

# Temperature difference controller LTDC-E

## Installation and operating instructions



**Read carefully before installation, commissioning and operation**

# Content

<b>Safety Instructions</b> .....	<b>3</b>
EU-Conformity .....	3
General instructions .....	3
Explanation of Symbols .....	3
Changes to the Unit .....	4
Warranty and Liability .....	4
Disposal and Pollutants .....	4
<b>Description LTDC-E</b> .....	<b>4</b>
About the Controller .....	4
Specifications .....	5
Scope of supply .....	5
Hydraulic Variants .....	6
<b>Installation</b> .....	<b>7</b>
Electrical Terminals .....	7
Connection example electric heating rod .....	7
Wall Installation .....	8
Electrical Connection .....	9
Installing the Temperature Sensors .....	9
Temperature Resistance Table for Pt1000 Sensors .....	9
<b>Operation</b> .....	<b>10</b>
Display and Input .....	10
Commissioning help .....	11
<b>1. Measurement values</b> .....	<b>11</b>
<b>2. Statistics</b> .....	<b>12</b>
Operating hours .....	12
Heat quantity .....	12
Graphic overview .....	12
Error messages .....	12
Reset / Clear .....	12
<b>3. Operating mode</b> .....	<b>13</b>
Automatic .....	13
Manual .....	13
Off .....	13
<b>4. Settings</b> .....	<b>14</b>
Tmin S1 .....	14
ΔTR1 .....	14
Tmax S2 .....	14
Tmin Storage X .....	14
Additional heating .....	14
Tset .....	14
Hysteresis .....	15
Sensor additional heating .....	15
Sensor 2 additional heating .....	15
Teco .....	15
Energy Saving Mode .....	15
Periods .....	15
Circulation .....	15
Tset .....	15
Hysteresis .....	15
Times .....	15
<b>5. Protective Functions</b> .....	<b>15</b>
Anti Legionella .....	15
System protection .....	16
Collector protection .....	16
Recooling .....	16
Frost Protection .....	16
Seizing Protection .....	16
Collector alarm .....	16
<b>6. Special Functions</b> .....	<b>17</b>

Program selection .....	17
Pump settings V1/ Signal V1 .....	17
Type of pump/ Type of signal .....	17
Pump/ Profile .....	17
Output Signal .....	17
PWM / 0-10V off .....	17
PWM / 0-10V on .....	17
PWM / 0-10V max. ....	17
Show signal .....	17
Speed control .....	17
Variant .....	17
Purging time .....	18
Sweep time .....	18
Max. Speed .....	18
Min. Speed .....	18
Heat quantity .....	18
Sensor Calibration .....	18
Commissioning .....	18
Factory Settings .....	19
Starting aid .....	19
Purging time .....	19
Increase .....	19
Time & Date .....	19
Daylight saving time .....	19
Eco Display Mode .....	19
Temperature unit .....	19
Network .....	20
Access Control .....	20
Ethernet .....	20
CAN bus ID .....	20
Sensor transmission interval .....	20
<b>7. Menu Lock</b> .....	<b>21</b>
<b>8. Service values</b> .....	<b>21</b>
<b>9. Language</b> .....	<b>21</b>
<b>Malfunctions/Maintenance</b> .....	<b>22</b>
<b>Additional Information</b> .....	<b>23</b>
CAN bus .....	23
<b>Tips</b> .....	<b>23</b>

# Safety Instructions

## EU-Conformity

By affixing the CE mark to the unit the manufacturer declares that the LTDC-E 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.

The device is an automatic, electric Temperature difference controller for/in Solar system and similar applications. 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

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- 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

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The unit has been manufactured and tested with regard to high quality and safety requirements. The unit is subject to the statutory guarantee period of two years from the date of sale. 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

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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.

## Description LTDC-E

### About the Controller

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The Temperature difference controller LTDC-E facilitates efficient use and function control of your Solar 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 LTDC-E can be used with different variants of installations, see "Hydraulic Variants" on page 6.

Important characteristics of the LTDC-E 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

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### Electrical specifications:

Power supply		100 - 240VAC, 50 - 60 Hz
Power consumption / standby		0,5 W - 2,5 W/ 0,5 W
Internal fuse	1	2A slow blow 250V
Protection category		IP40
Protection class / overvoltage category		II / II

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### Inputs/Outputs

Sensor inputs	4	PT1000	Measuring range -40 °C ... 300 °C
mechanical relay	R1 - R2	460VA for AC1 / 460W for AC3	
mechanical relay	R3	3000 VA für AC2 / 3000 W AC3	
0-10V/PWM output	V1	for 10 k $\Omega$ working resistance 1 kHz, level 10 V	

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### Max. cable length

Collector sensor	S1	<30m
other Pt1000 sensor		<10m
0-10V/PWM		<3m
mechanical relay		< 10m

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### 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

