EHC20

Mounting, installation
and operating manual

GB

Read and save these instructions!

exodraft
CHIMNEY DRAFT TECHNOLOGY

Legend for symbols: The following symbols are used throughout the manual as warnings. They indicate potential hazards or refer to important information relating to the product.

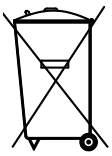
Prohibitory symbol: Failure to observe information marked with a prohibitory symbol can result in serious injuries – or even death!

Hazard symbol: Failure to observe information marked with a hazard symbol can result in injuries and/or damage to the device.

Attention symbol: Information that is particularly important for the functioning and optimum use of the device and the system.

TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCKS OR PERSONAL INJURIES, THE FOLLOWING RULES MUST BE OBSERVED:

- The device should only be used in the manner specified by the manufacturer. If you have any questions, please contact the manufacturer. The address and telephone number of the manufacturer can be found in the list at the end of this manual.
- Before maintaining or cleaning the device, switch it off at the service panel and lock the service panel so that it cannot be turned on again accidentally.
- Installation work and work on the electrical connections should be carried out by specialists in accordance with the laws and regulations in place.
- Observe the device manufacturer's guidelines and safety regulations as well as the official provisions in force in the particular country.
- The device must be earthed.



No special requirements. The device must be disposed of in accordance with the official provisions concerning the disposal of electronic waste.

A. Product information

A.1 Description

The controller was produced and tested in accordance with strict quality and safety requirements. The legal warranty period of two years from the date of sale applies to the device.
However, the manufacturer shall accept no liability or warranty claims for personal injuries and damage to property resulting from one or more of the following:

- Failure to observe these mounting and operating instructions
- Incorrect mounting, setup, maintenance and operation
- Improper repairs
- Unauthorized modifications to the device
- Installation of additional components that were not tested together with the device
- All damages resulting from continued use of the device in spite of an obvious defect
- Failure to use original spare parts and accessories
- Use of the device in an unintended manner
- Failure to observe the limit values set out in the technical data
- Force majeure

A.2 About the controller

The EHC temperature differential controller helps you to use your heating system and control its functions efficiently. The device has an impressive range of functions and is virtually self-explanatory in use. The individual entry buttons have specific functions and are explained in the context of each step. In the controller menu, you will find not only keywords but also help texts and clear graphics relating to the measurements and settings.
The EHC can be used as a temperature differential controller for various types of systems . These are illustrated and explained from page 10 onwards.
Key features of the EHC:

- Illuminated display showing graphics and texts
- Straightforward querying of current measurements
- Various options for evaluating and monitoring the system, e.g. graphical statistics
- Extensive settings menus with explanations
- Menu lock function to prevent accidental changes
- Reset option for restoring previous values or factory settings
- Various additional functions are optionally available

A.3 Items supplied

- EHC temperature differential controller
- 3 screws (3.5 x 35 mm) and 3 plugs (6 mm) for wall mounting
- 12 strain relief clamps with 24 screws, replacement fuses 1x T2 A / 250 V
- Micro SD card
- EHC mounting and operating manual

Optionally supplied depending on model/order:

- Pt1000 temperature sensors and thermowells
- Ethernet connection

Also available:

- Pt1000 temperature sensors, thermowells, overvoltage protection
- CAN bus data logger

B. Controller description

B.1 Technical data

Electrical data:

Mains voltage	100 - 240 VAC
Mains frequency	50 - 60 Hz
Power consumption	0.5 - 3 W
Switching power	
Total electronic relay switching power:	460 VA for AC1 / 240 W for AC3
Electronic relay R1	Min. 5 W...max. 120 W for AC3
Electronic relay R2	Min. 5 W...max. 120 W for AC3
Total mechanical relay switching power:	460 VA for AC1 / 460 W for AC3
Mechanical relay R3	460 VA for AC1 / 460 W for AC3
Mechanical relay R4	460 VA for AC1 / 460 W for AC3
Mechanical relay R5	460 VA for AC1 / 460 W for AC3
Mechanical relay R6	460 VA for AC1 / 460 W for AC3
Potential-free relay R7	460 VA for AC1 / 185 W for AC3
0..10V output	Designed for 10 kΩ load resistance
PWM output	Freq. 1 kHz, level 10 V
Internal fuse	2A slow-blow 250 V (3x)
Protection type IP40	
Protection class	II
Overvoltage category	II
Pollution level	II
Sensor inputs	8 x Pt1000 2 x Grundfos direct sensors 1 x RC21
Measuring range	
PT1000	-40°C to 300°C
Grundfos direct sensor:	0°C - 100°C (-25°C / 120°C briefly)

VFS	1 l/min - 12 l/min (VFS1-12)	RPS	0 - 0.6 bar
	2 l/min - 40 l/min (VFS2-40)		0 - 1 bar
	5 l/min - 100 l/min (VFS5-100)		0 - 1.6 bar
	10 l/min - 200 l/min (VFS10-200)		0 - 2.5 bar
			0 - 4 bar
			0 - 6 bar
			0 - 10 bar

Permitted total cable lengths:

Sensors S7 and S8	<30 m
Other Pt1000 sensors	<10 m
VFS/RPS sensors	<3 m
CAN	<3 m
PWM/ 0...10 V	<3 m
Electronic relay	<3 m
Mechanical relay	<10 m

Network connections
Ethernet (optional)
CAN bus

Storage medium	Micro SD card slot
Real time clock	RTC with 24-hour power backup

Permitted ambient conditions:

Ambient temperature	
during controller operation	0°C...40°C
during transport/storage	0°C...60°C
Air humidity	
during controller operation	Max. 85% rel. humidity at 25°C
during transport/storage	No condensation allowed

Other data and dimensions

Housing design	Three-part, ABS plastic
Installation options	Wall mounting, switch panel mounting (optional)
Overall dimensions	228 x 180 x 53 mm
Display	Fully graphical display, 128 x 128 dots
LEDs	2:, 1 x red, 1 x green
Operation	4 entry buttons

C. Installation

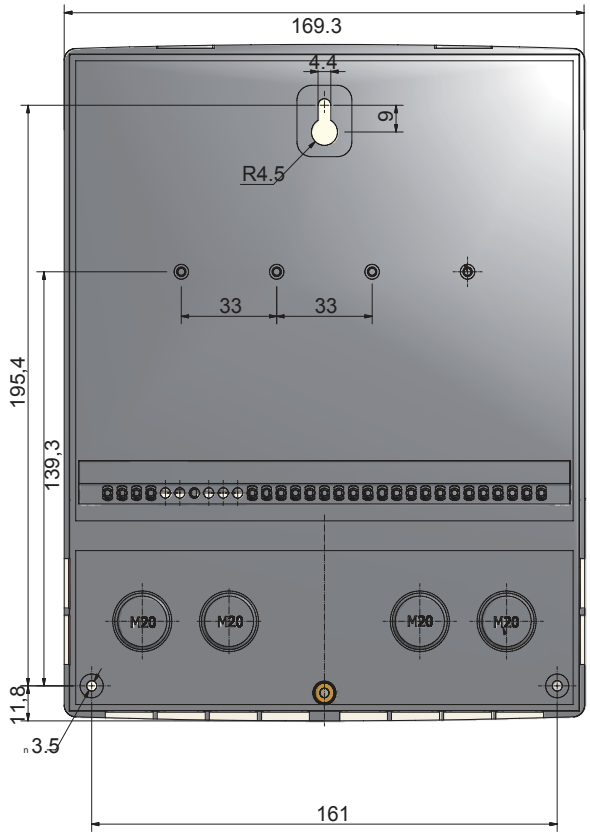
C.1 Wall mounting

1. Completely loosen the cover screw
2. Carefully remove the terminal box cover from the bottom section. Loosen the two screws in the top section and remove the top section from the base.
3. Mark the three fixing holes (see "C.1.1 Housing base"). Make sure that the wall surface is as flat as possible to prevent the housing distorting when the screws are tightened.
4. Using a drill and a size 6 mm bit, drill three holes in the wall at the points marked and insert the plugs.
5. Mount the controller from the top screw.
6. Insert the two bottom screws and tighten them.

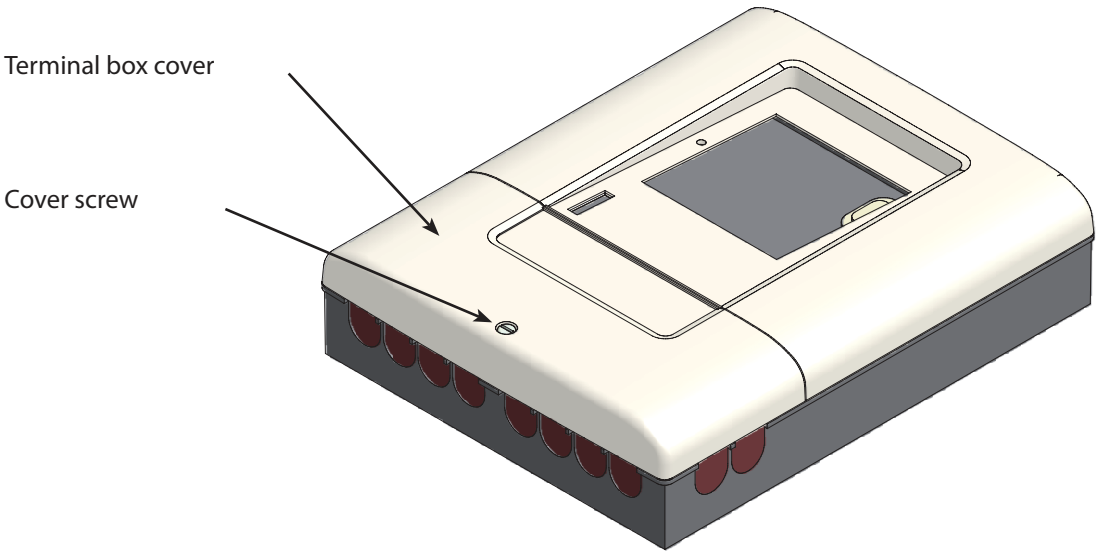
Install the controller only in rooms that are dry and meet the environmental requirements set out in "B.1 Technical data".

The controller must not be accessible from behind.

C.1.1 Housing base



C.1.2 Housing top



C.2 Electrical connection

Before working on the device, disconnect the power supply and ensure that the device cannot be switched on again! Check that the power is switched off.
The electrical connection work should only be carried out by a specialist in accordance with the regulations in place. The controller must not be used if there is visible damage to the housing, e.g. cracks.

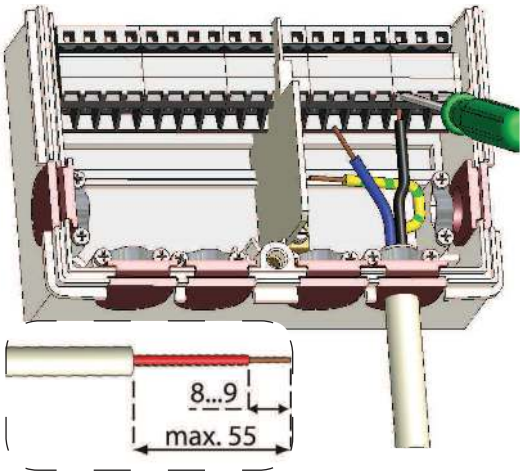
Extra low voltage leads such as temperature sensor leads should be kept away from the mains cables. Temperature sensor leads should only be inserted into the left-hand side and mains cables only into the right-hand side of the device.

An omnipolar cut-off device, e.g. an emergency heating switch, should be fitted to the power supply system for the controller by the customer.

No more than 55 mm of the sheath on the leads that are to be connected to the device should be stripped, and the sheath should reach just beyond the strain relief clamp where the cable enters the housing.

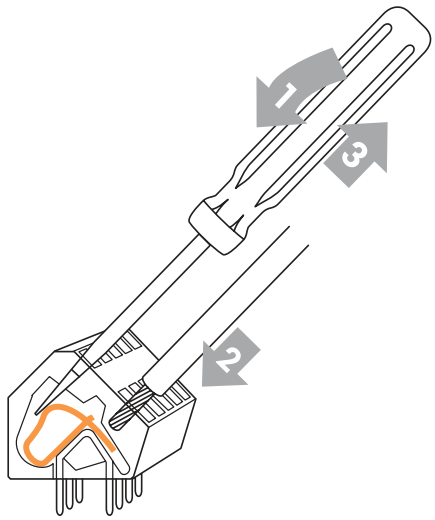
The controller and VFS sensor must have the same ground potential. The VFS sensor has a functional earthing system (PELV). The controller's PE terminal must be connected to the pipe system close to the sensor.

C.2.1



1. Select the required program/hydraulic system (see "D.3 Hydraulic variants / overview / systems", page 10)
2. Open the terminal box cover ("D.1 Terminal box", page 9)
3. Strip no more than 55 mm of the cable sheath, insert cables, attach the strain relief clamps, strip 8-9 mm of the insulation off the ends of the wires (Fig. "C.2.1")
4. Open the terminals using a suitable screwdriver (Fig. "C.2.2") and connect the power supply to the controller
5. Replace the terminal box cover and secure it with the screw
6. Switch on the mains power and begin using the controller

C.2.2



Instructions for terminals:

1. Insert a suitable screwdriver into the top opening and push the locking bar downwards. Keep the screwdriver in this position.
2. Insert the cable into the bottom opening.
3. Remove the screwdriver.

C.3 Installing the temperature sensors:

The controller works with Pt1000 temperature sensors. These measure the temperature extremely accurately and thus ensure that the system functions optimally from a control point of view.

The temperature sensor leads should be kept separate from the mains power cables and must for example not be routed through the same cable channel.

Position the sensors exactly in the area to be measured! Use only the immersion pipe or flat-mounted sensor with the appropriate permitted temperature range for the particular application.

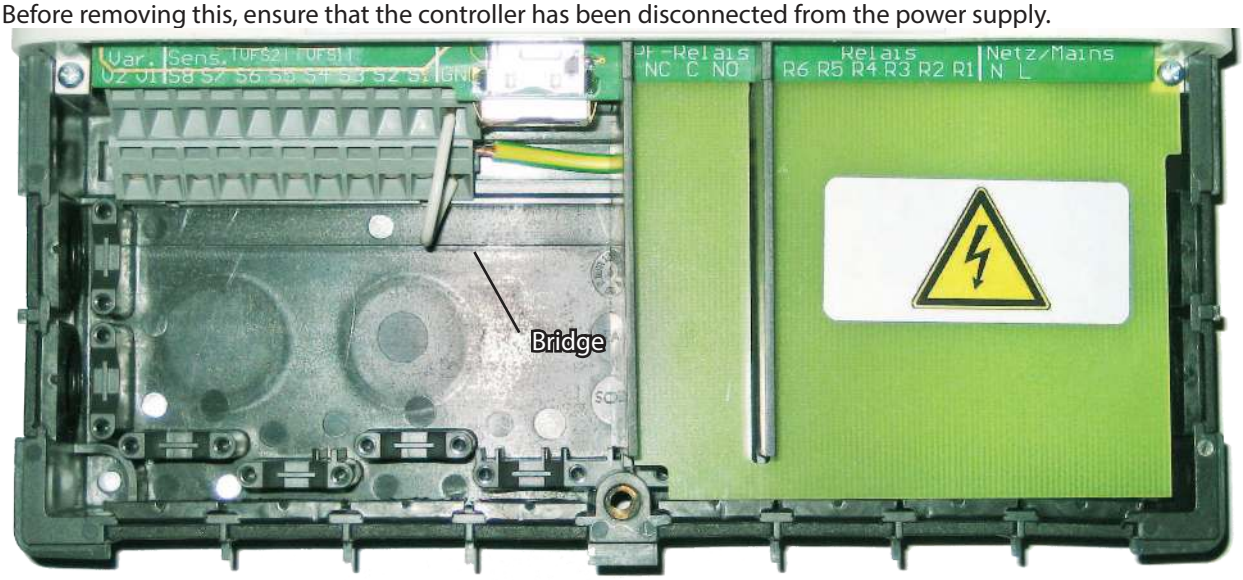
If necessary, the sensor lead connected to S7/S8 can be extended to a maximum length of 30 m using a cable at least 0.75 mm² in size. The sensor leads connected to S1 to S6 can be extended to a maximum length of 10 m using a cable at least 0.75 mm² in size.
When connecting the cables, ensure that no transition resistances occur.

The VFS direct sensors should be connected using the appropriate plugs.
To avoid damaging the direct sensors, it is recommended that you position them only in the return flow.
When mounting the direct sensor (VFS), the correct flow direction must be observed.

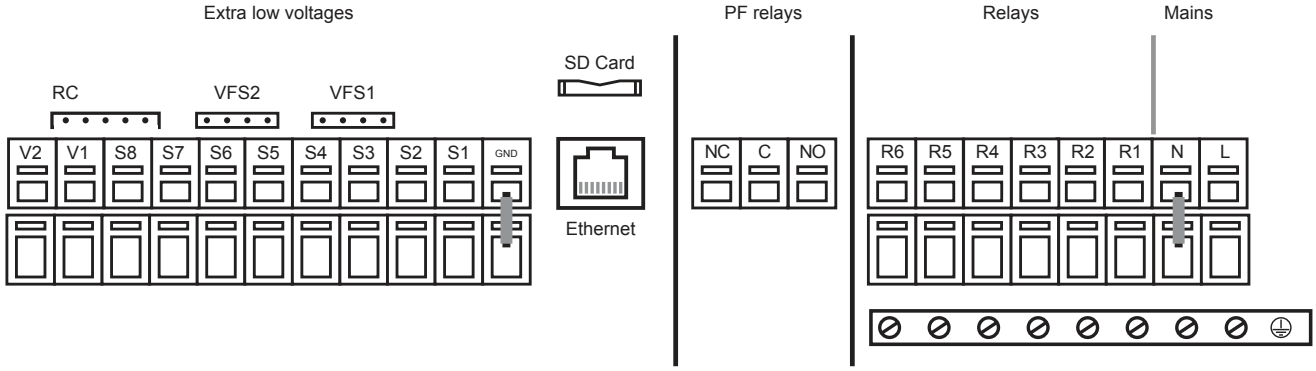
D. Terminal plan and connections

D.1 Terminal box

The mains section on the right-hand side of the terminal box is protected by an additional plastic panel. Before removing this, ensure that the controller has been disconnected from the power supply.



D.2 Terminal plan for electrical connections



Max. 12 V

Extra low voltages
Max. 12 VAC/DC

Terminal:	Connection for:
S1	Sensor 1
S2	Sensor 2
S3	Sensor 3
S4	Sensor 4
S5	Sensor 5
S6	Sensor 6
S7	Sensor 7
S8	Sensor 8
V1	0-10 V / PWM
V2	0-10 V / PWM
VFS1	Grundfos direct sensor
VFS2	Grundfos direct sensor
RC	Room controller

SD card slot

for data storage and updates

Ensure that the card is the right way around! The card should lock with no resistance, do not use excessive force!

