

Temperature controller TC

Installation and operating instructions



Read carefully before installation, commissioning and operation

Content

Safety Instructions	3
EU-Conformity	3
General instructions	3
Explanation of Symbols	3
Changes to the Unit	4
Warranty and Liability	4
Disposal and Pollutants	4
Description TC	5
About the Controller	5
Specifications	5
Scope of supply	5
Hydraulic Variants	6
Installation	6
Electrical Terminals	6
Electrical Connection	7
Wall Installation	7
Installing the Temperature Sensors	8
Temperature Resistance Table for Pt1000 Sensors	8
Operation	8
Display and Input	8
Commissioning help	9
1. Measurement values	9
2. Statistics	9
Operating hours	9
Heat quantity	10
Graphic overview	10
Error Messages	10
Reset / Clear	10
3. Operating mode	10
Automatic	10
Manual	10
Off	10
4. Settings	10
Tset on/off	10
PV contact	11
Set PV off	11
Operating hours	11
5. Protective Functions	12
Seizing Protection	12
Anti Legionella	12
6. Special Functions	13
Program selection	13
Time & Date	13
Sensor Calibration	13
Commissioning	13
Factory Settings	13
Daylight saving time	13
Eco Display Mode	13
7. Menu Lock	14
8. Service values	14
9. Language	14
Malfunctions/Maintenance	15

Safety Instructions

EU-Conformity

By affixing the CE mark to the unit the manufacturer declares that TC conforms to the following relevant safety regulations:

- EU low voltage directive 2014/35/EU
- EU electromagnetic compatibility directive 2014/30/EU

conforms. Conformity has been verified and the corresponding documentation and the EU declaration of conformity are kept on file by the manufacturer.

General instructions

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 and understood completely by the installation technician/specialist and by the system user before installation, commissioning and operation of the unit.

This unit is an automatic, electrical Thermostat Controller. Install the device only in dry rooms and under environmental conditions as described under "Technical Data".

The valid accident prevention regulations, VDE regulations, the regulations of the local power utility, the applicable DIN-EN standards and the installation and operating instruction of the additional system components must also be observed.

Under no circumstances does the unit replace any safety devices to be provided by the customer!

Installation, electrical connection, commissioning and maintenance of the device may only be carried out by an appropriately trained specialist. Users: Make sure that the specialist gives you detailed information on the function and operation of the unit. Always keep these instructions in the vicinity of the unit.

The manufacturer does not take over any liability for damage caused through improper usage or non-compliance of this manual!

Explanation of Symbols



Danger

Failure to observe these instructions can result in electrocution.



Danger

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



Caution

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



Caution

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

Changes to the Unit

- Changes, additions to or conversion of the unit are not permitted without written permission from the manufacturer.
- It is likewise forbidden to install additional components that have not been tested together with the unit.
- If it becomes clear that safe operation of the unit is no longer possible, for example because of damage to the housing, turn the Unit off immediately.
- Any parts of the unit or accessories that are not in perfect condition must be exchanged immediately.
- Use only original spare parts and accessories from the manufacturer.
- Markings made on the unit at the factory must not be altered, removed or made illegible.
- Only the settings described in these instructions may be set using the Unit.



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

Warranty and Liability

The Unit has been manufactured and tested with regard to high quality and safety requirements. The warranty and liability shall not include, however, any injury to persons or material damage that is attributable to one or more of the following causes:

- Failure to observe these installation and operating instructions.
- Improper installation, commissioning, maintenance and operation.
- Improperly executed repairs.
- Unauthorized structural changes to the unit.
- Use of the device for other than its intended purpose.
- Operation above or below the limit values listed in the 'Specifications' section.
- Force majeure.

Disposal and Pollutants

The unit conforms to the European RoHS 2011/65/EU for the restriction of the use of certain hazardous substances in electrical and electronic equipment.



