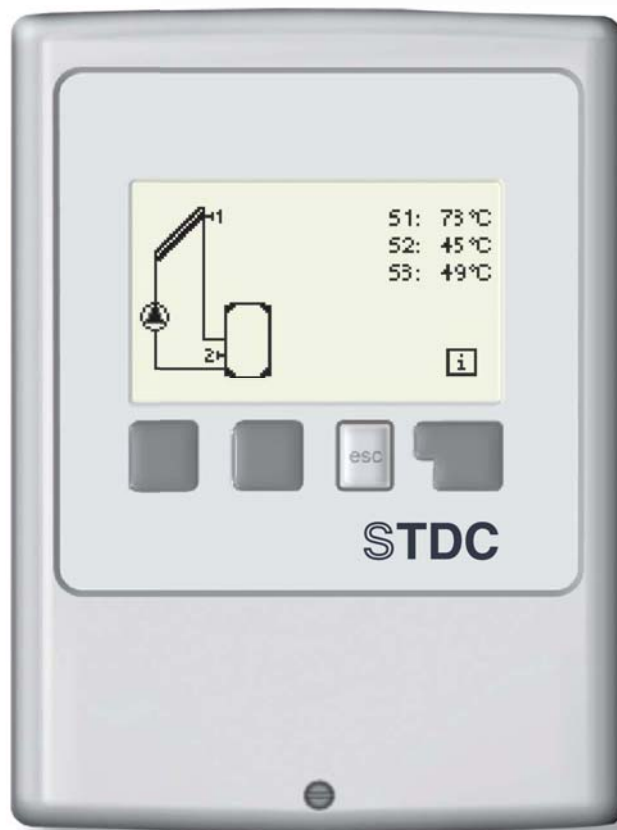


Instruction Manual

STDC E Controller



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CE

EN
v 1.5

Regulus

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Declaration

The Manufacturer declares that STDC E Solar Controller is marked with CE mark and meets the requirements of the following Directives:

- Directive 2006/95/EC – Low Voltage Directive (LVD)
- Directive 2004/108/EC - Electromagnetic Compatibility (EMC)

General information

Please read carefully!

This Instruction Manual contains basic instructions and important information on the safety, commissioning and the best use of the Controller. Please pay attention to this info and read it complete. Namely a specialist, a solar technician, should receive this info. The installation shall be performed respecting valid rules and standards. This Solar Controller does not replace any safety elements (like a safety or air discharge valve etc.) that shall be installed in a solar circuit as standard. The installation shall be done by a qualified worker who has been trained at the respective level.

For the user: The installer shall instruct you how to operate the system, explain its working and show the necessary settings. Keep this Manual with the Controller.



Danger

Changes to and tampering with the appliance may put at risk the safety and operation not only of the Controller but of the entire solar system

- It is forbidden to tamper with the Controller, with the exception of a written consent from the Manufacturer.
- It is forbidden to install any additional components into the Controller that have not been tested with it.
- The Controller shall not be used after an accident when its function might have been altered – e.g. after a fire. The Controller shall be switched off immediately.
- Use original spare parts only.
- Distributor's and Manufacturer's marking shall not be altered/removed.
- Setting shall be performed in compliance with this Manual.

A - DESCRIPTION AND INSTALLATION

A 1 - Specification

Electric specification:

Mains voltage	230 V ~ ±10 %
Mains frequency	50-60Hz
Power consumption	cca 1,5 VA

Switched power

mechanical relay, 460VA (AC1), 460W/AC3	1
0-10V output, 10% tolerance, 10kΩ or PWM output, 1kHz, 10V	1
Pt1000 input range measurement -40 ° C to 300 ° C	3

Max. permissible cable length from sensors and outputs:

sensor S1 (e.g. collector sensor)	<30 m
sensors S2 and S3 (e.g. storage tank sensor)	<10 m
mechanical	<10 m
PWM / 0...10V	<3m

Internal fuse	2 A slow-blow, 250 V
El. protection	IP40
Protection class	II
Sensor inputs	3× Pt1000
Measuring range	-40 to 300 °C

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	2-part, ABS plastic
Installation methods	wall installation
Overall dimensions	115 × 86 × 45 mm
Installation opening dimensions	108 × 82 × 25,2 mm
Display	Fully graphical display, 128 × 64 bodú
Operation	4 entry keys

Temperature resistance table for Pt1000 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

A 2 - About the controller

The STDC E controller is designed to control automatic operation of solar systems with solar collectors for heating fluids. This type is intended for use in solar systems with one collector field and one solar heat sink. This can be e.g. a storage water heater, a pool heat exchanger, or an accumulation tank for heating. The controller can be also used as a universal differential controller or as a thermostat switched by temperatures or time.

- 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 explanations
- menu lock can be activated to prevent unintentional setting changes
- usual preset parameters in factory setting

A 3 - Scope of supply

- STDC E Controller
- 2 Pt1000 temperature sensors for immersion sleeves
- 2 screws 3.5 × 35 mm and 2 plugs 6 mm for wall installation
- 4 strain relief clips with 8 screws
- 1 terminal block for PE
- replacement fuse 2A slow-blow
- Instruction Manual

A 4 - Explanation of symbols



Danger

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



Danger

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



Caution

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



Caution

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

B - Hydraulic variants

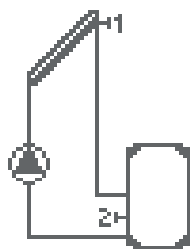
The following pictures represent possible hydraulic variants of solar systems controlled by STDC E controller.



Caution

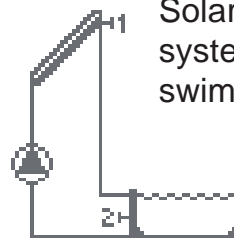
The following illustrations should be viewed only as schematic diagrams showing the respective hydraulic systems, and do not claim to be complete. The controller does not replace safety devices under any circumstances. Depending on the specific application, additional system components and safety components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

①



Solar thermal system with storage tank

②



Solar thermal system with swimming pool

③

Solid fuel boiler with storage tank



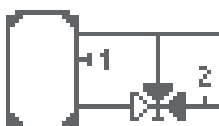
④

Heat transfer between storage tanks



⑤

Return line preheating



⑥

Thermostat



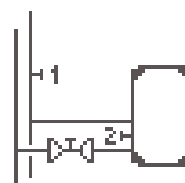
⑦

Universal ΔT

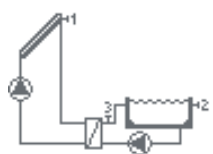


⑧

Stop valve



⑨



Solar thermal system with heat exchanger and swimming pool

1. B 1 - Solar thermal system with storage tank
2. B 2 - Solar thermal system with swimming pool
3. B 3 - Solid fuel boiler with storage tank
4. B 4 - Heat transfer between storage tanks
5. B 5 - Return line preheating
6. B 6 - Thermostat
7. B 7 - Universal ΔT
8. B 8 - Stop valve
9. B 9 - Solar thermal system with heat exchanger and swimming pool

C - Installation and wiring

C 1 - Wall installation

Install the controller only in dry areas.

Installation instructions:

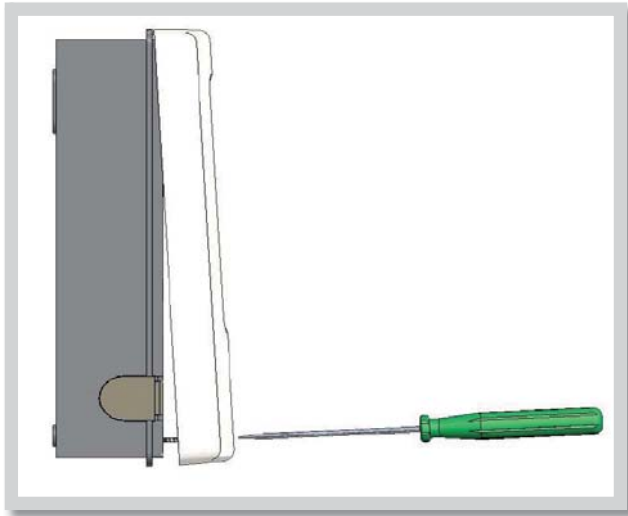


Fig. C 1.1

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 2 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.

