# DeltaSol® MX

Beginning with firmware version 2.02

## System controller for complex solar and heating systems

Manual for the specialized craftsman

**Installation**
**Operation**
**Functions and options**
**Troubleshooting**


The Internet portal for easy and secure access to your system data – www.vbus.net

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

11211452

en-US/CA
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.

Please read the following information carefully before installing and operating the controller. In this way damage to the solar system caused by wrong installation will be avoided. Please make sure that the mounting is adapted to the characteristics of the building, that the local regulations are respected and is conform with the technical rules.

## Instructions

Attention should be paid to

- Valid national and local standards, regulations and directives
- Respective valid standards and directives

Equipment to be installed and used in accordance with the rules of the National Electrical Code (NEC) or with Canadian Electrical Code (CEC), Part I.

## Information about the product

### Proper usage

The system controller is designed for electronically controlling solar thermal systems and heating systems in compliance with the technical data specified in this manual.

Improper use excludes all liability claims.

**Note**
Strong electromagnetic fields can impair the function of the controller.

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

**Subject to technical change. Errors excepted.**



## Target group

These instructions are exclusively addressed to authorized skilled personnel.

Only qualified electricians should carry out electrical works.

Initial installation must be effected by the system owner or qualified personnel named by the system owner.

## Description of symbols

**WARNING!** Warnings are indicated with a warning triangle!

➔ **They contain information on how to avoid the danger described.**

Signal words describe the danger that may occur, when it is not avoided.

- **WARNING** means that injury, possibly life-threatening injury, can occur.
- **ATTENTION** means that damage to the appliance can occur.

**Note**
Notes are indicated with an information symbol.

➔ Arrows indicate instruction steps that should be carried out.

## Disposal

- Dispose of the packaging in an environmentally sound manner.
- Dispose of old appliances 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.

The DeltaSol® MX is the most versatile system controller for complex solar and heating systems in our product range. It is ideal to control a combination of solar and non-solar parts of the system.

Easy combination and parameterization of pre-programmed functions for several millions of hydronic variants.

## Contents

## 1 Overview

- **14 relay outputs and 12 inputs for Pt1000, Pt500 or KTY temperature sensors**
- **Up to 5 extension modules via RESOL VBus® (45 sensors and 39 relays in total)**
- **Inputs for analog and digital Grundfos Direct Sensors™**
- **Integrated control of up to 4 high-efficiency pumps via PWM outputs**
- **Data logging, storing, easy transfer of controller adjustments prepared and firmware updates via SD card**
- **Cooling over the heating circuit with condensation detection by means of a dew point switch**
- **Simplified timer, 0-10 V boiler control and DHW preheating**
- **Remote access to the heating circuits with room control unit(s) or the VBus® Touch HC App**
- **Extended optional functions, e.g. solid fuel boiler function with mixer and target temperature control**

**Technical data**

**Inputs:** 12 Pt1000, Pt500 or KTY temperature sensor inputs (can optionally be used for remote controls, operating mode switches or dry-contact switches), 3 impulse inputs for V40 flowmeters (can optionally be used for Pt1000, Pt500 or KTY temperature sensors, remote controls, operating mode switches or dry-contact switches); 1 input for a FlowRotor, 1 CS10 solar cell, 4 Grundfos Direct Sensors™ (2 x analog, 2 x digital)

**Outputs:** 14 relays, 13 of them semiconductor relays for speed control, 1 dry-contact relay, 4 PWM outputs (switchable to 0-10 V)

**PWM frequency:** 512 Hz

**PWM voltage:** 10.5 V

**Switching capacity:**
1 (1) A 240 V~ (semiconductor relay)
4 (2) A 24 V⎓ / 240 V~ (dry-contact relay)

**Total switching capacity:** 6.3 A 240 V~

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

**Supply connection:** type Y attachment

**Standby:** 0.84 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:** RESOL VBus®, SD card slot

**VBus® current supply:** 35 mA

**Functions:** 7 integrated calorimeters and control of weather-compensated heating circuits. Adjustable system parameters and add-on options (menu-driven), balance and diagnostics functions, functionality control according to VDI 2169

**Housing:** plastic, PC-ABS and PMMA

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

**Indication / Display:** full graphic display

**Operation:** 7 buttons

**Protection type:** IP 20 / EN 60529

**Protection class:** I

**Ambient temperature:** 0 … 40 °C [32…104 °F]

**Degree of pollution:** 2

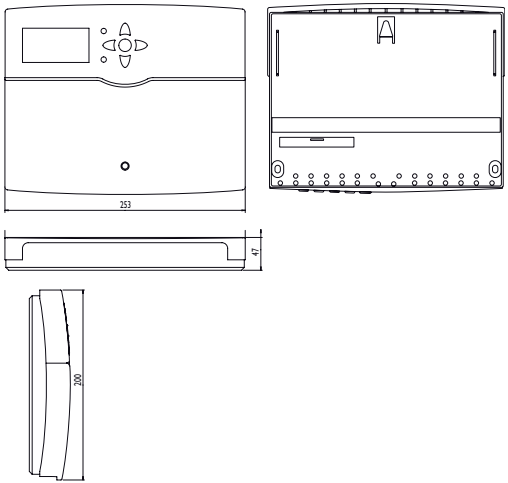
**Dimensions:** 253 × 200 × 47 mm [10" x 8.1" x 1.9"]

