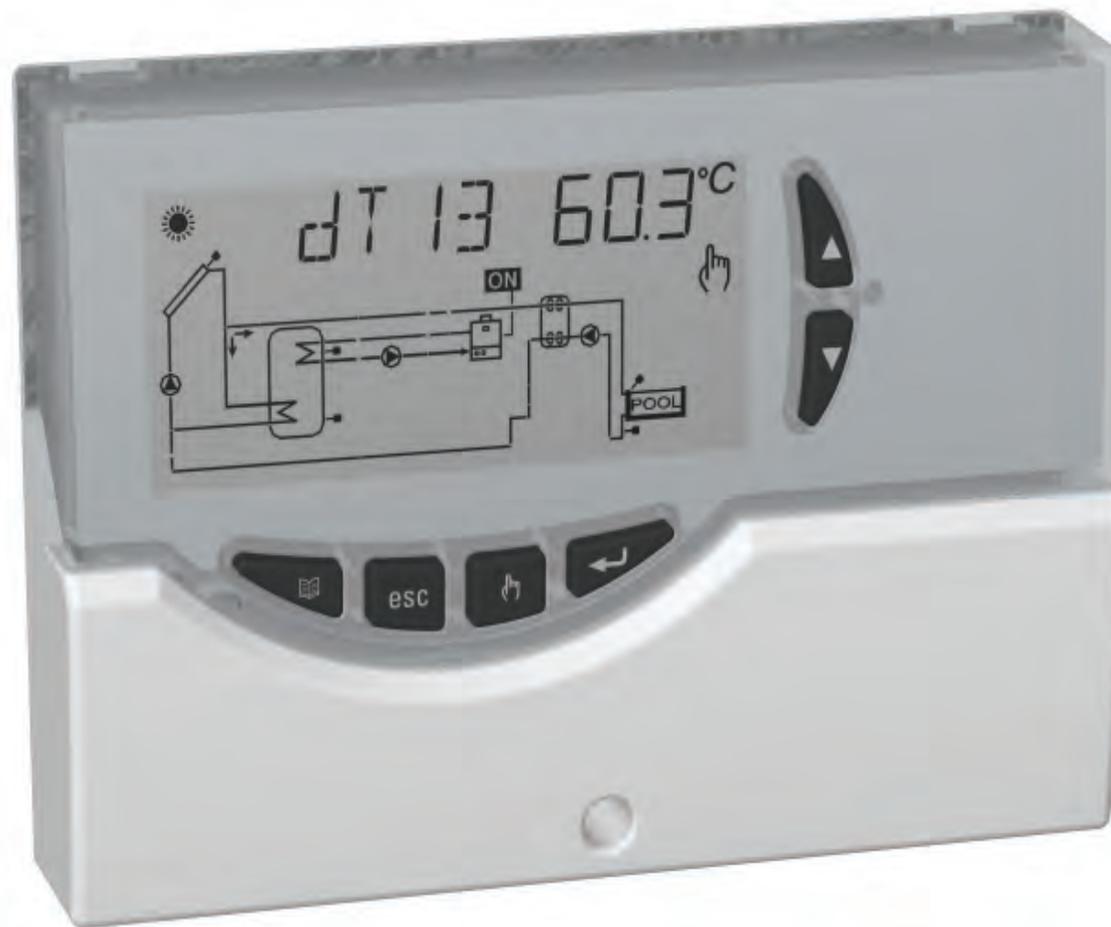




# DIGITAL CONTROL UNIT FOR THERMAL SOLAR SYSTEMS



ARISTON - ELIOS 25 - 3104047

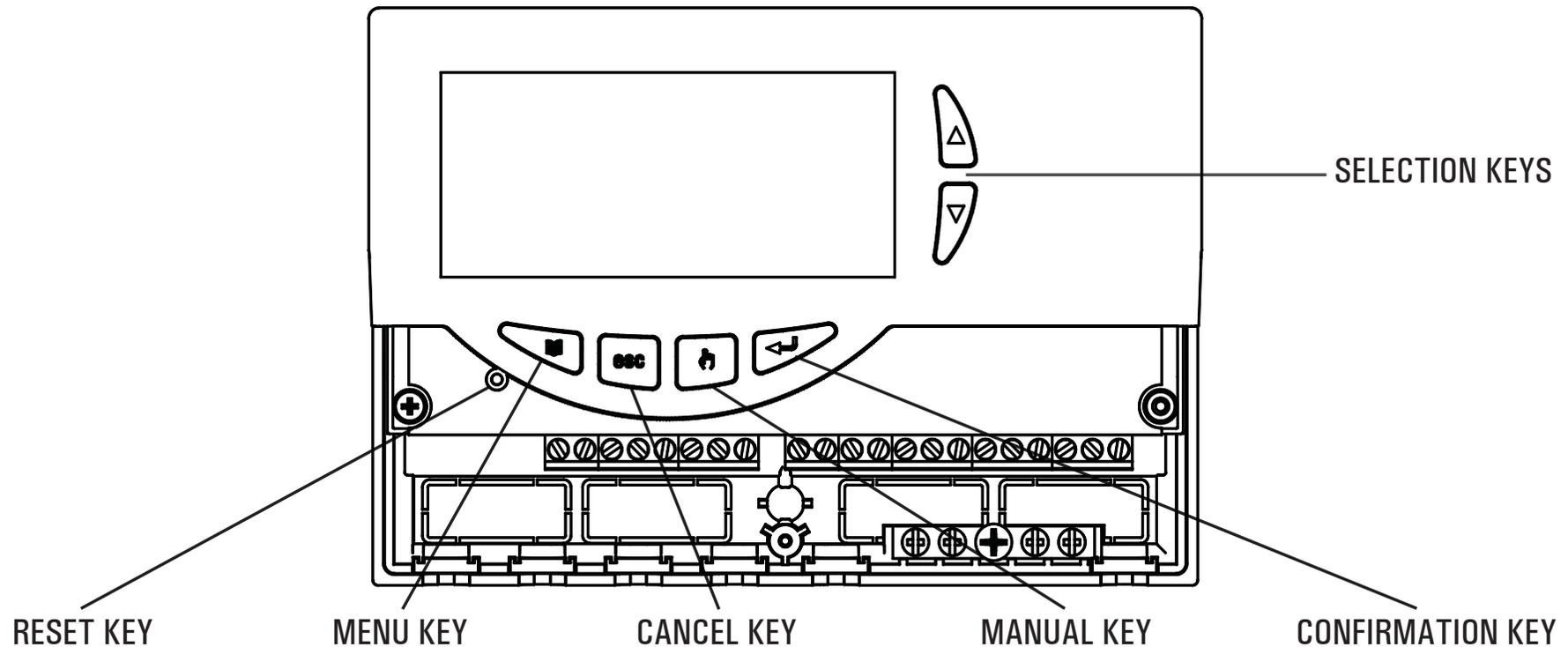
## OVERVIEW

This device is a centralized control unit for thermal solar panels. Supplied with 5 outputs (Load Relays + Alarm Relays) and 4 Inputs (Probes) it is able to manage a system configuration that can be selected among 20 common types of layouts. 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.

The power unit permits to reset the factory-set default data; for further information see the parameter P11 'UNIT'.

## DESCRIPTION OF THE KEYS



## TECHNICAL FEATURES

Power supply:	230V ~ ±10% 50Hz
Power absorption:	4 VA
Sensors type:	4 x Pt1000 Class B DIN
Sensor operating range:	-50 °C .. +200 °C (collector) -50 °C .. +110 °C (Boiler)
Temperature reading range:	-40,0°C .. 260,0°C
Accuracy:	± 1 °C
Resolution:	0,1 °C (0,2 °F)
Offset adjustment:	on S1: ±5.0°C on S2: ±5.0°C on S3: ±5.0°C on S4: ±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. non-editable logic for layouts with 2 collectors (default N.O.)
OUT3 Relay Logic:	NOR=N.O. REV=N.C. (default N.O.)
OUT4 Relay Logic:	NOR=N.O. REV=N.C. (default N.O.)
Output relay contacts rating:	
<u>For version with 4 SPST on-off relays:</u>	4x2(1)A max @ 230V ~ (SPST) Contacts powered.

## For version with 2 SPST on-off relays + 2 semiconductor relays:

	2x2(1)A max @ 230V ~ (SPST)
	2x2(1)A @ 230V ~ (45 .. 65 Hz) Contacts powered.
Alarm relay contacts rating:	4(1)A max @ 230V ~ (SPDT)
Protection grade:	IP 40
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:	~ 723 gr. (version with probe) ~ 553 gr. (version without probe)
Installation:	Wall-mount

## NORMATIVE REFERENCES

The product complies with the following standards (EMC 2004/108/EC and LVD 2006/95/EC):

CEI-EN-60730-1	(2002)
CEI-EN-60730-2-9	(1997)

## AVAILABLE ACCESSORIES AND SPARES

- Accessories for free contacts: 2 x 230V ~ inputs and 2 free voltage outputs.
- Pt1000 probe -50°C .. +200°C grey cable.
- Pt1000 probe -50°C .. +110°C blue cable.
- Brass pocket 1/2" 7x38mm

## INSTALLATION

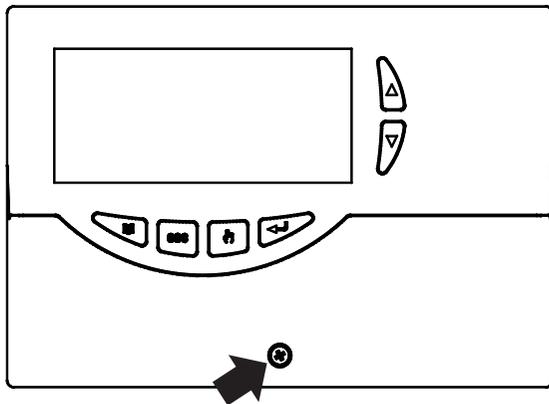


### WARNING

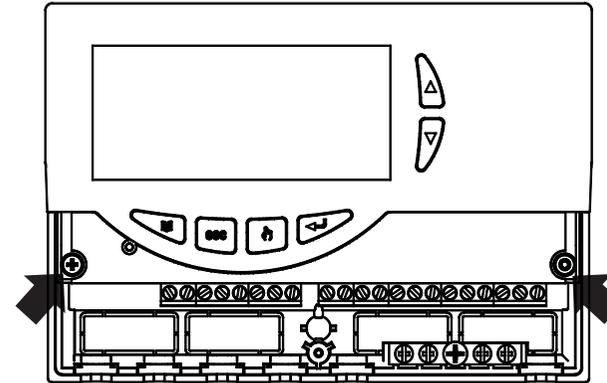
The installation technician shall operate in full compliance with all the applicable technical standards in order to grant the unit safety.