Under no circumstances may the device be disposed of with the normal household waste. Dispose of the unit only at appropriate collection points or ship it back to the seller or manufacturer.

About the Controller

The Thermostat Controller TC facilitates efficient use and function control of your solar or heating system possible while its handling is intuitive. After every input step the suitable functions are matched to the keys and explained in a text above. In the menu 'measurement values and settings' are help text and graphics in addition to key words.

The TC can be used for the various system variants.

Important characteristics of the TC are:

- Depiction of graphics and texts using a lit display.
- Simple viewing of the current measurement values.
- Statistics and system monitoring by means of statistical graphics
- Extensive setting menus with explanations.
- Menu block can be activated to prevent unintentional setting changes.
- Resetting to previously selected values or factory settings.

Specifications

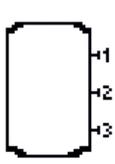
Model	TC	Thermostat Controller	
Temperature controller class	I		
Energy efficiency	1%		
Standby loss	0,5 W		
Request type heater	On/Off		
Electrical specifications:			
Power supply		100 - 240VAC, 50 - 60 Hz	
Power consumption / standby		0,5W - 2,5W/ 0,5 W	
Total switched power		3000W	
Internal fuse	1	1	
Protection category		IP40	
Protection class / overvoltage category		II / II	
Inputs/Outputs			
Sensor inputs	3	3	-40 °C ... 300 °C
Outputs mechanical relay		1	
potential free relay	R1	3000VA for AC1/3000W for AC3	
Max. cable length			
Pt1000 sensor		<10m	
mechanical relay		<10m	
Permissible Ambient Conditions			
for controller operation		0 °C - 40 °C, max. 85 % rel. humidity at 25 °C	
for transport/storage		0 °C - 60 °C, no moisture condensation permitted	
Other Specifications and Dimensions			
Housing design		2-part, ABS plastic	
Installation methods		Wall installation, optionally panel installation	
Overall dimensions		115 mm x 86 mm x 45 mm	
Aperture installation dimensions		108 mm x 82 mm x 25,2 mm	
Display		Fully graphical display, 128 x 64 dots	
Real Time Clock		RTC with 24 hour power reserve	
Operation		4 entry keys	

Scope of supply

- Thermostat Controller
- 3 screws 3,5 x 35 mm and 3 plugs 6 mm for wall installation.
- 4 strain relief clips with 8 screws, replacement fuse 2TA
- TC Installation and operating instructions

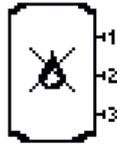
Hydraulic Variants

 The following illustrations should be regarded only as schematic representations of the respective hydraulic systems and do not claim to be complete. Under no circumstances should the controller replace any safety devices. Depending on the specific application, additional system and safety components such as check valves, non-return valves, safety temperature limiters, scalding protectors, etc., may be required.



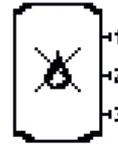
S1 65°C
S2 40°C
S3 25°C

Program 1 Temperature display



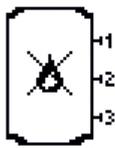
S1 65°C
S2 40°C
S3 25°C

Program 2 Thermostat function
Sensor for switch on / off.



S1 65°C
S2 40°C
S3 25°C

Program 3 Thermostat function
Switch on sensor S1.
Switch off sensor S2.



S1 65°C
S2 40°C
S3 25°C

Program 4 Thermostat function
Switch on sensor S1.
Switch off sensor S3.