## 1.1 Optional functions

| Solar |
|---|
| Bypass |
| CS bypass |
| External heat exchanger |
| Evacuated tube collector |
| Target temperature |
| Antifreeze |
| Backup heating suppression |
| Parallel relay |
| Cooling mode |
| Drainback |
| Twin pump |
| Heat dissipator |
| Flow rate monitoring |
| Pressure monitoring |

| Arrangement |
|---|
| Parallel relay |
| Mixer |
| Zone loading |
| Error relay |
| Heat exchange |
| Solid fuel boiler |
| Circulation |
| Return temperature offset |
| Function block |
| Irradiation switch |
| Return mixing function |

| Heating |
|---|
| Thermal disinfection |
| DHW heating |
| DHW preheating |




# 2 Installation

## 2.1 Mounting

**WARNING!** **Electric shock!**

Upon opening the housing, live parts are exposed!

➔ **Always disconnect the device 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.

The controller must additionally be supplied from a double pole switch with contact gap of at least 3 mm [0.12"].

Please pay attention to separate routing of sensor cables and power supply cables.

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

➔ Unscrew the crosshead screw from the cover and remove it along with the cover from the housing.

➔ Mark the upper fastening point on the wall. Drill and fasten the enclosed wall plug and screw leaving the head protruding.

➔ Hang the housing from the upper fastening point and mark the lower fastening points (centers 233 mm [8.8"]).

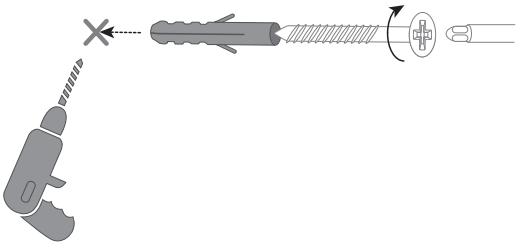
➔ Insert lower wall plugs.

➔ Fasten the housing to the wall with the lower fastening screw and tighten.

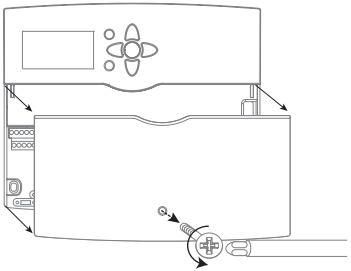
➔ Carry out the electrical wiring in accordance with the terminal allocation (see page 7).

➔ Put the cover on the housing.

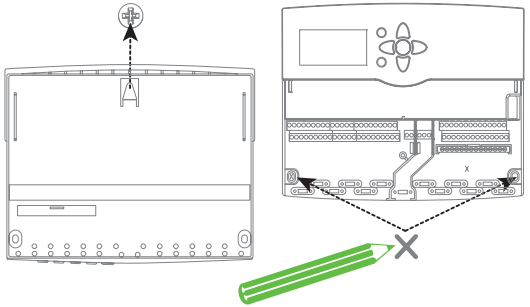
➔ Attach with the crosshead screw.



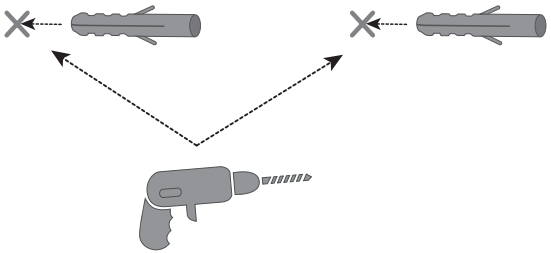
1



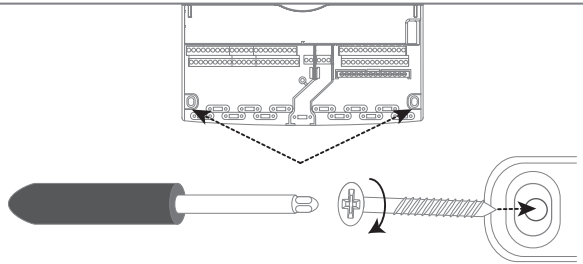
2



3

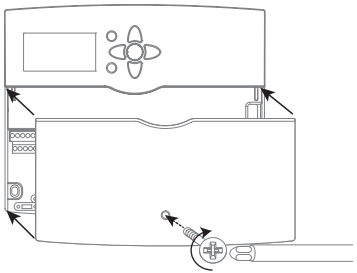


4



5

**Chap. 2.2**



6

## 2.2 Electrical connection

**WARNING!** **Electric shock!**

Upon opening the housing, live parts are exposed!

