



## **Installation and Operation Manual**

### **ITS CtrlLite 1Sense Version 4.0**

**Differential Temperature Solar Controller with ITS's  
patented 1Sense technology.**

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## 1. Customer information.

Dear customer. Thank you for choosing the ITS CtrlLite 1Sense micro controller based differential temperature solar controller. Some of the key features of this controller are:

- ITS patented OneSense technology. ITS OneSense technology enables the use of only one temperature sensor thereby drastically reducing installation time and cost.
- Advanced control features.
- Advanced protection features.
- Incredible value for money.

All control parameters are based on international standards and have been preprogrammed into the controller. Should a specific installation require these parameters to be altered it can be done by ITS. The controller has a programming interface that can be used to upload new control parameters onsite. The controller should be installed by a qualified person.

## 2. Technical data

1. Power supply: 220Vac or 12Vdc, Max. self consumption: < 3W
2. Temperature measuring accuracy:  $\pm 2^{\circ}\text{C}$
3. Temperature measuring range: 0 ~ 130 $^{\circ}\text{C}$
4. Available power from pump output: < 150W (220V pump version)  
< 15W (12V pump version)

## 3. Main functions/features

The CtrlLite OneSense features patented OneSense technology. This enables easy installation since only a solar collector temperature sensor is used. This eliminated the need for removing of the geyser thermostat to insert a sensor probe. The geyser element is controlled by the geyser thermostat.

### 3.1 Temperature difference controlled circulation pump

When the temperature difference between the collector and the Geyser exceeds the switch-on temperature difference, the solar circuit pump is triggered to transfer heat from the collector to the tank. The default value is 8  $^{\circ}\text{C}$ .

The switch-off temperature is mathematically determined by looking at the cool down slope of the collector – ITS's patented technique enables a very accurate geyser temperature calculation using only a collector temperature sensor.

## 4. Protection functions

### 4.1 Frost protection.

When the collector temperature drops below 5  $^{\circ}\text{C}$  the pump is triggered to protect the collector against freezing. When the collector reaches 8 $^{\circ}\text{C}$  the pump is stopped.

The logo for ITS (International Technology Sourcing) features the lowercase letters 'its' in a bold, sans-serif font. The letters are dark grey and are positioned in the bottom right corner of the page, partially overlapping the contact information.

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#### 4.2 Tank over temperature protection.

When the tank temperature exceeds the Max Tank Temperature the circulation pump is stopped. The default value is 75°C

#### 4.3 Low temperature circulation prevention

To prevent heat loss from the geyser the circulation pump will not activate if the collector temperature is below 50°C at the start of day even if it exceeds the differential switch on threshold.

### 5. Installation and Commissioning

**Warning! To avoid the hazard of electric shock never connect the sensor or output while the controller is powered. Only use the sensor supplied by ITS for the controller.**

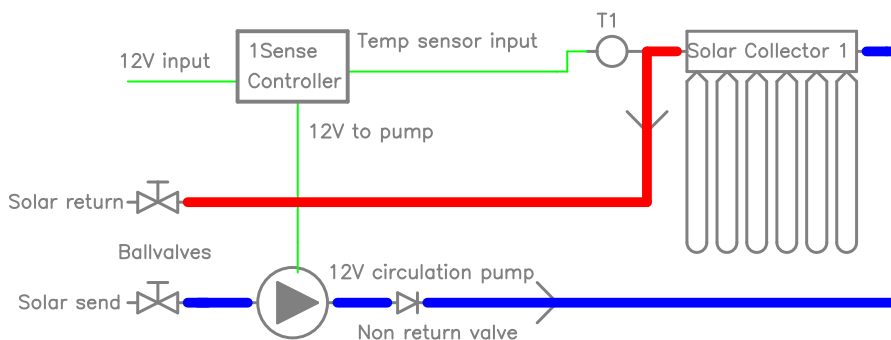


Figure 1: 12V CtrlLite OneSense wiring.