S1 55°C

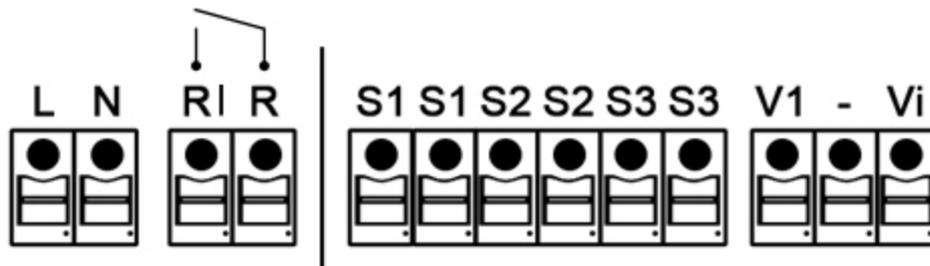
Program 5 Thermosyphon

Installation

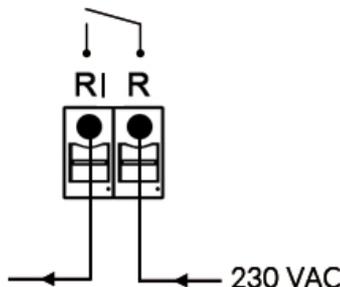
Electrical Terminals

 **Mains voltages**
230 VAC 50 - 60 Hz

 **Low voltages**
max. 12 VAC / DC



Terminal:	Connection for:	Terminal:	Connection for:
L	Network outer conductor L	S1	Temperature Sensor 1
N	Network neutral conductor N	S1	Temperature Sensor 1 (GND)
RI	Relay (NO normally open) NO	S2	Temperature Sensor 2
R	Relay (C common) C	S2	Temperature Sensor 2 (GND)
		S3	Temperature Sensor 3
		S3	Temperature Sensor 3 (GND)
		V1	0-10V / PWM output for speed controlled HE-pumps
		-	GND
		Vi	PWM return signal (e.g., pump - not used)



The PE protective conductor must be connected to the PE metal terminal block!

 The matching terminal assignment to your system or hydraulic diagram, see the descriptions in the respective hydraulic diagram, see "Hydraulic Variants" on page 6.

Electrical Connection



Before working on the unit, switch off the power supply and secure it against being switched on again! Check that there is no power flowing! Electrical connections may only be made by a specialist and in compliance with the applicable regulations. The unit may not be put into operation if there is visible damage to the housing, e.g. cracks.



The unit may not be accessible from behind.



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.

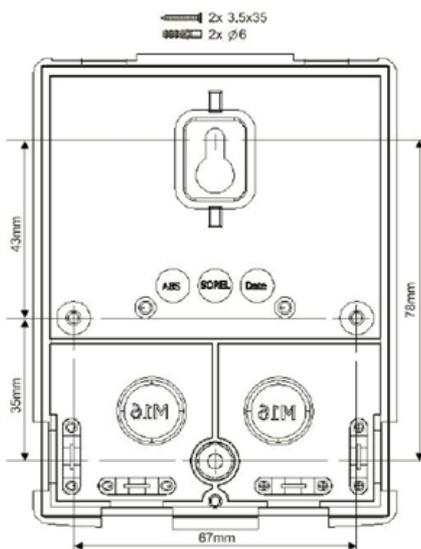
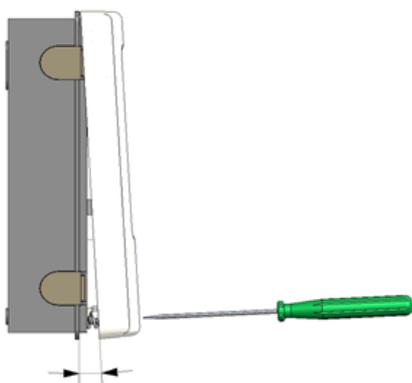


The customer must provide an all-pole disconnecting device, e.g. an emergency heating switch.



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.

Wall Installation



1. Unscrew cover screw completely.
2. Carefully pull upper part of housing from lower part.
3. Set upper part of housing aside. Do not touch the electronics.
4. Hold the lower part of the housing up to the selected position and mark the two mounting holes. Make sure that the wall surface is as even as possible so that the housing does not become distorted when screwed on.
5. Using a drill and size 6 bit, drill three holes at the points marked on the wall and push in the plugs. Optionally the housing can be mounted with 4 mounting holes.
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.

