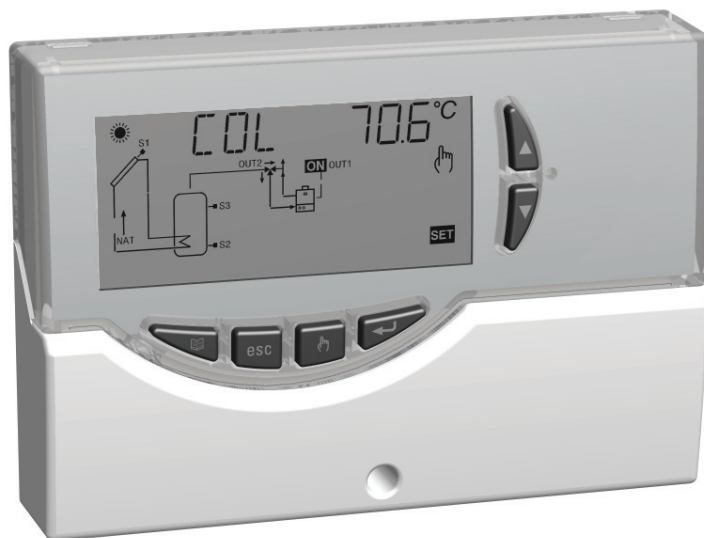
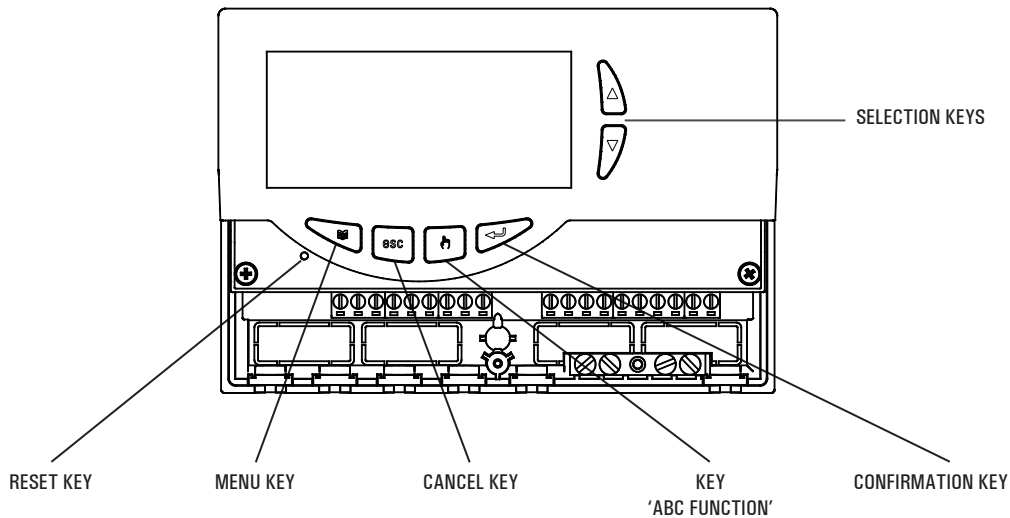


DIGITAL CONTROL UNIT FOR THERMAL SOLAR SYSTEMS



CE

DESCRIPTION OF THE KEYS



OVERVIEW

This device is a centralized control unit for thermal solar panels. Equipped with 3 relay outputs (2 for loads + 1 for alarm), PWM output, 0..10V output and 3 inputs (sensors), can configure and manage up to 6 different types of solar systems. When a specific installation is selected, the control unit automatically manages the outputs and inputs used to control the valves, the pumps, the integrative sources and the probes used in the type of installation selected.

Moreover on the backlit LCD display it is possible to visualize the hydraulic diagram of the installation set up, the state of the outputs, the probes as well as several other data and informations.

AVAILABLE ACCESSORIES AND SPARES

- Accessories for free contacts: 2 x 230V ~ inputs and 2 free voltage outputs
- NTC probe 10K Ohm @25°C ±1%, -50°C .. +200°C (blue cable)
- NTC probe 10K Ohm @25°C ±1%, -50°C .. +110°C (yellow cable)
- Brass pocket 1/2" 7x38mm

TECHNICAL FEATURES

Power supply:	230V ~ 50Hz
Power absorption:	< 2 VA
Sensors type:	3 x NTC 10K @ 25 °C ± 1 %
Sensor operating range:	-50 °C .. +200 °C (collector) -50 °C .. +110 °C (boiler)
Temperature reading range:	-20 °C .. 180 °C
Accuracy:	± 2 °C
Resolution:	0,1°C (-20°C .. 144,9°C) 1°C (145°C .. 180°C)
Offset adjustment:	on S1: ± 5.0°C on S2: ± 5.0°C on S3: ± 5.0°C
Installer Password:	0000 .. 9999 (default 0000)
Acoustic Signal:	On/Off (default On)
Backlight timing:	20 sec from last keypress
OUT2 Relay Logic:	NOR = N.O. REV = N.C. (default N.O.)
<u>Contacts rating:</u>	
OUT 1 relay:	2(1)A max 250V ~ (SPST) Voltage free
OUT 2 relay:	8(1)A max 250V ~ (SPST) Voltage free

Alarm relay contacts rating: 4(1)A max 250V ~ (SPDT)
Voltage free

Output Signal:

PWM: Amplitude: 10V ±15%
Frequency: 1KHz
Current: 15mA max.
0..10V: Amplitude: 0V..10V ±10%@10V
Minimum load: 10KOhm.

Max allowed PWM / 0...10V
cable length: < 3m.

Protection grade: IP 40
Type of action: 1
Pollution degree: 2
Equipment class: II (□)
Rated impulse voltage: 2500V
Number of manual cycles: 50000
Number of automatic cycles: 100000
Software class: A
EMC test voltage: 230V ~ 50Hz
EMC test current: 34mA
Distances tolerances fault
mode 'short' exclusion: ±0,15mm
Ball pressure test temperature: 75°C

Operating temp. range: 0°C .. 40°C
Storage temp. range: -10°C .. +50°C
Humidity limits: 20% .. 80% RH non-condensing
Case: Material: ABS V0 self-extinguishing
Color: Signal White (RAL 9003)
Dimensions: 156 x 108 x 47 (W x H x D)
Weight: ~ 672 gr. (version with probe)
~ 553 gr. (version without probe)
Installation: Wall-mount

CLASSIFICATION UNDER REG. 2013.811.EC

Class: not applicable
Contribution to energy efficiency: not applicable

NORMATIVE REFERENCES

The product complies with the following standards
(EMC 2014/30/UE and LVD 2014/35/UE):
CEI-EN-60730-1 (2011)
CEI-EN-60730-2-9 (2010)

INSTALLATION

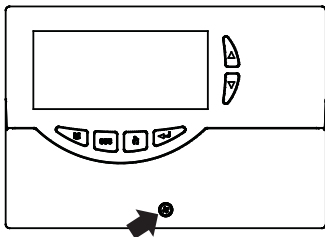


WARNING

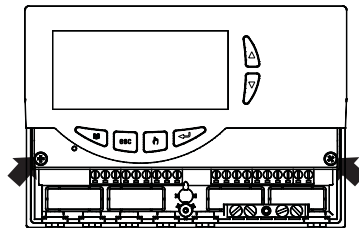
The installation technician shall operate in full compliance with all the applicable technical standards in order to grant the unit safety

TO INSTALL THE DEVICE, PERFORM THE FOLLOWING OPERATIONS:

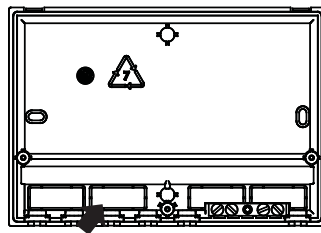
- 1 Remove the central screw and the plastic door.



