

## Installation and Operation Manual **EN** **REGULUS SRS1 T Solar Controller**

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## 19 Commissioning Procedure for SRS1 T Solar Controller 37

**This Instruction Manual applies to the following hardware versions:**  
**SRS1 T**

**SRS1 T**

- 1 output mechanical relay 230VAC
- 1 PWM/0-10V output for high-efficiency pumps
- 3 inputs for Pt1000 temperature sensors

# Safety Instructions

## A.1 EC Declaration of Conformity

The manufacturer declares that the SRS1 T Solar Controller is marked with the CE mark and conforms to the following relevant safety regulations:

- Directive 2014/35/EU - EC low voltage directive (LVD)
- Directive 2014/30/EU - EC electromagnetic compatibility directive (EMC)

## A.2 General information

**- Please read carefully!**

These installation and operating instructions contain basic instructions and important information regarding safety, installation, commissioning, maintenance and the optimal use of the unit. Therefore these instructions must be read completely and understood by the installation technician/specialist and by the system user before installing, commissioning and operating the unit. The installation shall be done in compliance with valid standards and rules. The controller does not under any circumstances replace any safety devices (e.g. safety valve, air vent valve etc.) to be installed into a solar circuit! Installation of the unit may only be carried out by a specialist who is trained on the required level.

**For the user:** Make sure that the specialist gives you detailed information on the function and operation of the controller. Always keep these instructions in the vicinity of the controller. Any changes to the controller or tampering with may pose a risk to safe operation of the appliance and to the complete solar thermal system.

## A.3 Explanation of symbols



*Failure to observe these instructions can result in danger to life from electric voltage.*



*Failure to observe these instructions can result in serious damage to health such as scalding, or even life-threatening injuries.*



*Failure to observe these instructions can result in destruction of the unit or the system, or damage to the environment.*



*Information especially important for the function and optimal use of the unit and the system.*

# Safety Instructions

## A.4 Changes to the unit

- Changes, additions to or conversion of the unit are not permitted without a written permission from the Manufacturer.
- It is forbidden to install any additional components into the controller that has not been tested together with the controller.
- The controller shall not be used after an accident when its functions may have been affected – e.g. after a fire. The controller shall be switched off immediately.
- Use original spare parts only.
- Marking of the Manufacturer and Distributor shall not be altered or removed.
- All adjustments shall be done in compliance with this Guide.

## A.5 Warranty

The Unit has been manufactured and tested with regard to high quality and safety requirements. It is covered by a legal warranty of 2 years from the date of purchase.

The warranty and liability shall not include, however, any injury to persons or material damage that is attributable to one or more of the following causes:

- Failure to observe this installation and operation manual.
- Improper installation, commissioning, maintenance or operation.
- Improperly executed repairs.
- Unauthorized structural changes to the unit.
- Any additional components added that have not been tested with the controller.
- Damage caused to the controller by continuing use despite it being obviously damaged.
- Use of non-original spare parts.
- Use of the device for other than its intended purpose.
- Operation above or below the limit values listed in the „Specification“ section.
- Force majeure.

# Description

## B.1 Specification

### Electric specification:

Voltage	230VAC +/- 10%
Mains frequency	50 - 60Hz
Power consumption	0,5W - 2,5W

Internal fuse T2A / 250V slow blow

IP rating	IP40
El. protection class	II
Overvoltage category	II
Pollution degree	II

	SRS1 T
Mechanical relay, 3000 VA (AC1), 3000 W (AC3)	1 (R1)
0-10V output, 10% tolerance, 10 k $\Omega$ , or PWM output, 1kHz, 10V	1 (V1)
Pt1000 sensors, from -40 °C to +300 °C	3 (S1 - S3)

### Permissible cable length of sensors and accessories:

Collector sensor	<30 m
other Pt1000 sensors	<10 m
PWM / 0-10V	<3 m
Mechanical relay	<10 m

**Clock backup period** 24 hrs

### Permissible ambient conditions:

Ambient temperature:	
for controller operation	0°C - 40 °C
for transport/storage	0°C - 60 °C
Air humidity:	
for controller operation	max. 85% rel. humidity at 25 °C
for transport/storage	no moisture condensation permitted

### Other specifications and dimensions:

Housing design	3-part, ABS plastic
Installation methods	wall installation, optionally panel installation
Overall dimensions	115 × 86 × 45 mm
Installation aperture dimensions	108 × 82 × 25,2 mm
Display	fully graphic display, 128 x 64
LED	multicolour, red/green
Operation	4 entry keys

## B.2 Temperature resistance table for Pt1000 sensors

°C	0	10	20	30	40	50	60	70	80	90	100
$\Omega$	1000	1039	1077	1116	1155	1194	1232	1270	1308	1347	1385

# Description

## B.3 Description

SRS1 T Controller is designed for automatic control of solar thermal systems. The SRS1 T model is intended to control solar thermal systems with up to 2 solar arrays and one or two heat consumers. The heat consumer can be a hot water storage tank, a heat exchanger for a swimming pool, and a thermal store for heating. All hydraulic variants are described in Chapter D.1.

- both graphics and texts on a backlit display
- simple viewing of the current measurement values
- analysis and monitoring of the system also by means of statistical graphics
- extensive setting menus with interactive explanations
- menu lock can be activated to prevent unintentional setting changes
- usual preset parameters in factory setting
- further measurement and switching applications using a temperature difference and a thermostat function

## B.4 Disposal

### IMPORTANT INFORMATION ON DISPOSAL IN COMPLIANCE WITH THE EUROPEAN DIRECTIVE 2002/96/ES

This product must not be disposed of with unsorted municipal waste. Please dispose of this product by returning it to the point of sale or to your local municipal collection point for recycling.

Respecting these rules will help to preserve, protect and improve the quality of the environment, protect human health and utilize natural resources prudently and rationally.

The crossed out wheeled bin with marking bar, printed either in the Manual or on the product itself, identifies that the product must be disposed of at a recycling collection site.



WEEE registration number:  
02771/07-ECZ

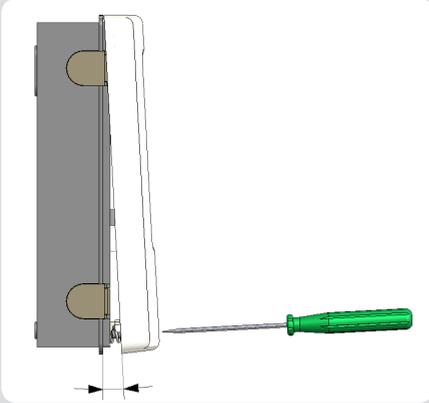
# Installation

## C.1 Wall installation



Install the controller in dry areas only.