Installing the Temperature Sensors

The controller operates with Pt1000 temperature sensors which are accurate to 1 °C, ensuring optimal control of system functions.



If desired, the sensor cables can be extended to a maximum of 30 m using a cable with a cross-section of at least 0.75 mm². Ensure there is no contact resistance! Position the sensor precisely in the area to be measured! Only use immersion, pipe-mounted or flat-mounted sensors suitable for the specific area of application with the appropriate permissible temperature range.



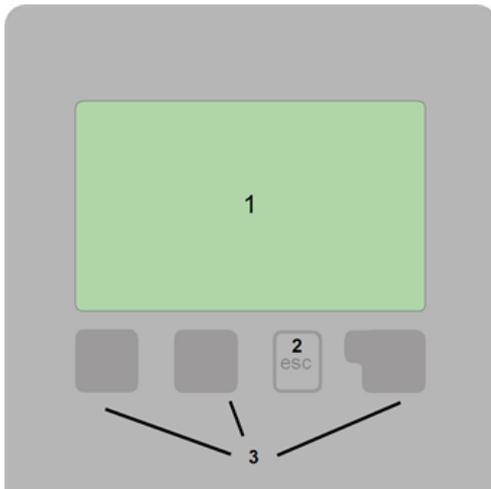
Low-voltage cables such as temperature sensor cables must be routed separately from mains voltage cables. Feed temperature sensor cables only into the left-hand side of the unit, and mains voltage cables only into the right-hand side.

Temperature Resistance Table for Pt1000 Sensors

°C	-20	-10	0	10	20	30	40	50	60	70	80	90	100
Ω	922	961	1000	1039	1077	1116	1155	1194	1232	1270	1308	1347	1385

Operation

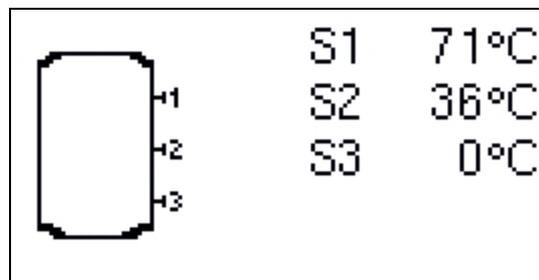
Display and Input



The display's (1), extensive text and graphical mode, enables simple, almost self-explanatory, operation of the controller.

Entries are made using 4 keys (2+3), to which contextual functions are assigned. The 'esc' key (3) is used to cancel an entry or to exit a menu. If applicable, a request for confirmation appears to save the made changes.

The function of the other 3 keys (4) is shown in the display right above the keys. The right-hand key generally has a confirmation and selection function.



The graphics mode appears if no key is pressed for 2 minutes or after exiting the main menu with 'esc'.

Hitting the "esc" key in the graphics mode takes you directly to the main menu.

-  Warning/Error message
-  New information available

Examples for key settings:

- +/- Increase / decrease values
- ▼/▲ Scroll down / up menu
- Yes/No agree / reject
- About further information
- Back to the previous display
- Ok Confirm selection
- Confirm Confirm setting

Commissioning help



1. Set language and time

2. Commissioning help / setup wizard

- a) select or
- b) skip.

The setup wizard guides through the necessary basic settings in the correct order. Each parameter is explained in the control display. Pressing the „esc“ key takes you back to the previous setting.

b) With free commissioning the settings should be made in the following order:

- menu 10. Language
- menu 3. Time, Date and Operating Times.
- menu 5. Heating Circuit Settings, all values.
- menu 6. Protection Functions (if any adjustments necessary).
- menu 7. Special Functions (if any adjustments necessary).