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### Other Specifications and Dimensions

Housing design	2-part, ABS plastic
Installation methods	Wall installation, optionally panel installation
Overall dimensions	163 mm x 110 mm x 52 mm
Aperture installation dimensions	157 mm x 106 mm x 31 mm
Display	Fully graphical display, 128 x 64 pixel
Light diode	multicolour
Real Time Clock	RTC with 24 hour power reserve
Operation	4 entry keys

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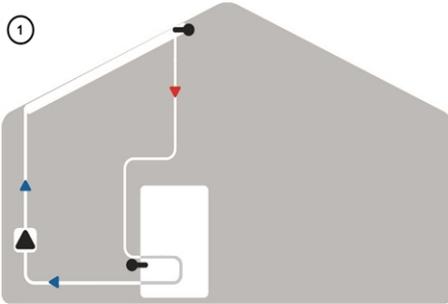
## Scope of supply

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- Temperature difference controllerLTDC-E
- 3 screws 3,5 x 35 mm and 3 plugs 6 mm for wall installation.
- 6 strain relief clips with 12 screws, replacement fuse 2TA
- LTDC-E Installation and operating instructions

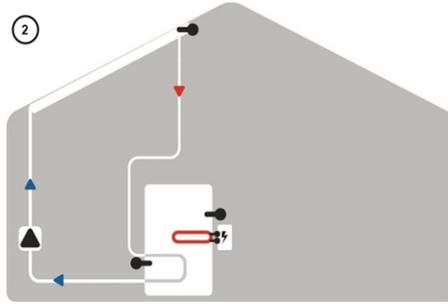
# Hydraulic Variants

 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.



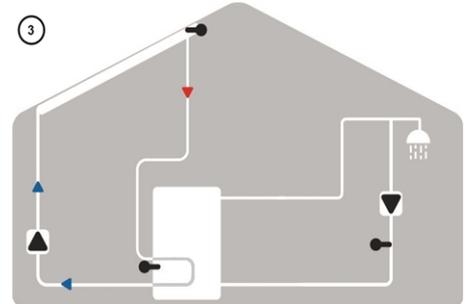
Solar with storage

S1	Collector sensor	R1/V1	Solar pump
S2	Storage sensor		



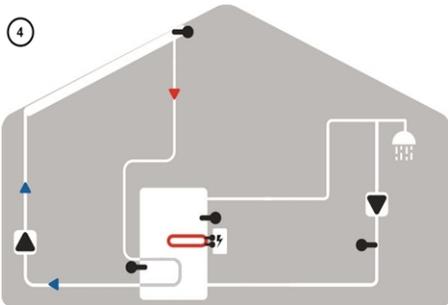
Solar with storage and immersion heater

S1	Collector sensor	R1/V1	Solar pump
S2	Storage sensor (bottom)	R3	Heating rod
S3	Storage sensor (top)		



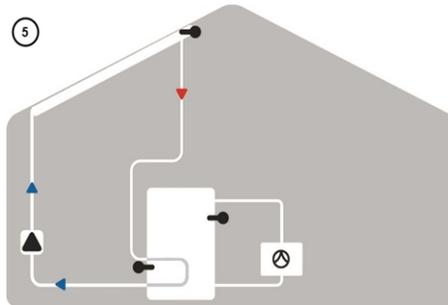
Solar with storage and circulation

S1	Collector sensor	R1/V1	Solar pump
S2	Storage sensor	R2	Circulation pump
S4	Circulation sensor		



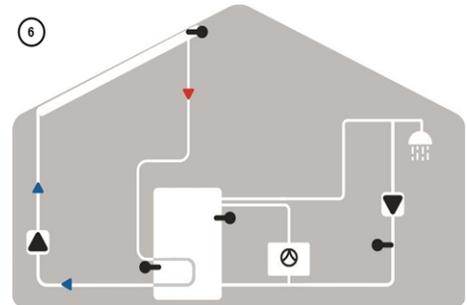
Solar with storage, immersion heater and circulation

S1	Collector sensor	R1/V1	Solar pump
S2	Storage sensor (bottom)	R2	Circulation pump
S3	Storage sensor (top)	R3	Heating rod
S4	Circulation sensor		



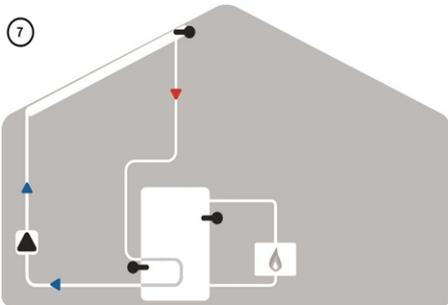
Solar with storage and heat pump

S1	Collector sensor	R1/V1	Solar pump
S2	Storage sensor (bottom)	R3	Heat pump
S3	Storage sensor (top)		