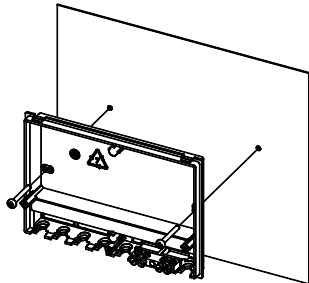
- 2 Remove the two screws shown in the drawing, then remove the whole body from the base.



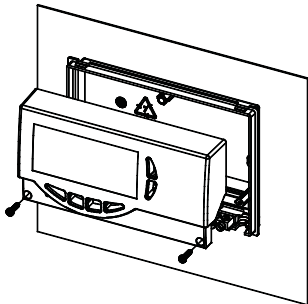
- 3 ASSEMBLY WITH CABLE INPUT ON THE REAR PANEL: if the cable fasteners (delivered with the unit) are not required for installation, use a screwdriver to remove the base blocks permitting the cables to pass through, and fit the blocks delivered (6).



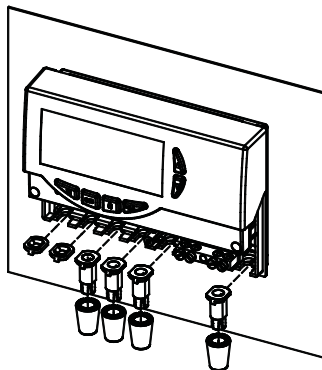
- 4 Fix the power unit base to the wall.



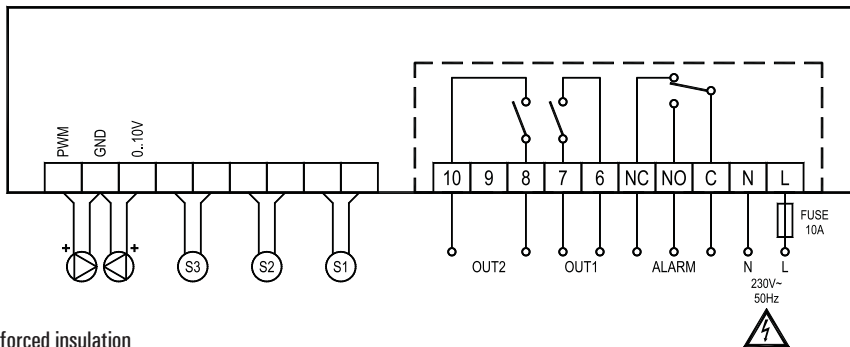
- 5 Fit the cover again with the electronics at the base.



- 6 ASSEMBLY WITH CABLE INPUT ON THE LOWER SIDE:
fit the cable fasteners and/or the blocks delivered with the unit.



- 7 Make the electrical connections according to the following layout.



- - : reinforced insulation



WARNING!

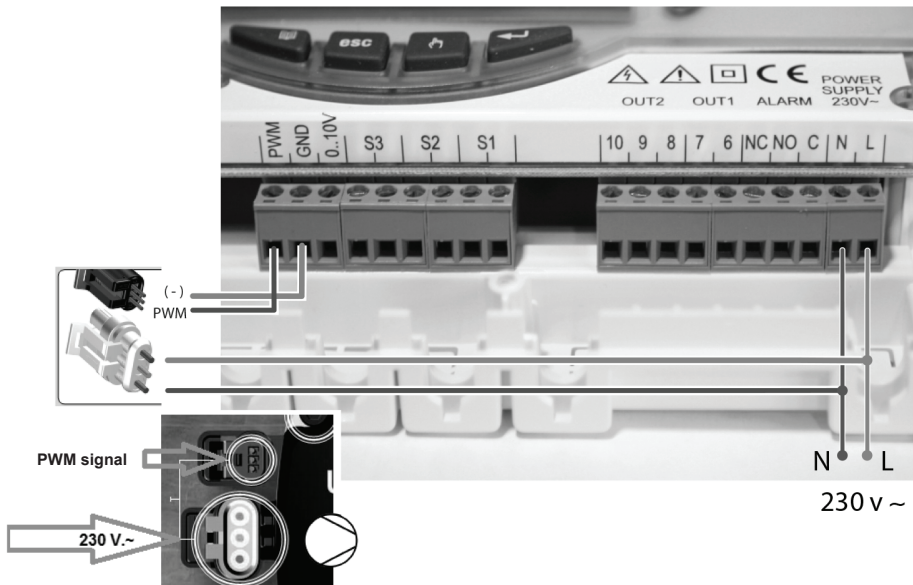
Before wiring the appliance be sure to turn the mains power off.

WARNING! S1, S2 and S3 are NTC temperature sensors. For S1 sensor the $-50^{\circ}\text{C}..+200^{\circ}\text{C}$ range probe (blue cable) must be used, while the probes with the range of $-50^{\circ}\text{C}..+110^{\circ}\text{C}$ (yellow cable) can be used for the other probes.

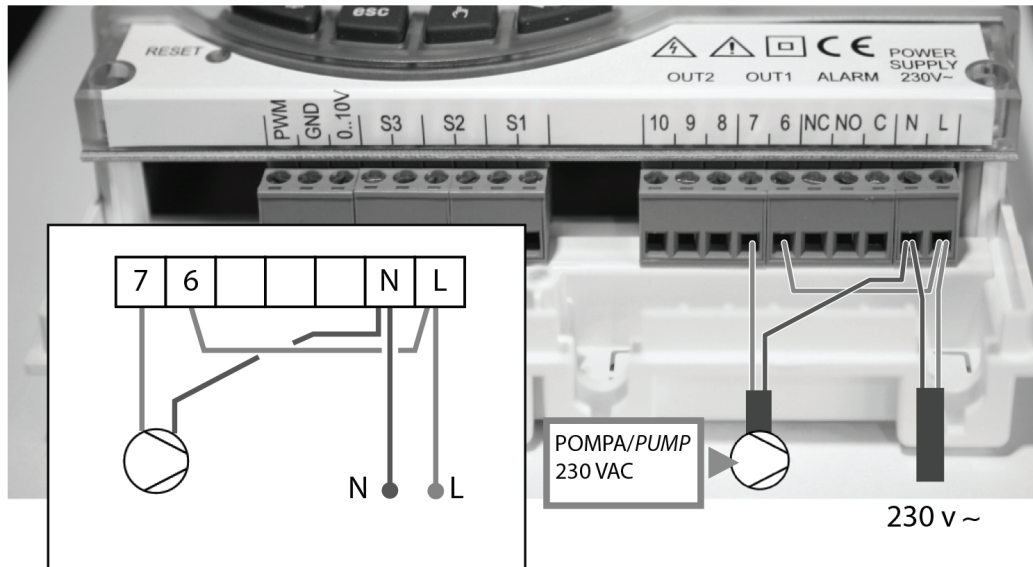
The outputs OUT1, OUT2 and Alarm, are voltage free. It is advisable to fit a 10A 250V ~ fuse on the power unit mains capable to intervene in case of short circuits on loads.

