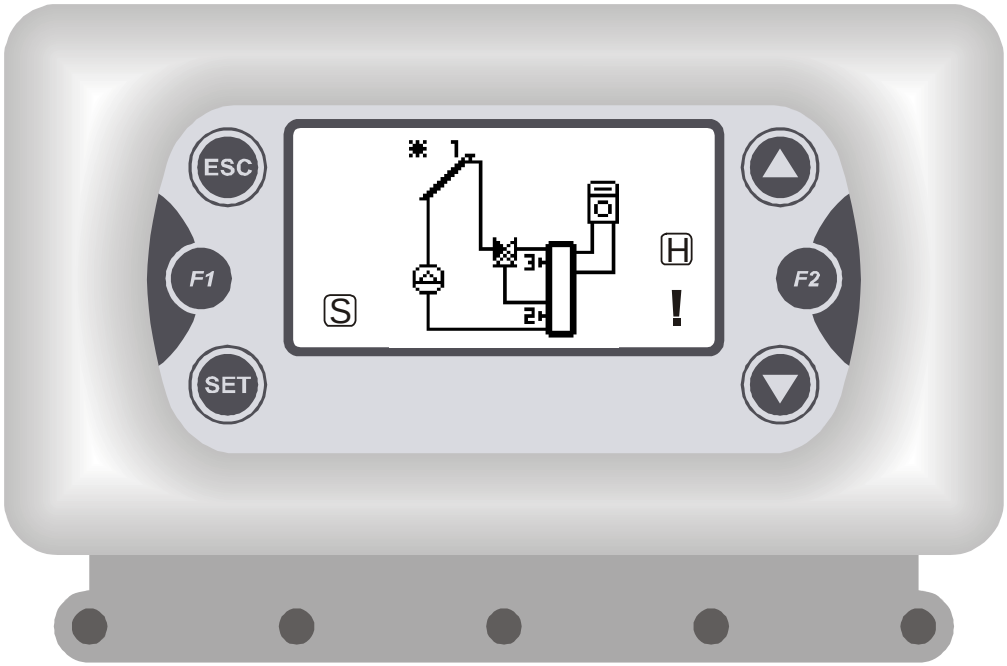


TSol503

Temperature Controller for Thermic Solar Panel Systems

GB

1 INTRODUCTION

Main

*The Controller **TSol503** is for the management of Solar Plants with Natural and Forced Circulation with a Solar Panel, Accumulation/Boiler/Pool, Integration and Systems of Protection/Cooling*

Safety regulations

Read carefully the following safety regulations, in order to prevent damages and danger to people and things.

Before working on plants, follow

- *Accident prevention measures*
- *Environmental protection measures*
- *National Institute for Work accidents measures*
- *Recognized prevention measure*
- *Directions are only for technical staff*
- *Electrical works must be done only by qualified technicians*
- *The first installation of the plant must be done by expert personal or by the builder*

Declaration of Conformity: **Rules:**
EN 60730-1 50081-1 EN 60730-1 A1 50081-2

TiEmme elettronica
06055 Marsciano (PG) Italy
Tel. +39.075.874.3905; Fax. +39.075.874.2239
info@tiemmeelettronica.it

CE

Product composition	***Technical data***	
N. 01 ***TSol503***	*Supply:*	*230 Vac 50 Hz*
N. 04 screws and plugs	*Input:*	*2 VA*
N. 02 screws for controller's fixing	*Capacity:*	*5A 250 Vac*
N. 01 Box	*Internal fuse:*	*3,15 A*
N. 01 Plate	*Protection grade:*	*IP40*
N. 01 Kit Probe PT1000	*Reading probes:*	*PT1000*
	Measure Range:	*-40 ÷ 300 °C*
Installing and Use Conditions	***Mechanical Characteristics***	
Functioning temperature: *0 ÷ 40 °C*	*Material:*	*ABS Plastic*
Storage temperature: *0 ÷ 60 °C*	*Installing:*	*Wall / Panel*
Humidity: *85% @25°C*	*Dimension:*	*160 x 90 x 58 mm*
	Display:	*Graphic Backlight 128x64*