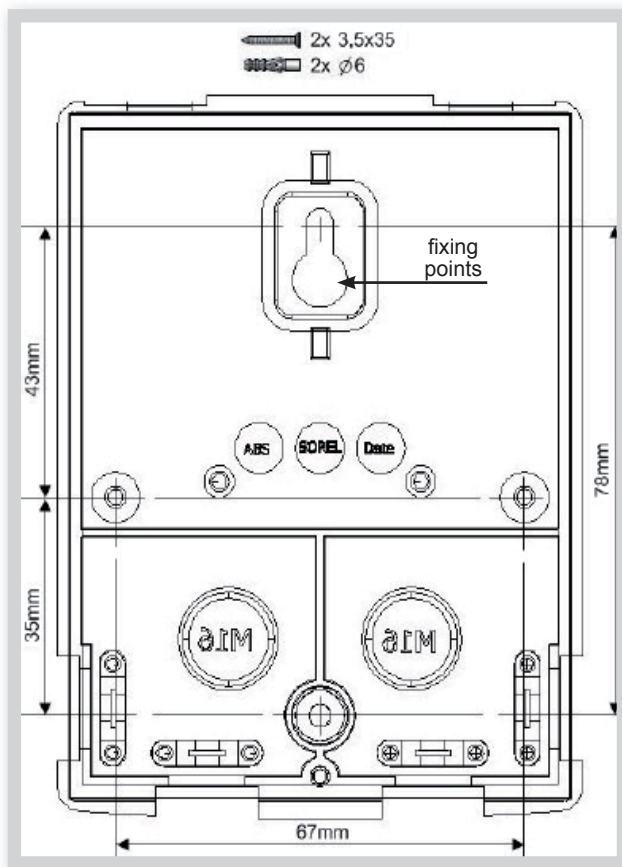


Fig. C 1.2

5. Mark the position on the wall. Using a drill and size 6 bit, drill 2 holes at the points marked on the wall and push in the plugs. 4 holes can be used alternatively.
6. Insert the upper screw and screw it in slightly.
7. Fit the upper part of the housing and insert the other screw.
8. Align the housing and tighten the all screws.

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! Electrical connections may only be made by a specialist and in compliance with the applicable regulations. Do not use the controller if the housing 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 left-hand side of the unit, and mains voltage cables only into the right-hand side



An all-pole disconnecting device shall be installed for switching off the controller.

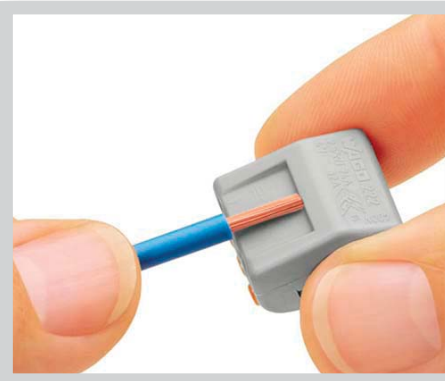


The controller is not equipped with a mains switch. For this purpose please use e.g. a circuit breaker. The cables being connected to the unit must not be stripped by more than 65mm, and the cable jacket must reach into the housing just to the other side of the strain relief.



We recommend the use of flexible cables to ease the installation in the clamp room.

Wiring instructions:



Obr. C 2.1 a

1. Make sure the circuit breaker is in off position and power supply is off.
2. Select a suitable hydraulic scheme (Chapters D1 to D7).
3. Open the controller.
4. Strip the cable in max. length of 55 mm, insert and fit the cable strain relief. Strip the last 9-10mm of all the wires (Fig. C 2.1 a).
5. Fix the PE terminal (see Fig. C 2.1 b).



Obr. C 2.1b



Warning! In order to prevent unintentional pressing the clamps during the box closing, the PE terminal shall be placed horizontal.

6. Connect the wires into the terminal following the appropriate wiring diagram. When stranded cable is used, press the orange locks with a small screwdriver (see Fig. C.2.1.c). When single-core cable is used, just pushing the wire in is sufficient (see Fig. C.2.1.c).

7. Push the plug into the terminal on the board.

8. Close the housing gently



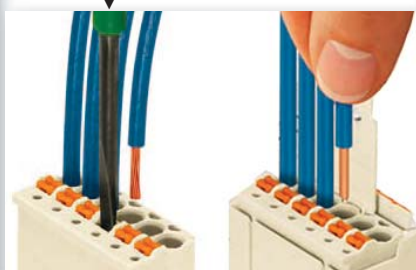
Warning! Mind the cables in order to prevent unintentional pressing the clamps (Fig. C 2.1 c).

9. Secure using a screw.

10. Switch on mains voltage and put controller in operation..

C.2.1.c

screwdriver





Caution

Mind the cables in order to prevent unintentional pressing the clamps.

C 3 - Installing the temperature sensors

The controller operates with Pt1000 temperature sensors.



Danger

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



Caution

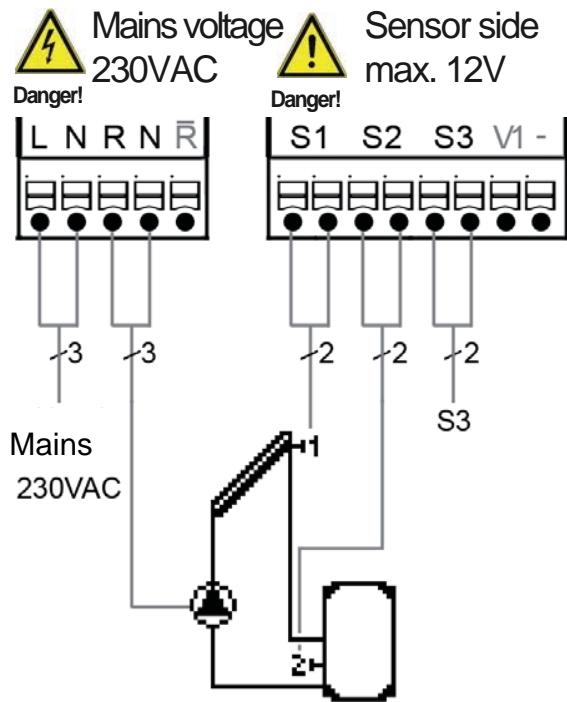
Max. S1 sensor lead length is 30 m with its cross section at least 0,75 mm².

Max. S2 and S3 sensor lead length is 10 m with its cross section at least 0,75 mm².

No contact resistance is permitted in the conductive connection to sensors!

D - Electric wiring

D 1 - Solar thermal system with storage tank



Sensor connection - max 12V

Terminal: connection for:

- S1 (2×) sensor 1 collector
- S2 (2×) sensor 2 storage tank
- S3 (2×) sensor 3 (free)

The polarity of the sensors is freely selectable.

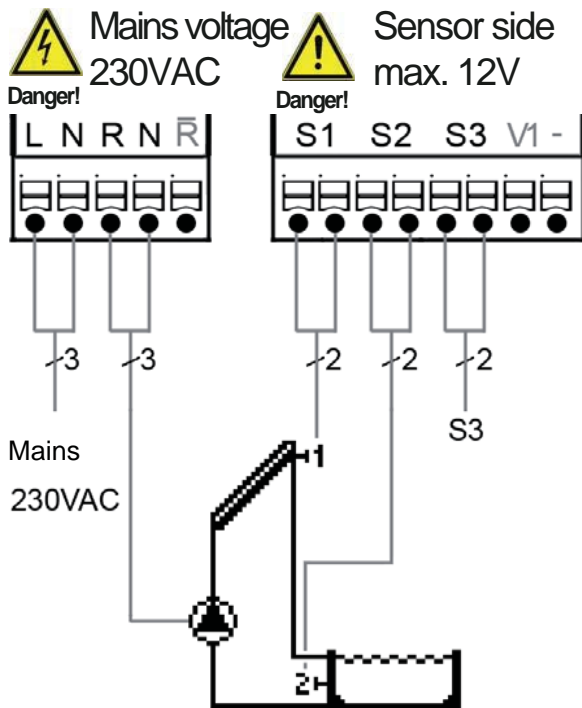
V1/ - 0-10V or PWM +/-

Mains voltage - 230V 50Hz

Terminal: connection for:

- L mains phase conductor L
- N mains neutral conductor N
- R pump L
- N̄ pump N
- R NC contact
- PE protective conductor (green-yellow)

D 2 - Solar thermal system with swimming pool



Sensor connection - max 12V

Terminal: connection for:

- S1 (2×) sensor 1 collector
- S2 (2×) sensor 2 pool
- S3 (2×) sensor 3 (free)

The polarity of the sensors is freely selectable.