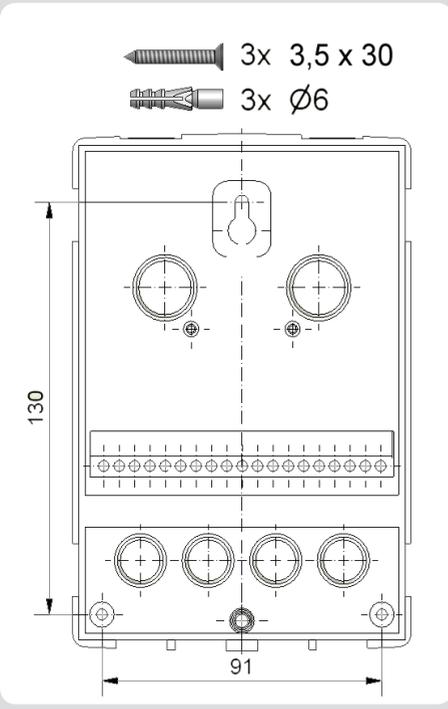
### C.1.1



Installation instructions:

1. Unscrew cover screw completely.
2. Carefully pull the upper part of the housing from the lower part, see C.1.1.
3. Set the upper part of the housing aside, being sure not to touch the electronics when doing so.
4. Hold the lower part of the housing up to the selected position and mark the 3 mounting holes. Make sure that the wall surface is as even as possible so that the housing does not become distorted when it is screwed on.
5. Mark the position on the wall with a pencil. Using a drill and size 6 bit, drill 3 holes at the points marked on the wall and push in the plugs. Fig. C 1.2.
6. Insert the upper screw and screw it in slightly.
7. Fit the upper part of the housing and insert the other two screws.
8. Align the housing and tighten the three screws.

### C.1.2



# Installation

## C.2 Electrical wiring



Before working on the unit, switch off the power supply and secure it against being switched on again! Check for the absence of power! Electric wiring may only be done by a specialist in compliance with valid rules. Do not use the controller if its case shows visible damage.



Low-voltage cables such as temperature sensor cables must be routed separately from mains voltage cables. Feed temperature sensor cables only into the right-hand side of the unit, and mains voltage and relay cables only into the left-hand side.



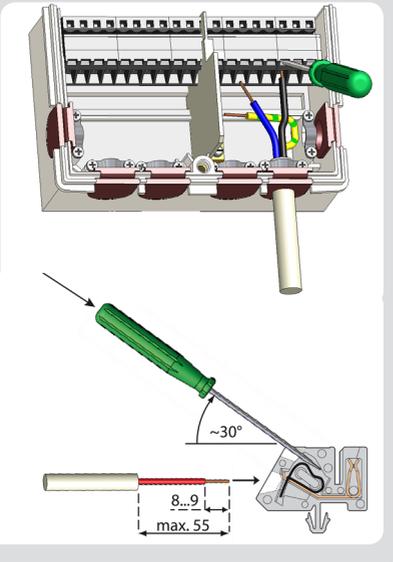
The controller is not equipped with a mains switch. For this purpose please use e.g. a circuit breaker.



The cables being connected to the unit must not be stripped by more than 55 mm, and the cable jacket must reach into the housing just to the other side of the strain relief.

# Installation

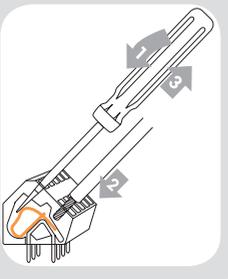
C.2.1



## C 2. 1 Wiring instructions:

1. Select the necessary hydraulic variant (D.1 - hydraulic variants).
2. Open the controller as described in chapter C1.
3. Strip the cable by 55 mm max., insert and fit the cable strain relief. Strip the last 8-9 mm of all the wires (Fig. C 2.1).
4. Open the terminals using a flat screwdriver (Fig. C.2.1.) and wire the leads following the diagram.
5. Refit the upper housing part and fasten with screw.
6. Switch on mains voltage and place controller in operation.

C.2.2



Instructions on how to use the terminal block:

1. Insert a flat screwdriver into the upper opening, pushing the inner spring downwards. Keep the screwdriver inserted.
2. Push the stripped cable end into the bottom opening.
3. Pull out the screwdriver. The spring will secure the cable in place.

## C.3 Installing the temperature sensors

The controller operates with Pt1000 temperature sensors.



Caution

Max. sensor lead length for S1 sensor is 30 m and its cross section at least 0.75 mm<sup>2</sup>.  
Max. sensor lead length for S2 and S3 is 10 m and its cross section at least 0.75 mm<sup>2</sup>.  
Make sure there is no contact resistance in the wiring! Select the proper location for the sensor where it feels the right temperature. Use only immersion sensors. Pipe-mounted sensors only in exceptional cases.  
Make sure that the terminals of extension cables and sensors are properly tightened.



Warning

The temperature sensor cables must be routed separately from mains voltage cables.



Warning

When connecting high-efficiency pumps with PWM, it is necessary to respect the right wiring (i.e. to wire the "PWM out" terminal at the controller with "PWM in" terminal at the pump, and "GND" at the controller with "GND" at the pump).

# Installation

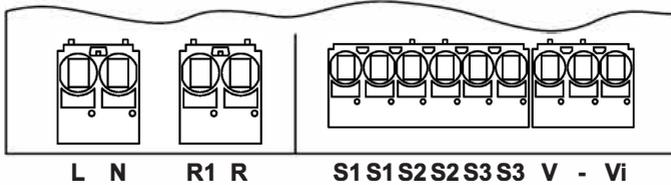
## D. - Terminal block wiring



Mains voltage  
230V



Sensor connection  
– max. 12V



**POWER SUPPLY**  
100-240 V AC

**SENSORS PWM**



Mains voltage  
230V

**Mains voltage** 230V 50Hz

Terminal:      connection for:  
L                    mains live L  
N                    mains neutral N

R1                  relay R1 (switched contact)  
R                    relay R1 (mains live)



Sensor connection  
– max. 12V

**Low voltage**, max. 12V– sensor  
connection

Terminal:      connection for:  
S1                  sensor 1  
S1                  sensor 1 (GND)  
S2                  sensor 2  
S2                  sensor 2 (GND)  
S3                  sensor 3  
S3                  sensor 3 (GND)  
V                    0-10V/PWM output for controllable  
                         high-efficiency pumps  
-                    0-10V gnd./PWM output for  
                         controllable high-efficiency pumps  
Vi                   PWM input to retrieve actual flow rate  
                         of some high-efficiency pumps

# Installation

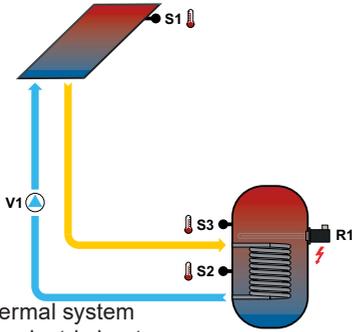
## D.1 Hydraulic variants



Warning

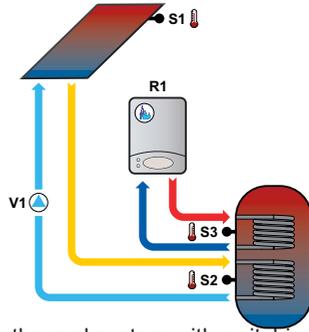
The following illustrations should be viewed only as schematic diagrams showing the respective hydraulic variants, do not claim to be complete. The controller does not replace safety device under any circumstances. Depending on the specific application, additional system components and safety components may be mandatory, such as check valves, non-return valves, safety temperature limiters, scalding protectors, etc., and must therefore be provided.