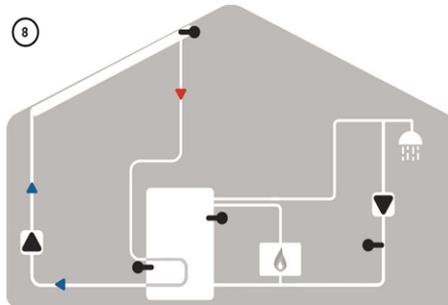
Solar with storage, heat pump and circulation

S1	Collector sensor	R1/V1	Solar pump
S2	Storage sensor (bottom)	R2	Circulation pump
S3	Storage sensor (top)	R3	Heat pump
S4	Circulation sensor		



Solar with storage and burner

S1	Collector sensor	R1/V1	Solar pump
S2	Storage sensor (bottom)	R3	Burner
S3	Storage sensor (top)		

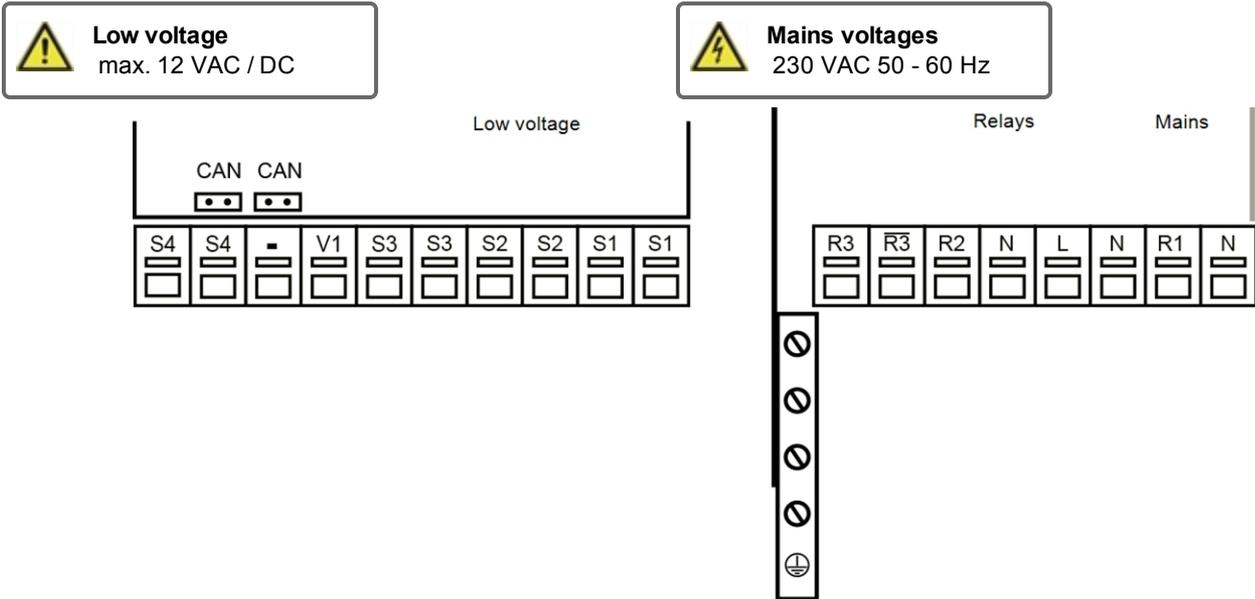


Solar with storage, burner and circulation

S1	Collector sensor	R1/V1	Solar pump
S2	Storage sensor (bottom)	R2	Circulation pump
S3	Storage sensor (top)	R3	Burner
S4	Circulation sensor		