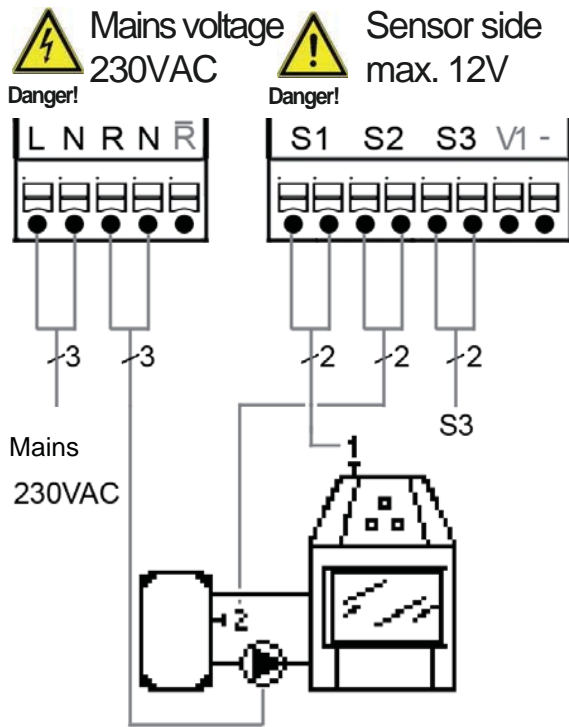
V1/ - 0-10V or PWM +/-

Mains voltage - 230V 50Hz

Terminal: connection for:

- L mains phase conductor L
- N mains neutral conductor N
- R pump L
- N̄ pump N
- R NC contact
- PE protective conductor (green-yellow)

D 3 - Solid fuel boiler with storage tank



Sensor connection - max 12V

Terminal: connection for:

- S1 (2×) sensor 1 solid-fuel boiler
- S2 (2×) sensor 2 storage tank
- S3 (2×) sensor 3 (free)

The polarity of the sensors is freely selectable.

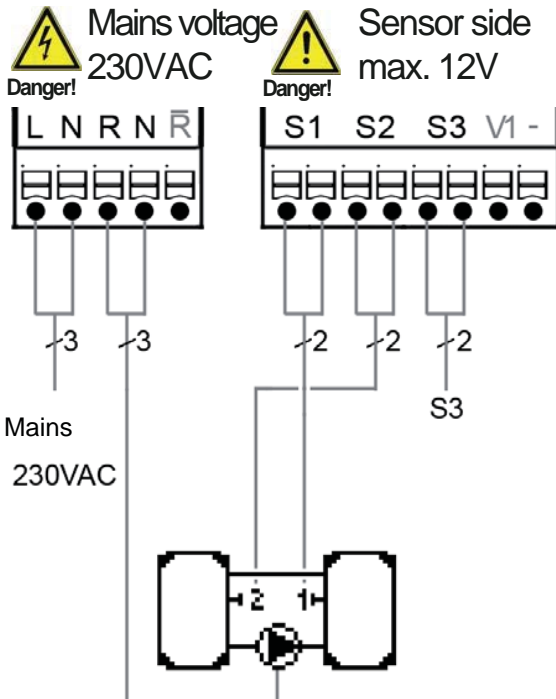
V1/ - 0-10V or PWM +/-

Mains voltage - 230V 50Hz

Terminal: connection for:

- L mains phase conductor L
- N mains neutral conductor N
- R pump L
- N̄ pump N
- R NC contact
- PE protective conductor (green-yellow)

D 4 - Heat transfer between storage tanks



Sensor connection - max 12V

Terminal: connection for:

- S1 (2×) sensor 1 storage tank
- S2 (2×) sensor 2 storage tank
- S3 (2×) sensor 3 (free)

The polarity of the sensors is freely selectable.

V1/ - 0-10V or PWM +/-

Mains voltage - 230V 50Hz

Terminal: connection for:

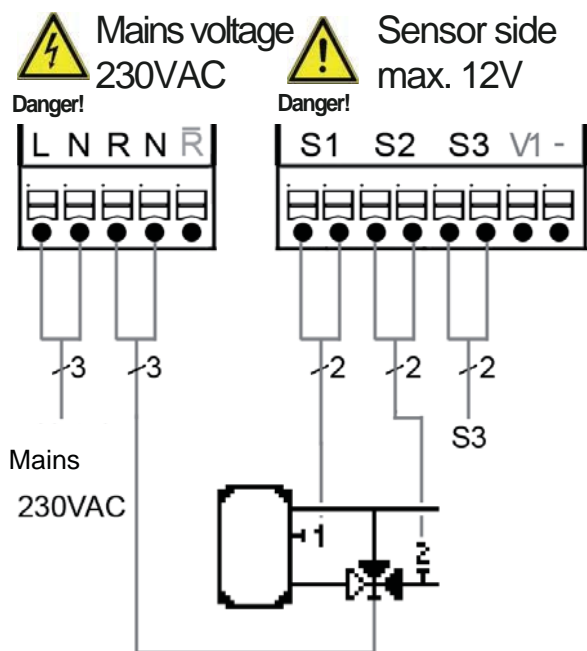
- L mains phase conductor L
- N mains neutral conductor N
- R pump L
- N̄ pump N
- R NC contact
- PE protective conductor (green-yellow)



Caution

Heat is flowing from storage tank 1 to storage tank 2.

D 5 - Return line preheating



Sensor connection - max 12V

Terminal: connection for:

- S1 (2×) sensor 1 storage tank
- S2 (2×) sensor 2 return line
- S3 (2×) sensor 3 (free)

The polarity of the sensors is freely selectable.

V1/ - 0-10V or PWM +/-

Mains voltage - 230V 50Hz

Terminal: connection for:

- L mains phase conductor L
- N mains neutral conductor N
- R pump L
- N̄ pump N
- R NC contact
- PE protective conductor (green-yellow)

Sensor wiring - 12V max. Mains - 230V

Low voltage max. 12 V~/= in the right part of the terminal board!

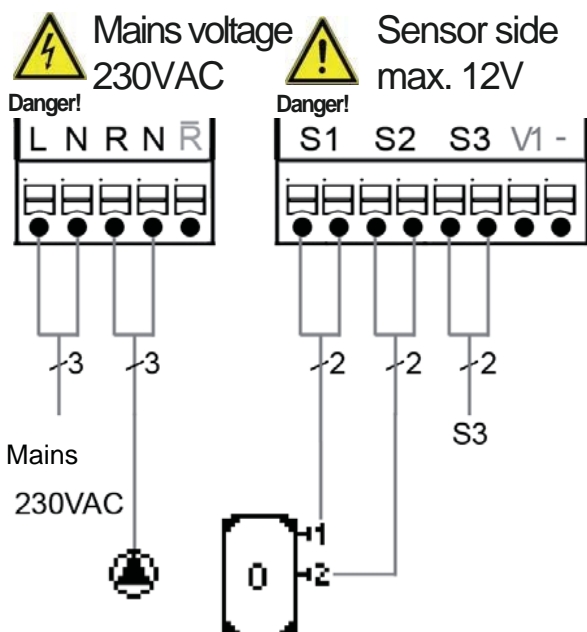


Actuating direction of the 3-way valve on the return line:

relay R off = valve closed = flow direction AB-B = no backup heating

relay R on = valve open = flow direction AB-A = flow through the storage tank

D 6 - Thermostat



Sensor connection - max 12V

Terminal: connection for:

- S1 (2×) sensor 1 storage tank
- S2 (2×) sensor 2 (free)
- S3 (2×) sensor 3 (free)

The polarity of the sensors is freely selectable.