Ethernet (optional)
For connecting to a LAN

Potential-free relay

NO
Normally open (closer)

C
Common (voltage)

NC
Normally closed (opener)

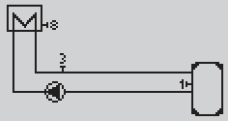
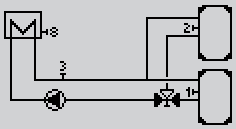
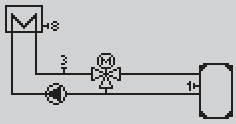
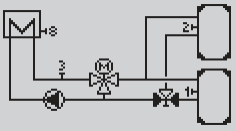
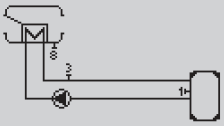
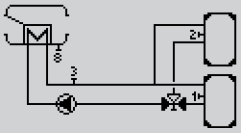
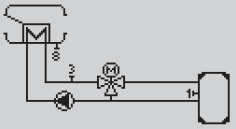
Mains
230 VAC

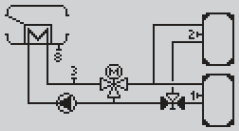
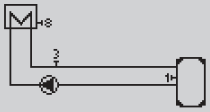
Mains voltages 230 VAC 50-60 Hz

Terminal:	Connection for:
R1	Switch output 1 (rot. sp.)
R2	Switch output 2 (rot. sp.)
R3	Switch output 3
R4	Switch output 4
R5	Switch output 5
R6	Switch output 6
N	Mains neutral wire N
L	Mains live wire L

The PE earth wire should be connected to the PE metal terminal block!

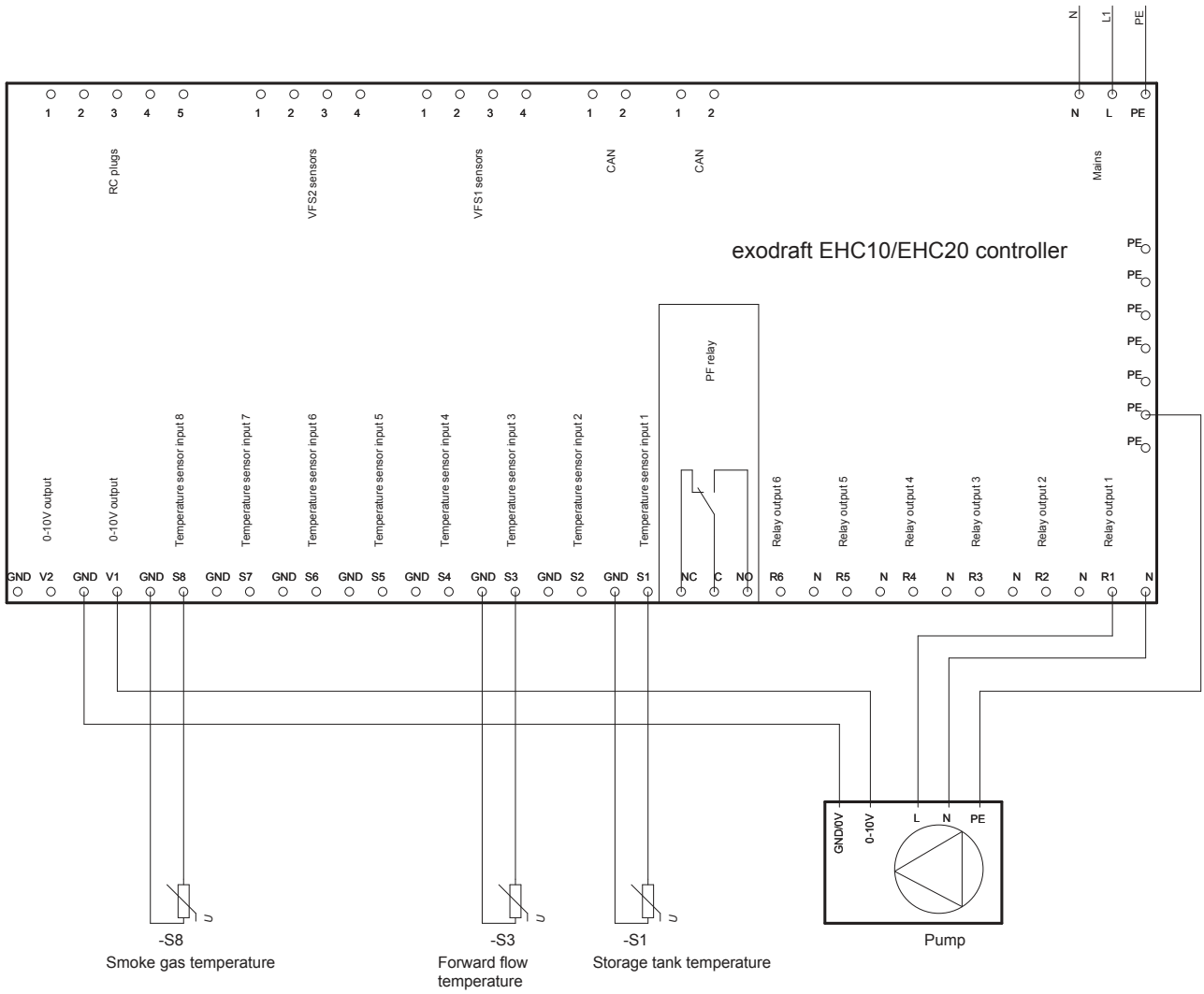
D.3 Hydraulic variants / overview / systems

	Temperature sensors Extra low voltage only												Relay connections 230 VAC						
	Storage tank temp. 1	Storage tank temp. 2	Forward flow temperature					Flue temperature			0-10 V signal pump		Circulator pump		Three-way valve	High temperature mixer valve	Low temperature mixer valve	Bypass damper	
	S1	S2	S3	S4	S5	S6	S7	S8	VFS1	VFS2	V1	V2	R1 (ELR)	R2 (ELR)	R3	R4	R5	R6	R7 (pot.-free)
Program 6.1.1 	X		X					X			X		X						
Program 6.1.2 	X	X	X					X			X		X		X				
Program 6.1.3 	X		X					X					X			X	X		
Program 6.1.4 	X	X	X					X					X		X	X	X		
Program 6.1.5 	X		X					X			X		X					X	
Program 6.1.6 	X	X	X					X			X		X		X			X	
Program 6.1.7 	X		X					X			X		X			X	X	X	

	Temperature sensors Extra low voltage only												Relay connections 230 VAC						
	Storage tank temp. 1	Storage tank temp. 2	Forward flow temperature					Flue temperature			0-10 V signal pump		Circulator pump		Three-way valve	High temperature mixer valve	Low temperature mixer valve	Bypass damper	
	S1	S2	S3	S4	S5	S6	S7	S8	VFS1	VFS2	V1	V2	R1 (ELR)	R2 (ELR)	R3	R4	R5	R6	R7 (pot.-free)
Program 6.1.8 	X	X	X					X					X		X	X	X	X	
Program 6.1.1 with VFS-Sensor  **(VFS-Sensor can be used with all systems)**	X		X					X	X		X		X						

E. Connection diagrams

E.1 Program 6.1.1. Heat exchanger without bypass damper. With one storage tank.



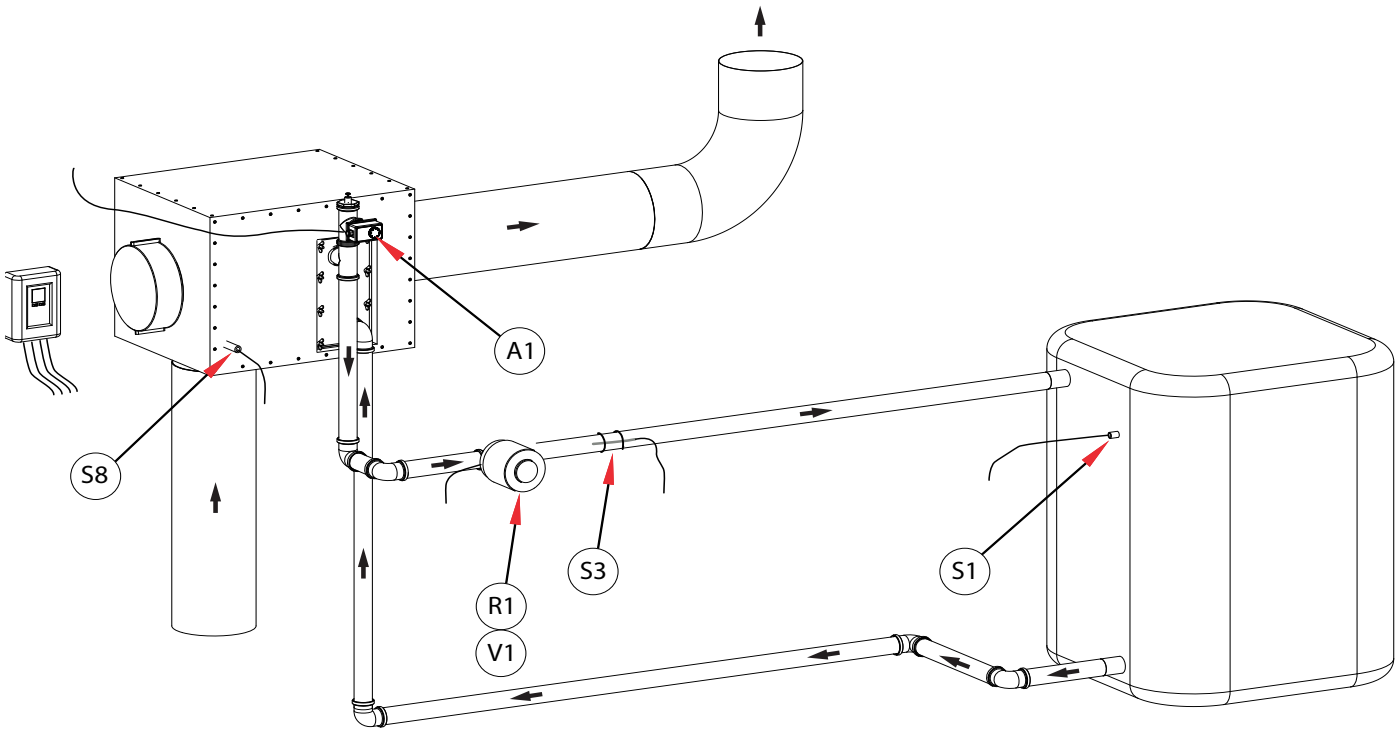
This diagram shows the following system:

Heat exchanger **without** bypass damper. One storage tank and a 0-10 V regulated circulator pump.

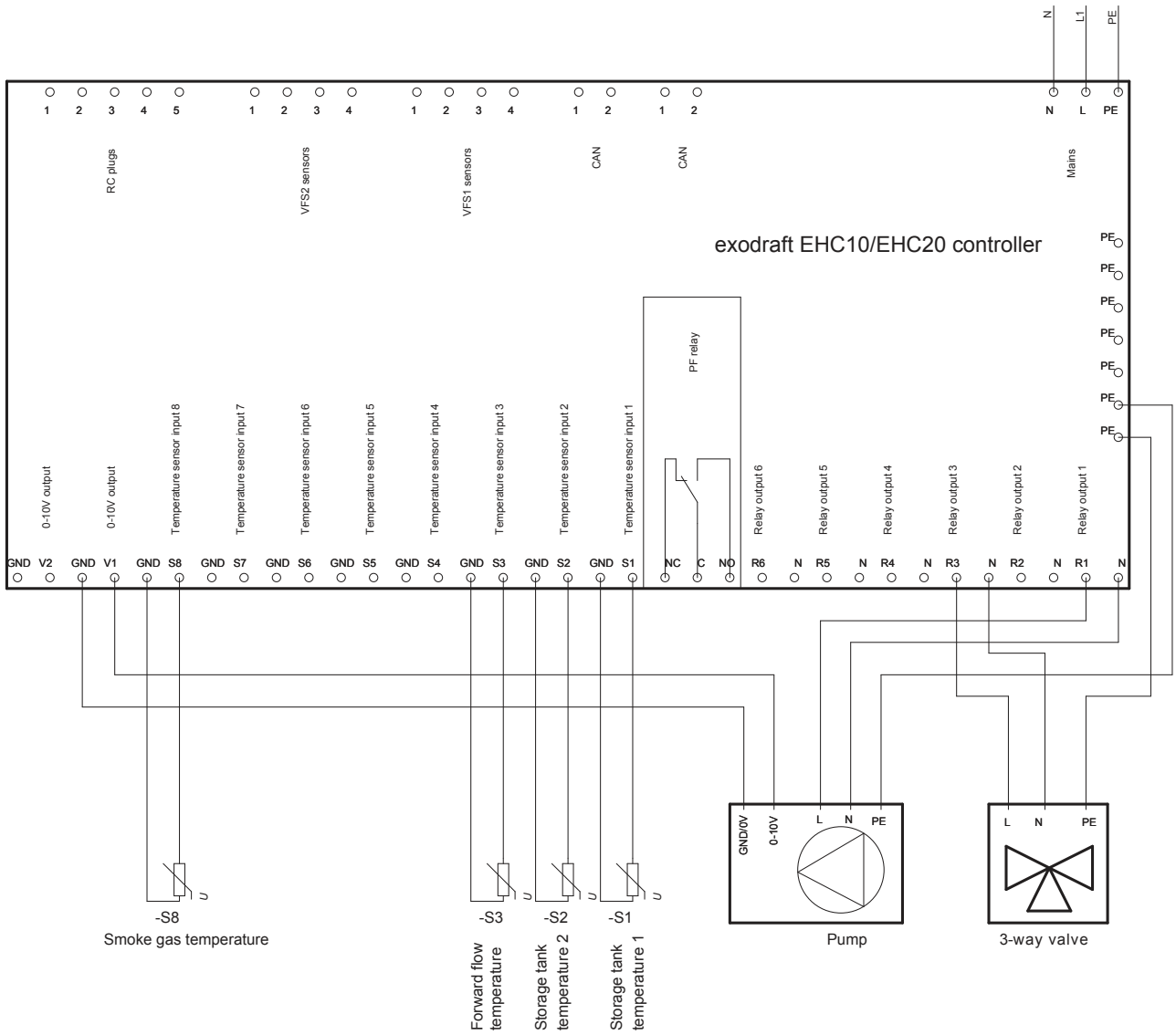
The S8 temperature sensor must be positioned in the heat exchanger inlet.
The S3 temperature sensor must be mounted on the forward flow pipe immediately after the heat exchanger.
The S1 temperature sensor must be mounted in the storage tank.

Important:

An STL thermostat which turns off the burner must be mounted on the forward flow pipe. The forward flow temperature must not exceed 100°C.


A1
S8
S3
S1
R1
V1

E.2 Program 6.1.2. Heat exchanger without bypass damper. With two storage tanks.



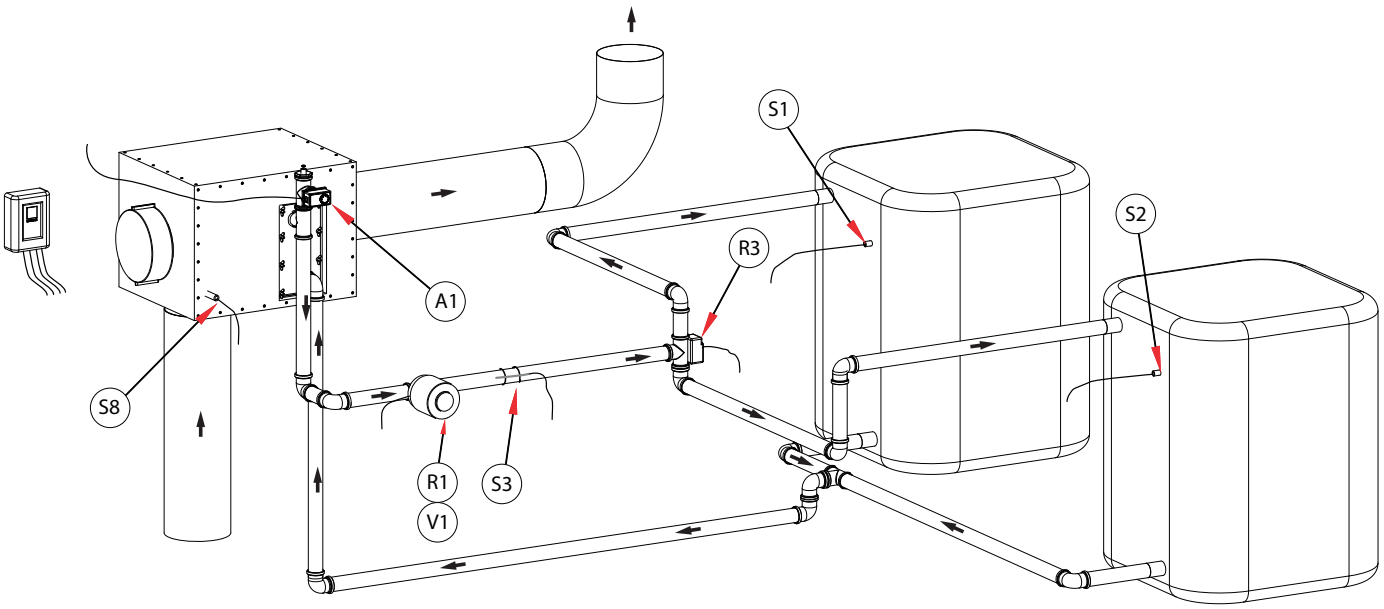
This diagram shows the following system:

Heat exchanger **without** bypass damper. Two storage tanks, a 3-way valve and a 0-10 V regulated circulator pump.

