Installation and Operating Instructions

REGULUS SRS6 EP Controller

CE

Regulus

EN
ver. 1.2

Contents

This Instruction Manual applies to the following hardware version:

SRS6 EP
1 output mechanical relay, 230VAC (with changeover contacts)
2 output electronic relay with a standard pump speed control
2 PWM/0-10V output for low-energy pumps
6 inputs for Pt1000 temperature sensors
2 VFS flowmeter direct sensor inputs

Part A - Safety

A1 Declaration

The manufacturer declares that the SRS6 EP Solar Controller is marked with the CE mark and conforms to the following relevant safety regulations:

- Directive 2006/95/EC = EC low voltage directive
- Directive 2004/108/EC - EC electromagnetic compatibility directive

A2 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 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.

A 4 - Changes to the unit

- No interference to the controller is allowed except for when approved by the Manufacturer in writing.
- It is forbidden to install any additional device 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.


Danger

Changes to the unit can compromise the safety and function of the unit or the entire system.

Part B - Description

B 1 - Specification

Electric specification:

Voltage	100 to 240 V ~
Mains frequency	50-60 Hz
Power consumption	0,5 - 2,5W
Internal fuse	2A slow blow, 250 V, type T2A
IP protection	IP40
El. protection class	II
Overvoltage category	II
Pollution degree	II

	Ver. 4
Mechanical relay, 460VA (AC1), 460W /AC3)	1 (R3)
Electronic relay, min 5W, max.120W for AC3	2 (R1-R2)
0-10V output, 10% tolerance, 10kΩ or PWM output, PWM, 1kHz, 10V	2
Pt1000 sensors, from -40 °C to +300 °C	6
VFS flowmeter with temperature sensor, range from 0 °C do 100 °C, (-25 °C /120 °C short term)	2
VFS flowmeter - flow rate range: 1 l/min - 12 l/min (VFS1-12) 2 l/min - 40 l/min (VFS2-40) 5 l/min - 100 l/min (VFS5-100) 10 l/min - 200 l/min (VFS10-200)	

Network connections

CAN Bus

Permissible cable length of sensors and appliances:

Collector and outdoor sensor	<30m
other Pt1000 sensors	<10m
VFS/RPS flowmeter	<3m
CAN bus	<3m
PWM / 0...10V	<3m
Electronic relay	<3m
Mechanical relay	<10m

Clock backup period 24h

Permissible ambient conditions:

Ambient temperature

for controller operation	0-40 °C
for transport/storage	0-60 °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	163 × 110 × 52 mm
Installation aperture dimensions	157 × 106 × 31 mm
Display	fully graphic display, 128 × 128
LED	multicolour
Operation	4 entry keys

B 2 - Temperature sensors:

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

B 3 - Description

SRS6 EP Controller is designed for automatic control of solar thermal systems. The SRS6 EP model is intended to control solar thermal systems with up to 2 independent solar arrays and one or two solar consumers. The solar consumers 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 2.

- both graphics and texts on a backlit display
- simple viewing of the current measurement values
- exact solar heat measurement
- analysis and monitoring of the system also by means of statistical graphics
- extensive setting menus with 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 - Scope of supply

- SRS6 EP Controller
- 3 screws 3.5 × 35 mm for wall installation
- 6 strain relief clips with 12 screws
- replacement fuse 1xT2A/250V
- 5 temperature sensors

C 1 - Electrical wiring

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

Controller and VFS sensor have to have the same ground potential. The VFS sensor uses a functional earth connector (PELV). The PE-connector of the controller has to be connected to the pipe system near the sensor.

C 2 - Wall installation

Install the controller in dry areas only .

Installation instructions:

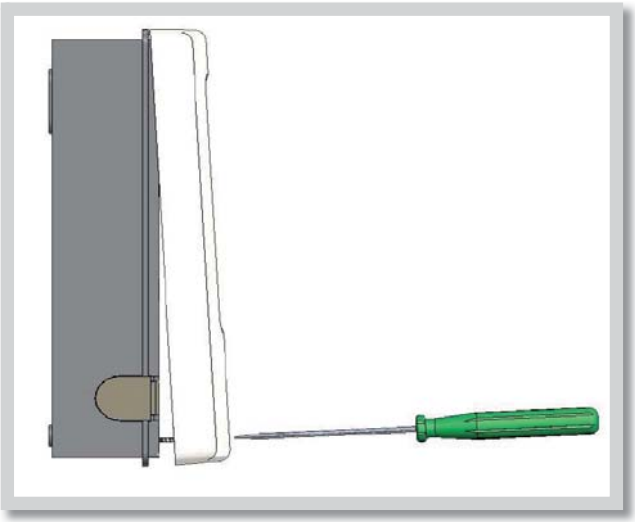


Fig.C 2.1

1. Unscrew cover screw completely

2. Carefully pull upper part of housing from lower part.

3. Set upper part of 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.

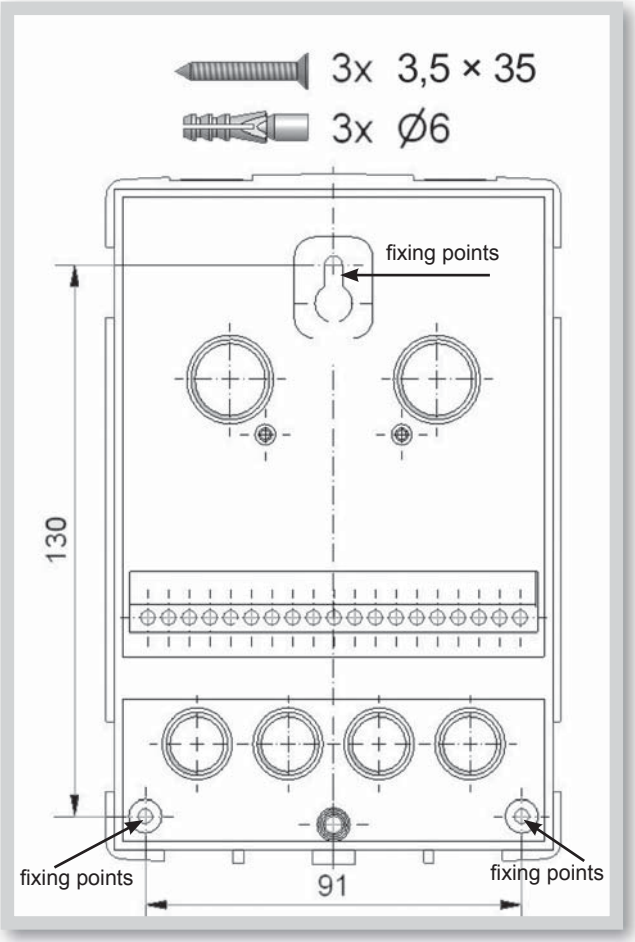


Fig. C 2.2

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.

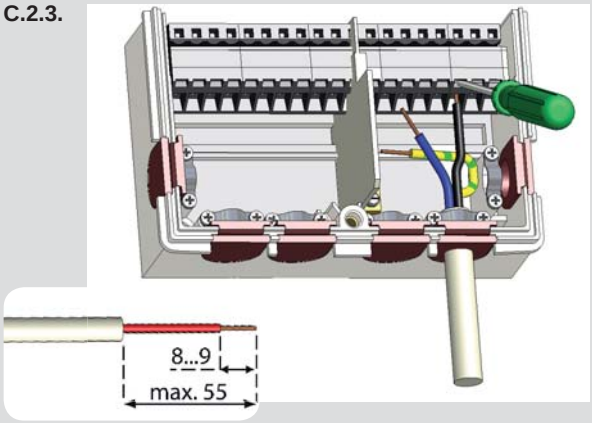
6. Insert the upper screw and screw it in slightly.

7. Fit the upper part of the housing and insert the other two screws.

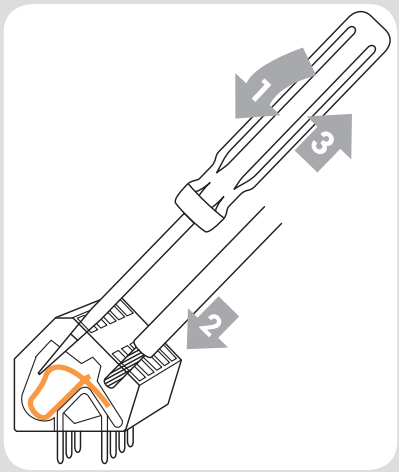
8. Align the housing and tighten the three screws.

Wiring instructions:

C.2.3.



C.2.4.



1. Make sure that the controller circuit breaker is off and that the power supply is off.
2. Select the necessary hydraulic variant (Chapter D.2. on page 13).
3. Open the controller.
4. 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 2.3).
5. Open the terminals using a flat screwdriver (Fig. C 2.4) and wire the leads following the diagram.
6. Refit the upper housing part and fasten with screw.
7. Switch on mains voltage and place controller in operation.

C 3 - Installing the temperature sensors

The controller operates with Pt1000 temperature sensors.

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

Max. sensor lead length for S1 and S5 is 30 m and its cross section at least 0.75 mm^2. Max. sensor lead length for S2 to S4 is 10 m and its cross section at least 0.75 mm^2. Make sure there is no contact resistance in the wiring!

Make sure that the terminals of extension cables and sensors are properly tightened. Use only immersion or pipe-mounted sensors.

The VFS shall be connected to the solar return. Observe the correct flow direction of solar fluid and its max. permissible temperature range (-40 °C to +100 °C, -2 5°C to +120 °C in short term). The flowmeter cables must be routed separately from mains voltage cables!

D - TERMINAL CONNECTION

D 1 - Terminal block wiring

Example: solar system with a storage tank and el. heating rod with an integrated thermostat.