V1/ - 0-10V or PWM +/-

Mains voltage - 230V 50Hz

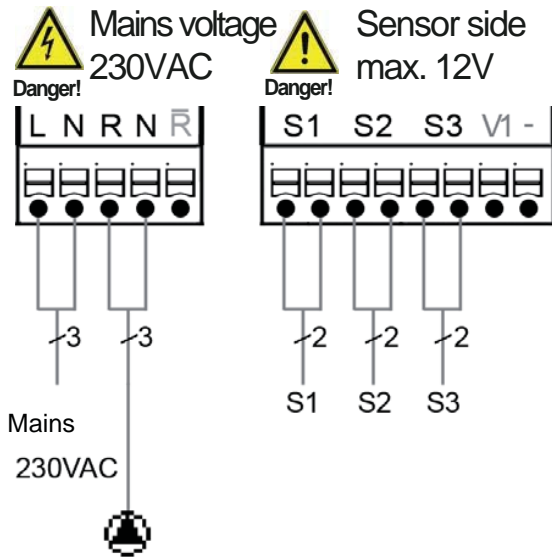
Terminal: connection for:

- L mains phase conductor L
- N mains neutral conductor N
- R pump L
- N̄ pump N
- R NC contact
- PE protective conductor (green-yellow)



If S2 sensor is installed, then S1 acts as a switch-on sensor and S2 as a switch-off sensor.

D 7 - Universal ΔT



Sensor connection - max 12V

Terminal: connection for:

- S1 (2×) sensor 1 control sensor
- S2 (2×) sensor 2 reference sensor
- S3 (2×) sensor 3 (free)

The polarity of the sensors is freely selectable.

V1/ - 0-10V or PWM +/-

Mains voltage - 230V 50Hz

Terminal: connection for:

- L mains phase conductor L
- N mains neutral conductor N
- R pump L
- N pump N
- R NC contact
- PE protective conductor (green-yellow)

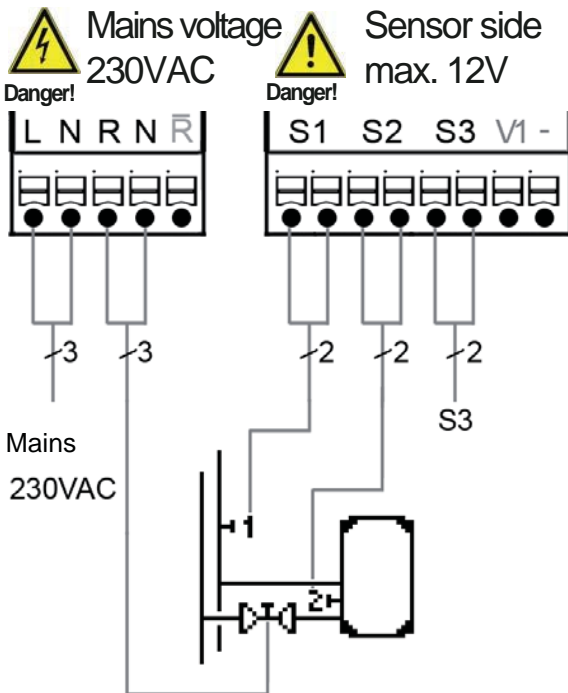


Caution

A brief description of switching function ΔT:

If the temperature at sensor 1 is higher than the temperature at sensor 2, relay R switches, turning pump on.

D 8 - Stop valve



Sensor connection - max. 12V

Terminal: connection for:

- S1 (2×) sensor 1 heating line
- S2 (2×) sensor 2 storage tank
- S3 (2×) sensor 3 (free)

The polarity of the sensors is freely selectable.

V1/ - 0-10V or PWM +/-

Mains voltage - 230V 50Hz

Terminal: connection for:

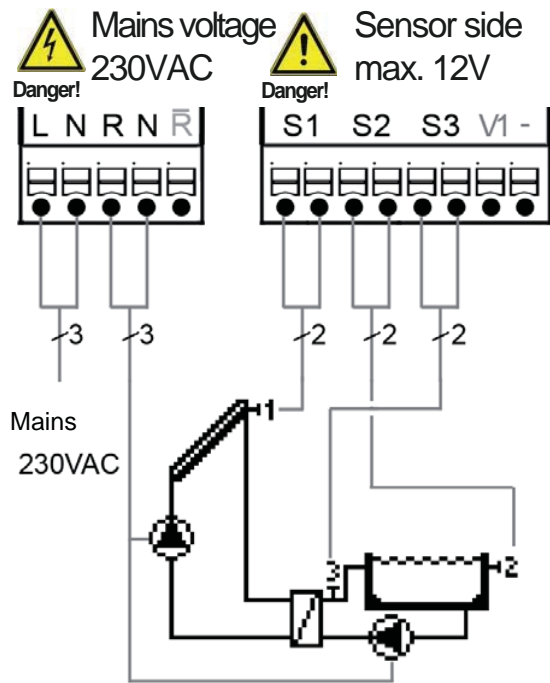
- L mains phase conductor L
- N mains neutral conductor N
- R regulating valve L
- N regulating valve N
- R NC contact
- PE protective conductor (green-yellow)



Caution

If the temperature at sensor 1 is higher than the temperature at sensor 2, relay R closes.

D 9 - Solar thermal system with heat exchanger and swimming pool [Sol./pool]



Sensor connection - max 12V

Terminal: connection for::

S1 (2×) sensor 1 solar collector

S2 (2×) sensor 2 pool

S3 (2×) sensor 3 pool water circuit

The polarity of the sensors is freely selectable.

V1/ - 0-10V or PWM +/-

Mains voltage - 230V 50Hz

Terminal: connection for:

L mains phase conductor L

N mains neutral conductor N

R valve L

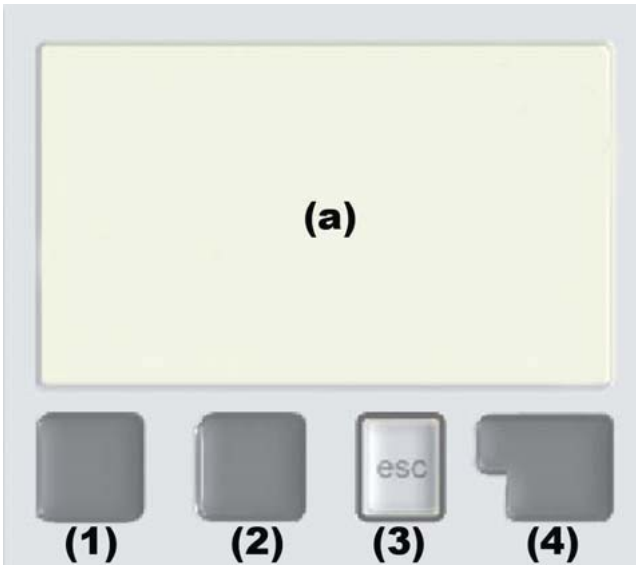
N̄ valve N

R NC contact

PE protective conductor (green-yellow)

E - Controller Use

E 1 - Display and input



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

Entries are made using four keys **(1) - (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 is shown in the display line directly above the keys; the right-hand key **(4)** generally has a confirmation and selection function.

Examples of key functions:

+/-	increase/decrease values
▼/▲	scroll menu up/down
YES/NO	confirm/reject
Details	additional information
Back	to previous screen
ok	selection confirmation
Confirm	setting confirmation

Display symbols:

	pump (rotates in operation)
	valve (direction of flow black)
	collector
	storage tank
	Solid-fuel boiler
	pool
	temperature sensor
	thermostat on/off
	warning/error message
	new information available

E 2 - Commissioning help - setup wizard



The first time the controller is turned on and after the language and time are set, 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, under

operating mode menu 4.2 „**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.



