DeltaTherm® HC mini

beginning with version 1.02

Heating controller

Manual for the
specialised craftsman
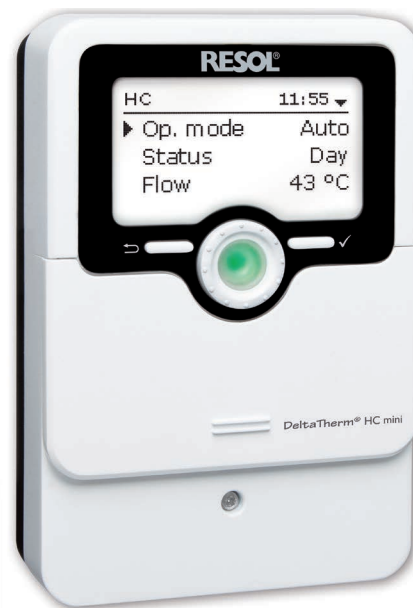
Mounting
Connection
Operation
Troubleshooting
Application examples

RESOL®

HC   11:55
▸ Op. mode   Auto
  Status   Day
  Flow   43 °C

DeltaTherm® HC mini

Adjust your heating via app

Thank you for buying this RESOL product.
Please read this manual carefully to get the best performance from this unit. Please keep this manual carefully.

en

Manual

www.resol.com

Safety advice

Please pay attention to the following safety advice in order to avoid danger and damage to people and property.

Danger of electric shock:

- When carrying out works, the device must first of all be disconnected from the mains.
- It must be possible to disconnect the device from the mains at any time.
- Do not use the device if it is visibly damaged!

The device must not be used by children or persons with reduced physical, sensory or mental abilities or without any experience and knowledge. Make sure that children do not play with the device!

Only connect accessories authorised by the manufacturer to the device.

Make sure that the housing is properly closed before commissioning the device.

Set the code to the customer code before handing over the controller to the customer.

Target group

These instructions are exclusively addressed to authorised skilled personnel.

Only qualified electricians are allowed to carry out electrical works.

Initial commissioning must be effected by authorised skilled personnel.
Authorised skilled personnel are persons who have theoretical knowledge and experience with the installation, commissioning, operation, maintenance, etc. of electric/electronic devices and hydraulic systems and who have knowledge of relevant standards and directives.

Instructions

Attention must be paid to the valid local standards, regulations and directives!

Information about the product

Proper usage

The controller is designed for use in heating systems in compliance with the technical data specified in this manual.

Any use beyond this is considered improper.

Proper usage also includes compliance with the specifications given in this manual.
Improper use excludes all liability claims.

> **i** **Note:**
> Strong electromagnetic fields can impair the function of the device.
> ➔ Make sure the device as well as the system are not exposed to strong electromagnetic fields.

EU Declaration of conformity

The product complies with the relevant directives and is therefore labelled with the CE mark. The Declaration of Conformity is available upon request, please contact the manufacturer.

$C\epsilon$

Scope of delivery

The scope of delivery of this product is indicated on the packaging label.

Storage and transport

Store the product at an ambient temperature of 0 … 40 °C and in dry interior rooms only.

Transport the product in its original packaging only.

Cleaning

Clean the product with a dry cloth. Do not use aggressive cleaning fluids.

Data security

We recommend regular backups of the data stored on the device via MicroSD card.

Subject to technical change. Errors excepted.

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Decommissioning

1. Disconnect the device from the power supply.
2. Dismount the device.

Disposal

• Dispose of the packaging in an environmentally sound manner.
• At the end of its working life, the product must not be disposed of as urban waste. Old appliances must be disposed of by an authorised body in an environmentally sound manner. Upon request we will take back your old appliances bought from us and guarantee an environmentally sound disposal of the devices.

Description of symbols

Warnings are indicated with a warning symbol!
Signal words describe the danger that may occur, when it is not avoided.

WARNING	means that injury, possibly life-threatening injury, can occur.
	➔ It is indicated how to avoid the danger described.

ATTENTION	means that damage to the appliance can occur.
	➔ It is indicated how to avoid the danger described.

Note
Notes are indicated with an information symbol.

➔ Texts marked with an arrow indicate one single instruction step to be carried out.

1. Texts marked with numbers indicate several successive instruction steps to be carried out.

DeltaTherm® HC mini Heating controller

The DeltaTherm® HC mini offers a compact and user-friendly solution for simple heating systems. It can control a weather-compensated heating circuit and its back-up heating demand. Additionally, there's a choice of 5 different operating modes, a boiler protection option and a night correction. Due to the commissioning menu and the 4 pre-configured basic systems, configuration is quick and easy. The chimney sweeper function and the holiday mode can be activated by pressing a single button.

Contents

1   Overview

- 4 pre-configured basic systems
- 12 pre-programmed schemes for the temperature controls classes II, III, V, VI, VII and VIII
- 4 relay outputs (incl. 1 extra-low voltage relay)
- 5 inputs for Pt1000 temperature sensors
- 5 operating modes, boiler protection, room thermostat and night correction
- Chimney sweeper function, screed drying function and holiday mode via microbuttons
- Holiday mode, chimney sweeper function and screed drying function via microbuttons
- Data logging, storing, easy transfer of controller adjustments prepared and firmware updates via SD card
- Modulating heating control with 0-10 V boiler control
- Weather-compensated control with room influence or demand-based room control with up to 3 room temperature sensors
- Remote access with a room control unit or the VBus®Touch HC App

Dimensions and minimum distances

Upper fastening

Lower fastening
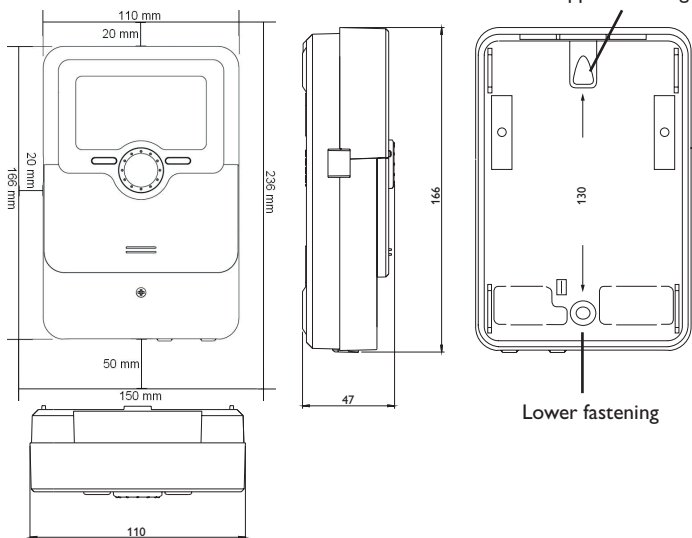
Technical data

Inputs: 5 inputs for Pt1000 temperature sensors (1 of them can be converted to Switch and one of them to RTA remote control or BAS operating mode switch)

Outputs: 3 semiconductor relays, 1 potential-free extra-low voltage relay, 1 PWM output, 1 0-10 V output

PWM frequency: 512 Hz

PWM voltage: 10.8 V

Switching capacity:
1 (1) A 240 V~ (semiconductor relay)
1 (1) A 30 V⎓ (potential-free relay)

Total switching capacity: 3 A 240 V~

Power supply: 100 – 240 V~ (50 – 60 Hz)

Supply connection: type X attachment

Standby: 0.62 W

Temperature controls class: VIII

Energy efficiency contribution: 5 %

Mode of operation: type 1.B.C.Y action

Rated impulse voltage: 2.5 kV

Data interface: VBus®, MicroSD card slot

VBus® current supply: 60 mA

Functions: weather-compensated heating circuit control, backup heating, room thermostat, chimney sweeper function, screed drying function, holiday mode

Housing: plastic, PC-ABS and PMMA

Mounting: wall mounting, also suitable for mounting into patch panels

Indication / Display: full graphic display, control lamp (Lightwheel®)

Operation: 4 buttons at the front and 1 Lightwheel®

Protection type: IP 20 / DIN EN 60529

Protection class: I

Ambient temperature: 0 … 40 °C

Degree of pollution: 2

Fuse: T4A

Maximum altitude: 2000 m above MSL

Dimensions: 110 x 166 x 47 mm

2   Installation

2.1   Mounting

WARNING!   **Electric shock!**

Upon opening the housing, live parts are exposed!

➔ **Always disconnect the controller from power supply before opening the housing!**

Note:

Strong electromagnetic fields can impair the function of the device.

➔ Make sure the device as well as the system are not exposed to strong electromagnetic fields.

The unit must only be located in dry interior rooms.

If the device is not equipped with a mains connection cable and a plug, the device must additionally be supplied from a double pole switch with contact gap of at least 3 mm or must be equipped with a disconnecting device (fuse) in accordance with the required installation regulations.

Please pay attention to separate routing of sensor cables and mains cables.

In order to mount the device to the wall, carry out the following steps:

1. Unscrew the crosshead screw from the cover and remove it along with the cover from the housing.
2. Mark the upper fastening point on the wall. Drill and fasten the enclosed wall plug and screw leaving the head protruding.
3. Hang the housing from the upper fastening point and mark the lower fastening point (centres 130 mm).
4. Insert lower wall plug.
5. Fasten the housing to the wall with the lower fastening screw and tighten.
6. Carry out the electrical wiring in accordance with the terminal allocation (see page page 8).
7. Put the cover on the housing.
8. Attach with the fastening screw.
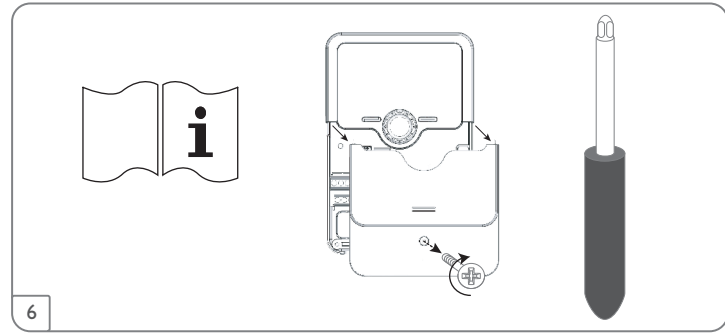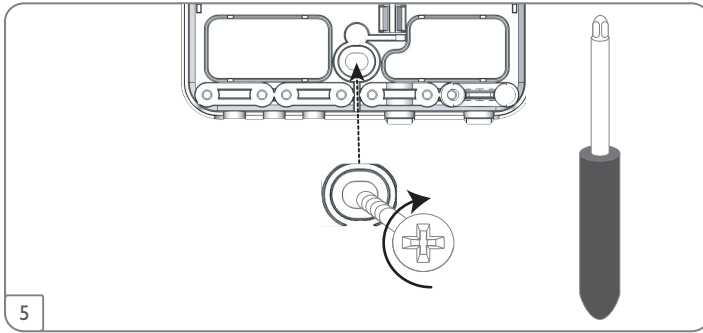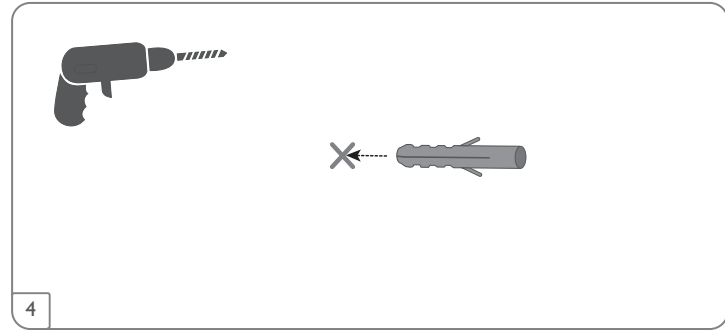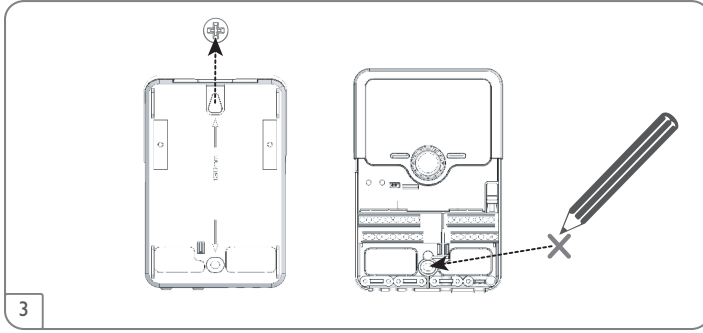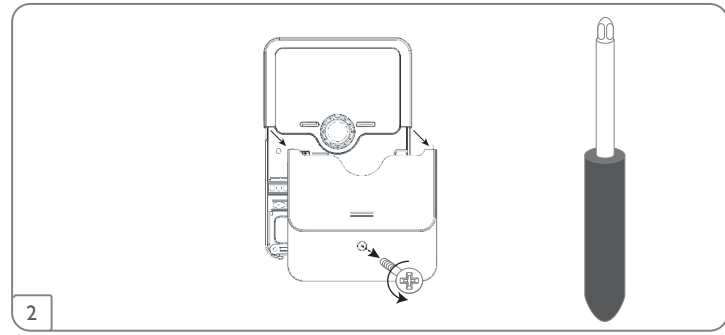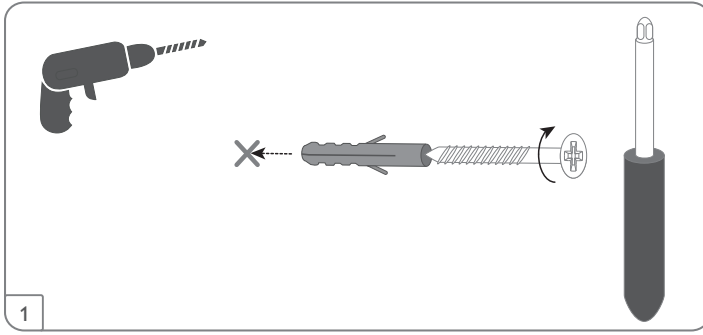
2.2   Electrical connection

WARNING! **Electric shock!**
Upon opening the housing, live parts are exposed!
➔ **Always disconnect the controller from power supply before opening the housing!**

ATTENTION! **ESD damage!**
Electrostatic discharge can lead to damage to electronic components!
➔ **Take care to discharge properly before touching the inside of the device! To do so, touch a grounded surface such as a radiator or tap!**

Note:
Connecting the device to the power supply must always be the last step of the installation!