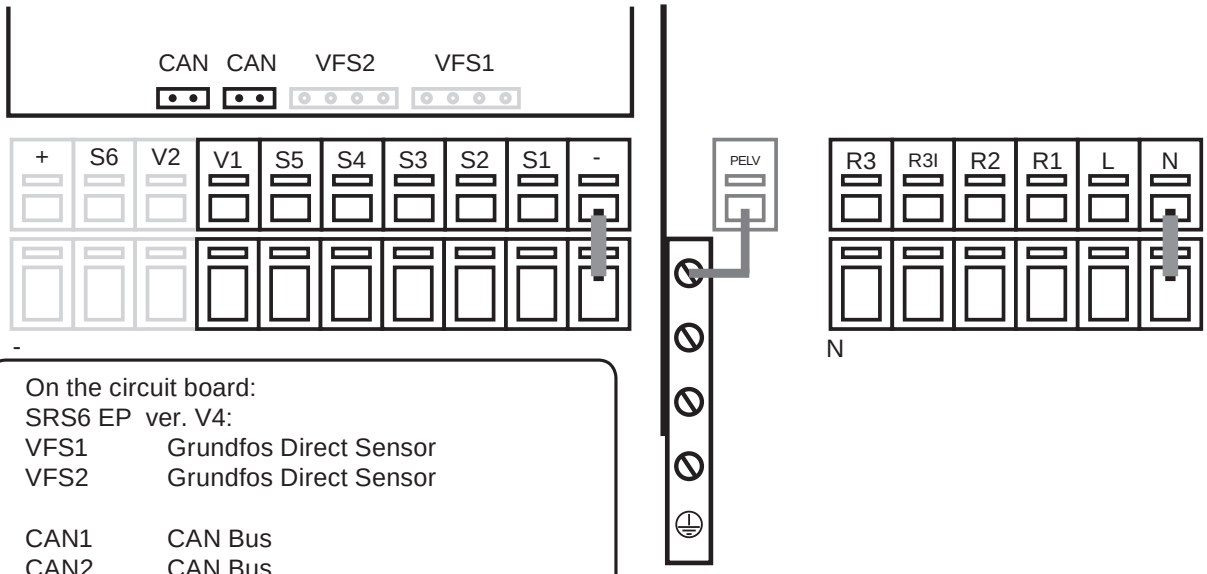
D 1 - Terminal block wiring

Caution

Sensor connection - max. 12V

Danger

Mains voltage
100-240V 50Hz



On the circuit board:
SRS6 EP ver. V4:

VFS1	Grundfos Direct Sensor
VFS2	Grundfos Direct Sensor
CAN1	CAN Bus
CAN2	CAN Bus

Low voltage - sensor connection

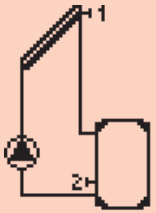
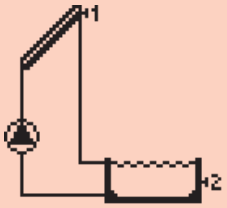
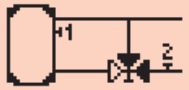
Terminal:	connection for:
S1	Sensor 1
S2	Sensor 2
S3	Sensor 3
S4	Sensor 4
S5	Sensor 5
V1	Output 0-10V / PWM

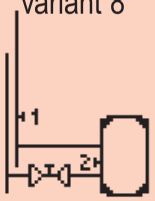
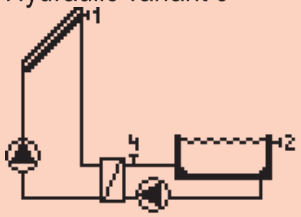
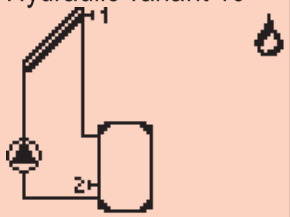
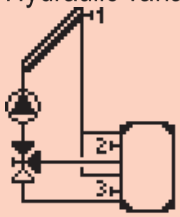
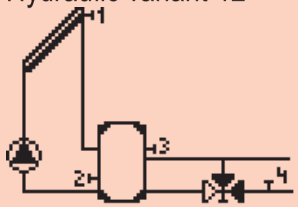
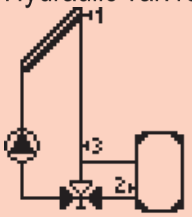
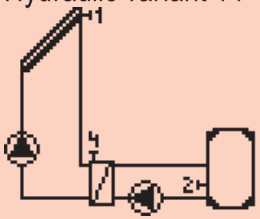
Terminal „ – „ is connected with a common terminal block for S1-S4 sensors and VFS sensors and also with earth on the mains side.

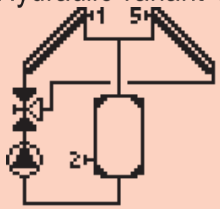
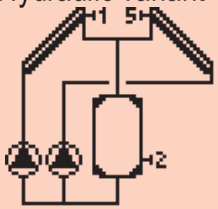
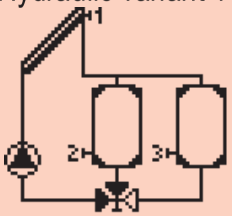
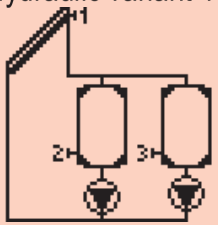
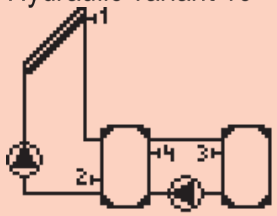
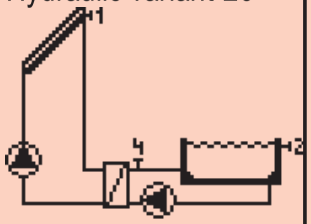
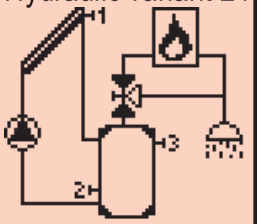
Mains voltage 100 - 240V 50Hz

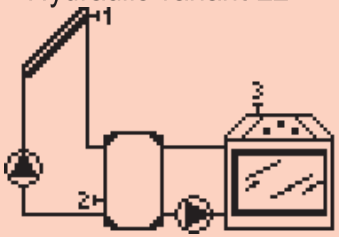
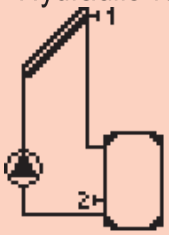
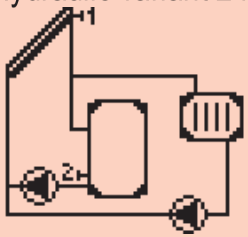
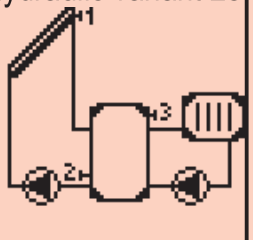
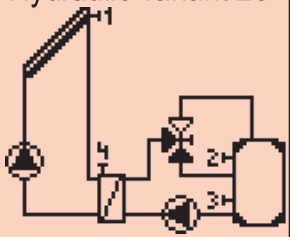
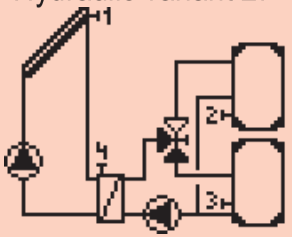
Terminal:	connection for:
R1	Relay 1
R2	Relay 2
R3	Relay 3 (normally open, NO)
R3I	Relay 3 (normally closed, NC)
L	Mains phase
N	Mains neutral
PE	protective conductor (green-yellow)

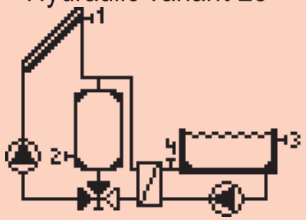
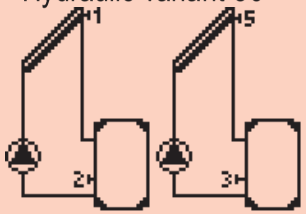
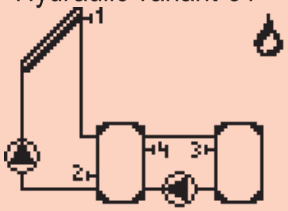
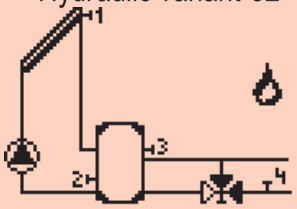
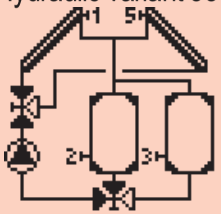
The power supply of low-energy pumps with 0-10V / PWM pumps can be connected to the corresponding relay (V1 -> R1, R2 -> V2), since the relays are switched on and off with the signal.

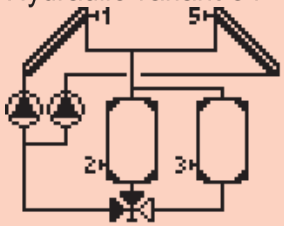
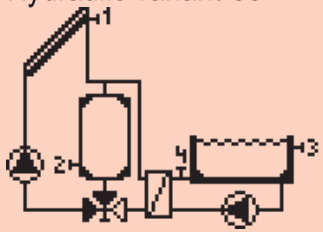
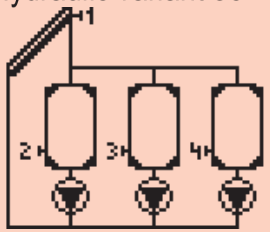
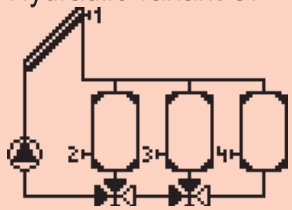
	Hydraulic var.1	Hydraulic variant 2	Hydraulic variant 3	Hydraulic variant 4	Hydraulic variant 5	Hydraulic variant 6	Hydraulic variant 7
	 Solar	 Solar + pool	 Solid fuel boiler	 Storage transfer	 Return flow increase	 Thermostat	 Universal DeltaT
S1 sensor	Collector	Collector	Boiler	Storage1	Storage top	Storage top	Source sensor
S2	Storage	Pool	Storage	Storage2	Return	Storage bottom	Target sensor
S3							
S4							
S5							
S6							
VFS1							
VFS2							
R1 / V1	Solar pump	Solar pump	Circulation pump	Pump			Pump 1
R2	-	-					
R3	-	-			3-way valve	Thermostat	

	Hydraulic variant 8  2-way valve	Hydraulic variant 9  Solar + heat exch. + pool	Hydraulic variant 10  Solar + thermostat	Hydraulic variant 11  Solar + 2-Zone Storage + Valve	Hydraulic variant 12  Solar + return fl ow increase	Hydraulic var.13  Solar + Bypass	Hydraulic variant 14  Solar + heat exchanger
S1	Source sensor	Collector	Collector	Collector	Collector	Collector	Collector
S2	Storage	Pool	Storage	Storage top	Storage bottom	Storage	Storage
S3			Thermostat	Storage bottom	Storage middle	Bypass	
S4		Heat exchanger			Return		Heat exchanger
S5							
S6							
VFS1							
VFS2							
R1 / V1		both pumps	Solar pump	Solar pump	Solar pump	Solar pump	Solar pump
R2							Secondary pump
R3	Valve		Thermostat	Bypass valve	Bypass valve	Bypass valve	