2 INSTALLATION

2.1 INSTALLING

⚠ ***Before doing any operation make sure that the Main Power Supply is OFF***

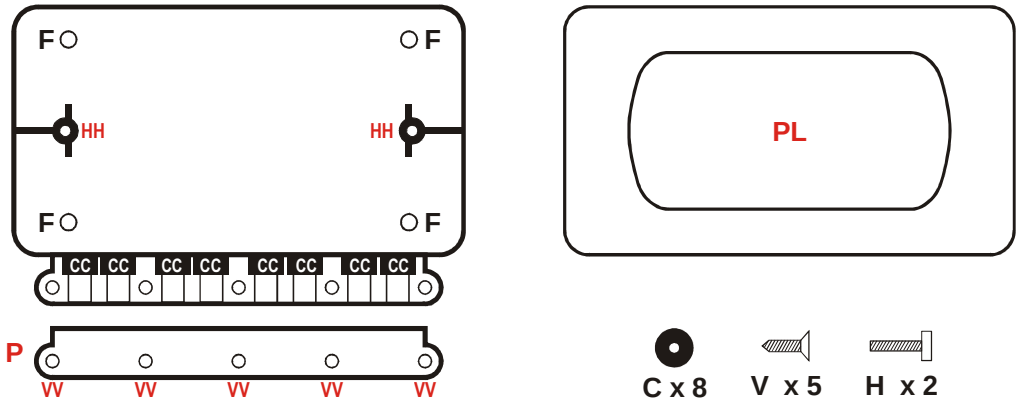
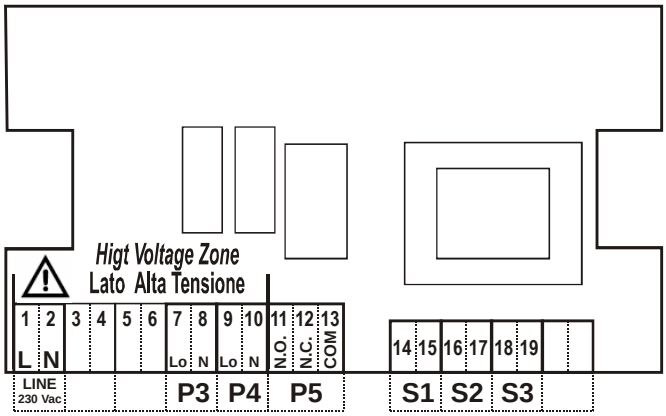


Fig. 1. Components

- *Install **TSol503** only in dry ambient and in correct climatic conditions*
- *Fix the Box with fixing points* **F**
- *Take away the lid that cable-block* **P**
- *Insert the connecting cables through cablethrough **C** that are in the points **CC** of the Box*
- *The box has 8 outputs for the cables: if more inputs are necessary*
  USE multipolar cables but put together only cables of the same type
- *Do the electrical connections*
- *Put the controller in the Box and put the cable in order to facilitate the insertion*
- *Block cable through the cable-block* **P** *with screws* **V** *in points* **VV**
- *Fix the controller through screws* **H** *in points* **HH**
- *Insert the plate* **PL**

2.2 Electrical Connections

For a correct and safe functioning make always the electrical connections to earth
Make ordered connections and separate low tension signals (probes, contacts, cables of the control board) from high tension signals (supply, loads) to reduce interference problems



S1	**S2**	**S3**	*Probes PT1000*
P3	**P4**		*Supplied outputs 230 Vac*
P5			*In Exchange Contacts Output*

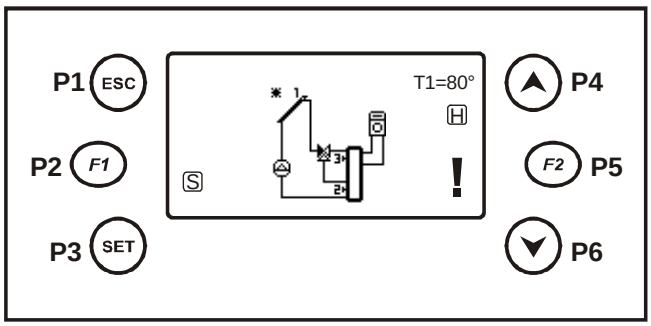
Fig. 2. Electrical Connections

3 Probes Installation

***TSol503** manages temperature probes* **PT1000**.
The reading range is -40 ÷ 300°C with precision of 1°C.
*If the probe is in **short-circuit** the display shows "**Short**"*
*If the probe is **unconnected** or **broken** the display shows "**Open**".*