1



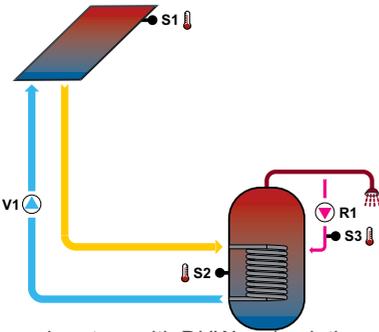
1. Solar thermal system with aux. electric heat source

2



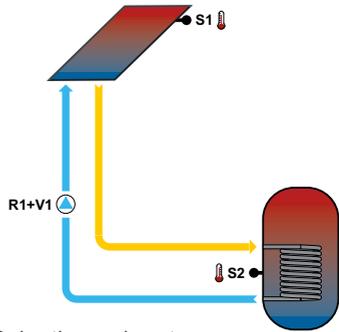
2. Solar thermal system with switching boiler

3



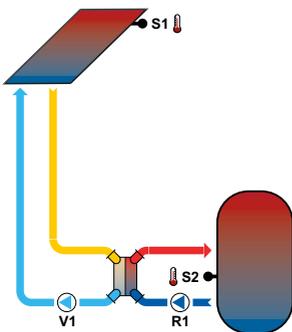
3. Solar thermal system with DHW recirculation

4



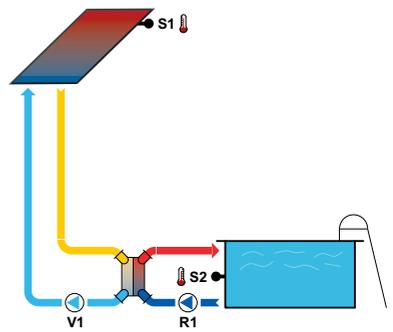
4. Solar thermal system

5



5. Solar thermal system with heat exchanger

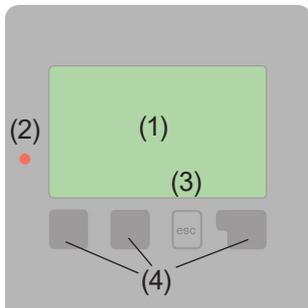
6



6. Solar thermal system with heat exchanger and pool

# Operation

## E.1 Display and input



Examples of display symbols:



Pump (rotates in operation)



Valve (direction of flow black)



Solar collector



Hot water storage tank



Swimming pool



Temperature sensor



Heat exchanger



Load pause



Warning/error message



New information available

The display (1) shows graphic and text info on the hydraulic variant, set and measured values and other text info.

The LED lamp (2):

**lights up green** - if a relay is closed and the controller works right

**lights up red** - if the controller is set to automatic operation and all relays are open

**flashes slowly red** - if manual operation mode is set

**flashes quickly red** - if an error occurred

Entries are made using four keys (3+4), which are assigned to different functions depending on the situation.

The "esc" key (3) is used to cancel an entry or to exit a menu.

If applicable there will be a request for confirmation as to whether the changes which have been made should be saved.

The function of each of the other three keys (4) is shown in the display line directly above the keys; the right-hand key generally has a selection and confirmation function.

Examples of key functions:

+/- = increase/decrease values

▼/▲ = scroll menu up/down

YES/NO = confirm/reject

Info = additional information

Back = to previous screen

ok = confirm selection

## E.2 Commissioning help - setup wizard



The first time the controller is turned on, language and clock need to be set.

After that a query appears as to whether you want to parameterize the controller using the Setup Wizard or not. The setup wizard can also be terminated or called up again at any time in the special functions menu. The setup wizard guides you through the necessary basic settings in the correct order, and provides brief descriptions of each parameter in the display.

Pressing the “esc” key takes you back to the previous value so you can look at the selected setting again or

adjust it if desired. Pressing the “esc” more than once takes you back step by step to the selection mode, thus cancelling the setup wizard. Finally, menu 4.2 under operating mode “Manual” should be used to test the switch outputs with the consumers connected, and to check the sensor values for plausibility. Then switch on automatic mode.

## E.3 Free commissioning

If you decide not to use the commissioning help, you should make the necessary settings in the following sequence:

- Menu 10. Language
- Menu 7.4 Time and date
- Menu 7.1 Program selection
- Menu 5 Settings, all values
- Menu 6 Protective functions if modifications are necessary
- Menu 7 Special functions if additional changes are necessary

*Note:* Setup wizard is available in Menu 7.6

Finally, menu 4.2 under operating mode “Manual” should be used to test the switched outputs with the consumers connected, and to check the sensor values for plausibility. Then switch on automatic mode.

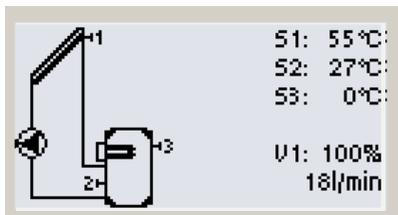


**Caution**

Observe the explanations for the individual parameters on the following pages, and check whether further settings are necessary for your application.

# Operation

## E.4 Menu sequence and menu structure



The graphics or overview mode appears when no key has been pressed for 2 minutes, or when the main menu is exited by pressing “esc”.

In the graphics menu the display shows (from the top right corner downwards) temperatures at connected sensors, then the current speed of a PWM controlled solar pump, and the current flow rate in the bottom right corner, calculated from the incoming PWM signal (if the incoming PWM signal from the pump is connected).



Caution

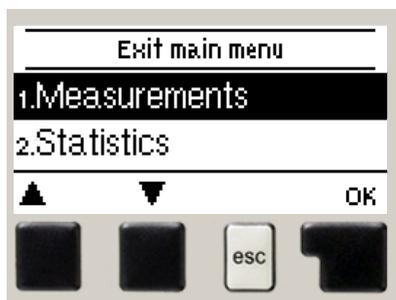
The displayed flow rate through the solar thermal system is indicative only!



Caution

If the flow rate reading is connected using the PWM signal from the pump, the pump is running and the displayed flow rate is 0 l/min., then it is a fault of the pump electronics (see the pump instruction manual). If the displayed flow rate is 0-2 l/min. and the pump is running, then it is probably a fault in the hydraulics of the solar circuit that obstructs flow (throttled by a valve, blocked filter etc.).