Note:
The pump speed must be set to 100 % when auxiliary relays or valves are connected.

Note:
It must be possible to disconnect the device from the mains at any time.
➔ Install the mains plug such that it is accessible at any time.
➔ If this is not possible, install a switch that can be accessed.

If the mains cable is damaged, it must be replaced by a special connection cable which is available from the manufacturer or its customer service.

Do not use the device if it is visibly damaged!
Depending on the product version, cables are already connected to the device. If that is not the case, please proceed as follows:

Terminal screws must be torqued to 0.5 Nm.

Attach flexible cables to the housing with the enclosed strain relief and the corresponding screws.

The controller is equipped with 4 **relays** in total to which loads such as pumps, valves, etc. can be connected:

Relays 1 … 3 are semiconductor relays, designed for pump speed control:
Conductor R1 … R3
Neutral conductor N (common terminal block)
Protective earth conductor ⊕ (common terminal block)

Relay 4 is a potential-free extra-low voltage relay:

Connections to the R4 terminals can be made with either polarity.

Connect the **temperature sensors** (S1 to S5) to the terminals S1 … S5 and GND (either polarity).

The cables carry extra-low voltage and must not run together in a cable conduit with cables carrying a voltage higher than 50 V (please pay attention to the valid directives). The cross section must be at least 1.5 mm^2 and the cables can be extended up to 100 m (or 0.75 mm^2 for 50 m respectively). The cables can be extended by means of a 2-wire cable (bell wire).

The terminals marked **PWM / 0-10 V** are control outputs for high-efficiency pumps and for 0-10 V boiler control respectively.
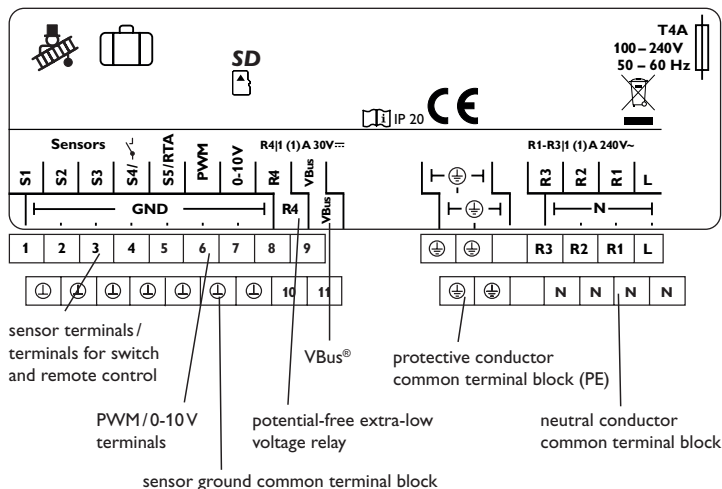
The controller is supplied with power via a mains cable. The power supply of the device must be 100 … 240 V~ (50 … 60 Hz).

The **mains connection** is at the terminals:
Neutral conductor N
Conductor L
Protective earth conductor ⊕ (common terminal block)

sensor terminals / terminals for switch and remote control

PWM / 0-10 V terminals

sensor ground common terminal block

VBus®

potential-free extra-low voltage relay

protective conductor common terminal block (PE)

neutral conductor common terminal block

Electrical connection of a high-efficiency pump (HE pump)

Speed control of a HE pump is possible via a PWM signal / 0-10 V control. The pump has to be connected to the relay (power supply) as well as to one of the PWM outputs of the controller. In the **Outputs** adjustment channel one of the PWM control types as well as a relay have to be selected (see page 37).
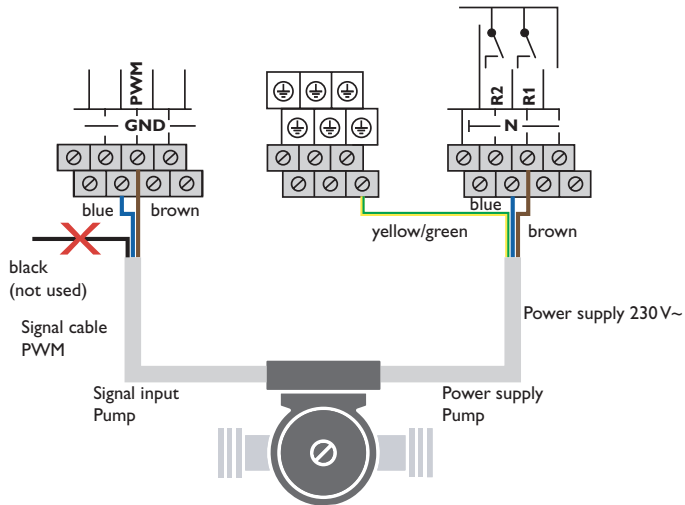
Note
For more details about the commissioning procedure see page page **16**.

2.3   Data communication / Bus

The controller is equipped with the **VBus**® for data transfer and energy supply to external modules. The connection is to be carried out at the terminals marked **VBus** (either polarity). The cable carries extra-low voltage and must not run together in a cable conduit with cables carrying a voltage higher than 50 V (please pay attention to the valid directives). The cross section must be at least 0.5 mm^2 and the cable can be extended up to 50 m in the case of a single connection.

One or more **VBus**® modules can be connected via this data bus, such as:

• DL2 / DL3 Datalogger
• KM2 Communication module
• VBus® / USB or VBus® / LAN interface adapter

Different solutions for visualisation and remote parameterisation are availabe on the website www.resol.com. On the website, firmware updates are also availabe.

> **i** **Note**
> More accessories on page page 41.

2.4   MicroSD card slot

The controller is equipped with a MicroSD card slot.
With a MicroSD card, the following functions can be carried out:

• Store measurement and balance values onto the MicroSD card. After the transfer to a computer, the values can be opened and visualised, e. g. in a spreadsheet.
• Prepare adjustments and parameterisations on a computer and transfer them via the MicroSD card.
• Store adjustments and parameterisations on the MicroSD card and, if necessary, retrieve them from there.
• Download firmware updates from the Internet and install them on the controller via MicroSD card.
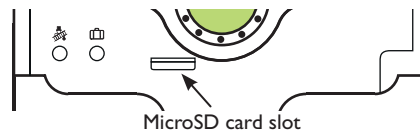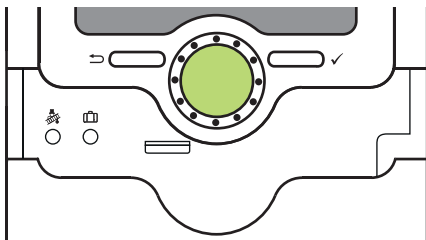

MicroSD card slot

> **i** **Note**
> For more information about using a MicroSD card, see page page 35.

3   Operation and function

3.1   Buttons and adjustment dial

The controller is operated via 2 buttons and 1 adjustment dial (Lightwheel®) below the display:

Left button (⬑) - escape button for changing into the previous menu/changing to the home screen (Status Heating circuit), if the button is pressed for 2 s

Right button (✓) - confirming/selecting

Lightwheel® - scrolling upwards/scrolling downwards, increasing adjustment values/reducing adjustment values

## 3.2   Microbutton for chimney sweeper function/screed drying and holiday mode

The controller is equipped with two microbuttons for quick access to the holiday mode and the chimney sweeper function/screed drying. The microbuttons are located underneath the slidable housing cover, the slider.

Microbutton 🧹: The chimney sweeper or screed drying function can be triggered with the microbutton 🧹. The chimney sweeper function is activated by default. In order to activate the screed drying function, the chimney sweeper function must be deactivated (see page page 32). In order to trigger the chimney sweeper or screed drying function, press and hold down the microbutton 🧹 for 5 s.

Microbutton 🏠: The microbutton 🏠 is used for activating the holiday mode. If the microbutton is pressed and held down for approx. 3 s, the adjustment channel **Days of absence** appears, allowing to enter the number of days for an absence. If the parameter is set to a value higher than 0, the holiday mode becomes active and the days will be counted backwards at 00:00. If the value is set to 0, the holiday mode is deactivated.

3.3   Control lamp

The controller is equipped with a multicolour LED in the centre of the Lightwheel®, indicating the following states:

Colour	Permanently shown	Flashing
Green	Everything OK	Manual mode on
Red	Screed drying cancelled	Sensor line break, sensor short circuit, initialisation
Yellow	Holiday mode active	Chimney sweeper function/screed drying active
Red/Green		Manual mode off

3.4   Selecting menu points and adjusting values

During normal operation of the controller, the display is in the status menu.

If no button is pressed for 1 min, the display illumination switches off. After 3 more minutes, the controller switches to the Status menu.

➔   In order to get from the Status menu into the Main menu, press the left button (⬑)!

➔   Press any key to reactivate the display illumination.

➔   In order to scroll through the display channels, turn the Lightwheel®.


```
Status: Mea... E 11:30 ▾
S1            42.0 °C≫
          HC-flow
            HC
```
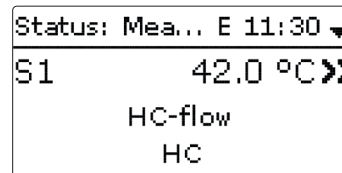
If the symbol ≫ is shown behind a menu item, pressing the right button (✓) will open a new submenu.

```
Sensor selec.  E 11:32 ⬍
  ▶   S3
      S4
      S5
```

Values and adjustments can be changed in different ways:

Numeric values can be adjusted by means of a slide bar. The minimum value is indicated to the left, the maximum value to the right. The large number above the slide bar indicates the current adjustment. By turning the Lightwheel®, the upper slide bar can be moved to the left or to the right.

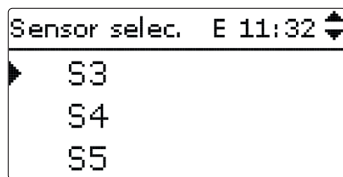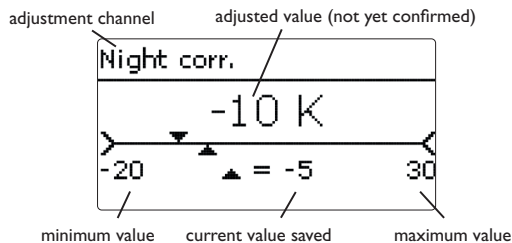Only after the adjustment has been confirmed by pressing the right button (✓) will the number below the slide bar indicate the new value. The new value will be saved if it is confirmed by pressing the right button (✓) again.

adjustment channel   adjusted value (not yet confirmed)

```
Night corr.

       -10 K

-20      ▲ = -5      30
```

minimum value   current value saved   maximum value

When 2 values are locked against each other, they will display a reduced adjustment range depending on the adjustment of the respective other value.

In this case, the active area of the slide bar is shortened, the inactive area is indicated as a dotted line. The indication of the minimum and maximum values will adapt to the reduction.

```
Op. mode         ▼
  ▶  ⦿ Auto
     ○ Day
     ○ Night
```
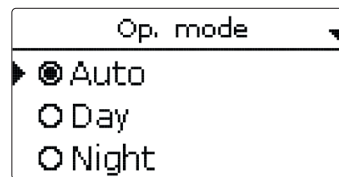
If only one item of several can be selected, they will be indicated with radio buttons. When one item has been selected, the radio button in front of it is filled.

```
Day selection
     ⊠ Mon
     ☐ Tue
  ▶  ⊠ Wed
```
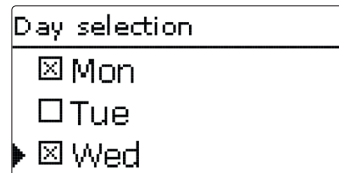
If more than one item of several can be selected, they will be indicated with checkboxes. When an item has been selected, an **x** appears inside the checkbox.

If no button has been pressed within a couple of minutes, the adjustment is cancelled and the previous value is retained.