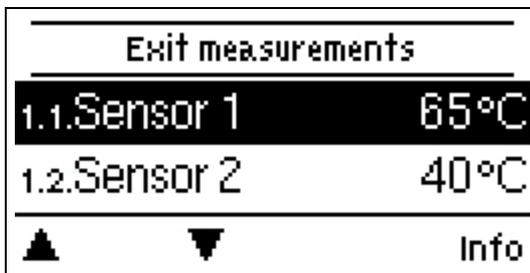
The setup wizard can be accessed in menu 7.2. at any time.



Consider the explanations for the individual parameters on the following pages and check if further settings are necessary for your application.

3. In Menu operating mode "Manual", test the switch outputs with the consumers connected and check the sensor values for plausibility. Then set to automatic mode. see " Manual " on page 10

1. Measurement values



Serve to display the current measured temperatures.



If ‚error‘ appears on the display instead of the measurement value, there may be a defective or incorrect temperature sensor.



If the cables are too long or the sensors are not well-placed, small deviations in the measurement values may occur. In this case, the display values can be compensated by adjustments in the controller - see ‚Sensor calibration‘. The selected program, connected sensors and the specific model design determine which measurement values are displayed.

2. Statistics



Serve for function control and long-term monitoring of the system.



For system data statistics it is essential for the time to be set accurately on the controller. Please note that the clock continues to run for about 24 hours if the mains voltage is interrupted, and afterward must be reset. Improper operation or an incorrect time may result in data being cleared, recorded incorrectly or overwritten. The manufacturer accepts no liability for the recorded data!

Operating hours

Display of the operating hours of the relay connected to the controller, whereby different time ranges (day-years) are available!

Heat quantity

Display of the consumed heat quantity from the system in kWh.

Graphic overview

This results in a clear illustration of the data as a bar graph. Different time ranges are available for comparison. You can page through with the two left keys.

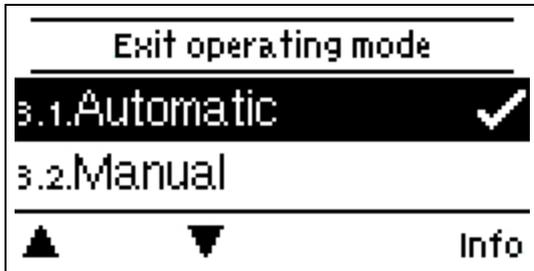
Error Messages

Display of the last 15 errors in the system with indication of date and time.

Reset / Clear

Resetting and clearing the selected statistics. Selecting ,all statistics' clears everything except the error log.

3. Operating mode



To specify the operating modes for the heating circuit. After an interruption of the mains voltage, the controller automatically returns to the last operating mode selected.



Only in automatic mode does the controller use the set operating times and the correspondingly set target flow temperatures!

Automatic

The automatic mode is the normal mode of the controller. A correct controller function under consideration of the current temperatures and the set parameters is only present in automatic mode! After an interruption of the mains voltage, the controller automatically returns to the last operating mode selected.

Manual

In ,Manual' mode, the individual relay outputs and the connected consumers can be checked for proper functioning and correct assignment.

 The operating mode ,Manual' may only be used by specialists for brief function tests, e.g. during commissioning! Function in manual mode: The relays and thus the connected consumers are switched on and off by pressing a key, with no regard to the current temperatures and set parameters. At the same time, the current measurement values of temperature sensors are also shown in the display for the purposes of function control.

Off

 If the operating mode "off" is enabled, all control functions are turned off. The measured temperatures are displayed for the overview.

4. Settings



The basic settings for the control function of the heating circuit are applied. Basic settings applied.



By no means does the controller replace the safety appliances on site!

Tset on/off

Set temperature on / off

temperature for switching the thermostat on / off is set here.

Program 1

In this program only temperatures are shown in the display without thermostat switch.

Programm 2

Thermostat is switched on, if the temperature at sensor S1 is below "Tset on" and is switched off again when "Tset off" is reached at sensor S1.

Programm 3

Thermostat is switched on, if the temperature at sensor S1 is below "Tset on" and is switched off again when "Tset off" is reached at sensor S2.