- *The probe's range depends on the declared probe's characteristics.*
  TiEmme elettronica is not responsible for damages or malfunctioning of the probe that are due to a use of it out of the range or due to a break of the cable.
- *The installing of the cables must be separated by the high tension cables like supply, pump commands, valves, in order to avoid interference problems during the temperature reading.*
- *Probes can be extended with a 2 x 1 mm cable until 30 mt*
- *Use the shielded cable in case of interference in the temperature reading.*

4 KeyBoard Use and Functions



Button's functions:

P4/P6 =*Run Menu*
Values Increase/decrease
P3 = *Enter in Menu*
Save in Menu
P1 = *Exit Menu*
P5 = *Probes' Temperature / Special Function*

Fig. 3. LCD Panel

4.1 DISPLAY

	Pump: ON if Blinking		*Valve: Flux Direction*
S	*Panel Protection : ON if Blinking*		*Integration Boiler: ON if Blinking*
H	*Holiday: Function Activated if present*	!	*Alarm/s in Course*
	Cooling Circuit		*Exchanger with Plates*
	Pool		

*With button **P4** enter menu "**Monitor**" to consult the current ALARM states and other information*

Sys 1 *=Plant Number* *Probe Temperature* *Probe in short circuit* *Unconnected Probe or Broken*	**Monitor** **Sys 1** T1 = 70 T2 = Short T3 = Open	

Fig. 4. Monitor Menu

*With button **P4** enter menu "**Statistics**" to consult the current ALARM states and other information*

Sys 1 = *Plant Number* *Alarms read* *Alarm Code* *Other possible information*	**Statistics** **Sys 1** A02	

Fig. 5. Statistics Menu

4.2 ALLARMI

DESCRIPTION	DISPLAY
Collector's over-temperature: temperature on S1 more than Thermostat **THS103**	**A01**
Boiler's over-temperature: Temperature on S2 more than Thermostat **THS203**	**A02**
Collector's De-Ice: temperature on S1 less then Thermostat **THS101**	**A03**
Probe Error: probable probe's break: the probe could be unconnected	**A04**
Probe Error: probable probe's break: the probe is in short-circuit	**A05**