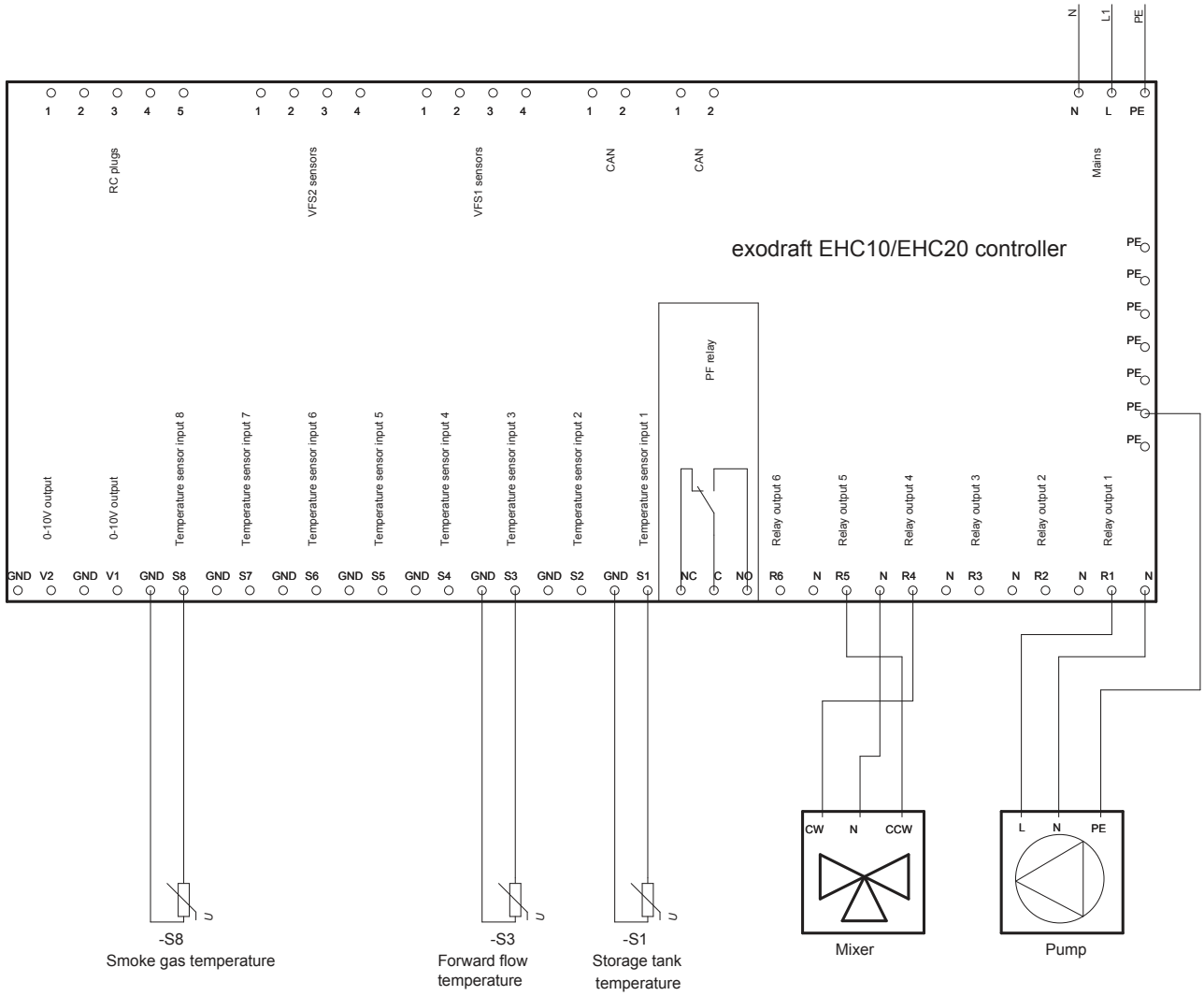
The S8 temperature sensor must be positioned in the heat exchanger inlet.
The S3 temperature sensor must be mounted on the forward flow pipe immediately after the heat exchanger.
The S2 temperature sensor must be mounted in storage tank #2.
The S1 temperature sensor must be mounted in storage tank #1.

Important:

An STL thermostat which turns off the burner must be mounted on the forward flow pipe. The forward flow temperature must not exceed 100°C.


S1
S2
R3
A1
S8
R1
S3
V1

E.3 Program 6.1.3 Heat exchanger without bypass damper. With one storage tank and a mixer.



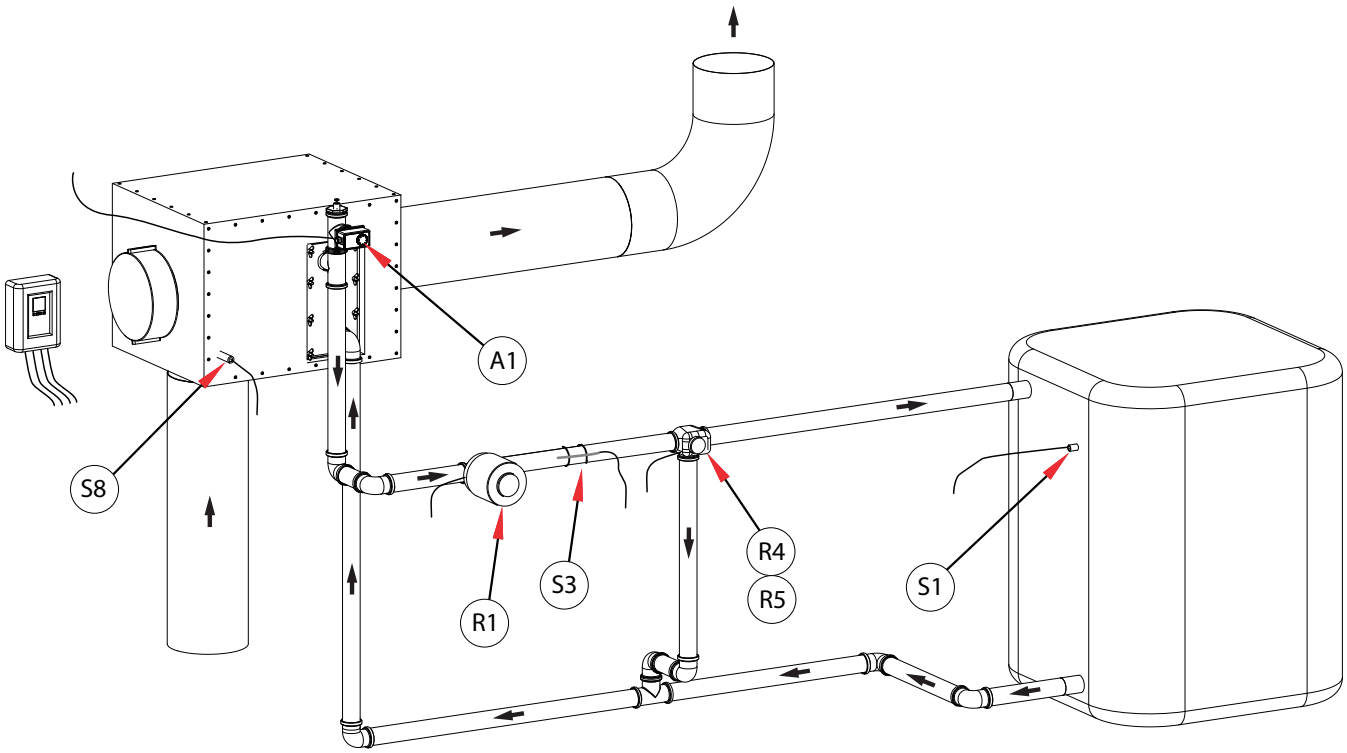
This diagram shows the following system:

Heat exchanger **without** bypass damper. One storage tank, a mixer and a circulator pump.

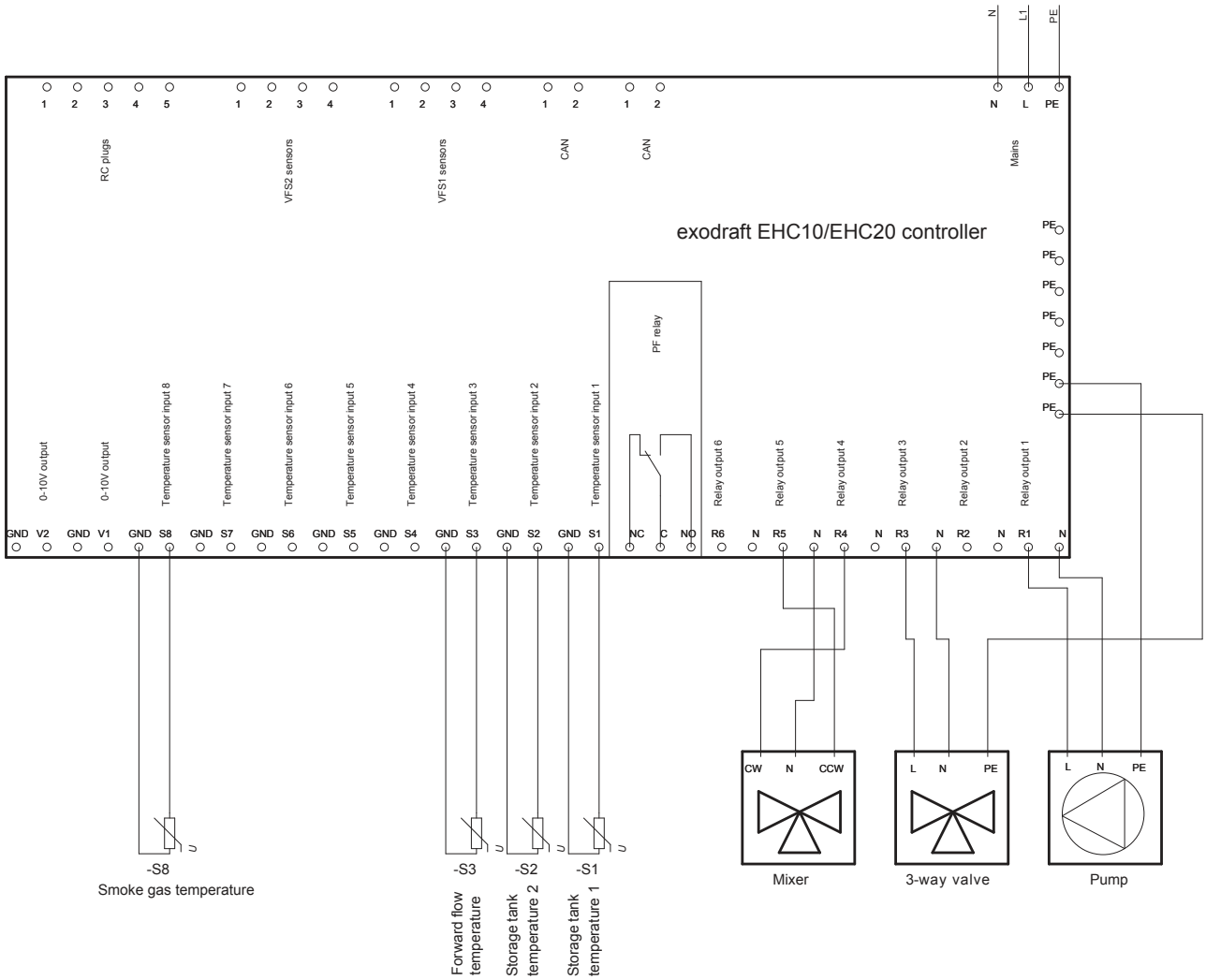
The S8 temperature sensor must be positioned in the heat exchanger inlet.
The S3 temperature sensor must be mounted on the forward flow pipe immediately after the heat exchanger.
The S1 temperature sensor must be mounted in the storage tank.
The mixer should be controlled in such a way that R4 is enabled when the temperature in the forward flow pipe needs to increase. R5 is enabled when the temperature needs to decrease.

Important:

An STL thermostat which turns off the burner must be mounted on the forward flow pipe. The forward flow temperature must not exceed 100°C.


A1
S8
R1
S3
R4
R5
S1

E.4 Program 6.1.4. Heat exchanger without bypass damper. With two storage tanks and a mixer.



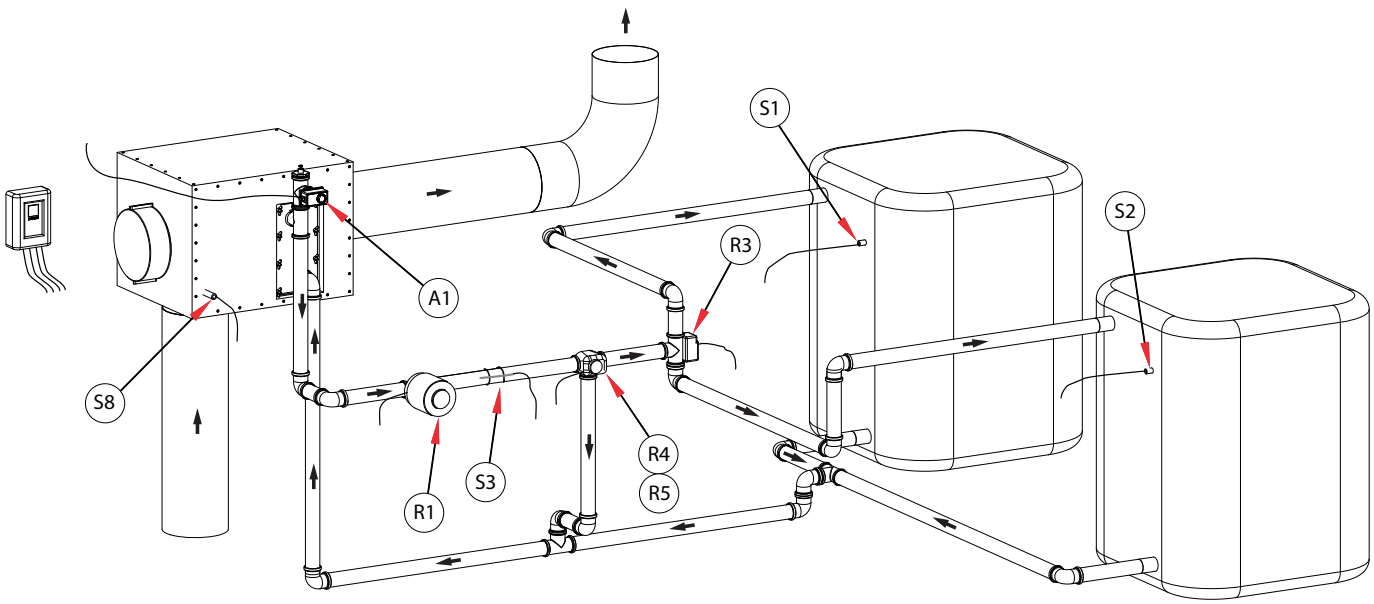
This diagram shows the following system:

Heat exchanger **without** bypass damper. One storage tank, a mixer and a circulator pump.

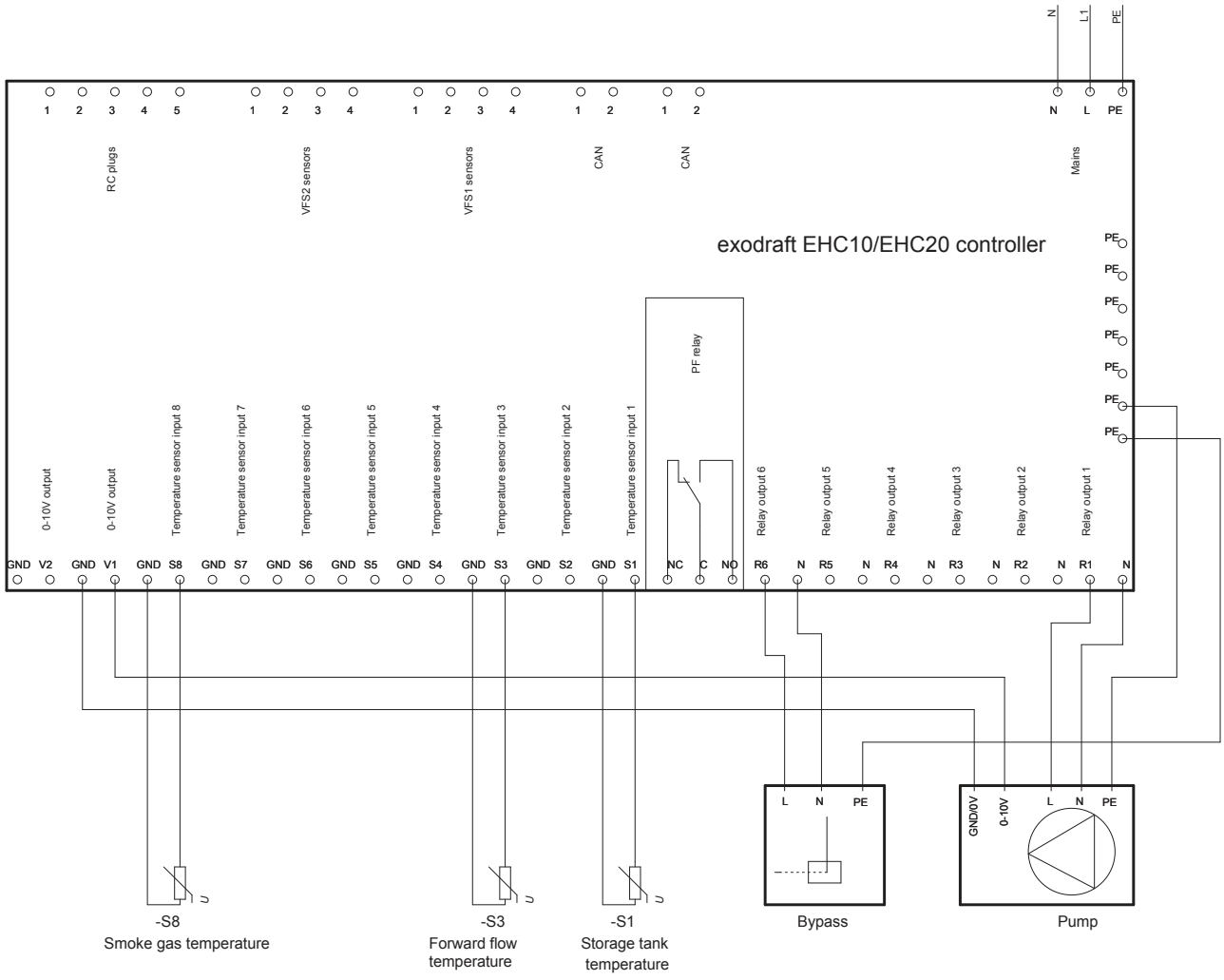
The S8 temperature sensor must be positioned in the heat exchanger inlet.
The S3 temperature sensor must be mounted on the forward flow pipe immediately after the heat exchanger.
The S2 temperature sensor must be mounted in storage tank #2.
The S1 temperature sensor must be mounted in storage tank #1.
The mixer should be controlled in such a way that R4 is enabled when the temperature in the forward flow pipe needs to increase. R5 is enabled when the temperature needs to decrease.

Important:

An STL thermostat which turns off the burner must be mounted on the forward flow pipe. The forward flow temperature must not exceed 100°C.


S1
S2
R3
A1
S8
R4
R5
S3
R1

E.5 Program 6.1.5. Heat exchanger with bypass damper. With one storage tank.