### TO INSTALL THE DEVICE, PERFORM THE FOLLOWING OPERATIONS:

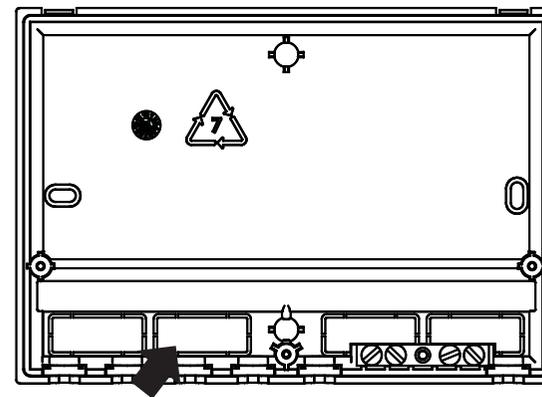
- 1 Remove the central screw and the plastic door.



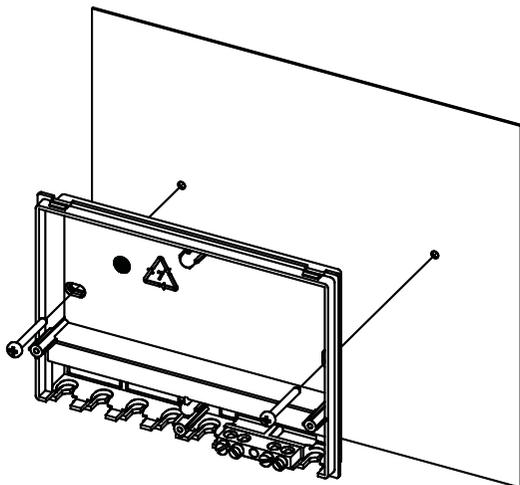
- 2 Remove the two screws shown in the drawing, then remove the whole body from the base.



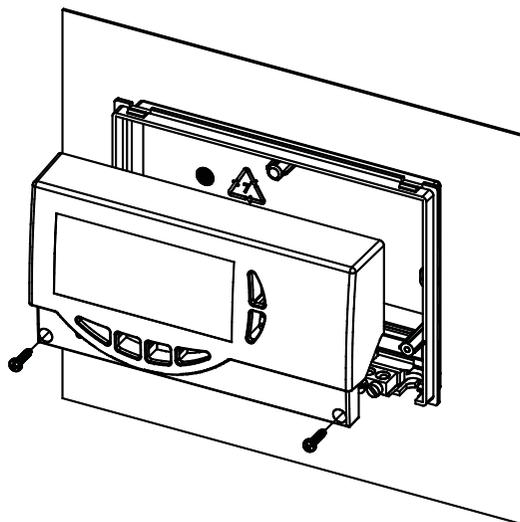
- 3 **ASSEMBLY WITH CABLE INPUT ON THE REAR PANEL:** if the cable fasteners (delivered with the unit) are not required for installation, use a screwdriver to remove the base blocks permitting the cables to pass through, and fit the blocks delivered (see point 6).



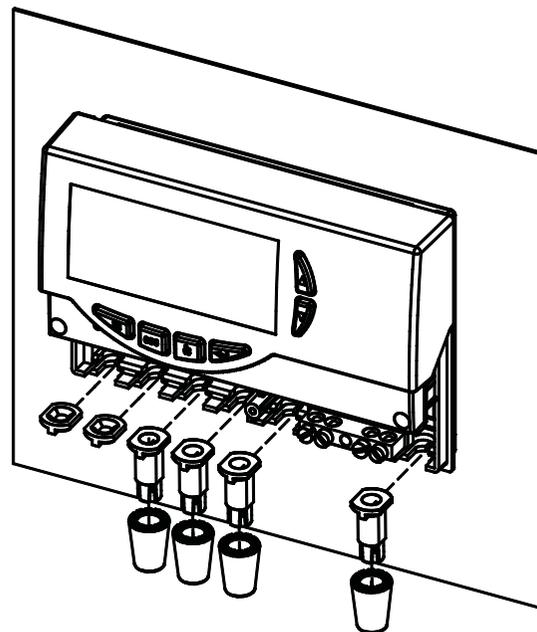
- 4 Fix the power unit base to the wall.



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

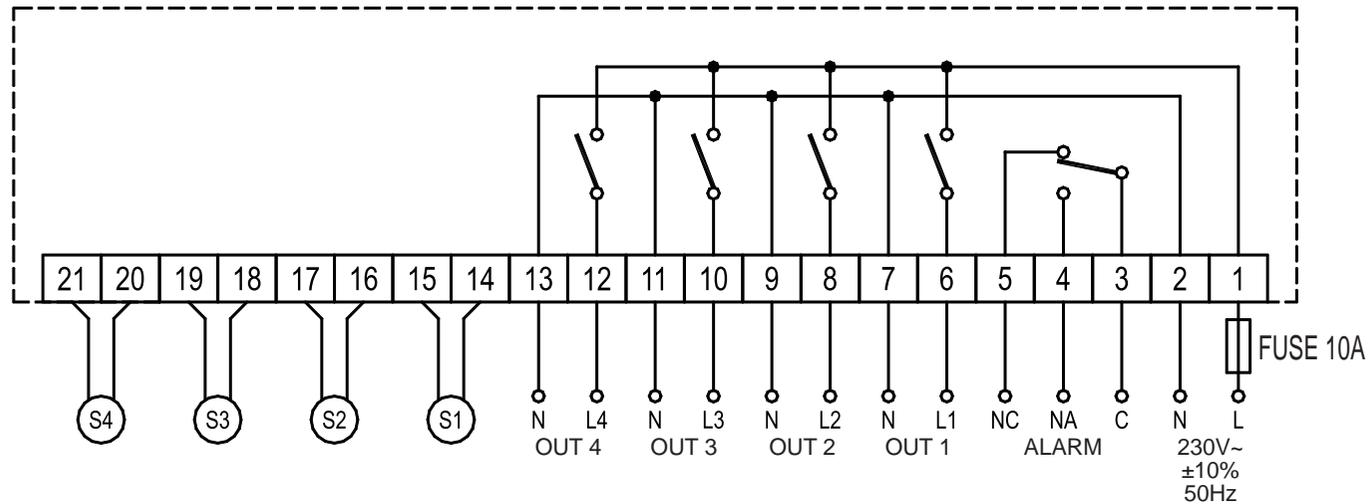


- 6 ASSEMBLY WITH CABLE INPUT ON THE LOWER SIDE: fit the cable fasteners and/or the blocks delivered with the unit.



- 7 Make the electrical connections, following the appropriate layout for the type of controller purchased (see page 6 and 7).

## VERSION WITH 4 SPST ON-OFF RELAY OUTPUTS, CONTACTS POWERED



### WARNING!

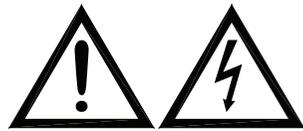
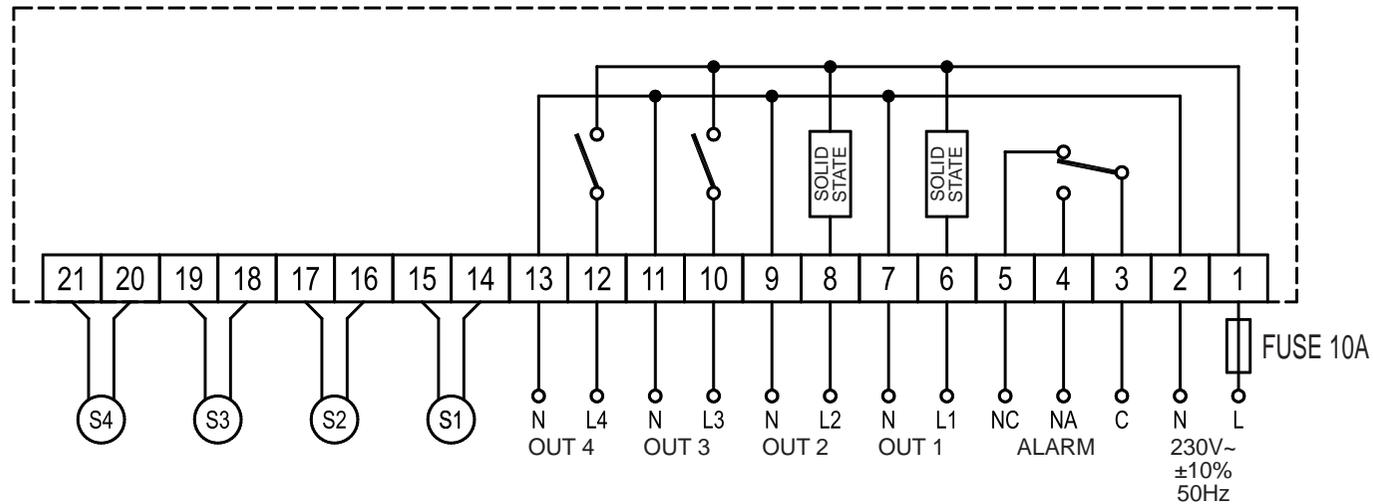
Before wiring the appliance be sure to turn the mains power off.