	Hydraulic variant 15  Solar + 2. Collector + Valve	Hydraulic variant 16  Solar + 2. Collector + 2. Pump	Hydraulic variant 17  Solar + 2. storage with valve	Hydraulic variant 18  Solar + 2. Storage + 2. Pump	Hydraulic variant 19  Solar + Storage transfer	Hydraulic variant 20  Solar + heat exch. + pool	Hydraulic variant 21  Solar + thermostat as valve
S1	Collector 1	Collector 1	Collector	Collector	Collector	Collector	Collector
S2	Storage	Storage	Storage1	Storage1	Storage1 bottom	Pool	Storage bottom
S3			Storage2	Storage2	Storage2 top		Storage top
S4					Storage1 top	Heat exchanger	
S5	Collector2	Collector2	Thermostat				
S6							
VFS1							
VFS2							
R1 / V1	Solar pump	Solar pump Coll. 1	Solar pump	Solar pump storage1	Solar pump	Solar pump	Solar pump
R2		Solár čerpadlo Coll. 2		Solar pump storage2	Transfer pump	Secondary pump	
R3	3-way valve		3-way valve				3-way valve

	Hydraulic variant 22	Hydraulic variant 23	Hydraulic variant 24	Hydraulic variant 25	Hydraulic variant 26	Hydraulic variant 27
	 Solar + Solid fuel boiler	 Solar + cooling 1	 Solar + cooling 2	 Solar + cooling 3	 Solar + heat exch. +2-zone storage + valve	 Solar + heat exch. +2 storages + valve
S1	Collector	Collector	Collector	Collector	Collector	Collector
S2	Storage	Storage	Storage	Storage bottom	Storage top	Storage1
S3	Solid fuel Boiler			Storage top	Storage bottom	Storage2
S4					Heat exchanger	Heat exchanger
S5						
S6						
VFS1						
VFS2						
R1 / V1	Solar pump	Solar pump	Solar pump	Solar pump	Solar pump	Solar pump
R2	Solid fuel boiler pump		Cooling pump	Cooling pump	Secondary pump	Secondary pump
R3		Cooler			3-way valve	3-way valve

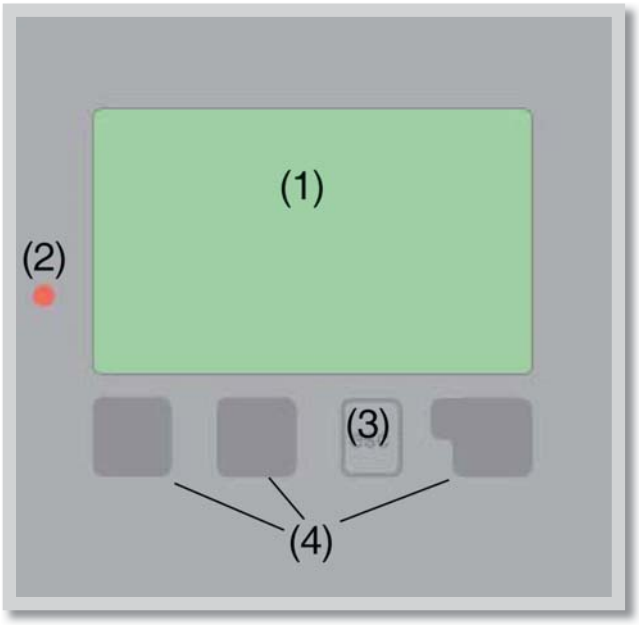
	Hydraulic variant 28	Hydraulic variant 29	Hydraulic variant 30	Hydraulic variant 31	Hydraulic variant 32	Hydraulic variant 33
	 Solar+Valve for Pool+WT	 Solar + Solid fuel-Boiler + S4	 2x Solar	 Solar + Storage transfer + Thermostat	 Solar + return flow increase + thermostat	 Solar + 2. Collector + Valve + 2. Storage with Valve
S1	Collector	Collector	Collector1	Collector	Collector	Collector1
S2	Storage	Storage dole	Storage1	Storage1 bottom	Storage bottom	Storage1
S3	Pool	Solid fuel boiler	Storage2	Storage1 top	Storage middle	Storage1
S4	Heat exchanger	Storage top		Return	Storage top	
S5			Collector2	Thermostat	Thermostat	Collector2
S6						
VFS1						
VFS2						
R1 / V1	Solar pump	Solar pump	Solar pump1	Solar pump	Solar pump	Solar pump
R2		Boiler pump	Solar pump2	Charge pump	Thermostat	collector 3-way valve
R3	Secondary pump + Switching valve			Thermostat	3-way valve	3-way valvel

	Hydraulic variant 34  2 collectors with pump + 2 storages with valve	Hydraulic variant 35  Solar + valve + heat exch. + pool pump	Hydraulic variant 36  Solar + 3 storages with pumps	Hydraulic variant 37  Solar + 3 storages with valves
S1	Collector1	Collector	Collector	Collector
S2	Storage1	Storage	Storage1	Storage1
S3	Storage2	Pool	Storage2	Storage2
S4		Heat exchanger (secondary)	Storage3	Storage3
S5	Collector2			
S6				
VFS1				
VFS2				
R1 / V1	Solar pump1	Solar pump	Solar pump1	Solar pump
R2	Solar pump2	Secondary pump	Solar pump2	3-way valve 1 (storage 1 or storage 2/3)
R3	3-way valve	3-way valve	Solar pump3	3-way valve 2 (storage 2 or storage 3)

E - Operation

E 1 - Display and input

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

Examples of display symbols:

- Pump (rotates in operation)
- Valve (direction of flow black)
- Collector
- Storage tank
- Swimming pool
- Temperature sensor
- Heat exchanger
- load pause (see Load time)
- Warning/error message
- New information available
- logging is active

Entries are made using four keys **(3) and (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:

+/-	= enlarge/shrink values
▼/▲	= scroll menu down/up
yes/no	= approve/reject
Info	= additional information
Back	= to previous screen
ok	= confirm selection
Confirm	= confirm setting

E 2 - Commissioning help

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 commissioning help or not. The commissioning help can also be terminated or called up again at any time in the special functions menu. The commissioning help 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 commissioning help. Finally, menu 3.2 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

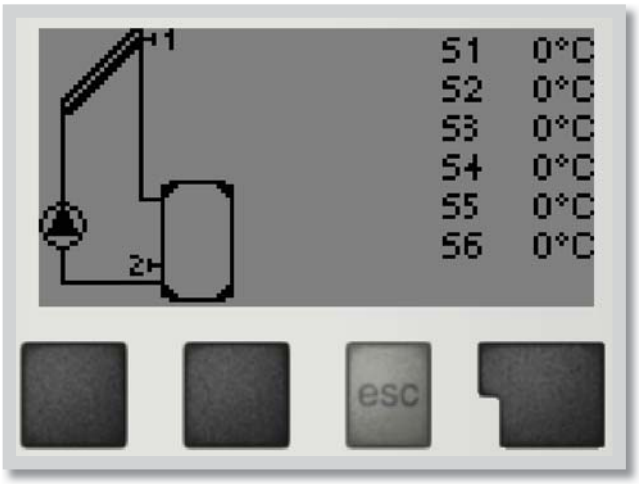
If you decide not to use the commissioning help, you should make the necessary settings in the following sequence:

- Menu 9. Language (page 49)
- Menu 6.11 Time and date (page 48)
- Menu 6.1 Program selection (page 30)
- Menu 4 Settings, all values (page 25)
- Menu 5 Protective functions if modifications are necessary (page 28)
- Menu 6 Special functions if additional changes are necessary (page 30)

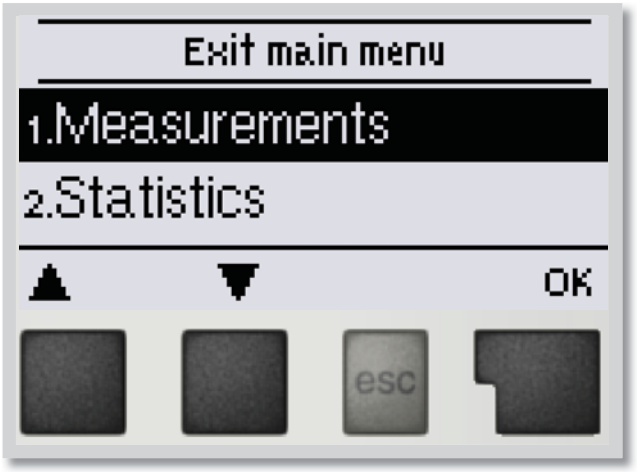
Finally, menu 3.2 under operating mode "Manual" should be used to test the switch outputs with the consumers connected, and to check the sensor values for plausibility. Then switch on automatic mode.

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

E4 Menu sequence and menu structure

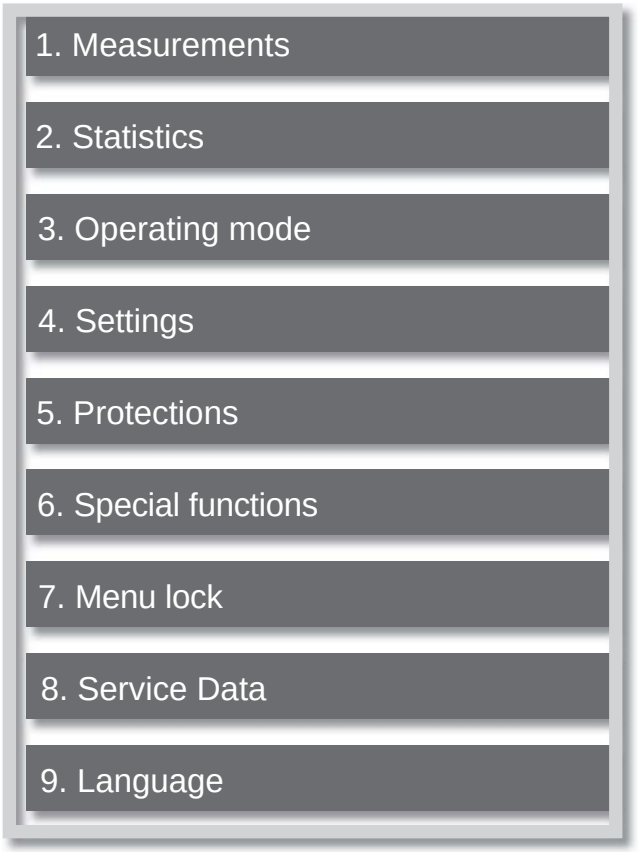


The graphics or overview mode appears when no key has been pressed for 2 minutes, or when the main menu is exited by pressing ***"esc"***.



