Microsol *RST Advanced*** has 1 sensor:
    Sensor T1: Thermostat - SB41 Sensor, plastic tip, 2m
- **Control temperature: Sensor T1:** -50 to 105ºC / -58 to 221ºF
- **Resolution:** 0.1ºC between -10 and 100ºC and 1ºC in the remainder of the range
    1ºF in all of the range
- **Control output:** The **Microsol *RST Advanced*** has one relay output:
    AUX - Relay output, max. 16A, resistance
        3500W in 220Vca (1750W in 127 Vca)
- **Dimensions:** 104 x 148 x 32 mm
- **Display:** LCD 2.75" with backlight

4. INDICATIONS AND SCREEN
4.1 PRESENTATION
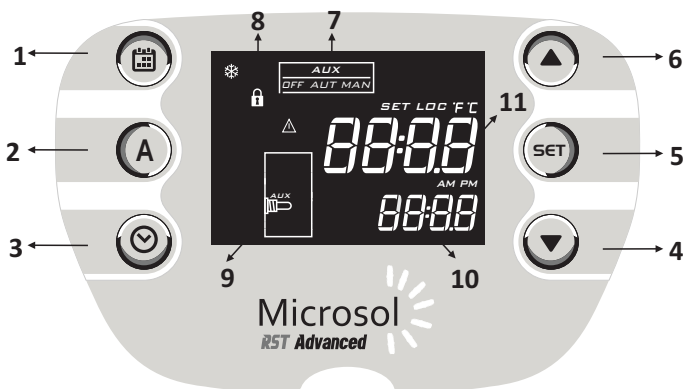
1	Schedule key
2	Thermostat mode key
3	Clock key
4	Lowering key
5	Set key
6	Increasing key
7	Indication of the thermostat operation mode
8	Controller signals
9	Representation of the solar heating system
10	Lower display numbers
11	Upper display numbers

4.2 INDICATIONS

SET	In programming, cleared parameter setting
LOC	In programming, blocked parameter setting
˚F	Fahrenheit scale temperature Indication
˚C	Celsius scale temperature Indication
❄	Thermostat output on, if F01=Cool
🔦 AUX	Thermostat output on, if F01=Heat
⚠	Indicates the occurrence of a controller error
🔒	Function block setting
AM	Before noon (standard clock 12pm)
PM	After noon (standard clock 12pm)

5. OPERATIONS FOR DOMESTIC USER
5.1 KEY MAP

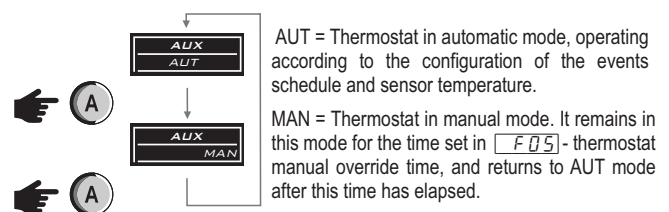The controller has easy-access to user resources. Contains table with description of the following:

(SET)	**Short key press: set the thermostat temperature**
(SET)	**Long touch (4 seconds): access to advanced settings**
(▲)	**Long touch (see F10 parameter): enables/disables function block**
(📅)	**Short key press: access the menu to set the events schedule**
(A)	**Short touch: switches way thermostat mode (AUT / MAN)**
(A)	**Long key press (4 seconds): enables/disables thermostat Holiday mode (OFF)**
(🕐)	**Short touch: accesses hour and day settings menu**

5.2 THERMOSTAT TEMPERATURE

Sets the operating temperature of the thermostat. To adjust this parameter, short press the **SET** button. Use the ▼ and ▲ keys to adjust the value. To confirm, short press the **SET** button and the value will be saved in the controller memory. This parameter can be adjusted between the values defined in the advanced configuration for parameters: `F03` – Minimum value of the thermostat temperature and `F04` – Maximum value of the thermostat temperature.

5.3 THERMOSTAT OPERATING MODE

With each short press of the **A** button you can change the operating mode of the thermostat output between AUT and MAN modes.

AUT = Thermostat in automatic mode, operating according to the configuration of the events schedule and sensor temperature.

MAN = Thermostat in manual mode. It remains in this mode for the time set in `F05` - thermostat manual override time, and returns to AUT mode after this time has elapsed.

Note: When adjusting the thermostat mode, the controller changes into the new mode 5 seconds after your selection. This is also the time required for the parameter to be stored in its memory.
Manual mode is used when you wish to control the load outside the hours set in the events schedule.
In manual mode, the thermostat output is still associated to the sensor temperature via the thermostat heating temperature (`tEMP` parameter). In this mode, the controller allows the output to be turned on during the period programmed in the parameter `F05`.

5.3.1 VACATION MODE

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

(A) [AUX OFF] OFF: vacation mode enabled.