Adjusting the timer

When the **Timer** option is activated, a timer is indicated in which time frames for the function can be adjusted.

```
▶ Day selection
  Reset
  back
```

In the **Day selection** channel, the days of the week are available individually and as frequently selected combinations.
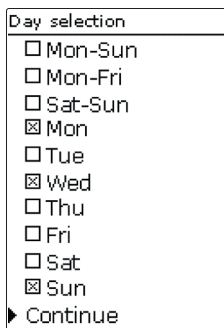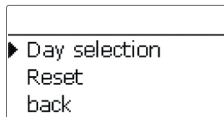
If more than one day or combination is selected, they will be merged into one combination for the following steps.

```
Day selection
  ☐ Mon-Sun
  ☐ Mon-Fri
  ☐ Sat-Sun
  ☒ Mon
  ☐ Tue
  ☒ Wed
  ☐ Thu
  ☐ Fri
  ☐ Sat
  ☒ Sun
▶ Continue
```

The last menu item after the list of days is **Continue**. If Continue is selected, the **Edit timer** menu opens, in which the time frames can be adjusted.

Adding a time frame:
In order to add a time frame, proceed as follows:

1. Select **New time frame**.

```
Mon,Wed,Sun
  00   06   12   18
▶ New time frame
  Copy from
```

```
Mon,Wed,Sun
▶ Start          --:--
  Stop           --:--
  back
```
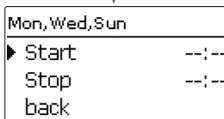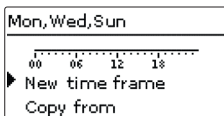
2. Adjust **Start** and **Stop** for the desired time frame. The time frames can be adjusted in steps of 5 min.
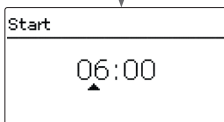
```
Start
    06:00
      ▲
```

```
Stop
    08:30
      ▲
```

3. In order to save the time frame, select **Save** and confirm the safety enquiry with **Yes**.

```
Mon,Wed,Sun
  Start          06:00
  Stop           08:30
▶ Save
```

```
Save
  Save?            Yes
```
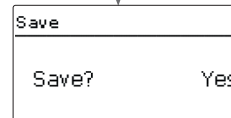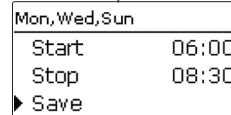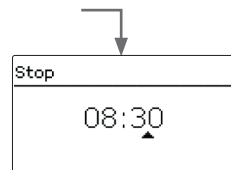
4. In order to add another time frame, repeat the previous steps.

6 time frames can be adjusted per day or combination.

```
Mon,Wed,Sun
  00   06   12   18
▶ New time frame
  Copy from
```

```
Mon,Wed,Sun
  00   06   12   18
▶ New time frame
  Copy from
```
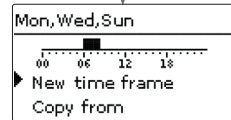
5. Press the left button ⬑ in order to get back to the day selection.

```
  Day selection
▶ Mon,Wed,Sun
  Reset
```

Copying a time frame:

In order to copy time frames already adjusted into another day / another combination, proceed as follows:

1. Choose the day / The combination into which the time frames are to be copied and select **Copy from**.

A selection of days and / or combinations with time frames will appear.

2. Select the day or combination from which the time frames are to be copied.

All time frames adjusted for the selected day or combination will be copied.

If the time frames copied are not changed, the day or combination will be added to the combination from which the time frames have been copied.

If the time frames copied are changed, the day / combination will be listed separately.

```
Tue
┌────────────────┐
│ 00  06  12  18 │
│ New time frame │
│▶ Copy from     │
└────────────────┘
```

```
┌────────────────┐
│ ▒  ■    ■      │
│ 00  06  12  18 │
│▶ Mon,Wed,Sun   │
└────────────────┘
```

```
Tue
┌────────────────┐
│  ■    ■    ■   │
│ 00  06  12  18 │
│ New time frame │
│▶ Copy from     │
└────────────────┘
```

```
┌────────────────┐
│ Day selection  │
│▶ Mon-Wed,Sun   │
│ Reset          │
└────────────────┘
```

```
┌────────────────┐
│ Day selection  │
│ Mon,Wed,Sun    │
│▶ Tue           │
└────────────────┘
```
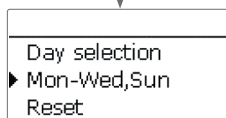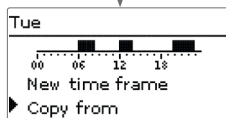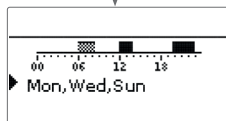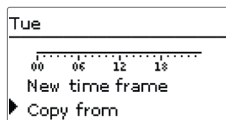
Changing a time frame:

In order to change a time frame, proceed as follows:

1. Select the time frame to be changed.
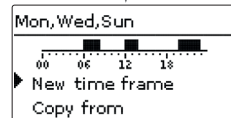
2. Make the desired change.
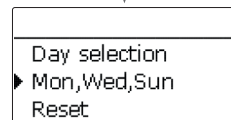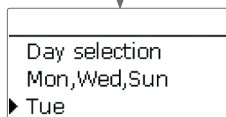
3. In order to save the time frame, select **Save** and confirm the safety enquiry with **Yes**.

```
Mon,Wed,Sun
┌────────────────┐
│     ▒  ■    ■  │
│ 00  06  12  18 │
│▶ 06:00-08:30   │
│ 12:10-13:50    │
└────────────────┘
```

```
Start
┌────────────────┐
│                │
│     07:00      │
│      ▲         │
└────────────────┘
```

```
Mon,Wed,Sun
┌────────────────┐
│ Start    07:00 │
│ Stop     08:30 │
│▶ Save          │
└────────────────┘
```
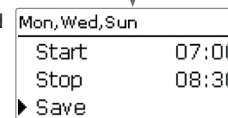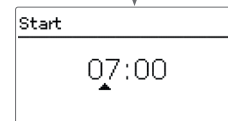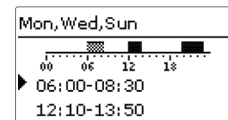
Removing a time frame:

In order to delete a time frame, proceed as follows:
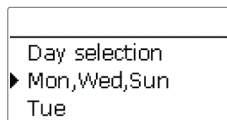
1. Select the time frame that is to be deleted.

2. Select **Delete** and confirm the safety enquiry with **Yes**.

```
Mon,Wed,Sun
┌────────────────┐
│     ▒  ■    ■  │
│ 00  06  12  18 │
│▶ 07:00-08:30   │
│ 12:10-13:50    │
└────────────────┘
```

```
Mon,Wed,Sun
┌────────────────┐
│ Stop     08:30 │
│ Save           │
│▶ Delete        │
└────────────────┘
```

```
Mon,Wed,Sun
┌────────────────┐
│          ■     │
│ 00  06  12  18 │
│▶ 12:10-13:50   │
│ 19:45-22:50    │
└────────────────┘
```
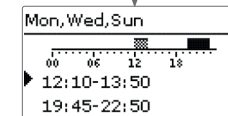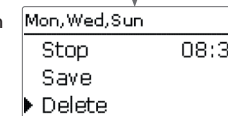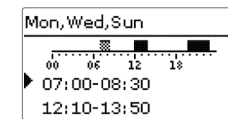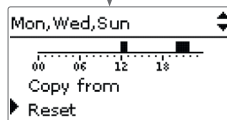
Resetting the timer:

In order to reset time frames adjusted for a certain day or combination, proceed as follows
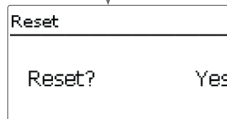
1. Select the desired day or combination.

```
Day selection
▶ Mon,Wed,Sun
  Tue
```

2. Select **Reset** and confirm the safety enquiry with **Yes**.
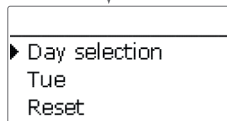
```
Mon,Wed,Sun        ▲▼
  ┄┄┄┄┄┄■┄┄■┄┄┄┄
  00  06  12  18
Copy from
▶ Reset
```

```
Reset

  Reset?          Yes
```
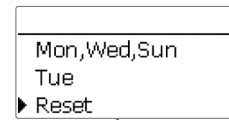
The selected day or combination will disappear from the list, all its time frames will be deleted
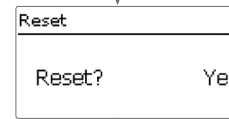
```
▶ Day selection
  Tue
  Reset
```

In order to reset the whole timer, proceed as follows:

➔ Select **Reset** and confirm the safety enquiry with **Yes**.
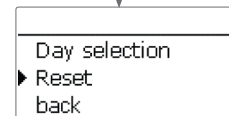
```
  Mon,Wed,Sun
  Tue
▶ Reset
```

```
Reset

  Reset?          Yes
```

All adjustments made for the timer are deleted.

```
  Day selection
▶ Reset
  back
```

4   Commissioning

When the hydraulic system is filled and ready for operation, connect the controller to the mains.

The controller runs an initialisation phase in which the Lightwheel® flashes red.

When the controller is commissioned or when it is reset, it will run a commissioning menu after the initialisation phase. The commissioning menu leads the user through the most important adjustment channels needed for operating the system. Disconnecting the controller from the power supply after having run the commissioning menu will not delete adjustments that have already been carried out. After you switch on the device again, the controller will not start the commissioning menu, but normal operation after the initialisation phase.

Commissioning menu

The commissioning menu consists of the channels described in the following. In order to make an adjustment, adjust the desired value with the Lightwheel® and confirm with the right button (✓). The next channel will appear in the display.

Operation

Adjustment mode

Changing a value

Confirming a value
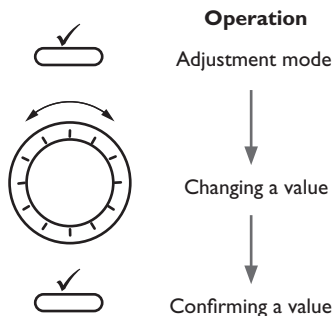
1. Language:
➜ Adjust the desired menu language.

Language
▶ Deutsch
English
Francais

2. Temperature unit:
➜ Adjust the desired temperature unit.

Temp. unit
▶ ◉ °C
○ °F

3. Daylight savings time adjustment:
➜ Activate or deactivate the automatic daylight savings time adjustment.

Auto DST
○ No
▶ ◉ Yes

4. Time:
➜ Adjust the clock time. First of all adjust the hours, then the minutes.

Time
12:01

5. Date:
➜ Adjust the date. First of all adjust the year, then the month and then the day.

Date
??.??.2014

6. Scheme:
➜ Adjust the desired scheme (heating circuit, demand).

Scheme
▶ Scheme 1
Scheme 2
Scheme 3

7. Completing the commissioning menu:

After the scheme has been selected, a security enquiry appears. If the safety enquiry is confirmed, the adjustments are saved.

➜ In order to confirm the security enquiry, press the right button (✓).

➜ In order to reenter the commissioning menu channels, press the left button (⬅).

If the security enquiry has been confirmed, the controller is ready for operation and should enable an optimum system operation.

```
Scheme 2

Save?          Yes
```

Adjusting the operating mode:

After commissioning the heating circuit will be in automatic mode. The operating mode can be changed in the status menu:

• Automatic
• Day
• Night
• Holiday
• Off

Note:
The adjustments carried out during commissioning can be changed anytime in the corresponding adjustment channel. Additional functions and options can also be activated or deactivated (see page page 9).

Set the code to the customer code before handing over the controller to the customer (see page page 36).
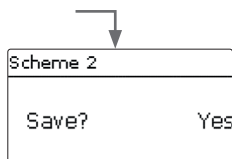
4.1 Schemes with basic settings

The controller is preprogrammed for 4 basic systems. The basic pre-adjustments have already been made.
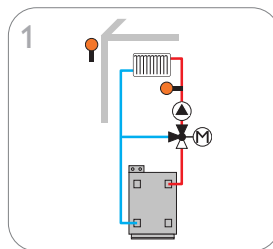
1 mixed heating circuit (see page page 19)
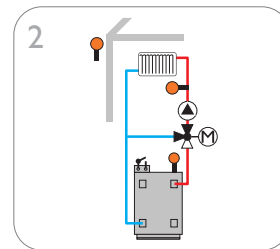
1 mixed heating circuit with backup heating (demand) (see page page 20)
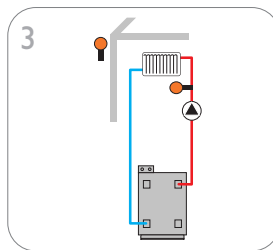
1 unmixed heating circuit (see page page 21)
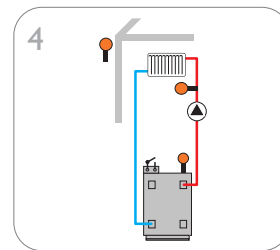
1 unmixed heating circuit with backup heating (demand) (see page page 22)

4.2   ErP temperature controls classes

Basic systems with backup heating (schemes 2 and 4) fulfil the requirements of the temperature controls class III according to the ErP Directive.

Further schemes with pre-programmed settings for 0-10 V boiler control, room influence or room control are also available to fulfil the requirements of other temperature controls classes.