TERMINAL BOARD GROUNDING: On the base of the control unit case is located a brass terminal board for connecting the ground protection conductors of the load devices connected to the control unit.

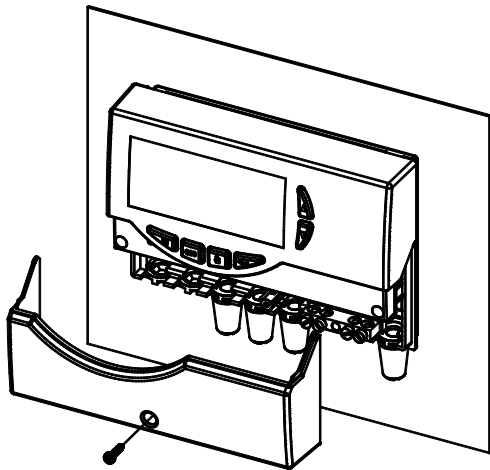
WIRING EXAMPLE ONLY FOR SOLAR CIRCULATORS IN ACCORDANCE WITH DIRECTIVE ErP 2015 WITH EXTERNAL PWM SIGNAL.



EXAMPLE OF CONNECTION FOR 3-SPEED SOLAR CIRCULATORS WITH WET or "HIGH EFFICIENCY" ROTOR COMPLIANT WITH DIRECTIVE ErP 2015, WHICH DOES NOT REQUIRE AN EXTERNAL PWM SIGNAL (WITHOUT A CONNECTOR FOR PWM).



- 8 Fit the door again to close the power unit.



WARNING!

When closing the unit please ensure that the removable wiring terminals have been inserted with the correct orientation (the terminals screws must be facing upward).

STARTING

TURNING ON AND OFF

To turn the control unit on and off, press the 'esc' key for at least 3 seconds. When the control unit is turned on it will carry out a diagnosis of the internal circuitry to verify its correct operation and the red led will flash three times.

If the control unit reveals no anomalies the red led will remain on, otherwise it will continue to flash quickly and the display will show the type of error.

BACKLIGHT

By pressing any key the backlight of the display is activated. The backlight automatically shuts off after about 20 seconds from the last key depression.

ACOUSTIC SIGNALS

The control unit is supplied with an internal buzzer that gives the user an acoustic feedback in case of pressure on the keys, alarms and failure. The acoustic signal can be disabled by properly setting the relevant 'Installer Parameter'.

TEST FUNCTION FOR LOAD WIRINGS CHECK

Through this function, available at the Installer Parameter P7, the control unit cyclically activates the loads wired to the unit so that the installer can verify the accuracy of the wirings performed.

TEMPERATURE AND SPEED DISPLAY

The unit will normally show on the alphanumeric display the temperature (in °C) measured by the sensors connected and the speed (in %) of the collector pump controlled with the PWM or 0..10V output.

By pressing the keys '▲' or '▼' you can cycle through the display of the value of the sensor or pump speed:

→ S_1 → S_2 → S_3 → %PWM → %010 →

AUTOMATIC / ABC (Automatic Boiler Control) OPERATION

The control unit can manage the installation selected in 2 different modes:

- AUTOMATIC (Normal controller operation)

In this mode the control unit automatically manages and controls the operation of the installation according to the programmed data (normal controller operation).

- ABC (Automatic Boiler Control)

By pressing the 'h' key you can enable or disable the ABC function on the unit.

When the 'ABC' function is active, the display will turn on the 'h' icon.

Following are the conditions which result in activating the collector pump:

$S_1 \geq TABC + \text{Hysteresis value}$

and

$S_1 \geq S_2 + \text{Hysteresis value}$

Following are the conditions which result in turning off the collector pump:

$S_1 < TABC$

or

$S_1 < S_2$

Where:

S_1: Temperature measured by the collector sensor.

S_2: Temperatura measured by the boiler sensor.er.

TABC: Temperature set with installer parameter P2.

Hysteresis value for ABC function: 3.0°C (fixed - unchangeable)

The only active controls will be those relative to the maximum and safety temperatures.

RESET

In order to reset the device, press the key labelled as 'RESET' located behind the removable door; **DO NOT USE PINS OR NEEDLES.**

INSTALLER PARAMETERS

To access the installer parameters press the '←' key.

Entering the Password

The display will show 'PWD 0000' with the leftmost digit flashing thus requesting for the correct password.

In order to set the 4 password digits use the '▲' or '▼' key; by pressing the '←' key, the current digit is confirmed and the flashing is transferred to the following digit.

After confirming the last digit, the '←' key will give access to the installer parameters.

The initial password is factory set as '0000'.

Modifying the Password

In order to modify the stored password, first press the '←' key, then proceed as follows:

PRESS THE 'MENU' KEY.

THE DISPLAY SHOWS
'PWDH0000'.

ENTER THE CURRENT PASSWORD.
(same procedure described above)

THE DISPLAY SHOWS
'PWDN0000'.

INSERT THE NEW PASSWORD.

THE DISPLAY SHOWS
'PWD00000'.

INSERT NEW PASSWORD.

THE CONTROL UNIT WILL MEMORIZE THE NEW PASSWORD
AND GIVE ACCESS TO THE INSTALLER PARAMETERS.

Pressing the 'esc' key at any time will exit the password management mode.

Using installer parameters

Inserting the correct Password gives access to the installer parameters change mode (' SET ' icon lights). The first information displayed is the model of the control unit in use and the parameter ' P1 ' value.

By pressing the ' ▲ ' or ' ▼ ' keys it is possible to scroll through the various parameters.

Pressing the ' ← ' key takes the user to the parameter modifying mode selected.

To exit the installer mode press the ' esc ' key or wait 20 seconds.

PRESS THE ' ← ' KEY ON THE START PAGE.

THE DISPLAY SHOWS ' PWD 0000 '.

INSERT THE CURRENT PASSWORD.

THE DISPLAY SHOWS THE FIRST
' INSTALLER PARAMETER '.