Programm 4

Thermostat is switched on, if the temperature at sensor S1 is below "Tset on" and is switched off again when "Tset off" is reached at sensor S3.



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

PV contact

This sensor input could be used as a PV-contact of Photovoltaic-System.

This sensor is observed to "short circuit" (PV-Contact closed).

If the PV contact is closed, programs 2 - 4 "**Set PV off**" are taken into account as the switch-off temperature.

Depending on the requirements and the program, the storage tank can be heated up to a higher temperature level via PV power.



Information about the operation and the connection of PV-contact, refer to the technical description of your PV system.

Set PV off

The temperature set here is set **as the switch-off temperature** in programs 2 - 4 when the PV contact is closed considered.

Operating hours

Here the desired periods are set in which the thermostat function is approved. For each weekday, three times can be specified, furthermore, you can copy individual day to other days. The thermostat function is shut down outside of the set times.

5. Protective Functions



The 'Protective functions' can be used by specialists to activate and set various protective functions.



By no means does the controller replace the safety appliances on site!

Seizing Protection

If the anti-seizing protection is activated, the controller switches the heat pump and the mixer on/off at 12:00 noon for 5 seconds to prevent seizing of the pump/valve after long periods of inactivity.

Anti Legionella

With the help of the anti legionella function (hereinafter referred to as: AL), the system can be heated up at selected times in order to free it of legionella.



In the delivery state, the anti legionella function is switched off.



As soon as it has heated up with "AL" turned on, information with the date will be shown in the display.



This anti legionella function does not offer any secure protection against legionella, because the controller requires an adequate added amount of energy and the temperatures cannot be monitored in the entire storage area and the connected pipe system. For secure protection against legionella, a heating up to the required temperature as well as a simultaneous circulation of water in the storage and pipe system must be guaranteed through energy sources and external control devices.



During the operation of the anti legionella function, if applicable, the storage is heated above the set value "Tmax", which may lead to scalding and system damage.

6. Special Functions



Used to set basic items and expanded functions.



The settings in this menu should only be changed by a specialist.

Program selection

Here the hydraulic variation fitting to the respective use case is selected and set.



The program selection normally occurs only once during the first entry into service by a specialist. An incorrect program selection may lead to unpredictable errors.

Time & Date

Serve to set the current time and date.



For system data statistics it is essential for the time to be set accurately on the controller. Please note that the clock continues to run for about 24 hours if the mains voltage is interrupted, and afterward must be reset. Improper operation or an incorrect time may result in data being cleared, recorded incorrectly or overwritten. The manufacturer accepts no liability for the recorded data!

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.



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

Commissioning

Starting 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 ,esc' more than once takes you back to the selection mode, thus cancelling the commissioning help see " Commissioning help " on page 9



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.

Factory Settings

All settings can be reset, returning the controller to its delivery state.



All of the controller's parametrization, statistics, etc. will be lost irrevocably. The controller must then be commissioned once again.

Daylight saving time

If this function is activated, the controller automatically changes to winter time or summer time (DST, Daylight Savings Time).

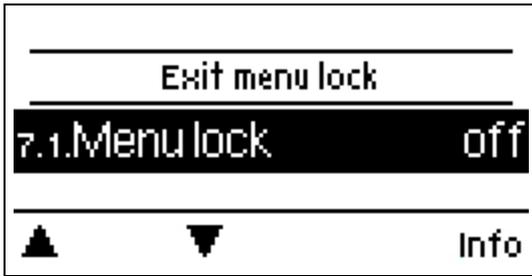
Eco Display Mode

In Eco Display Mode the backlight of the display is switched off if no buttons are pushed for 2 minutes.



If a message exists, the backlight does not switch off until the message has been scanned by the user.

7. Menu Lock



Secure the controller against unintentional changing and compromise of basic functions.

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
3. Times
8. Menu lock
9. Service values

8. Service values



Serve for remote diagnosis by a specialist or the manufacturer in the event of errors, etc.