For this purpose, the scheme number is extended to 3 digits. The first digit indicates the temperature controls class, the second and the third one indicate the desired basic system.

Example:

In order to select scheme 2 with the settings for temperature controls class VIII, enter the scheme number 802.

8	0	2
Temperature controls class	Number of the desired scheme; with a 0 in front of it for numbers with 1 digit.	

The settings for the different temperature classes will in the following be indicated with digit symbols:

②: Temperature controls class II

③: Temperature controls class III

⑤: Temperature controls class V

⑥: Temperature controls class VI

⑦: Temperature controls class VII

⑧: Temperature controls class VIII

The schemes extended can be found below scheme 4 in the selection.

```
Scheme          E 11:32 ⬍
  Scheme 4
  Scheme 202
▶ Scheme 204
```
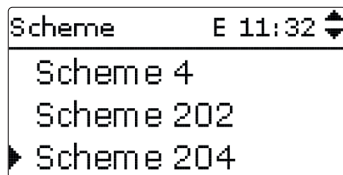
Scheme 1: 1 mixed heating circuit
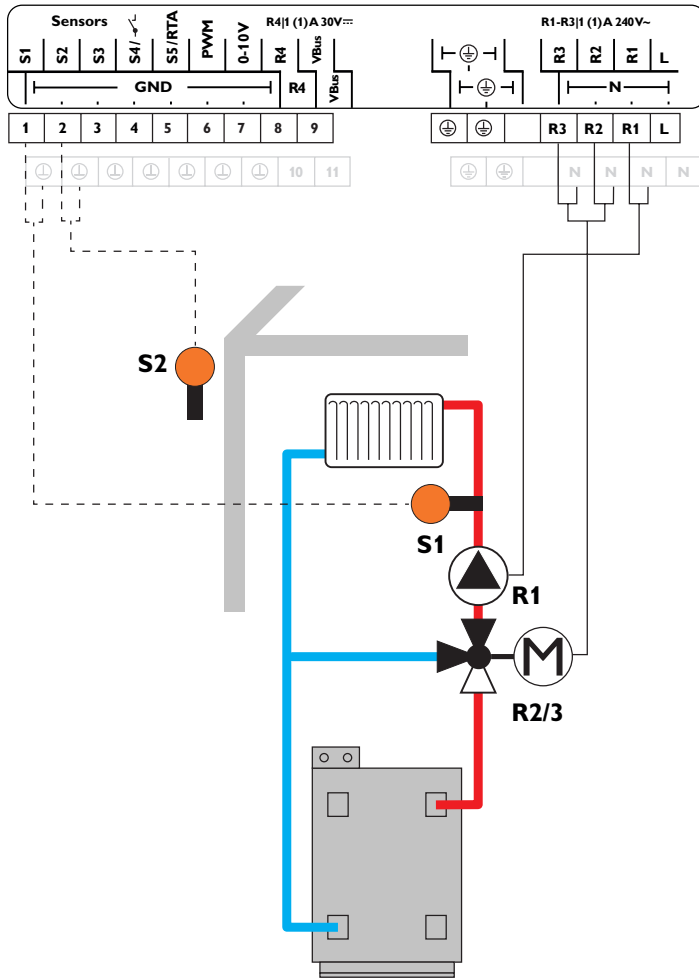
Sensors		
S1	Flow HC	1 / GND
S2	Outdoor	2 / GND
S3	Free	3 / GND
S4	Free	4 / GND
S5	Free	5 / GND

Relay		
R1	HC pump	R1 / N / PE
R2	Mixer open	R2 / N / PE
R3	Mixer closed	R3 / N / PE
R4	Free	8 / 10

By means of the flow sensor S1 and the outdoor temperature sensor S2, a mixed weather-compensated heating circuit can be controlled.

Scheme 2: 1 mixed heating circuit with backup heating (demand)
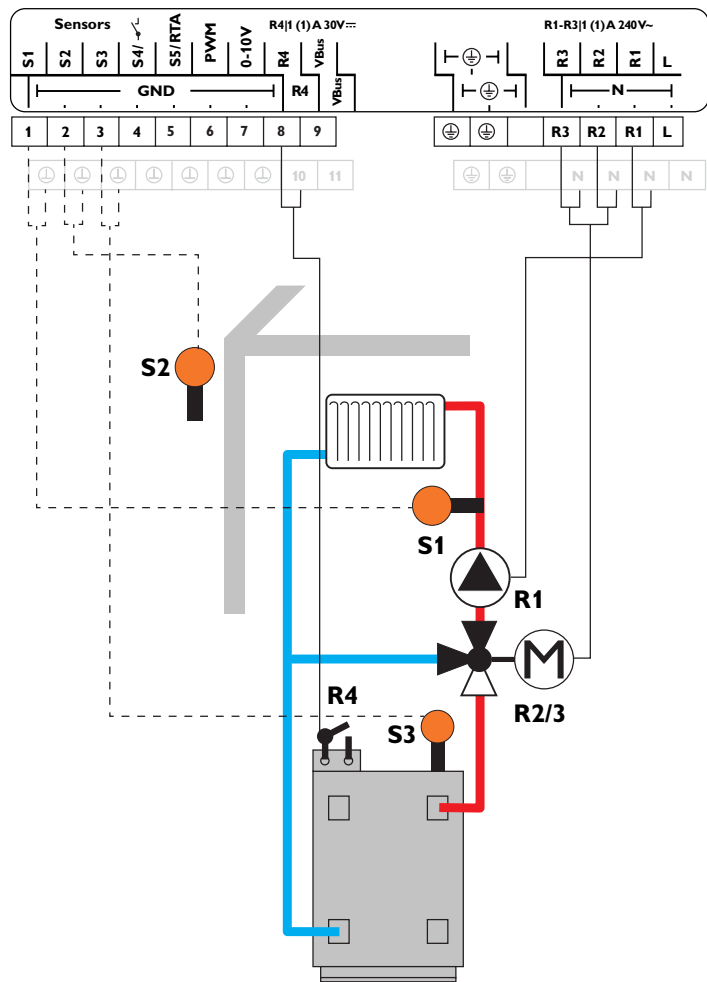
Sensors		
S1	Flow HC	1 / GND
S2	Outdoor (RTH3*) ② ③ ⑥ ⑦ ⑧*	2 / GND
S3	Backup heating / boiler	3 / GND
S4	RTH1 ⑤ ⑥ ⑦ ⑧	4 / GND
S5	RTH2 ⑧	5 / GND

*In the temperature controls class VIII S2 will be used as RTH3.

Relay		
R1	HC pump	R1 / N / PE
R2	Mixer open	R2 / N / PE
R3	Mixer closed	R3 / N / PE
R4	Demand ③ ⑦	8 / 10

By means of the flow sensor S1 and the outdoor temperature sensor S2, a mixed weather-compensated heating circuit can be controlled. Boiler demand via the potential-free relay is triggered depending on the temperature difference between the set flow temperature and the value measured at the backup heating sensor S3.

② **Scheme 202:** 0-10 V boiler control, weather-compensated

⑤ **Scheme 502:** 0-10 V boiler control, room control with room temperature sensor S4, no outdoor temperature sensor

⑥ **Scheme 602:** 0-10 V boiler control, room influence with room temperature sensor S4, weather-compensated

⑦ **Scheme 702:** Room influence with room temperature sensor S4, weather-compensated

⑧ **Scheme 802:** 0-10 V boiler control, room control with room temperature sensors S4, S5, S2, no outdoor temperature sensor

Scheme 3: 1 unmixed heating circuit
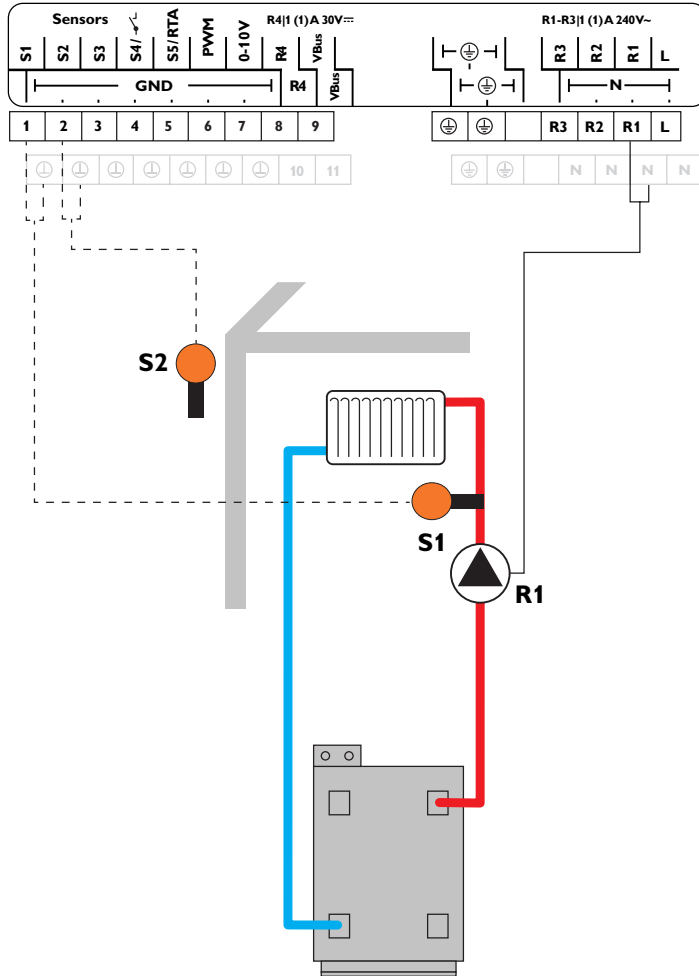
Sensors		
S1	Flow HC	1 / GND
S2	Outdoor	2 / GND
S3	Free	3 / GND
S4	Free	4 / GND
S5	Free	5 / GND

Relay		
R1	HC pump	R1 / N / PE
R2	Free	R2 / N / PE
R3	Free	R3 / N / PE
R4	Free	8 / 10

By means of the flow sensor S1 and the outdoor temperature sensor S2, an un-mixed weather-compensated heating circuit can be controlled.

Scheme 4: 1 unmixed heating circuit with backup heating (demand)
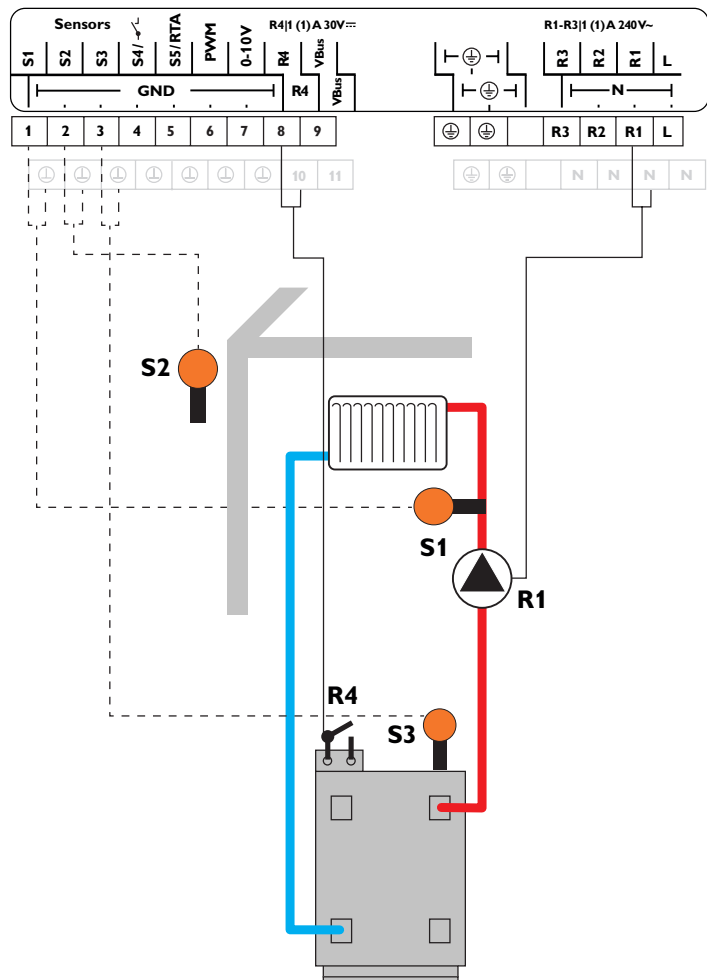
Sensoren		
S1	Flow HC	1 / GND
S2	Outdoor (RTH3*) ② ③ ⑥ ⑦ ⑧*	2 / GND
S3	Backup heating / boiler	3 / GND
S4	RTH1 ⑤ ⑥ ⑦ ⑧	4 / GND
S5	RTH2 ⑧	5 / GND

*In the temperature controls class VIII S2 will be used as RTH3.

Relais		
R1	HC pump	R1 / N / PE
R2	Free	R2 / N / PE
R3	Free	R3 / N / PE
R4	Demand ③ ⑦	8 / 10

By means of the flow sensor S1 and the outdoor temperature sensor S2, an unmixed weather-compensated heating circuit can be controlled. Boiler demand via the potential-free relay is triggered depending on the temperature difference between the set flow temperature and the value measured at the backup heating sensor S3.