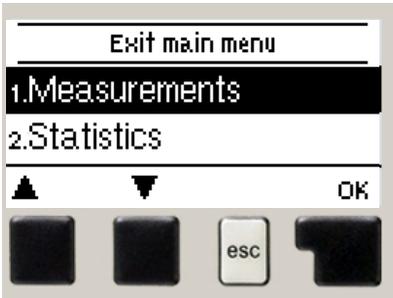
Pressing any key (4) in graphics or overview mode takes you directly to the main menu. The following menu items are then available for selection there:



- |                      |   |
|----------------------|---|
| 1. Measurements      | Current temperature values with explanations                          |
| 2. Statistics        | Function control of the system with operating hours etc.              |
| 3. Display mode      | Selection of the initial display default mode                         |
| 4. Operating mode    | Automatic mode, manual mode or switch unit off                        |
| 5. Settings          | Set parameters needed for normal operation                            |
| 6. Protections       | Solar and frost protection, recooling...                              |
| 7. Special functions | Commissioning help, program selection, sensor calibration, clock etc. |
| 8. Menu lock         | Lock against unintentional setting changes                            |
| 9. Service data      | For diagnosis in the event of an error                                |
| 10. Language         | Language selection  |

# Measurements

## 1. - Measurements



Menu „**1. Measurements**” serves to display the currently measured temperatures.

What measurement values are displayed depends on the selected program and the specific controller model.

The menu is closed by pressing „**esc**” or selecting „**Exit measurements**”.



Caution

If “--” appears on the display instead of the measurement value, then there may be a defective temperature sensor or its connection to the controller. If the cables are too long or the sensors are not placed optimally, the result may be small deviations in the measurement values. In this case the display values can be compensated for using the function of sensor compensation - see Chapter 7.5.

What sensors are displayed depends on the selected program, sensors connected and settings.

# Statistics

## 2. - Statistics



Menu „2. Statistics” is used for function control and long-term monitoring of the system.

The menu is closed by pressing „**esc**” or selecting „**Exit statistics**”.



Caution

For analysis of the system data it is essential that time is set accurately on the controller. Please note that the clock does not continue to run if the mains voltage is interrupted, and must therefore be reset. Incorrect time set in the controller may result in data being deleted, recorded incorrectly or overwritten.

### 2.1. - Operating hours

Display of operating hours of the solar pump connected to the controller; various time spans are available (last day, week, month, year).

### 2.2. - Average $\Delta T$

Display of the average daily temperature difference between the solar collector and the thermal store.

### 2.4. - Graphic overview

This provides a clearly-organised display of the data listed under 2.1. - 2.2. as a bar graph. Various time ranges are available for comparison. The two left-hand keys can be used to page through the data.

### 2.5. - Message log

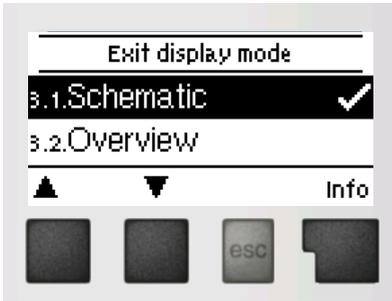
Display of the last 10 events occurring in the system with indication of date and time.

### 2.6. - Reset/Clear

Resetting and deleting the individual analyses. The function “All statistics” clears all statistics but not the error messages.

# Display mode

## 3. - Display mode



Menu “**3. Display mode**” is used to define the controller’s display for normal operation.

This display appears whenever two minutes go by without any key being pressed. The main menu appears again when a key is pressed. The menu is closed by pressing “**esc**” or selecting “**Exit display mode**”.

### 3.1 - Schematic

In the “Schematic” mode, the graphic display of the selected hydraulic variant is shown together with measured temperatures and operating conditions of connected consumers.

### 3.2 - Overview

In the “Overview” mode, the measured temperatures and operating conditions of connected consumers are shown in a text form.

### 3.3 - Alternating

In the “Alternating” mode, the “Schematic” and “Overview” modes are displayed alternately in 5s intervals.

### 3.4 - Eco display mode

After 2 min. of inactivity the display goes to standby mode, turning off the illumination. The backlight does not turn off when the on-screen error message or information message.

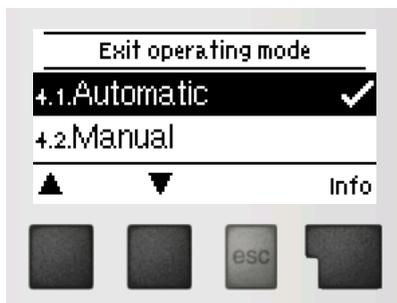


Caution

If a message or alarm is displayed, the backlight is not switched off until the message is read.

# Operating mode

## 4. - Operating mode



In menu “4. **Operating mode**“ the controller can either be switched to automatic mode, switched off, or switched to a manual operating mode.

The menu is closed by pressing “**esc**” or selecting “**Exit operating mode**”.

### 4.1. - Auto

Automatic mode is the normal operating mode of the controller.

Only automatic mode provides proper controller function taking into account the current temperatures and the parameters that have been set!

### 4.2. - Manual

The relay and thus the connected consumer are switched on and off by pressing a key, with no regard to the current temperatures and the parameters which have been set. The measured temperatures are also shown.



Danger

The manual mode is intended to be used by a technician when commissioning or checking the system. Activating manual mode in current operation can lead to system damage or overheating of water in the hot water storage tank!

### 4.3. - Off



Warning

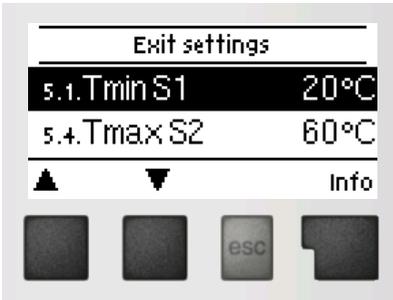
When the operating mode “Off” is activated, all controller functions are switched off. This can lead, for example, to overheating on the solar collector or other system components. The measured temperatures are displayed even when the controller is Off.

### 4.4. - Fill system

This is not used for Regulus solar thermal systems.

# Settings

## 5. - Settings



The system parameters are set in menu “**5. Settings**”.

The menu is closed by pressing “**esc**” or selecting “**Exit settings**”.



Caution

Various settings can be made depending on the selection of hydraulic variant 1-6. The following pages contain generally valid descriptions for the settings.

### 5.1. - Tmin S1

#### Sensor S1 switch-on temperature

If this value is exceeded at sensor S1 and the other conditions are also met, then the controller switches the associated pump and/or valve on. If the temperature at sensor S1 drops below this value by 5 °C, then the pump and/or the valve are switched off again.

### 5.4. - Tmax S2

#### Sensor S2 switch-off temperature

If this value is exceeded at sensor S2 and the other conditions are also met, then the controller switches the associated pump and/or valve off. If the temperature at sensor S2 drops below this value, then the pump and/or the valve are switched on again.



Danger

Temperature values which are set rather high will allow higher solar heat accumulation but it shall be checked that all system components are resistant to high temperature and scalding protection is provided. Regulus solar systems are safe for heating water up to 95 °C.

