Heating Controller LHCC

Weather-compensated heating circuit controller

Installation and operating instructions

Read carefully before installation, commissioning and operation

Content

Safety Instructions

EU-Conformity

By affixing the CE mark to the unit the manufacturer declares that theLHCC 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 Weather-controlled heating circuit regulator for heating and cooling systems for/in Heating 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 importation for the function and optimal use of the unit and the system.

Changes to the Unit

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

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

Warranty and Liability

The unit has been manufactured and tested with regard to high quality and safety requirements. The 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

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.

Specifications

Model	**LHCC**	Weather-controlled heating circuit regulator for heating and cooling systems	
Temperature controller class	VI		
Energy efficiency	4%; When operating at min. 3 ° CALEONs or RC20 a energy efficiency of 5% is achieved		
Standby loss	0.5		
Request type heater	On / off operation or modulating		
Electrical specifications:			
Power supply		100 - 240VAC, 50 - 60 Hz	
Power consumption / standby		0.5 - 2.5 W/ 0.5	
Total switched power		2 A	
Switched power per relay		480	
Internal fuse	1	2 A slow 250V	
Protection category		IP40	
Protection class / overvoltage category		II / II	
Inputs/Outputs			Measuring range
Sensor inputs	6	Pt1000	-40 °C ... 300 °C
Sensor inputs VFS / RPS		Grundfos Direct Sensor	0°C-100°C (-25°C /120°C short term)
Number room thermostats per circuit	8	°CALEON / °CALEON Clima	
Sensor inputs RC20	2	Pt1000	
Outputs mechanical relay		3	
of relay potential free	R4	1	
mechanical relay	R1 - R4	460VA for AC1 / 460W for AC3	
0-10V/PWM output	V1 - V2	for 10 k Ω working resistance 1 kHz, level 10 V	
Max. cable length			
VFS/RPS sensors		<3m	
CAN		<3m; at >=3m, a shielded twisted-pair cable is to be **used** and connected to the protective conductor on one side.	
0-10V/PWM		<3m	
mechanical relay		<10m	
Interface			
Fieldbus	CAN		
Permissible Ambient Conditions			
for controller operation		0 °C - 40 °C, max. 85 % rel. humidity at 25 °C	
for transport/storage		0 °C - 60 °C, no moisture condensation permitted	
Other Specifications and Dimensions			
Housing design		2-part, ABS plastic	
Installation methods		Wall installation, optionally panel installation	
Overall dimensions		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 dots	
Light diode		multicolour	
Real Time Clock		RTC with 24 hour power reserve	
Operation		4 entry keys	

About the Controller

The Weather-controlled heating circuit regulator for heating and cooling systems LHCC facilitates efficient use and function control of your Heating system possible while its handling is intuitive. After every input step the suitable functions are matched to the keys and explained in a text above. In the menu 'measurement values and settings' are help text and graphics in addition to key words.

The LHCC can be used with different variants of installations, see " Hydraulic Variants " on page 9.

Important characteristics of the LHCC 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.

Scope of supply

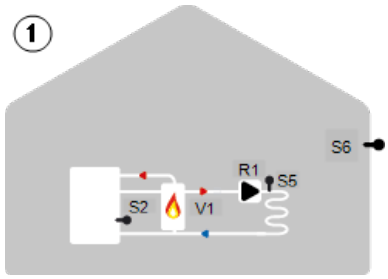
- Weather-controlled heating circuit regulator for heating and cooling systemsLHCC
- 3 screws 3,5 x 35 mm and 3 plugs 6 mm for wall installation.
- LHCC Installation and operating instructions

Optionally contained depending on design/order:

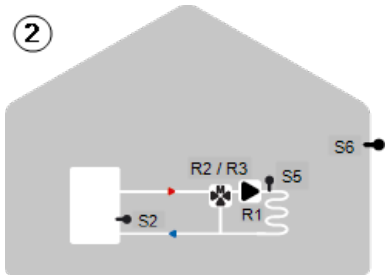
- Outdoor sensor: TA52 (87000)
- Ethernet connection: optionally possible via datalogger (77701)
- Pipe-mounted sensor: e.g. TR / S2 (81220)
- Room Controller: °CALEON (70001) / °CALEON Clima (70002)
- CAN Bus Accessories: e.g. CAN Connection kit 1.00m (89211)
- External relay for V1 / V2: 0-10V relay 1W / 6A (77502)

Hydraulic Variants

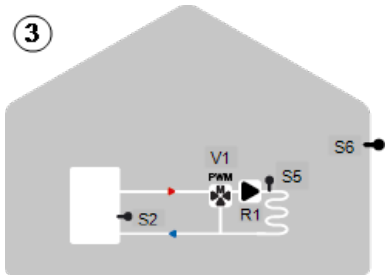
The following illustrations should be regarded only as schematic representations of the respective hydraulic systems and do not claim to be complete. Under no circumstances should the controller replace any safety devices. Depending on the specific application, additional system and safety components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



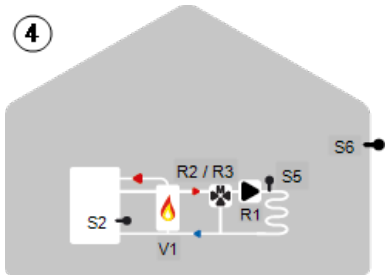
heating circuit and burner



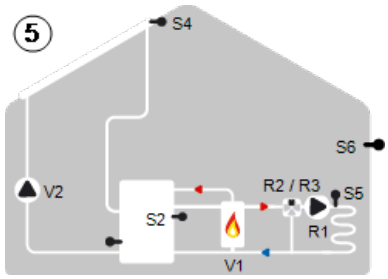
Mixed heating circuit



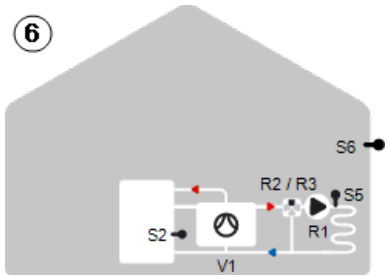
Mixed PWM heating circuit



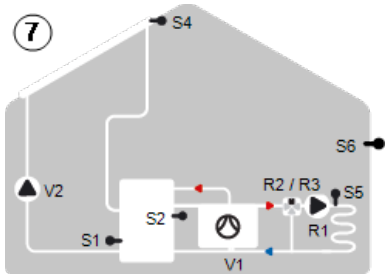
Mixed heating circuit and burner



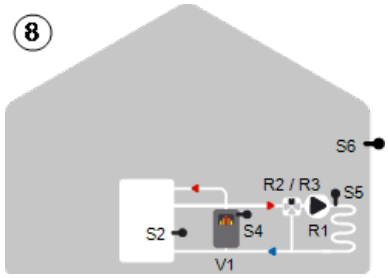
Mixed heating circuit, burner and solar



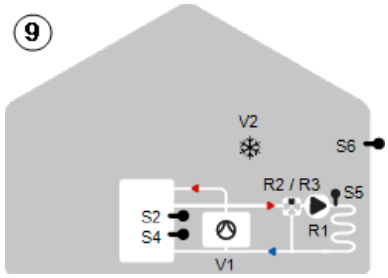
Mixed heating circuit and heat pump



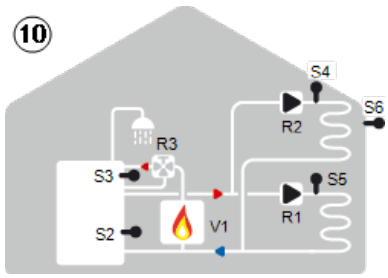
mixed heating circuit, heat pump and solar



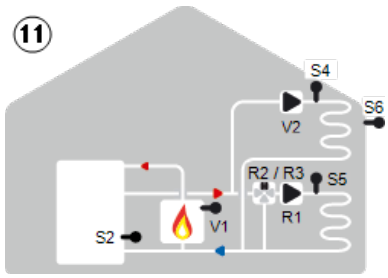
mixed heating circuit and solid fuel solid fuel boiler



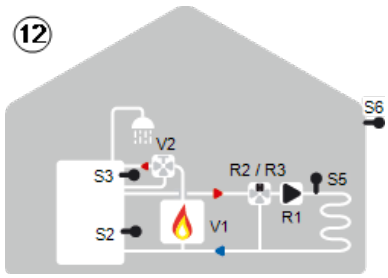
mixed heating circuit, heat pump and cooling function



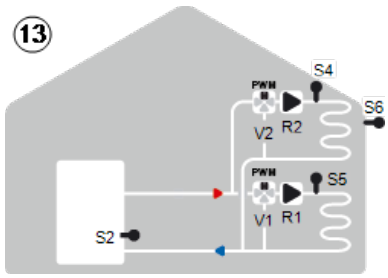
2 heating circuits, combined water tank, DHW-valve and burner



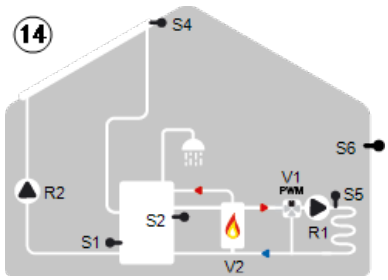
mixed heating circuit, unmixed heating circuit and burner



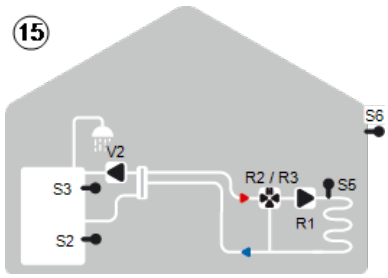
mixed heating circuit, DHW-valve and burner.