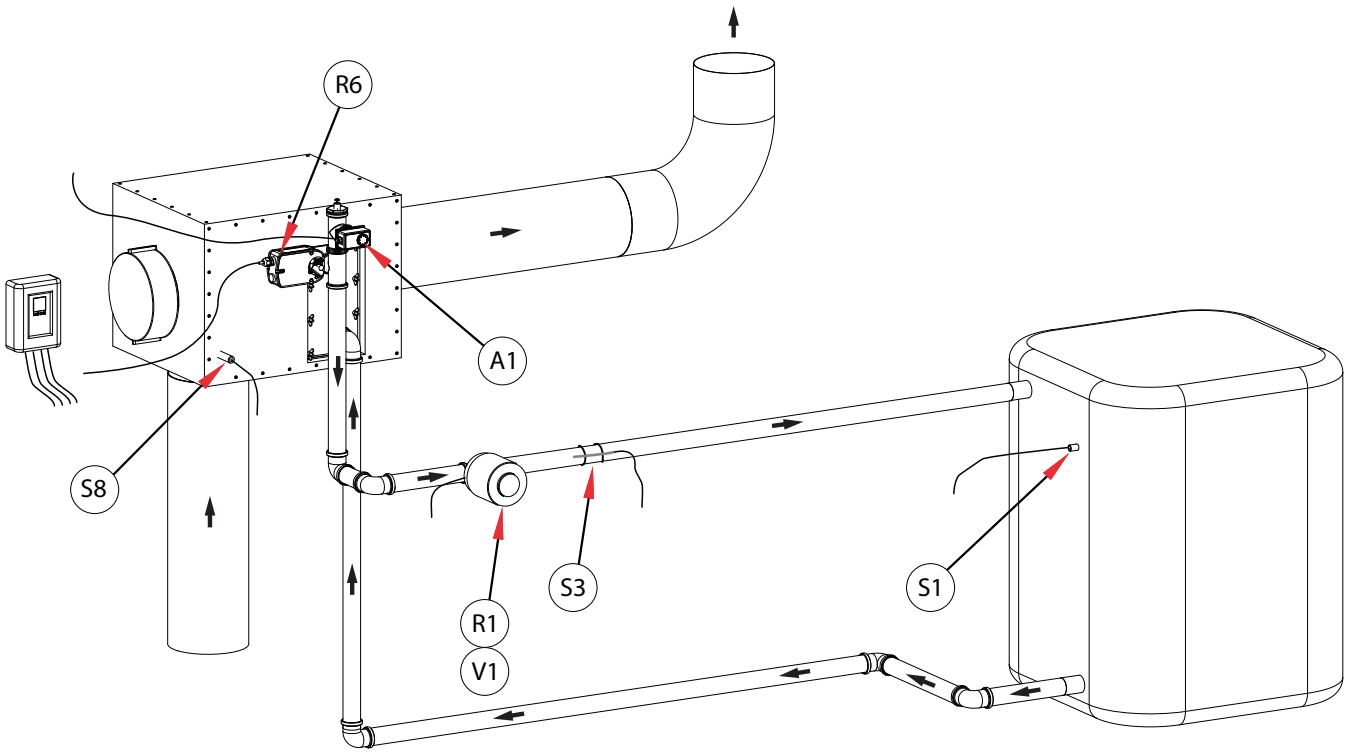
This diagram shows the following system:

Heat exchanger **with bypass** damper. One storage tank and a 0-10 V regulated circulator pump.

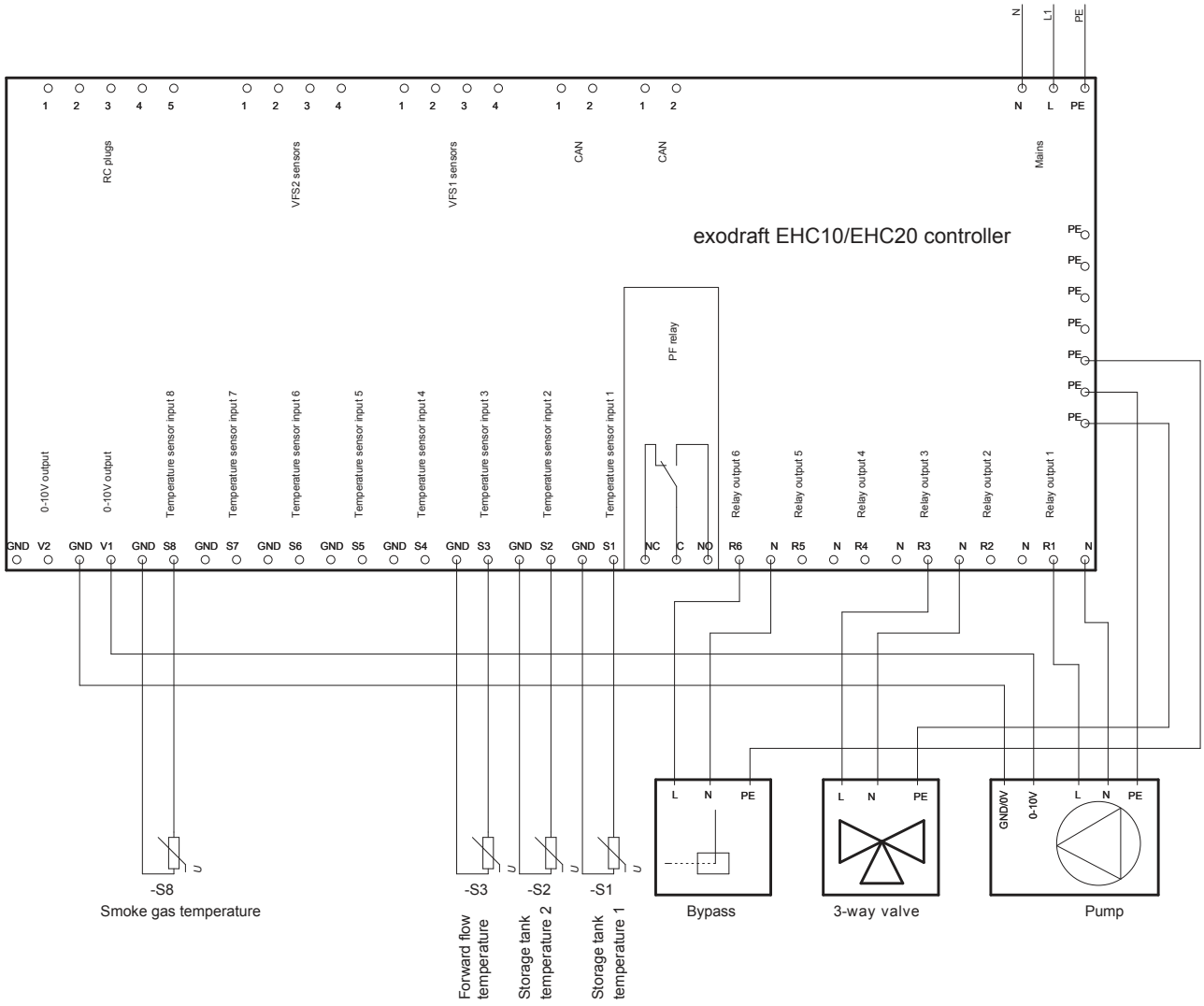
The S8 temperature sensor must be positioned in the heat exchanger inlet.
The S3 temperature sensor must be mounted on the forward flow pipe immediately after the heat exchanger.
The S1 temperature sensor must be mounted in the storage tank.
R6 is enabled when the bypass damper is to switch to the non-bypass position.

Important:

An STL thermostat which turns off the burner must be mounted on the forward flow pipe. The forward flow temperature must not exceed 100°C.


R6
A1
S8
S3
S1
R1
V1

E.6 Program 6.1.6. Heat exchanger with bypass damper. With two storage tanks.



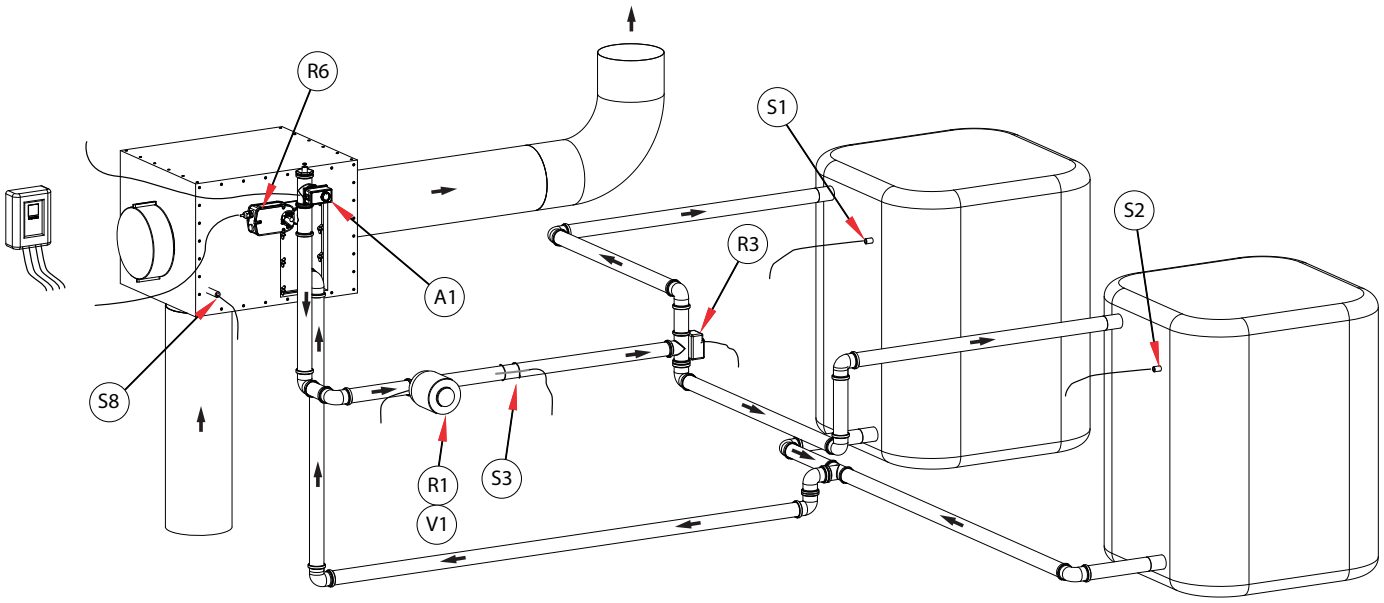
This diagram shows the following system:

Heat exchanger **with bypass** damper. Two storage tanks, a 3-way valve and a circulator pump.

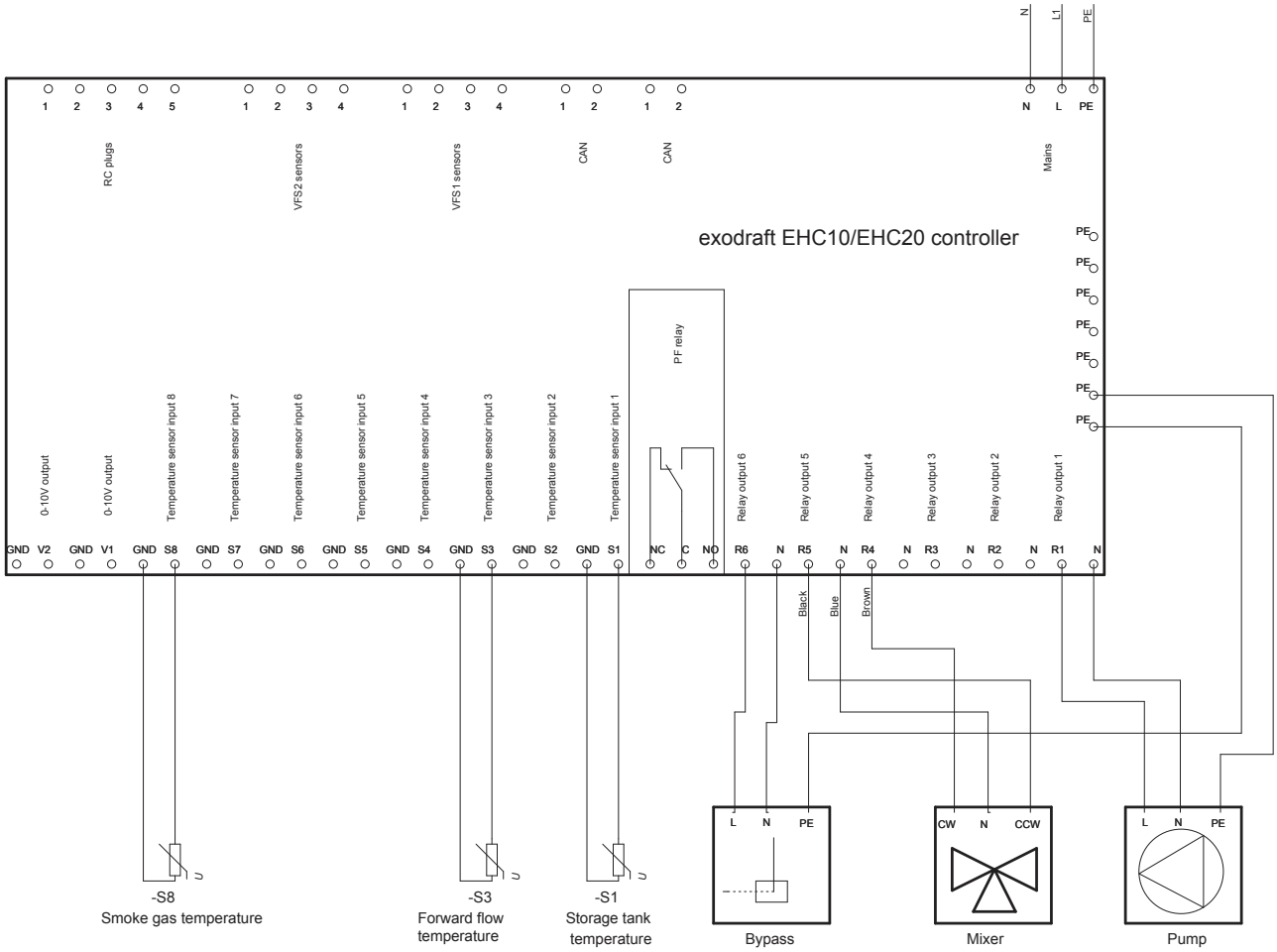
The S8 temperature sensor must be positioned in the heat exchanger inlet.
The S3 temperature sensor must be mounted on the forward flow pipe immediately after the heat exchanger.
The S2 temperature sensor must be mounted in storage tank #2.
The S1 temperature sensor must be mounted in storage tank #1.
R6 is enabled when the bypass damper is to switch to the non-bypass position.

Important:

An STL thermostat which turns off the burner must be mounted on the forward flow pipe. The forward flow temperature must not exceed 100°C.


R6
S1
S2
R3
A1
S8
R1
V1
S3

E.7 Program 6.1.7. Heat exchanger with bypass damper. With one storage tank and a mixer.



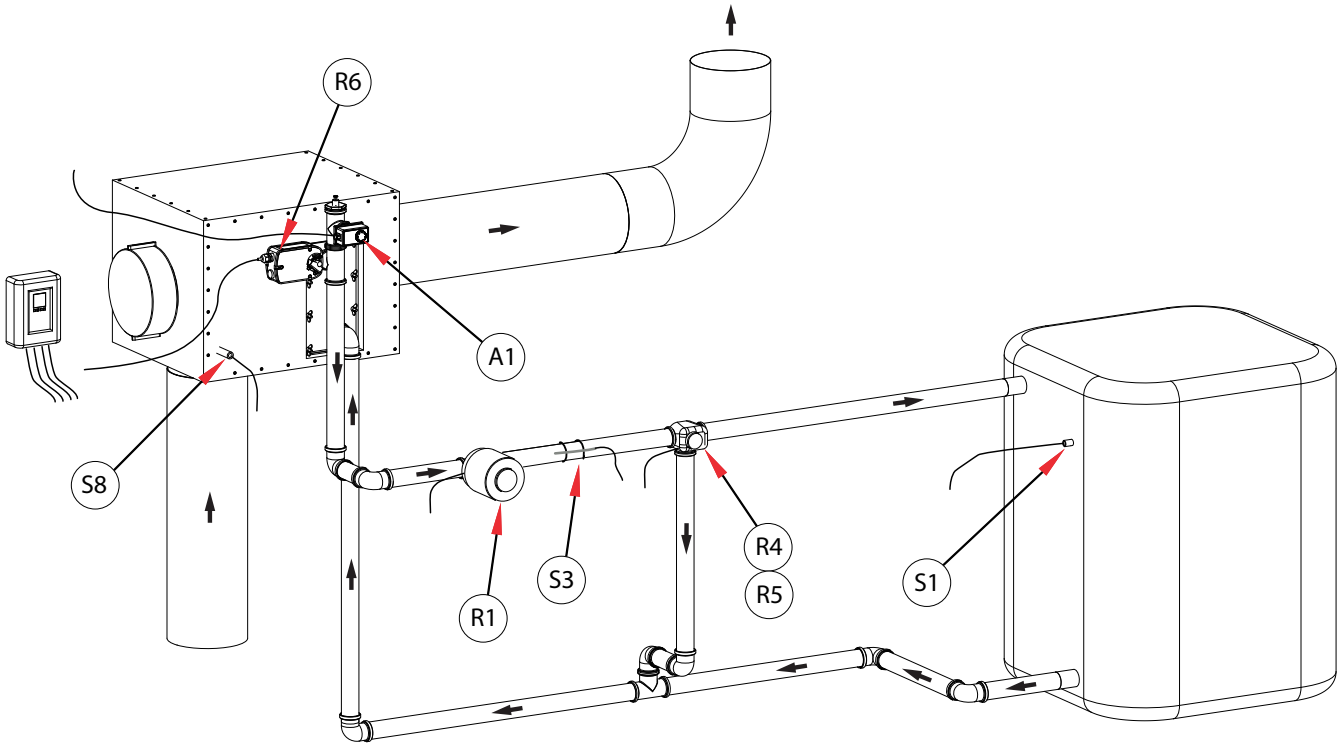
This diagram shows the following system:

Heat exchanger **with bypass** damper. One storage tank, a mixer and a circulator pump.