# Installation

## Electrical Terminals

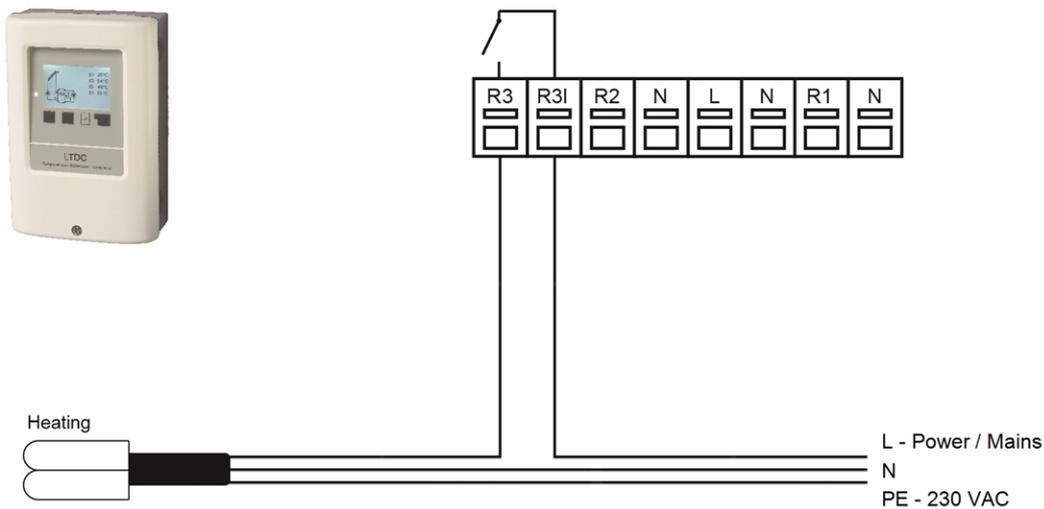


Terminal:	Connection for:
S1	Temperature Sensor 1
S1	(GND)
S2	Temperature Sensor 2
S2	(GND)
S3	Temperature Sensor 3
S3	(GND)
V1	speed controlled output for 0-10V / PWM high-efficiency pumps
S4 (2X)	Temperature Sensor 4

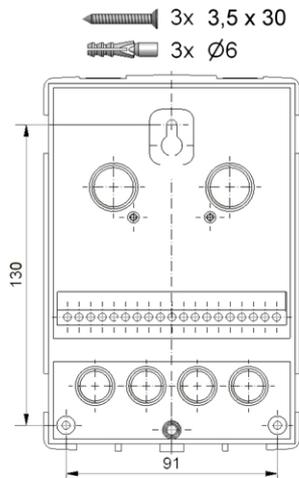
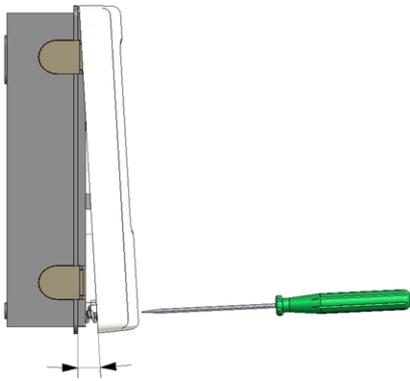
Terminal:	Connection for:
N	Neutral conductor N
R1	Relays 1
N	Network neutral conductor N
L	Network outer conductor L
N	Network neutral conductor N
R2	Relays 2
R3	Relay 3  closer (Voltage-free)
R3	Relay 3 closer (Voltage-free)

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

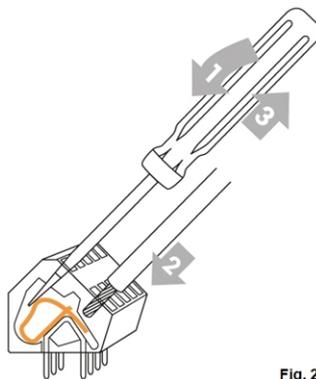
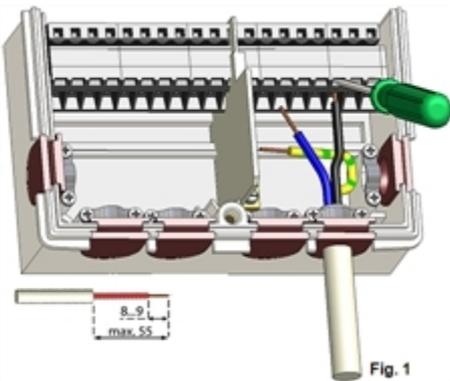
## Connection example electric heating rod



## Wall Installation



1. Unscrew cover screw completely.
2. Carefully pull upper part of housing from lower part. During the removal, the brackets are released as well.
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 three 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.
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.



1. open terminal cover.
2. Strip lines a max. of 55 mm, assemble the strain reliefs, strip wire ends 8-9 mm (figure 1)
3. Open clamps with a fitting screwdriver (figure 2) and connect electrical system to the controller.
4. Suspend clip room cover again and close with the screw.
5. Turn on mains supply and operate the controller.

## 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.

## 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 mm<sup>2</sup>. 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.

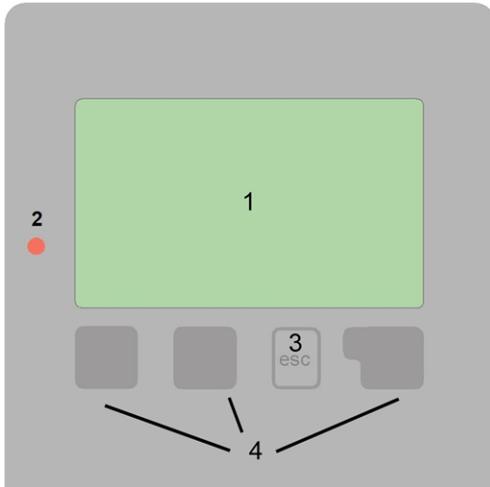


Low-voltage cables such as temperature sensor cables must be routed separately from mains voltage cables. Feed temperature sensor cables only into the left-hand side of the unit, and mains voltage cables only into the right-hand side.