➔ **Always disconnect the device 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 power supply at any time.

➔ Install the power supply plug such that it is accessible at any time.

➔ If this is not possible, install a switch that can be accessed.

**Do not use the device if it is visibly damaged!**

The controller is equipped with 14 **relays** in total to which loads such as pumps, valves, etc. can be connected:

Relays 1 … 13 are semiconductor relays, designed for pump speed control:

Conductor R1 … R13

Neutral conductor N (common terminal block)

Protective earth conductor ⏚ (common terminal block)

Relay 14 is a dry-contact relay:

R14-A = normally open contact

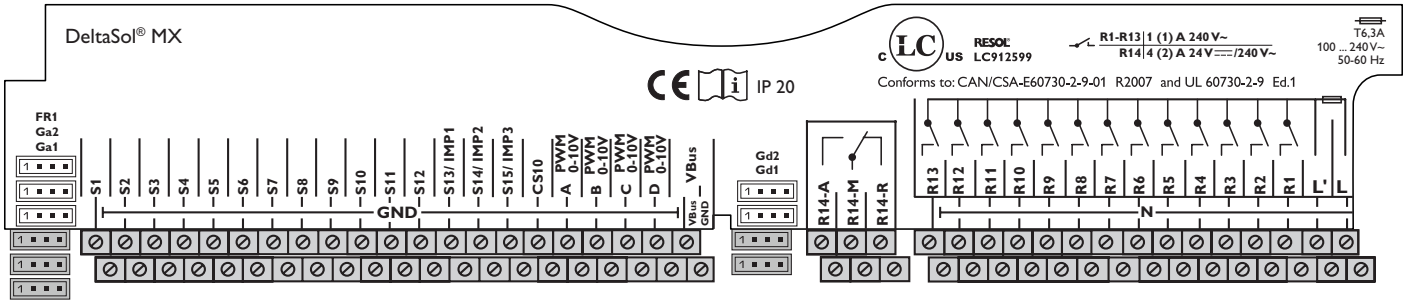
R14-M = center contact

R14-R = normally closed contact

Depending on the product version, power supply cables and sensor cables are already connected to the device. If that is not the case, please proceed as follows:

The **temperature sensors** (S1 to S12) have to be connected to the terminals S1 to S12 and GND (either polarity).

The **V40** flowmeters can be connected to the terminals S13 / IMP1 to S15 / IMP3 and GND (either polarity).



Connect the irradiation sensor **CS10** to the terminals CS10 and GND with correct polarity. To do so, connect the cable marked GND to the GND common terminal block, the cable marked CS to the terminal marked CS10.

The terminals marked **PWM / 0-10 V** are control outputs for high-efficiency pumps.

**Note**
When Grundfos Direct Sensors™ are used, connect the sensor ground common terminal block to PE.

Connect the **analog Grundfos Direct Sensors™** to the Ga1 and Ga2 inputs.

Connect the **digital Grundfos Direct Sensors™** to the Gd1 and Gd2 inputs.

Connect the **FlowRotor** to the FR1 input. (The FlowRotor is not available in the RESOL portfolio)

The controller is supplied with power via a power supply cable. The power supply of the device must be 100 … 240 V~ (50 … 60 Hz).

Connect the **power supply cable** to the following terminals:
Neutral conductor N
Conductor L

**WARNING!** **Electric shock!**

L' is a fused contact permanently carrying voltage.

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

Conductor L' (L' is not connected with the power supply cable. L' is a fused contact permanently carrying voltage.)

Protective earth conductor ⏚ (common terminal block)

**Note**
For more details about the commissioning procedure see page 9.

## 2.3 Data communication / Bus

The controller is equipped with the RESOL VBus® for data transfer and energy supply to external modules. The connection is to be carried out at the terminals marked **VBus** (any polarity).

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

- RESOL DL2 / DL3 Datalogger

Furthermore, the controller can be connected to a PC or integrated into a network via the RESOL VBus®/USB or VBus® /LAN interface adapter (not included). Different solutions for visualization and remote parameterization are available on the website www.resol.com. On the website, firmware updates are also available.

**Note**
During remote parameterization, the symbol will be displayed, the controller will not carry out any control function.

**Note**
For more information about accessories, see page 98.

## 2.4 SD card slot

The controller is equipped with an SD card slot.

With an SD card, the following functions can be carried out:

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

**Note**
For more information about using an SD card, see page 91.

## 3 Step-by-step parameterization

The DeltaSol® MX is a controller that offers a broad variety of functions to the user. At the same time, the user has a lot of freedom in configurating them. Therefore, to set up a complex system, careful planning is required. We recommend drawing a sketch of the system first.