4.3 PLANTS SURVEY

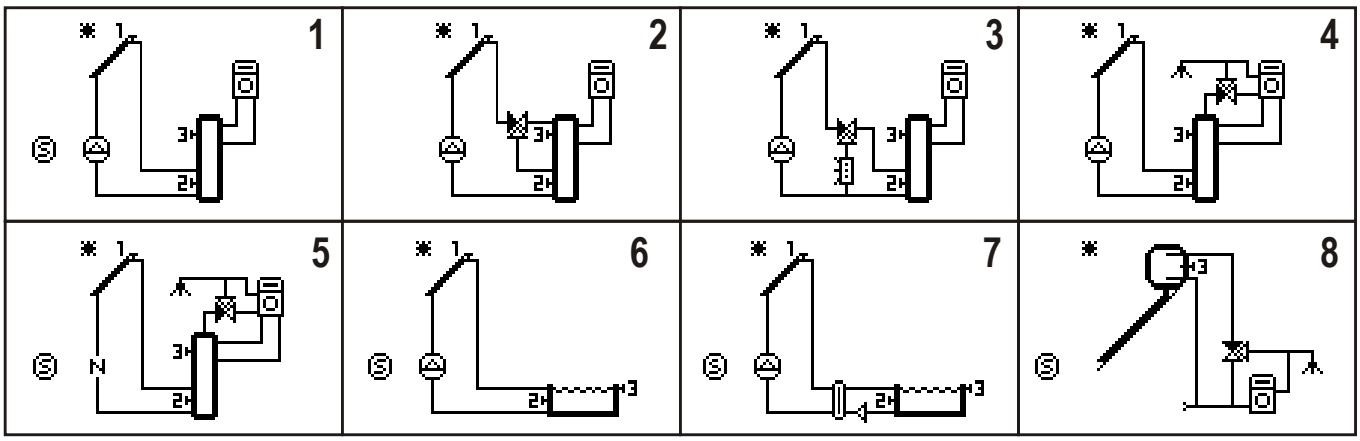


Fig. 6. Plants

5 Default Functions

5.1 Boiler/Pool Management

Parameters of the management of Boiler/Pool charge

DESCRIPTION	Code
Running's Thermostat Boiler/Pool on S3	**THS300**
Hysteresis thermostat THS300	**HYS300**
Differential thermostat (S1-S2) for Boiler/pool charge	**THD120**
Thermostat hysteresis THS102	**HYD120**
Thermostat of minimum on S1 under the solar circuit pump is deactivated	**THS102**
Thermostat hysteresis THS102	**HYS102**
Thermostat on S2 over the Cooling Function Boiler is activated through the Cooling and/or Solar Circuit	**THS202**
Hysteresis thermostat THS202	**HYS202**
Thermostat of maximum on S2 that Boiler/Pool can reach	**THS203**
Thermostat hysteresis THS203	**HYS203**

5.2 Sanitary Increasing

Parameters for the Sanitary Valve management

DESCRIPTION	Code
Thermostat on S3 over the Sanitary Valve is deviated to the sanitary water output	**THS305**
Thermostat hysteresis THS305	**HYS305**

5.3 Boiler Integration

Parameters for the Integration Boiler management

DESCRIPTION	Code
Thermostat on S3 under the Boiler Integration output is activated	**THS302**
Thermostat hysteresis THS302	**HYS302**

5.4 Solar Circuit Cooling

Parameters for the Cooling management of the solar circuit for over temperature.

DESCRIPTION	Code
Thermostat on S1 over the collector fluid is convoyed to the Cooler	**THS104**
Thermostat hysteresis THS104	**HYS104**
Thermostat on S1 over the solar pump charges the boilers/pool and takes them to the maximum thermostats.	**THS100**
Thermostat hysteresis THS100	**HYS100**
Maximum thermostat on S3 Boiler/Pool	**THS303**
Thermostat hysteresis THS303	**HYS303**
Thermostat on S1 over the solar pump charge boiler is blocked	**THS103**
Thermostat hysteresis THS103	**HYS103**

5.5 Panel Protection

In the following schema are the thermostats and hysteresis of the function panel's protection managed for example with a tent/shutter to cover the panel

DESCRIPTION	Code
Thermostat on S1 over the output Protection Panel is activated (ex. Shutter/tent)	**THS103**
Thermostat hysteresis THS103	**HYS103**

6 Menu

The Menu is divided in:

- ***Installer Menu*** *where are available all the parameters of* ***TSol503***
- ***User's menu*** *where are available only the parameters reserved to the final user*

6.1 Installer Menu

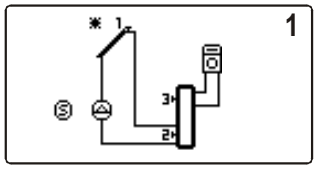
Settings		*Contains all the thermostats, hysteresis and parameters that the installer sets up*
Thermostats		*Contains all the thermostats and hysteresis used for the selected plant*
Parameters		*Contains all the parameters used for the selected plant*
Functions	***Bucket Charge***	*Contains only the functions used in the selected plant*
	Holiday	
	De-Ice	
	Stratification	
	Pumps DeBlock	
Statistics		*Menu for the visualization and reset of the statistic data (Pump functioning hours, alarms)*
Outputs Test		*Menu for the outputs functioning test*
Language		*To change the language*
Initialization		*Re-Initialization of the System*
Change Password		*For the installer's password change*
User Menu		*For the passage to User's menu*
KeyBoard Menu		*Display LCD regulation*

6.2 First Power ON

*At the first Power ON **TSol503** shows the available plants:*

Select the systems
*With the buttons **P4 / P6***

Confirm the selected PLANT
*With the button **P3***



*The same function of plant selection is available in the Installer menu with **Initialization***

6.3 Installer Menu Access

Main Menu **Installer Menu**	**PASSWORD?** **- - - -**	• *Push **P3** to select the first digit* **0 - - -** • *Select the value with **P4** and **P6*** **1 - - -** • *Confirm the value with button **P3*** **1 0 - -** • *Repeat until the 4th digit* **1 2 3 4** • *Confirm the password with the button **P3*** • With **P1** digit are deleted

When it is in the this Menu for long time without pushing any button, the system automatically enter in the User's Menu.