## 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

## Display and Input



Warning/Error message



New information available

Further symbols can be found in the special functions

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

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

The LED (2) lights up green when a relay is switched on. The LED (2) lights up red when operating mode ,Off' is set. The LED (2) flashes quickly red when an error is present.

Entries are made using 4 keys (3+4), 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'.

The temperature overview appears when you press the left button. Tapping the button again leads back to The graphic overview.

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



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 9. Language
- menu 3. Time, Date and Operating Times.
- menu 4. Heating Circuit Settings, all values.
- menu 5. Protection Functions (if any adjustments necessary).
- menu 6. Special Functions (if any adjustments necessary).

3. In menu operating mode "3.2. Manual", test the witch outputs with the consumers connected and check the sensor values for plausibility. Then set to automatic mode.see " Manual " on page 13



The setup wizard can be accessed in menu 6.9. at any time.



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

## 1. Measurement values



Serve to display the current measured temperatures.

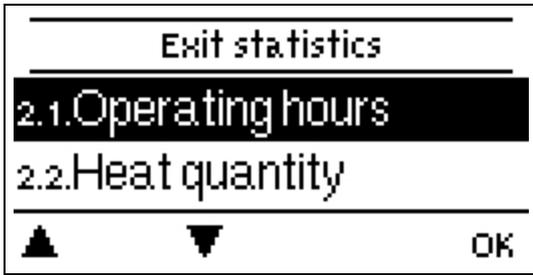


If ‚error‘ appears on the display instead of the measurement value, there may be a defective or incorrect temperature sensor.



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

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Display of the operating hours of the consumers connected to the controller (for example, solar pumps, valves etc.) whereby different time ranges (day-years) are available!

### Heat quantity

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

### Graphic overview

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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

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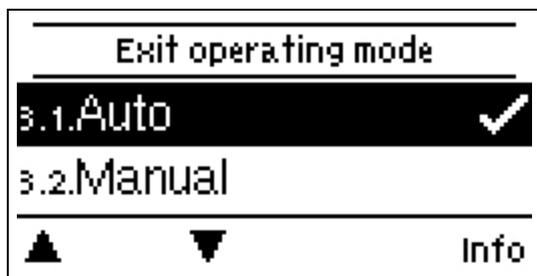
Display of the last 15 errors in the system with indication of date and time.

### Reset / Clear

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

### 3. Operating mode



#### Automatic

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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

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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.

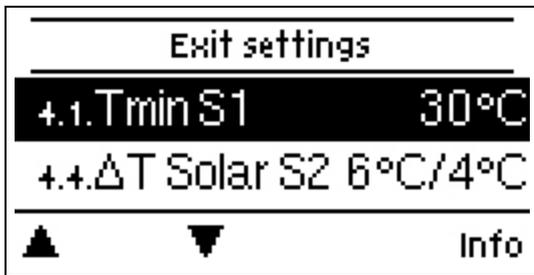
#### Off

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

## 4. Settings



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

### Tmin S1

#### Enable/start temperature at sensor 1:

If this value on the sensor 1 (collector sensor) is exceeded and the other conditions are not fulfilled, the controller will turn on the affiliated pump or the valve. If the temperature on the sensor 1 falls 5 °C below this value, the pump or the valve will be turned off again.

### ΔT R1

#### On/off temperature difference for solar charge through relay R1:

If the temperature difference  $\Delta T$  Solar between the reference sensors S1 and S2 is exceeded and the other conditions are fulfilled, the controller will turn on the pump on the relay R1. If the temperature difference falls to  $\Delta T$  Off, the pump will be turned off.



If the set temperature difference is too small, this may lead to ineffective operation depending on the system and sensor positioning. For speed regulation (see "Speed control" on page 17), special switch conditions apply!

### Tmax S2

#### Switch off temperature at sensor 2:

If this value is exceeded on the sensor 2, the controller turn off the affiliated pump or the valve. If this value on the sensor 2 is undershot and the other conditions are fulfilled, the controller will turn on the pump or the valve.



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 multiple storage systems, if the shut-down temperature S2 is exceeded, a downstream installed storage or storage area is switched to.

### Tmin Storage X

#### Switch off temperature at sensor S(X)

If this value is exceeded at sensor X then the controller switches the associated pump and/or valve off. If sensor (X) falls below this value again and the other conditions are also met, then the controller switches the pump and/or valve on again.



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

### Additional heating

All necessary settings for the additional heating are made here.

#### Tset

If this temperature falls below at the sensor of this function, the controller switches on the additional heating. The additional heating is switched off if this value is exceeded by the set hysteresis.



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



Other values, for example, Teco, apply in economy mode.

## Hysteresis

The hysteresis can be used to determine the heating of the storage tank. If the value Tset at sensor (e. g. S3) is exceeded by the set hysteresis, the controller switches off the additional heating.