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. Current temperature values with explanations

2.Function control of the system with operating hours, etc

3. Automatic mode, manual mode or switch unit off

4. Set parameters needed for normal operation

5. Solar and frost protection, recooling, anti-seizing protection.

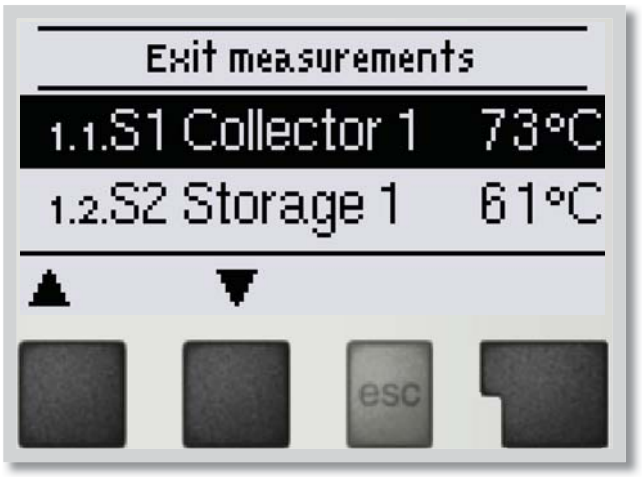
6. Program selection, sensor calibration, clock, additional sensor, etc.

7. Against unintentional setting changes at critical points

8. For diagnosis in the event of an error

9. Language selection

1 - Measurement values



Menu ***"1. Measurement values"*** serves to display the currently measured temperatures.
Jaké hodnoty se budou zobrazovat závisí na zvoleném programu a modelu regulátoru.

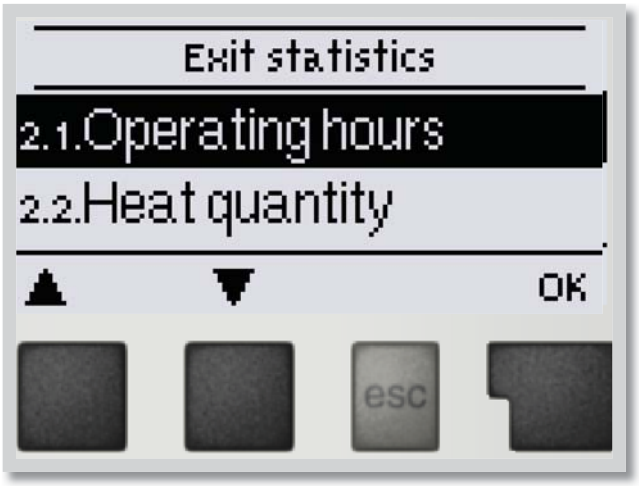
The menu is closed by pressing ***"esc"*** or selecting ***"Exit measurement values"***.

Caution

*If **"--"** appears on the display instead of the measurement value, then there may be a defective temperature sensor or its wiring.*

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 6.7. on page 47.
Which sensors are displayed will depend on the program selected, sensors connected and settings.

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.

Caution

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 menu 2.1

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

2.2 - Heat output menu 2.2

Display of the heat output of the solar thermal system. (Settings see 6.5)

2.3 - Graphic overview menu 2.4

This function provides a clearly-organized display of operating hours and heat output as a bar graph. Various time ranges are available. The two left-hand keys can be used to page through the data.

2.4 - Error log menu 2.5

Display of the last 20 events occurring in the system with indication of date and time.

2.5 - Reset / clear menu 2.6

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

3 - Operating modes

In menu ***"3. Operating modes"*** the controller can either be switched to automatic mode, turned off, or placed in a manual operating mode.

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

3.1 - Automatic menu 3.1

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!

3.2 - Manual menu 3.2

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

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 storage tank!

3.3 - Off menu 3.3

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

Never select other mode than automatic without a reason! Long-term operation in manual mode may lead to collector or storage tank overheating and limiting the lifetime of solar fluid and other solar thermal components!

4 - Settings

The system parameters are set in menu ***"4. Settings"***.

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

Caution

Various settings can be made depending on the selected hydraulic variant.

In many cases more conditions shall be met at one time in order to close the relay, see the setting tables. (E.g. ΔT between a collector and a storage tank, min./max. collector temperature and max. storage tank temperature.) The relay will not close when only one condition is met (e.g. ΔT has been reached but the collector has not reached the T1min temperature).

4.1 - Tmin S(X) menu 4.x = Sensor S**(X)** switch-on temperature at sensor **S(X)**
If the temperature at sensor S1 exceeds the value of TminS**(X)** and the other conditions in the Table are also met, then the controller switches on the associated pump and/or valve. If the temperature at the sensor S1 drops below the value of TminS**(X)** by 5°C, then the pump and/or the valve are switched off again.
Settings range: 0-99 °C / Default setting: 20 °C

4.2 - Tmax S(X) menu 4.x = Sensor S**(X)** switch-off temperature at sensor **S(X)**
If the temperature at sensor S**(X)** exceeds the value of TminS**(X)** and the other conditions in the Table 4.14 are also met, then the controller switches on the associated pump and/or valve. If the temperature at the sensor S(X) drops below the value of TmaxS**(X)**, then the pump and/or the valve are switched off again.
Settings range: 0-99 °C / Default setting: 60 °C

Danger

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

4.3 - Tmax SB menu 4.x = Switch-off temperature at pool sensor
If this value is exceeded at the applicable sensor, the controller switches the associated pump and/or valve off. If the temperature falls below TmaxSB again, then the controller switches the pump and/or valve on again.

Settings range: 0-50 °C / Default setting: 28 °C

4.4 - Tmax SB WT menu 4.x = Switch-off temperature at heat exchanger sensor
If this value is exceeded at the applicable sensor and the other conditions in the table are also met, the controller switches the associated pump and/or valve off. If the temperature falls below the set value again, then the controller switches the pump and/or valve on again.
Settings range: 0-50 °C / Default setting: 28 °C

Temperature values which are set high will allow higher solar heat accumulation but it shall be checked that all system components are resistant to high temperatures and scalding protection is provided.

4.5 - ΔT Solar S (X) menu 4.x = Switch-on/switch-off temperature difference for sensor X
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 by ΔT Off, then the relay is switched off again.
Settings range: ΔT: 4 - 50 °C / ΔT off: 2 - 49°C / Default setting: depends on the hydraulic variant

Setting the temperature difference too small may lead to a situation when the heat source will not be able to heat up the solar consumers to the value when the pump is switched off (ΔT of source – ΔT off). Then the pump will run continuously. Setting the temperature difference too big may lead to switching the circulation pump on and off permanently. Please refer to special rules described in Chapter 6.3 for switching pumps with controlled speed.

4.6 - Storage tank charging priority S (X) menu 4.x = charging priority in systems with 2 storage tanks
Set which storage tank (tank sensor) will have a higher priority. This one will then be preferred and will be charged as the priority one.
Settings range: 1 (highest priority) 3 (lowest priority)

4.7 - T priority - Temperature threshold for absolute priority menu 4.x = min. temperature threshold for absolute priority
Charging of the lower-priority storage tank take place only after this set temperature setpoint at the storage tank sensor of the higher-priority storage tank is exceeded.
Settings range: 0-90 °C. Default setting: 40 °C

4.8 - Charging interruption menu 4.x = interruption of charging into the lower priority storage tank
The charging of the lower-priority storage tank is interrupted (solar pump stops) after the settable time in order to check whether the collector has reached a temperature increase (see 4.9 Increase) that allows charging in the higher-priority storage tank. If not, the lower-priority storage tank continues to be charged until the next interruption.
Settings range: 1-90 min/ / Default setting: 20 min

4.9 - Increase

menu 4.x = temperature increase during charging interruption

When the lower-priority storage tank charging is interrupted, the controller measures the collector
If the temperature increase is higher than this setting (Increase), then the interruption continues until the condition is met for charging the higher-priority storage tank.
If the temperature increase is lower than this setting (Increase), then the interruption is finished and charging to the lower-priority storage tank continues.
Settings range: 1-10°C/min / Default setting: 3°C/min

5 - Protective functions

Menu ***„5. Protections"*** can be used to activate and set various protective functions.

Danger

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"***.

5.1 - System protection menu 5.1 = Protection of the highest priority

Protection of the solar circuit protects its components from overheating. If **„SProt Ton"** is exceeded at the collector, the pump is switched off. The collector is left at high temperature. The pump is activated again when the temperature drops below **„SProt TOff"**.

Solar circuit protection Settings range: ON, OFF / Default setting: ZAP
Settings range: SProt Ton 60 °C to 150 °C / Default setting: 120 °C
Settings range: SProt Toff 50 °C to SProt Ton – 5°C / Default setting: 115 °C

Caution

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!

5.2 - Collector protection menu 5.2

If **„CP 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 **„CP Toff"** or the temperature **„CP Tmax storage"** is exceeded in the storage or swimming pool. In systems with 2 storage tanks only the lower-priority tank or pool is used for collector cooling.

Collector protection - Settings range: ON, OFF / Default setting: VYP
Settings range: CP Ton 60 °C to 150 °C / Default setting: 11 0°C
Settings range: CP Toff 50°C to CP Ton – 5 °C / Default setting: 100°C
Settings range: CP Tmax storage(x). 30 °C to 140 °C/Default setting: 90 °C
** (x) is the storage tank number*

Caution

*When this function is active, a storage tank or swimming pool may get heated up to **"CP Tmax storage"**, over Tmax S2 (see 4.2. - Tmax S (X) on page 25) which might cause damage to the system. When only pool is heated, it is not utilized for collector protection.*
*System protection has a higher priority than collector protection. Only when the switch on conditions for collector protection are met, the solar pump will be switched on, supposed the **CP Ton** temperature is reached.*

5.3 - Recooling menu 5.3

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 **„Recool Tsetpoint"** 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 **„Recool Tsetpoint"** is reached. In systems with two storage tanks the setting applies to both the storage tanks.
Settings range: Recooling: ON, OFF / Default setting: OFF
Settings range: Tnast. pro noč.vychl.: 0 °C to 99 °C / Default setting: 70 °C

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

5.4 - Frost protection menu 5.4

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 stage 1"**. If the collector temperature drops further to the set value **„Frost stage 2"**, the controller switches the pump on continuously. If the collector temperature then exceeds the value **„Frost stage 2"** by 2 °C, then the pump switches off again.

Settings range: Frost protection: on/off. / Default setting: off
Settings range: Frost stage 1: -25 to 10 °C or off / Default setting: 7 °C
Settings range: Frost stage 2: -25 to 8 °C or off / Default setting: 5 °C

This function causes energy loss via the collector!
As Regulus solar thermal systems are filled with antifreeze fluid, the antifreeze protection shall remain off.