**WARNING!** S1 (or 'COL'), S2, S3 and S4 are Pt1000 temperature sensors. For S1 sensor the  $-50^{\circ}\text{C}..+200^{\circ}\text{C}$  range probe (grey cable) must be used, while the probes with the range of  $-50^{\circ}\text{C}..+110^{\circ}\text{C}$  (blue cable) can be used for the other probes. When setting up installations with 2 solar panels, the probes corresponding to S1 and S4 **must be exclusively of the  $-50^{\circ}\text{C} .. +200^{\circ}\text{C}$  range type**. The relay outputs relative to 1, 2, 3, 4 loads are powered (230V ~); the output of the auxiliary alarm relay is changeover type (SPDT) with voltage free contacts. It is advisable to fit a 10A 250V ~ fuse on the power unit mains capable to intervene in case of short circuits on loads.

**IN ORDER TO CHECK THAT THE DEVICE IS WORKING CORRECTLY IT IS NECESSARY FOR THE LOADS TO BE CONNECTED.**

**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.

**VERSION WITH 2 SPST ON-OFF RELAY OUTPUTS + 2 SEMICONDUCTOR RELAY OUTPUTS (VARIABLE COLLECTOR PUMP SPEED), CONTACTS POWERED**

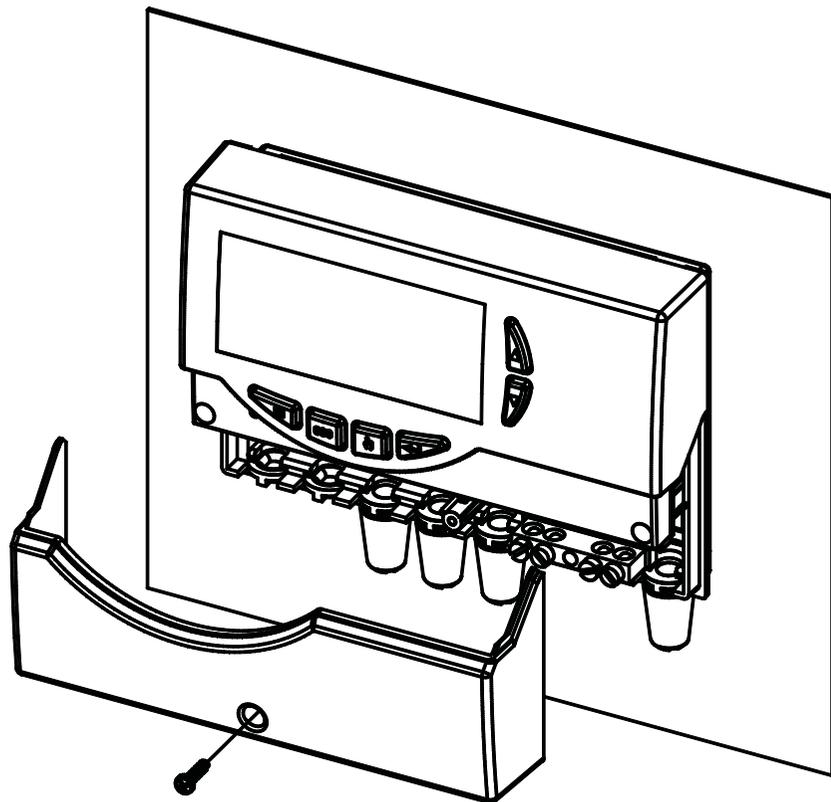


**WARNING! Before wiring the appliance be sure to turn the mains power off. OUT 1 e OUT 2 are semiconductor solid state relays suitable to drive the speed of a circulation pump. In case they are used to drive other electric devices (i.e. motorized valves) P12, %MN1 and/or %MN2 must be set to 100% (maximum speed).**

**WARNING! S1 (or 'COL'), S2, S3 and S4 are Pt1000 temperature sensors. For S1 sensor the -50°C..+200°C range probe (grey cable) must be used, while the probes with the range of -50°C..+110°C (blue cable) can be used for the other probes. When setting up installations with 2 solar panels, the probes corresponding to S1 and S4 must be exclusively of the -50°C .. +200°C range type. The relay outputs relative to 1, 2, 3, 4 loads are powered (230V ~); the output of the auxiliary alarm relay is changeover type (SPDT) with voltage free contacts. It is advisable to fit a 10A 250V ~ fuse on the power unit mains capable to intervene in case of short circuits on loads.**

**IN ORDER TO CHECK THAT THE DEVICE IS WORKING CORRECTLY IT IS NECESSARY FOR THE LOADS TO BE CONNECTED. 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.**

- 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.

### DISPLAYING TEMPERATURES AND ENERGY PRODUCED

The alphanumeric display of the power unit will normally show the temperature detected by the probes connected as well as the quantity of energy produced. The energy will be expressed in KWh + MWh. The counting of KWh, when reaching 1000 KWh, will be set to zero and the MWh counter will increase by 1. The addition of the two counters will give the total energy produced (i.e. 815 KWh + 12 MWh = 12.15 MWh). Press '▲' or '▼' to cyclically select the probe of which you need to see both the temperature and the quantity of energy produced:

→ COL → S\_2 → S\_3 → S\_4 → KWh → MWh →

### DISPLAYING SUN / ANTI-FREEZE

During normal operation, the 'SUN' icon will be always lit on the display. When the power unit detects a condition which forces the manifold pump to get started, the 'SUN' icon will be flashing.

When the Anti-freeze function is activated, both 'SUN' and 'SNOW' icons will be lit; when the power unit detects a temperature which forces the anti-freeze function to get started, the 'SNOW' icon will also be flashing.

### DISPLAY OF COLLECTOR PUMP SPEED



#### WARNING!

Visualization of this parameter is available only for version with variable collector pump speed.

If the '▲' or '▼' keys are pressed during normal operation, the central unit will not only show the temperature as read by the connected probes but it will also display the solar collector pump speed as a percentage.

As regards the %FS2 parameter, the power unit will show this parameter set at 0 if the OUT2 outlet is not connected. Alternatively, if the selected installation diagram does not require installation of a collector pump at outlet OUT2, this parameter will only be displayed with the values 0 (outlet N.O.) or 100 (outlet N.C.), i.e. it will work as an ON /OFF type outlet.

### AUTOMATIC / MANUAL / ABC (Automatic Boiler Control) OPERATION

The control unit can manage the installation selected in 3 different modes:

- AUTOMATIC: in this mode the control unit automatically

manages and controls the operation of the installation according to the programmed data.

- **MANUAL:** the collector pump is continuously powered; the only active controls will be those related to the maximum temperature and safety.
- **ABC:** this mode is identical to the Manual mode except that the collector pump will be activated only when the temperature of the collector exceeds ' T ABC ' programmed in the relevant installer parameter.

## **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 ' PWDC0000 '.



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.



### **WARNING!**

**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.**

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:

<b>P1:</b> SELECTION INSTALLATION TYPE	' SCH '
<b>P2:</b> SETTING THERMAL DATA	' DATA '
<b>P3:</b> ANTIFROST PARAMETERS MANAGEMENT	' O AF '
<b>P4:</b> ACOUSTIC SIGNAL MANAGEMENT	' BEEP '
<b>P5:</b> LOGIC RELAY SELECTION	' ACT '
<b>P6:</b> INTEGRATION HOURS COUNTER	' C AH '
<b>P7:</b> LOADS WIRING TEST	' TEST '
<b>P8:</b> CALCULATION OF THE ENERGY PRODUCED	' SEM '
<b>P9:</b> RECOOLING FUNCTION	' REF '
<b>P10:</b> PERIODIC ACTIVATION OF LOADS	' PVK '
<b>P11:</b> MEASUREMENT UNIT	' UNIT '
<b>P12:</b> SETTING OF COLLECTOR PUMP SPEED	' %FS '
<b>P13:</b> LIMITATION OF COLLECTOR MINIMUM TEMP.	' MTL '

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.



### **WARNING!**

**Parameter P12 ' %FS ' is available only for the controller with 2 SPST relay outputs + 2 semiconductor relay outputs (variable collector pump speed).**

**Therefore P12 parameter ' MTL ' (minimum collector temperature limitation) will be shown with P13 only for version with variable collector pump speed, while it will be shown with P12 for all the other versions.**

## P1: SELECT 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).



### WARNING!

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<sub>1</sub>.

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.

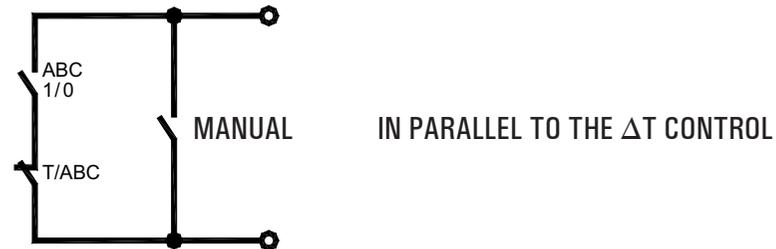
## List of thermal data to be eventually programmed

PARAMETERS	DESCRIPTION
TS1-TS2-TS3-TS4	Probe safety temperature
ΔT 12	Differential between the probes S1-S2
ΔT 13	Differential between the probes S1-S3
ΔT 14	Differential between the probes S1-S4
ΔT 34	Differential between the probes S3-S4
ΔT 42	Differential between the probes S4-S2
ΔT 43	Differential between the probes S4-S3
MTC	Adjustment of collector minimum temperature
MTEN	Enabling/disabling the collector minimum temperature
TM2	Maximum temperature of the probe S2
TM3	Maximum temperature of the probe S3
TM4	Maximum temperature of the probe S4
TAH	Integration temperature on the probe S3
HY12	Hysteresis of ΔT 12
HY13	Hysteresis of ΔT 13
HY14	Hysteresis of ΔT 14
HY34	Hysteresis of ΔT 34
HY42	Hysteresis of ΔT 42
HY43	Hysteresis of ΔT 43
HYT	Thermostatic hysteresis
HYTS	Safety thermostatic hysteresis

## CONTROL LOGIC

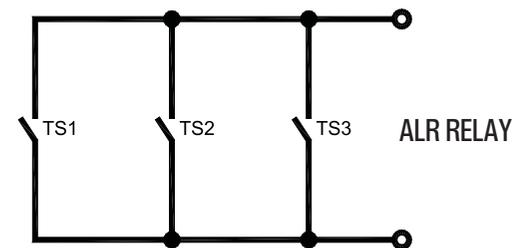
**WARNING:** The following control logics must be applied to all the diagram described hereinafter.