If planning, hydronic construction and electrical connection have all been carried out successfully, proceed as follows:

**1. Running the commissioning menu**

After the commissioning menu has been finished (see page 19), further adjustments can be made. The commissioning menu can be repeated any time by means of a reset (see page 90). Additional adjustments will be deleted.

For further information about the commissioning menu see page page 19.

**2. Registering sensors**

If flowmeters, flow switches, Grundfos Direct Sensors™, a FlowRotor, room control units, remote controls, switches and/or external extension modules are connected, these have to be registered in the **Inputs / Modules** menu.

For further information about the registration of modules and sensors see page 93.

**3. Activating solar optional functions**

The basic solar system has been adjusted during commissioning. Now, up to 16 optional functions can be selected, activated and adjusted.

Relays available can be allocated to optional functions which require a relay. The controller always suggests the numerically smallest relay available.

Sensors can be allocated to more than one function.

For further information about the solar optional functions see page 50.

**4. Activating optional arrangement functions**

Up to 16 optional functions for the non-solar part of the arrangement can be selected, activated and adjusted.

Relays available can be allocated to optional functions which require a relay. The controller always suggests the numerically smallest relay available.

Sensors can be allocated to more than one function.

For further information about the optional arrangement functions see page 63.

**5. Adjusting heating circuits and activating optional heating functions**

If one or more heating circuits are to be controlled, heating circuits can be activated and adjusted. Internal heating circuits can only be activated if at least 3 relays are available.

For the heating part of the arrangement, up to 16 optional functions can be selected, activated and adjusted.

To heating circuits and optional functions which require one or more relays, the corresponding number of free relays can be allocated. The controller always suggests the numerically smallest relay available.

Sensors can be allocated to more than one function.

For further information about heating circuits and optional heating functions see page 75.

# 4 Operation and function

## 4.1 Buttons

The controller is operated via the 7 buttons next to the display. They have the following functions:

Button (1) - scrolling upwards

Button (3) - scrolling downwards

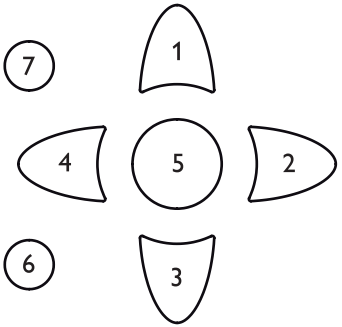
Button (2) - increasing adjustment values

Button (4) - reducing adjustment values

Button (5) - confirming

Button (6) - entering the status menu / chimney sweeper mode (system-dependent)

Button (7) - escape button for changing into the previous menu / to the holidays menu




**Operating control LED (in the directional pad)**

| | |
|---|---|
| Green: | Everything OK |
| Red: | Screed drying cancellation |
| Red flashing: | Sensor fault / initialization / chimney sweeper function active |
| Green flashing: | Manual mode / screed drying active |

## 4.2 Selecting menu points and adjusting values

During normal operation of the controller, the display is in the main menu. If no button is pressed for 1 min, the display illumination goes out. After 4 further minutes, the controller will display the home screen (see page 47).

Press any key to reactivate the display illumination.

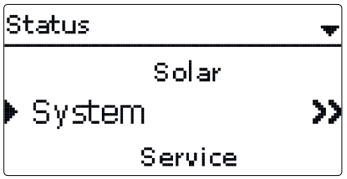
➔ In order to scroll through a menu or to adjust a value, press either buttons (1) and (3) or buttons (2) and (4).

➔ To open a submenu or to confirm a value, press button (5).

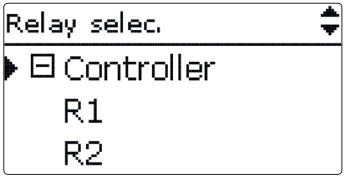
➔ To enter the status menu, press button (6) – unconfirmed adjustments will not be saved.

➔ To enter the previous menu, press button (7) – unconfirmed adjustments will not be saved.

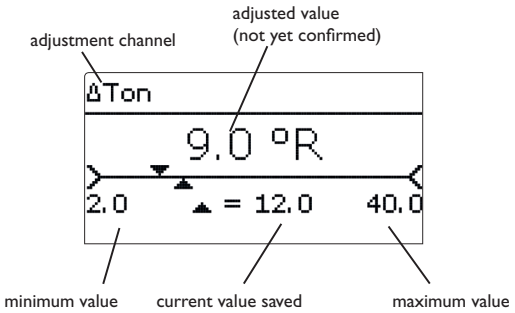
If no button has been pressed within a couple of minutes, the adjustment is cancelled and the previous value is retained.




If the symbol » is shown behind a menu item, pressing button (5) will open a new submenu.