4 seconds

When enabled:
The event schedule is ignored, the support outlet is turned off, resulting in energy consumption reduction.
Obs.: In thermostat mode settings, the controller takes on the new mode 5 seconds after its selection. This also is the time necessary for the parameter to be stored in its memory.

In order to access the Time and Day menu, just give a short touch on the ⊙ key. Through the ▲or▼keys it is possible to navigate among the parameters. In order to edit them press the **SET** key and through the ▲ or ▼ keys update its value. By pressing once again the **SET** key, you return to the parameter menu.

Clock - Time settings.

Day - Day of the week settings.
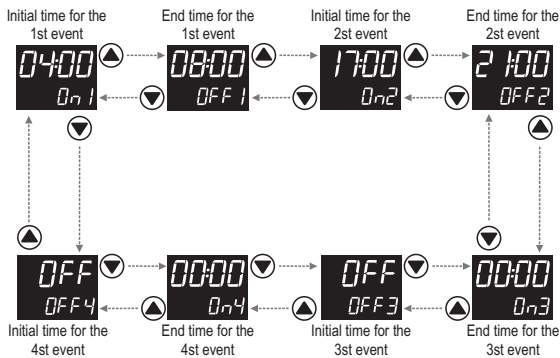Adjustable from 1 (Sunday) to 7 (Saturday).

NOTICE:
The controller is equipped with a lithium rechargeable battery in order to keep its date and time in the case of an energy shortage. A fully charged battery can provide enough energy to keep the time and date running for some weeks. If the controller remains turned off for a prolonged period of time, it will display the message `ECLO` ; in this case the controller's date and time has been lost due to low battery and the user must adjust it again. To completely recharge a dischaged battery, keep the controller turned on for at least 10hours.

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

To set the event schedule associated to the thermostat outlet, you should hold the 📅 key. The schedule allows setting up to 4 events for each day of the week, as the programming performed in parameter `F06` - thermostat event schedule operation mode. Each event is comprised by a final and initial schedule.
The event schedule gets factory settings in mode `It 7`, same events for each day of the week, and the schedules are defined as follows:

| Initial time for the 1st event | End time for the 1st event | Initial time for the 2st event | End time for the 2st event |
| Initial time for the 4st event | End time for the 4st event | Initial time for the 3st event | End time for the 3st event |

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

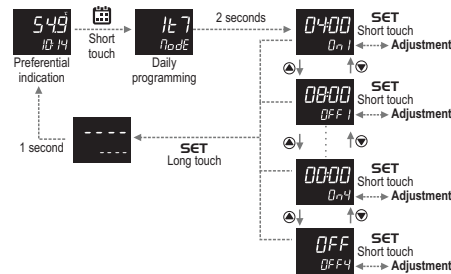According to the set operation mode, the following programming possibilities may be presented:
Programmed case `F06` **=** `Ib1`
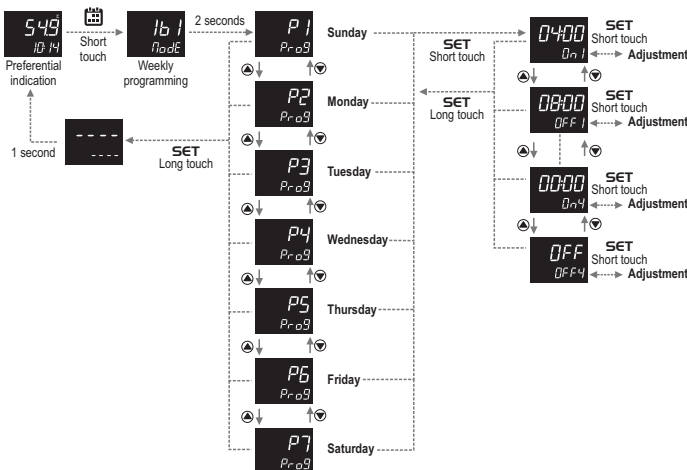
Programmed case `F06` **=** `2t6`
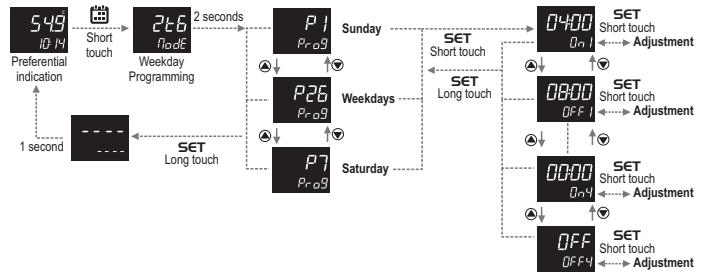
Programmed case `F06` **=** `It 7`

For security reasons and in order to avoid unauthorized people changing the controller settings, there is the function block resource. With that setting activated, the parameters cannot be changed, but they can be displayed, however. In the block condition, upon trying to change the value of a parameter the message "`LOC` `On` no display " will be displayed.
To enable/disable the function block you should hold the ▲key for the time set in parameter key for the time set in parameter `F10` – Time for function block. The 🔒 icon indicates the block state to the user, in case it is accessed, it indicates that the function block is active.