5.5 - Seizing protection menu 5.5

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 consumer on every day at 12:00 or weekly on Sundays at 12:00 (setting "weekly") for 5 seconds in order to prevent the pump and/or the valve from sticking after an extended stationary period.
Settings range: R1: daily, weekly, off / Default setting: daily
Settings range: R2: daily, weekly, off / Default setting: daily

5.6 - Collector alarm menu 6.5

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 in the display.
Settings range: Collector alarm OFF, ON /Default setting: OFF
Settings range: Collector Tmax 60 °C to 299 °C / Default setting: 115 °C
Settings range: Delay 1 - 60 min / Default setting: 1 min

6 - Special functions

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

Danger

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".

Caution

Menu numbering depends on the hydraulic variant selected

6. 1 - Program selection menu 6.1

The suitable hydraulic variant for the specific application is selected and set here (see Chapter D2 Hydraulic variants, page 13). The associated diagram can be displayed by pressing "info".
Settings range: Program selection: 1-37 / Default setting: 1

Caution

Normally the program selection is made only once during initial commissioning by the specialist. Incorrect program selection can lead to wrong operation and unpredictable errors. Once the program is changed, other settings are reset to factory values.

6. 2 - Signal V1 (V2) menu 6.2

Setting for high efficiency pumps with either 0-10V or PWM control.

Caution

High efficiency pumps with either 0-10V or PWM control shall be connected to the respective relay (V1 to R1, R2 to V2). Relays are switched on/off together with the 0-10V / PWM control signal.

6.2.1 Type of pump menu 6.2.1

Standard: enables speed control for standard pump
0-10V: enables speed control for high efficiency pumps with 0-10V control
PWM: enables speed control for high efficiency pumps with PWM control.

6.2.2 Pump menu 6.2.2

In this menu, preconfigured profiles for pump control can be selected. Described in Chapter J - Appendix.

6.3 - Speed control R1 / R2 menu 6.3

With activated speed control the SRS6 EP makes it possible to vary the speed of a connected standard pump wired to R1 relay by means of special internal electronics.

This function should only be activated by a specialist. Depending on the pump and pump stage used, 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, the min. speed and the pump stage should generally be set too high rather than too low.

6.3.1 - Modes of speed control menu 6.3.1

Off: There is no speed control. The connected pump is only switched on or off with full speed.
Mode M1 Control to the set ΔT, starts from max. speed:
The pump starts at max. speed. After the purging time the controller switches to the set max. speed. If the temperature difference ΔT 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 ΔT between the reference sensors is less than ΔT off, the pump is switched off.
Mode M2 Control to the set ΔT, starts from min. speed:
The pump starts at min. speed. After the purging time the controller switches to the set min. speed. If the temperature at the collector sensor (or relay R2 in variants with a heat exchanger) is greater than the Setpoint, then the speed is increased. If the temperature at the collector sensor is less than the Setpoint, then the speed is decreased.
Mode M3 Control to constant collector temperature, starts from min. speed:
The pump starts at 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 by one stage after the Sweep time elapses. If the temperature at the collector sensor is lower than Setpoint then the speed is decreased by one stage after the Sweep time elapses.
Mode M4 If the storage tank of the highest priority is heated to the desired temperature, then the speed control works by mode M3. If the (secondary) storage tank of a lower priority is heated to the desired temperature, then the speed control works by mode M2.
Settings range: M1, M2, M3,M4, off / Default setting: off

6.3.2 Purging time menu 6.3.2

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 variant chosen (M1-M4, see 6.3.1).
Settings range: Purging time 5-600 sec. / Default setting: 8 sec.

6.3.3 Sweep time menu 6.3.3

Sweep time determines the inertia of the speed control to prevent strong fluctuations in speed and subsequently in temperature. The meaning of the parameter is described above.
Settings range: Sweep time 1-15 min. / Default setting: 4 min.

6.3.4 Max. speed menu 6.3.4

The maximum speed of the pump is specified here
Settings range: 70-100% / Default setting: 100%

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

6.3.5 Min. speed menu 6.3.5

The minimum speed of the pump at relay R1 is specified here.
Settings range: from (see J.14.6. - Speed when „On“ on page 53) to max. speed -5 % / Default setting: 50%

The indicated percentages are guide values that may vary to a greater or lesser extent depending on the system, pump and pump stage. 100% is the maximum possible for the existing voltage/ frequency of the controller.

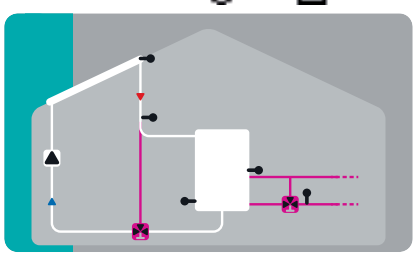
6.3.6 Setpoint menu 6.3.6

This value is the control setpoint for Mode 3 (see „6.3.1. - Modes“ on page 31). If the value at the collector sensor drops below this, the speed is reduced. If it rises above this, the speed is increased.
Settings range: 0 - 90 °C / Default setting: 60 °C

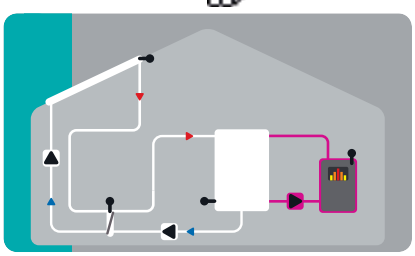
6.4 Relay functions menu 6.4

The here explained additional functions can be assigned to unused relays. Every additional function can only be used once. Pay special attention to the technical data of the relays („B.1. - Specifications“ on page 6).

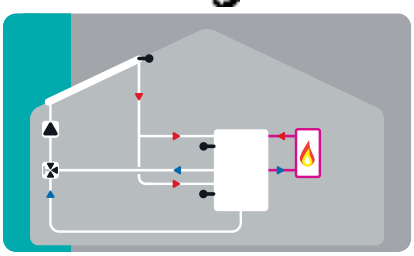
Examples:

System 1 + + 

Solar with storage tank
With additional function
Solar Bypass
and Return Flow Increase

System 14 + 

Solar with heat exchanger
with additional function
Solid Fuel Boiler

System 11 + 

Solar with switching
to storage tank
Thermostat

6.4.1 - Solar bypass menu 6.4.1

Use the relay to switch a bypass valve or a bypass pump
This can direct the flow pass through the storage, when the flow temperature at the bypass sensor is lower than the storage that has to be charged.
Settings range: On, Off

6.4.1.1 - Variant menu 6.4.1.1

This menu determines wether a pump or valve is used to direct the flow through the bypass.
Settings range: Pump, Valve / Default setting: Valve

6.4.1.2 - Bypass (sensor) menu 6.4.1.2

The flow sensor for the bypass function is selected in this menu. Do not install in the return flow.
Settings range: S1-S8, VFS1, VFS2 / Default setting: none

6.4.2 Thermostat menu 6.4.2

Thermostat is used for time- and temperature controlled additional heating.
Settings range: On, Off, Inverted

Temperature values which are set too high can lead to scalding or damage to the system. Scalding protection must be provided by the customer!

In Energy savings mode, different settings may apply, see e.g. T eco.

6.4.2.1 - TH Set

Target temperature at thermostat sensor 1. Below this temperature, additional heating is switched on, till TH set + hysteresis is reached.
Settings range: 0-100 °C / Default setting: 50

6.4.2.2 - TH hysteresis menu 6.4.2.2

Hysteresis of setpoint temperature.
Settings range: -20-+20K / Default setting: 10K

6.4.2.3 - Thermostat sensor 1 menu 6.4.2.3

T set is measured with thermostat sensor 1.
When thermostat sensor 2 is also connected, the relay switches on when T set is undershot at thermostat Sensor 1, and switches off when T set + hysteresis at thermostat sensor 2 is exceeded.
Settings range: S1-S8, VFS1-2, active storage / Default setting: none

6.4.2.4 - Thermostat sensor 2 menu 6.4.2.4

Optional switch off sensor
When T set + hysteresis is exceeded at the optional thermostat sensor 2, the relay is switched off.
Settings range: S1-S8, VFS1-2, active storage / Default setting: none

6.4.2.5 - T eco menu 6.4.2.5

For Energy saving mode
When Energy saving mode is active: During solar charge T eco is used instead of TH set. When the temperature drops below T eco at thermostat sensor 1, the relay is switched on and heats up to T eco + hysteresis.
Settings range: 0-100 °C / Default setting: 40 °C

6.4.3 - Storage menu 6.4.3

For Energy saving mode
Loading this storage activates the Energy saving mode
When this storage is charged by solar, additional heating is only switched on when the temperature is below T eco.
Settings range: (Storage sensors) / Default setting: first storage

6.4.3.1. - Energy saving mode menu 6.4.3.1

Energy saving mode switches the heating on when T eco is undershot und heats up to T eco + hysteresis when solar charging is active.
Settings range: On, Off / Default setting: Off

6.4.3.2 - Periods menu 6.4.3.2

Thermostat activity times
Set the desired periods of time when the thermostat should be active. 3 periods can be set per day, settings can also be copied to other days. Outside the set times the thermostat is switched off.
Settings range: from 00:00 to 23:59 /Default setting: 06:00 to 22:00

6.4.3. Thermostat 2 menu 6.4.3

Thermostat is used for time- and temperature controlled additional heating.
See Thermostat 1

6.4.4 - Cooling menu 6.4.4

This is used to cool down e.g. storages to a setpoint temperature by radiating heat, time- and temperature controlled.
Settings range: S1-S8, VFS1-2, active storage / Default setting: none

6.4.4.1 - Co T set menu 6.4.4.1

Target temperature at thermostat sensor 1. Cooling is on above this temperature till Co T set + hysteresis is reached.
Settings range: 0-100 °C / Default setting: 50 °C

6.4.4.2. - Co hysteresis menu 6.4.4.2

If the temperature drops below Co T set + hysteresis, the relay is switched off.
Settings range: 0-100 / Default setting: 40

6.4.4.3 - Cooling (sensor) menu 6.4.4.3

Reference sensor of the cooling function.
Settings range: (Storage sensor) / Default setting: storage 1

6.4.4.4 Periods menu 6.4.4.4

Cooling activity times
Set the desired periods of time when the cooling should be active. 3 periods can be set per day, settings can also be copied to other days. Outside the set times the cooling function is switched off.