### CONTROL LOGIC IN MANUAL MODE OR IN ABC



The control logic concerning the commands of the 'ABC' function or the 'MANUAL' operation mode takes the place of the differential gear control. The controls concerning the Safety and Maximum temperatures are always active. The integrative source in Manual mode or in ABC is deactivated. It will be automatically reactivated when the above modes are deactivated.

### CONTROL LOGIC OF THE SAFETY THERMOSTATS

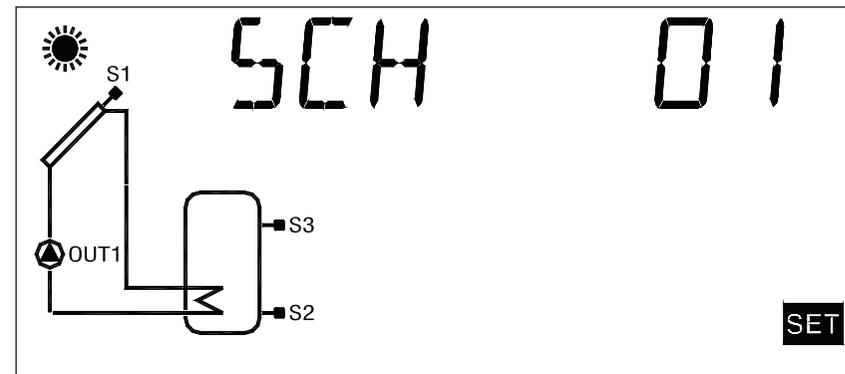


The control is not active when the unit is in 'OFF' status.

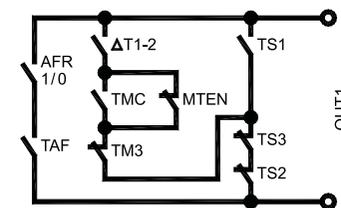
## AVAILABLE DIAGRAMS

### SCH 01

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



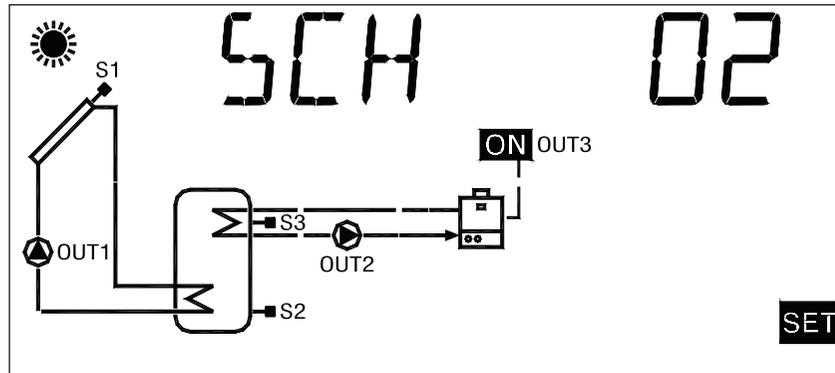
### Control logic



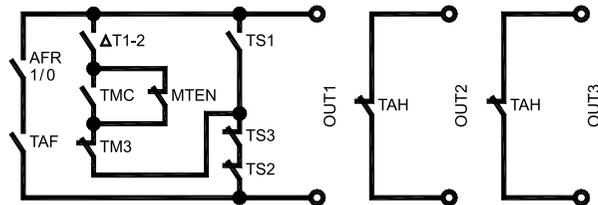
**WARNING!**  
All outputs are 230V ~ powered and are NOT potential free.

## SCH 02

Solar heating installation with 1 tank and additional thermostatic heating.

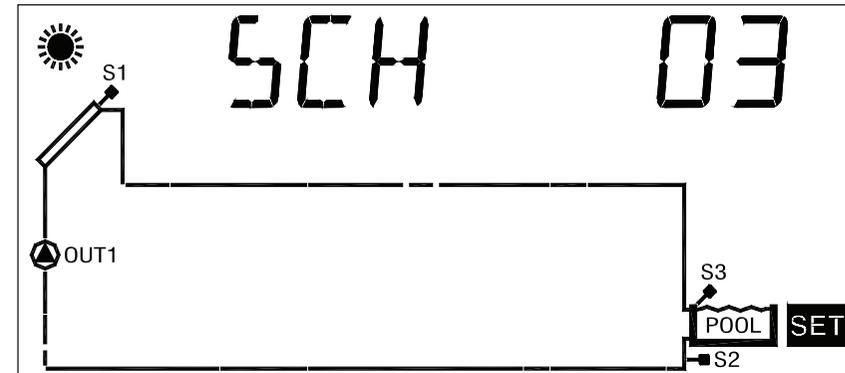


### Control logic

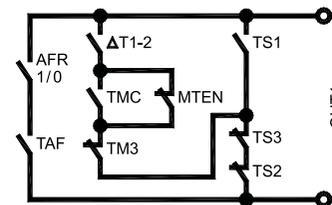


## SCH 03

Pool solar heating installation.

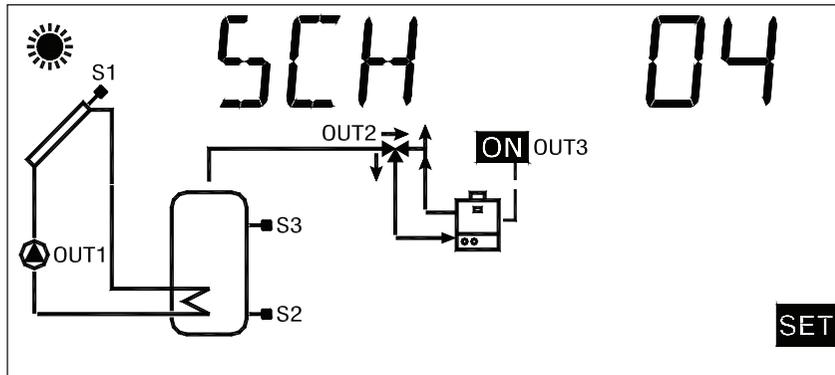


### Control logic

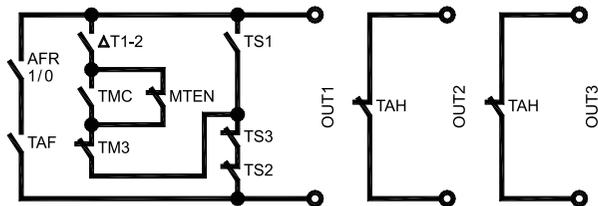


## SCH 04

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



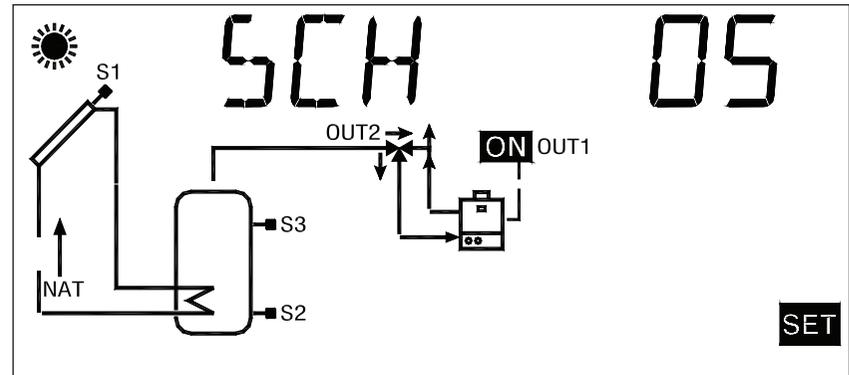
### Control logic



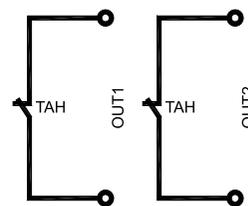
**WARNING!**  
All outputs are 230V ~ powered and are NOT potential free.

## SCH 05

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



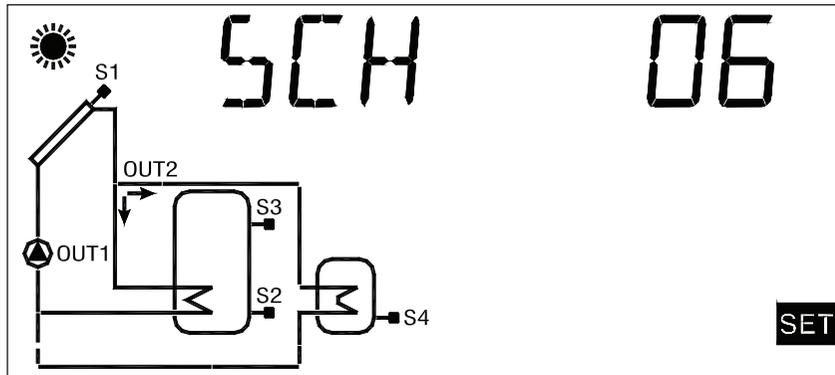
### Control logic



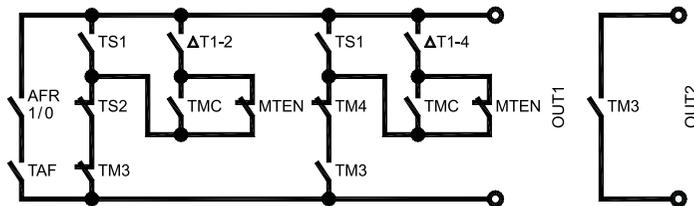
**WARNING!**  
All outputs are 230V ~ powered and are NOT potential free.