Enter the values into the table when an error occurs.

9. Language



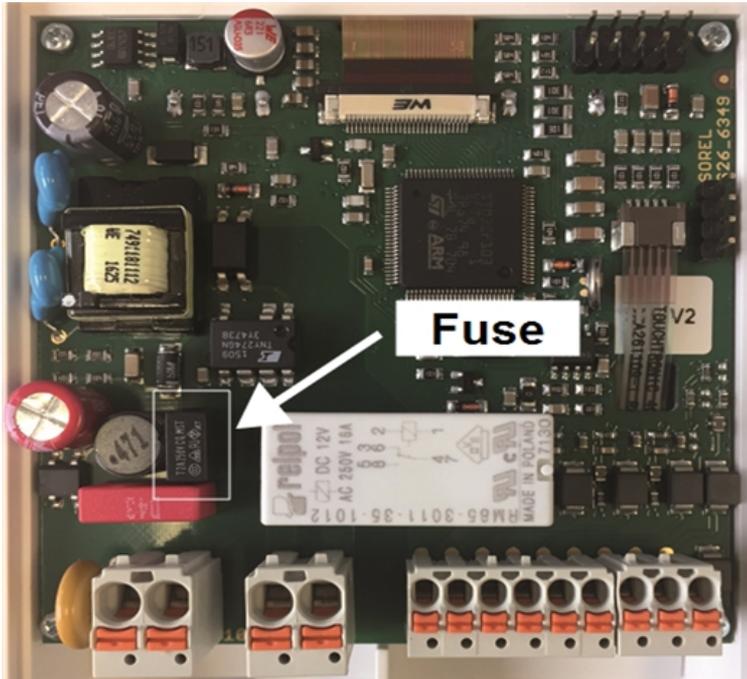
To select the menu language. For initial commissioning the query is automatic.

Malfunctions/Maintenance

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 that there is no power flowing!

 Only use the supplied spare fuse or a fuse of the same design with the following specifications: 2 AT/250 VSOREL Art. No.: 2125



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, open the device as described in section C, remove the old fuse and check it.

Exchange the defective fuse for a new one, locate the external source of the error (e.g. the pump) and exchange it. Then first recommission the controller and check the function of the switch outputs in manual mode as described in Section 3.2..

Maintenance

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

Performing maintenance:

- Check date & time ()
- Assess/check plausibility of statistics (see Section 2)see " Serve for function control and long-term monitoring of the system. " on page 9
- Check the error memory see " Error Messages " on page 10
- Verify/check plausibility of the current measurement values see " Measurement values " on page 9
- Check the switch outputs/consumers in manual mode see " Manual " on page 10
- Possibly optimize the parameter settings.

Possible error messages

Possible error messages	Notes for the specialist
Check time	Means that the solar pump is/was in operation between 11:00 PM and 4:00 AM. Normally happens when the clock is incorrectly set, but can also suggest a malfunction while the solar circulation pump was in operation outside of hours with sun.
Time & Date	This display appears automatically after a longer network disruption, because the time & date must be examined and, if applicable, adjusted.
Sensor x defective	Means that either the sensor, sensor input on the controller or the connection line is / or was defective (see " Temperature Resistance Table for Pt1000 Sensors " on page 8)
AL failed	Is displayed when AL ref -5 °C was not measured for the set AL residence time at the AL sensor.

Final declaration

Although these instructions have been created with the greatest possible care, the possibility of incorrect or incomplete information cannot be excluded. Subject as a basic principle to errors and technical changes.

Date and time of installation:

Name of installation company:

Space for notes:

Your specialist dealer:

Manufacturer:

SOREL GmbH Mikroelektronik
Reme-Str. 12
D - 58300 Wetter (Ruhr)

+49 (0)2335 682 77 0
+49 (0)2335 682 77 10

info@sorel.de
www.sorel.de