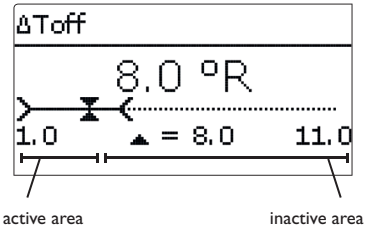

If the symbol ⊞ is shown in front of a menu item, pressing button (5) will open a new submenu. If it is already opened, a ⊟ is shown instead of the ⊞.




Values and adjustments can be changed in different ways:

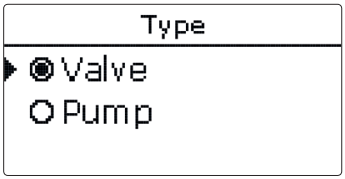
Numeric values can be adjusted by means of a slide bar. The minimum value is indicated to the left, the maximum value to the right. The large number above the slide bar indicates the current adjustment. By pressing buttons 2 or 4 the upper slide bar can be moved to the left or to the right.

Only after the adjustment has been confirmed by pressing button 5 will the number below the slide bar indicate the new value. The new value will be saved if it is confirmed by pressing button 5 again.

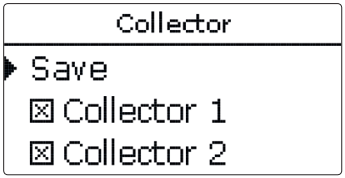



When 2 values are locked against each other, they will display a reduced adjustment range depending on the adjustment of the respective other value.

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.




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.




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.

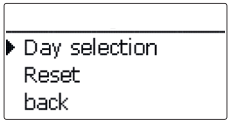
## 4.3 Adjusting the timer

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

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.

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

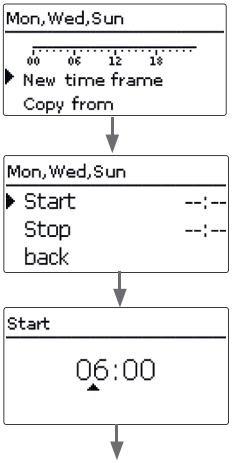




**Adding a time frame:**

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

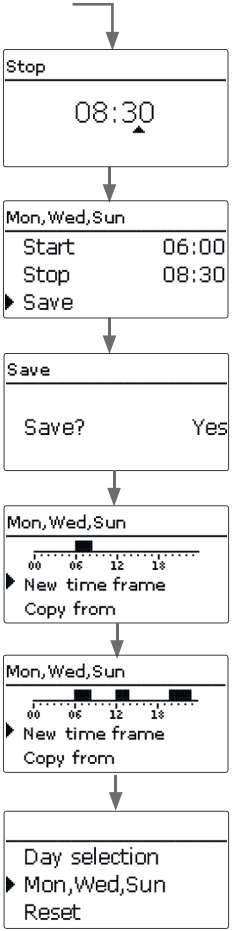
➔ Select **New time frame**.




➔ Adjust **Start** and **Stop** for the desired time frame.

The time frames can be adjusted in steps of 5 min.

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




➔ In order to add another time frame, repeat the previous steps.

6 time frames can be adjusted per day or combination.

➔ Press the left button (⮌) in order to get back to the day selection.

**Copying a time frame:**

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

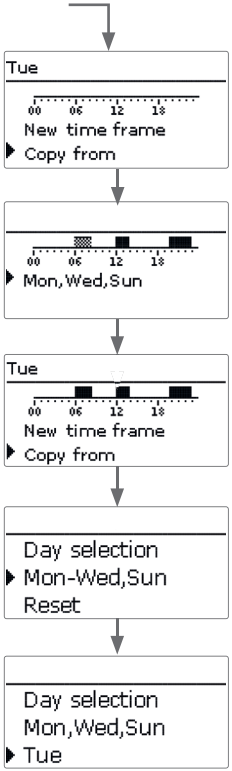
➔ Choose the day / the combination into which the time frames are to be copied and select **Copy from**.

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

➔ 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.



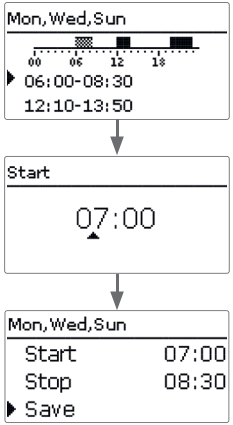

**Changing a time frame:**

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

➔ Select the time frame to be changed.

➔ Make the desired change.

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

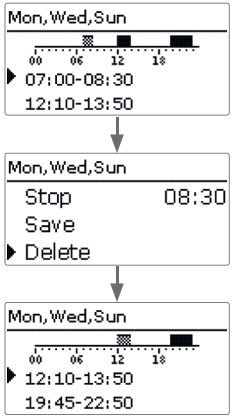



**Removing a time frame:**

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

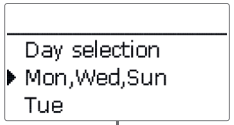
➔ Select the time frame that is to be deleted.