## SCH 06

Solar heating installation with 2 tanks, valve logic control and no integrative heat source.



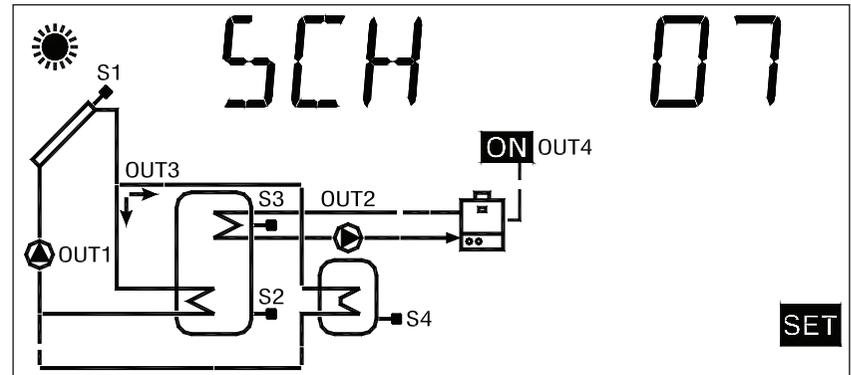
### Control logic



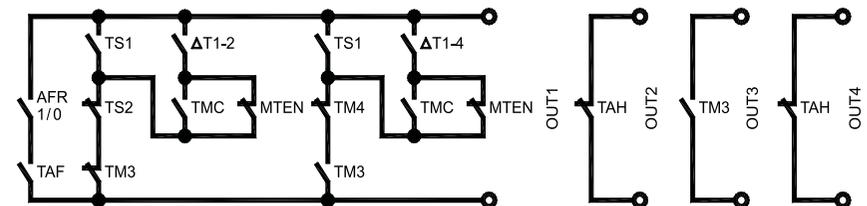
**WARNING!**  
All outputs are 230V ~ powered and are NOT potential free.

## SCH 07

Solar heating installation with 2 tanks, logic valve control, and integrative heat source.



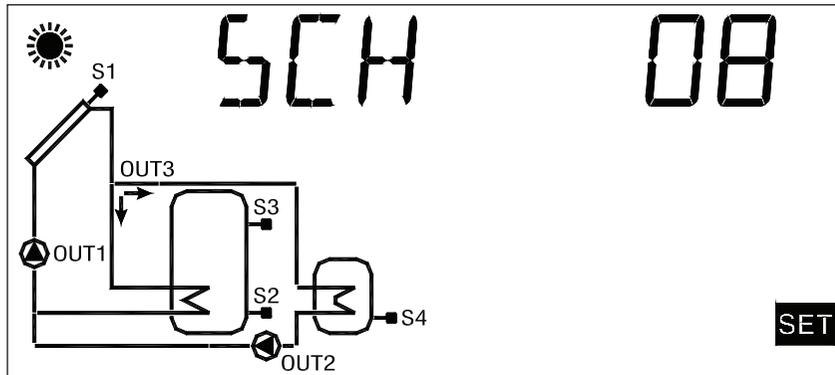
### Control logic



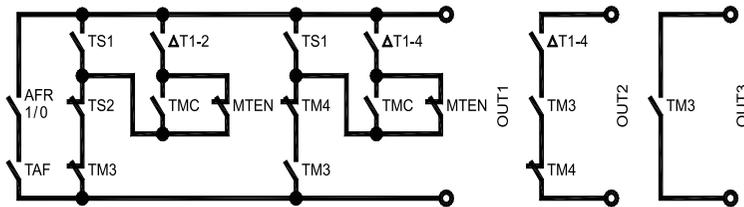
**WARNING!**  
All outputs are 230V ~ powered and are NOT potential free.

**SCH 08**

Solar heating installation with 2 tanks, valve logic control, no integrative heat source.



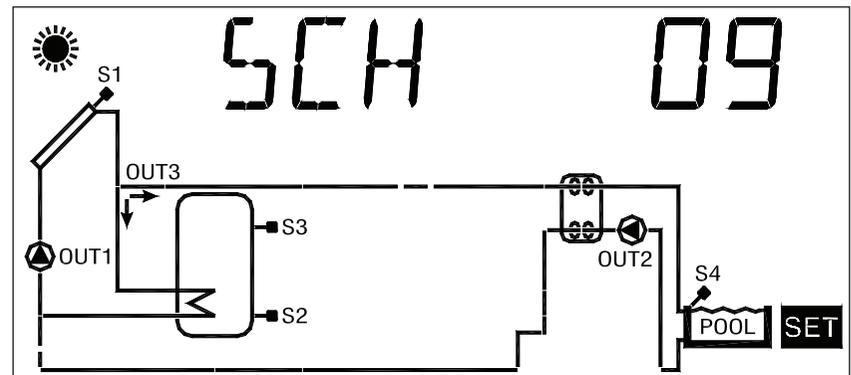
**Control logic**



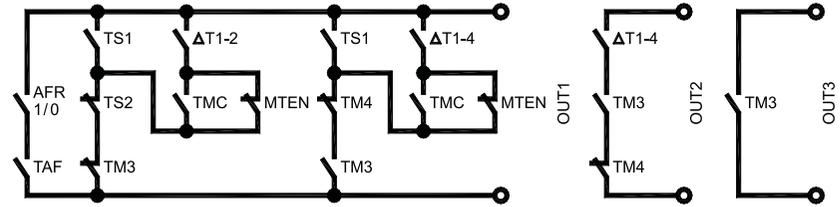
**WARNING!**  
All outputs are 230V ~ powered and are NOT potential free.

**SCH 09**

Solar heating installation with 1 tank, valve logic control and heat exchanger for pool heating.



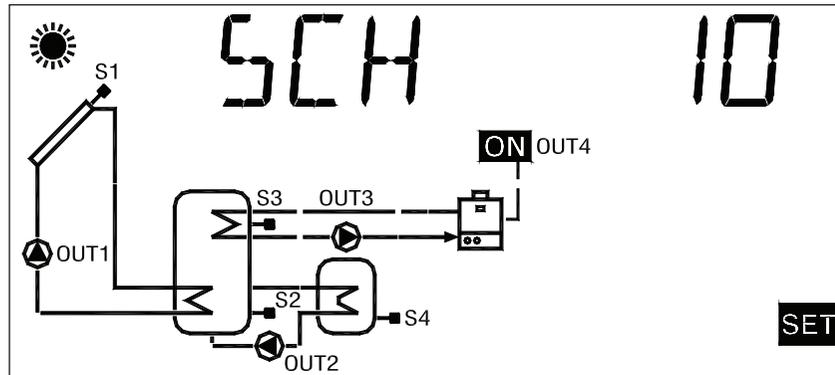
**Control logic**



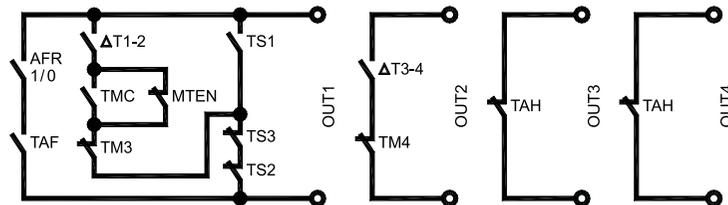
**WARNING!**  
All outputs are 230V ~ powered and are NOT potential free.

## SCH 10

Solar heating installation with 2 tanks, sanitary regulation with thermal exchange and integrative heat source.



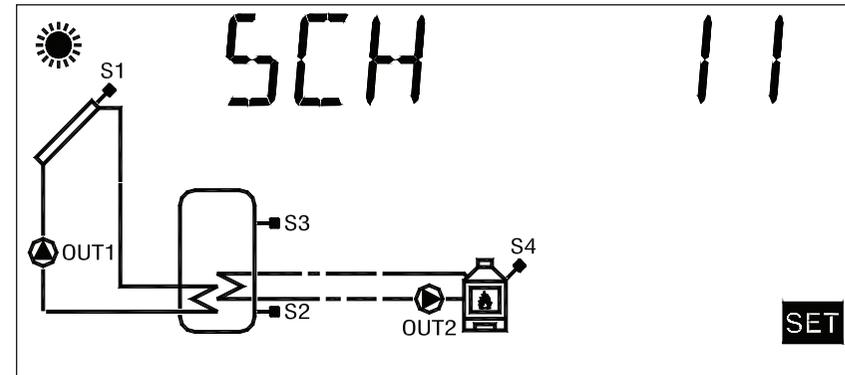
### Control logic



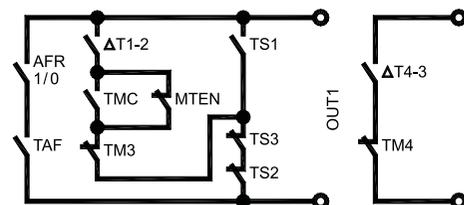
**WARNING!**  
All outputs are 230V ~ powered and are NOT potential free.

## SCH 11

Solar heating installation with 1 tank and additional heat source with solid fuel.