2 mixed PWM heating circuit

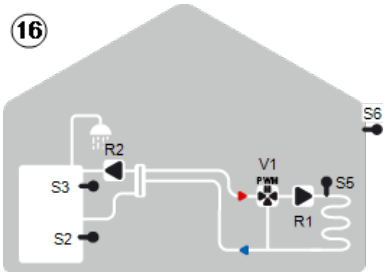


mixed PWM heating circuit, DHW, solar and burner



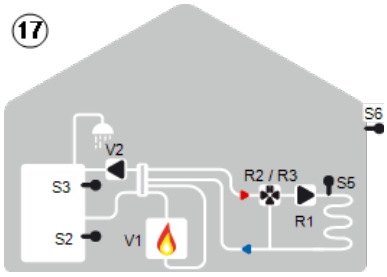
mixed heating circuit and solid fuel boiler

16



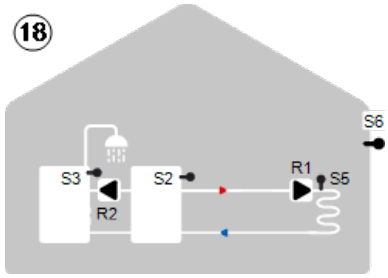
mixed PWM heating circuit and solid fuel boiler

17



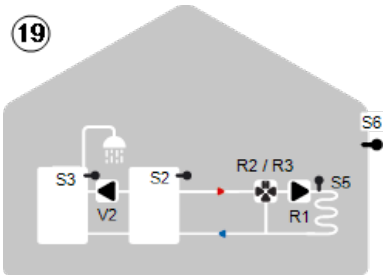
mixed heating circuit, solid fuel boiler, and burner

18



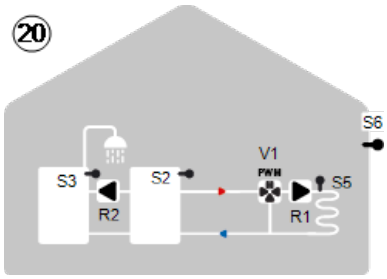
unmixed heating circuit, DHW and heat transfer

19



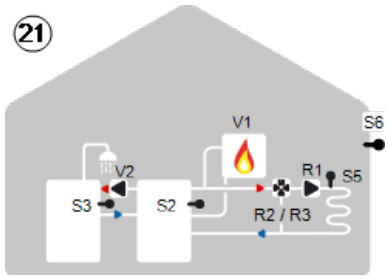
mixed heating circuit, DHW, and heat transfer

20



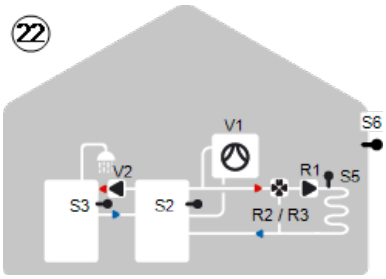
mixed PWM heating circuit, DHW, and heat transfer

21



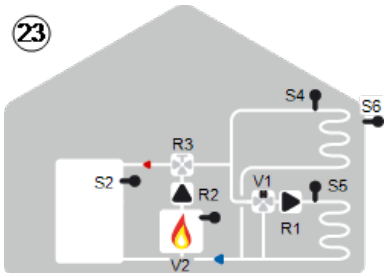
mixed heating circuit, DHW, heat transfe and burner

22

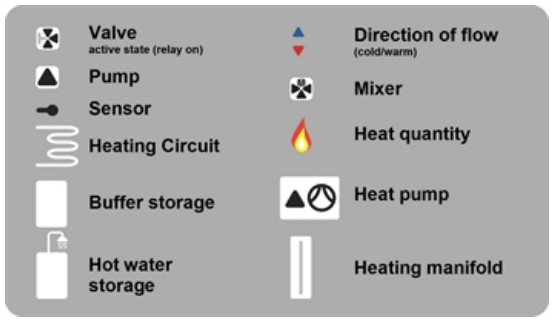


mixed heating circuit, DHW, heat transfer and heat pump

23



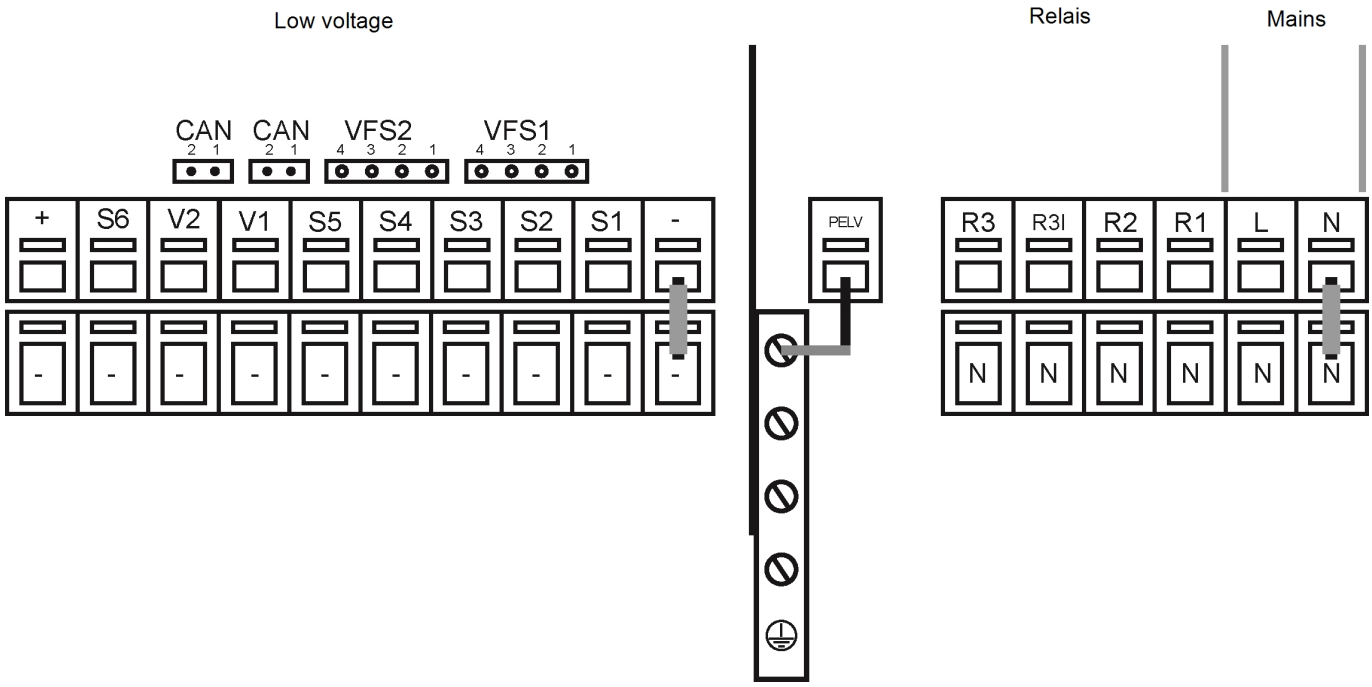
mixed heating circuit with unmixed heating circuit, solid fuel boiler



Electrical Terminals

Low voltages
max. 12 VAC / DC

Mains voltages
230 VAC 50 - 60 Hz



On the control board

VFS1	Grundfos Direct Sensor
VFS2	Grundfos Direct Sensor
CAN1	CAN bus connection (1=high,2=low)
CAN2	CAN bus connection (1=high,2=low)

Terminal:	Connection for:
-	GND bridge on the lower ground terminal block
S1	Temperature Sensor 1
S2	Temperature Sensor 2
S3	Temperature Sensor 3
S4	Temperature Sensor 4
S5	Temperature Sensor 5
V1	0-10V / PWM signal output e.g. for controlling high-efficiency pumps
V2	0-10V / PWM signal output e.g. for controlling high-efficiency pumps
S6	Temperature Sensor 6 (outdoor)
+	12V Power supply

The connection of the ground wire is made at the lower gray terminal block.