➔ Select **Delete** and confirm the security enquiry with **Yes**.

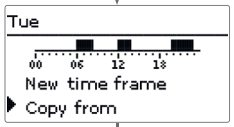


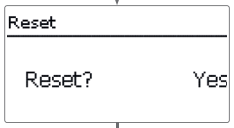
**Resetting the timer:**

In order to reset time frames adjusted for a certain day or combination, proceed as follows



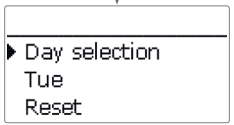

➔ Select the desired day or combination.



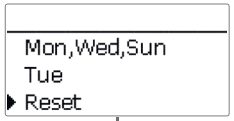

➔ Select **Reset** and confirm the security enquiry with **Yes**.

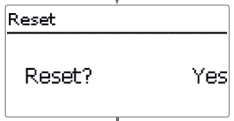
The selected day or combination will disappear from the list, all its time frames will be deleted.



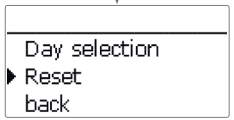

In order to reset the whole timer, proceed as follows:

➔ Select **Reset** and confirm the security enquiry with **Yes**.

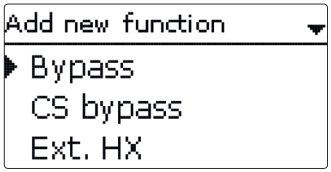



All adjustments made for the timer are deleted.



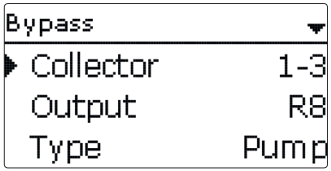

## 4.4 Adjusting optional functions




In the **Optional functions** menus, optional functions can be selected and adjusted.

By selecting **Add new function**, different pre-programmed functions can be selected.

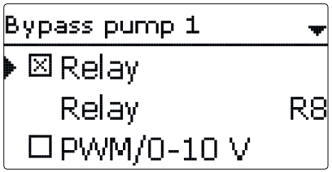
The kind and number of optional functions offered depends on the previous adjustments.



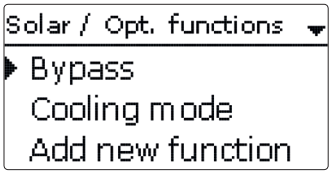

When a function is selected, a submenu will open in which all adjustments required can be made.

In this submenu, an output and, if necessary, certain system components can be allocated to the function.

If an output can be allocated to the function, the output selection menu **Output** will open (see page 16).

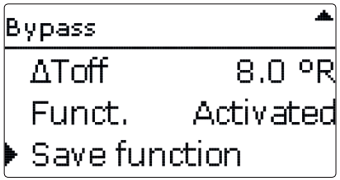



When a function has been adjusted and saved, it will appear in the **Optional functions** menu above the menu item **Add new function**.



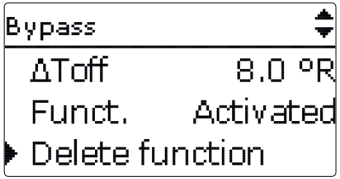

This allows an easy overview of functions already saved.

An overview about which sensor has been allocated to which component and which relay has been allocated to which function is given in the **Status** menu.

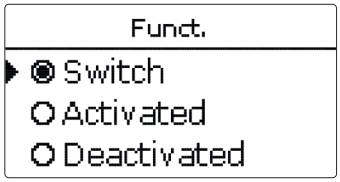



At the end of each optional function submenu, the menu items **Function** and **Save function** are available. In order to save a function, select Save function and confirm the security enquiry by selecting Yes.

In functions already saved, the menu item Delete function will appear instead.




In order to delete a function already saved, select **Delete function** and confirm the security enquiry by selecting Yes. The function will become available under **Add new function** again. The corresponding outputs will be available again.

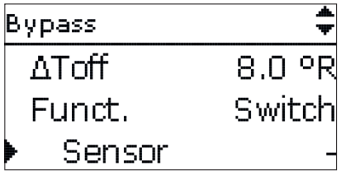



With the menu item **Function**, an optional function already saved can be temporarily deactivated or re-activated respectively. In this case, all adjustments will remain stored, the allocated outputs will remain occupied and cannot be allocated to another function. The allocated sensor will be monitored for faults.

By selecting **Switch**, the function can be activated or deactivated respectively by means of an external dry-contact switch.

The selection is only available if a sensor input has previously been set to **Switch** in the **Inputs / Modules** menu.

If **Switch** is selected, the channel **Sensor** will appear. In this channel, the sensor input to which the switch is to be connected can be allocated to the function.