USING THE ARROWS ' ▲ ' OR ' ▼ ' IT IS POSSIBLE
TO CYCLICALLY SCROLL THROUGH THE INSTALLATION
PARAMETERS:

P1: SELECTION INSTALLATION TYPE	' MIDI '
P2: SETTING THERMAL DATA	' DATA '
P3: ANTIFROST PARAMETERS MANAGEMENT	' O AF '
P4: ACOUSTIC SIGNAL MANAGEMENT	' BEEP '
P5: LOGIC RELAY SELECTION	' ACT '
P6: INTEGRATION HOURS COUNTER	' C AH '
P7: LOADS WIRING TEST	' TEST '
P8: LIMITATION OF COLLECTOR MINIMUM TEMP.	' MTL '
P9: PWM and 0..10V OUTPUTS SETTINGS	' ERP '
P10: COLLECTOR RESET TEMPERATURE	' SAFE '
P11: VACUUM TUBES	' VTC '
P12: ANTI-LEGIONELLA	' LEG '

PRESS THE '←' KEY TO MODIFY THE
SELECTED PARAMETER.



CONFIGURE DATA FOR EVERY SINGLE PARAMETER AS
EXPLAINED BELOW.



PRESS THE 'esc' KEY TO RETURN TO THE INSTALLER
PARAMETERS SELECTION.



WAIT 20 SECONDS OR PRESS THE 'esc' KEY TO EXIT
THE INSTALLER MODE.

Note: in the 'installer parameters' mode all the outputs
are disabled.

All default values are to be considered as
indicative, being they subject to changes due to
the version and without prior notice.

P1: SELECTION INSTALLATION TYPE

Pressing the '▲' or '▼' keys will show all the installations
that can be set up (if the probe for the selected installation
has a problem or is left unconnected, that probe will flash on
the display).

To confirm the selected installation press the '←' key; the
control unit will memorize the choice and the display will
again show the parameter list.

To cancel the selection, press the 'esc' key. In this case the
control unit will abandon the changes made and will show
again the parameter list.

The parameters influencing the regulation of the selected
setup are listed in the following and can be modified through
the second installer parameter (P2).

Note: When going into parameter P1, the controller
will reset the maximum temperatures (MT) detected
until that moment. Furthermore, when quitting this
parameter, the controller will set again the temperature
display on the sensor S_1.

List of thermal data to be eventually programmed:

Parameters	Description
TS1-TS2-TS3	Probe safety temperature
$\Delta T 12$	Differential between the probes S1-S2
MTC	Adjustment of collector minimum temperature
MTEN	Enabling/disabling the collector minimum temperature
TM3	Maximum temperature of the probe S3
TAH	Integration temperature on the probe S3
HY12	Hysteresis of $\Delta T 12$
HYT	Thermostatic hysteresis
HYTS	Safety thermostatic hysteresis



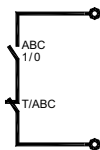
WARNING!

The thermal parameters to be set are displayed when the relevant scheme is selected, this means the power unit will only display the thermal parameters actually activated for the selected hydraulic scheme.

CONTROL LOGIC

WARNING: The following control logics must be applied to all the diagram described hereinafter.

CONTROL LOGIC IN ABC



The control logic of the 'ABC' function actually replaces the differential control. The checks on the Maximum and Safety temperatures are always kept active. The integrative source is switched off when ABC mode is active. Once ABC mode is turned off the integrative source will be automatically activated.

CONTROL LOGIC OF THE SAFETY THERMOSTATS

If an alarm turns on because of an overcoming of the safety temperature, the alarm relay will be activated.

While the loads outputs will keep on functioning according to the relative logics.

In this conditions, the control unit emits a beeping audio signal and on the display will flash the icon "⚠".

The control is not active with the control unit in "OFF" mode (the display shows the message OFF).

Condition for the alarm relay activation

The logic of the functioning of the alarm relay, always present in every diagram selected, runs with the following conditions:

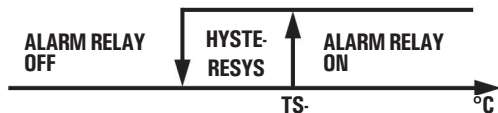
$TX- \geq TS- =$ Alarm relay ON

$TX- \leq (TS- - \text{hysteresys}) =$ Alarm relay OFF

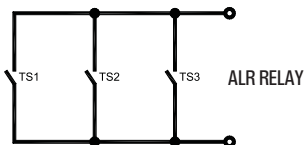
Where:

TX-: Temperature picked up by the connected sensors (S1 .. S3).

TS-: Safety temperature related to the sensors (S1 .. S3).



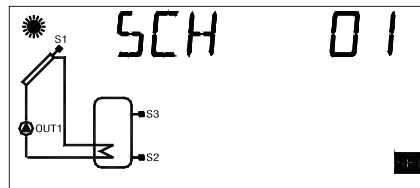
Control logic



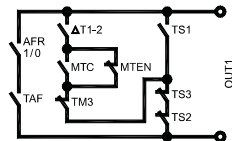
AVAILABLE DIAGRAMS

SCH 01

Solar heating installation with 1 tank and no integrative heat source.

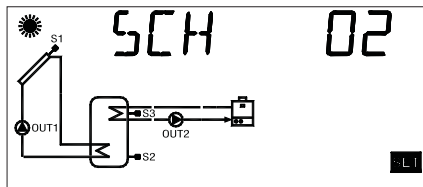


Control logic



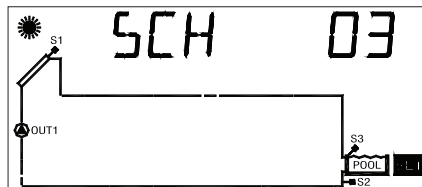
SCH 02

Solar heating installation with 1 tank and additional thermostatic heating.

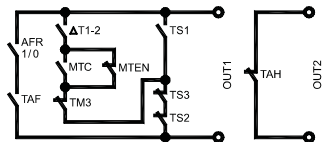


SCH 03

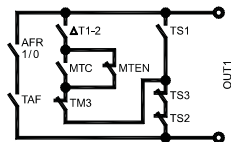
Pool solar heating installation.



Control logic

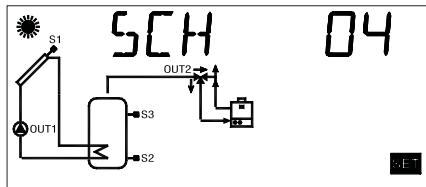


Control logic



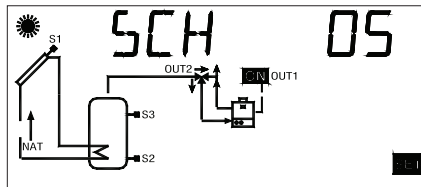
SCH 04

Solar heating installation with 1 tank, direct integration by means of valve logic.

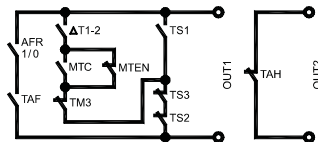


SCH 05

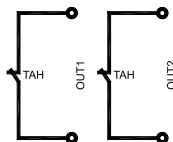
Natural circulation solar heating installation with 1 tank and direct integration by means of valve logic.



Control logic

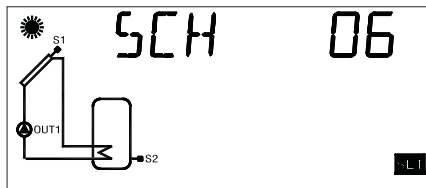


Control logic

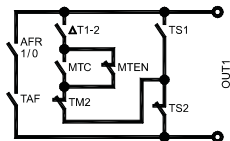


SCH 06

Solar heating installation with 1 tank and only 2 probe.