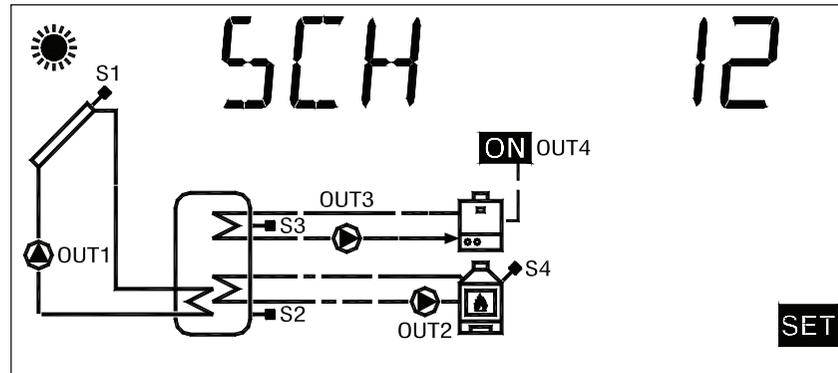
### Control logic



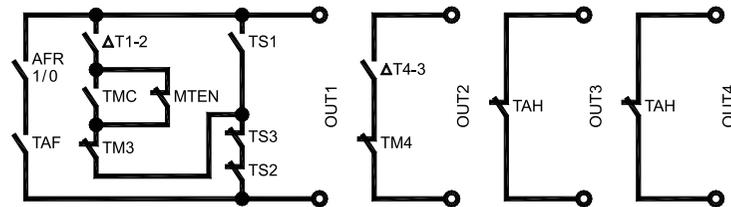
**WARNING!**  
All outputs are 230V ~ powered and are NOT potential free.

## SCH 12

Solar heating installation with 1 tank plus one integrative and one solid fuel heat sources.



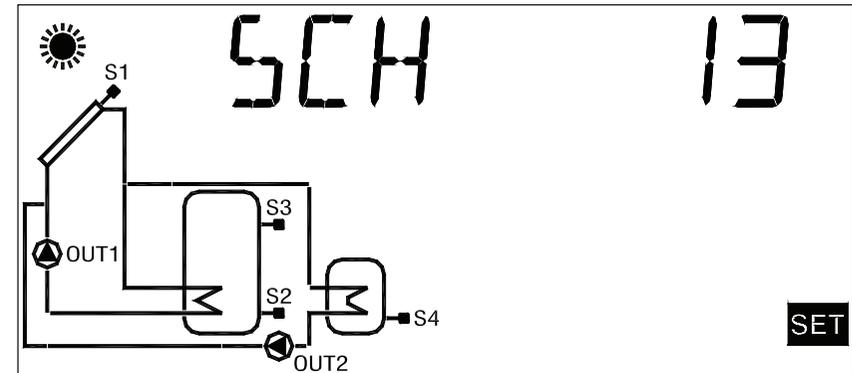
### Control logic



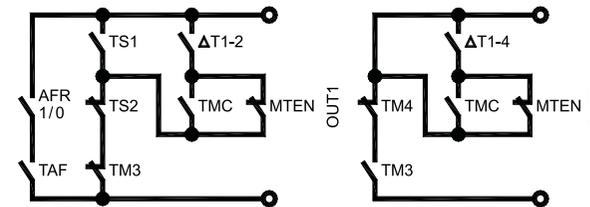
**WARNING!**  
All outputs are 230V ~ powered and are NOT potential free.

## SCH 13

Solar heating installation with 2 tanks, pump logic.



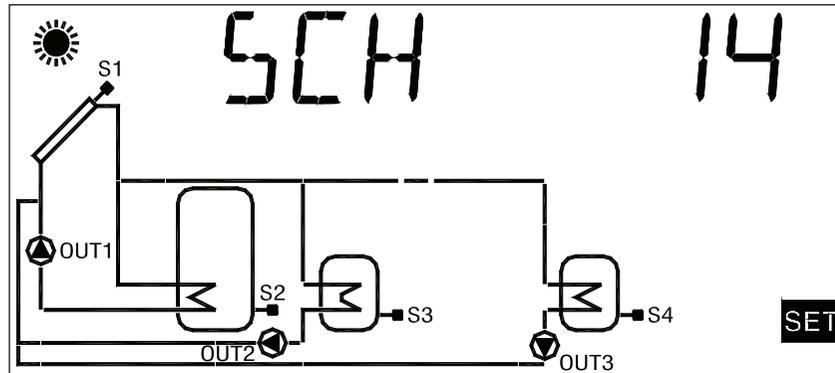
### Control logic



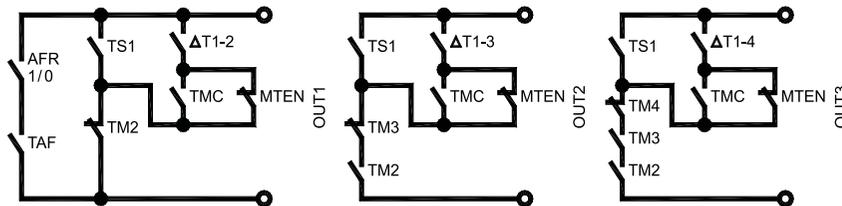
**WARNING!**  
All outputs are 230V ~ powered and are NOT potential free.

## SCH 14

Solar heating installation with 3 tanks, pump logic.



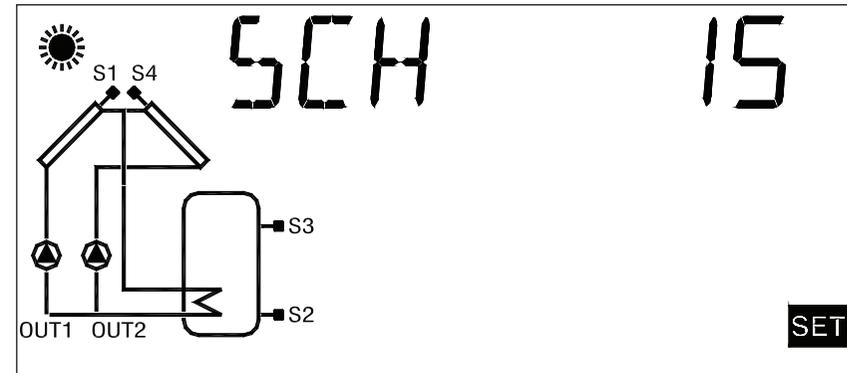
### Control logic



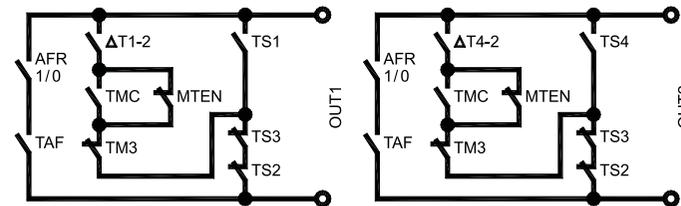
**WARNING!**  
All outputs are 230V ~ powered and are NOT potential free.

## SCH 15

Solar heating installation EAST / WEST, 1 tank and no integrative heat source.



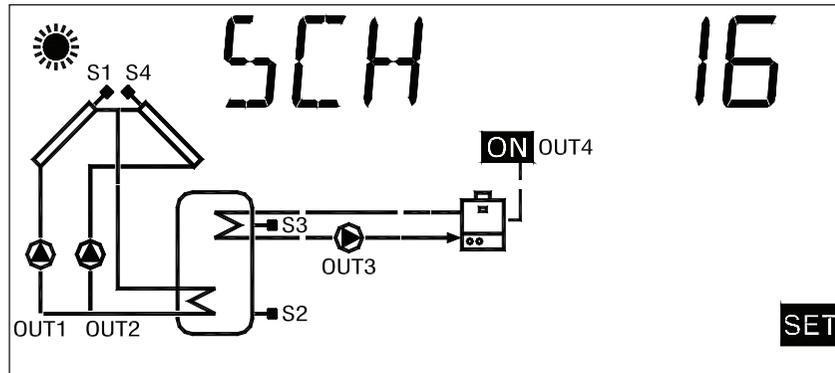
### Control logic



**WARNING!**  
All outputs are 230V ~ powered and are NOT potential free.

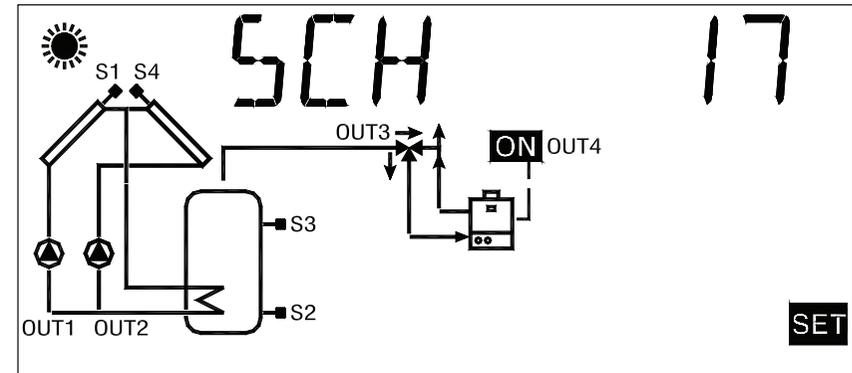
## SCH 16

Solar heating installation EAST / WEST, 1 tank and integrative heat source.

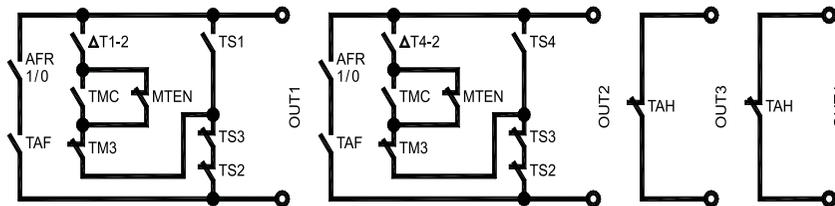


## SCH 17

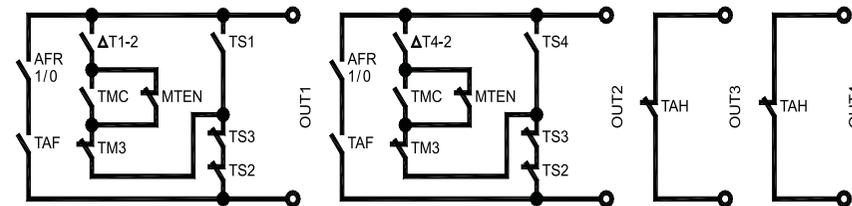
Solar heating installation EAST / WEST, 1 tank, integrative heat source by means of valve logic.