Settings range: from 00:00 to 23:59 /Default setting: 06:00 to 22:00

6.4.5. – Return flow increase menu 6.4.5

This function is used to raise the temperature of e.g. the return flow by the storage tank.
Settings range: On, Off

6.4.5.1. - RF Tmax menu 6.4.5.1

Maximum temperature at the return flow sensor. If this temperature is exceeded, the relay is switched off.
Settings range: 0-80 °C / Default setting: 70 °C

6.4.5.2. – ΔT return flow menu 6.4.4.2

Switch-on temperature difference
When this difference is exceeded between return flow sensor and storage sensor, the relay is switched on.
Settings range: 5-20 K / Default setting: 8 K
Switch-off temperature difference:
When this difference is exceeded between return flow sensor and storage sensor, the relay is switched off.
Settings range: 2-19 K (limited by ΔT Storage RF On) / Default setting: 4 K

6.4.5.3. – Return flow (sensor) menu 6.4.5.3

Determines the sensor for return flow increase.
Settings range: S1-S8, VFS1-2, active storage / Default setting: none

6.4.5.4. - Storage (sensor) menu 6.4.5.4

Determines the storage sensor
Settings range: S1-S8, VFS1-2, active storage / Default setting: none

6.4.6 - Collector field cooling menu 6.4.6

This function controls an external cooling unit to cool down the collector (cooling to radiators, to A/C units).

6.4.6.1 - Tmax field menu 6.4.6.1

If this temperature is exceeded at the reference sensor, the relay is switched on.
Settings range: 100-180 °C / Default setting: 120 °C

6.4.6.2. - Hys min menu 6.4.6.2

When the temperature falls below Tmax field +Hys min, the relay is switched off.
Settings range: -20 to -2 °C / Default setting: -5 °

6.4.6.3 - Hys max menu 6.4.6.3

When the temperature falls below Co T set + Hys max, the relay is switched off.
Settings range: 2 to 60 °C / Default setting: -20

6.4.6.4 Field cooling sensor menu 6.4.6.4

Reference sensor of the collector field cooling function.
Settings range: S1-S8, VFS 1-2, active storage, RC / Default setting: none

6.4.7 - Anti Legionella menu 6.4.7

This function is used to heat up the system during selected periods to eliminate legionella bacteria.
Settings range: S1-S8, VFS1-2, Active storage/ Default setting: none

6.4.7.1 - LegT nast. menu 6.4.7.1

This temperature has to be detected for the time set in AL residence time at the AL sensors for a successful heat up.
Settings range: 60-99 °C / Default setting: 70 °C

6.4.7.2. - AL residence time. menu 6.4.7.2

This determines the time span for which the AL T set temperature must be detected for a successful AL heat up.
Settings range: 1-120 min / Default setting: 60 min

6.4.7.3 - Last AL heat menu 6.4.7.3

This displays the date and time of the last successful heat up.
Setting none

6.4.7.4 - Leg sensor 1 menu 6.4.7.4

This temperature is used to measure the AL temperature

6.4.7.5 - Leg sensor 2 menu 6.4.7.5

Optional AL sensor
When a second sensor is connected, both sensors must reach and hold the setpoint temperature for the residence time for a successful heat up.
Settings range: S1-S8, VFS1-2, Active storage/ Default setting: none

6.4.7.6. - AL-times menu 6.4.7.6

During this periods the AL heat up is attempted.
Settings range: from 00:00 to 23:59 /Default setting: 06:00 to 22:00

Attention
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 temperature, 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.

Attention
The anti-Legionella function is switched off at delivery.

Danger
During the anti-Legionella function the storage tank is heated up to a very high temperature which can lead to scalding and damage to the system.

Attention
Whenever heating-up has been carried out with the anti-Legionella function switched on, an information message with the date appears on the display.

6.4.8 - Heat transfer menu 6.4.8

This is used to transfer energy from one storage to another with a pump.
Settings range: S1-S8, VFS1-2, Active storage / Default setting: none

6.4.8.1 - Δ T Heat transfer menu 6.4.8.1

Temperature difference for heat transfer function. When the temperature difference between HT Source and HT Drain reaches ΔT Heat Transfer On, the relay is switched on. As soon as the difference drops to ΔT Heat Transfer Off, the relay is switched off again.
ON: Settings range: 5-20 K/ Default setting: 8 K
OFF: Settings range: 2 K to ΔT Zap / Default setting: 4 K

6.4.8.2. - Setpoint menu 6.4.8.2

Setpoint temperature of the target storage
When this temperature is detected in the target storage, heat transfer is switched off.
Settings range: 0 to 90 °C / Default setting:60 °C

6.4.8.3 - HT Tmin menu 6.4.8.3

Minimum temperature in source storage tank to enable the heat transfer
Settings range: 0 to 90°C / Default setting:30°C

6.4.8.4 HT Source (sensor) menu 6.4.8.4

This menu determines the sensor placed in the source storage
Settings range: S1-S8, VFS1-2, Active storage/ Default setting: none

6.4.8.5 – HT Drain (Target sensor) menu 6.4.8.5

This determines the sensor placed in the storage that is receiving energy from the source storage.
Settings range: S1-S8, VFS1-2, Active storage/ Default setting: none

6.4.9 - Difference menu 6.4.9

The relay is used for switching based on reaching a temperature difference (Δ T). The relay is switched on when a specific temperature difference (**Δ T**) is reached.

Settings range: On, Off

6.4.9.1. - ΔT Difference menu 6.4.9.1

Switch on - difference:
When this temperature difference is reached, the relay is switched on.
Settings range: 5-20 K / Default setting: 8 K
Switch off - difference:
When this temperature difference is reached, the relay is switched off.
Settings range: 2-19 K / Default setting: 4 K (the upper limit is the switch on - difference)

6.4.9.2. - DF source (sensor) menu 6.4.9.2

Heat source sensor for Difference function
This determines the sensor for the heat source.
Settings range: S1-S8, VFS1-2, Active storage / Default setting: none

6.4.9.3. – Diff Tmin menu 6.4.9.3

Minimum temperature at source sensor to enable the difference relay
When the temperature at the source sensor is below this level, the difference function is disabled.
Settings range: 0 to 90 °C / Default setting: 20 °C

6.4.9.4 - DF Drain (sensor) menu 6.4.9.4

Target sensor for difference function
This determines the sensor for the target storage, i.e. the storage tank of lower temperature.
Settings range: S1-S8, VFS1-2, Active storage / Default setting: none

6.4.9.5. – DF Tmax menu 6.4.9.5

Maximum temperature at target sensor to enable difference function
If the temperature at the target sensor exceeds this value, difference function is disabled.
Settings range: 0 to 99 °C / Default setting: 60 °C

6.4.10 - Solid fuel boiler menu 6.4.10

The relay is used to control an additional solid fuel boiler pump.
Settings range: On, Off

6.4.10.1. - SF Tmin menu 6.4.10.1

Minimum temperature in the solid fuel boiler to switch on the pump. If the temperature at the boiler sensor is below this temperature, the relay is disabled.
Settings range: 0 °C to 100 °C / Default setting: 70 °C

6.4.10.2. – Δ T Solid fuel / Δ T SF off menu 6.4.10.2

Switch on and Switch off condition for the temperature difference between boiler and storage.
Switch on difference: Δ T SF
Settings range: 5 to 20 K / Default setting: 8
Switch off temperature difference: Δ T SF off
Settings range: 0 K to Switch Δ T SF / Default setting: 7

6.4.10.3. SF Tmax menu 6.4.10.3

Maximum temperature in the storage. If this is exceeded, the relay is switched off.
Settings range: Off to 100 °C / Default setting: 70 °C

6.4.10.4. Boiler sensor menu 6.4.10.4

This determines the sensor used as boiler sensor.
Settings range: S1-S8, VFS1-2,Active storage / Default setting: none

6.4.10.5. - Storage sensor menu 6.4.10.5

This determines the sensor used as boiler sensor.
Settings range: S1-S8, VFS1-2, Active storage / Default setting: none

6.4.11 - Error message

The relay is switched on, when one or more protective functions are active. This function can be inverted, so that the relay is always on and switches off when a protective function is activated.

Settings range: On, Inverted, Off / Default setting: Off
Collector protection
System protection
Frost protection
Recooling
Antilegionella protection
Message
Collector alarm

6.4.12 - Pressure monitor menu 6.4.12

The relay is switched on when the pressure drops below set minimum or exceeds the set maximum pressure.
Settings range: On, Off / Default setting: Off

6.4.12.1. - Pressure monitor menu 6.4.12.1

This menu is used to configure the system pressure monitoring via direct sensor. As soon as the set limits are exceeded, the relay is switched on.

6.4.12.2. - RPS1 / RPS2 menu 6.4.12.2

Type of pressure sensor
This menu is used to determine the type of pressure sensor used.
Please note: If e.g. VFS1 is connected, RPS1 option is not shown.
Settings range: Off; 0-0.6 bar; 0-1 bar; 0-1.6 bar; 0-2.5 bar; 0-4 bar; 0-6 bar; 0-10 bar
Default setting: Off

6.4.12.3. - Pmin menu 6.4.12.3

Minimum pressure. If this value is undershot, an error message is displayed and the relay is switched on.
Settings range: Off; 0,0 to 1.6 bar
Default setting: Off

6.4.12.4. - Pmax menu 6.4.12.4

Maximum pressure. If this value is exceeded, an error message is displayed and the relay is switched on.
Settings range: Off; 0,0 až 10 bar
Default setting: Off

6.4.13. - Booster pump menu 6.4.13

Additional pump that fills the system at the start of every solar charge.
Settings range: S1-S8, VF S1-2, Active storage
Default setting: Off

6.4.13.1. – Filling time menu 6.4.13.1

This setting determines the length of time the pump is switched on at the start of a solar charge.
Settings range: 0-120 s / Default setting: 30 s

6.4.14 - Parallel operation R (X) menu 6.4.14

The relay is switched on at the same time as the set relay R1 or R2. (Replace X with the relay number, e.g. 3, 4, 5…)
Settings range: On, Off, Inverted

6.4.14.1 - Delay menu 6.4.14.1

This menu determines how long after the start of R1 or R2 the parallel relay is switched on.
Settings range: 0-120 s / Default setting: 30 s

6.4.14.2 - Followup time menu 6.4.14.2

This menu determines how long after the switch off of R1 or R2 the parallel relay is switched off.
Settings range: 0-120 s / Default setting: 30 s

6.4.15. - Always on menu 6.4.15

Relay is always switched on.