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

Access the settings menu holding the **SET** key for 4 seconds until `Func` appears. After that `CodE` will appear and then press once again the **SET** key, short touch. Use the ▲ or ▼keys to enter the access code value, 123, and when ready press the **SET** key once again (short touch). Use the ▲ or ▼keys to select the desired function. With a short touch to the **SET** key it's possible to edit its value. Use the ▲ or ▼keys to change the value, and when ready give a short touch on the **SET** key to memorize the set value and return to the function menu.

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

Observations:

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

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

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

Fun	Description	CELSIUS				FAHRENHEIT			
		Min	Max	Unit	Standard	Min	Max	Unit	Standard
CodE	Access code	0	999	-	0	0	999	-	0
F01	Thermostat control logic	Cool	Heat	-	Heat	Cool	Heat	-	Heat
F02	Thermostat temperature hysteresis	0.1	20.0	ºC	2.0	1	36	ºF	3
F03	Minimum allowable setting for the thermostat temperature (TEMP parameter)	-50	105	ºC	0.0	-58	221	ºF	32
F04	Maximum allowable setting for the thermostat temperature (TEMP parameter)	-50	105	ºC	50.0	-58	221	ºF	122
F05	Thermostat manual override time	no (0)	600	min	120	no (0)	600	min	120
F06	Events schedule operating mode	1b1	1t7	-	1t7	1b1	1t7	-	1t7
F07	Thermostat output linked to the events schedule	Off	On	-	On	Off	On	-	On
F08	Thermostat temperature in economy mode	no (-11)	30.0	ºC	no	no (12)	86	ºF	no
F09	T1 Sensor indication displacement (Offset)	-5.0	5.0	ºC	0.0	-9	9	ºF	0
F10	Function lock time	no (3)	30	s	4	4	30	s	4
F11	Intensity of the display backlight	1	10	-	8	1	10	-	8

6.3 DESCRIPTION OF PARAMETERS

CodE – Access code (123):
Required when you want to change the advanced configuration parameters. This code is not required to only view the set parameters.

F01 – Thermostat control logic:
Sets the operating logic of the thermostat.
Cool – Cooling.
HEAt – Heating.

F02 – Thermostat temperature hysteresis (tEMP parameter):
Temperature difference to turn on the thermostat. This function allows you to define a temperature range within which the output will remain off.
For example: If set to tEMP = 45.0, F02 = 2.0 and F01 = hEAt the thermostat output will be turned off when the T1 sensor temperature reaches 45.0 °C, and will only turn on when this falls below 43.0 °C (45.0-2.0=43.0).

F03 – Minimum allowable setting for the thermostat temperature:
F04 – Maximum allowable setting for the thermostat temperature:
These parameters serve as upper and lower limits for adjusting the tEMP parameter (thermostat heating temperature). They are used to block temperature adjustment so as to prevent an inappropriate configuration, for example. A high value could mean the thermostat output stays on for a long time, resulting in high power consumption.

F05 – Thermostat manual override time:
Used when you wish to activate the output outside the hours set in the events schedule. When using manual override, the thermostat returns to AUT (automatic) mode after the time programmed in this parameter. To disable this function, move the setting to the minimum until no appears.

F06 – Events schedule operating mode:
Sets the operating mode of the events schedule:
1b1 – Weekly Programming – in this mode, the instrument can set up to 4 different events for each day of the week.
2t6 – Weekday Programming – in this mode, the instrument keeps events the same on weekdays (Monday to Friday) and allows you to program different events for Saturday and Sunday.
1t7 – Daily Programming – in this mode, the instrument keeps the events the same for every day of the week.
Note: When changing the mode of the events schedule, the controller loads the events with default values.

F07 – Thermostat output linked to the events schedule:
This option lets you link the operation of the thermostat output to the events schedule.
OFF – the thermostat output is controlled only by temperature.
On – the thermostat output is controlled by temperature and by the events schedule.
Note: If set to OFF, the controller will indicate AUT for the thermostat mode.

F08 – Thermostat temperature in economy mode:
Determines the temperature setpoint that the controller uses as a reference when in AUT mode and no event is active or when Holiday mode (OFF) is selected. This feature is preferably used for floor heating applications where, outside the ranges defined in the events schedule, the temperature control takes on a setpoint with a lower value in order to maintain the floors pre-heated and enable rapid heating of the environment when necessary.
To disable this function, move the setting to the minimum until no appears, turning off the temperature control in Holiday mode or when no event is active, a mode preferably used to heat thermal reservoirs.