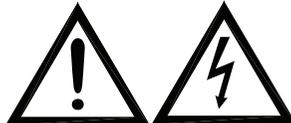


### Control logic



### Control logic

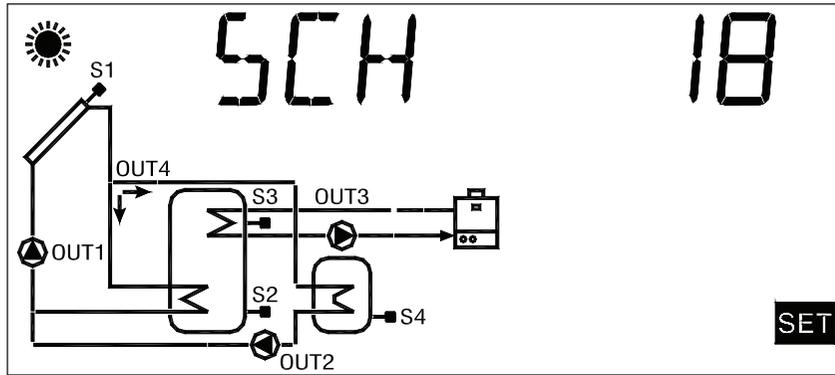


 **WARNING!**  
All outputs are 230V ~ powered and are NOT potential free.

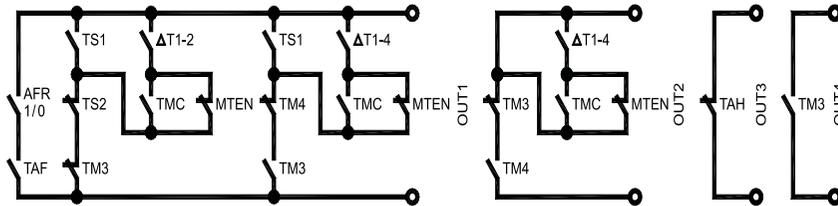
 **WARNING!**  
All outputs are 230V ~ powered and are NOT potential free.

## SCH 18

Solar heating installation with 2 tanks, logic valve, integrative heat source, extra pump on the second boiler.



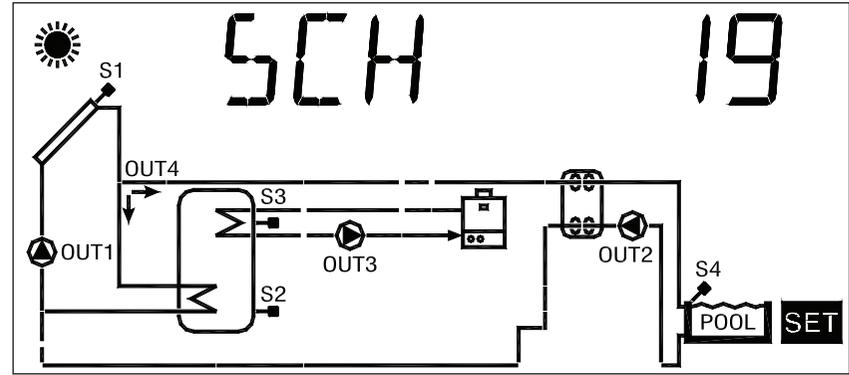
### Control logic



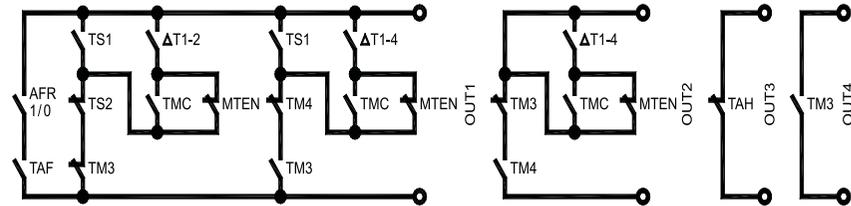
**WARNING!**  
All outputs are 230V ~ powered and are NOT potential free.

## SCH 19

Solar heating installation with 1 tank, logic valve, integrative heat source and heat exchanger for pool heating.



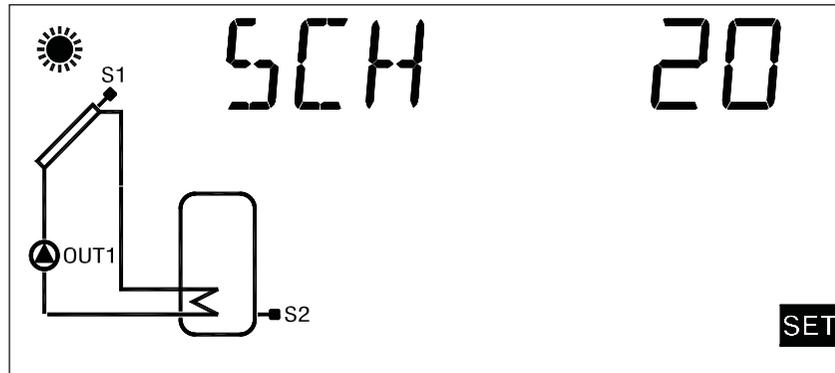
### Control logic



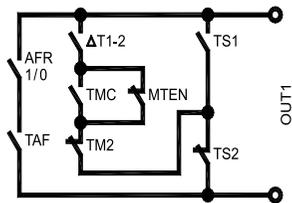
**WARNING!**  
All outputs are 230V ~ powered and are NOT potential free.

## SCH 20

Solar heating system with 1 tank, 2 sensors only and supplemental heating excluded.



### Control logic



**WARNING!**

All outputs are 230V ~ powered and are NOT potential free.

## P2: SETTING THE THERMAL DATA

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

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.

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.

### **Safety temperatures**

Data	Regulation range	Default
TS1	60.0 .. 240.0 °C	140.0 °C
TS2	40.0 .. 90.0 °C	90.0 °C
TS3	40.0 .. 90.0 °C	90.0 °C
TS4 <sup>1</sup>	40.0 .. 90.0 °C	90.0 °C
TS4 <sup>2</sup>	60.0 .. 240.0 °C	140.0 °C



### **WARNING!**

If the selected scheme has only one manifold, the default  
value of the safety temperature (TS4) will be 90°C (<sup>1</sup>); if  
the selected scheme has two manifolds, the default value  
of the safety temperature (TS4) will be automatically set  
at 140°C (<sup>2</sup>).

When changing from a two-manifold scheme to  
one-manifold scheme and the maximum temperature  
(TM4) is higher or equal to 85°C, the safety temperature  
(TS4) will be automatically limited to the value TM4  
+ 5°C.

It is not possible to set the Safety Temperatures TS2,  
TS3, TS4 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 highest Maximum Temperature operating in the current scheme (i.e. in scheme no.6, the value of the TS2 safety temperature will be limited according to the value of the TM3 maximum temperature if this is higher than TM4).

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		
Data	Regulation range	Default
ΔT12	1.0 .. 25.0°C	8.0 °C
ΔT14	1.0 .. 25.0°C	6.0 °C
ΔT34	1.0 .. 25.0°C	6.0 °C
ΔT43	1.0 .. 25.0°C	6.0 °C
ΔT42	1.0 .. 25.0°C	8.0 °C
ΔT13	1.0 .. 25.0°C	6.0 °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 differentials		
Data	Regulation range	Default
HY12	0.5 .. 20.0°C	4.0 °C
HY14	0.5 .. 20.0°C	2.0 °C
HY34	0.5 .. 20.0°C	2.0 °C
HY43	0.5 .. 20.0°C	2.0 °C
HY42	0.5 .. 20.0°C	4.0 °C
HY13	0.5 .. 20.0°C	2.0 °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 ( $\Delta T$ ).

<b>Hysteresis of the safety temperatures</b>		
Data	Regulation range	Default
HYTS	1.0 .. 15.0°C	2.0 °C

<b>Thermostatic hysteresis</b>		
Data	Regulation range	Default
HYT	1.0 .. 15.0°C	2.0 °C

<b>Probe Offset</b>		
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
OS4	-5.0 .. +5.0°C	0.0 °C

<b>Maximum temperature of the probes</b>		
Data	Regulation range	Default
TM2	20.0 .. 90.0°C	70.0 °C
TM3	20.0 .. 90.0°C	70.0 °C
TM4	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.

<b>Integration Temperature (After Heating) on probe S3</b>		
Data	Regulation range	Default
TAH	40.0 .. (TM3 -5)°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.



**WARNING!**  
 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 OFF '
- 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 .. +5.0°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).

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

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

**Note:** '0' disables it, while '1' enables acoustic signalling.

#### 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).

**If the parameter is not activated in the selected scheme, the message 'NONE' will appear on the display.**

AFTER SELECTING PARAMETER P5 PRESS THE '↵' KEY.



USING THE '▲' or '▼' ARROWS IT IS POSSIBLE TO SCROLL THROUGH THE ACTIVE OUTPUTS.



SELECT THE DESIRED OUTPUT AND PRESS THE '↵' KEY.



CHANGE THE OUTPUT LOGIC USING THE '▲' or '▼' ARROWS.



PRESS THE '↵' KEY TO CONFIRM THE PROGRAMMED SETTING OR PRESS THE 'esc' KEY TO CANCEL THE MODIFICATION.

The user is allowed to select the relay logic for max. 3 outputs only, listed in the following.

