

# ART. S301-S302 TEMPERATURE CONTROLLERS FOR SOLAR HEATING SYSTEMS



Specification Sheet 0004/08/Rev00 ING

## FUNCTIONS

The S301-S302 controllers are installed in solar heating plants to govern the system and supervise the thermal interchange between solar collector panels and power storage in an efficient way, allowing the installer to regulate the system.

The backlit LCD panel display the functions of the controller, its status and signals out possible malfunctions.

Among other complementary functions, the model highlights the holiday function which protects the system during long absences from home and the antifreezing function. The S302 switchboard also allows the control of thermal stratifications in the boiler.



Art.S301



Art.S302

## PRODUCTS

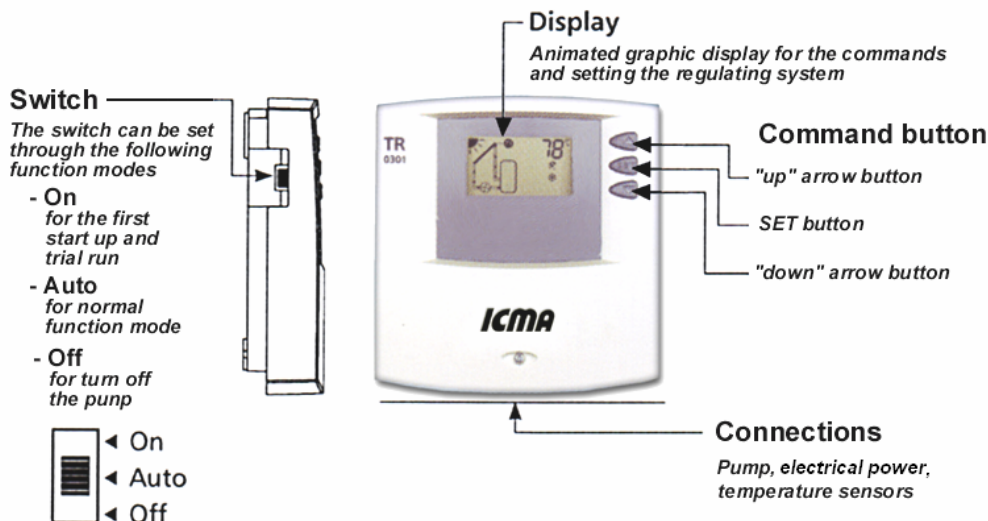
**S301** MULTILoop TEMPERATURE CONTROLLERS FOR HEATING SYSTEMS 2 INPUTS – 1 OUTPUT

**S302** MULTILoop TEMPERATURE CONTROLLERS FOR HEATING SYSTEMS 3 INPUTS – 1 OUTPUT

## TECHNICAL DATA

	<b>S301</b>	<b>S302</b>
Electrical power supply	230V ~ (±15%), 50Hz	230V ~ (±15%), 50Hz
Self consumption	<1W	<1W
Inputs	N.2 - temperature gauge (Pt1000)	N.3 - temperature gauge (Pt1000)
Output	N.1 - output command, max. 800W [230V~]	N.1 - output command, max. 800W [230V~]
Display	Graphic animated LCD Display dual color background	Graphic animated LCD Display dual color background
Power-up differential value	4-20K	8K
Power-down differential value	2-18K	4K
Type of protection	IP 20/DIN 40050	IP 20/DIN 40050
Room Temperature allowed	from 0 to + 45°C	from 0 to + 45°C
Weight	250 g	250g
Dimensions	137x134x38	137x134x38
Thermal sensors 2xPt1000 (supplied with kit)	1.5m silicone wire (working range up to 180°C)	1.5m silicone wire (working range up to 180°C)