Control logic



P2: SETTING THE THERMAL DATA

Using this parameter it is possible to set the thermal data related to the selected installation:

Note: The control unit is supplied with pre-programmed thermal data for optimal operation. Any change to these values must be performed by qualified personnel only. When changing the hydraulic scheme by means of the parameter P1, the thermal values (TS, TM, TAH and TABC) already set will be reset at the default values.

AFTER SELECTING PARAMETER P2 PRESS THE '←' KEY.



USING THE ▲ ' OR ' ▼ ' ARROWS IT IS POSSIBLE TO SCROLL CYCLICALLY THROUGH THE THERMAL DATA:

- Safety temperatures
- Differentials
- Hysteresis of the differentials
- Hysteresis of the safety thermostats
- Hysteresis of the thermostats
- Offset
- Maximum temperatures
- Integration temperature
- ABC (Automatic Boiler Control) temperature



PRESS THE '←' TO MODIFY THE THERMAL DATA SELECTED; THE DATA WILL START FLASHING.



SET THE DESIRED NUMERIC VALUE USING THE '▲' OR '▼' ARROWS.



PRESS THE '←' KEY TO CONFIRM THE PROGRAMMED SETTINGS OR PRESS THE 'esc' KEY TO CANCEL THE CHANGES.

In the following the regulation ranges allowed for each parameter are listed.



WARNING!

The thermal parameters to be set are displayed when the relevant scheme is selected, this means the power unit will only display the thermal parameters actually activated for the selected hydraulic scheme.

Probe safety temperatures

Data	Regulation range	Default
TS1	60.0 .. 240.0 °C	140.0 °C
TS2	20.0 .. 90.0 °C	80.0 °C
TS3 ¹	20.0 .. 90.0 °C	80.0 °C
TS3 ²	60.0 .. 240.0 °C	140.0 °C



WARNING!

If the selected scheme has only one manifold, the default value of the safety temperature (TS3) will be 80°C (¹); if the selected scheme has two manifolds, the default value of the safety temperature (TS3) will be automatically set at 140°C (²). When changing from a two-manifold scheme to one-manifold scheme and the maximum temperature (TM3) is higher or equal to 75°C, the safety temperature (TS3) will be automatically limited to the value TM3 + 5°C.

It is not possible to set the Safety Temperatures TS2 and TS3 to a value lower than the relevant Maximum Temperature, as the value of the Safety Temperature is limited to the value of the Maximum Temperature + 5°C. To lower the Safety Temperature, it is first necessary to

decrease the Maximum Temperature and then set the Safety Temperature to the desired value.

If the Safety Temperature is displayed but the relevant Maximum Temperature is not, then the Safety Temperature will be limited according to the Maximum Temperature operating in the current scheme (i.e. in scheme no.1, the value of the TS2 safety temperature will be limited according to the value of the TM3 maximum temperature). Should the hydraulic scheme be changed and SCH5 scheme previously activated, all the Safety and Maximum temperatures will be set at the factory-set default values.

Differential between the probes S1-S2 (ΔT_{12}) or S3-S2 (ΔT_{32})		
Data	Regulation range	Default
ΔT_{12}	1.0 .. 20.0°C	8.0 °C
ΔT_{32}	1.0 .. 20.0°C	8.0 °C



WARNING!

It is not possible to set the Differential to a value lower than the relevant hysteresis because the value of the Differential is limited to the value of the hysteresis +1°C. To lower the Differential it is first necessary to decrease the value of the hysteresis.

Hysteresis of the differential ΔT_{12}

Data	Regulation range	Default
HY12	1.0 .. 15.0°C	4.0 °C



WARNING!

It is not possible to set the Hysteresis (HY) to a value higher than the relevant Differential (ΔT), because the value of the hysteresis is limited to the value of the Differential -1°C. To increase the value of the Hysteresis it is first necessary to increase the value of the Differential (ΔT).

Hysteresis of the safety temperatures

Data	Regulation range	Default
HYTS	1.0 .. 15.0°C	2.0 °C

Thermostatic hysteresis

Data	Regulation range	Default
HYT	1.0 .. 15.0°C	2.0 °C

Probe Offset		
Data	Regulation range	Default
OS1	-5.0 .. +5.0°C	0.0 °C
OS2	-5.0 .. +5.0°C	0.0 °C
OS3	-5.0 .. +5.0°C	0.0 °C

Maximum temperature of the probes S2 (TM2) o S3 (TM3)		
Data	Regulation range	Default
TM2	20.0 .. 90.0°C	70.0 °C
TM3	20.0 .. 90.0°C	70.0 °C



WARNING!

It is not possible to set the Maximum Temperature (TM) to a value higher than the relevant Safety Temperature, as the Maximum Temperature value is limited to the value of the Safety Temperature (TS) -5°C. To increase the Maximum Temperature value, it is first necessary to increase the value of the Safety Temperature.

Integration Temperature (After Heating) on probe S3		
Data	Regulation range	Default
TAH	20.0 .. 90.0°C	45.0 °C



WARNING!

It is not possible to set the value of the integration temperature (TAH) at a value which is higher than the Maximum Temperature (TM3) because the value of the integration temperature (TAH) is linked to the Maximum Temperature (TM3) -5°C.

In order to lower the value of the Maximum Temperature (TM3) below the value of the integration temperature (TAH) already set, first of all lower the value of the integration temperature (TAH), then change the Maximum Temperature (TM3).

ABC Temperature (Automatic Boiler Control) on probe S3		
Data	Regulation range	Default
TABC	20.0 .. 80.0°C	30.0 °C

P3: ANTIFROST PARAMETER MANAGEMENT

Using this parameter it is possible to set the data managing the antifrost function.

The control unit is supplied with preset antifrost data for optimal operation.

Any change to these values must be performed by qualified personnel only.

AFTER SELECTING PARAMETER P3 PRESS
THE '←' KEY.

IT IS POSSIBLE TO SCROLL CYCLICALLY THROUGH
ANTIFROST DATA USING THE '▲' OR '▼' ARROWS:

- | | |
|------------------------------------|----------|
| - Antifrost temperature | ' TAF ' |
| - Collector pump ignition interval | ' P ON ' |
| - Collector pump shut off interval | ' P OF ' |
| - Antifrost test duration | ' TMR ' |

PRESS THE '←' KEY TO MODIFY THE THERMAL DATA
SELECTED; THE DATA WILL START FLASHING.

USE THE '▲' OR '▼' ARROWS TO SET THE DESIRED
NUMERIC VALUE.

PRESS THE '←' KEY TO CONFIRM THE PROGRAMMING
OR PRESS THE 'esc' KEY TO CANCEL THE CHANGES.

BY PRESSING THE '←' KEY AFTER MODIFYING
THE DATA RELATIVE TO THE DURATION OF THE
ANTIFROST TEST, THE CONTROL UNIT WILL CONFIRM
THE DATA AND WILL START THE TEST.