② **Scheme 204:** 0-10 V boiler control, weather-compensated

⑤ **Scheme 504:** 0-10 V boiler control, room control with room temperature sensor S4, no outdoor temperature sensor

⑥ **Scheme 604:** 0-10 V boiler control, room influence with room temperature sensor S4, weather-compensated

⑦ **Scheme 704:** Room influence with room temperature sensor S4, weather-compensated

⑧ **Scheme 804:** 0-10 V boiler control, room control with room temperature sensors S4, S5, S2, no outdoor temperature sensor

5　Menu structure

Main menu			
Status			
Heating			
Basic settings			
SD card			
Manual mode			
User code			
In-/Outputs			

Heating

Heating
Shared relays
Heating circuit
Screed drying

Heating circuit

Heating circuit
Heating system
Heating curve
Interval
Day correction
…
TFrost
Chimney sweeper

Basic settings

Basic settings
Language
Temp. unit
Auto DST
Time
…
Scheme
Factory setting

In-/Outputs

In-/Outputs
Inputs
Outputs

ℹ️ The menu items and adjustment values selectable are variable depending on adjustments already made. The figure only shows an exemplary excerpt of the complete menu in order to visualise the menu structure.

6　Main menu


```
Main menu      11:30 ▾
▶ Status
  Heating
  Basic settings
```
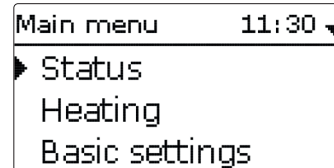
In this menu, the different menu areas can be selected.

The following menus are available:

- Status
- Heating
- Basic settings
- SD card
- Manual mode
- User code
- In-/Outputs

1. Select the menu area by turning the Lightwheel®.
2. Press the right button (✓) in order to enter the selected menu area.

If no button is pressed for 1 min, the display illumination switches off. After 3 more minutes, the controller switches to the Status menu.

➔ In order to get from the Status menu into the Main menu, press the left button (⬑)!

7 Status menu

```
Status        E 11:32 ▾
▶
         Heating
HC                   »

         Service
```

The status menu contains information about the current state of the heating circuits. Furthermore, measured and balance values as well as messages are indicated.

7.1 Heating

```
HC            11:55 ▾
▶ Op. mode       Auto
  Status          Day
  Flow          43 °C
```
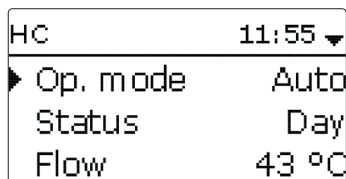
In the **Status/HC** menu, the status of the heating circuit is indicated. The status of the heating circuit is also the home screen of the controller. In this menu, the operating mode of the heating circuit can be changed:

Automatic: Automatic heating mode.

Day: Constant heating mode with the adjusted day correction.

Night: Constant heating mode with the adjusted night correction and the selected correction mode.

Holiday: Constant heating mode within an adjustable time frame with the adjusted night correction and the selected correction mode.

Off: The heating circuit is switched off. The antifreeze function of the heating circuit remains active.

7.2 Meas./Balance values

In the **Status/Meas./Balance** menu, all current measurement values as well as a range of balance values are displayed. Some of the menu items can be selected in order to enter a submenu.

Each sensor and relay is indicated with the component or function it has been allocated to. The symbol ▶ at the edge of the display next to a sensor allocated to a function, means that this sensor has several functions. Use the Lightwheel® to scroll to these functions. The sensors and relays of the controller are listed in numerical order.

```
Status: Meas. values  ▾
S1           43.5 °C»

        HC-flow
          HC
```
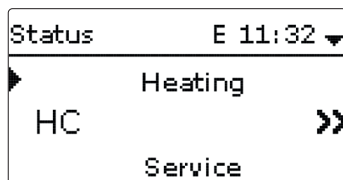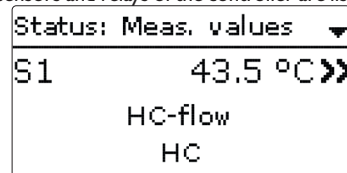
When a line with a measurement value is selected, another submenu will open.

```
S1            E 11:32
▶ Minimum     42.0 °C
  Maximum     96.3 °C
  back
```
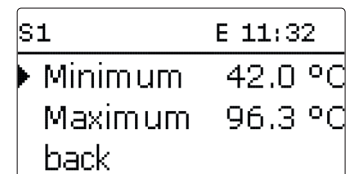
If, for example, S1 is selected, a submenu indicating the minimum and maximum values will open.

7.3 Messages

```
Status: Meas. E 11:55 ▾
▶ !Sensor fault
                   S2
               break
```
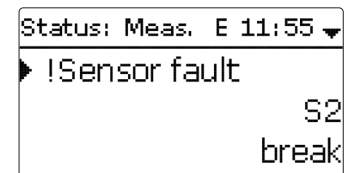
In the **Status/Messages** menu, error and warning messages which have not been acknowledged are indicated.

During normal operation, the message **Everything OK** is indicated.

A short circuit (**short-circuit**) or line break (**break**) in a sensor line is indicated as **!Sensor fault**.

8   Heating

```
┌─────────────────────────────┐
│ Heating        E 11:35 ▼    │
│ ▶ Shared relays             │
│   HC                        │
│   Screed drying             │
└─────────────────────────────┘
```

In this menu, all adjustments for the heating circuit can be made.
Additionally, the screed drying function can be activated and adjusted.

```
┌─────────────────────────────┐
│ Heating        E 11:35 ▲    │
│   HC                        │
│   Screed drying             │
│ ▶ back                      │
└─────────────────────────────┘
```

8.1   Shared relays

```
┌─────────────────────────────┐
│ Heating / Sh...E 11:35      │
│ ▶ Dem. 1    Activated       │
│   Dem. 1          »         │
│   back                      │
└─────────────────────────────┘
```
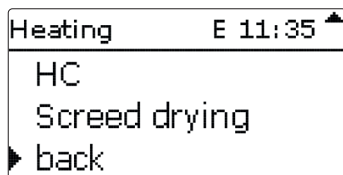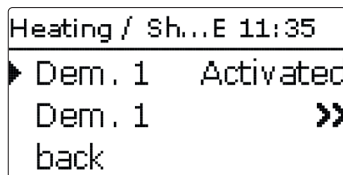
In this menu, 1 shared relay can be activated and adjusted. Further options such as a minimum and a maximum limitation for boiler protection are also available. The shared relay will be available for selection under Virtual in the relay allocation channel of the Heating circuit menu.

> **i** **Note:**
> Activate and adjust the shared relay first. It will then be available in the heating circuit.

```
┌─────────────────────────────┐
│ Dem. 1         E 11:36 ▼    │
│ ▶⊠ Relay                    │
│   Relay           »         │
│  ⊠ 0-10 V                   │
└─────────────────────────────┘
```
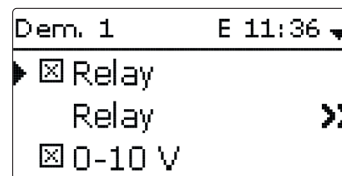
Demand

The demand can be carried out by means of a relay and/or a 0-10 V output. If both the **Relay** and the **0-10 V** option are activated, the demand will use both outputs in parallel.

Relay option

If the **Relay** option is activated, the sub-menu **Relay** appears, in which a relay can be allocated to the demand.

The options **Boiler protection min** and **Boiler protection max** can be activated for the demand via a relay, allowing temperature-dependent control of the boiler demand. For this purpose, a boiler sensor (**Sensor Boiler**) is required.

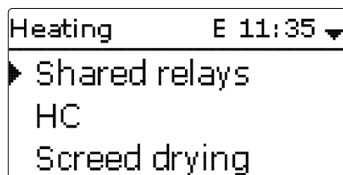The **Boiler pr. min** option is used for protecting an older type boiler against cooling. If the temperature falls below the adjusted minimum temperature, the allocated relay is energised until the minimum temperature is exceeded by 2 K.

The **Boiler pr. max** option is used for protecting an older type boiler against overheating. If the adjusted maximum temperature is exceeded, the allocated relay is switched off until the temperature falls by 2 K below the maximum temperature.

Heating/Shared relays

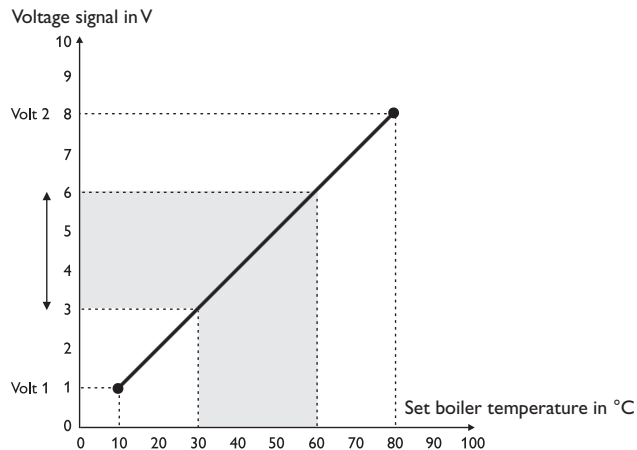| Adjustment channel	Description	Adjustment range/ selection	Factory setting
Dem. 1	Demand 1	Activated, Deactivated	Deactivated
Relay	Relay option	Yes, No	No
Relay	Relay sub-menu	-	-
Output	Output selection	system dependent	R4
Boiler pr. min	Option for boiler protection min	Yes, No	No
Tmin	Minimum boiler temperature	10…90 °C	55 °C
Boiler pr. max	Option for boiler protection max	Yes, No	No
Tmax	Maximum boiler temperature	20…95 °C	90 °C
Sensor Boiler	Boiler sensor selection	system dependent	S3
0-10 V	0-10 V option	Yes, No	No
0-10 V	0-10 V sub-menu	-	-
Tset 1	Lower boiler temperature	10…90 °C	10 °C
Volt 1	Lower voltage	0.0…10.0 V	1.0 V
Tset 2	Upper boiler temperature	10…90 °C	80 °C
Volt 2	Upper voltage	0.0…10.0 V	8.0 V
Permanent volt.	Permanent voltage option	Yes, No	No
Volt	Permanent voltage value	0.1…9.9 V	2.0 V
Tmin	Minimum boiler temperature	1…90 °C	10 °C
Tmax	Maximum boiler temperature	1…90 °C	80 °C
Sen. Flow	Flow sensor option	Yes, No	No
Sensor	Flow sensor selection	system dependent	S3
Interval	Monitoring period	10… 600 s	30 s
Hysteresis	Correction hysteresis	0.5…20.0 K	1.0 K
Correction	Correction of the voltage signal	0.1…1.0 V	0.1 V
Min. runtime	Minimum runtime option	Yes, No	No
tMin	Minimum runtime	0…120 min	10 min

0-10 V option

If the **0-10 V** option is activated, the sub-menu 0-10 V will appear, in which a 0-10 V output can be allocated to the demand.

With this option, the controller can demand modulating heat generators equipped with a 0-10 V interface.

The characteristic curve of the 0-10 V signal as a function of the boiler set temperature are defined by means of 2 set points according to the specifications of the boiler manufacturer. At a temperature of **Tset 1**, the voltage signal of the heat generator is **Volt 1**. At a temperature of **Tset 2**, the voltage signal of the heat generator is **Volt 2**. The controller automatically calculates the characteristic curve resulting from these values. If the permanent voltage option is activated, the parameter **Volt** appears, by means of which a minimum voltage that is permanently applied to the output can be defined.

By means of the adjustment channels **Tmax** and **Tmin** the maximum and minimum limitations for the boiler set temperature can be defined.

When the **Sensor flow** option is activated, the controller will monitor whether the heat generator actually reaches the desired set temperature and will, if necessary, adjust the voltage signal accordingly. In order to do so, the controller will check the temperature at the boiler flow sensor when the **Interval** has elapsed. If the temperature measured deviates from the boiler set temperature by more than the **Hysteresis** value, the voltage signal will be adapted by the **Correction** value. This process will be repeated until the temperature measured is identical to the boiler set temperature.

When the **Minimum runtime** option is activated, a minimum runtime can be adjusted for the demand.

8.2 Heating circuit

The controller has one heating circuit. The following heating circuit variants are possible:

- **1** mixed weather-compensated heating circuit
- **1** unmixed weather-compensated heating circuit
- **1** mixed constant heating circuit

```
HC             E 11:35 ▾
▶ HC pump            R1
  Mixer open         R2
  Mixer closed       R3
```

If the measured flow temperature deviates from the set flow temperature, the mixer will be activated in order to adjust the flow temperature correspondingly.

The mixer runtime can be adjusted with the parameter **Interval**.

```
HC             E 11:35 ▴▾
  Interval           4 s
▶ Heat. sys.     Curve
  Heating curve    1.0
```

The heating system **Constant** is only available in a mixed heating circuit. An outdoor temperature sensor cannot be allocated.

```
HC             E 11:35 ▴▾
▶ Heat. sys. Constant
  Set temp.       25 °C
  Room therm.       ⟫
```

The heating system **Constant** aims to keep the set flow temperature to a constant value which can be adjusted by means of the parameter **Set temperature**.