## Sensor additional heating

### Sensor

The reference sensor for the additional heating can be changed here.

## Sensor 2 additional heating

### Optional sensor 2

An optional sensor for additional heating can be set here.



If an optional sensor is set for the function, then "sensor" is the switch-on **sensor** and **sensor 2** is the switch-off sensor.

Sequence: If Tset is fallen below at the defined **sensor** of the function, the function starts until **Tset + hysteresis** at **sensor 2** is exceeded.

## Teco

In the case of a solar charge, Teco is used for the additional heating instead of Tsoll.

## Energy Saving Mode

In energy saving mode, the setpoint for the additional heating is set to **Teco** for a solar charge in order to delay the activation of the additional heating.

## Periods

Here the required time periods are set in which the additional heating is released. For each weekday, three times can be specified, furthermore, you can copy individual day to other days. The additional heating is switched off outside the set time periods.

## Circulation



All required settings for the circulation are done here.  
Activate function.

### Tset

Circulation on sensor S4

If the value of S4 falls below Tset and the circulation is time released, the controller switches the circulation on. Until the value Tsoll + hysteresis at sensor S4 is reached.

### Hysteresis

If the value T-target on S4 is exceeded by the hysteresis set here, the circulation will shut down.

### Times

Here the desired periods are set in which the circulation is approved. For each weekday, three times can be specified, furthermore, you can copy individual day to other days. The circulation 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!

## 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.



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.

## System protection

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### Priority protection function

The system protection should prevent an overheating of the components installed in the system through the forced shut down of the solar circulation pump. If the value “AS Ton” on the collector has been exceeded for 1 Min. the pump will be turned off and not turn on again in order to protect the collector, for example, from steam. The pump is turned on again when the value “AS Toff” on the collector has not been met.



With the system protection (on), there are increased standstill temperatures in the solar collector and therefore an increased pressure in the system. The operating manuals from the system components must be observed.

## Collector protection

---

### Priority protection function

The collector protection prevents the collector from overheating. A forced switching of the pump makes sure that the collector is cooled through the storage. If the value “KS Ton” is exceeded on the collector, the pump will be turned on in order to cool the collector. The pump is shut down if the value “KS Toff” on the collector is not met or the value “KS Tmax Sp.” on the storage or KS SB Max on the pool is exceeded.



System protection has priority over collector protection! Even if the switch requirements for the collector protection are present, the solar circulation pump is turned off once “AS T on” is reached. Normally the values from the system protection (depending on the maximum temperature of the storage or other components) are higher than the collector protection.

## Recooling

---

In the system hydraulics with solar, excess energy is guided from the storage back to the collector with an activated return cooling function. This only occurs if the temperature in the storage is greater than the value “Return cooling Tref” and the collector is at least 20 °C colder than the storage and until the storage temperature has fallen below the value “Return cooling Tref”. For multi-storage systems, the return cooling applies to all storage.



Energy is lost through the collector through this function! The recooling should only be activated in cases of exception, with low heat acceptance, for example, during vacation.

## Frost Protection

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Switching the frost protection function off or setting the minimum flow temperature too low can lead to severe damage to the system.

## Seizing Protection

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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.

## Collector alarm

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If this temperature at the collector sensor is exceeded when the solar pump is turned on, a warning or error notification is triggered. There is a corresponding warning in the display.

## 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.

### Pump settings V1/ Signal V1

In this menu, the settings for the speed controlled output V1 are executed.

#### Type of pump/ Type of signal

The type of speed controlled pump used can be set here.

**0-10V:** Control of special pumps (e.g. high efficiency pumps) through a 0-10V signal.

**PWM:** Control of special pumps (e.g. high efficiency pumps) through a PWM signal.

#### Pump/ Profile

In this menu, the preset profiles for the pump can be selected or under "manual" all settings can be done personally. The settings can still be changed after a profile has been selected.

#### Output Signal

In this menu, the type of pump is set: heating pumps have the greatest output with a small input signal, solar pumps in contrast have very little output with a small input signal. Solar = normal, heating = inverted.

#### PWM / 0-10V off

This signal / this voltage is emitted if the pump is turned off (pumps with cable break detection require a minimal voltage / a minimum signal).

#### PWM / 0-10V on

This voltage / this signal requires the pump in order to turn on and to run at a minimum speed.

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

With this value, the maximum voltage level / maximum frequency can be specified for the highest speed of the energy saving pump, which is used, for example, during the flushing or manual operation.

#### Show signal

Represents the set pump signal in a graphic and text overview.

### Speed control

If the speed control is activated, itLTDC-E offers the possibility through a special internal electronic system to change the speed of pumps depending on the process. The relay R1, R2 and the Pwm and 0-10V outputs can work with the speed controlled.