In the following the regulation ranges allowed for each parameter are listed.

Antifrost temperature		
Data	Regulation range	Default
TAF	-10.0°C .. +10.0°C	4.0 °C

Collector pump 'on' time		
Data	Regulation range	Default
P ON	5 .. 60 sec.	10 sec.

Collector pump 'off' time		
Data	Regulation range	Default
P OF	1 .. 60 min.	20 min.

Antifrost test duration		
Data	Regulation range	Default
TMR	5 .. 60 sec.	10 sec.

P4: ACOUSTIC SIGNAL MANAGEMENT

Using this parameter it is possible to enable or disable the acoustic signalling of the control unit (keyboard tones, alarms, and diagnostics).

Enable (1)/Disable (0) acoustic signal		
Data	Regulation range	Default
BEEP	Off .. On	On

Note: 'on' enables acoustic signalling, while 'off' disables it.

P5: RELAY LOGIC SELECTION

Using this parameter it is possible to reverse the output logic from Normally Open (N.O.) to Normally Closed (N.C.) and vice-versa. It is only possible to modify the output logic for the relays actually active in the selected setup.

Value '1' for these parameters means that the output logic is reset to the N.O. value (default).

OUT 2 is the only output for which the output logic can be changed.

If the controller displays 'NONE' it means that 'OUT2' is not provided for in the selected layout.

Output logic for OUT 2		
Data	Regulation range	Default
OUT 2	0 .. 1	1

If the function is not supported by the layout selected the controller will display 'NONE'.

Note: '1' means Normally Open (N.O.) logic, while '0' means Normally Closed (N.C.) logic.

P6: INTEGRATION HOURS COUNTER

Using this parameter it is possible to display the actual number of hours of the integrative source operation or reset it.

The counter recording the running hours of the integrative source can handle values up to 9999. Once the maximum value is reached the counter stops.

AFTER SELECTING PARAMETER P6 PRESS THE '↵' KEY.



THE DISPLAY SHOWS 'H' AND ACTUAL HOURS OF ACTIVITY OF THE INTEGRATIVE SOURCE.



PRESS THE '↵' KEY , THE DISPLAY SHOWS 'H' FLASHING.



PRESSING THE '↵' KEY RESETS THE COUNTER, PRESSING THE 'esc' AGAIN SHOWS THE CURRENT RUNNING HOURS.

P7: LOADS WIRING TEST

This parameter allows to set the test of the loads wired to the control unit as well as the wirings themselves.

The control unit tests the loads connected to it, according to the selected diagram, by turning on all the available outputs in sequence for 10 seconds each.

The number of times for which the entire test is repeated, in multiples of 3, can be set using the single 'TMR' parameter present. The activation of the test is signalled on the display with the 'TIMER' icon.

The activation of the alarm relay will be shown on the display with the flashing 'TIMER' icon as well as with the activation of the buzzer in order to test also the acoustic signal emission.

AFTER SELECTING PARAMETER P7 PRESS THE '←' KEY.

THE DISPLAY SHOWS 'TMR' AND THE NUMBER OF CYCLES IN THE TEST.

PRESS '←'. THE DISPLAY SHOWS 'TMR' FLASHING.

USING THE KEYS '▲' OR '▼' SET THE NUMBER OF CYCLES TO 3, 6, 9, 12 OR 15.

PRESS '←' TO CONFIRM THE PROGRAMMED DATA AND START THE TEST. BY PRESSING 'esc' THE MODIFICATIONS ARE CANCELED AND THE DISPLAY AGAIN SHOWS THE NUMBER OF PRESET CYCLES.

Test sequence cycles number		
Data	Regulation range	Default
TMR	03 .. 15	03

P8: LIMITATION OF COLLECTOR MINIMUM TEMPERATURE

The parameter 'Minimum Temperature Limitation' on collector is used to manage the Minimum Temperature Thermostat used for activation of the collector pumps.

This thermostat stops the pumps operation whenever on the relevant panel is measured a temperature lower than the one set in this parameter.

The function 'Minimum Temperature Limitation' is not active when in ABC operation or in case the pumps activation is caused by the intervention of Recooling or similar functions.

AFTER SELECTING PARAMETER P8 PRESS
THE ' ← ' KEY.

WITH ARROWS ' ▲ ' OR ' ▼ ', YOU CAN CYCLE AMONG
THE FOLLOWING THERMAL DATA FOR REGULATION:

- Setting of the collector minimum temperature ' MTC '
- Enabling/Disabling of the minimum
temperature limitation ' MTEN '

PRESS THE ' ← ' KEY TO MODIFY THE THERMAL DATA
SELECTED; THE DATA WILL START FLASHING.

USE THE ' ▲ ' OR ' ▼ ' ARROWS TO SET THE DESIRED
NUMERIC VALUE.

PRESS THE ' ← ' KEY TO CONFIRM THE
PROGRAMMING OR PRESS THE ' esc ' KEY TO CANCEL
THE CHANGES.

In the following the regulation ranges allowed for each
parameter are listed.

Adjustment of collector minimum temperature

Data	Regulation range	Default
MTC	10.0°C .. 90.0°C	10.0 °C

Enabling/disabling the collector minimum temperature

Data	Regulation range	Default
MTEN	0 .. 1	0

Note: with ' 0 ' the limitation of minimum temperature on collector is disabled, while with ' 1 ' it is enabled.

P9: PWM and 0..10V OUTPUT SETTINGS

With this parameter you can change the settings which control the pump connected to the PWM or 0..10V output of the control unit.

AFTER SELECTING PARAMETER P9 PRESS
THE ' ← ' KEY.



WITH ARROWS ' ▲ ' OR ' ▼ ', YOU CAN CYCLE AMONG
THE FOLLOWING THERMAL DATA FOR REGULATION:

- Type of pump connected ' PUMP '
- Operating mode logic ' MODO '
- Pump speed control time ' TIME '
- Fixed point temperature control ' T_FT '

In the following are listed the parameters whose default value varies depending on whether the parameter ' PUMP ' is set to ' REV ' (PWM1 / R010V) or ' NOR ' (PWM2 / N010V) :

- % PWM to turn the pump off ' %OFF '
- % PWM to turn the pump on and drive it at maximum speed ' %ON '

- % PWM to drive the pump at maximum speed ' %MAX '
- Pump flow with PWM = %ON ' %FMN '
- 0V .. 10V voltage level to turn the pump off ' VOFF '
- 0V .. 10V voltage level to turn the pump on and drive it at minimum speed ' VON '
- 0V .. 10V voltage level to drive the pump at Maximum speed with 100% flow ' VMAX '
- Pump flow with 0..10V = VON ' VFMN '



PRESS THE ' ← ' KEY TO MODIFY THE THERMAL DATA SELECTED; THE DATA WILL START FLASHING.



USE THE ' ▲ ' OR ' ▼ ' ARROWS TO SET THE DESIRED NUMERIC VALUE.



PRESS THE ' ← ' KEY TO CONFIRM THE PROGRAMMING OR PRESS THE ' esc ' KEY TO CANCEL THE CHANGES.