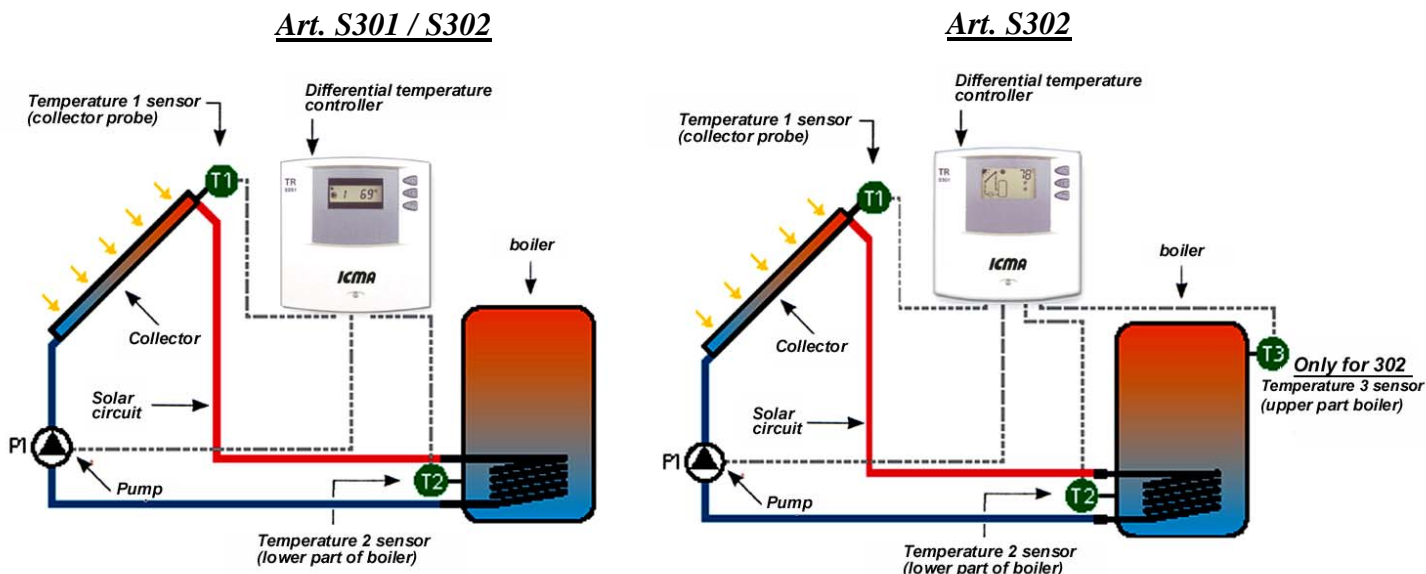
## REGULATING FUNCTIONS



## TECHNICAL SPECIFICATIONS

The controller continually compares the temperature in the collector (T1) with that in the area below the boiler (T2). Once the collector is heated up by solar radiations, establishing a thermal difference of 8 K (variable parameter) the collector, boiler and pump are activated. The pump sucks the heat-transfer fluid from the lower and cooler zone of the boiler and pumps it towards the collector. The heat-transfer fluid is heated up in the collector by the solar rays and starts flowing back to the boiler, pumping it towards the collector. In the boiler the heat-transfer fluid heats the water up for industrial use through a heat-exchanger.

## APPLICATION DIAGRAMS



## ELECTRIC CONNECTIONS

### Safety norms

Before opening the box, disconnect the controller from the power supply. The equipment must be installed to the grid through a Schuco type of plug or when dealing with a fixed electric installation, through a disconnecting switch, on the basis of installation instructions.

### Wiring Layout

According to the type of monitoring system, the wires may pass from behind through the back wall of the box or from the lower part of the box base.

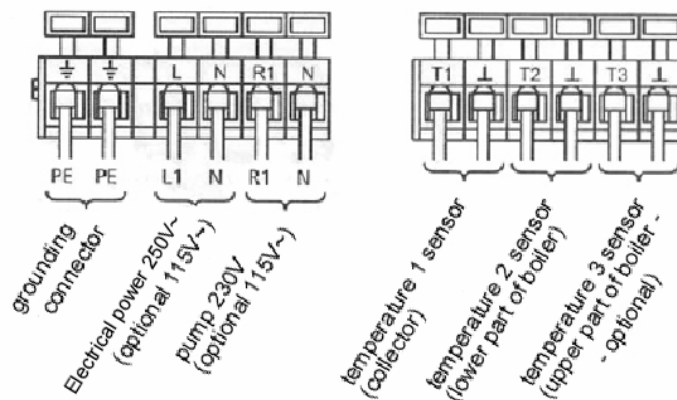
To pass the wires **from behind** remove the plastic tongue on the back of the box with a suitable tool (e.g. a pair of scissors).