If the heating system **Curve** is selected, the controller calculates a set flow temperature by means of the outdoor temperature and the selected **Heating curve**. In both cases, the dial setting of the remote control and the controller day correction or night correction are added.

Heating system Constant:

Set flow temperature = set temperature + remote control + day correction or night correction

Heating system Curve:

Set flow temperature = heating curve temperature + remote control + day correction or night correction

The calculated set flow temperature is limited by the adjusted values of the parameters **set flow temperature** and **flow minimum temperature**.

Flow maximum temperature ≥ set flow temperature ≥ flow minimum temperature

```
HC             E 11:36 ▴▾
  Tflowmin        20 °C
▶ Tflowmax        50 °C
  ☐ Pump off
```

The parameter **Pump off** is used for switching off the heating circuit pump, if the adjusted value of the maximum flow temperature is exceeded by 5 K.

If the outdoor temperature sensor is defective, an error message will be indicated. For the duration of this condition, the maximum flow temperature -5 K is assumed as the set flow temperature.
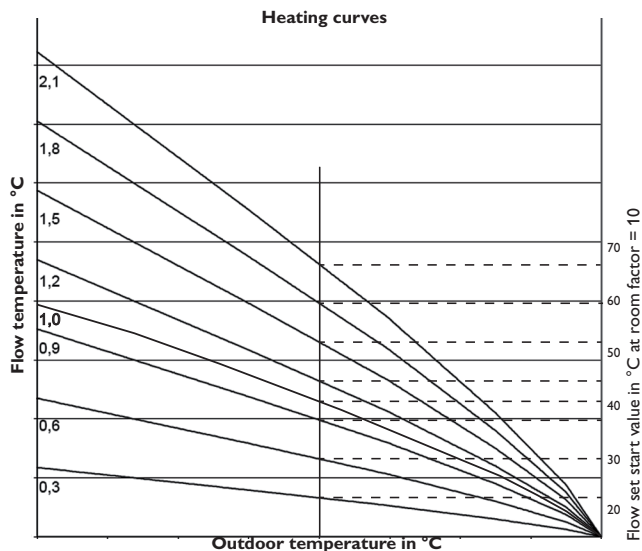
Heating curves

Room influence

If the heating system **Constant** is selected, the **Room influence** option will be available. The weather-compensated set flow temperature will thus be expanded by a demand-based room control.

The parameter **Room factor** can be used for determining the intensity of the room influence.

Room factor < 10

If the room factor is < 10, the controller will calculate the set flow temperature using the heating system Curve plus the room influence:

Set flow temperature = set temperature + remote control + day correction or night correction + room influence.

Room factor = 10

If the room factor is equal to 10, the controller will calculate the set flow temperature by means of the room influence, the outdoor temperature will not be taken into account.

An outdoor temperature sensor cannot be allocated. The parameters **Day / Night correction**, **Timer** and **TSummer** will not be indicated.

The start value of the set flow temperature can be influenced by the parameter **Heating curve**. The start value corresponds to the set flow value of the selected curve at an outdoor temperature of 0 °C.

Set flow temperature = set flow start value + room influence

In order to calculate the deviation of the room temperature from the adjusted set value, a room thermostat is required. The adjustments can be made using the parameter **Room therm. (1 ... 3)**. **Room. therm. 1** is always pre-adjusted for the room influence with a room factor < 10.

Room control

For the **Room control** with room factor = 10, the adjustment of all room thermostats activated will be considered. The controller will calculate the average value of the deviations measured.

Room thermostat option

In order to integrate room thermostats into the control logic without activating the room influence option, proceed as follows:

```
Room therm... E 11:45 ▾
  ☐ Room therm. 1
  ☐ Room therm. 2
▸ ☒ Room therm. 3
```
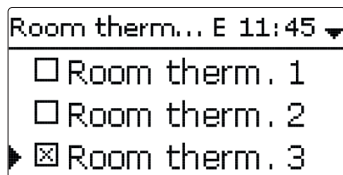
With the **Room thermostat** option, up to 3 room thermostats can be integrated into the control logic.

To each room thermostat, a sensor input can be allocated. The temperature at the allocated sensor is monitored. If the measured temperature exceeds the adjusted value **TambSet** at all activated room thermostats and if the parameter **HC off** is activated, the heating circuit will switch off.

Common room thermostats with potential-free outputs can be used alternatively. In this case, **Switch** must be selected in t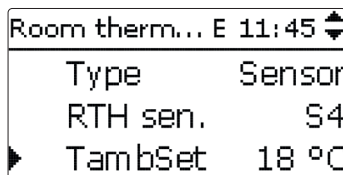he **Type** channel. The corresponding input must beforehand be set to **Switch** in the **Inputs/Outputs** menu. Only inputs set to **Switch** will be displayed in the channel **Sen. RTH** as possible inputs for a Switch type room thermostat.

```
Room therm... E 11:45 ▴▾
    Type      Sensor
    RTH sen.      S4
▸   TambSet    18 °C
```
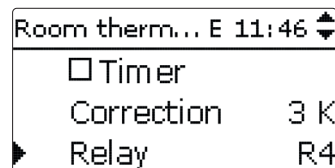
When the **Timer** option is activated, a timer is indicated in which time frames for the function can be adjusted. During these time frames, the adjusted room temperature decreases by the **Correction** value.

i **Note:**
For information on timer adjustment see page page 13.

```
Room therm... E 11:46 ▴▾
  ☐ Timer
    Correction    3 K
▸   Relay         R4
```

To each room thermostat, an additional relay can be allocated. The relay will switch on when the temperature falls below the adjusted room temperature. This way, the room in question can be excluded from the heating circuit via a valve as long as the desired room temperature is reached.

```
Room therm... E 11:47 ▴▾
    Relay         R4
▸   RTH     Activated
  ☒ HC off
```
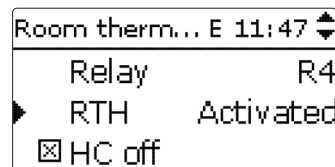
With the parameter **RTH**, the room thermostat can be temporarily deactivated or re-activated respectively. All adjustments remain stored.

Correction timer

With the **Timer**, the day/night operation can be adjusted. During day phases, the set flow temperature is increased by the adjusted **Day correction** value, during night phases it is decreased by the **Night correction** value (night setback).

```
HC          E 11:47 ▴▾
    Day correction   0 K
    Night corr.     -5 K
▸ ☒ Timer
```

```
HC          E 11:48 ▴▾
  ☒ Timer
▸   Mode  Day / night
    Timer HC        »
```
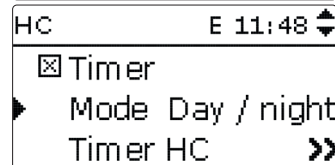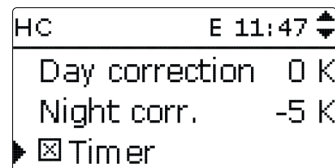
The parameter **Mode** is used for selecting between the following correction modes:

Day/night: A reduced set flow temperature (night correction) is used during night operation.

Day/off: The heating circuit and the optionally activated backup heating are switched off during night operation.

Room/off: The heating circuit and the backup heating are switched off during night operation. If the temperature falls below the adjusted limit temperature at the allocated room sensor, the controller changes to the reduced heating mode.

Outdoor/off: The heating circuit and the backup heating are switched off during night operation. If the temperature falls below the adjusted limit temperature at the allocated outdoor temperature sensor, the controller changes to the reduced heating mode.

The **Timer HC** parameter can be used for adjusting the time frames for day operation.

Summer mode

```
HC            E 11:48
 TSummer       20 °C
   Daytime on00:00
▶ Daytime off00:00
```

The automatic summer mode becomes active when the outdoor temperature exceeds the adjusted summer temperature **TSummer**. This can be limited to a daytime frame with the parameters **Daytime on** and **Daytime off**. Outside the adjusted time frame, the lower temperature **TNight** is used in summer mode. In summer mode, the heating circuit is switched off.

```
HC            E 11:48
   Daytime on09:00
   Daytime off19:00
▶ TNight       14 °C
```

Backup heating

```
HC            E 11:48
▶⊠ Backup heating
   Backup heating»
 □ Remote access
```

For heating circuit **backup heating**, the calculated set flow temperature is compared with the temperature at one or two store/buffer reference sensors (differential control). If this temperature difference (Δ**TOn**) is too small, backup heating will be activated. It will be switched off, if the difference (Δ**TOff**) between the store and the set flow temperature is large enough.

If **Therm.** is selected, the set flow temperature is compared with a store reference sensor. If **Zone** is selected, the set flow temperature is compared with 2 reference sensors. The switching conditions have to be fulfilled at both reference sensors.

```
Backup heatingE 11:48
 ΔTon          5.0 K
 ΔToff        15.0 K
▶ΔTFlow        0.0 K
```

In the **Set temperature** mode, backup heating will heat to the set flow temperature without a reference sensor. The value Δ**TFlow** will be automatically added to the boiler set temperature in order to compensate for e. g. the heat loss in the pipes. This can be used with modulating boilers which provide direct backup heating without a store.

```
Backup heatingE 11:49
▶Mode          Zone
 Sensor 1        S3
 Sensor 2        S4
```

If a **shared relay** is used which has been previously adjusted and allocated, the boiler protection will become active, provided it has previously been adjusted.

```
Backup heatingE 11:50 ▾
⊠ Demand
▶   Relay      Dem. 1
Mode        Therm.
```
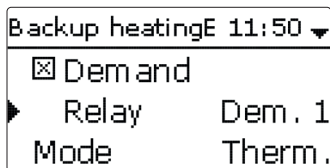
If the Correction mode **Day/Off, Room/Off** or **Outdoor/Off** is selected, the heating circuits and the backup heating are completely switched off during night operation. If the system has a store, the **Starting time** can be used for activating the backup heating before the day operation in order to heat the store to a sufficiently high temperature.

```
Backup heatingE 11:50 ▲
   Start.time    0 min
▶ Funct.    Activated
back
```
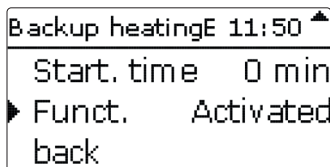
At first, backup heating is activated and can be temporarily deactivated.

Remote access

With the parameter **Remote access** different types of remote access to the controller can be activated.

The following types of remote access are possible:

Remote control: A device which allows manual adjustment of the heating curve, thus influencing the set flow temperature.

➔ In order to use a remote control, set the corresponding input to **RTA**.

Room control unit: A device incorporating a remote control as well as an additional operating mode switch.

➔ In order to use a room control unit, set the corresponding input to **BAS**.

The operating mode switch of the room control unit is used for adjusting the operating mode of the controller. If a room control unit is used, the operating mode can be adjusted by means of the room control unit only. The controller menu only allows the activation of the operating mode **Holiday**.

```
HC             E 11:52 ⬍
▶ ⊠ Remote access
   Sen. RC        S5
   Sen. BAS       S5
```
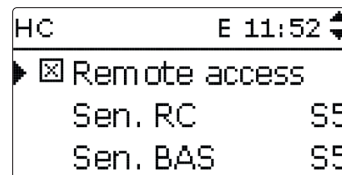
In the sensor selection menu, only outputs which have previously been selected as the input for remote access in the **Inputs/Outputs** menu will be available.

Remote access with the app: In addition to the wireline possibilities of remote access, an app can be used as well.

```
Sensor selec.  E 11:54 ▲
   ⊟ Virtual
▶   VF1
back
```
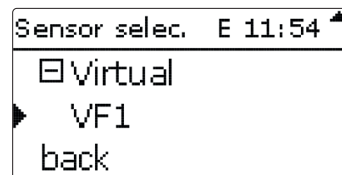
➔ In order to use an app, adjust the corresponding input to **VF1**.

If you use an app, the operating mode can be adjusted in the controller menu as well as in the app.

Antifreeze function

```
HC             E 11:54 ⬍
▶ ☐ Remote access
   Sen. Frost    Flow
   TFrost       5 °C
```
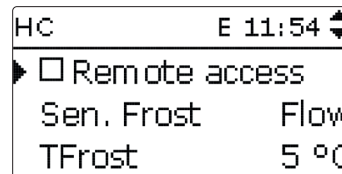
The antifreeze function of the heating circuit can be used to temporarily activate an inactive heating circuit during sudden temperature drop in order to protect it against frost damage.

The temperature at the allocated antifreeze sensor **Sen. Frost** is monitored. If the temperature falls below the adjusted antifreeze temperature **TFrost**, the heating circuit will be activated until the antifreeze temperature is exceeded by 2 K, but at least for 30 min.

Chimney sweeper function

The chimney sweeper function can be used for enabling quick access to measurement conditions without having to navigate through the menu.

```
HC              E 11:54 ⌃
      ⊠ Chimney sweeper
      Funct.    Activated
    ▸ back
```
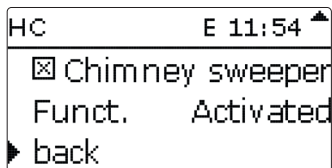
The chimney sweeper funtion is activated by default. The chimney sweeper mode can be activated by pressing microbutton 🖙 for 3 s.