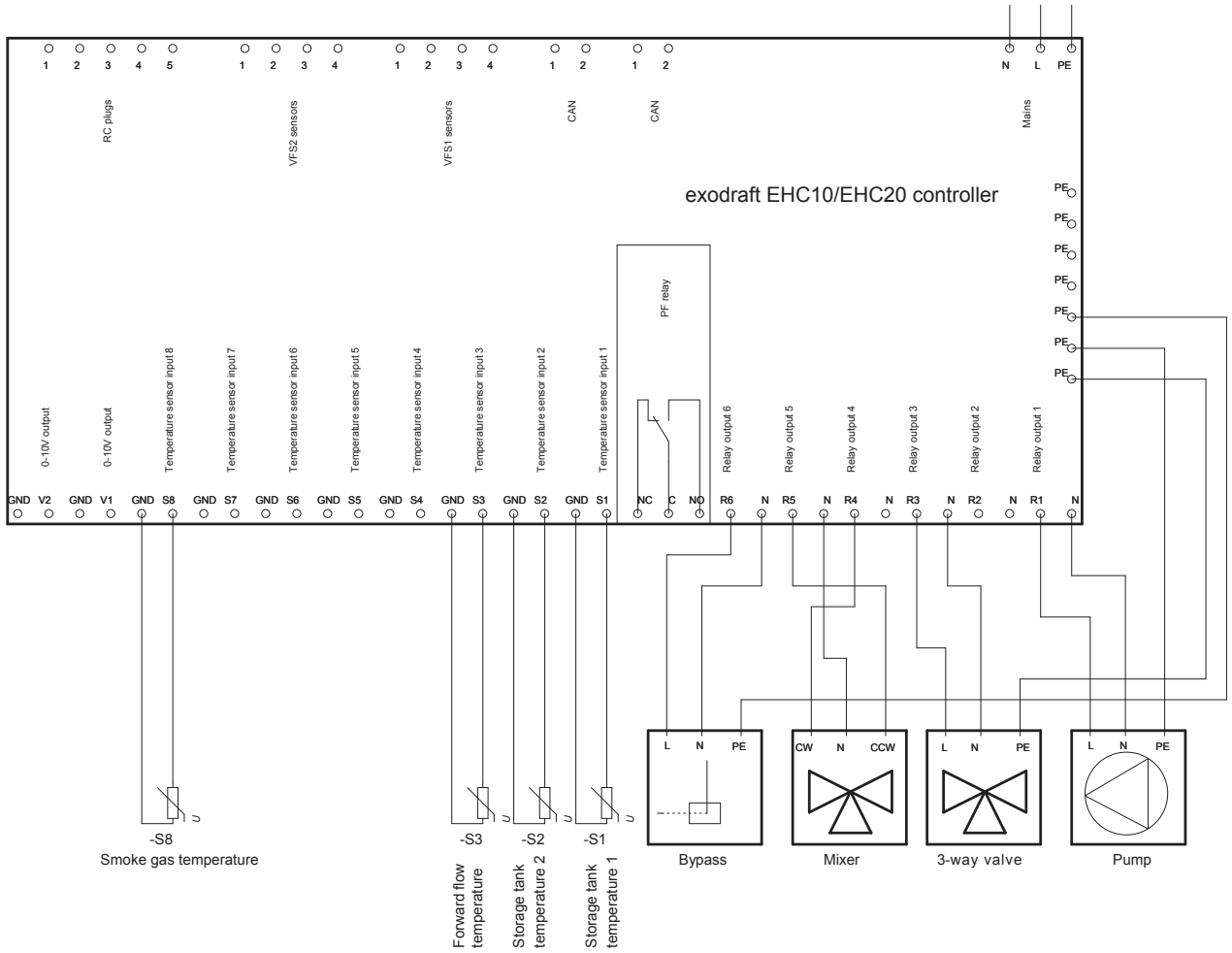
The S8 temperature sensor must be positioned in the heat exchanger inlet.
The S3 temperature sensor must be mounted on the forward flow pipe immediately after the heat exchanger.
The S1 temperature sensor must be mounted in storage tank #1.
The mixer should be controlled in such a way that R4 is enabled when the temperature in the forward flow pipe needs to increase. R5 is enabled when the temperature needs to decrease.
R6 is enabled when the bypass damper is to switch to the non-bypass position.

Important:

An STL thermostat which turns off the burner must be mounted on the forward flow pipe. The forward flow temperature must not exceed 100°C.


R6
A1
S8
R1
S3
R4
R5
S1

E.8 Program 6.1.8. Heat exchanger with bypass damper. With two storage tanks and a mixer.



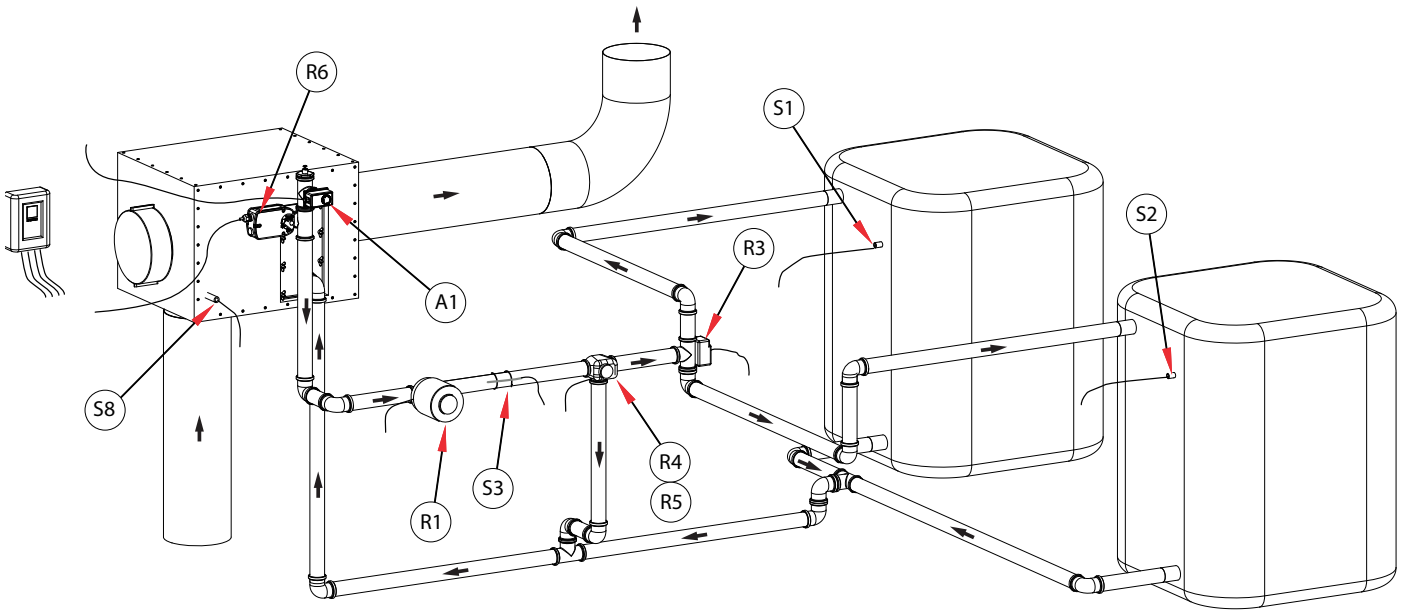
This diagram shows the following system:

Heat exchanger **with bypass** damper. Two storage tanks, a mixer, a 3-way valve and a circulator pump.

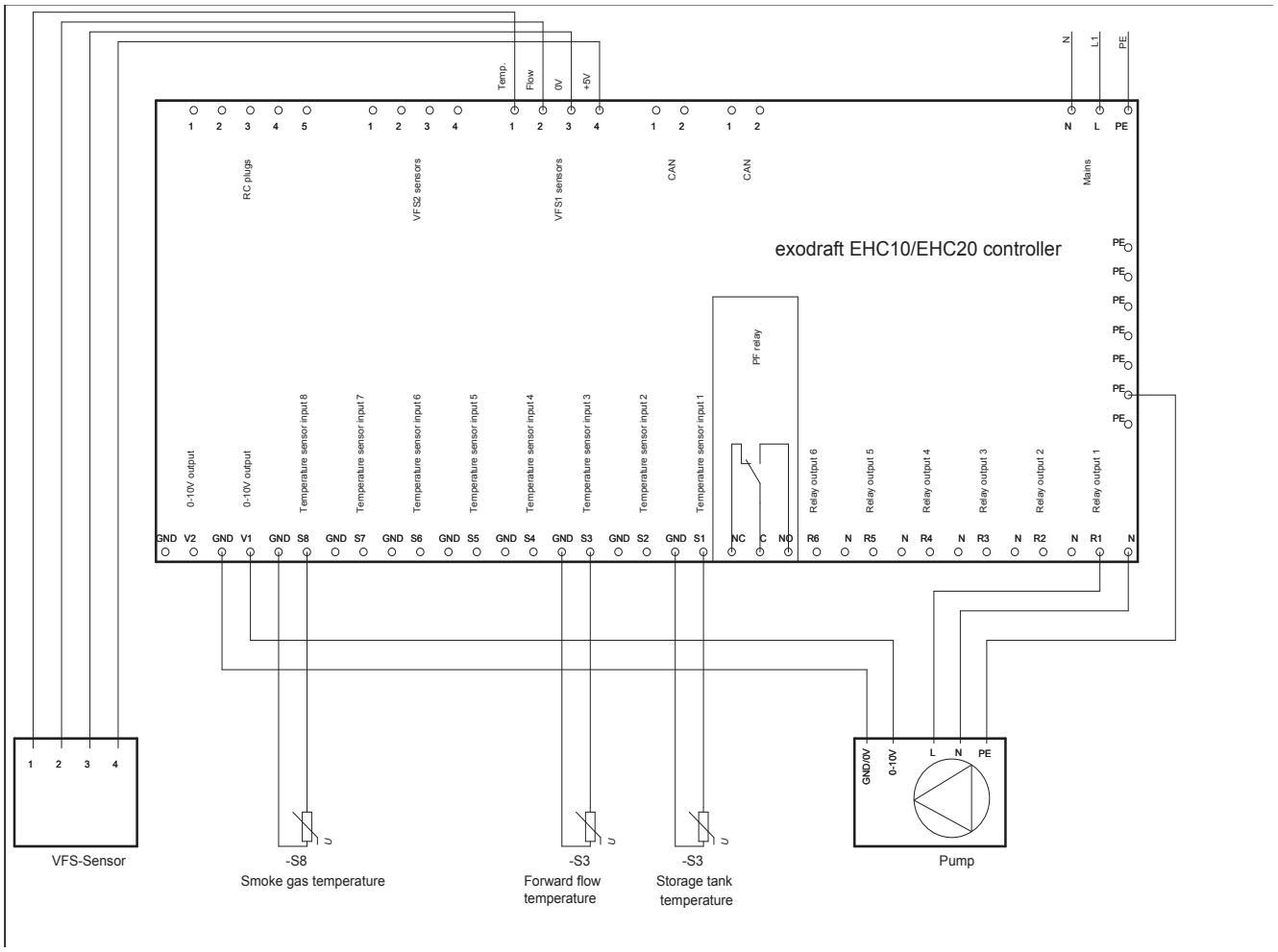
The S8 temperature sensor must be positioned in the heat exchanger inlet.
The S3 temperature sensor must be mounted on the forward flow pipe immediately after the heat exchanger.
The S2 temperature sensor must be mounted in storage tank #2.
The S1 temperature sensor must be mounted in storage tank #1.
The mixer should be controlled in such a way that R4 is enabled when the temperature in the forward flow pipe needs to increase. R5 is enabled when the temperature needs to decrease.
R6 is enabled when the bypass damper is to switch to the non-bypass position.

Important:

An STL thermostat which turns off the burner must be mounted on the forward flow pipe. The forward flow temperature must not exceed 100°C.


R6
S1
S2
R3
A1
S8
R4
R5
S3
R1

E.9 Program 6.1.1. Heat exchanger with VFS sensor for power measurement.



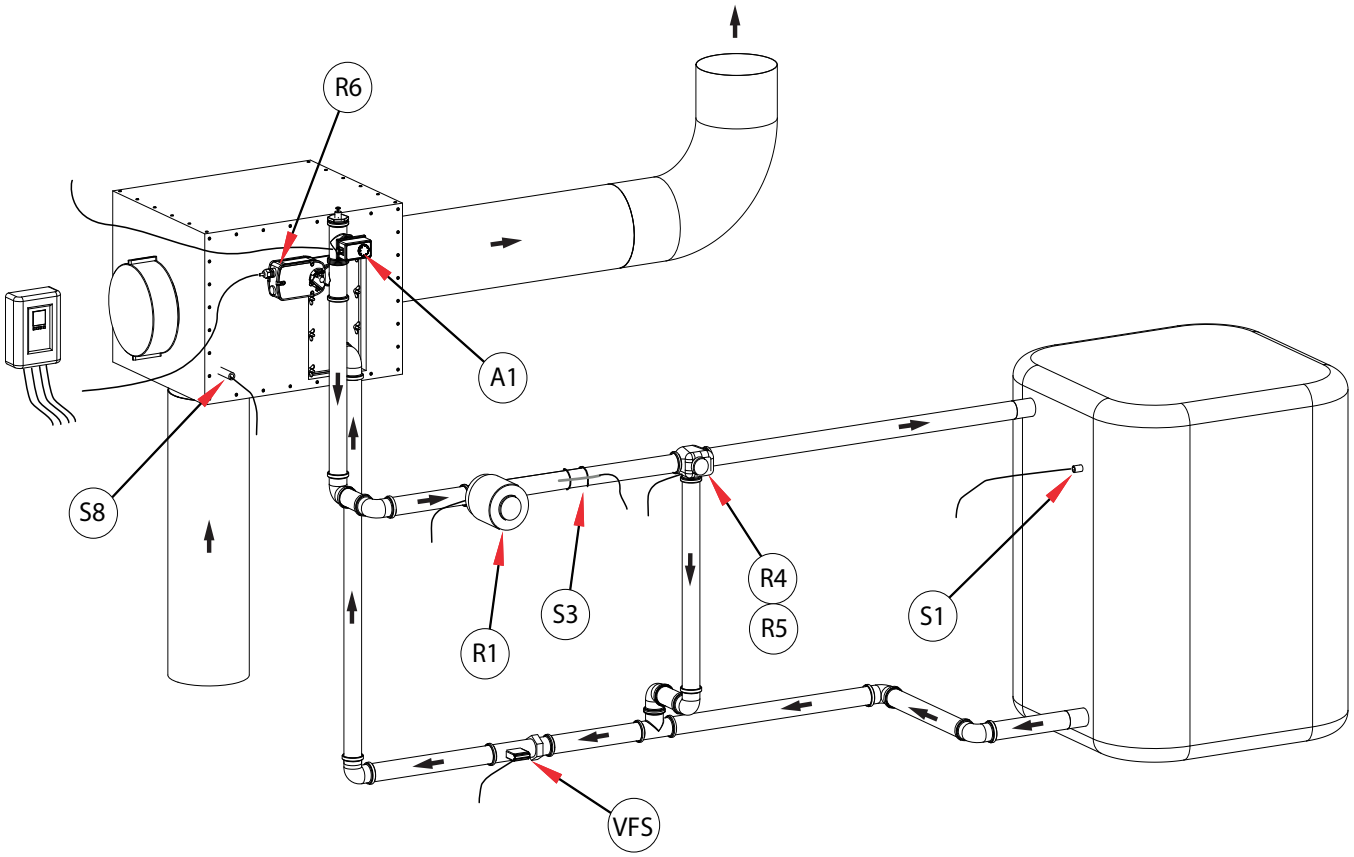
This diagram shows the following system:

Heat exchanger **with bypass** damper. Two storage tanks, a mixer, a 3-way valve and a circulator pump.

The S8 temperature sensor must be positioned in the heat exchanger inlet.
The S3 temperature sensor must be mounted on the forward flow pipe immediately after the heat exchanger.
The S1 temperature sensor must be mounted in storage tank #1.
VFS sensor

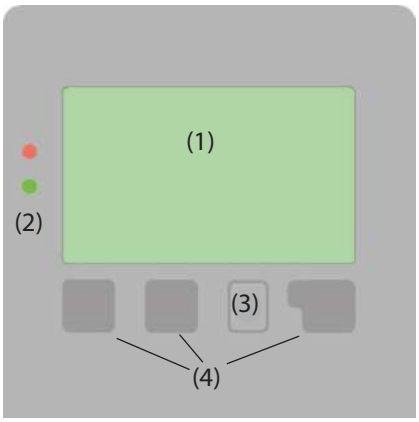
Important:

An STL thermostat which turns off the burner must be mounted on the forward flow pipe. The forward flow temperature must not exceed 100°C.


R6
A1
S8
R1
S3
R4
R5
S1
VFS

F. Operation

F.1 Display and entry system



Example display symbols:

- Pump (rotates when operating)
- Valve (direction of flow in black)
- Storage tank
- Temperature sensor
- Heat exchanger
- Filling delay (see Filling time)
- Warning / error message
- New information
- Logging enabled

Further symbols are used for the special functions

The display (1) with an extensive text and graphics mode makes the controller virtually self-explanatory in use.

To access the settings from the overview, press the "esc" button.

The green status LED (2) lights up as soon as a relay is connected; the red LED flashes in the event of an error message.

Entries are made using four buttons (3+4) which perform different functions depending on the situation. The "esc" button (3) is used to cancel an entry or exit a menu.

You may then be prompted to confirm that you wish to save your changes.

The functions of the other three buttons (4) are explained in the area of the display directly above the buttons. Generally speaking, however, the right-hand button is used to make and confirm selections.

Example button functions:

+/-	= Increase / decrease values
▼/▲	= Scroll down / up in a menu
Yes/No	= Confirm / cancel
Info	= Further information
Back	= Return to previous display
OK	= Confirm selection
Confirm	= Confirm setting

F.2 Setup wizard

After switching the controller on for the first time and setting the language and time, you will be asked whether or not you would like to parametrise the controller with the help of the setup wizard. However, the setup wizard can be closed or launched again later on from the Special functions menu. The setup wizard guides you through the necessary basic settings in the correct order and provides brief descriptions of the various parameters in the display. Pressing the "esc" button takes you back to the previous value so that you can view the selected setting again and adjust it if necessary. Pressing the "esc" button more than once takes you back step by step to the selection mode, thus cancelling the setup wizard. You should now select "Manual" in the Operating mode menu (page 34) in order to test the switch output with the load connected and check the sensor values for plausibility. You can then switch to automatic operation.

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

F.3 Unassisted setup

If you decide not to use the setup wizard, you should make the necessary settings in the following order:

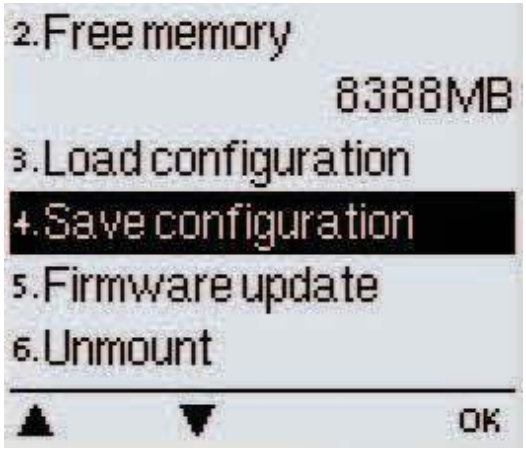
- Menu 9. Language, page 52
- Menu 6.15 Time and date, page 51
- Menu 6.1 Program selection, page 36
- Menu 4. Settings, all values, page 34
- Menu 5. Protective functions, if changes needed, page 35
- Menu 6. Special functions, if further changes needed. page 36

You should now select "Manual" in the operation mode menu, page 34 in order to test the switch outputs with the load connected and check the sensor values for plausibility. You can then switch to automatic operation.