To pass the wires **from below** cut off the plastic tongues on the right and left, and remove them from the box. Secure the flexible lines in the box with the wire-stop clips supplied with the kit.

### Connecting the lines

For connections, the following points must be followed:

- Polarity of sensor contacts is not important
- Lay out the sensor line separately from the 230V or 400V power lines (minimum distance of 100mm).
- Should there be inductive flows due to excessive power intensity, transformers, radio-television sets, microwave ovens or similar appliances, lay the shielded lines for the sensors.
- The sensor lines may be extended up to a length of 100m



With the following types of wires :  
 0.75mm<sup>2</sup> up to 50m long  
 1.5 mm<sup>2</sup> up to 100m long.

Connect the lines as with a scheme of clamps  
 Make sure that the protection contact is connected to the controller on the side of the power supply grid.  
 Use only the original thermal sensors homologated for the controller (Pt1000)

## MAIN FUNCTIONS

### Automatic boiler loading

The controller constantly compares the temperature on the collector (T1) with that of the lower boiler (T2). The moment the collector's temperature (T1) exceeds 8K (Variable value) the temperature in the collector (T2), will appear on the screen with the sun symbol. If the safety threshold does not prohibit the pump function, the pump itself will be start functioning.

The display will show the symbol of the pump wheel.

If the difference in temperatures lowers below 4K (Variable value) the pump is turned off. The sun symbol will disappear from the screen.

### Maximum boiler temperature

If the lower part of the boiler (T2) reaches the set maximum temperature (preset at 60°C), the loading will stop. Loading will be possible only at a starting temperature of 3K below the accumulator's maximum temperature.

The screen will display the following messages:

- the symbol of the pump at a standstill
- the sun symbol
- the message *max* in the boiler's symbol which will be flashing

### Maximum temperature of the collector

In the event of strong solar heat radiation, the temperature (T1) of the heat-transfer fluid may exceed 130°C. The heat-transfer fluids will then evaporate. Should this occur the pump will stop, as a protection, until the temperature does not lower once again below 127°C. The screen will display the following messages:

The symbol of the pump at a standstill

The sun symbol

The flashing of the vapor symbol.

### Functions of the evacuated tube collectors

For installations with evacuated tube collectors start up function (6)

According to their construction, it may occur that in evacuated tube collectors the metering of the temperature of the collector (T1) may be inexact. In this event, the solar circuit must be started up periodically for a short period, to allow the tube collector to convey the heat effectively to the sensor (T1). If the tube collector is working, the controller automatically turns on the pump for 30 seconds every 30 minutes. The temperature symbol T1 of the sensor is displayed at the lower right of the screen.

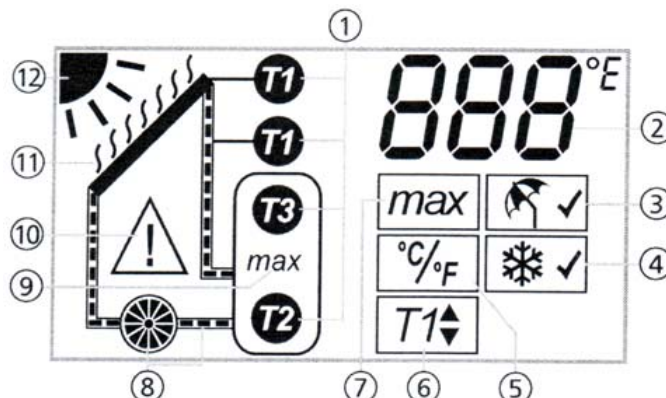
### Holiday function (3)

During summer, the boiler may heat up excessively because of strong solar heat radiations, or when the water is not used for a long period. If the function is active, the boiler is automatically cooled. The holiday symbol appears on the screen.