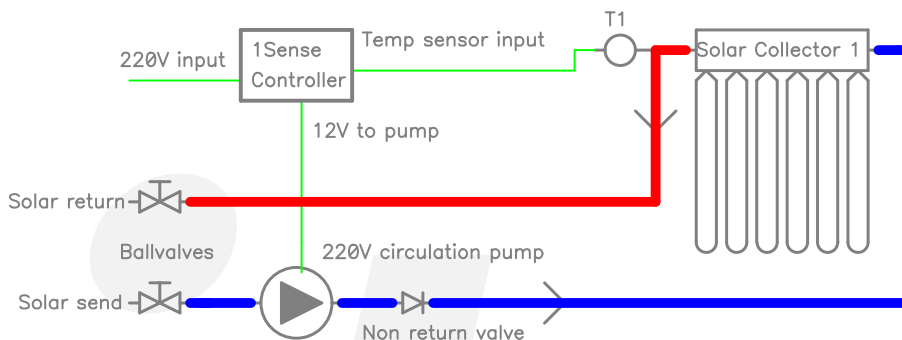


Figure 1: 220V CtrlLite OneSense wiring.

Install temperature sensor T1 in the collector sensor pocket (it is imperative that the temperature sensor is making good thermal contact with the water in the collector – **taping the sensor to the piping on the outside of the collector will cause malfunctioning**). The sensor wires can be extended up to 100m from the controller but the right cable must be used. For distances up to 50m, please use 0.75mm<sup>2</sup> rip cord. For distances up to 100m, please use 1.5mm<sup>2</sup> rip cord. When all the connections have been made and verified the power may be switched on. After about 1 second the controlled will pulse the pump with the current temperature reading in tens of degrees (this will only happen the first 10 time the controller is powered since this function is only serving as a quick commissioning test). In other words, if the sensor measures 56 deg when the controller is switched on the pump will give 5 short pump pulses to inform the installer that the temperature being sensed is in the fifties. Thereafter the

controller will wait for 1 min and then turn on the circulation pump for 3 minutes if the solar collector temperature is more than 50 degC – this is part of the controller’s way of determining the geyser temperature. ITS OneSense Technology mathematically determines the geyser temperature by looking at the cool down slope while pumping. Now the startup sequence is complete.

ITS CtrlLite OneSense does not control the geyser element. The geyser element is controlled by the thermostat supplied with the geyser. ITS Solar recommends that the geyser thermostat temperature be set to the minimum required hot water temperature (usually 50°C) in order to minimize the use of electricity.

## 6. Faultfinding

Should a fault be suspected with the controller the following steps can be taken:

1. Verify the supply to the controller as well as the pump and temperature sensor connections.
2. If the pump is not running then use a voltmeter to verify the supply to the controller and also to check if there is power on the pump terminals.
3. If the pump comes on for about 3 minutes after power up but an operational fault is suspected please verify that the sensor connections are ok. The temperature sensor can also be checked by disconnecting the sensor from the controller and measuring the sensor resistance using an ohm meter. Resistance versus temperature values are given in the table below.

ITS CtrlLite OneSense sensor resistance values:

°C	0	10	20	30	40	50	60	70	80	90	100	110	120
Ω	33620	20174	12535	8037	5301	3588	2486	1759	1270	933	697	529	407

## 7. Liability waiver

The manufacturer cannot monitor the compliance with these instructions or the circumstances and methods used for installation, operation and utilization of this controller. Improper installation can cause damage to the solar system and personal injury. For this reason we do not take responsibility and liability for losses, damages or cost that might arise due to improper installation, operation or wrong utilization and maintenance or that occur in some connection with the aforementioned. The manufacturer preserves the right to make changes to the product, or installation and operation instructions without prior notice. As soon as it becomes evident that safe operation is no longer possible (e.g. visible damage), please immediately take the device out of operation.



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