Terminal:	Connection for:
N	Neutral conductor N
L	Network outer conductor L
R1	Relays 1
R2	Relays 2
R3|	Relays 3
R3	Relays 3

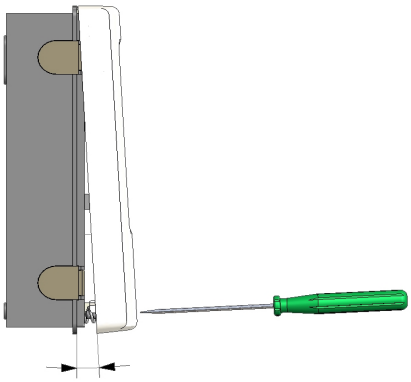
The neutral conductor N must be connected to the N terminal block.

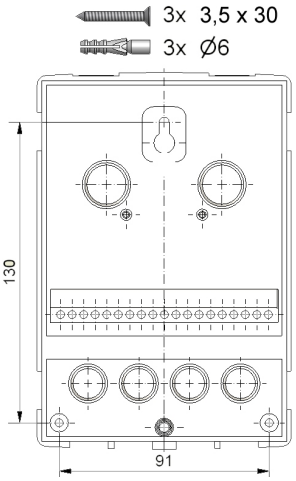
The PE protective conductor must be connected to the PE metal terminal block!

For high-efficiency pumps with 0-10V / PWM signal input, the power can be provided (V1 / V2 parallel operation) over a free relay.

R3 / R3I is an alternating contact, which outputs relay 230V to R3I when relay is inactive

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.

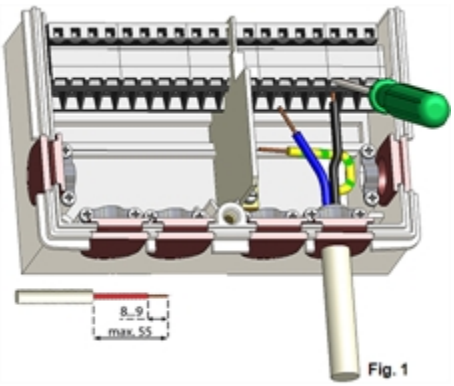


Fig. 1

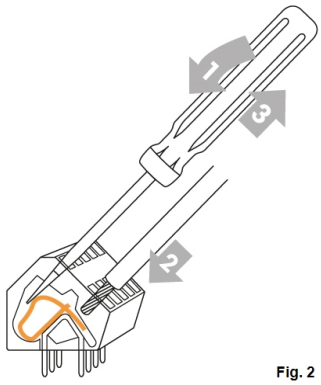


Fig. 2

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.

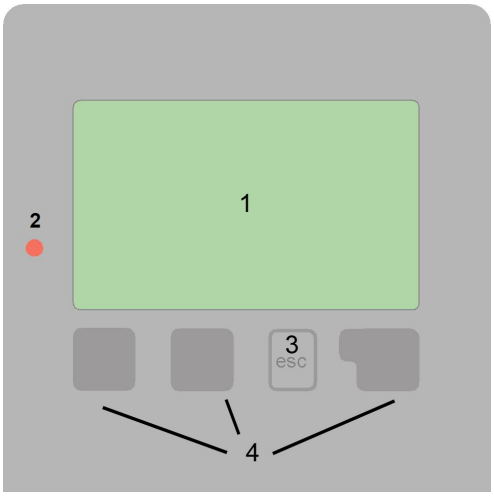
If desired, the sensor cables can be extended to a maximum of 30 m using a cable with a cross-section of at least 0.75 mm². Ensure there is no contact resistance! Position the sensor precisely in the area to be measured! Only use immersion, pipe-mounted or flat-mounted sensors suitable for the specific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

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

Temperature Resistance Table for Pt1000 Sensors

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

Display and Input



⚠ Warning/Error message

🛈 New information available

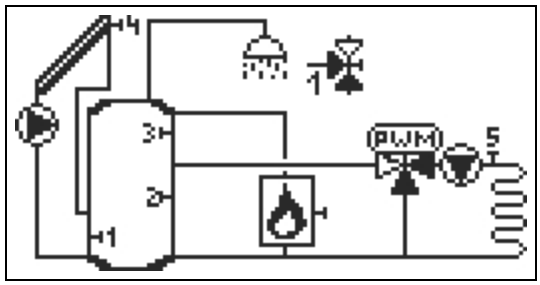
Further symbols can be found in the special functions

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

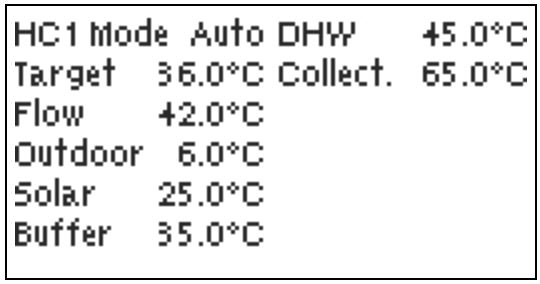
The LED (2) lights up green when a relay is switched on. The LED (2) lights up red when operating mode ‚Off‘ is set. The LED (2) flashes quickly red when an error is present.

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.



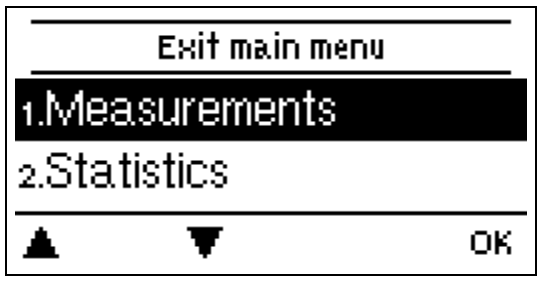
The graphics mode appears if no key is pressed for 2 minutes or after exiting the main menu with ‘esc’.



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

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



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:

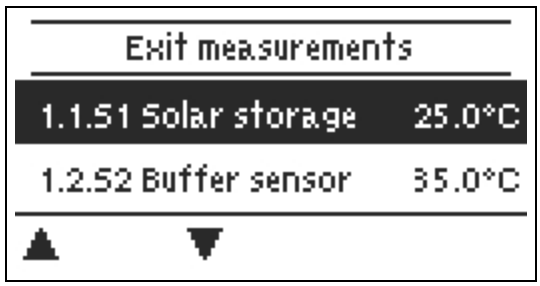
- menu 10. Language
- menu 3. Time, Date and Operating Times.
- menu 5. Heating Circuit Settings, all values.
- menu 6. Protection Functions (if any adjustments necessary).
- menu 7. Special Functions (if any adjustments necessary).

3. In menu operating mode "4.1. 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 18

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

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

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!

Today

Flow temperature of the last 24 hours
In the graphical overview the characteristics of the flow for the present day is shown from 0 ... 24 h. The right button changes the unit of time (days) and the two left buttons scroll through the diagram.

28 days

Flow temperature during the last 28 days
In the graphical overview the characteristics of the flow temperature during the last 28 days is shown. The right button changes the unit of time (days) and the two left buttons scroll through the diagram.

Operating hours

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!

Operating hours

Here the operating hours of the heating circuit and other switch or signal outputs are displayed. This is the entire time the heating circuit pump and other switch or signal outputs were active. The displayed date in this menu is the date of the last deletion. From this date on the current count is added.

Heat quantity

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

Graphic overview

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

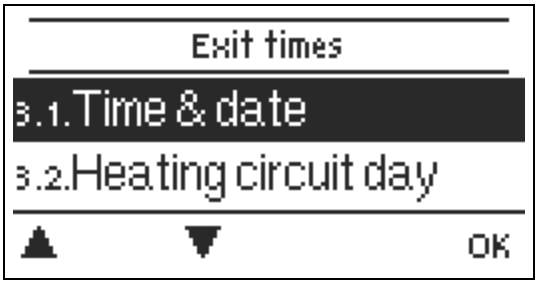
Error messages

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

Reset / Clear

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

3. Times



Settings for time, date and operating times for the heating circuit.

The associated temperature reference values are specified in Menu 5, ‚Settings'.

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!

Heating Circuit (Day)

This menu is used to select the daytime mode times for the heating circuit; three time periods can be specified for each weekday and copied to the following days.

Unspecified times are automatically considered to be night-time mode. The set times are only taken into account in the ‚Automatic' heating circuit operating mode.

Heating Circuit Comfort

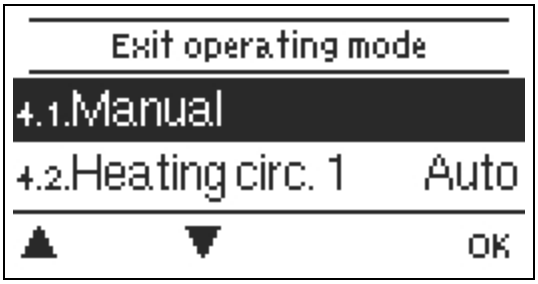
This menu can be used to select three time ranges for each day of the week in which the heating circuit is supplied with an increased comfort temperature, e.g. for quick heating in the morning.

DHW enable

In this menu, the approval times for the DHW load (sensor S3) are selected, whereby for every weekday 3 periods can be determined and copied in the following days.