### Anti-freezing function (4)

If the anti-freezing function is active the temperature controller turns on the pump the minute the temperature of the collector goes down below +5°C. In this way the heat-transfer fluid is heated up and prevents freezing. When the collector reaches a temperature of +7°C, the pump is once again deactivated.

## DISPLAY SCREEN



- |   |   |
|---|---|
| ① Symbol of temperature sensors   | ⑦ Setting boiler to maximum temperature   |
| ② Display of temperature values and failure symbols e.g. short circuit, black-out (see p. 30) or "SYS"=system fault (see instructions p.31) | ⑧ Solar circuit symbol  |
| ③ Holiday function (see page 22/23)   | ⑨ Message: "Maximum boiler temperature reached"   |
| ④ Antifreeze function (see page 23)   | ⑩ Warning for breakdowns, e.g. short circuit, black-out, (see p 30) or "SYS" = system fault (see instructions p.31) |
| ⑤ Setting temperature unit C°/F°  | ⑪ Message for evaporation of collector liquid   |
| ⑥ Pipe collector functions  | ⑫ Message for "Heat offer sufficient"   |

### NOTE

The temperature in the upper part of the boiler is displayed only if it has also been connected to the temperature sensor T3 (not included in the supplies). Select the temperature sensor by using the ▲, ▼ buttons to display the actual metered temperature.

In the event of a short circuit of the sensor T3 the recycle system does not stop. For repairs, request the assistance of a specialized technician.

## ASSEMBLY AND INSTALLATION

Before opening the box, disconnect the controller from the power supply.

The lid is kept in place by two tongues at the higher corner of the box base and is secured in place with a screw.

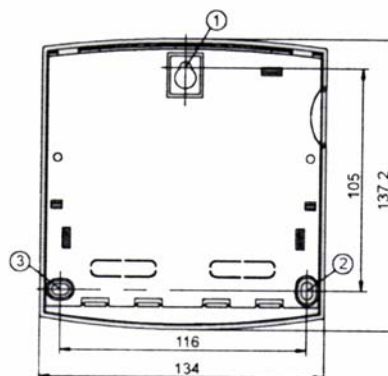
Loosen the screw and open the box upwards.

To reclose the box let the box lid lean obliquely against the base.

Insert the grooves of the hinge into the securing tongues of the box base. Close the lid, inserting the command keys into the relevant opening. Close the box and tighten the screw.

To assembly the box, follow this procedure:

- Perforate the upper hole-way (1)
- To screw
- Dismount the box lid
- Hook the base at the hole
- Mark out the location of the lower holes
- Remove the base of the box
- Perforate the lower hole points (2-3)
- Re-hook the base to the hole
- Screw the base at the lower holes
- Mount the lid on



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## START UP

During assembly or start up, various types of dangerous circumstances may occur ( in the event of assembly errors):

- Danger of death due to electric shock
- Danger of fire due to shortcircuits, erroneous lay out
- Damage to the controller and to the connected equipment in the event of prohibited environmental conditions, faulty equipment, assembly or erroneous installation.

All the interventions that require the opening of the controller must be performed exclusively by specialized technicians. Ensure furthermore that:

- The laying of wires respects the safety norms against fires.
- That the type of protection is not inferior to the type prescribed
- Ensure that the technical data of the equipment connected to the controller correspond with the technical data of the controller
- Disconnect the equipment from the electrical power before carrying out maintenance works.
- Protect the controller against overloads and shortcircuits

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## MAINTENANCE

The controller was manufactured to last for many years and should not require maintenance by the user. Despite this, breakdowns may still occur . Maintenance must be performed only by qualified personnel.

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## PROHIBITED USE

The controller cannot be used in the following environments:

- In open air
- In humid facilities
- In facilities where a mix of easily inflammable gas may accumulate
- In environments where danger may arise due to electrical faults.

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## SAFETY

Safety warnings



Read the assembly and start up instructions carefully before activating the device, so as to avoid accidents and breakdowns to the plant caused by improper use. Remember that warranty rights expire if the device is modified or mishandled without the proper authorization during assembly or installation. Respect all the safety warnings, and when in doubt, request the help of qualified personnel.