6.4 Settings

Contains thermostats, hysteresis, parameters of the default functions in the selected plant

6.5 Thermostats

Contains thermostats and hysteresis for the management of the selected plant

6.6 PARAMETERS

Contains timer parameters, counters for the management of the selected plant

6.7 FUNCTIONS

From the main menu select the function from the available

6.7.1 BUCKET CHARGE

This function increases the collector's temperature in conditions of low radiation. In case of differential between the probes S1 and S2, but the temperatures S1 and S3 are both less than thermostat THS301*, the solar pump is managed with time* TIM001 *(Pause) and* TIM002 *(Work) to allow the increase of the solar fluid temperature until the value* THS301*. The cycle Pause/Work is repeated for a number of time* COU000*, then the function is deactivated for a time* TIM000*. In the end the function starts again in case of right conditions.*

N.B. In The systems with stratification, activating the Bucket Charge Function, the stratification function is automatically deactivated.

DESCRIPTION	Code
Thermostat(on S3 under the function is activated	**THS301**
Thermostat hysteresis THS301	**HYS301**
Function deactivation time after COU00 *pump's stop*	**TIM000**
Pump's pause time during the function	**TIM001**
Pump's work time during the function	**TIM002**
Maximum number of attempts of the pump during the function	**COU000**
Enable Function	**ENA000**

6.7.2 HOLIDAY

The function ***Holiday*** *is for the setting up of the system during long periods of break.*
When the function is activated the system does:

- *Boiler's Cooling*
- *Deactivation Boiler's Integration*
- *Boiler's Cooling through the Solar Circuit*

DESCRIPTION	Code
Thermostat on S2, over the System cools the boiler when there is negative differential S1-S2*.*	**THS201**
Thermostat hysteresis THS201	**HYS201**
Enable Holiday function	**ENA002**

6.7.3 DE-ICE

Contains Thermostats/Hysteresis/Parameters of the De-Ice function. If temperature (S1) is less than Thermostat **THS101***, the Solar Pump is activated in modality Pause / Work.*

DESCRIPTION	Code
Under this thermostat the function is activated	**THS101**
Thermostat hysteresis THS102	**HYS101**
Pump's work time during the function (sec)	**TIM012**
Pump's time pause during the function (min)	**TIM013**
De-Ice function enable	**ENA007**

6.7.4 STRATIFICATION

In case of differential S1-S3 the high boiler zone is charged up to THS306; then the low boiler zone is charged up the thermostat THS300. In case of absence of differential S1-S3 but presence of differential S1-S2, the lower boiler's zone is charged in Pause/Work modality.
After a number of cycles COU001*, the function is deactivated for a time* TIM017*.*

N.B. In plants with stratification, activating the function Bucket Charge, the function stratification is automatically deactivated and vice versa

DESCRIPTION	Code
Stratification Thermostat	**THS306**
THS306 hysteresis Thermostat	**HYS306**
Minimum differential between probes S1 and S3	**THD130**
Maximum number of cycles Pause/Work of Solar Pump modality	**COU001**
Pump's Pause time during the Stratification function	**TIM010**
Pump's Work time during the Stratification function	**TIM011**
Deactivation time of the Stratification function	**TIM017**
Stratification function Enable	**ENA008**

6.7.5 Pumps De-Block

Menu that sets all the thermostats/hysteresis/ parameters of the Pump's De-Block function

DESCRIPTION	Code
Waiting Time For the De-Block activation (in days)	**TIM019**
Pump's Time work in De-Block (in minutes)	**TIM020**
Enable for P3 Pump's De-Block Control	**P3**
Enable for P4 Pump's De-Block Control	**P4**
Enable for P5 Pump's De-Block Control	**P5**

6.8 Statistic

To see the list of the managed alarms.
***Reset** sets at zero the counters and the alarms*

6.9 Outputs Test

To verify the output's functioning. Select one of the outputs to set them on ON (1).
The exit form menu restores automatically the system's state