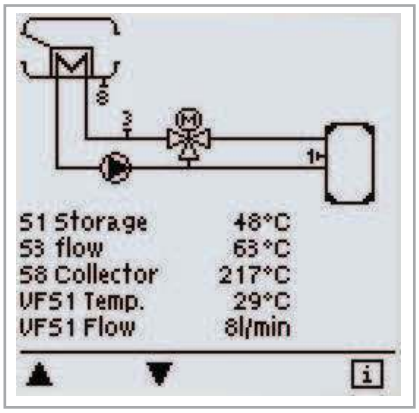
Observe the explanations of the individual parameters on the following pages, and check whether further settings are necessary for your application.

Exodraft recommends that you save the configuration on the SD card after the setup.

To save the configuration, you will need to use the "Save config." function. This can be found in Menu 6.14 (Special functions/SD card).

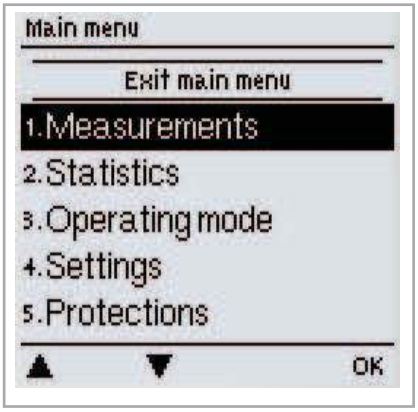


F.4 Menu sequence and structure



The graphics or overview mode appears when no button has been pressed for two minutes or if the main menu is exited by pressing "esc".

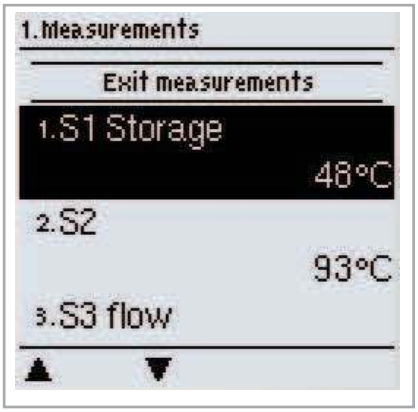
Within this overview, you can scroll through the sensors and relays using the up and down buttons.



In graphics or overview mode, the esc button takes you straight to the main menu. The following items are then available to choose from:

1. Measurements	Current temperature values with explanations
2. Statistics	System function check with operating hours etc.
3. Operating mode	Automatic operation, manual operation or switch off device
4. Settings	Set parameters required for normal operation
5. Protections	Return cooling, anti-seize protection
6. Special functions	Program selection, sensor calibration, clock, additional sensors etc.
7. Menu lock	Prevents accidental changes at critical points
8. Service data	For diagnostics in the event of an error
9. Language	Select language

1. Measurements

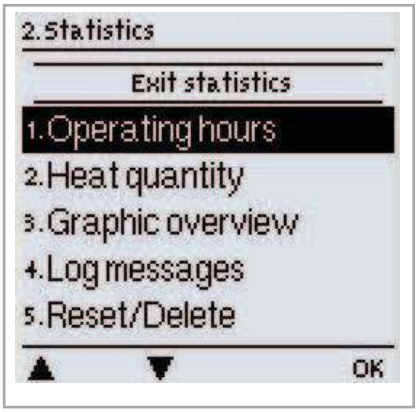


The "1. Measurements" menu is used to display the temperatures currently measured.

The menu can be exited by pressing "esc" or selecting "Exit measurements".

If "--" appears in the display instead of the measurement, this indicates a defective or incorrect temperature sensor. If the cables are too long or the sensors are not positioned optimally, this can result in minor deviations in the measurements. In this case, the display values can be corrected by entering the relevant information into the controller. Follow the instructions under page 49.
What measurements are displayed depends on the selected program, the sensors connected and the specific device design.

2. Statistics



The "2. Statistics" menu is used for function control and long-term monitoring of the system.

The menu can be exited by pressing "esc" or selecting "Exit statistics".

In order to evaluate system data, the controller clock must be set correctly. Improper operation or an incorrect time may result in data being deleted, recorded incorrectly or overwritten. The manufacturer accepts no liability for the data recorded.

2.1 Operating hours

Shows the number of hours that the solar pump connected to the controller has been in operation. Various time ranges (day-years) are available.

2.2 Heat quantity

Shows the system's heat yield.

2.3 Graphic overview

The data set out under 2.1-2.2 are presented clearly in the form of a bar chart here. Various time ranges are available for comparison. You can scroll using the two buttons on the left.

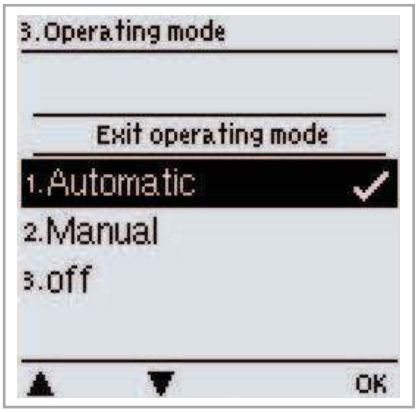
2.4 Reports

Shows the last 20 system reports issued along with details of the date and time.

2.5 Reset / delete

Allows you to reset and delete individual statistics. If you select "All statistics", everything apart from the error list will be deleted.

3. Operating mode



In the "3. Operating mode" menu, you can not only select the automatic mode but also switch off the controller or switch to a manual operating mode.

You can exit the menu by pressing "esc" or selecting "Exit statistics".

3.1 Automatic

Automatic mode is the normal mode of operation for the controller. Only in automatic mode can the controller function correctly, taking into account the current temperatures and the parameters set. If the power supply is interrupted, the controller will automatically return to the last selected operating mode.

3.2 Manual

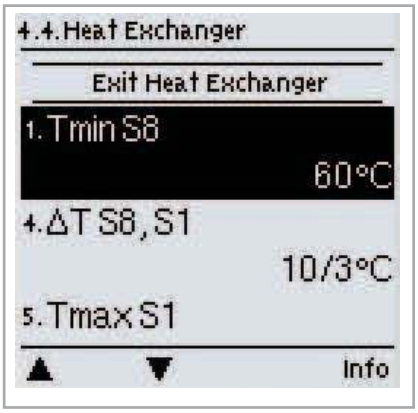
The relay and therefore the loads connected are switched on or off at the push of a button, without taking into account the current temperatures and the parameters set. The temperatures measured are displayed for overview and function control purposes.

If the "Manual" operating mode is selected, the current temperatures and parameters selected no longer play any role. There is therefore a risk of scalding or serious damage to the system. The "Manual" operating mode should only be used by specialists for brief function tests or when setting up the controller.

3.3 Off

If the "Off" operating mode is enabled, all controller functions are switched off. This can cause the solar collector or other system components to overheat. The temperatures measured continue to be displayed for overview purposes.

4. Settings



In the "4. Settings" menu, you can configure the basic settings for the control functions.

Under no circumstances are these settings designed as a substitute for the customer's own safety provisions!

You can exit the menu by pressing "esc" or selecting "Exit settings".

The menu numbering varies depending on the hydraulic schema chosen
(see "6.1 Program selection", page 36)

4.1 Tmin S (X)

Enable/switch-on temperature at sensor X
If this value is exceeded at the specified sensor and the other conditions are met, the controller will switch on the associated pump or valve. If the temperature at the sensor then drops 5°C below this value, the pump or valve will be switched off again.
Setting range: 0°C to 99°C / default: 20°C

4.2 Tmax S (X)

Switch-off temperature at sensor X
If this value is exceeded at the specified sensor, the controller will switch off the associated pump or valve. If this value is then undershot at the sensor and the other conditions are met, the controller will switch on the pump or valve again.
Setting range: 0°C to 99°C / default: 60°C

Excessively high temperature settings can result in scalding or damage to the system. The customer must make provisions to prevent scalding.

4.3 Priority S(X)

Priority of the storage tank X
This setting specifies the filling order. If an equal priority is set, the storage tanks will be filled on an equal basis.
Setting range: 1-4

4.4 T priority

Temperature threshold for absolute priority during primary filling
In multiple storage tank systems, the filling of a lower-ranking storage tank will not commence until the temperature setpoint at the sensor for the higher-ranking storage tank is exceeded.
Setting range: 0°C to 90°C / default: 40°C

4.5 Filling time

Interrupting the filling of a lower-ranking storage tank
When a lower-ranking storage tank is being filled, a check to determine whether the collector has reached a temperature level which would allow the higher-ranking storage tank to be filled is carried out after the period of time set here. If this is the case, the higher-ranking storage tank will be filled again.
If this is not possible, the temperature rise will be measured (see "4.6 Temperature rise") in order to check whether the collector will shortly allow the higher-ranking storage tank to be filled.
Setting range: 1 to 90 minutes / default: 20 minutes

4.6 Temperature rise

Extending the filling delay owing to temperature rise
In order to set the exact filling priorities for systems with multiple storage tanks, the minimum temperature rise at the collector (measured over a minute) which is needed in order for the delay in filling the lower-ranking storage tank to be extended by a minute is set. The delay is extended because the temperature rise at the collector will presumably soon allow the higher-ranking storage tank to be filled. The filling of the primary storage tank will begin as soon as ΔT switch-on conditions are met. If, however, the temperature rise undershoots the set value, the filling of the lower-ranking storage tank will once again be enabled.
Setting range: 1°C to 10°C / default: 3°C

5. Protective functions

In the "5. Protective functions" menu, you can enable and configure various protective functions.

Under no circumstances are these settings designed as a substitute for the customer's own safety provisions.

You can exit the menu by pressing "esc" or selecting "Exit protective functions".

5.1 Anti-seize protection

If anti-seize protection is enabled, the controller will switch on the relevant relay and the connected load for 5 seconds every day at 12 o' clock or every Sunday at 12 o' clock in order to prevent the pump or the valve seizing as a result of extended standstill periods.
R1 setting range: daily, weekly, off / default: Off
R2 setting range: daily, weekly, off / default: Off

6. Special functions

In the "6. Special functions" menu, basic settings and advanced functions can be configured.

With the exception of the time, the settings should only be configured by specialists.

You can exit the menu by pressing "esc" or selecting "Exit special functions".

The menu numbering varies depending on the hydraulic schema chosen (see "6.1 Program selection")

6.1 Program selection

You can select and set the appropriate hydraulic variant for your particular application here (see Hydraulic variants / schemata / systems 10).
Setting range: 1-48 / default: 1

Under normal circumstances, the program is selected once only when the specialist is setting up the controller. If an incorrect program is selected, this may lead to unexpected malfunctions.

6.2 Rotational speed control

If rotational speed control is enabled, a special internal electronic system in the EHC allows you to alter the rotational speed of pumps according to process requirements.

This function should only be enabled by a specialist. Depending on the pump and pump level used, the minimum rotational speed should not be set too low because the pump or the system could otherwise be damaged. The information provided by the relevant manufacturers must also be observed! In case of doubt, it is better to set the min. rotational speed and pump level too high rather than too low.

6.2.1 Rotational speed modes

The following rotational speed modes are available:
Off: There is no rotational speed control. The pump connected is switched on at full speed or switched off.
Mode 1: The controller switches to the set max. rotational speed after the purging period. If the temperature difference ΔT between the reference sensors (collector and storage tank) is below the set switch-on temperature difference ΔT R1, the rotational speed will be reduced.
If the temperature difference between the reference sensors is above the set switch-on temperature difference ΔT R1, the rotational speed will be increased. If the controller has adjusted the rotational speed of the pump down to the lowest level and the ΔT between the reference sensors is ΔToff, the pump is switched off.
Mode 2: The controller switches to the set min. rotational speed after the purging period. If the temperature difference ΔT between the reference sensors (collector and storage tank) is above the set switch-on temperature difference ΔT R1, the rotational speed will be increased.
If the temperature difference ΔT between the reference sensors is below the set switch-on temperature difference ΔT R1, the rotational speed will be reduced.
If the controller has adjusted the rotational speed of the pump down to the lowest level and the ΔT between the reference sensors is ΔToff, the pump is switched off.
Mode 3: The controller switches to the set min. rotational speed after the purging period. If the temperature at the reference sensor (collector; in systems with heat exchanger for relay 2 the heat exchanger) is above the setpoint value to be set subsequently, the rotational speed will be increased.
If the temperature at the reference sensor is below the setpoint value to be set subsequently, the rotational speed will be reduced.

Mode 4 (2 storage tank system)
If the valve is set towards the higher-ranking storage tank, the rotational speed will be regulated as in M3. If the valve is set towards the lower-ranking storage tank, the rotational speed will be regulated as in M2.
Setting range: M1, M2, M3, M4, off / default: off

6.2.2 Pump type

The type of speed-controlled pump should be set here.
Standard: Rotational speed control via wave packet control for standard pumps.
0-10 V: Control system for special pumps (e.g. high-efficiency pumps) using a 0-10 V signal.
PWM: Control system for special pumps (e.g. high-efficiency pumps) using a PWM signal.

6.2.3 Pump settings

In this menu, you can configure the settings for the 0-10 V or PWM pump.

If you select this menu, you may be prompted to save the rotational speed settings.

6.2.3.1 Pump

In this menu, you can select preset profiles for the pump or configure all settings yourself under "Manual". The settings can also be changed after selecting a profile.

6.2.3.2 Signal form

In this menu, you can set the type of pump: Heating pumps are designed to set maximum power with a small input signal, while solar pumps provide low power from a small input signal. Solar = normal, heating = inverted.
Setting range: Normal, inverted / default: Normal

6.2.3.3 PWM off

This signal is output when the pump is switched off (pumps with cable breakage detection require a minimal signal).
Setting range: (Solar:) 0 to 50% / default: 0% - (Heating:) 50% to 100% / default: 100%

6.2.3.4 PWM on

The pump needs this signal in order to switch on and run at minimum speed.
Setting range: (Solar:) 0 to 50% / default: 10% - (Heating:) 50% to 100% / default: 90%

6.2.3.5 PWM max

With this value, you can specify the maximum frequency for the highest speed of an energy-saving pump which will be used during purging or manual operation for example.
Setting range: (Solar:) 50 to 100% / default: 100% - (Heating:) 0% to 50% / default: 0%

6.2.3.6 0-10V off

This voltage is output when the pump is switched off (pumps with cable breakage detection require a minimum voltage).
Setting range: (Solar:) 0.0 to 5.0 V / default: 1.0 V - (Heating:) 5.0 to 0.0 V / default: 4.0 V

6.2.3.7 0-10V on

The pump needs this voltage in order to switch on.
Setting range: (Solar:) 0.0 to 5.0 V / default: 1.0 V - (Heating:) 5.0 to 10.0 V / default: 9.0 V

6.2.3.8 0-10V max

With this value, you can specify the maximum voltage level for the highest speed of an energy-saving pump which will be used during purging or manual operation for example.
Setting range: (Solar:) 5.0 to 10.0 V / default: 10.0 V - (Heating:) 0.0 to 5.0 V / default: 0.0 V

6.2.3.9 Rotational speed when "On"

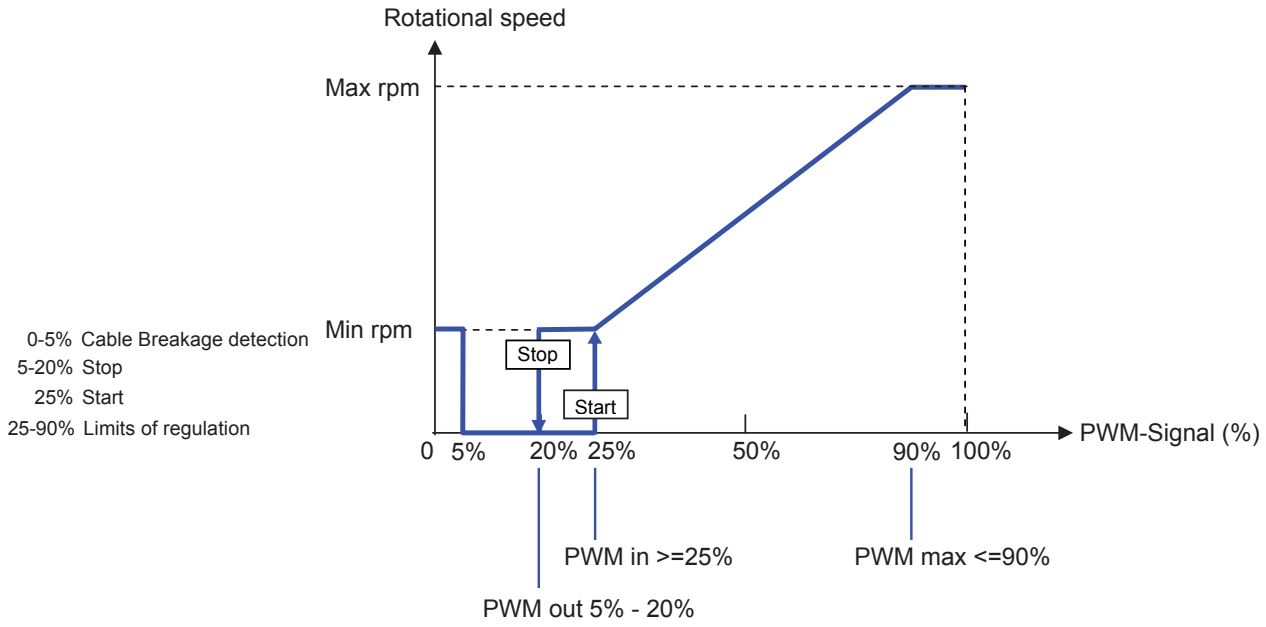
In this menu, you can change the basis for calculating the rotational speed shown. If, for example, 30% is specified here, 30% rotational speed will be shown when applying the frequency/voltage under "PWM On" / "0-10 V On". If the frequency/voltage for "PWM Max" / "0-10 V Max" is applied, 100% rotational speed will be shown. Intermediate values will be calculated accordingly.
Setting range: 10 to 90% / default: 30%

This function does not influence control functions. It merely influences the display on the status screen.