In the following the regulation ranges allowed for each parameter are listed.

Type of pump settings		
Data	Regulation range	Default
PUMP	REV .. NOR	NOR

Settings details

'REV' setting

PWM output:

The pump connected on the PWM output works according to the "PWM1" standard, or heating logic, also said 'reversed'. With the PWM output at minimum value (0%) the pump runs at full speed, while with the PWM output at maximum value (100%) the pump runs at minimum speed. Of course the pump will operate to all the intermediate speeds through the modulation of the PWM signal between 0% and 100%.

0..10V output:

The pump connected on the 0..10V output works according to the 0V .. 10V 'reversed' standard (R010V). With the 0V ..10V output at minimum value (0V) the pump runs at full speed, while with the 0V ..10V output at maximum value (10V)

the pump runs at minimum speed. Of course the pump will operate to all the intermediate speeds through the modulation of the 0 .. 10V signal between 0V and 10V.

'NOR' setting

PWM output:

The pump connected on the PWM output works according to the "PWM2" standard, or solar logic, also said 'normal'. With the PWM output at minimum value (0%) the pump runs at minimum speed, while with the PWM output at maximum value (100%) the pump runs at full speed. Of course the pump will operate to all the intermediate speeds through the modulation of the PWM signal between 0% and 100%.

0..10V output:

The pump connected on the 0..10V output works according to the 0V .. 10V 'normal' standard (NO10V). With the 0V ..10V output at minimum value (0V) the pump runs at minimum speed, while with the 0V ..10V output at maximum value (10V) the pump runs at full speed. Of course the pump will operate to all the intermediate speeds through the modulation of the 0 .. 10V signal between 0V and 10V.

Operating logic settings		
Data	Regulation range	Default
MOD0	MdT .. MFT	MdT

Settings details

MdT settings (differential mode)

The pump speed is set by comparing the measured ΔT with the set ΔT .

If the differential temperature ΔT measured between the collector and storage tank sensors is higher than the temperature differential ΔT set for solar control, the speed increases up to the maximum value only after the 'TIME' control time has elapsed.

If the differential temperature ΔT measured between the collector and storage tank sensors is lower than the temperature differential ΔT set for solar control, the speed decreases down to the minimum value only after the 'TIME' control time has elapsed.

If the control unit decreases the pump speed until it reaches the minimum level %ON or VON and the ΔT between the sensors is still below the set ΔT , then the pump switches off and sets to level %OFF or VOFF.

MFT settings (fixed mode)

The pump speed is set by comparing the collector temperature against the fixed value T_FT.

If the temperature measured by the reference sensor (collector) is higher than the value set for T_FT, then the speed is increased up to the maximum value only after the 'TIME' control time has elapsed.

If the temperature measured by the reference sensor (collector) is lower than the value set for T_FT, then the speed is decreased down to the minimum value only after the 'TIME' control time has elapsed.

Pump speed control time		
Data	Regulation range	Default
TIME	1 .. 15 minuti	4 minuti

TIME parameter detail

Sets the maximum time used to drive the pump from the minimum to maximum speed and vice versa, in order to prevent abrupt changes or oscillations in the system regulation.

Fixed mode temperature control		
Data	Regulation range	Default
T_FT	0 °C .. 90 °C	60 °C

Note: this parameter is active only when the option MFT is selected under 'MODE' parameter.

<i>In the following are listed the parameters and relevant default values when parameter 'PUMP' is set to 'REV'</i>		
Data	Regulation range	Default
Parameters for PWM (PWM1) output		
%OFF	%ON .. 100%	100%
%ON	%MAX .. %OFF	90%
%MAX	0% .. 50%	0%
%FMN	0% .. 100%	30%
Parameters for 0..10V (R010V) output		
VOFF	VON .. 10,0V	9,0V
VON	VMAX .. VOFF	9,0V
VMAX	0,0V .. 5,0V	0,0V
VFMN	0% .. 100%	30%

In the following are listed the parameters and relevant default values when parameter 'PUMP' is set to 'NOR'

Data	Regulation range	Default
Parameters for PWM (PWM2) output		
%OFF	0% .. %ON	0%
%ON	%OFF .. %MAX	10%
%MAX	50% .. 100%	100%
%FMN	0% .. 100%	30%
Parameters for 0..10V (N010V) output		
VOFF	VON .. 10,0V	9,0V
VON	VMAX .. VOFF	9,0V
VMAX	0,0V .. 5,0V	0,0V
VFMN	0% .. 100%	30%

P10: COLLECTOR RESET TEMPERATURE

With this parameter you can set the 'T_SF' temperature value used for the collector pump reset when the TS_2 safety temperature is reached, in order to avoid thermal shock and air pockets in the system.

The collector pump will automatically restart only if the collector temperature measured with sensor S_1 is below the T_SF collector reset temperature.

AFTER SELECTING PARAMETER P10 PRESS
THE ' ← ' KEY.



THE DISPLAY SHOWS ' T_SF '.



PRESS ' ← '. THE DISPLAY
SHOWS ' T_SF ' FLASHING.



PRESS ARROWS '▲' and '▼' TO SET
THE DESIRED VALUE.



PRESS THE '↵' KEY TO CONFIRM THE
PROGRAMMING OR PRESS THE 'esc' KEY TO CANCEL
THE CHANGES.

Collector reset temperature		
Data	Regulation range	Default
T_SF	OFF / 60 °C .. 180 °C	OFF

P11: VACUUM TUBES

In some solar systems, for example when vacuum tubes are installed, the collector temperature measurement could be slow, because of its non optimal position.

By enabling the function you can choose between two different operating programs:

P_1 where VTC function is enabled and Boiler safety thermostats are prioritized.

P_0 where VTC function is enabled and both Boiler and collector pump safety thermostats are disabled.

By enabling the VTC, the following collector pump control is started:

If the collector sensor temperature increases by the amount set in the subparameter 'INC' within one minute, then the collector pump will be operated for the time set in the subparameter 'TIME'.

After the activation of the pump for the time set in the subparameter 'TIME', the function will be off for 5 minutes.

AFTER SELECTING PARAMETER P11 PRESS
THE '↵' KEY.



WITH ARROWS '▲' OR '▼', YOU CAN CYCLE AMONG THE FOLLOWING DATA FOR REGULATION:

- Enable parameter 'ENA'
- Increase temperature 'INC'
- Pump activation lapse 'TIME'



PRESS THE '←' KEY TO MODIFY THE DATA SELECTED; THE DATA WILL START FLASHING.



USE THE '▲' OR '▼', ARROWS TO SET THE DESIRED NUMERIC VALUE.



PRESS THE '←' KEY TO CONFIRM THE PROGRAMMING OR PRESS THE 'esc' KEY TO CANCEL THE CHANGES.

Enable parameter

Data	Regulation range	Default
ENA	OFF / P_1 / P_0	OFF



WARNING

By enabling parameter 'ENA' in 'P_0', the boiler safety thermostats are disabled and consequently the boiler temperatures could exceed the safety thresholds set.