6.10 Language

To set the language

6.11 Initialization

To initialize again the system and to choose another plant

6.12 Change Password

To change the enter password from the Installer's Menu

6.13 User Menu

To enter into the User Menu

6.14 Keyboard Menu

Menu for the Display LCD regulation

6.14.1 Contrast Regulation

Contrast Regulation
+

15
-

- *Set with **P4/P6***
- *Confirm with **P3***
- ***P1** to exit.*

6.14.2 Minimum Light Regulation

Min. Light Regulation
+

15
-

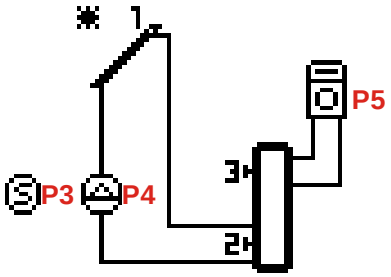
- *Set with **P4/P6***
- *Confirm with **P3***
- ***P1** to exit.*

7 Managed Plants

Plant 1

Boiler Charge, Boiler Integration, Panel Protection

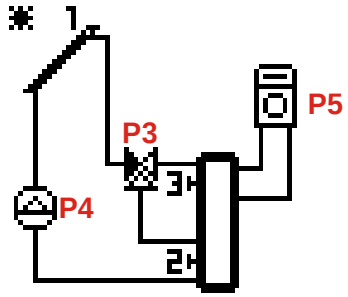
P5	**11** N.O.	**12** N.C.	**13** Com	*Boiler Integration*
P4	**9-10**			*Solar Pump*
P3	**7-8**			*Panel Protection*
S1	**14-15**			*Collector Probe*
S2	**16-17**			*Low Boiler Probe*
S3	**18-19**			*High Boiler Probe*



Plant 2

Boiler Charge, Stratification, Boiler Integration

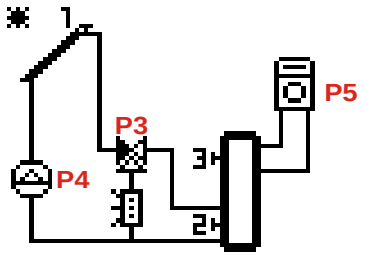
P5	**11** N.O.	**12** N.C.	**13** Com	*Boiler Integration*
P4	**9-10**			*Solar Pump*
P3	**7-8**			*Panel Protection*
S1	**14-15**			*Collector Probe*
S2	**16-17**			*Low Boiler Probe*
S3	**18-19**			*High Boiler Probe*



Plant 3

Boiler Charge, Cooling, Boiler Integration

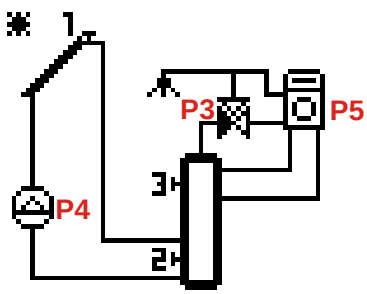
P5	**11** N.O.	**12** N.C.	**13** Com	*Boiler Integration*
P4	**9-10**			*Solar Pump*
P3	**7-8**			*Cooling Circuit Valve*
S1	**14-15**			*Collector Probe*
S2	**16-17**			*Low Boiler Probe*
S3	**18-19**			*High Boiler Probe*



Plant 4

Boiler Charge, Sanitary Increasing, Boiler Integration

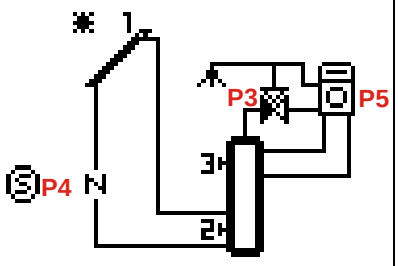
P5	**11** N.O.	**12** N.C.	**13** Com	*Boiler Integration*
P4	**9-10**			*Solar Pump*
P3	**7-8**			*Sanitary Valve*
S1	**14-15**			*Collector Probe*
S2	**16-17**			*Low Boiler Probe*
S3	**18-19**			*High Boiler Probe*



PLANT 5

Boiler Charge Natural Circulation, Sanitary Increasing, Boiler Integration, Panel Protection