### 5.8. - $\Delta T$ sol.

#### Switch-on/switch-off temperature difference for solar heat

If this temperature difference between the reference sensors is exceeded and the other conditions are also met, then the controller switches the applicable relay on. When the temperature drops to  $\Delta T$  sol Off, then the relay is switched off.



Caution

If the set temperature difference is too small, this may result in ineffective operation, depending on the system and sensor positions. Special switching conditions apply for speed control (see 7.3. - Speed control V1)!

# Settings

## 5.11 – Tref On / Tref Off (for variants 4 and 3)

If the temperature at the sensor S3 drops below “**Tref On**” and the thermostat function is on, the relay for an auxiliary heating will switch on and remain on until the temperature reaches “**Tref Off**”.

## 5.21 - Thermostat periods R1 (for variants 4 and 3)

Set the desired periods of time when the auxiliary source connected to the relay R1 shall be running. 2 periods can be set per day. The settings can be copied to other days. Outside the set times the relay R1 is switched off.

## 5.23 – Purging time (variant 1)

The period of time when the circulation pump will be running if the function is active (see 5.28 - Circulation periods). After this time expires, the pump will pause for the set pause time (5.24). If a circulation sensor is also selected, the condition of a min. temperature at this sensor (5.25) shall be also met.

## 5.24 – Circ. pause time (variant 1)

The period of time when the circulation pumps is stopped after the circulation time has expired (5.23). After the pause time the circulation-pause cycle repeats.

## 5.25 – Circ. Tmin (variant 1)

If the temperature at the hot water sensor drops below this set temperature during the period of time when the circulation is running (see 5.28 - Circulation periods), then the circulation pump is switched on. This works only if an optional circulation sensor has been selected.

## 5.26 – Circ. hysteresis (variant 1)

Circulation pump switch-off hysteresis for the set min. temperature.

## 5.27 – Circ. sensor (variant 1)

Optional circulation sensor (sensor S3).

## 5.28 – Circ. periods (variant 1)

Set the desired time periods when the circulation pump shall be running. 2 periods per day can be set. The settings can be copied into other days. Outside these time periods the circulation pump is switched off.

# Protections

## 6. - Protections



Menu "**6. Protections**" can be used to activate and set various protective functions.



Warning

These functions do not under any circumstances replace safety elements in solar thermal systems!

The menu is closed by pressing "**esc**" or selecting "**Exit protections**".

### 6.1. - Seizing protection

Protection against pump seizing by regular short running of a pump or a valve. Seizing may occur after longer inactivity of valves or pumps. If the seizing protection is activated, the controller switches the relay in question and the connected solar consumer on every day at 12:00 or weekly on Sundays at 12:00 for 5 seconds in order to prevent the pump and/or the valve from sticking after an extended stationary period.

### 6.2. - Frost protection

A two-stage frost protection function is available. In stage 1 the controller switches the pump on for 1 minute every hour if the collector temperature drops below the set value "**Frost level 1**". If the collector temperature drops further to the set value "**Frost level 2**", the controller switches the pump on continuously. If the collector temperature then exceeds the value "**Frost level 2**" by 2 °C, then the pump switches off again.



Caution

This function causes energy loss via the collector!

As Regulus solar thermal systems are filled with antifreeze fluid, the antifreeze protection shall remain off.

### 6.3. - System protection

#### Priority protection

Protection of the solar circuit protects its components from overheating. If "**SProt T on**" is exceeded at the collector for over 1 minute, the pump is switched off. The collector is left at high temperature. The pump is activated again when the temperature drops below "**SProt T off**".



Warning

Collectors do not get cooled and stay heated. This may result in limited lifetime of the solar fluid. If you use this function, please check your solar fluid regularly!

# Protections

## 6.4 - Collector protection

If „**CProt Ton**” is exceeded at the collector sensor, the pump is switched on in order to cool the collector down. The pump turns off when the collector temperature drops below „**CProt Toff**” or the temperature “**Cprot Tmax storage**” is exceeded in the storage or pool.



When this function is active, a storage tank or swimming pool may get heated up to “**Storage maximum**”, over **Tmax S2** (see 5.4. - **Tmax S2**) which might cause damage to the system. When only a pool is heated, it is not used to cool down solar collectors.

## 6.5. - Collector alarm

If this temperature is exceeded at the collector sensor when the solar pump is on, a warning is triggered. A red LED starts flashing and a warning message is shown on the display.

## 6.6. - Recooling

At the end of a sunny day the temperature in a storage tank may easily reach high values. In order to prevent further temperature increase the next day, excess energy can be released into the air via collectors under cloudy conditions or after sunset.

If the temperature in the storage tank exceeds the value “**Recooling Tset**” and the collector is at least by 20 °C cooler than the storage tank, the solar pump starts. The storage tank is then cooled down until the “**Recooling Tset**” is reached.



Caution

This function enables to release excess heat from the storage tank considerably and without solar fluid overheating, via piping and collectors into the ambient air. It is recommended to keep activated.

## 6.7. - Anti-legionella

This function is used to heat up the system during selected periods to eliminate legionella bacteria.

### 6.7.2 – AL Tset S2

This temperature has to be detected for the time set in “**AL residence time**” at the AL sensor (S2) for a successful heat up.

### 6.7.3 – AL resid. time

This determines the time span for which the “**T Legionela**” set temperature must be detected for a successful AL heat up.

# Funkce ochrany

## 6.7.4 – AL heat

This displays the date and time of the last successful heat up.

## 6.7.5 – AL times

During this periods the AL heat up is attempted.



Caution

This anti-Legionella function does not provide complete protection against Legionella, because the controller is dependent on sufficient energy being fed in, and it is not possible to monitor the temperatures in the entire range of the storage tanks and the connected piping system. To provide complete protection against Legionella bacteria, it must be ensured that the temperature is raised to the necessary value, and at the same time there must be water circulation in the storage tank and piping system by means of other additional energy sources and external control units.

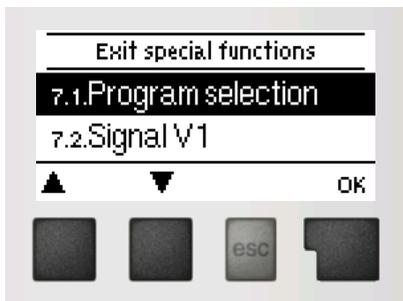


Caution

During the anti-Legionella function the storage tank is heated up to a very high temperature above  $T_{max} S2$  which can lead to scalding and damage to the system.

# Special functions

## 7. - Special functions



Menu “**6. Special functions**” is used to set basic items and expanded functions.



Warning

Time and Date is the only function to be set by the user. Other functions may be set by a specialist only.

The menu is closed by pressing “**esc**” or selecting “**Exit special functions**”.

### 7.1. - Program selection

The suitable hydraulic variant for a solar thermal system is selected here (see D.1 Hydraulic variants). The associated diagram can be displayed by pressing “info”.



Caution

Normally the program selection is made only once during initial commissioning by the specialist. Incorrect program selection can lead to unpredictable errors.