This function should only be activated by a technician. Depending on the pump being used and the pump level, the minimum speed may not be set too small, because the pump or the system may be damaged. The specifications from the affected manufacturer must be observed for this! When in doubt, the min. speed and the pump level should be set too high instead of too low.

#### Variant

The following speed variants are available here:

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

**Mode M1:** The controller changes to the set max. speed after the purging time. If the temperature difference  $\Delta T$  between the reference sensors is below the set switch on temperature difference  $\Delta T$  R1, the speed will be reduced. If the temperature difference between the reference sensors is above the set switch on temperature difference  $\Delta T$  R1, the speed will be increased. If the con-

troller has decreased the speed of the pump to the smallest level and the  $\Delta T$  between the reference sensors is still only  $\Delta T_{\text{off}}$ , the pump will be turned off.

**Mode M2:** The controller changes to the set min. speed after the Speed. If the temperature difference  $\Delta T$  between the reference sensors is above the set switch on temperature difference  $\Delta T R1$ , the speed will be increased. If the temperature difference  $\Delta T$  between the reference sensors is below the set switch on temperature difference  $\Delta T R1$ , the speed will be reduced. If the controller has decreased the speed of the pump to the smallest level and the  $\Delta T$  between the reference sensors is still only  $\Delta T_{\text{off}}$ , the pump will be turned off.

**Mode M3:** The controller changes to the set min. speed after the Speed. If the temperature on the reference sensors is above the set value to be set in the following, the speed will be increased. If the temperature on the reference sensors is below the set value to be set in the following, the speed will be reduced.

### Purging time

For this time, the pump runs with its full speed (100%) in order to guarantee a secure start-up. Only after expiration of this purging time will the pump have a controlled speed and will switch, depending on the set variant, to the max. or min. speed. Speed.

### Sweep time

With the control time, the inertia of the speed control is determined in order to prevent strong temperature deviations as much as possible. The timespan is entered here, which is needed for a complete cycle from minimum speed to maximum speed.

### Max. Speed

The maximum speed of the pump is determined here. During the setting, the pump runs in the respective speed and the flow can be determined.



The specified percentages are variables, which may deviate more or less strongly depending on the system, pump and pump level. 100% is the maximum possible power of the controller.

### Min. Speed

The minimum speed of the pump is determined here. During the setting, the pump runs in the respective speed and the flow can be determined.



The specified percentages are variables, which may deviate more or less strongly depending on the system, pump and pump level. 100% is the maximum possible power of the controller.

## Heat quantity

---

### Constant flow

If "Constant flow" is activated as the type of heat quantity metering, the approximate heat from the manually entered values for antifreeze, its concentration and the flow from the system and the measured sensor values from the collector and storage are calculated. Additional information about antifreeze, its concentration and the flow of the system is required. Additionally through the setting offset  $\Delta T$ , a correction factor can be set for the heat quantity collection. Since the collector temperature and the storage temperature can be used for the heat quantity metering, depending on the system, there may be deviations from the displayed collected temperature to the actual previous temperature or the displayed storage temperature to the actual return temperature. Through the setting Offset  $\Delta T$ , this deviation can be corrected.

Example: displayed collector temperature 40°C, read previous temperature 39°C, displayed storage temperature 30°C, read return temperature 31° means a setting of -20% (displayed  $\Delta T$  10K, actual  $\Delta T$  8K => -20% correction value)



The heat quantity data in the "Constant flow" mode only consists of calculated values for the functional inspection of the system.

## Sensor Calibration

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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 11



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

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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.

## Starting aid

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For some solar systems, in particular for vacuum tube collectors, the measurement recording on the collector sensors may be too slow or imprecise, because the sensor is often not on the warmest spot. With an activated starting aid, the following procedure occurs: If the temperature on the collector sensor increases within a minute by the value defined under "increase", the solar circulation pump will be turned on for the set "purging time" so that the medium to be measured is transported to the collector sensor. If there is still no normal switching condition through this, there will be a 5 minute block time for the start wizard function.



This function should only be activated by a technician if problems occur with the measurement recording. Observe in particular the instructions from the collector manufacturer.

The menus "Purging time" and "Increase" are only displayed when the starting aid function is set to "On".

### Purging time

If the temperature on the collector sensor increases within a minute by the value defined under "increase", the solar circulation pump will be turned on for the set "purging time" so that the medium to be measured is transported to the collector sensor. If the set  $\Delta T$  is not reached, a 5-minute circulation pause time for the starting aid function will apply.

### Increase

If the temperature at the collector reaches within a minute the value defined, the solar pump is turned on for the duration of the purging time.

## 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!

## Daylight saving time

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

## Eco Display Mode

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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.

## Temperature unit

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In this menu, you can select which temperature unit is displayed.

## Network

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If applicable, the network settings of the connected data logger have to be adjusted

### Access Control

This menu lets you give up to 4 users access to the data logger. The users that are registered then have access to the controller or respectively the data logger.