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

Output logic for OUT 3		
Data	Regulation range	Default
OUT 3	0 .. 1	1

Output logic for OUT 4		
Data	Regulation range	Default
OUT 4	0 .. 1	1

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

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.

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.

## **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.

Depending on the configured scheme, the power unit will activate the loads connected by sequentially activating all the available outlets for 10 seconds each, including the alarm relay and its buzzer.

The number of times for which the entire test is repeated, in multiples of 5, can be set using the single ' TMR ' parameter present. The activation of the test is signalled on the display with the ' TIMER ' icon.

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.





PRESS ' ← ' TO CHANGE THE SELECTED PARAMETER;  
THE PARAMETER WILL START BLINKING.



PRESS ARROWS ' ▲ ' and ' ▼ ' TO SET  
THE DESIRED VALUE (for ' FLOW ' parameter only).



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

Plant flow rate expressed in litres/minute		
Data	Regulation range	Default
FLOW	OFF .. 20.0 l/min.	2.3 l/min.

## P9: RECOOLING FUNCTION

This function permits to automatically reduce the boiler temperature.

This parameter permits to set the data concerning the management of the automatic cooling function of the boiler. The icons of 'pump' and 'sun' flashing on the display will indicate that the manifold pump cooling the boiler has been activated.

The Recooling function will be activated if the RCEN parameter is 1, whereas it will be deactivated if the parameter is 0.

**If the parameter is not activated in the selected scheme, the message ' NONE ' will appear on the display.**

AFTER SELECTING PARAMETER P9 PRESS  
THE ' ← ' KEY.



PRESS ARROWS ' ▲ ' or ' ▼ ' TO CYCLICALLY SCROLL  
THE RECOOLING FUNCTION PARAMETERS:

Recooling Temperature ' TR '  
Recooling Temperature Differential ' ΔTR '  
Recooling function enabling ' RCEN '



PRESS ' ← ' TO CHANGE THE SELECTED PARAMETER;  
THE PARAMETER WILL START BLINKING.



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



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

Recooling Temperature		
Data	Regulation range	Default
TR	70°C .. (TM3+5)°C	70°C



**WARNING!**

It is not possible to set the value of the Recooling Temperature (TR) at a value which is equal or lower than the value of the highest Maximum Temperature.

The value of the Recooling Temperature (TR) is linked to the value of the highest Maximum Temperature + 1°C. In order to lower the Recooling Temperature (TR) below the value of the maximum Temperatures already set, first of all lower the value of the maximum Temperature(s), then change the Recooling Temperature (TR). Should any Maximum Temperature be increased to a value which is higher than the value of the Recooling Temperature (TR), this is automatically set at the value of the highest maximum temperature + 1°C.

The same shall be considered as regards the Recooling Temperature (TR) with reference to the integration temperature (TAH).

**Recooling Temperature (TR) Differential**

Data	Regulation range	Default
ΔTR	6°C .. 15°C	8°C

**Activation / Deactivation of the Recooling function**

Data	Regulation range	Default
RECEN	0 .. 1	1

Note: ' 0 ' indicates the Recooling function is deactivated, whereas ' 1 ' indicates it is activated.

## P10: PERIODIC ACTIVATION OF LOADS

This parameter permits to manage the periodic activation of loads (pumps and valves) included in the hydraulic scheme selected. In particular, if a load has not been activated in 21 hours' time, it will be automatically activated by the power unit for 15 seconds, according to the operation logic.

If a load is activated during this time gap, the counting will start again from zero.

The timers counting the waiting and activation time will not be stored, and counting will start again from zero in case of reset or voltage lack.

The 'periodic activation of loads' function will be activated if the PVK parameter is 1, whereas it will be deactivated if the parameter is 0.

AFTER SELECTING PARAMETER P10 PRESS THE '↵' KEY.

THE DISPLAY SHOWS 'PVK'.

PRESS '↵'. THE DISPLAY SHOWS 'PVK' 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.

Periodic activation of loads		
Data	Regulation range	Default
PVK	0 .. 1	1

**Note:** '0' indicates that the periodic activation of loads is deactivated, whereas '1' indicates it is activated.

## P11: MEASUREMENT UNIT

This parameter permits to select the measurement unit required, in °C or °F.

AFTER SELECTING PARAMETER P11 PRESS  
THE ' ← ' KEY.



THE DISPLAY SHOWS ' UNIT '.



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



SET THE MEASUREMENT UNIT REQUIRED BY  
PRESSING ARROWS ' ▲ ' or ' ▼ '.



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

Measurement unit		
Data	Regulation range	Default
UNIT	°C .. °F	°C



### WARNING

Changing the measurement unit from °C to °F, or vice versa, will entail the reset of the "default" data, that is the loss of all the personal data included and stored in the power unit, such as thermal parameters, hydraulic scheme, counters, password, and any other data stored in the internal storage of the power unit itself.

The default data reset could be exploited, for example, if the installer wanted to set the factory data again without however changing every single parameter.

If the measurement unit is changed, the power unit will be reset in scheme no.1 and the message 'RST data' will appear on the display for approx. 6 seconds to indicate that all data have been reset to the default values.

## P12: SETTING OF COLLECTOR PUMP SPEED



### WARNING!

**This parameter is available only for version with variable collector pump speed.**

**OUT 1 e OUT 2 are semiconductor solid state relays suitable to drive the speed of a circulation pump. In case they are used to drive other electric devices (i.e. motorized valves) P12, %MN1 and/or %MN2 must be set to 100% (maximum speed).**

This parameter can be selected by the 'menu' key, and permits to set the data which will control the speed of the collector pumps connected to OUT1 and OUT2.

The working principle which regulates solar collector pump speed variation is very much linked to the need to keep the difference in temperature between the solar collector and the boiler as constant as possible (T).

Since it is a well-known fact that as incidental solar radiation increases, the T also tends to increase, one way of decreasing the T whilst maintaining incidental solar radiation constant is to reduce the amount of time that the fluid transits within the collector, or rather to increase fluid transit speed, by increasing the number of solar collector pump rotational speed.

Using the P12 parameter it is possible to set both the minimum work speed of the solar collector pump as a percentage and the variation in temperature required to increase solar collector pump speed by 10% in relation to the T (INC parameter).

**The power unit is delivered already set for an optimal operation.**

**The preset data can only be changed by qualified staff.**

AFTER SELECTING PARAMETER P12 PRESS  
THE ' ← ' KEY.



PRESS ARROWS ' ▲ ' and ' ▼ ' TO CYCLICALLY SCROLL  
COLLECTOR PUMP PARAMETERS:

MINIMUM SPEED OUT 1 IN %	' %MN1 30 '
MINIMUM SPEED OUT 2 IN %	' %MN2 30 '
INCREASE 10%	' INC 2.0°C '



PRESS ' ← ' TO CHANGE THE SELECTED PARAMETER;  
THE PARAMETER WILL START BLINKING.



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



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

Minimum speed OUT 1 in %		
Data	Regulation range	Default
%MN1	30% .. 100%	30%

Minimum speed OUT 2 in %		
Data	Regulation range	Default
%MN2	30% .. 100%	30%

Increase 10%		
Data	Regulation range	Default
INC	1.0°C .. 20.0°C	2.0°C

## P13: MINIMUM TEMPERATURE LIMITATION



### WARNING!

This parameter will be shown with P13 only for version with variable collector pump speed, while it will be shown with P12 for all the other versions.

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 Manual operation mode, in ABC operation or in case the pumps activation is caused by the intervention of Recooling or similar functions.

AFTER SELECTING PARAMETER P13 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.

#### 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.

## 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

To turn the control unit on and off, press the ' **esc** ' key for at least 3 seconds.

### Manual Management of the installation

By pressing the '  ' key it is possible to activate or deactivate the manual operation of the control unit.

When manual function is chosen the display shows the icon '  '. In manual operation the collector pump is always active, regardless of the measured temperatures and the integrative heat source is always disabled.

The only active controls are those related to the maximum temperatures and safety.

## USER PARAMETERS

To access the user parameters press the '  ' key.



### WARNING!

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

## 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

U3: ENABLES / DISABLES ABC



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.

**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 → TM4



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.

## Automatic Boiler Control by means of Collectors (ABC)

The function ' ABC U3 ' is an interesting addition to the Manual mode.

When the function ' ABC ' is enabled, the collector pump, in contrast to the Manual mode, in which it is always running, is stopped if the collector temperature, measured by the probe S1, drops below the temperature set in the ' TABC ' parameter in the installer parameters.

PRESS THE ' ← ' KEY;  
THE DISPLAY SHOWS ' ABC ' FLASHING.



USING THE ' ▲ ' or ' ▼ ' ARROWS IT IS POSSIBLE TO  
ENABLE OR DISABLE THE ABC:  
**0: DISABLED**  
**1: ENABLED** (THE DISPLAY SHOWS ⚙ and ⌚ )



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'. 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> <table border="0" data-bbox="795 459 1955 699"> <tr> <td>Open circuit on probe input (<math>R = \infty</math>).</td> <td>Short circuit on probe input (<math>R \approx 0</math>).</td> </tr> <tr> <td>COL OPEn</td> <td>COL ShrT</td> </tr> <tr> <td>S_2 OPEn</td> <td>S_2 ShrT</td> </tr> <tr> <td>S_3 OPEn</td> <td>S_3 ShrT</td> </tr> <tr> <td>S_4 OPEn</td> <td>S_4 ShrT</td> </tr> </table>	Open circuit on probe input ( $R = \infty$ ).	Short circuit on probe input ( $R \approx 0$ ).	COL OPEn	COL ShrT	S_2 OPEn	S_2 ShrT	S_3 OPEn	S_3 ShrT	S_4 OPEn	S_4 ShrT
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S_4 OPEn	S_4 ShrT										
<p>The display shows the icon  and the control unit emits an acoustic signal characterized by a series of 'beeps'.</p>	<p>One or more probes are measuring a temperature higher than the relevant programmed safety temperature.</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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