## 4.5 Output selection submenu

The **Output selection** submenu is available in almost all optional functions. Therefore, it will not be explained in the individual function descriptions.

In this submenu, relays and / or signal outputs can be allocated to the function selected. All adjustments required for the outputs can be made in this menu.

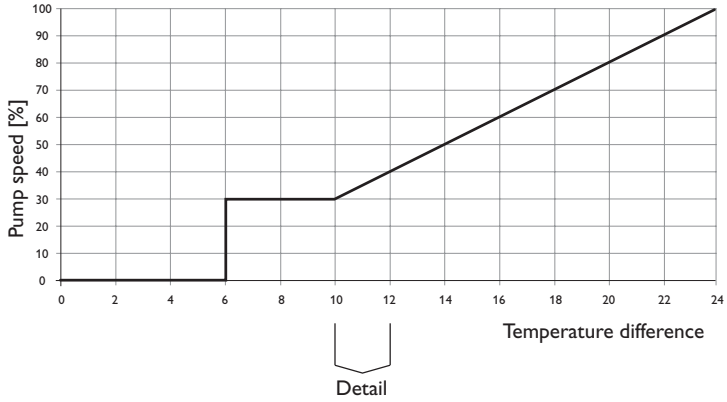
All controller and module (if connected) outputs available will be displayed. If **-** is selected, the function will run normally in the software but will not operate an output. Relay and signal outputs can be activated separately. Depending on the adjustments made, the following results are possible:

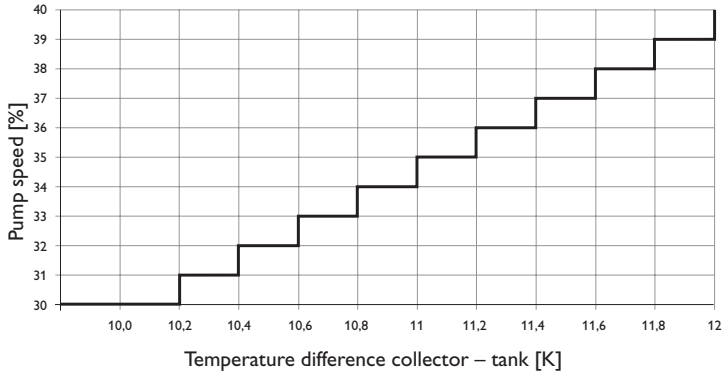
| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Relay | Relay option | Yes, No | No |
| Relay | Relay selection | system dependent | system dependent |
| PWM/0-10 V | PWM/0-10 V option | Yes, No | No |
| Output | Signal output selection | system dependent | system dependent |
| Signal | Signal type | PWM, 0-10 V | PWM |
| Profile | Characteristic curve | Solar, Heating | Solar |
| Speed | Speed control | Yes, No | system dependent |
| Min. | Minimum speed | 20 … 100 % | 20 % |
| Max. | Maximum speed | 20 … 100 % | 100 % |
| Adapter | Adapter option | Yes, No | No |
| Inverted | Inverted switching option | Yes, No | No |
| Blocking protection | Blocking protection option | Yes, No | No |
| Manual mode | Operating mode | Max, Auto, Min, Off | Auto |

1 relay and / or 1 0-10 V output can be allocated to each output selection.

| Settings | | | | Result | | |
|---|---|---|---|---|---|---|
| Relay option | PWM/0-10 V option | Speed control | Adapter option | Behaviour of the relay output | Behaviour of the signal output | Behaviour of the adapter |
| Yes | Yes | Yes | Yes | → On/Off | Modulating | Modulating |
| Yes | No | Yes | No | → Burst control | - | Modulating |
| Yes | No | Yes | Yes | → On/Off | - | Modulating |
| Yes | No | No | irrelevant* | → On/Off | - | 0 % / 100 % |
| Yes | Yes | Yes | No | → On/Off | Modulating | 0 % / 100 % |
| Yes | Yes | Yes | Yes | → On/Off | Modulating | Modulating |
| Yes | Yes | No | irrelevant* | → On/Off | 0 % / 100 % | 0 % / 100 % |
| No | Yes | Yes | irrelevant* | → - | Modulating | - |
| No | Yes | No | irrelevant* | → - | 0 % / 100 % | - |

* If the Relay option and / or speed control is deactivated, the adjustment in the adapter option will have no effect.




**Speed control**

In the **Speed** adjustment channel, the speed control for the output can be activated or deactivated respectively If **Yes** is selected, the channels **Min.**, **Max.** and **Adapter** will appear.

In the **Min.** adjustment channel, a relative minimum speed for a pump connected can be allocated to the output

In the **Max.** adjustment channel, a relative maximum speed for a pump connected can be allocated to the output.