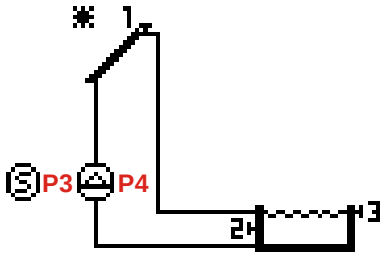
P5	**11** N.O.	**12** N.C.	**13** Com	*Boiler Integration*
P4	**9-10**			*Panel Protection*
P3	**7-8**			*Sanitary Valve*
S1	**14-15**			*Collector Probe*
S2	**16-17**			*Low Boiler Probe*
S3	**18-19**			*High Boiler Probe*



PLANT 6

Pool Charge, Panel Protection

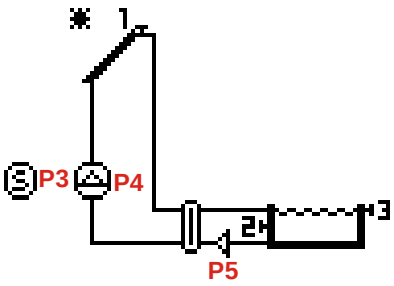
P5	**11** N.O.	**12** N.C.	**13** Com	*Not used*
P4	**9-10**			*Pool Pump*
P3	**7-8**			*Panel Protection*
S1	**14-15**			*Collector Probe*
S2	**16-17**			*Low Pool Probe*
S3	**18-19**			*High Pool Probe*



PLANT 7

Pool Charge with Exchanger, Panel Protection

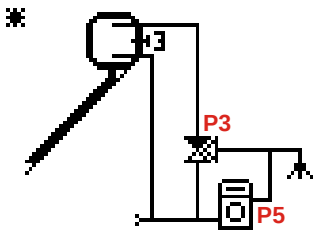
P5	**11** N.O.	**12** N.C.	**13** Com	*Pool Pump*
P4	**9-10**			*Solar Pump*
P3	**7-8**			*Panel Protection*
S1	**14-15**			*Collector Probe*
S2	**16-17**			*Low Pool Probe*
S3	**18-19**			*High Pool Probe*



PLANT 8

Boiler Charge Natural Circulation, Sanitary Increasing, Boiler Integration, Panel Protection

P5	**11** N.O.	**12** N.C.	**13** Com	*Boiler Integration*
P4	**9-10**			*Not used*
P3	**7-8**			*Sanitary Valve*
S1	**14-15**			*Not used*
S2	**16-17**			*Not used*
S3	**18-19**			*Boiler Probe*



8 Thermostats and Parameters

Description	Code	Function	Range			U
			Min	Set	Max	
Differential thermostat (S1-S2) to activate the Boiler Charge	**THD120**	*Boiler/Pool Charge*	1	**6**	30	℃
THD120 hysteresis	**HYD120**		1	**2**	5	℃
Thermostat differential (S1-S3) to activate Stratification	**THD130**	*Stratification*	1	**3**	30	℃
Thermostat on S1 over the Solar Pump charges the Boiler until the Maximum Thermostats	**THS100**	*Collector protection*	80	**95**	200	℃
THS100 hysteresis	**HYS100**		0	**2**	25	℃
Thermostat on S1 under the function De-Ice is activated	**THS101**	*De-Ice*	-20	**5**	30	℃
THS101 hysteresis	**HYS101**		0	**2**	25	℃
Thermostat on S1 under the Solar Pump is deactivated	**THS102**	*Boiler/Pool Charge*	0	**30**	40	℃
THS102 hysteresis	**HYS102**		0	**2**	25	℃
Thermostat on S1 over the Solar Pump is blocked	**THS103**	*Collector Protection*	80	**100**	200	℃
THS103 hysteresis	**HYS103**		0	**2**	25	℃
Thermostat on S1 over the collector fluid is sent to the Cooler	**THS104**	*Cooling*	70	**100**	200	℃
THS104 hysteresis	**HYS104**		0	**20**	30	℃
Thermostat on S2, over the Boiler is cooled with negative differential S1-S2.	**THS201**	*Holiday*	20	**60**	85	℃
THS201 hysteresis	**HYS201**		0	**2**	25	℃
Thermostat on S2 over the function Boiler cooling is activated through the solar circuit	**THS202**	*Boiler Protection*	20	**85**	100	℃
THS202 hysteresis	**HYS202**		0	**2**	25	℃
Thermostat of maximum on S2 the boiler/pool can reach	**THS203**	*Boiler/Pool Protection*	20	**80**	100	℃
THS203 hysteresis	**HYS203**		0	**2**	25	℃
Boiler/Pool Running's Thermostat on S3	**THS300**	*Boiler/Pool Charge*	10	**70**	85	℃
THS300 hysteresis	**HYS300**		0	**2**	25	℃
Thermostat on S1 and S3 under the Bucket Charge is activated	**THS301**	*Bucket Charge*	20	**45**	85	℃
THS301 hysteresis	**HYS301**		0	**2**	25	℃
Thermostat on S3 under the Boiler Integration is activated	**THS302**	*Boiler/Pool Charge*	20	**50**	85	℃
THS302 hysteresis	**HYS302**		0	**2**	25	℃
Thermostat of maximum on S3 the Boiler/Pool can reach	**THS303**	*Boiler/Pool Protection*	20	**90**	100	℃
THS303 hysteresis	**HYS303**		0	**2**	25	℃
Thermostat on S3 over the Sanitary Valve is deviated to the sanitary water output	**THS305**	*Sanitary Increasing*	20	**50**	85	℃
THS305 hysteresis	**HYS305**		0	**2**	25	℃