In the chimney sweeper mode, the heating circuit mixer opens, the heating circuit pump and the backup heating contact are activated. If the chimney sweeper function is active, the Lightwheel® flashes yellow. Additionally, **Chimney sweeper** and a countdown of 30 min are indicated on the display.

When the countdown has elapsed, the chimney sweeper mode is automatically deactivated. If, during the countdown, microbutton 🖙 is again pressed for more than 3 s, the chimney sweeper mode will end.

Heating / Heating circuit

Adjustment channel	Description	Adjustment range / selection	Factory setting
HC pump	Heating circuit pump	system dependent	system dependent
Mixer open	Relay selection mixer open	system dependent	system dependent
Mixer closed	Relay selection mixer closed	system dependent	system dependent
Interval	Mixer interval	1…20 s	4 s
Heat. sys.	Heating system selection	Curve, Constant	PWM characteristic curve
Heating curve	Heating curve	0.3…3.0	1.0
Set temp.	Set temperature	10…100 °C	25 °C
Room influence	Room influence option	Yes, No	No
Room factor	Room influence factor	1…10	5
Room therm.	Room thermostats sub-menu	-	-
Room therm. 1…3	Room thermostat option (1…3)	Yes, No	No
Type	Room thermostat type selection	Sensor, Switch	Sensor
RTH sen.	RTH input allocation	system dependent	system dependent
TambSet	Room temperature	10…30 °C	18 °C
Hysteresis	RTH hysteresis	0.5…20.0 K	0.5 K

Adjustment channel	Description	Adjustment range / selection	Factory setting
Timer	RTH timer	Yes, No	No
Correction	Correction	1…20 K	3 K
Relay	RTH relay selection	system dependent	system dependent
RTH	Room thermostat	Activated, Deactivated	Activated
HC off	Heating circuit off option	Yes, No	No
Sensor Flow	Flow sensor selection	system dependent	system dependent
Tflowmin	Minimum flow temperature	20…89 °C	20 °C
Tflowmax	Maximum flow temperature	21…90 °C	50 °C
Pump off	Deactivation of the heating circuit pump when Tflowmax is exceeded	Yes, No	No
Sen. Outd.	Outdoor sensor selection	system dependent	S2
Day correction	Day correction	-5…+45 K	0 K
Night corr.	Night correction	-20…+30 K	-5 K
Timer	Timer option	Yes, No	No
Mode	Correction mode selection	Day / night, Day / Off, Room / Off, Outdoor / Off	Day / night
Sen. Room	Room sensor	system dependent	system dependent
TLimit	Limit temperature	-20…+30 °C	16 °C / 0 °C
Timer HC	Heating circuit timer	Yes, No	No
TSummer	Summer temperature day	0…40 °C	20 °C
Daytime on	Daytime on	00:00…23:45	00:00
Daytime off	Daytime off	00:00…23:45	00:00
TNight	Summer temperature night	0…40 °C	14 °C
Backup heating	Backup heating option	Yes, No	No
Mode	Backup heating mode selection	Therm., Zone, Set temp.	Therm.
Sensor 1	Reference sensor 1	system dependent	system dependent
Sensor 2	Reference sensor 2 (if mode = Zone)	system dependent	system dependent
ΔTon	Switch-on temperature difference	-15.0…44.5 K	3 K
ΔToff	Switch-off temperature difference	-14.5…45.0 K	5 K
ΔTFlow	Increase for the set flow temperature	0…20 K	0 K
Start. time	Backup heating starting time	0…120 min	0 min
Demand	Demand option	Yes, No	No
Relay	Relay selection	system dependent	system dependent

Adjustment channel	Description	Adjustment range / selection	Factory setting
Funct.	De/activation of the backup heating	Activated, Deactivated	Activated
Remote access	Remote access option	Yes, No	No
Sen. RC	Remote access input selection	system dependent	system dependent
Sen. BAS	Operating mode switch input selection	system dependent	system dependent
Sen. Frost	Antifreeze sensor	Flow, Outdoor	Flow
TFrost	Antifreeze temperature	+4…+10 °C/ -20…+10 °C	+5 °C/0 °C
Chimney sweeper	Chimney sweeper option	Yes, No	Yes
Funct.	De/activation of the heating circuit	Activated/Deactivated	Activated

8.3   Screed drying

This function is used for time- and temperature-controlled screed drying for the heating circuit.

```
Estrich-Trocknung
▶ Funkt.    Deaktiviert
  TStart       20 °C
  TMax         30 °C
```

ℹ **Note:**
The screed drying function is blocked against the chimney sweeper function. In order to activate the screed drying function, the chimney sweeper function must be deactivated.

In the **Heating/Screed drying** menu the function can be set to standby by using the **Activated** item.

```
Screed drying  E 12:12 ▼
▶ Funct.   Deactivated
  TStart       20 °C
  TMax         30 °C
```

If the microbutton ⚄ is pressed and held down for at least 3 s, the screed drying programme will start.

The message **Screed drying** will be indicated on the display and the remaining time will be indicated as a countdown (dd:hh). During this process, the Lightwheel® will be flashing red.

```
Screed drying  E 12:12 ▲▼
▶ Phase       Heating
  Remaining time
    14 d, 23 h, 59 min
```

If the microbutton ⚄ is pressed again and held down for at least 3 s, the screed drying function will be cancelled. For this reason, a security enquiry appears. If you wish to interrupt the screed drying function, confirm the safety enquiry.

```
Screed drying  E 12:12

  Cancel?           No
```

At the beginning of the screed drying function, the heating circuit is put into operation for the adjusted **Rise time** with the start temperature as the set flow temperature. Afterwards, the set flow temperature increases in steps by the adjustable rise value for the duration of the adjustable rise time until the holding temperature is reached. After the holding time has elapsed, the set flow temperature is reduced in steps until the start temperature is reached again.

```
Screed drying  E 12:12 ▲▼
▶ Rise          2 K
  Rise time      24 h
  tBacking        5 d
```

If the set flow temperature is not reached within 24 hours or after the rise time respectively, or if it is constantly exceeded, the screed drying function will be cancelled.

The heating circuit switches off and an error message is displayed. The Lightwheel® flashes red.

Error 1: flow sensor defective

Error 2: the flow temperature is higher than the maximum flow temperature + 5 K for over 5 min

Error 3: the flow temperature is higher than the holding temperature + rise value for over 30 min

Error 4: the flow temperature is higher than the set flow temperature + rise value for over 2 h

Error 5: the flow temperature is lower than the set flow temperature - rise value for over a rise time period

The left button (⬅) can be used any time for changing to the status or main menu of the controller in order to carry out adjustments.

When the screed drying function has been successfully completed, the heating circuit changes to its previously selected operating mode.

Screed drying is automatically deactivated. The chimney sweeper function is automatically activated.

> **i** **Note:**
> Make sure the heating circuit is supplied with heat from a heat source (backup heating).

> **i** **Note:**
> If a Micro SD card has been inserted into the slot, a screed protocol will be generated.

Heating / Screed drying

Adjustment channel	Description	Adjustment range / selection	Factory setting
Funct.	Activation / Deactivation	Activated, Deactivated	Deactivated
TStart	Start temperature	10…30 °C	20 °C
TMax	Holding temperature	20…60 °C	30 °C
Rise	Temperature increase per rise time	1…10 K	2 K
Rise time	Duration for emperature increase	1…24 h	24 h
tBacking	TMax holding time	1…20 d	5 d

9   Basic settings

```
Basic settings  E 12:00 ▾
▶ Language    English
⊠ Auto DST
  Date   30.08.2017
```
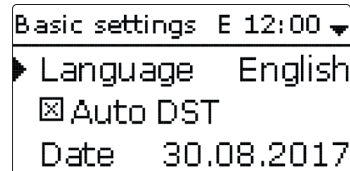
In the **Basic settings** menu, all basic parameters for the controller can be adjusted. Normally, these settings have been made during commissioning. They can be subsequently changed in this menu.

Basic settings

Adjustment channel	Description	Adjustment range / selection	Factory setting
Language	Selection of the menu language	Deutsch, English, Français, Español, Italiano, Nederlands, Türkçe, České, Polski, Portugues, Hrvatski, Română, Български, Русский, Suomi, Svenska, Magyar	Deutsch
Auto DST	Daylight savings time selection	Yes, No	Yes
Date	Adjustment of the current date	01.01.2001 … 31.12.2099	01.01.2014
Time	Adjustment of the current time	00:00 … 23:59	-
Temp. unit	Temperature unit	°C, °F	°C
Scheme	Scheme selection	1 … 4, 202 … 804	1
Reset	back to factory setting	Yes, No	No

10   SD card

```
SD card          E 12:01 ↕
▸      Options
     Remove card...
     Save adjustments
```
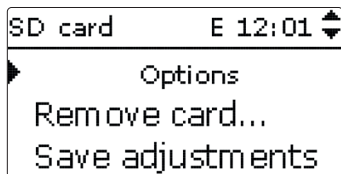
The controller is equipped with a MicroSD card slot for MicroSD memory cards. With a MicroSD card, the following functions can be carried out:
• Logging measurement and balance values. After the transfer to a computer, the values can be opened and visualised, e. g. in a spreadsheet.
• Store adjustments and parameterisations on the MicroSD card and, if necessary, retrieve them from there.
• Running firmware updates on the controller.

Running firmware updates

The current software can be downloaded from www.resol.com/firmware.
When a MicroSD card with a firmware update is inserted, the enquiry **Update?** is indicated on the display.
➔ In order to run an update, select **Yes** and confirm with the right button (✓).
The update is run automatically. The indication **Please wait** and a progress bar appear on the display. When the update has been completed, the controller will automatically reboot and run a short initialisation phase.

> **i Note**:
> Only remove the card when the initialisation phase has been completed and the status menu is indicated on the controller display!

➔ To skip the update, select **No**.
The controller starts normal operation.

> **i Note:**
> The controller will only recognise a firmware update file if it is stored in a folder named **RESOL\HCM** on the first level of the MicroSD card.
> ➔ Create a folder named **RESOL\HCM** on the MicroSD card and extract the downloaded ZIP file into this folder.

Starting the logging

1. Insert the MicroSD card into the slot.
2. Adjust the desired logging type and interval.

Logging will start immediately.

Completing the logging process

1. Select the menu item **Remove card...**
2. After **Remove card** is displayed, remove the card from the slot.

When **Linear** is adjusted in the **Logging type** adjustment channel, data logging will stop if the capacity limit is reached. The message **Card full** will be displayed.
If **Cyclic** is adjusted, the oldest data logged onto the SD card will be overwritten as soon as the capacity limit is reached.

> **i Note:**
> Because of the increasing size of the data packets, the remaining logging time does not decrease linearly. The data packet size can increase, e. g. with the increasing operating hours value.

Storing controller adjustments

➔ To store the controller adjustments on the MicroSD card, select the menu item **Save adjustments**.

While the adjustments are being stored, first **Please wait**, then **Done!** will be indicated on the display. The controller adjustments are stored as a .SET file on the MicroSD card.

Loading controller adjustments

1. To load controller adjustments from a MicroSD card, select the menu item **Load adjustments**.

The **File selection** window is indicated.

2. Select the desired .SET file.

While the adjustments are being loaded, first **Please wait**, then **Done!** will be indicated on the display.

> **i Note:**
> To safely remove the MicroSD card, always select the menu item **Remove card …** before removing the card.

SD card

Adjustment channel	Description	Adjustment range / selection	Factory setting
Remove card...	Safely remove card	-	-
Save adjustments	Save adjustments	-	-
Load adjustments	Load adjustments	-	-
Logging interval	Interval for Data logging	00:01 … 20:00 (mm:ss)	01:00
Logging type	Logging type	Cyclic, Linear	Linear

11 Manual mode

```
Manual mode  E 12:01 ▲▼
▶ Relay 1        Auto
  Relay 2        Auto
  Relay 3        Auto
```
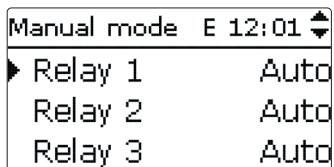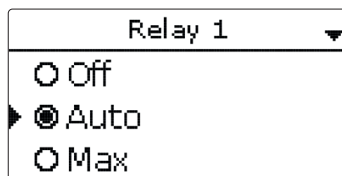
In the **Manual mode** menu, the operating mode of all relays of the controller can be adjusted.

All relays are listed in numerical order.

In the menu item **All relays...**, all relays can be switched off (Off) or set to automatic mode (Auto) at once:

Off = Relay is switched off (manual mode)

Auto = Relay is in automatic mode

```
      Relay 1        ▼
  ○ Off
▶ ◉ Auto
  ○ Max
```

The operating mode can be selected for each individual relay, too. The following options are available:

Off   = Relay is switched off (manual mode)

Max   = Relay active at 100 % speed (manual mode)

Auto = Relay is in automatic mode

> **Note:**
> After service and maintenance work, the relay mode must be set back to **Auto**. Normal operation is not possible in manual mode.