Caution

If a program is changed to another one, settings are reset to default values.

### 7.2. - Signal V1

This menu contains the settings for speed control output V1.

#### 7.2.1. - Type of Signal

Here the pump type w. speed control shall be entered.

**0-10V:** Speed control of a high efficiency pump by 0-10V signal.

**PWM:** Speed control of a high efficiency pump by PWM signal.



Caution

In order to control standard pumps, nothing needs to be adjusted in this menu.

#### 7.2.2. - Profile

In this menu, preconfigured profiles for various pumps can be selected. Alternatively, all settings can be done manually. Manual settings are still possible even when a profile has been selected.

# Special functions

## 7.2.3. - Output Signal

This menu determines the type of pump used: Solar pumps perform at their highest power when the signal is also at its maximum. Heating pump on the other hand are set to highest power when the control signal is at the lowest. Solar pump = normal, Heating pump = inverted.

## 7.2.4. - 0-10V / PWM off

This signal is put out when the pump is switched off (pumps that can detect cable break need a minimum voltage).

## 7.2.5. - 0-10V / PWM on

This signal is needed to turn the pump on at minimum speed.

## 7.2.6. - 0-10V / PWM max

This determines the output voltage for the maximum performance of the pump that is used e.g. during purging or manual operation.

## 7.2.7. - Show signal

Displays the set signal in text and a graphical diagram.

# Special functions

## 7.3. - Speed control

SRS1 T enables changing the speed of connected pumps using this function.



This function should only be activated by a specialist. Depending on the pump used and its performance, the minimum speed should not be set too low, because otherwise the pump or the system may be damaged. The information provided by the relevant manufacturer must also be observed! If in doubt, generally, a higher speed should be preferably set.

### 7.3.1. - Speed control R1

In this menu, the following speed control variants are available:

**Off:** There is no speed control. The connected pump is only switched on or off with full speed.

**M1:** Control to the set  $\Delta T$ , starting from max. speed:

After the purging time the controller switches to the set max. speed. If the temperature difference  $\Delta T$  between the reference sensors (collector and storage tank) is less than the set value, then the speed is decreased by one stage after the “Sweep time” elapses. If the temperature difference between the reference sensors is greater than the set value, then the speed is increased by one stage after the “Sweep time” elapses. If the controller has adjusted the speed of the pump down to the smallest stage and the  $\Delta T$  between the reference sensors is less than  $\Delta T$  off, the pump is switched off.

**M2:** Control to the set  $\Delta T$ , starting from min. speed:

After the purging time the controller switches to the set min. speed. If the temperature difference  $\Delta T$  between the reference sensors (collector and storage tank) is greater than the set value, then the speed is increased by one stage after the “Sweep time” elapses. If the temperature difference  $\Delta T$  between the reference sensors is below the set value, then the speed is decreased by one stage after the “Sweep time” elapses. If the controller has adjusted the speed of the pump down to the smallest stage and the  $\Delta T$  between the reference sensors is less than  $\Delta T_{off}$ , the pump is switched off.

**M3:** Control to constant collector temperature, starting from min. speed:

After the purging time the controller switches to the set min. speed.

If the temperature at the collector sensor is higher than the setpoint, then the speed is increased.

If the temperature at the collector sensor is lower than the setpoint, then the speed is decreased.

# Special functions

## 7.3.2. - Purging time

During this time period, the pump is running with full speed (100%) to ensure trouble-free startup. After this time has passed, the pump is set to speed control and is set to max. speed or min speed, depending on the speed control mode (M1-M3) chosen.

## 7.3.3. - Sweep time

Sweep time determines the inertia of the speed control to prevent quick fluctuations in speed and subsequently also big fluctuations in temperature.

## 7.3.4. - Maximum speed

The maximum speed of the pump is specified here. The pump runs at the set speed during adjusting and the flow rate can be established.



Caution

The indicated percentages are guide values that may vary to a greater or lesser extent depending on the system, pump model and pump stage.

## 7.3.5. - Minimum speed

The minimum speed of the pump with output V1 switched on.

## 7.3.6. - Setpoint

This value is the control setpoint for Mode M3 (see 7.3.1.). If the value at the collector sensor drops below this, the speed is reduced. If it rises above this, the speed is increased.

## 7.3.7. - Setpoint $\Delta T$

This value is an adjustable temperature difference for Modes M1 and M2 (see 7.3.1 - Speed control R1). If the measured temperature difference  $\Delta T$  between reference sensors is lower than this value, the speed is reduced. If it is higher, the speed is increased.

# Special functions

## 7.4. - Time & date

This menu is used to set the current time and date.



Caution

For analysis of the system data it is essential for the time to be set accurately on the controller.

## 7.5. - Sensor calibration

Deviations in the temperature values displayed, for example due to cables which are too long or sensors which are not positioned optimally, can be compensated for manually here. The settings can be made for each individual sensor in steps of 0.33 °C (temperature).



Caution

Settings are only necessary in special cases at the time of initial commissioning by the specialist. Incorrect measurement values can lead to unpredictable errors.

## 7.6. - Commissioning

Starting the commissioning help guides you in the correct order through the basic settings necessary for commissioning, and provides brief descriptions of each parameter in the display. Pressing the “esc” key takes you back to the previous value so you can look at the selected setting again or adjust it if desired. Pressing the “esc” more than once takes you back to the selection mode, thus cancelling the commissioning help (see also E.2).



Caution

May only be started by a specialist during commissioning! Observe the explanations for the individual parameters in these instructions, and check whether further settings are necessary for your application.

## 7.7. - Factory settings

All of the settings that have been made can be reset, thus returning the controller to its delivery state.



Caution

All of the settings that have been made can be reset, thus returning the controller to its delivery state.

# Special functions

## 7.9. - Starting aid

With some solar thermal systems, especially with vacuum tube collectors, it may occur that the measurement value acquisition at the collector sensor occurs too slowly or too inaccurately because the sensor is often not at the hottest location. When the start help is activated the following sequence is carried out: If the temperature at the collector sensor increases by the value specified under “Increase” within one minute, then the solar pump is switched on for the set “Purging time” so that the medium to be measured can be moved to the collector sensor. If this still does not result in a normal switch-on condition, then the start help function is subject to a 5-minute lockout time.



Caution

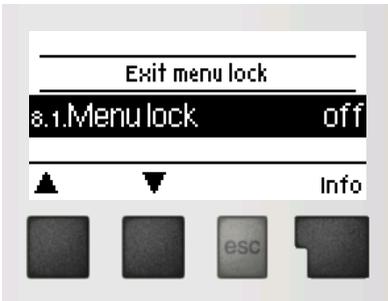
This function shall be activated by an expert only, in case when problems with acquiring measured values appear. First of all, instructions from the collector manufacturer shall be respected.

## 7.10. - Daylight saving time

When this function is active, the controller’s clock changes automatically to and from DST (DST, Daylight Saving Time).