Caution

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

E 3 - Free commissioning

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

- Menu 10 Language (see F 10)
- Menu 7.2 Time and date (see F 7.4)
- Menu 7.1 Program selection (see F 7.1)
- Menu 5 Settings, all values (see F 5)
- Menu 6 Protective functions if adaptations are necessary (see F 6)
- Menu 7 Special functions if additional changes are necessary (see F 7)

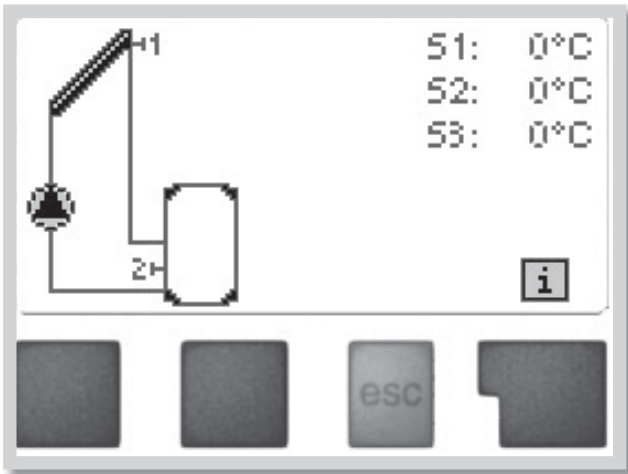
Finally, menu 4.2 under operating mode „**Manual**“ should be used to test the switch outputs with the consumers connected, and to check the sensor values. Then switch on automatic mode.



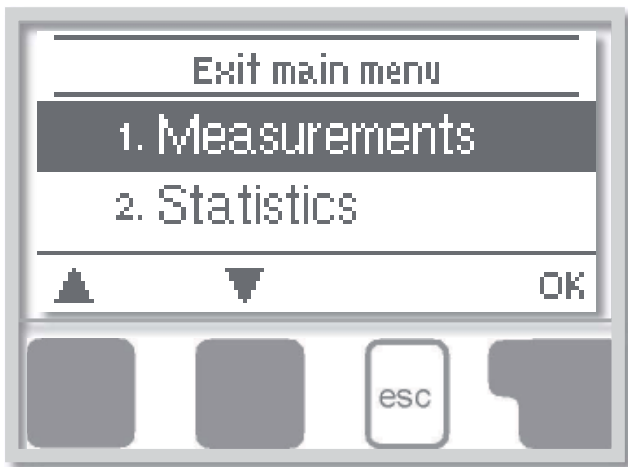
Caution

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

E 4 - Menu sequence and menu structure

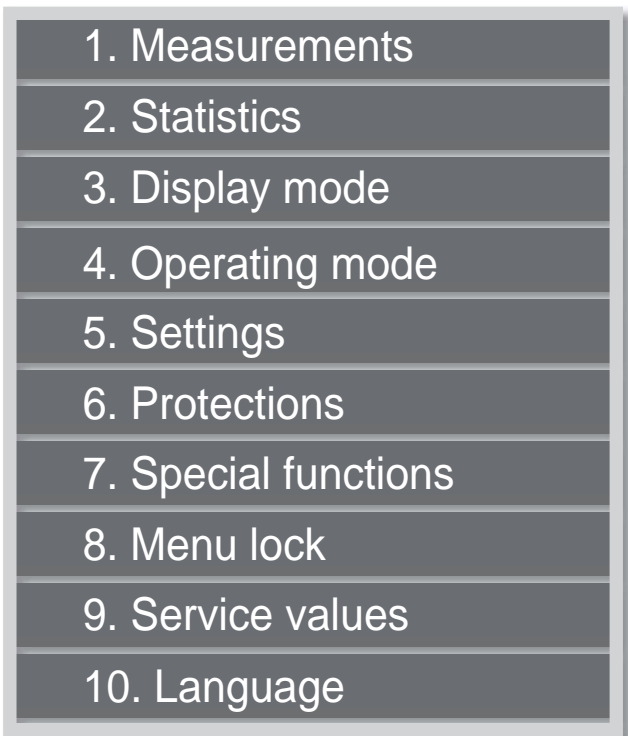


The graphics or overview mode appears when no key has been pressed for 2 minutes, or when the main menu is exited by pressing „esc“.



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. Select graphics mode or overview mode
4. Automatic mode, manual mode or switch unit off
5. Set parameters needed for normal operation
6. Solar and frost protection, recooling
7. Commissioning help, program selection, sensor calibration, clock etc.
8. Lock against unintentional setting changes
9. For diagnosis in the event of an error
10. Language selection

F - Menu description

F 1 - Measurements



Menu „**1. Measurements**” serves to display the currently measured temperatures. The menu is closed by pressing „**esc**” or selecting „**Exit measurements**”.



Selecting „**Details**” leads to a brief help text explaining the measurement values. Selecting „**Overview**” or „**esc**” exits the Info mode.



Caution

If „**Error**” appears on the display instead of the measurement value, then there may be a defective or improper temperature sensor.

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 D 7.5.

What measurement values are displayed depends on the selected program, sensors connected and the specific device connected.

F 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.

F 2.1 - Operating hours

Display of operating hours of the solar pump connected to the controller; various time ranges are available (day-year).

F 2.2 - Average temperature difference ΔT

Display of the average temperature difference between the reference sensors of the solar system with the consumer switched on.

F 2.3 - Heat output

Display of the approximate heat output of the solar system. This menu can be selected, however, only when the function of Heat quantity is activated under F 7.7.

F 2.4 - Graphic overview

This function provides a clearly-organized display of the data listed under F2.1 to F 2.3 as a bar graph. Various time ranges are available. The two left-hand keys can be used to page through the data.

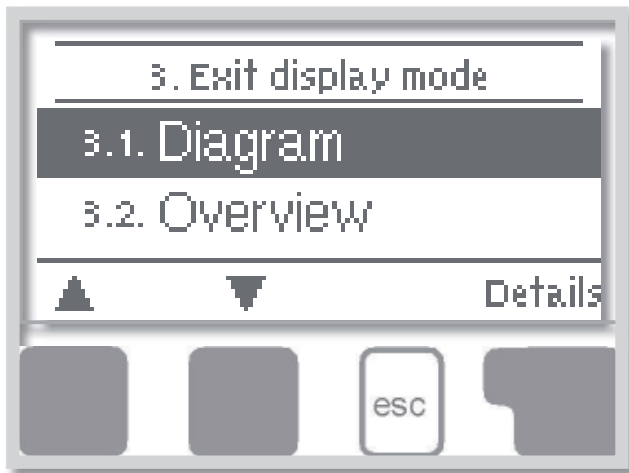
F 2.5 - Error messages

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

F 2.6 - Reset / Clear

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

F 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**”.

F 3.1 - Schematic

In schematic mode, the selected hydraulic systems are depicted with the measured temperatures and operating states of the connected consumers.

F 3.2 - Overview

In overview mode, the measured temperatures and operating states of the connected consumers are shown in text form.

F 3.3 - Alternating

In alternating mode the schematic mode and then the overview mode are active for 5 seconds at a time.

F 3.4 - Display standby 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.

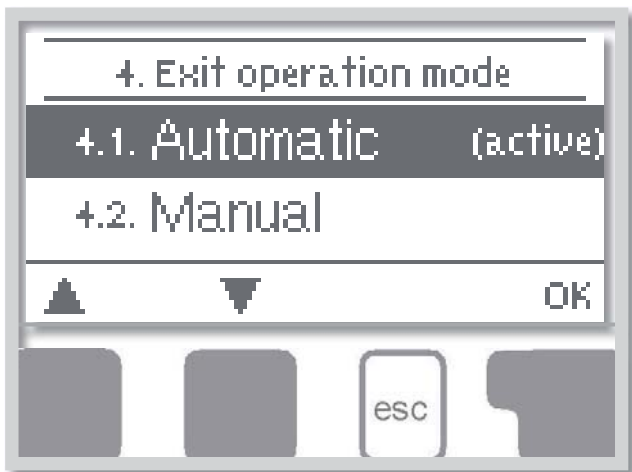
Setting range: On, Off / Default setting: Off



Caution

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

F 4 - Operating modes



In menu „4. Operating modes” 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 modes”.

F 4.1 - Automatic

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! After an interruption of the mains voltage the controller automatically returns to the last operating mode selected!

F 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

When operating mode „Manual” is activated, the current temperatures and the selected parameters are no longer considered. There is a danger of scalding or serious damage to the system. The operating mode „Manual” may only be used by specialists for brief function tests or during commissioning!