Increase temperature

Data	Regulation range	Default
INC	1 °C/min. .. 10 °C/min.	3°C/min.

Pump activation lapse

Data	Regulation range	Default
TIME	2 sec. .. 30 sec.	5 sec.

P12: ANTI-LEGIONELLA

Through this parameter you can enable or disable the Anti-legionella function.

The anti-Legionella (function activated by default) consists of a boiler's water heating cycle at 65°C every 30 days for 5 minutes (in order to carry out thermal disinfection action against the related bacteria) only in case the water in the tank has not been driven at least once at 65°C for 5 minutes without interruptions.

The 30-day counter is reset whenever the water temperature in the boiler reaches 65°C at least for 5 minutes.

If the water, during the heating cycle in the boiler, does not reach 65°C for 5 minutes within one hour, the control unit emits an acoustic signal and the display shows, on the hydraulic diagram, the icon of a flashing boiler. In this alarm situation, the control unit forces the water heating in the boiler and if that succeeds automatically resets the alarm. Otherwise, after entering the parameter P16 "LEG" select the sub-parameter "RS L"; the control unit exits from the alarm condition resetting the 30-day counter.

The Anti-Legionella function can be enabled only for hydraulic schemes which provide additional heating: diagrams 02 - 04 - 05 (selectable in the installer parameter P1).

AFTER SELECTING PARAMETER P12 PRESS
THE '↵' KEY.



WITH THE ARROWS '▲' OR '▼', YOU CAN SCROLL
CYCLICALLY THROUGH THE FOLLOWING SETTING
PARAMETERS:

- Enabling the anti-legionella function 'EN L'
- Alarm reset 'RS L'



PRESS THE '↵' KEY TO ENTER SELECTED
PARAMETER SETTINGS;
THE PARAMETER STARTS TO BLINK.



WITH THE ARROWS '▲' OR '▼', ENABLE / DISABLE
THE SELECTED PARAMETER.



PRESS THE '↵' KEY TO CONFIRM THE PROGRAMMING OR PRESS THE 'esc' KEY TO CANCEL THE CHANGES.

The setting ranges for each individual data are listed below.

Enabling the anti-legionella function		
Data	Regulation range	Default
EN L	0 .. 1	1

Note: with '0', the function is disabled, while with '1' the function is activated.

Alarm Reset / Reset of the 30-days counter.		
Data	Regulation range	Default
RS L	0 .. 1	0

Note: Selecting '1' the control unit exits from the alarm mode, resetting the 30 days' counter.



WARNING

- When the Anti-Legionella function is enabled, both maximum TM and safety TS temperatures, if they are lower, are automatically set to the following values:
TM:- TLEG + 5.0°C
TS:- TLEG + 10°C
- The temperature value of anti-Legionella is fixed to 65°C, therefore not adjustable.
- The differential value is fixed to 2°C, therefore not adjustable.

FUNCTIONS ACCESSIBLE TO THE USER

The functions accessible to the user are limited and do not allow setting those data influencing the installation management.

The only operations allowed to the user are the following:

Turning on / Turning off the control unit

Enabling / Disabling ABC function in the control unit.

User menu

PRESS THE '  ' KEY TO ACCESS ' USER PARAMETERS '.

THE FIRST ' USER PARAMETER ' IS SHOWN.

USING THE ' ▲ ' OR ' ▼ ' ARROWS IT IS POSSIBLE TO SCROLL CYCLICALLY THROUGH THE USER PARAMETERS:

U1: SHOWS MAXIMUM TEMPERATURES
U2: ENABLES / DISABLES ANTIFROST

PRESS THE ' ← ' KEY TO SELECT THE DESIRED PARAMETER.

SET THE DESIRED VALUE FOR EVERY SINGLE PARAMETER AS EXPLAINED BELOW.

PRESS THE ' esc ' KEY TO RETURN TO THE USER PARAMETERS SELECTION MENU.

WAIT 20 SECONDS OR PRESS THE ' esc ' KEY TO QUIT THE USER MODE.



WARNING!

In the ' USER PARAMETERS ' mode all the outputs are disabled.

Displaying the Maximum Temperatures recorded

Parameter ' TMAX U1 ' allows to display the maximum temperature recorded in the system for each probe TM-.

PRESS THE '↵' KEY
TO VIEW THE TEMPERATURE.



USING THE '▲' OR '▼' ARROWS IT IS POSSIBLE
TO SCROLL CYCLICALLY THROUGH THE RECORDED
TEMPERATURES:

TM1 → TM2 → TM3



PRESS THE '↵' KEY. THE DISPLAY SHOWS FLASHING
THE NUMBER OF THE PROBE.
PRESSING THE 'esc' KEY RETURNS TO SHOWING THE
USER PARAMETERS.



PRESSING '↵' RESETS THE TEMPERATURE
RECORDED TO THAT POINT;
PRESSING 'esc' RETURNS TO SHOWING THE
MEMORIZED TEMPERATURE.



PRESS THE 'esc' KEY TO QUIT THE MAXIMUM
TEMPERATURE DISPLAY MODE.

Antifrost Activation

The 'AFR U2' parameter (anti-frost) enables or disables the antifrost function. The management of the antifrost data is performed through the user parameters.

PRESS THE '↵' KEY;
THE DISPLAY SHOWS 'AFR' FLASHING.




USING THE '▲' OR '▼' ARROWS IT IS POSSIBLE TO
ENABLE OR DISABLE THE ANTIFROST:
0: DISABLED
1: ENABLED (THE DISPLAY SHOWS ❄)



PRESS THE '↵' KEY TO CONFIRM THE
PROGRAMMING OR PRESS THE 'esc' KEY TO QUIT
USER PARAMETERS.

TROUBLESHOOTING

ANOMALY	POSSIBLE CAUSE
<p>During normal operation the control unit displays the symbol  and emits an acoustic signal characterized by a series of 'beeps' together with the quick flashing of the red power supply led. The probe originating the problem is flashing on the display.</p>	<p>The control unit has revealed an anomaly on the probe. The display shows the number of the damaged probe and the type of anomaly present.</p> <p>COL OPEN S_2 OPEN S_3 OPEN = Probe missing, not properly wired or open ($R = \infty$) - Probe is detecting a temperature lower than -31°C.</p> <p>COL HIGH S_2 HIGH S_3 HIGH = Probe is short circuited ($R = 0$) or is detecting a temperature higher than 200°C.</p> <p>--- = The probe has detected a temperature included between $-30^{\circ}\text{C} \dots -20^{\circ}\text{C}$</p> <p>EEE = The probe has detected a temperature included between $+180^{\circ}\text{C} \dots +199^{\circ}\text{C}$</p>
<p>In the selection of the installation to be realized (installer parameter P1) one or more probes flashing.</p>	<p>The probe is miswired or damaged.</p>

WARRANTY

In the view of a constant development of their products, the manufacturer reserves the right for changing technical data and features without prior notice. The consumer is guaranteed against any lack of conformity according to the European Directive 1999/44/EC as well as to the manufacturer's document about the warranty policy. The full text of warranty is available on request from the seller.

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