6.2.3.10 Show signal

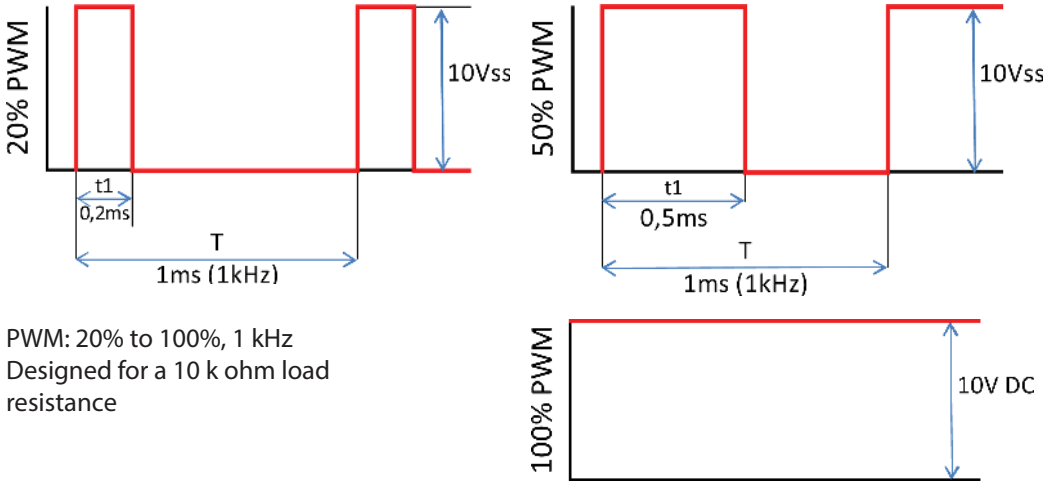
Shows the pump signal set in a graphical and text overview.

6.2.3a Example pump settings



6.2.3b Technical data – PWM and 0-10 V

PWM technical data:



PWM: 20% to 100%, 1 kHz
Designed for a 10 k ohm load resistance

0-10 V technical data:
0-10 V: 2 V to 10 V (20% to 100%)
Designed for a 10 k ohm load resistance.

10 V = 100% rotational speed
5 V = 50% rotational speed
2 V = 20% rotational speed
0 V = Off

6.2.4 Purging time

During this time, the pump runs at full speed (100%) in order to ensure a reliable start-up. Only after this purging time will the pump run at a controlled speed and switch to the max. or min. speed depending on the mode set.
The purging time cannot be used with 0-10 V / PWM pumps.
Setting range: 5 to 600 seconds / default: 8 seconds

6.2.5 Control time

The control time is used to determine the latency of rotational speed control in order to minimise temperature fluctuations. The time span required for a complete control cycle from minimum to maximum speed is specified here.
Setting range: 1 to 15 minutes / default: 4 minutes

6.2.6 Max. rotational speed

The maximum rotational speed of the pump is specified here. During the setting procedure, the pump runs at the relevant speed and the throughflow can be determined.
Setting range: 70% to 100% / default: 100%

If you select this menu, you may be prompted to save the rotational speed settings.

6.2.7 Min. rotational speed

The minimum rotational speed of the pump is specified here. During the setting procedure, the pump runs at the relevant speed and the throughflow can be determined.
Setting range: ("6.2.3.9 Rotational speed when "On", page 38) to max. rotational speed -5% / default: 30%

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

6.2.8 Setpoint value

This value is the control setpoint value for Mode 3 (see "6.2.1 Rotational speed modes", page 36). If this value at the sensor drops below, the rotational speed will be reduced. If it is exceeded, the rotational speed will be increased.
Setting range: 0°C to 90°C / default: 60°C

6.3 R2 rotational speed control

R2 rotational speed control - see "6.2 Rotational speed control", page 36

6.4 Relay functions

Free relays, i.e. relays not used in the basic schema, can be assigned the additional functions explained here. Each additional function can be used only once.
R1 and R2: ELRs / electronically speed-controlled relays
R3 to R6: Mechanical relays 230 V
R7: Potential-free relay
V1 and V2: PWM and 0-10 V outputs
Please note the technical information for the relays (see page 5).

The symbols shown will be displayed on the overview screen as soon as you enable the function.

The numbering in this list does not correspond to the numbering in the controller menu.

6.4.1 Thermostat

Using the thermostat function, you can provide the system with additional energy on a time and temperature-controlled basis.
Setting range: On, Off

Excessively high temperature settings can result in scalding or damage to the system.
The customer must make provisions to prevent scalding.

In economy mode, other values, e.g. T eco may apply.

6.4.1.1 TH setpoint

The target temperature at thermostat sensor 1. Below this temperature, the heating will switch on until TH setpoint+hysteresis is reached.
Setting range: -20 - 99°C / default: 50°C

6.4.1.2 TH hysteresis

Hysteresis of the setpoint value.
Setting range: 1 - 50°C / default: 10°C

6.4.1.3 Thermostat sensor 1

Tsetpoint is measured at thermostat sensor 1
If thermostat sensor 2 is connected, the relay will switch on when the temperature drops below "TH setpoint" at thermostat sensor 1, and off when "TH setpoint" + hysteresis at thermostat sensor 2 is exceeded.
Setting range: S1-S8, VFS1-2, Active storage tank / default: none

6.4.1.4 Thermostat sensor 2

Optional switch-off sensor
If "TH setpoint" + hysteresis at thermostat sensor 2 is exceeded, the relay will be switched off.
Setting range: S1-S8, VFS1-2, Active storage tank / default: none

6.4.1.5 T eco

Setpoint value in economy mode
When in economy mode: During solar charging, the "T eco" value will be used instead of "TH setpoint" as the setpoint value. As soon as the temperature at thermostat sensor 1 drops below "T eco", the relay will be switched on and will heat until "T eco" + hysteresis is reached.
Setting range: 0 - 99°C / default: 40°C

6.4.1.6 Storage tank

Economy mode
Charging the storage tank selected here will enable the economy mode.
If this storage tank is currently being run using solar, the heating will only be switched on if the temperature is below "T eco".
Setting range: (Storage tank sensor) / default: First storage tank

6.4.1.7 Economy mode

In economy mode, the heating will only switch on when the temperature drops below the "T eco"-setting, and will heat to "T eco" + hysteresis if solar charging is enabled.
Setting range: On, Off / default: Off

6.4.1.8 Times

Enable time for the thermostat function
You can set the desired time periods during which the thermostat function is enabled from a time point of view here. You can enter three times for each day of the week. You can also copy individual days to other days. The thermostat function is switched off outside the set times.
Setting range: 00:00 to 23:59 / default: 06:00 to 22:00

6.4.2 Thermostat 2

See "6.4.1 Thermostat", page 40

6.4.3 Cooling

With this function, an attempt is made to cool storage tanks for example to a variable setpoint temperature by releasing heat.
Setting range: On, Off

6.4.3.1 Co Tsetpoint

The target temperature at thermostat sensor 1. Above this temperature, cooling will be switched on until Co Tsetpoint + hysteresis is reached.
Setting range: 0 - 99°C / default: 50°C

6.4.3.2 Co hysteresis

If the temperature at the cooling sensor undershoots Tsetpoint + hysteresis, the relay will be switched off.
Setting range: -50°C to -1°C / default: -10°C

6.4.3.3 Cooling sensor

The reference sensor for the cooling function.
Setting range: S1-S8, VFS1-2, Active storage tank, RC / default: none

6.4.3.4 Times

Enable time for the cooling function
You can set the desired time periods during which the cooling function is enabled from a time point of view here. You can enter three times for each day of the week. You can also copy individual days to other days. The cooling function is switched off outside the set times.
Setting range: 00:00 to 23:59 / default: 06:00 to 22:00

6.4.4 Return flow temperature rise

With this function, the return flow temperature of a heating circuit can be increased with the help of the storage tank.
Setting range: On, Off

6.4.4.1 RF Tmax

Maximum temperature at the storage tank sensor. If this temperature at the set storage tank sensor is exceeded, the relay will be switched off again.
Setting range: 0 - 99°C / default: 70°C

6.4.4.2 ΔT return flow

Switch-on temperature difference
If the temperature difference between the storage tank sensor and the return flow sensor is exceeded, the relay will be switched on.
Setting range: 5-20 K / default: 8 K
Switch-off temperature difference:
If the temperature difference between the storage tank sensor and the return flow sensor is exceeded, the relay will be switched off.
Setting range: 2-19 K (limited by ΔT storage tank RF On) / default: 4 K

6.4.4.3 Return flow sensor

Return flow sensor selection
Setting range: S1-S8, VFS1-2, Active storage tank / default: none

6.4.4.4 Storage tank sensor

Storage tank sensor selection
Setting range: S1-S8, VFS1-2, Active storage tank / default: none

---

6.4.5 Anti-Legionella function

With the help of the anti-Legionella function, you can heat up the system at selected times in order to eliminate Legionella bacteria.
Setting range: On, Off

6.4.5.1 AL Tsetpoint

This temperature must be reached at the AL sensor(s) for the AL action time in order to allow successful heating.
Setting range: 60 - 99°C / default: 70°C

6.4.5.2 AL action time

The AL Tsetpoint temperature at the AL sensors must prevail for this period of time in order to allow successful heating.
Setting range: 1-120 min / default: 15 min

6.4.5.3 Last AL heating

Details of when the last successful heating took place are shown here.
No setting options

6.4.5.4 AL sensor 1

The temperature for the AL function is measured by this sensor.
Setting range: S1-S8, VFS1-2, Active storage tank / default: none

6.4.5.5 AL sensor 2

Optional AL sensor
If this sensor is connected, Tsetpoint AL must be reached at both sensors for the action time in order to allow successful heating.
Setting range: S1-S8, VFS1-2, Active storage tank / default: none

6.4.5.6 AL times

AL heating will take place at these times.
Setting range: 00:00 to 23:59 / default: 06:00 to 22:00

This anti-Legionella function does not offer complete protection against Legionella because the controller relies on a sufficient supply of energy and the temperatures cannot be monitored in the entire storage tank area and the connected pipe system. To ensure complete protection against Legionella, your energy sources must be able to heat the water to the necessary temperature, while your external control devices must ensure that the water is able to circulate within the storage tank and pipe system.

The anti-Legionella function is switched off as standard.

When the anti-Legionella function is enabled, the storage tank will be heated to above the "Tmax S2" value set, which can result in scalding and damage to the system.

6.4.6 Transfer

With this function, energy can be transferred from one storage tank to another.
Setting range: S1-S8, VFS1-2, Active storage tank / default: none

6.4.6.1 Δ T transfer

Temperature difference for energy transfer.
If the temperature difference between the sensors reaches Δ T transfer on, the relay will be switched on. As soon as the difference drops to Δ T transfer off, the relay will be switched off again.
On: Setting range: 5-20°C/ default: 8°C
Off: Setting range: 2°C to ΔT on / default: 4°C

6.4.6.2 Tr Tmax

Setpoint temperature of the destination storage tank
If this temperature is measured at the sensor in the destination storage tank, the transfer function will be switched off.
Setting range: 0-90°C / default: 60°C

6.4.6.3 Tr Tmin

Minimum temperature in the source storage tank to allow transfer
Setting range: 0-90°C / default: 30°C

6.4.6.4 Source sensor

In this menu, you can set the sensor that is positioned in the storage tank from which energy is withdrawn.
Setting range: S1-S8, VFS1-2, Active storage tank / default: none

6.4.6.5 Destination sensor

In this menu, you can set the sensor that is positioned in the storage tank to which energy is transferred.
Setting range: S1-S8, VFS1-2, Active storage tank / default: none

---

6.4.7 Difference

The relay is activated as soon as the set temperature difference between the source and destination sensor prevails.
Setting range: On, Off

6.4.7.1 Δ T difference

Switch-on difference
The relay will switch on when this temperature difference is reached.
Setting range: 3-50°C / default: 10°C
Switch-off difference
The relay will switch off when this temperature difference is reached.
Setting range: 2-49°C / default: 4 (the upper limit of the setting range is governed by the switch-on difference)

6.4.7.2 Source sensor

Heat source sensor/heat supplier for differential function
Sets the heat source sensor.
Setting range: S1-S8, VFS1-2, Active storage tank / default: none

6.4.7.3 Diff Tmin

Minimum temperature at the source sensor to activate the differential relay
If the temperature at the source sensor is below this value, the difference function will not be switched on.
Setting range: 0 to 90°C / default: 20°C

6.4.7.4 Destination sensor

Heat sink sensor/heat outlet for the differential function
Sets the heat outlet sensor.
Setting range: S1-S8, VFS1-2, Active storage tank / default: none

6.4.7.5 Diff Tmax

Maximum temperature at the destination sensor to activate the differential relay
If the temperature at the destination sensor is above this value, the difference function will not be switched on.
Setting range: 0 to 99°C / default: 60°C


6.4.8 Solid fuel boiler

The relay will be used to control an additional solid fuel boiler.
Setting range: On, Off

6.4.8.1 SF Tmin

Minimum temperature in the boiler for switching on the pump. If the temperature at the boiler sensor is below this temperature, the relay will not be switched on.
Setting range: 0°C to 99°C / default: 70°C

6.4.8.2 SF Tmax

Maximum temperature in the storage tank. If this is exceeded, the relay will be switched off.
Setting range: Off up to 100°C / default: 70°C

6.4.8.3 Δ T SF

The temperature difference between the boiler and storage tank as a switch-on and switch-off condition.
Switch-on temperature difference Δ T SF
Setting range: 5 to 20 K / default: 8
Switch-off temperature difference Δ T SF
Setting range: 0°C up to switch-on Δ T SF / default: 4

6.4.8.4 Boiler sensor

The sensor that is used as a boiler sensor.
Setting range: S1-S8, VFS1-2, Active storage tank / default: none

6.4.8.5 Storage tank sensor

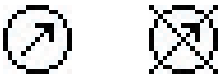
The sensor that is used as a storage tank sensor.
Setting range: S1-S8, VFS1-2, Active storage tank / default: none

---


6.4.9 Error messages

The relay will be switched on if one or more of the set conditions become active.
This function can also be inverted so that the relay is switched on all the time (Permanently on) and then switched off when a protective function becomes active.
Setting range: On, Inverted, Off / default: Off

Collector alarm
Collector protection
System protection
Frost protection
Return cooling
Anti-Legionella function
Reports



6.4.10 Pressure control

The relay switches on if the pressure drops below a minimum or exceeds a maximum.
Setting range: On, Off / default: Off

6.4.10.1 Pressure control

In this menu, you can enable system pressure control via a direct sensor. As soon as the set pressure conditions are exceeded, the set relay will switch on.

6.4.10.2 RPS1 / RPS2

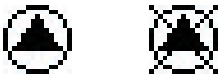
Pressure sensor model
In this menu, you can set the type of pressure sensor used.
Please note: If, for example, VFS1 is connected, RPS1 will be hidden.
Setting range: Off; 0-0.6 bar; 0-1 bar; 0-1.6 bar; 0-2.5 bar; 0-4 bar; 0-6 bar; 0-10 bar
Default: Off

6.4.10.3 Pmin

Minimum pressure in the system. If this pressure drops below, the controller will issue an error message and the relay will switch (hysteresis: 0.5 bar).
Setting range: Off; 0.0 to 10 bar
Default: Off

6.4.10.4 Pmax

Maximum pressure in the system. If this pressure is exceeded, the controller will issue an error message and the relay will switch (hysteresis: 0.5 bar).
Setting range: Off; 0.0 to 10 bar
Default: Off



6.4.11 Booster pump

An additional pump which fills the system at the start of each solar charge.

6.4.11.1 Filling time

Duration of pump operation
Determines for how long the pump should fill the system after being triggered.
Setting range: 0 - 120 seconds / default: 30 seconds

6.4.12 Parallel operation R (X)

The relay operates at the same time as the set relay R1 or R2.
Setting range: On, Off

6.4.12.1 Delay

In this menu, you can specify how long after starting R1 or R2 the system waits until the relay operating in parallel starts.
Setting range: 0 - 120 seconds / default: 30 seconds

6.4.12.2 Follow-up time

In this menu, you can specify how long the relay operating in parallel continues to run after R1 or R2 switches off.
Setting range: 0 - 120 seconds / default: 30 seconds

6.4.13 Parallel operation R2

See "6.4.12 Parallel operation R (X)", page 46

6.4.14 Permanently on

The relay is always switched on.

6.4.15 Heating circuit

A heating circuit pump is controlled with fixed hysteresis (+/-1°C) so as to reach the setpoint value.
A 30-second switch-on and switch-off delay is set as standard in order to prevent cycling.
RC21 Room Controller can be used as a room sensor.
Setting range: On, Off

6.4.15.1 Room setpoint day

Room setpoint temperature during daytime operation. If this temperature at the room sensor is exceeded within the set times, the relay will switch off.
Setting range: 10 to 30°C / default: 20°C

6.4.15.2 Room setpoint night

Room setpoint temperature during night-time operation. If this temperature at the room sensor is exceeded outside the set times, the relay will switch off.
Setting range: 10 to 30°C / default: 16°C

6.4.15.3 Room sensor

Allows you to select the reference sensor for the room temperature.
Setting range: S1-S8, VFS1-2, Active storage tank / default: none

6.4.15.4 Times

Daytime operating times for the heating circuit function
You can set the desired time periods during which the heating circuit operates in daytime mode here. You can enter three times for each day of the week. You can also copy individual days to other days. The heating circuit operates in night-time mode outside the set times.
Setting range: 00:00 to 23:59 / default: 06:00 to 22:00

6.5 Heat quantity

1. Constant throughflow
If "constant throughflow" is enabled for heat quantity metering purposes, the approximate heat yield will be calculated using the values for antifreeze, antifreeze concentration and system throughflow (values to be entered manually) as well as the collector and storage tank sensor values measured.
Additional information regarding the antifreeze, the antifreeze concentration and the system throughflow is required.
A correction factor for heat quantity calculation can also be set using the Offset ΔT value. Because the heat quantity calculation is based on the collector temperature and storage tank temperature, system-related deviations in the displayed collector temperature compared to the actual forward flow temperature or in the displayed storage tank temperature compared to the actual return flow temperature can occur. These deviations can be corrected using the Offset ΔT value. Example: Displayed collector temperature 40°C, read forward flow temperature 39°C, displayed storage tank temperature 30°C, read return flow temperature 31°C means a setting of -20% (displayed ΔT 10 K, actual ΔT 8 K => -20% correction value).

The heat quantity data in the "constant throughflow" mode are merely guide values calculated in order to check the system functions.