F 4.3 - Off

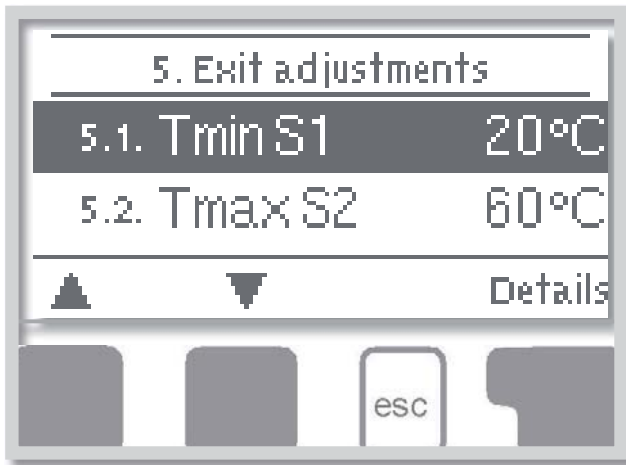


Danger

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 continue to be shown to provide an overview.

F 4.4 - Not in use

F 5 - Settings



The necessary basic settings required for the control function are made in menu „**5. Settings**”.

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

Parameters are set depending on the hydraulic variant selected.

The following pages contain generally valid settings descriptions.

F 5.1 - Tmin S1

If this value is exceeded at sensor S1, 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.
Setting range: 0-99 °C / default setting: 20 °C



Caution

When using hydraulic variant 3 with solid fuel boiler, at least 60 °C should be set. Consider instructions of boiler manufacturer!

F 5.4 - Tmax S2

If this value is exceeded at sensor S2, then the controller switches the associated pump and/or valve on. If the temperature at sensor S2 drops below this value again, then the pump and/or the valve are switched off again.
*Setting range: 0-99 °C (for hydraulic variants „**Thermostat**” and „**Universal ΔT**” this value may be set to Off)
Default setting: 60 °C (for hydraulic variant „**Solar system with pool**” the default setting is off)*



Danger

Temperature values which are set too 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.

F 5.8 - ΔT R1

Switch-on/switch-off temperature difference for relay R1

If the temperature difference ΔT between the reference sensors is exceeded, then the controller switches the pump on. If the temperature difference between the reference sensors drops to ΔT_{off} , then the pump is switched off again.

Settings range: ΔT from 3 to 20 °C / ΔT_{off} from 2 to ΔT minus 1

Default setting: ΔT 10 °C / ΔT_{off} 3 °C.



Caution

If a too small temperature difference is set, it may happen that the heat source cannot heat up the consumer to the pump switch-off temperature ($T_{source} - T_{off}$). Then the pump runs continuously.

F 5.11 - Tset (Thermostat1)

„Thermostat“ has 2 functions:

Backup (heating) - if the parameter value of „Tset on“ is lower than that of „Tset off“.

If the temperature at sensor S1 falls below „Tset on“ and the „Thermostat“ function is on, the backup heating relay switches on and stays on until the temperature reaches „Tset off“.

Example: The storage tank shall be heated from a backup source to keep its temperature above 50 °C. A heat source pump shall be wired to relay R.

Set Tset On = 50 °C, Tset Off = 58 °C. When the temperature in the tank falls below 50 °C, relay R will switch on and remain switched until the tank heats up to 58 °C.

Heat exchange (tank recooling) - if the parameter value of „Tset on“ is higher than that of „Tset off“.

If the temperature at sensor S1 falls below „Tset on“ and the „Thermostat“ function is on, the recooling relay switches on and stays on until the temperature reaches „Tset off“.

Example: When the tank temperature exceeds 60 °C, the surplus heat shall be conveyed into the heating system. A heat source pump shall be wired to relay R.

Set Tset On = 60 °C, Tset Off = 52 °C. When the temperature in the tank exceeds 60 °C, relay R will switch on and remain switched until the tank cools down to 52 °C.

Setting range:

Tset on: 10-90 °C / Default setting: 50 °C

Tset off: 0-99 °C / Default setting: 60 °C



Caution

If a S2 sensor is installed, then S1 sensor shall be used for switching on (Tset On) and S2 for switching off (Tset Off).

F 5.20 - Tmax S1

If this value is exceeded at sensor S1, 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.

Setting range: 0-99 °C (for hydraulic variants „Thermostat“ and „Universal ΔT “ this value may be set to Off)

Default setting: 60 °C (for hydraulic variant „Solar system with pool“ the default setting is off)



Danger

Temperature values which are set too 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.

F 5.21 - Thermostat periods

Set the desired periods of time when the thermostat should be active. 2 periods can be set per day, settings can also be copied to other days. Outside the set times the thermostat is switched off.

Setting range: from 00:00 to 23:59 / default setting: 06:00 to 22:00

F 5.22 - Tmax S3

Switch-off temperature at S3 sensor

If this value is exceeded at sensor S3, the controller switches the relay off. If the temperature falls below this value again, the controller switches the relay on again. For switching on and off further conditions shall be met as well.

Setting range: from 0 °C to 99 °C / default setting: 60 °C

(if the selected variant does not use S3, the default setting is Off).



Danger

Temperature values which are set too 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.

Party function (for Thermostat function only)

With the party function the storage tank is heated up once to the set temperature (TsetS1), disregarding the set thermostat times.

The party mode is enabled by pressing the „esc“ key for 3 seconds in the main menu. While this mode is active, the system heats up to the set value Tset Off unattached to preset thermostat times. The mode is ended once the required temperature is reached.

F 6 - Protections



Menu „**6. Protections**” can be used to activate and set various protective functions. These functions do not under any circumstances replace safety elements in solar systems!



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

F 6.1 - Seizing protection

Pump seizing protection using regular short turning on a pump or a valve. Seizing may occur after prolonged inactivity of valves or pumps. If this protection is activated, then the controller switches the relay in question and the connected consumer on every day at 12:00 or on Sundays at 12:00 (for weekly settings) for 5 seconds in order to prevent the pump and/or the valve from sticking after an extended stationary period.

Setting range: daily, weekly, off / default setting: Off

F 6.2 - Frost protection (solar only)

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, the pump switches off again.

Frost protection setting range: on, off / default setting: off

Frost protection stage 1 setting range: from -25 °C to 10 °C or off/default setting: 7 °C

Frost protection stage 2 setting range: from -25 °C to 8 °C or off/default setting: 5 °C

This function causes energy loss via the collector!

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

F 6.3 - System protection prevents overheating of solar system components (solar only).

System protection prevents overheating of system components by automatic shutdown of the solar pump. If „**AS Ton**” is exceeded at the collector, the pump is switched off. The collector is let at high temperature. The pump is activated again when the temperature drops below „**AS Toff**”.

Automatic shutdown - settings range: On / Off / Default: on AS Ton - settings range: 60 °C to 150 °C / Default: 120 °C

AS Toff - settings range: 50 °C to Ton minus 5 °C / Default: 110 °C



When solar system protection is on, the temperature in the idle collector will reach a high stagnation value and a corresponding high pressure in the system!

F 6.4 - Collector protection (solar only)

Collector protection prevents overheating of the collector. The pump is switched on to transfer heat from the collector to the storage tank.

If „**CP Ton**” is exceeded at the collector sensor, the pump is switched on until the temperature reaches „**CP Toff**” or the temperature „**CP Tmax storage**” is exceeded in the storage or pool.

Collector protection - Setting range: On, Off / default setting: Off

CP Ton settings range: 60 °C to 150 °C / Default: 110 °C

CP Toff settings range: 50 °C to Ton minus 10 °C / Default: 100 °C

CP Tmax storage settings range: 0 °C to 140 °C / Default: 90 °C



Danger

When collector protection is active, the storage or pool may get heated to a very high temperature!

F 6.5 - Col.- Alarm (solar only)

If this temperature is exceeded at the collector sensor when the solar pump is on, a warning is triggered and a warning message is shown in the display.

Collector alarm settings range: on / off / Default: off

Col. alarm - setting range: 60 °C to 300 °C / Default: 150 °C

F 6.6 - Recooling (solar only)

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.

Setting range: Recooling off, on / default setting: off

Setting range: Recooling Tset from 0 °C to 99 °C / default setting: 70 °C



Caution

This function causes energy loss via the collector! It may be combined e.g. with the System protection function (F 6.3) that causes collector overheating. It is also useful during holiday absence when no heat is used.