6.4.16. – Heating circuit menu 6.4.16

Heat circuit pump is controlled with a fixed hysteresis of (+/-1° for setpoint temperature). 30 seconds Switch on and Switch off delay is fixed setting to prevent unnecessary switching of the pump. RC21 room controller can be used as room temperature sensor, with 3 modes available to switch over during the day: “Always Day”, “Always Night” and “Automatic/Time Schedule”.
Settings range: On., Off

6.4.16.1. – Room set day menu 6.4.16.1

Desired temperature - day
Room reference temperature in day mode. If this temperature is exceeded at the room temperature sensor at the set times, the relay is switched off.
Settings range: 10 °C to 30 °C /

6.4.16. 2 - Room set night menu 6.4.16.2

Desired temperature - night
Room reference temperature in night mode. If this temperature is exceeded at the room temperature sensor at the set times, the relay is switched off.
Settings range: 10 °C to 30 °C /

6.4.16.3 - Room sensor menu 6.4.16.3

This menu determines the sensor for the room temperature.

6.4.16.4 - Periods menu 6.4.16.4

Set the desired periods of time when the heat circuit day mode should be active. 3 periods can be set per day, settings can also be copied to other days. Outside the set times the heating function is working in night mode.
Settings range: from 00:00 to 23:59 /Default setting: 06:00 to 22:00

6.5. - Heat quantity menu 6.5

6.5.1 - Prodleva menu 6.5.1

When the heat meter mode „Flow rate“ is selected, an approximate heat quantity is calculated using the values the user has to enter. These are type of glycol/AntiFreeze, glycol portion and flow rate. These values are put into correlation with the temperature data of collector sensor and storage sensor. If necessary a correction value for ΔT can be set: Since for the heat meter the collector and the storage temperature are used, a difference to the flow respectively return flow temperature can be compensated by changing Offset ΔT accordingly.
Example:
Displayed collector temp. 40 °C, measured flow temperature 39 °C, displayed storage temperature 30 °C, measured return temperature 31 °C = results in a correction value of -20% (displayed ΔT 10K, real ΔT 8K = -20% correction).

Note: The heat quantity measured in the mode “Flow rate” is a calculated approximation for function control of the system**.**

6.5.1.1. - Flow sensor (X) menu 6.5.1.1

This determines the sensor that is used to measure the flow temperature (hot side)..
Settings range: S1-S8, VFS1-2, active collector, active storage/ Default setting: S1

6.5.1.2. - Return sensor menu 6.5.1.2

This determines the sensor that is used to measure the return temperature.
Settings range: S1-S8, VFS1-2, active collector, active storage/ Default setting: S1

6.5.1.3. - Anti freeze type menu 6.5.1.3

Set the type of antifreeze fluid used. If none is used, please set to 0.
Settings range: Ethylene, Propylene / Default setting: Ethylene

6.5.1.4. - Glycole percentage menu 6.5.1.4

The amount of antifreeze agent in the system.
Settings range: 0-100 % / Default setting: 45 %

6.5.1.5. - Flow rate (X) menu 6.5.1.5

Flow rate that is used to calculate the heat quantity
This determines the fl ow rate in litres per minute that is used for the calcualtion of the heat quantity.
Settings range: 0-100 l/min / Default setting: 5 l/min

6.5.1.6. - Offset ΔT menu 6.5.1.6

Correction value for temperature difference
Since for the heat meter the collector and the storage temperature are used, a difference to the flow respectively return flow temperature can be compensated by changing Offset ΔT accordingly.
Example: Displayed collector temp. 40 °C, measured flow temperature 39 °C, displayed storage temperature 30 °C, measured return temperature 31 °C = results in a correction value of -20% (displayed ΔT 10K, real ΔT 8K = -20% correction).
Settings range: -50 to +50 % / Default setting: 0 %

6.5.2. – VFS (X) menu 6.5.2

6.5.2.1 – VFS Type menu 6.5.2.1
The VFS type is set here
Settings range: Off; 1-12; 1-20; 2-40; 5-100; 10-200; 20-400 / Default setting: Off

6.5.2.2. - VFS - Position menu 6.5.2.2
This setting determines the position of the VFS flowmeter with temperature sensor.
Settings range: flow, return / Default setting: return

Warning:
To prevent damage to the Vortex Flow Sensor it is strongly recommended to install it into the return flow. If it is necessary to install in the flow, it is imperative not to exceed the maximum temperatures of the sensor! (0° C to 100 °C and -25 °C to 120 °C short term.)

6.5.2.3. – Reference sensor menu 6.5.2.3
The reference sensor used for the heat metering is set here.
Settings range: S1-S8, VFS1-2, active collector, active storage/ Default setting: S1

6.6. - Pressure monitor menu 6.6
A message is shown when the pressure drops below set minimum or exceeds the set maximum pressure. No relay is switched, for that see „6.4.12. - Pressure monitor“ on page 43.

6.6.1. - Pressure monitor menu 6.6.1
A message is shown and the LED flashes when the pressure deviates from the set minimum or maximum value.
Default setting: On, Off / Výchozí nastavení: Off

6.6.1.1. - RPS1 / RPS2 menu 6.6.1.1
Type of pressure sensor
This menu is used to determine the type of pressure sensor used.
Please note: If e.g. VFS1 is connected, RPS1 option is not shown.
Settings range: Off; 0-0.6 bar; 0-1 bar; 0-1.6 bar; 0-2.5 bar; 0-4 bar; 0-6 bar; 0-10 bar
Default setting: Off

6.6.1.2. – Pmin menu 6.6.1.2
Minimum pressure
If this value is undershot, an error message is displayed and the relay is switched on.
Settings range: Off; 0,0 to 1.6 bar
Default setting: 0,0bar

6.6.1.3. - Pmax menu 6.6.1.3
Maximum pressure
If this value is exceeded, an error message is displayed and the relay is switched on.
Settings range: Off; 0,0 to 10 bar
Default setting: 1.6 bar

6.7. - Sensor calibration menu 6.7

Deviations in the temperature values displayed, for example due to cables which are to 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 0.8°C (temperature) resp. 0.2% of the measuring range of the VFS / RPS sensor (flow rate / pressure) per step.

Sensor Offset - Settings range: -100 ... +100 / Default setting: 0

Warning:
These settings are only necessary in special cases at the time of initial commissioning and may be done by a specialist only. Incorrect settings may lead to an error.

6.8. - Commissioning menu 6.8

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 step by step to the selection mode, thus cancelling the commissioning help..

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

6.9. - Factory settings menu 6.9

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

Note: The entire parameterization, analyses, etc. of the controller will be lost irrevocably. The controller must then be commissioned and set once again.

6.10. – Start aid function menu 6.10

Start aid function

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.

Start help setting range: on, off/default setting: off
Purging time setting range: 2 ... 30 sec./default setting: 5 sec.
Increase setting range: 1 °C....10 °C/default setting: 3 °C/min

Note:
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.

6.11. – Time and date menu 6.11

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

Warning:
For a proper working of the controller and analysis of the system data it is essential for the time to be 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.

6.12. - Daylight saving time menu 6.12

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

6.13. – Sleep mode menu 6.13

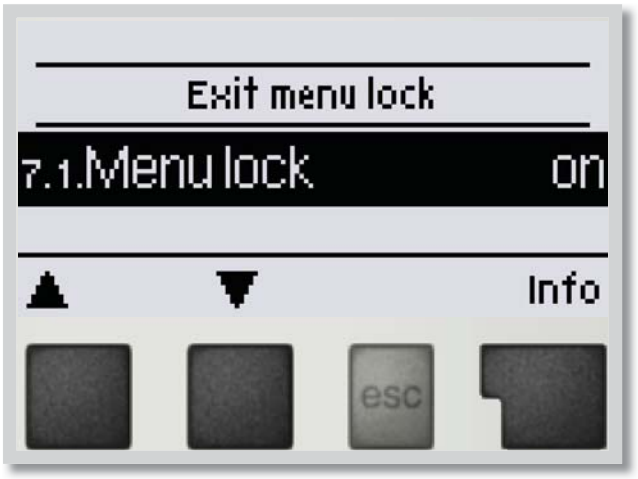
When active, the display backlight is switched off after 2 minutes of inactivity.

If a message is waiting, the backlight is not switched off.

6.14. – Temperature unit menu 6.14

This menu is used to select the temperature unit that is displayed.
°F, °C / Default °C

7 - Menu lock



Menu **“7. 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 - Measurement values
2 - Statistics
6 - Time & date
7 - Menu lock
8 - Service values

To lock the other menus, select **“Menu lock on”**. To enable the menus again, select **“Menu lock off”**.
Settings range: On, Off / Default setting: Off

Caution *It is recommended to activate the Menu lock in order to prevent unintentional changes by the user.*

8 - Service values

The menu **“8. - Service values“** can be used for remote diagnosis by a specialist in the event of an error, etc.

Caution *The menu “8. - Service values“ can be used for remote diagnosis by a specialist in the event of an error, etc.*

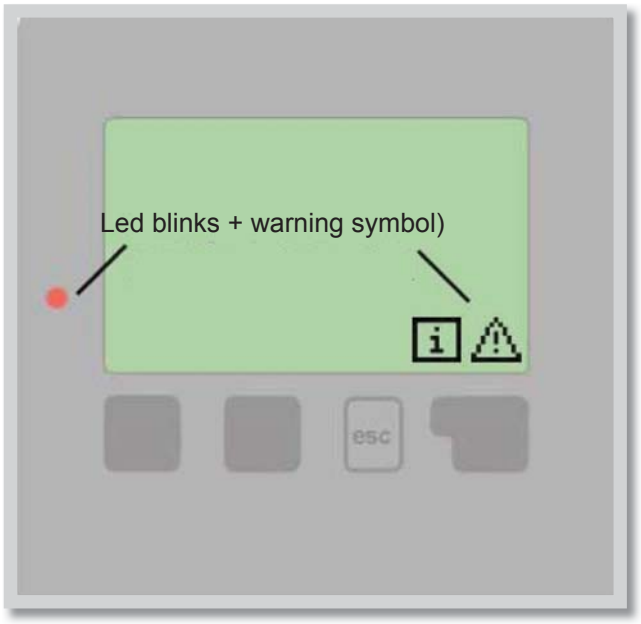
The menu can be closed at any time by pressing **“esc”**.

9 - Language

Menu **“9. Language”** can be used to select the language for the menu guidance. This is queried automatically during initial commissioning. The controller contains 18 languages.

Z - Malfunctions and maintenance

Z 1 - Malfunctions with error messages



If the controller detects a malfunction or a non-standard system state, 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.

If this concerns a defect (e.g. a defect sensor), contact a service provider!

Possible error messages:	**Notes for the specialist:**
Sensor x defective	Means that either the sensor, the sensor input at the controller or the connecting cable is defective. (Temperature resistance table for Pt1000 sensors in Chap. B2)
Collector alarm	This means that the collector temperature has risen above the temperature set under menu 5.6 (page 29).
Restart	Means that the controller was restarted, for example due to a power failure. Check the date & 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 ΔT between storage and collector is 50 °C or higher for 5 minutes without interruption..
Frequent on / off	A relay was switched on and off more than 5 times within 5 minutes.
AL failed	This text is displayed when AL ref-5 °C was not reached for the set Al residence time at the AL sensor.