In times that are not filled, the DHW load is automatically shut down by the controller.

4. Operating mode



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

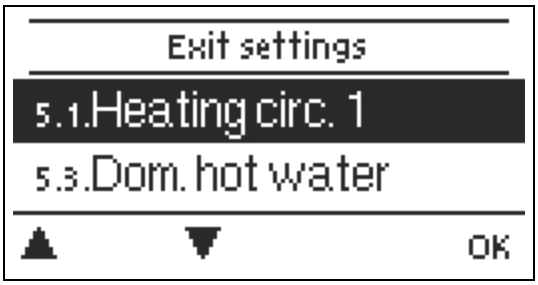
Only in automatic mode does the controller use the set operating times and the correspondingly set target flow temperatures!

Manual

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

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

5. Settings



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

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

Heating Circuit (X)

Operating mode

Heating= Automatic/Normal mode using the set times.
Reference Value = Fixed flow temperature regardless of the outdoor temperature. The desired flow temperature must be set in Menu 4.3. .
14 days reference value program = For the next 14 days, you can enter the menu 4. temperatures for the next 14 days. After 14 days, the reference temperature of the 14th day is used continuously until the operating mode is changed. Different temperature values can be set in menu 4.4. for every individual day.
Heating and cooling=Automatic/Normal mode using the set times. the changeover takes place via the additional function of season switch.
CoolingAutomatic/Normal mode using the set times.

S/W Day

Summer / Winter changeover in daytime mode
If this value is exceeded at the outdoor sensor the controller automatically switches the heating circuit off = Summer mode. If the outdoor temperature drops below this value, the heating circuit is switched on again = Winter mode.

In addition to the operating times in normal daytime operation, this setting is also valid for times with activated comfort.

S/W Night

Summer/Winter changeover in night-time mode
If this value is exceeded at outdoor sensor S1 during the nighttime mode times, the controller automatically switches the heating circuit off = Summer mode. If the outdoor temperature drops below this value, the heating circuit is switched on again = Winter mode.

Curve

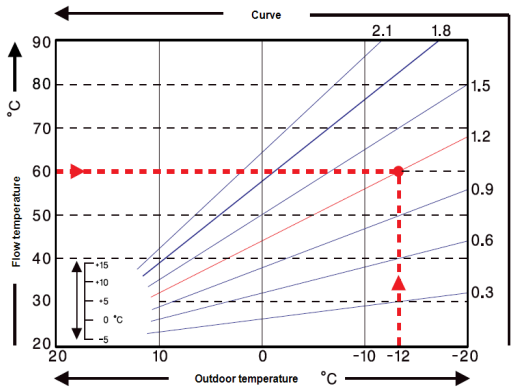
Type and slope of the heating characteristic curve
The characteristic curve is used to control the heat dissipation of the heating circuit relative to the outdoor temperature. The demand for heat differs due to factors such as the type of building, heating, insulation and outdoor temperature. For this reason, the controller can operate with a normal straight curve (setting ‚simple') or split curve (setting ‚split').

If ‚simple' is selected, the curve is adjusted using the graphic diagram. While setting the slope, the controller also shows the slope value and the calculated target flow temperature at -12 °C as a reference point.

If ‚split' is selected, the curve is set in the following steps:

1. Slope over outdoor temperature for change
2. Outdoor temperature for slope change
3. Slope below outdoor temperature for change

While setting the slope, the controller also shows the slope value and the calculated target flow temperature at -12 °C as a reference point. In case of repeated adjustment of the split curve, the settings appear in reverse order.



The diagram shows the influence of the selected characteristic curve steepness (standard curve) on the calculated reference flow temperature of the heating unit. The correct characteristic curve is determined by defining the intersection point of the maximal calculated flow temperature (=design temperature) at minimal outdoor temperature.

Example: The design temperature of the heater 60 °C flow at lowest outdoor temperature according to calculation of heat requirement -12 °C. The intersection point renders a slope of 1.2 as the setting.

Day Correction

Parallel characteristic translation
The day correction causes a parallel shift of the heating curve during daytime operating hours, because with certain outdoor temperatures the building might not be optimally heated with the set heating curve. With a non-optimised heating curve, the following situations frequently occur: hot weather = room too cold/cold weather = room too hot. In this case, the slope of the curve should be reduced stepwise by 0.2 points and increases the day correction
by 2 ... 4 °C each.

Night Correction

Parallel characteristic translation
The night correction produces a parallel translation of the heating characteristic during the nighttime operating hours. If a negative value is set for the night correction, the reference flow temperature is lowered accordingly during the nighttime operating hours. In this manner, primarily at night, but also during the day when no-one is at home, the room temperature is lowered, thus saving energy. Example: A day correction of +5 °C and a night correction of -2 °C produces a reference flow temperature in nighttime operation that is 7 °C lower.

Comfort Temperature Boost

Parallel characteristic translation
The comfort temperature boost is added to the set day correction. In this manner it is possible to carry out quick heating and/or raise the temperature of living spaces at a certain time each day.

Min. Flow

The minimum flow temperature is the lower limit of the heating curve, and by this, the reference flow temperature of the heating circuit. In addition to that, the minimal flow temperature is the reference flow temperature for the frost protection function.

Max. Flow

This value is the upper limit of the reference flow temperature of the heating circuit If however, the temperature of the heating circuit exceeds the set value, the heat circuit shuts down until the temperature falls below this value. The system purged for 30 seconds every 5 minutes.

> ⚠ The customer must provide an additional limiting thermostat which is connected to the pumps in series (eg underfloor heating) for safety.

Reference/Actual -

Switch on hysteresis for additional heating
This setting determines the allowed undershoot of the heating circuit temperature below the calculated reference fl ow temperature. If the heating circuit flow temperature and the storage temperature drop below the reference flow temperature by this value, the additional heating will start the additional heat source after a 1 minute delay.

Heat request is started when the flow temperature is continuously below reference temperature for 1 minute.

Reference/Actual +

This value determines the acceptable underflow of the heating circuit temperature beyond the calculated reference flow temperature at the buffer sensor or flow sensor. If the temperature at the buffer sensor exceeds the reference flow temperature by the value set here, the heating request is deactivated.

Heat request is started when the flow temperature is continuously below reference temperature for 1 minute.

Variant

Condition for shutting off the heating circuit pump

In the mode Flow (VL), the pump is shut down if the reference temperature is exceeded. In the summer/winter mode (SW), it is shut down in the winter mode at Tmax, in the summer mode the heating circuit pump is shut down in general.

The sensor should be placed in the return line in the VL mode.

Buffer sensor

Input of heating circuit buffer sensor

In this menu, the sensor is set, which is used as a reference sensor for the heating circuit request.

The request only works if an energy source (burner, compressor, solid chamber) is activated as an additional function and if this source is set for the heating circuit request

(see also
Thermostat: see " Thermostat " on page 29,
Burner: see " Heating Circuit request " on page 35,
Compressor: see " HC request " on page 35,
Heater: see " HC request " on page 31).

Room Controller

This value is used to appoint the amount of influence the room temperature has on the reference flow temperature, as a percentage. For each degree deviation between room temperature and set point temperature, the percentage set here is added from the calculated set flow temperature to the set flow temperature or subtracted from it until the min. or max flow values.

Example: Reference room temp.: e.g. 25 °C; room temp.: e.g. 20 °C ±5 °C. Calculated reference temp.: e.g. 40 °C: room controller: 10 %= 4 °C 5 X 4 °C= 20 °C. Accordingly, 20 °C are added to the reference flow temperature, giving 60 °C. If the value is higher than the one set in max. flow temp, the resulting temperature is the one set in max. flow temp.

Room Reference (Day)

The desired room temperature for day mode. As long as this temperature is not reached, the reference flow temperature is raised and/or lowered according to the percent setting in ‚room controller'. If ‚room controller' is set to 0 %, this function is deactivated.

Room Reference (Night)

The desired room temperature for night mode. As long as this temperature is not reached, the reference flow temperature is raised and/or lowered according to the percent setting in ‚room controller'. If ‚room controller' is set to 0 %, this function is deactivated.

In the modes ‚Set point' and ‚Set point program, the room controller has no influence.

Thermostat (X)

The room controller is selected here. If no room controller is connected and a room controller is connected via the CAN Bus, another room controller can be selected here.
The CAN bus ID of a controller is shown in the respective controller menu under 7.16.4. special functions - network. In °CALEON see the CAN Bus ID in the expert menu under Network. Choose the Room Controller with the CAN Bus ID of the corresponding controller.

Sensor Typ

If a sensor input is connected to a room controller, it must be set here whether it is a room temperature sensor (RC20) or a switching contact.

Mixer

This menu contains all settings relating to the mixer of the heating circuit.

Direction
Direction of the mixing valve can be set here.

Mixer turn time
The mixer is switched on i.e. is opening or closing for the time span set here, then the temperature is measured to control the flow temperature

Mixer off factor
The calculated pause time of the mixer is multiplied with the value set here. If the pause factor is ‚1', the normal pause time is used, ‚0.5' will use half the normal pause time. Setting the pause factor to ‚4' would quadruple the pause time.