F 6.7 - Anti-Legionella

With the “**AL function**” activated the STDC makes it possible to heat the storage tank up to a higher temperature (“**AL Tsetpoint S2**”, provided that the energy source allows this. Time periods where the AL heat up is attempted are to be setup in the menu “**AL times**” Once the temperature “**AL Tset S2**” is reached, the controller will try to maintain this temperature for the time period set in “**AL residence time**”. When this happened, the time and date is saved and displayed in the menulog “**AL heat**”.

AL Function settings range: on / off / Default: off

AL Tset S2 (Thermostat uses both S1 and S2) settings range: 60°C to 99°C / default setting: 70°C

AL residence time - settings range: 1 to 60 minutes / default setting: 15 minutes

AL heat. (no setting): Displays the date and time of the last successful AL heat up

AL times - settings range: Mo-Su , 0-24h/ default setting: daily 3-5h



Caution

*The anti-Legionella function is switched off at delivery. **For solar systems:** This function may be used for storage tanks with installed S2 sensor only. After each successful performance of AL function, a message with performance date will appear on the display. **For Thermostat function:** S1 sensor is used for switching off. If both the sensors (S1 and S2) are connected, then both have to reach the Legionella temperature “**T Legionela S2**”.*



Danger

*During the anti-Legionella function the storage tank is heated up over the set value „**Tmax S2**”.*

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 tanks.



Danger

F 7 - Special functions



Menu „7. Special functions” is used to set basic items and expanded functions. Other than the time all settings may only be made by a specialist.



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

F 7.1 - Program selection

The suitable hydraulic variant for the specific application is selected and set here (see A2 Hydraulic variants). The associated diagram can be displayed by pressing „Details”.

Setting range: 1-9/ default value: 1



Caution

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

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

F 7.2 - Signal V1 (STDC E)

Settings for 0-10V or PWM controlled low-energy pumps.

When selecting this menu, you will be prompted to save the settings.

F 7.2.1 - Pump control

Settings for pump speed control. The below listed options are valid for STDC E controller:

Standard: Speed control for standard 230V pumps on output R1. Use this setting for standard pump only. PWM/0-10V outputs are switched off.

0-10V: Speed control for special pumps via low-energy pump output V1 by means of a 0-10V. Relay output R1 (230V) is switched on for power supply when output V1 is switched on.

PWM: Speed control for low-energy pumps via output V1 by means of a PWM signal. Relay output R1 (230V) is switched on for power supply when output V1 is switched on.

F 7.2.2 - Pump 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.

F 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

Setting range: Normal, Inverted / Default setting: Normal

When Output signal PWM is selected:

F 7.2.4. - PWM Off

This signal is sent when the pump is switched off (Pumps that can detect cable break need a minimum signal).

Setting range: (Solar:) 0 to 50% / Default setting: 0%

(Heating:) 50% to 100% / Default setting: 100%

F 7.2.5. - PWM On

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

F 7.2.6. - PWM Max

This determines the output signal for the highest speed of the pump, that is used e.g. during purging or manual operation.

Setting range: (Solar:) 50 to 100% / Default setting: 100%
(Heating:) 0% to 50%/Default setting: 0%

When Output signal 0-10V is selected:

F 7.2.4. - 0-10V Off

This voltage is used when the pump is turned off (Pumps that can detect cable break need a minimum voltage).

Setting range: (Solar:) 0.0 to 5.0V / Default setting: 1.0V
(Heating:) 5.0 to 10.0V/Default setting: 9.0V

F 7.2.5. - 0-10V On

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

Setting range: (Solar:) 5.0 to 10.0V / Default setting: 10.0V
(Heating:) 0.0 to 5.0V/Default setting: 0.0V

F 7.2.6. - 0-10V Max

This determines the output signal for the highest speed of the pump, that is used e.g. during purging or manual operation.

Setting range: (Solar:) 5.0 to 10.0V / Default setting: 10.0V
(Heating:) 0.0 to 5.0V/Default setting: 0.0V

F 7.2.7. - 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.

Setting range: 10 to 90 %/Default setting: 30 %



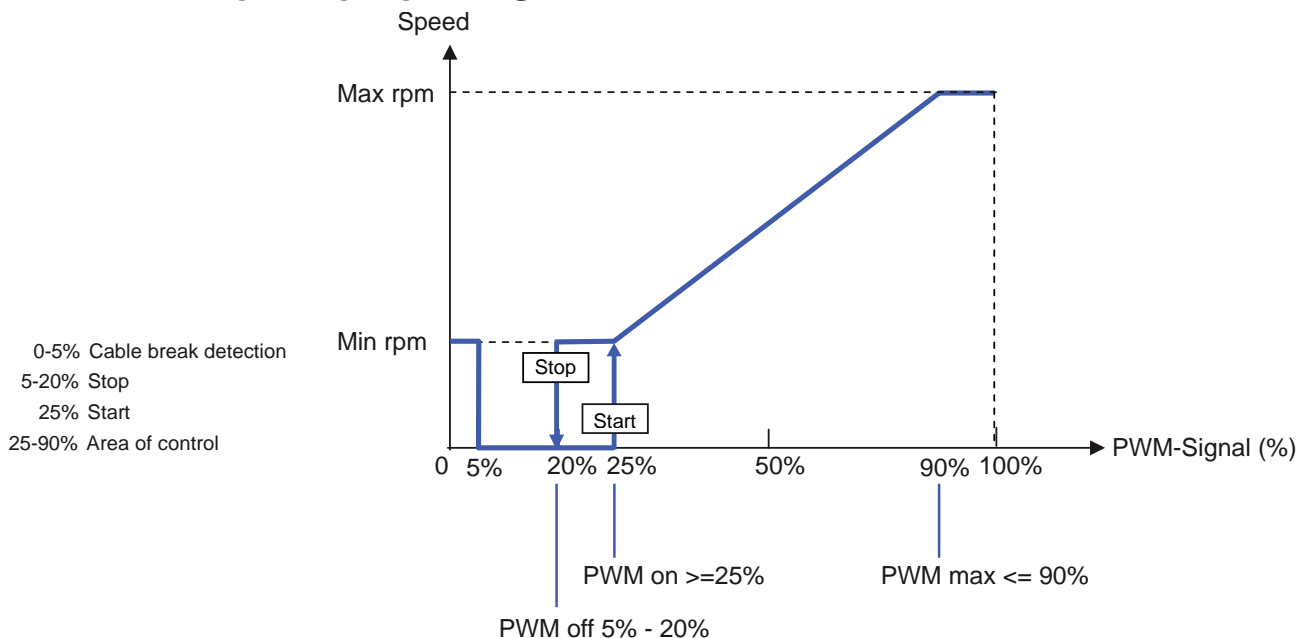
This function has no influence on the regulation, but changes only the speed displayed.

Caution

F 7.2.8. - Show signal

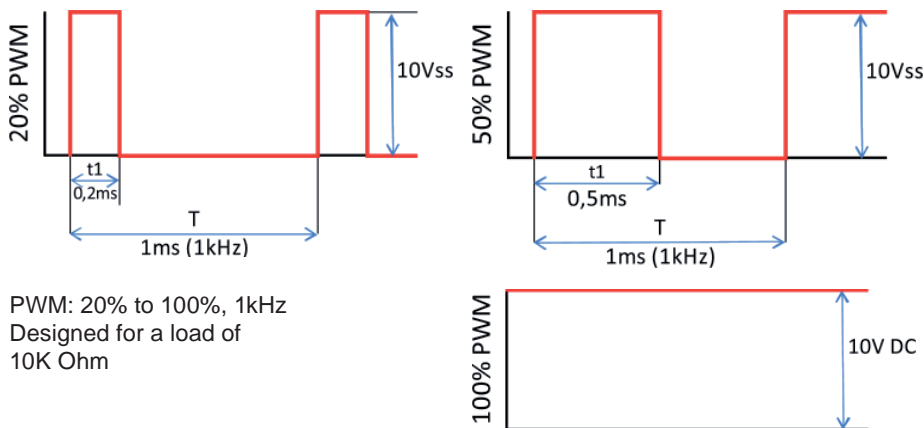
Displays the set signal in text and a graphical diagram.

F 7.2.8.a - Example for pump settings



F 7.2.8.b - Technical data for 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

F 7.3 - Speed control R1

If the speed control is activated, the STDC E makes it possible to vary the speed of standard pumps at relay by means of special internal electronics.