Description	Code	Function	Range			U
			Min	Set	Max	
Stratification Function Thermostat on S3. Under this thermostat the high boiler zone is charged	**THS306**	*Stratification*	20	**60**	85	**℃**
THS306 Hysteresis	**HYS306**		0	**2**	20	**℃**
Function Bucket Charge deactivation Time	**TIM000**	*Bucket Charge*	1	**30**	480	**Min**
Pump's Pause Time during the function Bucket Charge	**TIM001**	*Bucket Charge*	1	**5**	60	**Min**
Pump's Work Time during the function Bucket Charge	**TIM002**	*Bucket Charge*	1	**5**	60	**Min**
Pump's Pause Time during the function Stratification	**TIM010**	*Stratification*	1	**5**	60	**Min**
Pump's Work Time during the function Stratification	**TIM011**	*Stratification*	1	**5**	60	**Min**
Solar Pump's Work Time During the function De-Ice	**TIM012**	*De-Ice*	1	**5**	480	**Sec**
Solar Pump's Pause Time During the function De-Ice	**TIM013**	*De-Ice*	0	**5**	60	**Min**
Stratification deactivation Time	**TIM017**	*Stratification*	1	**3**	480	**hh**
Pause Time for the Pump's De-Block Pump activation	**TIM019**	*Pumps De-Block*	1	**7**	30	**Giorni *Days***
Work Time of the Pump in Pump's De-Block	**TIM020**	*Pumps De-Block*	1	**1**	30	**Min**
Maximum number of stops of the Solar Pump during Bucket Charge	**COU000**	*Bucket Charge*	1	**5**	20	
Maximum number of Cycles Pause/Work of the Solar Pump during Stratification function	**COU001**	*Stratification*	1	**5**	20	
Bucket Charge Enable	**ENA000**	*Bucket Charge*	0	**0**	1	
Holiday function Enable	**ENA002**	*Holiday*	0	**0**	1	
De-Ice function Enable	**ENA007**	*De-Ice*	0	**0**	1	
Stratification function Enable	**ENA008**	*Stratification*	0	**1**	1	
Enable for P3 Output Pump's De-Block Control	**P3**	*Pumps De-Block*	0	**0**	1	
Enable for P4 Output Pump's De-Block Control	**P4**	*Pumps De-Block*	0	**0**	1	
Enable for P5 Output Pump's De-Block Control	**P5**	*Pumps De-Block*	0	**0**	1	

Installation Note:

TiEmme elettronica

Zona Industriale Torre Sapienza, Via A. Ferranti, 05 06055 Marsciano (PG) Italy
Tel: +39 075.8743.905 www.tiemmeelettronica.it
Fax: +39 075.8742.239 info@tiemmeelettronica.it