Mixer increase
If the temperature rises very fast, this value is added to the measured flow temperature so that the mixer's reaction is stronger. If the measured temperature does not rise any more, the measured value is used again. The measurement occurs once every minute.

PV contact

This sensor input could be used as a PV-contact of Photovoltaic-System.
This sensor is observed to "short circuit" (PV-Contact closed).
If the PV-Contact is closed, the mode of this function is changed to "comfort" and operate

This also applies in the case that the mode "comfort" of the function currently has no time release.

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

Settings Domestic Hot Water (DHW)

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

Operating mode

The DHW heating can be set here. "Auto" activates the DHW heating according to the time program, with "off" the DHW heating is turned off.

Hot water minimum

Minimum DHW temperature
If the set temperature at the DHW sensor is undeshot outside of the set times, the DHW charge and heat request will be turned on.

DHW reference

Minimum DHW temperature time program
If the set temperature at the DHW sensor is undershot and the BW charge is approved for the time, the DHW charge and the heat request will be turned on.

The request only works if an energy source (burner, compressor, solid boiler) is activated as an additioanl function and if this source is set for the DHW request (see also
Burner: Request BW on page 38,
Compressor: request BW on page 40).

DHW comfort

DHW temperature for comfort time
The set temperature considered as minimum temperature during the set comfort time. If the temperature on DHW-sensor is below the value set here is during the DHW comfort periods, the DHW heating is started, until DHW comfort + hysteresis is achieved.

DHW hysteresis

DHW hysteresis
The DHW charge and heat request are shut down if the temperature at the DHW sensor reaches the value set under "see " Hot water minimum " on page 21" / "see " DHW reference " on page 21" plus the heating set here.

Buffer DHW load

DHW load from the buffer
The DHW load from the buffer storage is turned on if the temperature on the buffer sensor is at least 8°C warmer than at the DHW sensor. The DHW load from the buffer storage is shut down if the temperautre at the buffer sensor is only 4 °C warmer than at the DHW sensor or if the temperature at the DHW sensor has reached the value set under see " Hot water minimum " on page 21 or see " DHW reference " on page 21.

DHW priority

Preferred DHW charge

If this function is activated, the reference flow temperature during a BW heating will be set to the minimum flow temperature see " Min. Flow " on page 19 so that the mixer moves to the “closed” position.

PV contact

This sensor input could be used as a PV-contact of Photovoltaic-System.
This sensor is observed to "short circuit" (PV-Contact closed).
If the PV-Contact is closed, the mode of this function is changed to "comfort" and operate

This also applies in the case that the mode "comfort" of the function currently has no time release.

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

6. Protective Functions

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

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

Seizing Protection

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

Frost Protection

If the external temperature on sensor S1 goes below 1 °C and the heating circuit is turned off, the heating circuit will automatically be turned on if the frost protection is activated and the reference flow temperature is set at the minimum flow temperature set under see " Min. Flow " on page 19. As soon as the outdoor temperature exceeds 1 ° C, the heat circuit is switched off again.

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

Discharge Protection

With activated buffer discharge protection, the heating circuit is switched off as soon as the buffer temperature undershoots the min. flow temperature. flow temperature. Every 5 minutes, the system checks if the flow temperature has been reached.

Pressure Monitoring

In this menu, the system pressure monitoring can be activated through a direct sensor. A message is displayed and the LED flashes red when the pressure drops below the minimum or exceeds the maximum.

RPS1 / RPS2

In this menu, you can adjust which pressure sensor model is being used. Please note: If e.g. VFS1 is connected, RPS1 will be hidden

Pmin

Minimum pressure in the system. If this pressure is not met, the controller emits an error notification and the red LED flashes.

Pmax

Maximum pressure in the system. If this pressure is exceeded, the controller reads out an error message and the red LED flashes.

Protective functions for Solar

The protection functions for Solar are not displayed in the “Protective functions” menu, but rather as a sub-menu in the settings from the solar function, see " Solar " on page 33.

System protection

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 muti-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
A 2-level frost protection function can be activated. In level 1, the controller turns on the pump every hour for 1 minute if the collector temperature is below the set value “Frost Level 1”. If the collector temperature continues to decrease to the set value “Frost Level 2”, the controller will turn on the pump without disruption. If the collector temperature exceeds the value “Frost level 2” by 2 °C, the pump will turn off again.

Energy is lost through the collector through this function! It is normally not activated for solar systems with antifreeze. The operating manuals from the other system components must be observed.

Collector alarm

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.

7. 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

Settings from the 0-10V or the PWM pump can be made in this menu.

When this menu is selected, you may receive a request to save the speed settings.

Signal type

The type of device to be controlled is set here.
0-10V: Controlled by a 0-10V signal.
PWM: Control by means of a PWM signal.

Pump

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, itLHCC offers the possibility through a special internal electronic system to change the speed of pumps depending on the process. The PWM and 0-10V outputs can work speed-controlled.

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 ΔT between the reference sensors is below the set switch on temperature difference ΔT R1, the speed will be reduced. If the temperature difference between the reference sensors is above the set switch on temperature difference ΔT R1, the speed will be increased. If the controller has decreased the speed of the pump to the smallest level and the ΔT between the reference sensors is still only ΔToff, the pump will be turned off.

Mode M2: The controller changes to the set min. speed after the Speed. If the temperature difference ΔT between the reference sensors is above the set switch on temperature difference ΔT R1, the speed will be increased. If the temperature difference ΔT between the reference sensors is below the set switch on temperature difference ΔT R1, the speed will be reduced. If the controller has decreased the speed of the pump to the smallest level and the ΔT between the reference sensors is still only ΔToff, 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.

Setpoint

This value is the control setpoint for mode 3 see " Variant " on page 24, only version 2.3, and 4. If this value is below at the sensor, the speed is reduced. When it is exceeded, the speed is increased.

Sensor Calibration

Deviations in the temperature values displayed, for example. due to cables which are too long or sensors which are not positioned optimally can be compensated for manually here. The settings can be made for each individual sensor in steps of 0.5 °C.

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

Relay functions

Free relays, i.e., relays not used in a basic scheme, can be assigned to various additional functions. Every additional function can only be assigned once. **See all additional functionssee " Function overview " on page 28.**

R1 to R4: mechanical relay 230V
V1 and V2: PWM and 0-10 V output

Please pay special attention to the relay's technical information (see "Specifications").

The symbols shown here are displayed on the main overview screen when the special function is activated.

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 ΔT, 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 ΔT, 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 ΔT 10K, actual ΔT 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.

Flow temperature sensor (X)
In this menu, it is set which sensor is used to measure the return flow temperature.

Return flow sensor
In this menu, you can set which sensor is used to measure the return flow temperature.

Glycol type
In this menu, the antifreeze used is set. If none is used, please set glycol proportion to 0.

Glycol percentage
The percentage of antifreeze in the medium.

Flow rate supply flow (X)
Nominal system flow.
The flow of the system in liters per minute, which is used as calculation basis for heat metering.

Offset ΔT
Correction factor for the temperature difference for heat metering
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. This deviation can be corrected with the adjustment value Offset ΔT

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

VFS (X)
The type used of direct sensor is set in this menu.

VFS - Position
This menu is used to set whether the direct sensor was mounted in supply or return flow.

To prevent damage to the Vortex Flow sensor it is highly recommended to place it in the return flow. If contrary to this recommendation it is used in the supply line, the maximum temperature has to be considered. (0 ° C to 100 ° C continuous operation and short term -25 ° C to 120 ° C)

Reference sensor
The sensor to be used for heat metering is set here.

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 ‚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 15

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

Factory Settings

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

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

Eco Display Mode

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

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

Network

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.

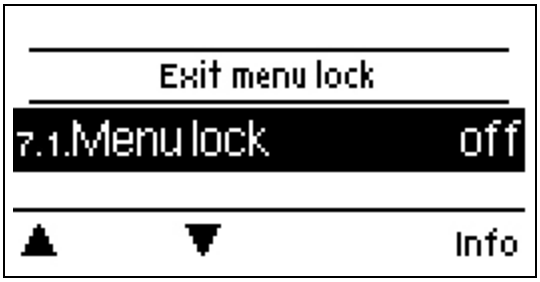
DNS-Server

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.

8. 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

9. 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.

10. 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.

Function overview

Mixer

Here individual parameters for mixer control can be changed.

Turn Time
The mixer is switched on i.e. is opening or closing for the time span set here, then the temperature is measured to control the flow temperature

Pause Factor
The calculated pause time of the mixer is multiplied with the value set here. If the pause factor is ‚1', the normal pause time is used, ‚0.5' will use half the normal pause time. Setting the pause factor to ‚4' would quadruple the pause time.