Danger

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.

F 7.3.1 - Speed control mode

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

Mode V1: Speed control set to ΔT , starts from the max. speed:

After the purging time (at max. speed) the controller switches to the set max. speed. If the temperature difference ΔT between the reference sensors (collector and storage tank) is smaller than the set value, then the speed is decreased by one step after the Sweep time expires. If the temperature difference between the reference sensors is greater than the set value, then the speed is increased by one step after the Sweep time expires. If the controller has adjusted the speed of the pump down to the smallest stage and the ΔT between the reference sensors is below the desired ΔT off, the pump is switched off.

Mode V2: Speed control set to ΔT , starts from the min. speed.

After the purging time (at max. speed) the controller switches to the set min. speed. If the temperature difference ΔT between the reference sensors (collector and storage tank) is greater than the set value, then the speed is increased by one step after the Sweep time expires. If the temperature difference ΔT between the reference sensors is below the set value, then the speed is decreased by one step after the Sweep time expires. If the controller has adjusted the speed of the pump down to the smallest stage and the ΔT between the reference sensors is below the desired $T\Delta_{off}$, the pump is switched off.

Mode V3: Speed control set to a constant collector temperature, starts from the min. speed.

After the purging time (at max. speed) the controller switches to the set min. speed. If the temperature at the reference sensor (collector, in systems with heat exchanger on relay 2 the heat exchanger instead) is greater than the setpoint to be set subsequently, then the speed is increased by one step after the Sweep time expires. If the temperature at the reference sensor (collector) is less than the setpoint to be set subsequently, then the speed is decreased by one step after the Sweep time expires.

Setting range: V1, V2, V3, off/default setting: off

F 7.3.2 - Purging time

During this time period, the pump is running with full speed (100%) to ensure troublefree 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 (V1-V3). Purging time can not be applied with PWM or 0-10V.

Setting range: 5 to 600 seconds / Default setting: 8 seconds

F 7.3.3 - Sweep time

Sweep time determines the inertia of the speed control to prevent strong fluctuations speed and subsequently in temperature. Sweep time is the time span for a complete change from minimum to maximum pump speed.

Setting range: 1 to 15 min. / Default setting: 4 min.

F 7.3.4 - Max. speed

The maximum speed of the pump is specified here.

Setting range: 70% to 100%/Default setting: 100%



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. 100% is the maximum voltage/frequency of the controller.

F 7.3.5 - Min. speed

The minimum speed of the pump at relay R1 is specified here.

Setting range: 30% to max. speed -5%/Default setting: 50%



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. 100% is the maximum voltage/frequency of the controller.

F 7.3.6 - Setpoint

This value is the control setpoint for mode V3 (see Chapter 7.3.1). If the value at the sensor drops below this, the speed is reduced. If it rises above this, the speed is increased.

Setting range: 0° to 90°C/Default setting: 60°C

F 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. Please note that the clock does not continue to run if the mains voltage is interrupted, and must therefore be reset.

F 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 0.5 °C.

Offset S1...S3 -10 °C to +10 °C / default setting: 0 °C



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.

F 7.6 - Commissioning help

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.



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.

F 7.7 - Factory settings

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



Caution

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

F 7.8 - Heat quantity

A simple heat metering function can be activated in this menu. Additional settings regarding the glycol, the percentage of glycol and the flow rate of the system are required. A correction value for the heat metering is also possible by adjusting the „**Offset ΔT** ”.



Caution

Keep in mind that the system is not changed, adjustments made in this menu are only used to calculate the heat volume and should be based on the actual system. Resulting data is only approximate value for function control!

F 7.8.1 - Heat metering

Activate or deactivate the heat metering function.

Settings range: On/off /default setting: Off

F 7.8.2 - AF type

Adjust the type of antifreeze used in the system. The solar fluid used in Regulus systems is of propylene type.

Setting range: Ethylene/Propylene / default setting: Ethylene

F 7.8.3 - Glycol portion

Adjust the percentage of glycol that has been used in the system. The solar fluid used in Regulus systems has a concentration of 50 %.

Setting range: 0-60 % /default setting: 40 %

F 7.8.4 - Flow rate

Adjust the flow rate according to the system.

Setting range: 10-5000 l/h /default setting: 500 l/h

F 7.8.5 - ΔT Offset

Since the calculation of the heat metering is based on the temperature of the collector and storage where measuring takes place, a possible deviation from the flow and return temperature can be compensated with this value.

Example: Displayed collector temp. 40 °C, measured flow temp. 39 °C, displayed storage temp. 30 °C, measured return temp. 31 °C means a setting of -20 %

(Displayed ΔT 10K, actual ΔT 8K => -20 % correction value)

Setting range: -50 % to +50 % /default setting: 0 %

F 7.9 - Start aid function

With some solar 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.



Caution

This function should only be activated by a specialist if problems arise with acquisition of measurement values.

F 7.10 - Daylight saving time

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

F 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:

- F 1 - Measurements
- F 2 - Statistics
- F 3 - Display mode
- F 7.4 - Time & date
- F 8 - Menu lock
- F 9 - Service values

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

Setting range: on, off/default setting: off

F 9 - Service values

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



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

Caution

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

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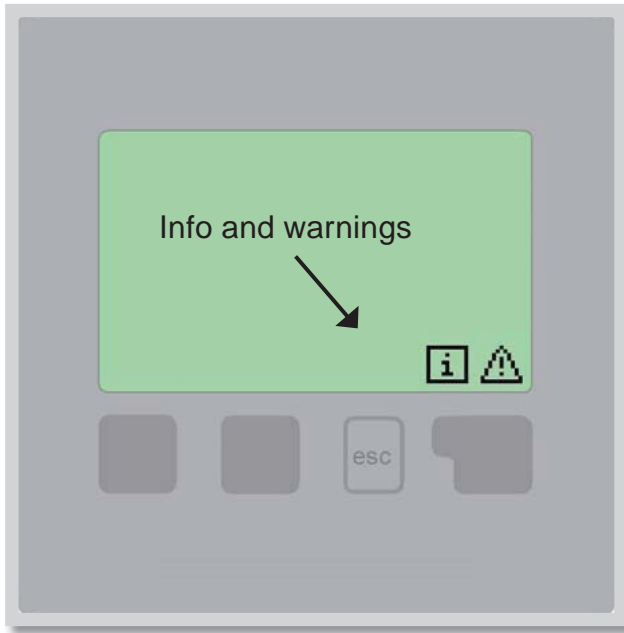
F 10 - Language

Menu „10. Language” can be used to select the language for the menu guidance. This is queried automatically during initial commissioning. The choice of languages may differ, however, depending on the device design. Language selection is not available in every device design!

The latest version contains the following languages: German, English, Spanish, French, Italian, Swedish, Polish, Portuguese, Greek, Finnish, Hungarian Turkish, Czech, Russian, Danish, Dutch, Croatian and Bulgarian.

G - Defects and Maintenance

G 1 - Malfunctions with error messages



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

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



Do not try to deal with this yourself. Consult a specialist in the event of an error!

Possible error messages:

Sensor x failed

Collector alarm

On / Off too often

Restart

Notes for the specialist:

Means that either the sensor, the sensor input at the controller or the connecting cable is defective.

Means that the collector temperature has exceeded the value set in Menu F 6.5.

The solar pump was switched more than 6 times in 5 minutes.

Means that the controller was restarted, for example due to a power failure. Check the date and time!

G 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.



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.

Exchange the defective fuse for a new one, locate the external source of the error (e.g. pump) and replace it. Then first recommission the controller and check the function of the switch outputs in manual mode as described under F 4.2.

Fig. G 2.1

G 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.

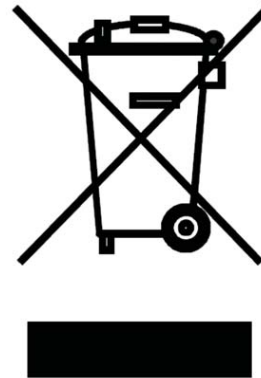
Performing maintenance:

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

G 4 - Disposal

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

European Directive 2002/96/EC requires that the equipment bearing this symbol on the product and/or its packaging 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

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