# Menu lock

## 8. - Menu lock



Menu “**8. Menu lock**” can be used to secure the controller against unintentional changing of the set values.

The menu is closed by pressing “**esc**” or selecting “**Exit menu lock**”.

The menus listed below remain completely accessible despite the menu lock being activated, and can be used to make adjustments if necessary:

1. Measurements
2. Statistics
3. Display mode
4. Operating mode
- 7.4 Time & date
8. Menu lock
9. Service data

To lock the other menus, select “**Menu lock on**”. To enable the menus again, select “**Menu lock off**”.

# Service data

## 9. - Service data

The menu „9. Service data” can be used for remote diagnosis by a specialist in the event of an error etc.



Caution

Enter the values at the time when the error occurs e.g. in the table.

The menu can be closed at any time by pressing „esc”.

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# Language

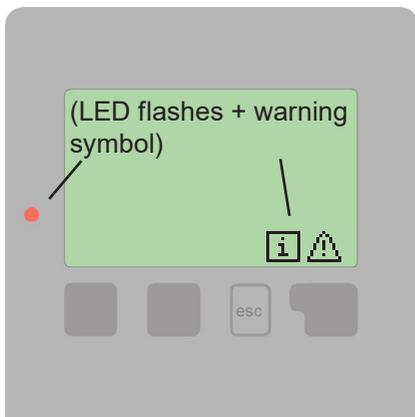
## 10. - Language



Menu “**10. Language**” can be used to select the language for the menu guidance. This is queried automatically during initial commissioning.

# Malfunctions, additional information

## Z.1. Malfunctions with error messages



If the controller detects a malfunction, the red light flashes and the warning symbol also appears in the display. If the error is no longer present, the warning symbol changes to an info symbol and the red light no longer flashes.

To obtain more detailed information on the error, press the key under the warning or info symbol.



Consult a specialist in the event of an error!

Possible error messages:	Notes for the specialist:
Sensor x failed	Means that either the sensor, the sensor input at the controller or the connecting cable is defective. (Temperature resistance table for sensors in Chap. B.2)
Collector alarm	Means that the collector temperature has exceeded the value set in Menu 6.5.
Restart	Means that the controller was restarted, for example due to a power failure. Check the date and time!
Time & Date	This message appears automatically after a mains failure because the time & date have to be checked, and reset if necessary.
No flow!	This text is displayed when $\Delta T$ between storage and collector is 50 °C or higher for 5 minutes.
Frequent on / off	A relay was switched on and off more than 5 times within 5 minutes.
AL failed	This is displayed when "T Legionela"-5 °C was not measured for the set "AL residence time" at the sensor assigned as "AL sensor".

# Malfunctions, additional information

## Z.2 Replacing the fuse

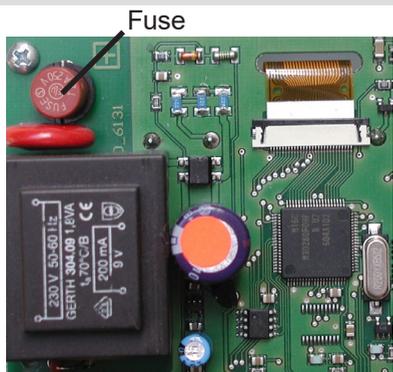


Repairs and maintenance may only be performed by a specialist. Before working on the unit, switch off the power supply and secure it against being switched on again! Check for the absence of power!



Only use the supplied spare fuse or a fuse of the same design with the following specifications: T2A 250V.

### Z.2.1



If the mains voltage is switched on and the controller still does not function or display anything, then the internal device fuse may be defective. In that case, disconnect the device, open it, remove the old fuse and check it. Replace the defective fuse with a new one, locate the external source of the error (e.g. pump) and replace it. Then first re-commission the controller and check the function of the switch outputs in manual mode as described in Chap. 4.2.

## Z.3 Maintenance



Caution

In the course of the general annual maintenance of your heating system you should also have the functions of the controller checked by a specialist and have the settings optimized if necessary.

Performing maintenance:

- Check the date and time (see Chap. 7.4)
- Assess/check plausibility of analyses (see Chap. 2)
- Check the error memory (see Chap. 2.5.)
- Verify/check plausibility of the current measurement values (see Chap. 1)
- Check the switch outputs/consumers in manual mode (see Chap. 4.2)
- Possibly optimize the parameter settings

# Commissioning Procedure for SRS1 T Solar Controller

Before commissioning, check that the installation has been carried out in accordance with the applicable regulations and the current instructions for all components and also:



## Hot water tank

- Is a suitable hot water storage tank installed? (*INFO: Its size should be at least 50l per 1 sqm of a flat collector, allowing for thermal layering of water.*)
- Is the auxiliary heat source connected to the upper third of the hot water tank?
- Is the heat exchanger in the hot water storage tank large enough? (*INFO: Heat exchanger area should be at least 20% of the area of the flat collectors for a smooth pipe in the hot water tank and at least 35% for a corrugated pipe.*)
- Is a mixing valve installed, is it set to a suitable temperature?

## Temperature sensors

- Isn't the hot water tank sensor **incorrectly** located below the solar heat exchanger?
- Do the sensors show the correct temperature?
- Do the sensors have good contact with the sheath? (*HINT: use a spring, or possibly also a heat conducting paste, and insulate.*)

## Fluid pressure, air in piping

- Is there sufficient pressure in the solar circuit? (*INFO: Static pressure (0.1 bar per meter of static height) + 1.3 bar overpressure.*)
- Has the system been bled? (*INFO: Presence of air is manifested by strong fluctuations in pressure or blocked flow. In the first 3 weeks, the pressure can drop by up to 0.3 bar.*)

## El. wiring

- Electrical wiring of the controller and components.
- Suitable integration into the grounding and lightning protection system. (*INFO: Protection of collectors and pipelines against lightning, overvoltage protection of the collector sensor, connection of the collector circuit to grounding for potential equalization.*)

## Solar collectors

- Slope, orientation, location of the sensor in the hottest part, protection against wind and snow, possibility of air venting, watertightness of the roof passage, enabling dilatation. (*INFO: With the elbow close to the collector to avoid mechanical stress on the connections, etc.*)

## Piping

- Checking the tightness during the pressure test, correct connection, metal piping with high temperature resistant insulation, UV protection is necessary for outdoor piping (*HINT: e.g. protection with sheet metal is excellent, it is also not liked by birds*), presence of check valves (to prevent heat leakage through the collectors).

## Circulation pump

- Is the circulation pump installed in a permitted position?
- Is the pump set to the correct mode? (*INFO: In solar mode the pump is stopped without PWM signal.*)

## 3-way valve

- If a 3-way valve is used, check the correct direction of flow and el. wiring.