Increase
If the temperature rises very fast, this value is added to the measured flow temperature so that the mixer's reaction is stronger. If the measured temperature does not rise any more, the measured value is used again. The measurement occurs once every minute.

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

Heating Circuit 2

see " Heating Circuit (X) " on page 18

Difference

The assigned relay is activated as soon as there is a preset temperature difference (ΔT on/off) between the source and target sensors.

Δ T Difference

Switch on - difference:
If this temperature difference is reached, the relay will switch on.

Switch off - difference:
If this temperature difference is reached, the relay will switch off.

DF-Source

Heat source sensor/heat supplier for differential function
Adjusts the sensor from the heat source.

Diff. Tmin

Minimum temperature on the source sensor for approval of the difference relay.
If the temperature on the source sensor is below this value, the difference function will not be switched on.

Diff.-Drain

Heat decreasing sensor / heat customer for the different functions
Sets the sensor of the heat customer.

Diff. Tmax

Maximum temperature on the target sensor for approval of the difference relay.
If the temperature at the target sensor exceeds this value, the difference function will not be turned on.

Heat transfer

With this function, energy from one storage can be loaded in another.

Δ T Heat transfer

Temperature difference for the transfer. If the temperature difference between the sensors ΔT transfer On is reached, the relay is switched on. As soon as the difference on ΔT Transfer off falls, the relay is turned off again.

HT Tmax

Target temperature of the target storage
If this temperature is measured on the sensor in the target storage, the HT will be shut down.

HT Tmin

Minimum temperature in the source storage for the approval of the Heat Transfer.

HT-Source

In this menu, the sensor is set, which is placed in the storage from which the energy is extracted.

HT-Drain

In this menu, the sensor is set that is placed in the storage in which it is loaded.

Thermostat

Through the thermostat function, additional energy can be added to the system while being time and temperature controlled.

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, T eco, apply in economy mode.

DHW request
Thermostat is started for a DHW - heat request.

HC request
Thermostat is started with a heating circuit - heat request.

Tset
The target temperature of the thermostat sensor 1. Below this temperature, the thermostat turns on until Tref + Hysteresis is reached.

Hysteresis
Hysteresis of set point temperature.

Energy Saving Mode
The Energy Saving Mode switches the heating on when “T eco on” is undershot and heats up to “T eco” + hysteresis when solar charge or solid fuel boiler is active.

Delay
Delay for this function.
The function first turns on after this time span if the switch conditions were reached and are still present. This delay is intended to prevent unnecessary switching operations caused by temperature fluctuations or to
Give another energy source time to provide the necessary energy.

Thermostat sensor 1
TH Set is measured at thermostat sensor 1. With a connected thermostat sensor 2, the relay switches on if “TH Ref” at thermostat sensor 1 is undershot and off if “TH Ref” + hysteresis is exceeded at thermostat sensor 2.

Thermostat sensor 2
Optional switch off sensor
If “TH target” + hysteresis is exceeded on thermostat sensor 2, the relay will be shut down.

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

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.

AL Tref
For a successful heating, this temperature has to be reached at the AL sensor(s) for the exposure time period.

AL residence time
For this period of time the AL Tref temperatures at the activated AL-sensors have to be reached for a successful heating.

Last AL heat
This displays when the last successful heating has occurred.

AL sensor 1
On this sensor, the temperature of the AL function is measured.

AL Sensor 2
Optional AL sensor
If this sensor is set for a successful heating Tset AL have to be achieved at this sensor too for the action time.

Electric heating rod (auxiliary heating)

An electric heating element that heats up the storage water heater if needed.

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

DHW request
Electric heating rod is started for a DHW - heat request.

HC request
Electric heating rod is started with a heating circuit - heat request.

TH Set
The target temperature of the thermostat sensor 1. Below this temperature, the eat turns on until TH Reference + Hysteresis is reached.

Delay
After reaching the switching conditions, the time set here will be waited until the heating rod is actually turned on in order to give another heat source time to heat up.

Hysteresis
Hysteresis of set point temperature.

Ecomode
The Energy Saving Mode switches the heating on when “T eco on” is undershot and heats up to “T eco” + hysteresis when solar charge or solid fuel boiler is active.

Sensor 1
TH Reference is measured at the thermostat sensor 1. With a connected thermostat sensor 2, the relay switches on if “TH Ref” at thermostat sensor 1 is undershot and off if “TH Ref” + hysteresis is exceeded at thermostat sensor 2.

Sensor 2
Optional switch off sensor
If “TH target” + hysteresis is exceeded on thermostat sensor 2, the relay will be shut down.

Electric heating rod approval times
Release time for the electric heating rod
Here the desired periods are set in which the electric heating rod is approved. For each weekday, three times can be specified, furthermore, you can copy individual day to other days. The electric heating rod is shut down outside of the set times.

Anti-legionella heating rot
see " Anti Legionella " on page 30.

Cooling function

The **dissipation** function is a simple cooling function.
The relay of this function switches "on" as soon as the set **Tsoll** temperature at the assigned **cooling sensor** is exceeded and the set time **delay** has elapsed.
If the temperature at the cooling sensor reaches **Tsoll hysteresis**, the function switches "off" without a time **delay**.

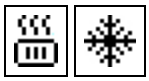
Tset
The target temperature at the set sensor for the function **dissipation** (cooling simple).

Cooling sensor
The corresponding cooling sensor for the dissipation **function is** set here.

Delay
Switch delay of the heat and cooling request. In order to prevent the heat or cooling request to be activated if there are heat deviations, the corresponding relay is switched up ot 5 minutes before the switch conditions occur.

Tset
The target temperature at the set sensor for the function **dissipation** (cooling simple).

Season switch



The seasonal switch changes the operating mode of the heat pump (compressor) between "heating" and "cooling".
For this purpose, the heat pump (compressor) must be suitable for reversible operation.
Please refer to the technical documentation of the heat pump used.
If request for DHW is activated for the heat pump in the controller, the operating mode of the heat pump automatically switches to "heating" mode in case of a DHW request.

Min. flow cooling
This value is the lower limit of the reference flow temperature of the cooling.

Dew point correction
The internal dew point curve is moved parallel with this value. The dew point calculation is used to calculate at which room temperature there is an undesired condensation (precipitation) at the currently measured humidity. This calculated room temperature will not be undershot with the cooling system and therefore represents a temperature lower limit for the cooling system.
The calculated room temperature can be moved by up to 10 °C with the dew point correction.

Example 1: You determine that there is precipitation with the default value,
so you increase this correction value.

Example 2: Condensation/precipitation can be ignored, instead a
stronger cooling system is required. You therefore decrease this correction value.

> In case of reduction of the calculated temperature with the help of dew point correction condensation / perspiration / precipitation can occur, which, among other things, may cause the formation of mold.

Max. flow cooling
This value is the upper limit of the reference flow temperature of the cooling.

Cool storage
The storage can be cooled through this function.

Yes: The flow and buffer storage are cooled down to the reference flow temperature + hysteresis.
No: It is cooled down to the reference flow temperature + hysteresis, the temperature in the buffer storage is ignored.

Buffer sensor
If the buffer tank is to be cooled in the cooling mode, the corresponding sensor can be set here.

Solid fuel boiler

In solid-fuel boiler function, a pump is controlled with a assigned relay, which loads the heat energy from a solid-fuel boiler into a storage tank.
The solid-fuel boiler function controls the charge pump of a solid-fuel boiler based on the temperature difference between the solid-fuel boiler sensor and the storage tank sensor.
If a control output (V1 or V2, ...) is used with this function, a speed control with a PWM / 0-10V HE pump is possible.

Solid fuel boiler Tmax
Maximum temperature in storage tank. If this is exceeded, the relay is switched off.

Solid fuel boiler Tmin
Minimum temperature in the solid fuel boiler to start the pump.
If the temperature at the solid fuel boiler sensor exceeds the temperature set here, the relay switches on the pump, if the other starting conditions are met.
Below the solids boiler Tmin temperature, the solids boiler function is deactivated.

ΔT Solid fuel boiler
Switch-on and switch-off difference between solid fuel boiler (SFB) and storage tank.

If the temperature difference between the sensors defined for this function exceeds the value set here (ΔT SF **On**), the function switches **on** the assigned output (relay or signal output).

If the set temperature difference (ΔT SF **Off**) between the solids boiler and the storage tank is below, the function switches **off** the assigned output (relay or signal output).

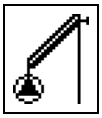
Boiler sensor of this function

Sensor used as a solids boiler sensor. Considered for SF Tmin and ΔTon/off.

Storage sensor

Sensor used as a storage tank sensor. Considered for FS Tmax and ΔTon/off.

Solar



This function is used to control a solar pump.

Tmin Collector

Enable/start temperature at sensor X:
If this value on the specified 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 falls 5 °C below this value, the pump or the valve will be turned off again.

ΔT Solar

Switch on/switch off temperature difference for sensor X:
If the temperature difference ΔT Solar between the reference sensors is exceeded and the other conditions are fulfilled, the controller will turn on the pump/valve on the corresponding relay. If the temperature difference falls to ΔT Off, the pump/valve will be turned off again.