F09 – T1 Sensor indication displacement (Offset):
Used to compensate for possible deviations in the sensor reading as a result of sensor replacement or changing the cable length.

F10 – Function lock time:
Sets the time that the increment button must be pressed in order to lock/unlock parameter changes. For more information see item 5.6 – Function Lock. To disable this function, move the setting to the minimum until no appears.

F11 – Intensity of the display backlight:
Sets the intensity of the display backlight in order to set contrast.

6.4 UNIT SELECTION

To define the temperature unit with which the instrument is going to operate you should access the CodE function (see article 6.1 to find out how to access this function), insert the 231 code and press the key. The user may select the unit by pressing the keys ▲ or ▼, where the messages ºC or ºF are alternated. Press the SET key to confirm the desired unit. Next the message - - - - will be displayed and the C or F icons corresponding to the unit will be turned on.
Obs.: While changing the unit, the controller carries the factory values in its parameters, FAC, being necessary to perform their setting.

7. SIGNALS

Ert1 Err - **Motive:** Sensor 1 disconnected or out of the specified range.
- **Corrective measures:** Check the connections and sensor operation.

ECLO Err - **Motive:** Dis-programmed clock due to prolonged energy absence.
- **Corrective measures:** Adjust time and day, see article 5.5.

MAn OFF - **Motive:** Manual thermostat activation with parameter settings F05 = no.
- **Corrective measures:** Set parameter value F05 - Time of manual thermostat activation.

ModE Aut - **Motive:** Attempted exchange the mode of thermostat with parameter adjustment F07 = OFF.
- **Corrective measures:** Check parameter F07 – Thermostat output linked to the events schedule

PPPP Err - **Corrective measures:** Contact the technician responsible for installation.

ECAL Err - **Corrective measures:** Contact the technician responsible for installation.

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

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

2 Push the bottom openings necessary for the passage of cables;

3 Attach the controller to the wall using the screws and plugs provided;

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

4 Make the electrical connections of the controller;

5 For a better finish install X system type channels to run cables;

6 Place the protective cover of the electrical connections and secure it with the screw (included in package).

8.2 INSTALLATION OF 4x2 BOX

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

2 Push the rear openings necessary for the passage of cables;

3 Route the cables through the openings as controller connections;

Secure the controller in 4x2 box using the screws provided;

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

Place the protective cover of the electrical connections and secure it with the screw (included in package).

5 Make the electrical connections of the controller;

6

8.3 ELECTRICAL CONNECTIONS

⚠️ **A qualified technician must perform the installation of the device.** ⚠️

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

DON'Ts The controller MUST NOT be installed:
- in wet places;
- exposed to sunlight or rain;
- in saunas, machine rooms or bathrooms.

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

THERM | POWER SUPPLY

1 2 3 4 5 6 7 8 9 10 11

SENSOR T1 PLASTIC TIP (THERMOSTAT)

LOAD

115 Vac or 230 Vac | 0

Power supply

Turn off the network before removing the protection cover.

NOTE: check supply as product model
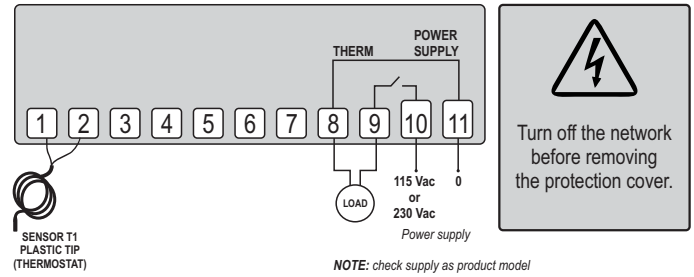
Note: The length of the sensor cable can be increased by the user up to 200 meters using PP 2 x 24 AWG cable.

9. IMPORTANT

According to the chapters of norm IEC 60364:

1: Install protector against overvoltage on the power supply.

2: Sensor cables and signal cables of the computer may be joined, but not in the same electric conduit through which the electric input and the activation of the loads run.

3: Install transient suppresors (RC filters) parallel to the loads as to increase the product life of the relays.
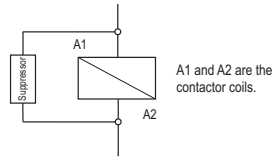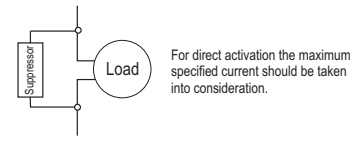
Contact suppressor connection diagram

A1

Suppressor

A2

A1 and A2 are the contactor coils.

Diagram for suppressor installation for direct drive load inputs

Suppressor

Load

For direct activation the maximum specified current should be taken into consideration.

Suppressors on offer from Full Gauge Controls

♻️ **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.