## Expansion vessel

- Is the correct expansion vessel used? (*INFO: With membrane resistant to antifreeze, the pressure of the expansion vessel is 0.5 bar lower than the pressure in the solar circuit*)
- Is the expansion vessel installed correctly? (*INFO: I.e. installed bottom down to avoid thermal stress on the membrane.*)

*This document does not replace the installation manual or an on-site installation assessment by a professional. Should you have any questions regarding the SRS1 T Controller, please contact our technical support.*

# Commissioning Guide

<p>The commissioning guide is started from Menu <b>7.6. Commissioning</b>. Please select the desired hydraulic variant and confirm with the right button.</p> <p><i>(INFO: The individual variants are shown in more detail in the Manual.)</i></p>	<p>7.5.Sensor calibration  <b>7.6.Commissioning</b>          7.7.Factory settings</p> <p>▲ ▼ OK</p>	<p>7.1.1.Solar Heat  <b>7.1.2.Solar Boiler</b> ✓          7.1.3.Solar Circulation</p> <p>▲ ▼ Info</p>
<p>Usually the factory value is suitable.</p>	<p>5.1.Tmin S1 <b>20°C</b>          minimum temperature of S1 in solar collector for clearance          Range: 0...99 (20)</p> <p>- + OK</p>	
<p><i>HINT: For a better utilization of the collector heat, it is theoretically possible to reduce the switching differential to e.g. 7 °C. However, if the pump cycles, increase the differential instead. If the fluid cools down more (due to long or poorly insulated pipes), then the switching differential can be increased to e.g. 5 °C.</i></p>	<p>5.8.ΔTR1 <b>10°C/3°C</b>          ΔT between S1 and S2 for switching R1 on          Range: 4...50 (10)</p> <p>- + OK</p>	
<p>Enter the desired temperature in the hot water tank here.</p> <p><i>HINT: Also check the settings of the mixing valve.</i></p>	<p>5.4.Tmax S2 <b>60°C</b>          maximum temperature at S2 in storage for shutoff          Range: off...99 (60)</p> <p>- + OK</p>	
<p>After-heating from the auxiliary heat source is to the upper third of the hot water tank.</p> <p><i>HINT: If the temperature is set below 50 °C, we recommend activating the Anti-Legionella function.</i></p>	<p>5.11.Tref On <b>50°C/60°C</b>          Switch on temp. for the thermostat funct.          Range: -20...99 (50)</p> <p>- + OK</p>	<p>6.1.1.ABSR1 <b>off</b>          Seizing protection turns on relay 1 at 12:00 for 5 seconds</p> <p>- + OK</p>
<p>Antifreeze fluid is always used in Regulus systems, so this protection is not needed.</p> <p><i>HINT: Verify that a suitable antifreeze fluid has been used.</i></p>	<p>6.2.1.Frost protection <b>off</b>          During frost the collector is heated from the storage</p> <p>- + OK</p>	
<p>It is recommended to activate the solar circuit protection in order to prevent damage to components.</p> <p><i>HINT: For example, max. temperature of a KPG1 collector is 120 °C.</i></p>	<p>6.3.1.System protection <b>on</b>          Shutdown at high temps.</p> <p>- + OK</p>	<p>6.3.2.SProt Ton <b>120°C/115°C</b>          Shutdown at this temperature          Range: 60...150 (120)</p> <p>- + OK</p>

*This document does not replace the installation manual or an on-site installation assessment by a professional. Should you have any questions regarding the SRS1 T Controller, please contact our technical support*

<p>Recommended to activate. This function prevents collector overheating and gradual degradation of solar fluid.</p> <p><i>HINT: For example, max. temperature of a UPM3 HYBRID pump is 110 °C. (The pump should be placed before the collector inlet.)</i></p>	<p><b>6.4.1.Collector protection</b> <b>off</b></p> <p>Collector is cooled down by heat up of storage</p> <hr/> <p>- + OK</p>	<p><b>6.4.2.CProt Ton</b> <b>110°C/1100°C</b></p> <p>Switch-on temperature CProt</p> <p>Range: 60...150 (110)</p> <hr/> <p>- + OK</p> <p><b>6.4.3.CProt Tmax storage</b> <b>90°C</b></p> <p>Collector prof.is deactivated when storage exceeds this temp.</p> <p>Range: 0...140 (90)</p> <hr/> <p>- + OK</p>
<p><i>HINT: Recommended to activate, especially when the system overheats during summer months (often with lower collector slope, or during holidays).</i></p>	<p><b>6.6.1.Recooling</b> <b>off</b></p> <p>Recooling of the system via the collector</p> <hr/> <p>- + OK</p>	<p><b>6.6.2.Recooling Tset</b> <b>70°C</b></p> <p>Storage temp &gt; Tset=Recooling via the collector</p> <p>Range: 0...99 (70)</p> <hr/> <p>- + OK</p>
<p><i>INFO: Suitable to activate in case of operating temperatures in the tank below 50 °C. Activation will also increase the power consumption.</i></p>	<p><b>6.7.1.AL function</b> <b>on</b></p> <p>Anti-legionella function</p> <hr/> <p>- + OK</p>	<p><b>6.7.2.AL Tset S2</b> <b>70°C</b></p> <p>Target temperature for Al heating</p> <p>Range: 60...99 (70)</p> <hr/> <p>- + OK</p>
<p>Recommended to activate speed control in the Start min. mode.</p> <p><i>INFO: In some cases, the same LEDs light up in different modes and differ only in the number of flashes!</i></p>	<p><b>7.2.1.Type of Signal</b> <b>PWM</b></p> <p>Standard = standard pump at R1 0-10V = voltage signal at V1 PWM = rectangular signal at V1.</p> <hr/> <p>- + OK</p>	<p><b>7.3.1.Speed control R1</b> <b>off</b></p> <p>M1=Start with maximum speed, to set-ΔT M2=Start with minimum speed, to</p> <hr/> <p>- + OK</p>
<p><i>HINT: In case of cycling, the minimum speed of the circulation pump can be limited in accordance with the pump Manual.</i></p> <p><i>INFO: If needed, max. speed can be limited to max. flow equal to 0.5 to 0.7 l/min per 1 sqm of collector surface area.</i></p>	<p><b>7.3.4.Maximum speed</b> <b>100%</b></p> <p>The maximum speed limits the pump speed in its range of</p> <p>Range: 15...100 (100)</p> <hr/> <p>- + OK</p>	<p><b>7.3.3.Sweep time</b> <b>4min</b></p> <p>Interval from lowest to highest speed and vice versa.</p> <p>Range: 1...15 (4)</p> <hr/> <p>- + OK</p>
	<p><b>7.3.2.Purging time</b> <b>8s</b></p> <p>Purging time with 100% speed</p> <p>Range: 5...1000 (8)</p> <hr/> <p>- + OK</p>	<p><b>7.3.5.Minimum speed</b> <b>30%</b></p> <p>The minimum speed limits the pump speed in its range of operation.</p> <p>Range: 10...95 (30)</p> <hr/> <p>- + OK</p>

*This document does not replace the installation manual or an on-site installation assessment by a professional. Should you have any questions regarding the SRS1 T Controller, please contact our technical support*