Tmax Storage

Switch off temperature at sensor X:
If this value is exceeded at the specified sensor, the controller turn off the affiliated pump or the valve. If this value on the sensor 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!

Starting aid

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 ΔT 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.

Protective Functions

see " Protective functions for Solar " on page 22

Collector

Collector sensor

The collector sensor can be determined or changed here. The collector sensor set here is used for solar function (Tmin collector, ΔT Solar,....) as well as all protection functions Solar (collector protection, system protection, ...).

Solar storage

The solar storage sensor can be determined or changed here. The solar storage sensor determined here is used for the solar function (Tmax storage, ΔT Solar,....).

Solar bypass

Use a relay to switch a bypass valve or a bypass pump. With this function, the flow can be guided past the storage if the flow temperature at the bypass sensor is less than in the storage to be filled.

Variant

In this menu, you can set if the flow is guided through the bypass with a pump or a valve.

Bypass sensor

The reference sensor for the bypass function to be placed in the flow is selected in this menu.

Booster

This function can control an additional booster pump for filling a resistance system.

Charge time

When solar charging begins, the connected booster pump fills the system for the time set here.

Zone valve

This feature can control a solar accumulator charging valve. This enables charging of a second tank or second tank zone. The number on the left next to the zone valve indicates which tank / zone is being charged by the system.

Tmax storage 2

Maximum temperature storage 2. Up to this temperature, store 2 or the 2nd store zone will be charged.

Solar storage 2

In this menu, the storage tank sensor 2 must be set.

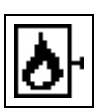
Heat exchanger

Adds a heat exchanger and a secondary pump to the solar circuit. Function is only visible if the additional funciton Solar is activated.

Heat exchanger sensor

The sensor that is used to turn on the secondary pump. It must be on the primary side on the heat exchanger.

Burner



This function requests a burner when a request of a heating circuit or the DHW function is present. Depending on the request, the burner will turn on in a more economic manner in the Eco-Mode if the solar circulation pump is running.

DHW request

The burner is started for a DHW - heat request.

Heating Circuit request
The burner is started for a heating circuit heat request.

Burner sensor
Reference sensor for burner function. If this temperature at the set sensor is exceeded, the burner is shut down.

Delay
Switch delay, valid for cooling and heat request. The burner first turns on after this time span if the switch conditions were reached and are still present. This function should prevent unnecessary switches through temperature changes or create a regenerative energy source that adds energy.

Burner offset
When using the 0-10V outputs V1 or V2 for the burner function, the requested temperature is emitted through a corresponding voltage. This offset increases the requested temperature.

Eco mode (during solar charge)
The economy mode for this function can be operated in 2 different variants:
Shutdown: The function is not started with an active solar charge.
Decrease:
For a heating request the function first turns on when the conditions and an additional offset were not met.

For a DHW request the function only activates when T eco is not met and de-activates when T eco + DHW-heating is achieved.

Tmax
Maximum temperature at the burner sensor. If this temperature at the set sensor is exceeded, the burner is shut down.

Enable
(temporal) **enable for this function**
Here, the desired periods can be set in which the function is enabled.
For each weekday, three times can be specified, furthermore, you can copy individual day to other days.
Outside the set times the function is disabled.

Anti Legionella
see " Anti Legionella " on page 30.

Boiler pump

A boiler pump is turned on and off together with the burner. Function is only visible if the additional function Burner is activated.

Boiler pump Tmin
Minimum temperature at the burner sensor for enabling of the boiler pump. If this temperature is exceeded at the burner sensor, the burner pump is activated.

Compressor

The function switches on the compressor from a heat pump if a heat request from the heating circuit or DHW sensor is present.

DHW request
The compressor is started with a DHW - heat request.

HC request
The compressor is started with a heating circuit - heat request.

Cooling request
The compressor is started when cooling is requested.

Eco mode (during solar charge)
The economy mode for this function can be operated in 2 different variants:
Shutdown: The function is not started with an active solar charge.
Decrease:
For a heating request the function first turns on when the conditions and an additional offset were not met.

For a DHW request the function only activates when T eco is not met and de-activates when T eco + DHW-heating is achieved.

Heating circuit offset
The temperature offset setting for the eco operaing mode “Lower” (see above).

Heat pump run time
The compressor turns on at least for the set time.

Heat pump idle time
The compressor is blocked for this time after it is shut down.

Heat pump delay
Delay for this function.The function first turns on after this time span if the switch conditions were reached and are still present. This delay is intended to prevent unnecessary switching operations caused by temperature fluctuations or toGive another energy source time to provide the necessary energy.

Storage charge pump (SLP) overshoot
The pump turns off after the compressor delayed by this time.

Bivalent temperature
Below the temperature set here, the next energy source is added.

Min. outdoor temperature
When the outdoor temperature set here is undershot, the heat pump switches off.

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

Anti Legionella
see " Anti Legionella " on page 30.

Loading pump

The function switches on the charge pump of a heat pump if a heat request from the heating circuit or DHW sensor is present. This function can only be selected if a compressor was activated on a different relay.

Storage charge pump (SLP) overshoot
The pump turns off after the compressor delayed by this time.

Glycol pump

The glycol pump is turned on and off together with the compressor. Function is only visible if the additional function Compressor is activated.

Gylcol pump lag
After shutting down the compressor, the pump remains on for the time set here.

Return flow increase

With this function, for example, the return temperature of a heating circuit is increased through the storage.

RF Tmin
Minimum temperature at storage sensor to enable the return flow increase. As soon as this temperature at the set storage sensor is exceeded and adequate ΔT is present, the relay is turned on.

RL Tmax
Maximum temperature set on the storage sensor set for this function If this temperature is exceeded at the RL storage sensor, the function is deactivated again.

ΔT return flow

Switch on temperature difference:
The relay is turned on if this temperature difference is exceeded between the storage sensor and the recooling sensor.
Switch off temperature difference:
The relay is turned off if this temperature difference is undershot between the storage sensor and the recooling sensor.

Return flow sensor

Selection of the return flow sensor.

Storage sensor

Selection of the storage sensor.

Domestic hot water valve

This function activates a DHW-valve or -pump, if a DHW heat request is present.

Circulation

Depending on the temperature and time approval, a circulation pump is turned on for the DHW storage.

Tmin

If this value at the circulation sensor is undershot and the circulation is approved or there is a request through a tapping process, the circulation pump is started.

Hysteresis

If the circulation Tmin value is exceeded by the value set here, the circulation pump will be shut down.

Circulation sensor

If the circulation Tmin value is exceeded by the value set here, the circulation pump will be shut down.

Circulation pause time

In order to prevent an excessive switching on of the circulation pump, a block time can additionally be set up here to prevent it from being turned on again. If the circulation pump has turned off, it can first go into operation again after the expiration of the time set here.

Purging time

If during the operation of the circulation pump, also after expiration of the optional purging time, the previously selected temperature at the circulation sensor is not reached, the pump will turn off. This function should protect against unnecessarily long operation of the circulation pump, for example, if the warm water storage is too cold.

Circulations periods

Operating times of the circulation
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.

Anti Legionella

see " Anti Legionella " on page 30.

Error messages

The relay is switched on if one or several of the set protective functions are activated. This function can be inverted so that the relay is turned on (Duration on) and then turned off again if a protective function is activated.

Collector protection
System protection
Frost Protection
Recooling
Anti Legionella
Error messages

Error message

Activate or deactivate function

The additional function error message activates the relay for certain events and only deactivates again when the information message to each event was read.
The following messages are available:
Collector protection
System protection
Frost Protection
Recooling
Anti Legionella
Message
Sensor error VFS1
Sensor error VFS2

Pressure monitor

In this menu, the system pressure monitoring can be activated through a direct sensor. As soon as the set pressure conditions are undershot or exceeded, the set relay will switch on.

Pressure monitor

Relay turns on if the pressure goes below the minimum or exceeds the maximum.

RPS1 / RPS2

Type of pressure sensor
In this menu, you can adjust which pressure sensor is being used. Please note: If e.g. VFS1 is connected, RPS1 option is not shown.

Pmin

Minimum pressure. If this pressure is not met, the controller emits an error notification and the relay switches.

Pmax

Maximum pressure in the system. If this pressure is exceeded, the controller emits an error notification and the relay switches.

Dehumidifier

Operating mode

The operating mode of the dehumidifier function can be set here.
Summer: In the summer operating mode, the dehumidifier turns on when the target humidity is exceeded, if the S/W day temperature is exceeded and the function is approved.
Summer+Circ.: In the summer+circulation operating mode, the dehumidifier turns on when the target humidity is exceeded, if the S/W day temperature is exceeded and the heating circuit pump is running and the function is approved.
Year round: In the year round operating mode, the dehumidifier turns on when the target humidity is exceeded if the function is approved.