Manual mode

Adjustment channel	Description	Adjustment range/ selection	Factory setting
Relay 1 … X	Operating mode selection	Max, Auto, Off	Auto
All relays...	Operating mode of all relays	Auto, Off	Off

12 User code

```
User code:

    0000
     ▲
```
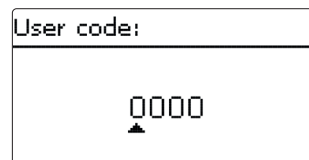
The access to some adjustment values can be restricted via a user code (customer).

1. Installer **0262** (Factory setting)

All menus and adjustment values are shown and all values can be altered.
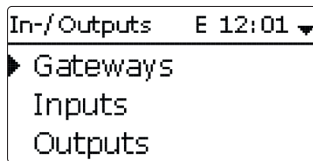
2. Customer **0000**

The installer level is not shown, adjustment values can be changed partly.

For safety reasons, the user code should generally be set to the customer code before the controller is handed to the customer!

➔ In order to restrict the access, enter 0000 in the menu item **User code**.
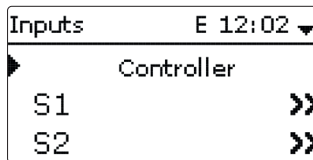
13   In-/Outputs

In the **In-/Outputs** menu, sensor offsets can be adjusted and relay outputs configured.

> ℹ️ **Note:**
> The **Gateways** submenu has no function!

13.1   Inputs

In this submenu, the type of the sensor connected can be adjusted for each individual input. The following types can be selected:
- Pt1000
- Switch (S4 only)
- RTA (S5 only)
- None

> ☞ **ATTENTION!** **System damage!**
> Selecting the wrong sensor type will lead to unwanted controller actions. In the worst case, system damage can occur!
> ➔ **Make sure that the right sensor type is selected!**

If **Pt1000** has been selected, the channel **Offset** appears, in which an individual offset can be adjusted.

1. In order to select a sensor for the offset adjustment, select the corresponding menu item by pressing the right button (✓).
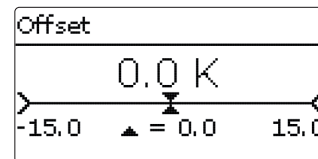

2. In order to make an adjustment, adjust the desired value with the Lightwheel® and confirm with the right button (✓).

In-/Outputs/Inputs

Adjustment channel	Description	Adjustment range/selection	Factory setting
S1 … S5	Sensor input selection	-	-
Type	Sensor type selection	Switch (S4 only), RTA (S5 only), BAS (S5 only), Pt1000, none	Pt1000
Offset	Sensor offset	-15.0 … +15.0 K	0,0 K
Inverted	Inverted switching option (only if Type = Switch)	Yes, No	No

13.2   Outputs
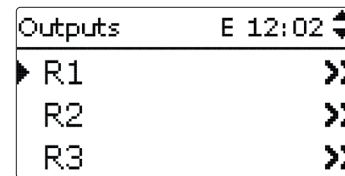
In this menu, the signal type and the minimum speed can be adjusted for each relay.
➔ In order to make adjustments for a relay, select the corresponding menu item by pressing the right button (✓).
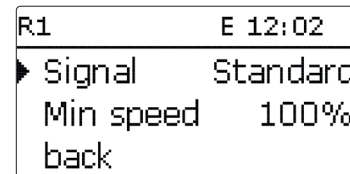
For each relay, the signal type and the minimum pump speed can be adjusted. The parameter Minimum speed will not be available for R4, if the signal type Standard has been selected.

The signal type determines the way speed control of a connected pump is effected. The following modes are available:

Adapter = Speed control signal via a VBus® / PWM interface adapter

0-10 V   = Speed control via a 0-10 V signal (R1 only)

PWM   = Speed control via a PWM signal (R1 only)

Standard = Burst control (factory setting)

Speed control of a HE pump is possible via a PWM signal / 0 - 10 V control. The pump has to be connected to the relay (power supply) as well as to the PWM or 0-10 V output of the controller.

If the signal type **PWM** or **0-10 V** has been selected, the adjustment channel **Profile** appears. In the Profile channel, PWM characteristic curves for solar and heating pumps can be selected.

In the Profile channel, a PWM characteristic curve for solar pumps and a heating curve for heating pumps can be selected.

### Characteristic curve profile Solar
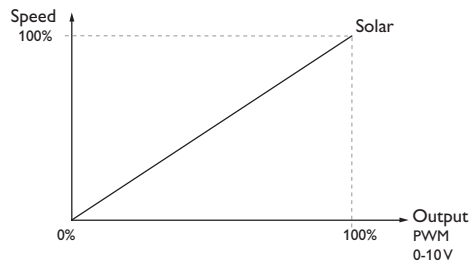
Characteristic curve profile Heating
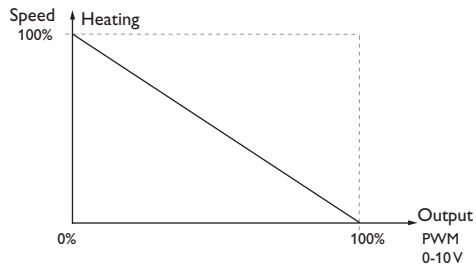
In- / Outputs / Outputs

Adjustment channel	Description	Adjustment range / selection	Factory setting
R1 … R4	Relay output selection	-	-
Signal	Signal type	Adapter, 0-10 V (R1 only), PWM (R1 only), Standard	Standard
Profile	PWM characteristic curve	Solar, Heating	Heating
Min speed	Minimum speed	(20) 30 … 100 %	30 %
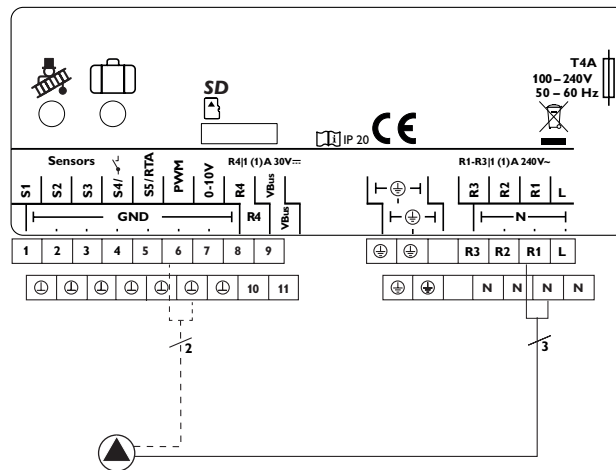
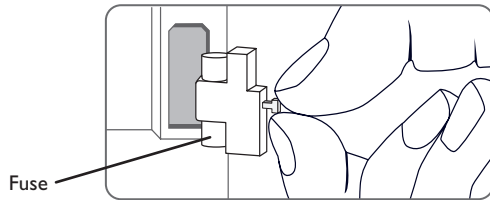Example of the electrical connection of a HE pump.

Note:
If the signal type **PWM**, **Adapter** or **0-10 V** is selected for an output, the adjustment range for the minimum speed of the corresponding output changes to 20 ... 100 %.

14 Troubleshooting

If a malfunction occurs, a message will appear on the display of the controller.

Fuse

The Lightwheel® flashes red.

Sensor fault. An error code instead of a temperature is shown on the sensor display channel.

Short circuit or line break
Disconnected temperature sensors can be checked with an ohmmeter. Please check if the resistance values correspond with the table.

°C	°F	Ω Pt1000	°C	°F	Ω Pt1000
-10	14	961	55	131	1213
-5	23	980	60	140	1232
0	32	1000	65	149	1252
5	41	1019	70	158	1271
10	50	1039	75	167	1290
15	59	1058	80	176	1309
20	68	1078	85	185	1328
25	77	1097	90	194	1347
30	86	1117	95	203	1366
35	95	1136	100	212	1385
40	104	1155	105	221	1404
45	113	1175	110	230	1423
50	122	1194	115	239	1442

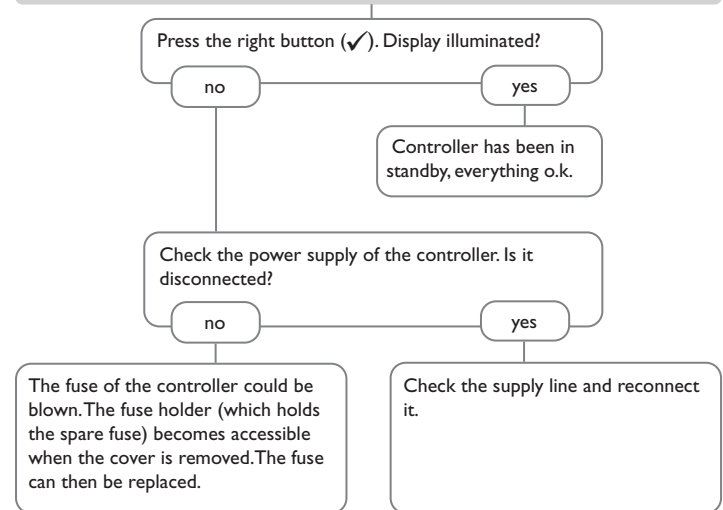
WARNING! **Electric shock!**

Upon opening the housing, live parts are exposed!
➔ **Always disconnect the device from power supply before opening the housing!**

The controller is protected by a fuse. The fuse holder (which also holds the spare fuse) becomes accessible when the cover is removed. To replace the fuse, pull the fuse holder from the base.

The display is permanently off.

Press the right button (✓). Display illuminated?

no — yes

Controller has been in standby, everything o.k.

Check the power supply of the controller. Is it disconnected?

no — yes

The fuse of the controller could be blown. The fuse holder (which holds the spare fuse) becomes accessible when the cover is removed. The fuse can then be replaced.

Check the supply line and reconnect it.

---

i **Note:**
For answers to frequently asked questions (FAQ) see www.resol.com.

The heating circuit pump does not work, although this is indicated on the display.

Display illuminated?
If not, press the right button (✓).
Display illuminated again?

- yes
- no → There is no current; check fuses / replace them and check power supply.

Does the pump start up in manual operation?

- no
- yes → The adjusted temperature difference for starting the pump is too high; choose a value which makes more sense.

Is the pump current enabled by the controller?

- no
- yes → Is the pump stuck?
  - yes → Turn the pump shaft using a screwdriver; now passable?
    - no → Pump is defective - replace it.

Controller might be defective - replace it.

15   Accessories

15.1   Sensors and measuring instruments

Sensors
The product range includes high-precision platinum temperature sensors, flatscrew sensors, outdoor temperature sensors, indoor temperature sensors, cylindrical clip-on sensors, also as complete sensors with immersion sleeve.

RTA12 remote control
With the RTA12, the heating curve can be comfortably adjusted from the living area.

RCP12 Room control unit
With the RTA12 Room control unit, the heating curve can be comfortably adjusted from the living area. The integrated sensor measures the ambient temperature.

FAP13 outdoor temperature sensor
The FAP13 is used for measuring the outdoor temperature with a Pt1000 measuring element. The FAP13 is placed in a weather-resistant housing and is designed for mounting outdoors. Cable glands for the sensor cables at the bottom of the housing allow easy installation.

15.2   VBus® accessories

AM1 Alarm Module
The AM1 Alarm Module is designed to signal system failures. It is to be connected to the VBus® of the controller and issues an optical signal via the red LED if a failure has occurred.

KM2 Communication module
The KM2 Communication module is the ideal interface between a solar or heating controller and the Internet. In only a few steps, the controller can be connected to the VBus.net visualisation portal.

DL3 Datalogger
For visualisation via VBus.net, incl. SD card, mains adapter, network and VBus® cable.

DL2 Datalogger
For visualisation via VBus.net, incl. SD card and network cable, mains adapter and VBus® cable pre-connected.

VBus®Touch HC
This easy-to-use app enables you to make adjustments on your heating controller (DeltaTherm® HC and HC mini) from a mobile device.
Thus, e.g. the operating mode can be set via the app. Additionally, the system data are displayed in a clearly arranged graphic.
VBus® ist eine eingetragene Marke der RESOL GmbH
Google Play is a trademark of Google Inc.
Apple, das Apple Logo, iPad und iPhone sind Marken der Apple Inc., die in den USA und weiteren Ländern eingetragen sind. App Store ist eine Dienstleistungsmarke der Apple Inc.

VBus®/USB & VBus®/LAN interface adapters
With the RESOL VBus®/USB interface adapter, the controller can be connected to the USB port of a PC via the VBus®.
The VBus®/LAN interface adapter is designed for the direct connection of the controller to a PC or router. It enables easy access to the controller via the local network of the owner.

ANDROID APP BEI Google play

Available on the App Store

en

16 Index

Important note

The texts and drawings in this manual are correct to the best of our knowledge. As faults can never be excluded, please note:

Your own calculations and plans, under consideration of the current standards and directions should only be basis for your projects. We do not offer a guarantee for the completeness of the drawings and texts of this manual - they only represent some examples. They can only be used at your own risk. No liability is assumed for incorrect, incomplete or false information and / or the resulting damages.

Note

The design and the specifications can be changed without notice.
The illustrations may differ from the original product.

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