Z 2 - Replacing the fuse

Danger

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!

Caution

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

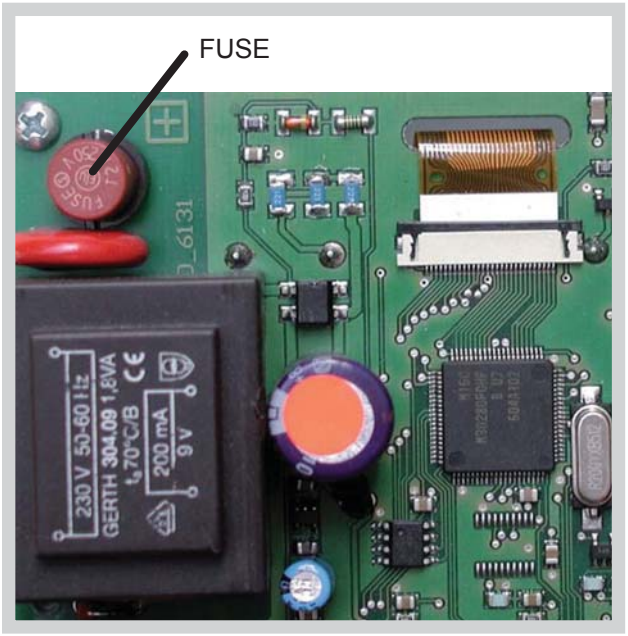


Fig. 3.1.1

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. 3.2.

Z 3 - Maintenance

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. 6.11)
- Assess/check plausibility of analyses (see Chap. 2)
- Check the error memory (see Chap. 2.4)
- Verify/check plausibility of the current measurement values (see Chap. 1)
- Check the switch outputs/consumers in manual mode (see Chap. 3.2)
- Possibly optimize the parameter settings

Z 4 - Useful hints and tricks

Instead of setting the flow rate for the system using a flow rate limiter, it is better to adjust the flow rate using the switch on the pump and by means of the “Max. speed” setting on the controller (see 6.9.4 Max. speed). This saves electricity!

The service values (see 8) include not only current measurement values and operating states, but also all of the settings for the controller. Write the service values down once commissioning has been successfully completed.

In the event of uncertainty as to the control response or malfunctions the service values are a proven and successful method for remote diagnosis. Write the service values down (see 8) at the time when the suspected malfunction occurs. Send the service value table by fax or e-mail with a brief description of the error to the specialist.

In a system with a swimming pool, the pool can be easily switched off (e.g. for the winter) using a simple function. Just press and hold the “esc” key for several seconds while the system is displayed. As soon as the pool is switched off or on, the respective information will be displayed.

It is recommended to record any analyses and data that are particularly important to you at regular intervals.

Z 5 - Disposal

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

This product must not be disposed of with unsorted municipal waste. The symbol indicates that this product should be disposed of separately from regular household waste streams. It is your responsibility to dispose of this and other electric and electronic equipment via designated collection facilities appointed by the government or local authorities.
Correct disposal and recycling will help prevent potential negative consequences to the environment and human health. For more detailed information about the disposal of your old equipment, please contact your local authorities, waste disposal service, or the shop where you purchased the product.

WEEE registration number: 02771/07-ECZ

J. - Appendix - Pump control - types

Manual pump settings (see “6.2. - Pump menu“)

J. 14.1. Pump

Settings for various pump models.

J. 14.2. - Output Signal

This menu determines the type of pump used:
Solar pumps perform at their highest power when the signal is also at its max, heating pumps on the other hand are set to highest power when the control signal is at the lowest.
Solar = normal, heating = Inverted.
Settings range: Normal, Inverted / Default setting: Normal

J. 14.3. - PWM off

This signal is put out when the pump is switched off (pumps that can detect cable break need a minimum signal).
Settings range: (Solar:) 0 to 50% / Default setting: 0% - Heating:) 50% to 100%/Default setting: 100%

J. 14.4. - PWM on

This signal is needed to turn the pump on at minimum speed.
Settings range: (Solar:) 0 to 50% / Default setting: 10% - (Heating:) 50% to 100% / Default setting: 90%

J. 14.5. - PWM Max

This determines the output signal for the highest speed of the pump, that is used e.g. during purging or manual operation.
Settings range: (Solar:) 50 to 100% / Default setting: 100% - (Heating:) 0% to 50% / Default setting: 0%

J. 17.3. - 0-10V Off

This voltage is put out when the pump is turned off (pumps that can detect cable break need a minimum voltage).
Settings range:(Solar:) 0,0 to 5,0 V /Default setting: 1.0 V - (Heating:) 5.0 to 0.0 V /Default setting: 4.0 V

J. 17.4. - 0-10V On

This voltage is needed to turn the pump on at minimum speed.
Settings range:(Solar:) 0.0 to 5.0 V/Default setting:1.0 V - (Heating:) 5.0 to 10.0 V/Default setting: 9.0 V

J. 17.5. - 0-10V Max

This determines the output voltage for the highest speed of the pump, that is used e.g. during purging or manual operation.
Settings range:(Solar:) 5.0 to 10.0 V /Default setting: 10.0 V- (Heating:) 0.0 to 5.0V/Default setting: 0.0 V

J. 17.6. - Speed when “On“

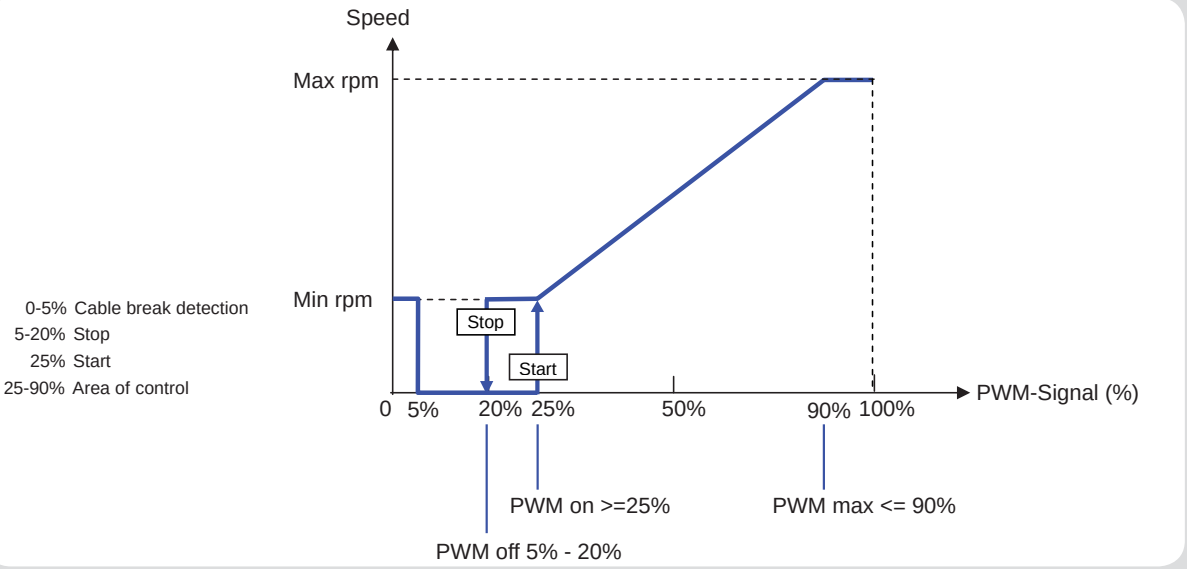
This menu determines the calculated and displayed speed of the pump. If e.g. 30% is set here and the signal set in „PWM on/0-10V on“ is put out, 30% speed is displayed. When the signal set in „PWM max/0-10V max“ is put out, 100% speed is displayed. Everything in between is calculated accordingly.
Settings range: 10 to 90 % / Default setting: 30 %

Caution: This function has no influence on the regulation, but changes only the speed displayed.

J. 14.7. - Show signal

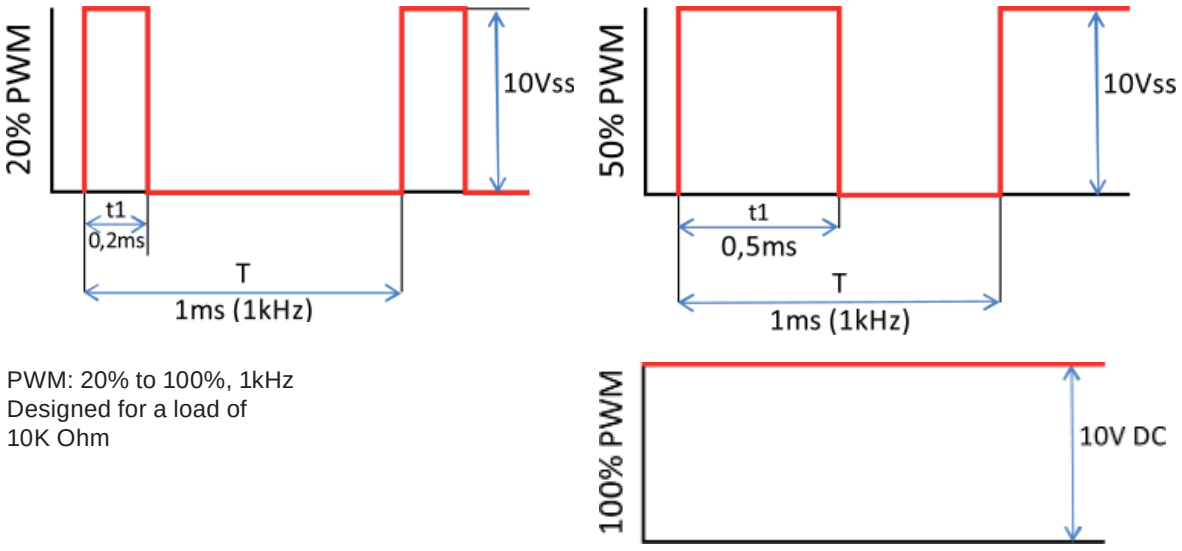
Displays the set signal in text and a graphical diagram.

J.2.3a Example for pump settings



J.2.3b Technical data PWM and 0-10V

Technical data PWM:



PWM: 20% to 100%, 1kHz
Designed for a load of
10K Ohm

Technical data 0-10V:
0-10V: 2V to 10V
(20% to 100%)
Designed for a load of
10K Ohm.

10V = 100% Speed
5V = 50% Speed
2V = 20% Speed
0V = Off

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