6.5.1 Forward flow sensor (X)

In this menu, you can specify which sensor is used to measure the forward flow temperature.
Setting range: S1-S8, VFS1-2, Active collector, Active storage tank / default: S8

6.5.2 Return flow sensor

In this menu, you can specify which sensor is used to measure the return flow temperature.
Setting range: S1-S8, VFS1-2, Active collector, Active storage tank / default: S1

6.5.3 Glycol type

In this menu, you can specify the type of antifreeze used. If no antifreeze is used, please set the proportion of glycol to 0.
Setting range: Ethylene, propylene / default: Ethylene

6.5.4 Proportion of glycol

The proportion of antifreeze added to the medium in percent.
Setting range: 0-100% / default: 45%

6.5.5 Forward throughflow (X)

Nominal system throughflow
The system throughflow in litres per minute which is used as a basis for calculating the metered heat quantity.
Setting range: 0 - 100 l/min / default: 5 l/min

6.5.6 Offset ΔT

Temperature difference correction factor for heat metering
Because the heat quantity calculation is based on the collector temperature and storage tank temperature, system-related deviations in the displayed collector temperature compared to the actual forward flow temperature or in the displayed storage tank temperature compared to the actual return flow temperature can occur. These deviations can be corrected using the Offset ΔT value. Example: Displayed collector temperature 40°C, read forward flow temperature 39°C, displayed storage tank temperature 30°C, read return flow temperature 31°C means a setting of -20% (displayed ΔT 10 K, actual ΔT 8 K => -20% correction value).
Setting range: -50 to +50% / default: 0%

6.5.7 VFS (X)

In this menu, you can specify the type of direct sensor used.
Setting range: Off; 1-12; 1-20; 2-40; 5-100; 10-200; 20-400 / default: Off

6.5.8 VFS position

In this menu, you can specify whether the direct sensor is mounted in the forward flow or the return flow.
Setting range: Forward flow, return flow / default: Return flow

To avoid damaging the vortex flow sensor, it is recommended that you position it only in the return flow. If, contrary to this recommendation, you do position it in the forward flow, you must observe the maximum permitted temperature! (0°C to 100°C during permanent operation and -25°C to 120°C for short periods)

6.5.9 Reference sensor

You can specify the sensor to be used for heat metering here.
Setting range: S1-S8, VFS1-2, Active collector, Active storage tank / default: S1

6.6 Pressure monitoring

In this menu, you can enable system pressure monitoring via a direct sensor. As soon as the set pressure conditions are exceeded, a message will be generated and the LED will flash red.

6.6.1 Pressure monitoring

If the pressure drops below a minimum or exceeds a maximum, a message will be displayed and the LED will flash red.
Setting range: On, Off / default: Off

6.6.1.1 RPS1 / RPS2

Pressure sensor model
In this menu, you can set the type of pressure sensor used.
Please note: If for example VFS1 is connected, RPS1 will be hidden.
Setting range: Off; 0-0.6 bar; 0-1 bar; 0-1.6 bar; 0-2.5 bar; 0-4 bar; 0-6 bar; 0-10 bar
Default: Off

6.6.1.2 Pmin

Minimum pressure in the system. If this pressure drops below, the controller will issue an error message and the red LED will flash.
Setting range: Off; 0.0 to 10 bar
Default: Off

6.6.1.3 Pmax

Maximum pressure in the system. If this pressure is exceeded, the controller will issue an error message and the red LED will flash.
Setting range: Off; 0.0 to 10 bar
Default: Off

6.7 Sensor calibration

Deviations in the displayed temperature values, e.g. as a result of long cables or sensors not being positioned optimally, can be corrected manually here. The settings are configured individually for each sensor in steps of 0.8°C (temperature) or 0.2% of the measurement range of the VFS / RPS sensor (throughflow / pressure).
Sensor offset per setting range: -100 ... +100 / default: 0

Settings only need to be made by a specialist in special cases during the setup. Incorrect measurements can result in malfunctions.

6.8 Setup

Once launched, the setup wizard guides you through the basic settings for the setup in the correct order and provides brief descriptions of the various parameters in the display.
Pressing the "esc" button takes you back to the previous value so that you can view the selected setting again and adjust it if necessary. Pressing the "esc" button more than once takes you back to the selection mode, thus cancelling the setup wizard. (See also "F.2 Setup wizard", page 30)

The setup wizard should only be launched by a specialist! Observe the explanations of the individual parameters in this manual, and check whether further settings are necessary for your application.

6.9 Factory settings

All settings can be reset to the original factory settings.

All controller parameters and statistics etc. will be irretrievably lost. The controller will then need to be set up again.

6.10 SD card

Settings for the logging function with data storage on the SD card.

6.10.1 Logging

In this menu, you can enable the logging of sensor and relay data and adjust the settings. Various file formats are available.
Setting range: On, Off / default: Off

6.10.2 Free storage space

Shows the amount of free space available on the SD card.

6.10.3 Load configuration

This function allows you to load all controller settings from the SD card.

All previous controller settings will be overwritten.

6.10.4 Save configuration

This function allows you to save all controller settings including the service values on the SD card.

6.10.5 Firmware update

With this function, the firmware stored on the SD card will be transferred to the controller.

During the firmware update, do not switch off the controller or disconnect the power as this can cause irreparable damage.

Settings can be changed and/or overwritten. After the firmware update, reset the controller to the factory settings and carry out the setup procedure again.

6.10.6 Eject

In order to remove the SD card with no risk of damage or data loss, you should deregister it here first.

6.11 Time and date

In this menu, you can set the current time and date.

In order to evaluate system data, the controller clock must be set correctly. Please note that the clock does not continue running in the event of a power failure and will therefore need to be set again.

6.12 Summer time

If this function is enabled, the controller will automatically switch to winter time or summer time (DST – daylight saving time).

6.13 Power saving mode

In power saving mode, the background lighting for the display will be switched off if no button is pressed for two minutes.
Default: Off

If a message has been issued, the background lighting will not switch off until the message has been viewed by the user.

6.14 Ethernet

In this menu, you can adjust the settings for the controller's Ethernet module.

6.14.1 Ethernet

Enables or disables the Ethernet function.
Setting range: On, Off / default: Off

6.14.2 MAC address

Displays the controller's individual MAC address.
No setting options

6.14.3 TCP/IP address

In this menu, you can set the controller's IPV4 TCP/IP address.

6.14.4 Network mask

In this menu, you can set the network's network mask.

6.14.5 Gateway

In this menu, you can set the IP of the standard gateway for the controller.

6.14.6 Login

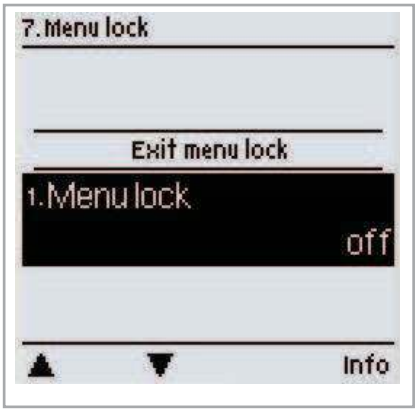
In this menu, you can define users who are allowed to access the controller via the network.
Up to four users (User 01 to User 04) can be defined. Login names and passwords are set.
The following statuses can be set:

Disabled	No access
Guest	Information can be read from controller but no changes can be made
Administrator	Information can be read from controller and it can be fully remote-controlled

6.15 Temperature unit

In this menu, you can specify which temperature unit is displayed.
Setting range: °F or °C / default: °C

7. Menu lock



In the "7. Menu lock" menu, you can prevent the controller settings being accidentally changed.

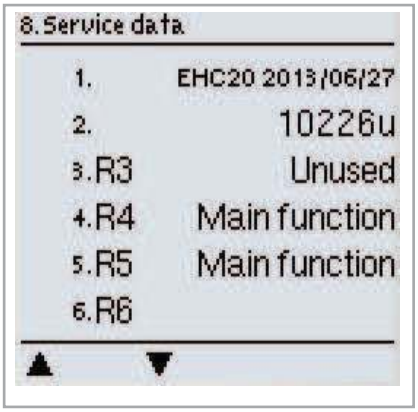
You can exit the menu by pressing "esc".

The following menus remain fully accessible even if the menu lock is enabled and changes can be made if necessary:

1. Measurements
2. Statistics
6.23. Time and date
8. Menu lock
9. Service values

To lock the other menus, select "Menu lock on".
To unlock the menus again, select "Menu lock off".
Setting range: on, off / default: off

8. Service Data



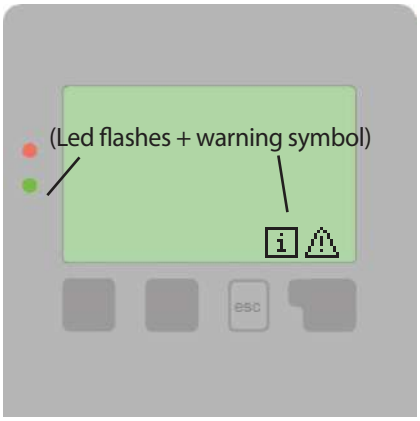
The "8. - Service Data" menu can be used by a specialist or the manufacturer for remote-diagnostics etc. in the event of an error.
You can exit the menu at any time by pressing "esc".

The service Data are saved on the SD card during logging.

9. Language

In the "9. - Language" menu, you can select the language for the menus.
You will automatically be asked to select a language when the controller is used for the first time.
The languages available may vary depending on the device version! Not all device versions offer a choice of languages!

G. Faults with error messages



If the controller identifies a malfunction, the warning symbol will appear in the display. If the error is no longer present, the warning symbol will change to an information symbol.
Pressing the button below the warning or information symbol will bring up more detailed information regarding the error.

Do not try to deal with problems yourself.
In the event of an error, please consult a specialist.

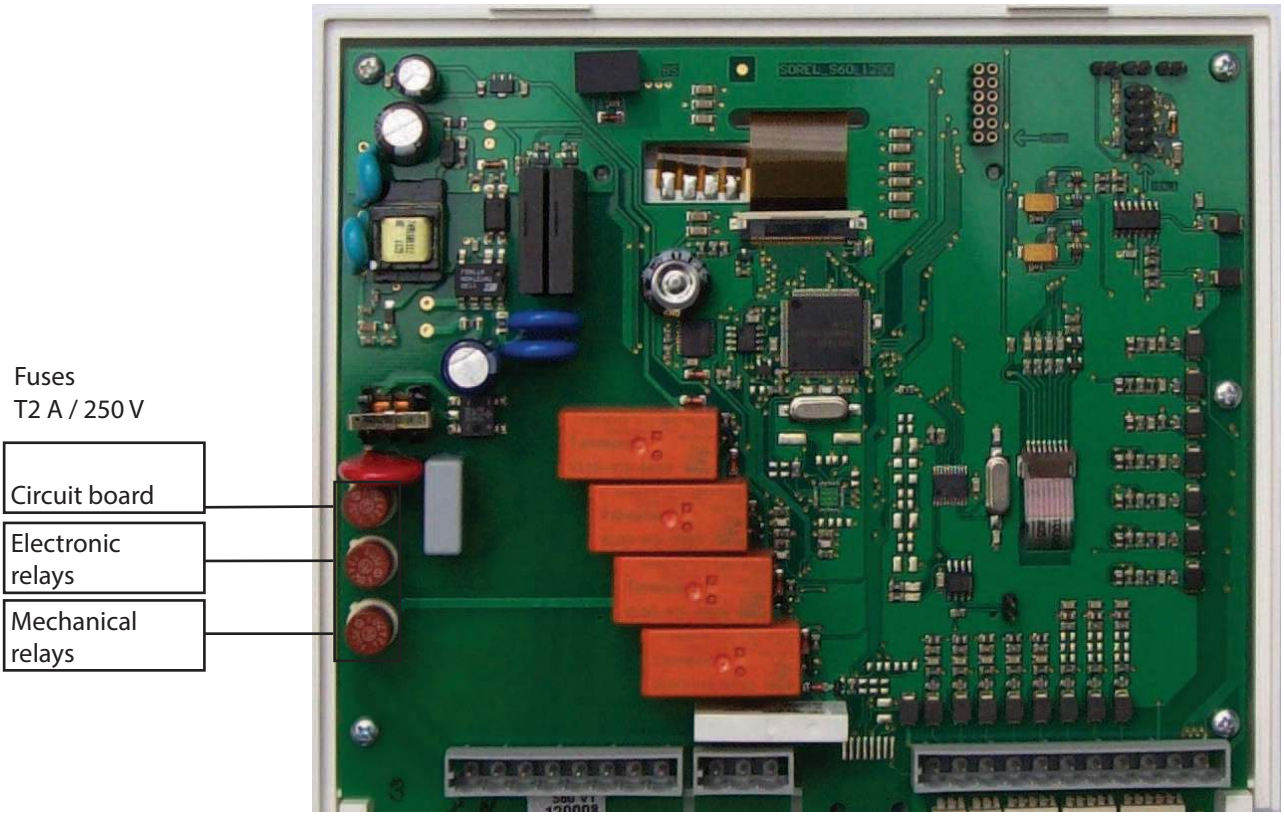
Possible error messages:	Information for specialists:
Sensor fault	Either the sensor, the sensor input on the controller or the connecting lead is/was defective. (See "Temperature resistance table for Pt1000 sensors", page 55)
Restart	Indicates that the controller was restarted, e.g. owing to a power failure. Check date and time!
Time and date	This message appears automatically after an extended power failure because the time and date will need to be checked and adjusted if necessary.
Excessive cycling	This message is shown if the solar pump switches on and off again more than five times in five minutes (i.e. if 11 switching operations are recorded).
No throughflow	This message is shown if the solar pump is running and dT >=50°C over a five-minute period.
Excessive/insufficient system pressure	This message is displayed if the pressure monitoring function is enabled and Pmin or Pmax is exceeded.
SD card error	This message is displayed if an SD card was recognised but the controller cannot write or read data.

G.1 Replace fuse

Repair and maintenance work should only be carried out by specialists. Before working on the device, disconnect the power supply and ensure that the device cannot be switched on again. Check that the power is switched off.

Use only the spare fuses supplied or an equivalent fuse with the following rating: T2 A / 250 V.

Three fuses are fitted to the controller. These protect the various relays as well as the electronic control system. If the controller is switched on but the functions and display are not working or the mechanical or electronic relays are not functioning, open the device as described under C, remove the old fuse and check it.
Replace the defective fuse, identify any defective external components (e.g. pump) and replace them too.
Switch on the controller again and check that the switch outputs are functioning in manual mode as described under "3.2 Manual", page 34.



G.2 Maintenance

As part of the general annual maintenance for your heating system, you should have the controller functions checked by a specialist and have your settings optimised if necessary.

- Maintenance procedures:
- Checking the time and date (see "6.11 Time and date", page 51)
- Assessing the statistics and carrying out a plausibility check (see "2. Statistics", page 33)
- Checking the error memory (see "2.4 Messages", page 33)
- Assessing the current measurements and carrying out a plausibility check (see "1. Measurements", page 32)
- Checking the switch outputs/loads in manual mode (see "3.2 Manual", page 34)
- If necessary, optimizing the parameters set

H. Useful information / tips and tricks

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

Instead of setting the system throughflow with a volume flow limiter, it is better to adjust the throughflow using the selector switch on the pump and the controller's "Max. rotational speed" setting (see "6.2.6 Max. rotational speed", page 39). This saves electricity!

The service values (see "8. Service data", page 52) include not only current measurements and operating statuses but also all controller settings. Following a successful setup, save the service values on a one-off basis ("6.10.4 Save configuration", page 50)!

In the event of queries regarding control functions or malfunctions, the service values provide a reliable and successful remote-diagnostics method. Save the service values (see "8. Service data", page 52 and "6.10.4 Save configuration", page 50) when the malfunction occurs. Send the data along with a brief description of the fault to a specialist or the manufacturer!

Log the statistics and data that are of particular importance to you (see "2. Statistics", page 33) at regular intervals in order to prevent data loss.

I. EU Declaration of Conformity

DK: EU-Overensstemmelseserklæring **GB: Declaration of Conformity** **DE: EU-Konformitätserklärung** **FR: Déclaration de conformité de l'Union Européenne** **NO: EU-Samsvarserklæring**	**NL: EU-Conformiteits verklaring** **SE: EU-Överensstämmelsedeklaration** **FI: EU-Vaatimustenmukaisuusvakuutus** **IS: ESS-Samræmisstaðfesting** **IT: Dichiarazione di Conformità Unione Europea**
exodraft a/s **C.F. Tietgens Boulevard 41** **DK-5220 Odense SØ**	
-erklærer på eget ansvar, at følgende produkter: -hereby declares that the following products: -erklärt hierdurch auf eigene Verantwortung, daß folgende Produkte: -déclare, sous sa propre responsabilité, que les produits suivants: -erklærer på eget ansvar at følgende produkter:	-veklaart dat onderstaande producten: -deklarerar på eget ansvar, att följande produkter: -vastaa siltä, että seuraava tuote: -Staðfesti à eigin àbyrgð, að eftirfarandi vörur: -dichiara con la presente che i seguenti prodotti:
EHC /10 /20	
-som er omfattet af denne erklæring, er i overensstemmelse med følgende standarder: -were manufactured in conformity with the provisions of the following standards: -die von dieser Erklärung umfaßt sind, den folgenden Normen: -auxquels s'applique cette déclaration sont en conformité avec les normes ci-contre: -som er omfattet av denne erklæring, er i samsvar med følgende standarder:	-zijn vervaardigd in overeenstemming met de voorschriften uit de hieronder genoemde normen en standaards: -som omfattas av denna deklaration, överensstämmer m ota tämä selvitys koskee, on seuraavien standardien mukainen: -sem eru meðtalin i staðfestingu Pessari, eru i fullu samræmi við eftirtalda staðla: -sono stati fabbricati in conformità con le norme degli standard seguenti:
EN 60335-1, EN60335-2-102, EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 301489-1, EN 301489-3, EN 300220-1, EN298:2003	
-i.h.t bestemmelser i direktiv: -in accordance with -entsprechen gemäß den Bestimmungen der folgenden Richtlinien: -suivant les dispositions prévues aux directives: -i.h.t bestemmelser i direktiv:	-en voldoen aan de volgende richtlijnen: -enligt bestämmelserna i följande direktiv: -seuraavien direktiivien määräysten mukaan: -med tilvisun til àkvarðana eftirlits: -in conformità con le direttive:
-Lavspændingsdirektiv: -the Low Voltage Directive: -Niederspannungsrichtlinie: -Directive Basse Tension: -Lavspenningsdirektivet:	-de laagspanningsrichtlijn: -Lågspänningsdirektivet: -Pienjännitedirektiivi: -Småspennueftirlitið: -Direttiva Basso Voltaggio:
2006/95/EC	
-EMC-direktivet: -and the EMC Directive: -EMV-Richtlinie: -Directive Compatibilité Electromagnétique: -EMC-direktivet:	-en de EMC richtlijn: -EMC-direktivet: -EMC-direktiivi: -EMC-eftirlitið: -Direttiva Compatibilità Elettromagnetica:
2004/108/EC	
-Gas Appliances Directive (GAD)	
2009/142/EC	
Odense, 05.08.2013 -Adm. direktør -Managing Director Jørgen Andersen 	-Algemeen directeur -Geschäftsführender Direktor -Président Directeur Général -Verkställande direktör -Toimitusjohtaja -Framkvemdastjori -Direttore Generale

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