Reference humidity

Reference value for the humidity in the room.
If the value set here is exceeded, the relay will turn on the dehumidifier if this is approved for the time. The dehumidifier is turned off if the reference value hysteresis is not met.

Hysteresis

Hysteresis of setpoint for the humidity.

Dehumidifier periods

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

Parallel operation

The relay runs simultaneously with the set relay.

Parallel operation

Here you can additionally set the switch mode.
On : The function switches parallel to the set signal output.
Inverted : The function switches contrary to the set signal output.

Parallel to
Here, the output can be selected, which this function should be activated parallel to. Every available signal output can be selected.

Delay
In this menu, it is set how long to wait after switching the signal output until the parallel operated relay switches as well.

Followup time
In this menu, it is set how long the parallel-operated relay continues to operate after the set signal output has been deactivated.

Remote

Relay status
The relay status determines if the condition of the relay is in sleep mode, and it also applies if the controller is restarted.

Title
Here you can assign a name for the selected relay. This name also appears on the Sorel-Connect page to simplify the assignment.

Always on

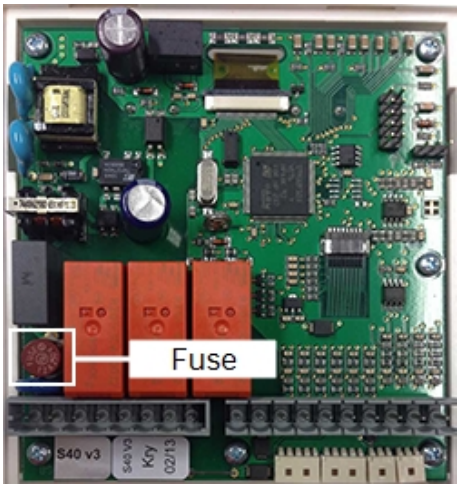
Relay is permanently switched on.

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 4.1.

Maintenance

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

Performing maintenance:

- Check the date and time see " Time & Date " on page 17
- Assess/check plausibility of statistics see " Serve for function control and long-term monitoring of the system. " on page 16
- Check the error memory see " Error messages " on page 16
- Verify/check plausibility of the current measurement values see " Measurement values " on page 15
- Check the switch outputs/consumers in manual mode see " Manual " on page 18
- Possibly optimize the parameter settings.

Possible error messages

Possible error messages	Notes for the specialist
Sensor x defective	Means that either the sensor, sensor input on the controller or the connection line is / or was defective (see " Temperature Resistance Table for Pt1000 Sensors " on page 13)
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.
No flow	If ΔT between store and collector is 50 ° C or more for 5 minutes, this error message is displayed.
Frequent on / off	A relay was switched on and off more than 5 times within 5 minutes.

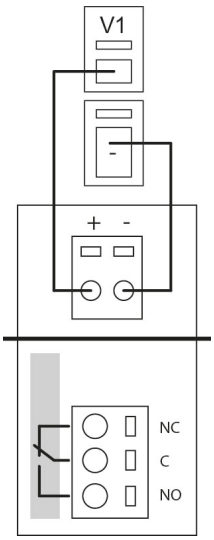
Additional Information

External relay at signal output V(X) (0-10V / PWM)

In order to use a 0-10V / PWM output as a 230V / AC switching output, an external switching relay (Art. No. 77502) can be connect at the output V (X) (V1, V2, ...).

The external relay is then activated via the signal output (0V = "off", 10V = "on").

1. Connect external 0-10V relay to signal output, e.g. V1.

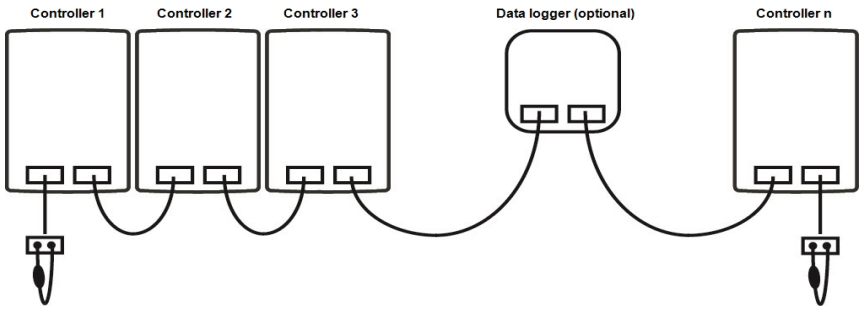


2. Assign additional function to signal V1.
see " Relay functions " on page 25

3. Disable the speed control for the corresponding 0-10V / PWM output (Off).
see " Variant " on page 24

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.

Appendix

Pump

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. For 0-10 V pump always choose the "Normal" setting

PWM / 0-10V off

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

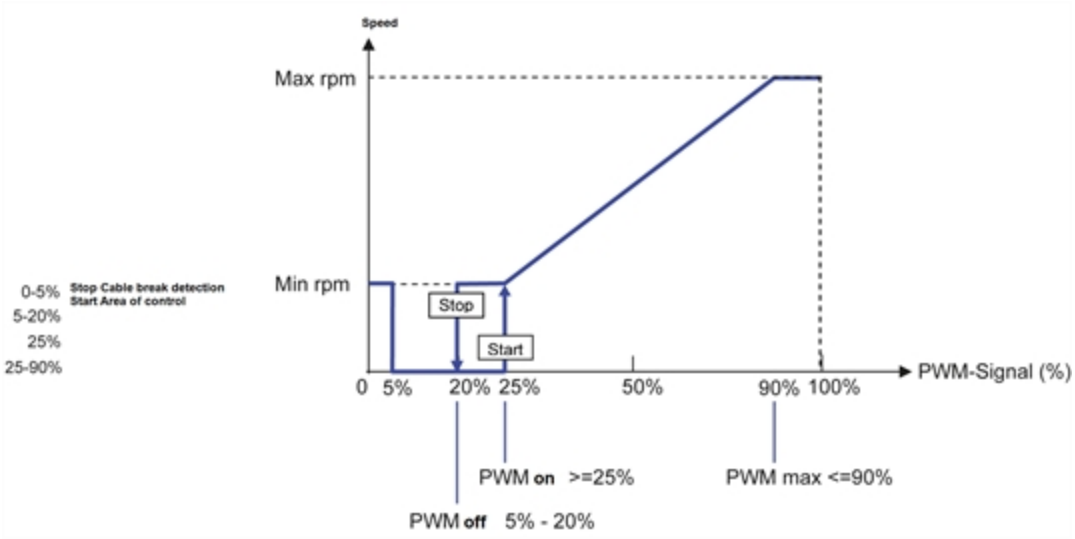
With this value, the maximum voltage level / maximum frequency can be specified for the highest speed of the energy saving pump, which is used, for example, during the flushing or manual operation.

Speed when „On“

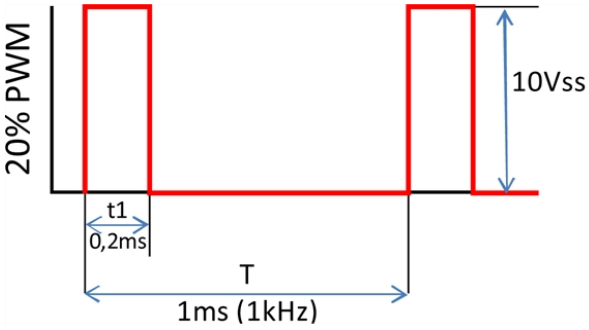
In this menu, the calculation basis of the displayed speed is changed. If, for example, 30% is specified here, the frequency/voltage set under “PWM On” / “0-10V On” will be displayed during creation so that a 30% speed is present. When creating the voltage/frequency of PWM Max / 0-10V Max, 100% speed is displayed. Temporary values are calculated correspondingly.

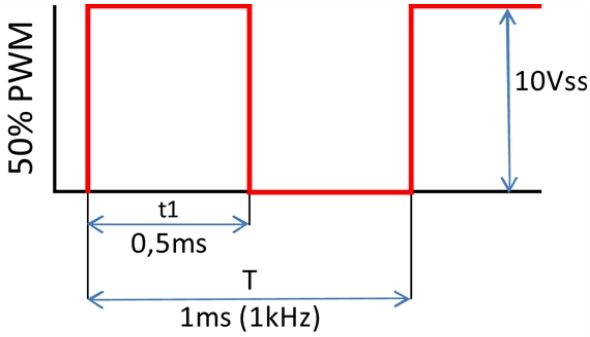
This function does not influence the rule, but rather only the display on the status screen.

Example for pump settings



Technical data PWM and 0-10V





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

Technical data 0-10V: 0-10V: 2V to 10V (20% to 100%) Designed for a load of 10K Ohm. 10V = 100% Speed 5V = 50% Speed 2V = 20% Speed 0V = Off

Show signal

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

Final declaration

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

Date and time of installation:

Name of installation company:

Space for notes:

Your specialist dealer:

Manufacturer:

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

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Version: 29.05.2017