To add a user in the list, select <add user>. Leave the now visible menu open und connect to the address of the connector or respectively the data logger. Your user name is going to appear in this menu and can be selected and confirmed with 'OK'.

### Note

You can find the address of the connector or respectively the data logger on the address sticker on the outside of the casing. Pointers and help on how to establish a connection you can find in the enclosed SOREL connect instructions or the instructions of the data logger.

Select a user with 'OK' to grant access.

To revoke access again, choose one of the users from your list and choose <remove user>.

### Ethernet

The data logger's Ethernet connection settings can be set using this menu.

#### MAC Address

Displays the individual MAC address of the data logger.

#### Auto-Configuration (DHCP)

If auto-configuration is activated, the data logger requests IP addresses and network parameters from a DHCP server that assigns an IP address, subnet mask, gateway IP and DNS server IP. **If you deactivate the auto configuration (DCHP), you will have to make the required network settings manually!**

#### IP-Address

Please refer to the router configuration for the IP address to be set.

#### Subnetz

Please refer to the router configuration for the subnetz to be set.

#### Gateway

Please refer to the router configuration for the gateway to be set.

#### DNS-Server

Please refer to the router configuration for the DNS server to be set.

### CAN bus ID

Here you can see the ID of the controller on the CAN bus.

### Sensor transmission interval

The transmission interval determines how often the sensor values of the controller are transmitted via the CAN bus. If a sensor value changes, it is transmitted immediately. If a sensor value does not change over a longer period, the sensor value is transmitted after this time.



If there are several controllers in the CAN network, a too short transmission interval can lead to an overload of the CAN network.

## 7. Menu Lock

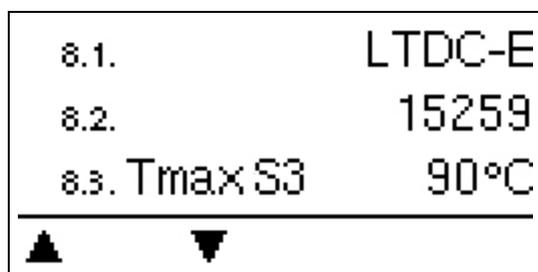


Secure the controller against unintentional changing and compromise of basic functions.

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. The choice of languages may differ depending on the model. Language selection is not available for every model.

## 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..

### Possible error messages

Possible error messages	Notes for the specialist
Sensor x defective	Means that either the sensor, sensor entrance on the controller or the connecting wire was defective (see " Temperature Resistance Table for Pt1000 Sensors " on page 9).
Collector alarm	Means that the temperature on the collector set under "Collector protection" was exceeded.
Restart	Means that the controller was restarted, for example, due to a power outage. Check date & time!
Time & Date	This display appears automatically after a longer network disruption, because the time & date must be examined and, if applicable, adjusted.

### 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.

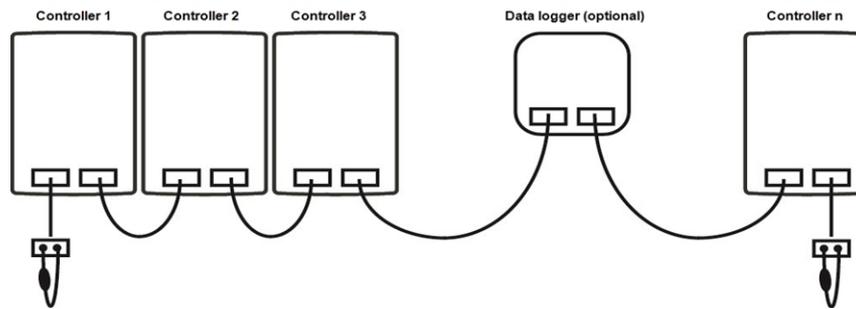
Performing maintenance:

- Check the date and time see " Time & Date " on page 19
- Assess/check plausibility of statistics see " Serve for function control and long-term monitoring of the system. " on page 12
- Check the error memory see " Error messages " on page 12
- Verify/check plausibility of the current measurement values see " Measurement values " on page 11
- Check the switch outputs/consumers in manual mode see " Manual " on page 13
- Possibly optimize the parameter settings.

## Additional Information

### CAN bus

The CAN bus can be used to connect two or more controllers with each other or with the data logger to exchange data.



1. The controllers are connected in series with the CAN bus cable.
2. The first and last controllers in this connection in series must be fitted with terminating resistance.  
**The wiring of the two CAN sockets is arbitrary.**
3. Optionally, the data logger can also be connected to the CAN bus.

### Tips



The service values include not only current measurement values and operating states, but also all of the settings for the controller. Write the service values down just once after 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 at the time that the suspected malfunction occurs. Send the service value table by fax or e-mail with a brief description of the error to the specialist or manufacturer.



To protect against loss of data, record any statistics and data of particular importance at regular intervals.

**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  
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