If the speed control signal is generated via a VBus®/PWM interface adapter, the **Adapter** option has to be activated. If **Yes** is selected, the relay will switch on or off (no burst control). Speed information will be transmitted via the VBus®.

For functions controlling loads which are not speed controlled, the speed control will not be shown on the display (e. g. the bypass type, mixer).

If the temperature difference reaches or exceeds the Switch-on temperature difference, the pump switches on at 100% speed for 10 s. Then, the speed is reduced to the Minimum pump speed value. If the temperature difference exceeds the adjusted Set value by 1/10 of the rise value, the pump speed increases by one step (1%). The response of the controller can be adapted via the parameter Rise. Each time the difference increases by 1/10 of the adjustable Rise value, the pump speed increases by one step until the Maximum pump speed of 100% is reached. If the temperature difference decreases by 1/10 of the adjustable Rise value, pump speed will be decreased by one step.

**Relay option**

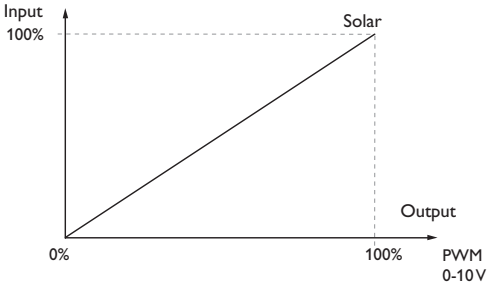
If the **Relay** option is activated, a relay can be allocated to the output selection.

**0-10 V option**

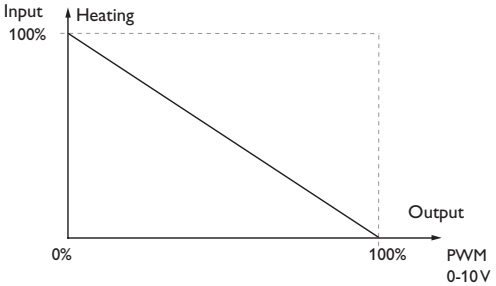
If the **0-10 V** option is activated, a 0-10 V output can be allocated to the output selection.

In the **Signal** channel, a selection between a PWM or a 0-10 V signal can be made. In the **Profile** channel, characteristic curves for solar and heating pumps can be selected.

**Signal characteristic: PWM; Profile: Solar**




**Signal characteristic: PWM; Profile: Heating**




**Blocking protection**

In order to protect the pumps against blocking after standstill, the controller is equipped with a blocking protection option. This option can be activated in the output selection submenu. The **Blocking protection** option can be adjusted in the **Basic setting / Blocking protection** menu (see page 90).

**Manual mode**

In the **Manual mode** adjustment channel, the operating mode of the output can be selected. The following options are available:

Off = Output is switched off (manual mode)

Min = Output active with minimum speed (manual mode)

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

Auto = Output is in automatic mode

**Note**

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

## 5 Commissioning

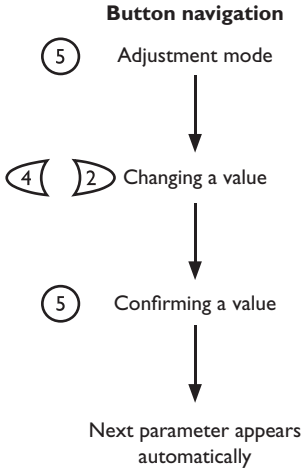
When the hydronic system is filled and ready for operation, connect the controller to the power supply.

The controller runs an initialization phase in which the directional pad flashes red.

When the controller is commissioned or when it is reset, it will run a commissioning menu after the initialization phase. The commissioning menu leads the user through the most important adjustment channels needed for operating the system.

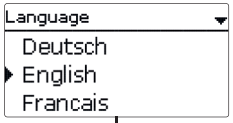
### Commissioning menu

The commissioning menu consists of the channels described in the following. In order to make an adjustment, press button (5). Adjust the value by pressing buttons (4) and (2), then push button (5) to confirm. The next channel will appear in the display.



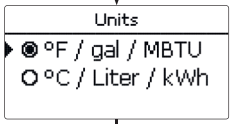

**1. Language:**

➔ Adjust the desired menu language.



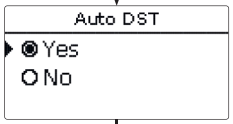

**2. Units:**

➔ Adjust the desired unit system.




**3. Daylight savings time adjustment:**

➔ Activate or deactivate the automatic daylight savings time adjustment.

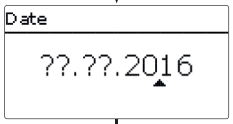



**4. Time:**

➔ Adjust the clock time. First of all adjust the hours, then the minutes.

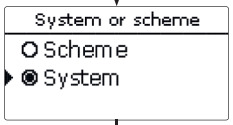

**5. Date:**

➔ Adjust the date. First of all adjust the year, then the month and then the day.



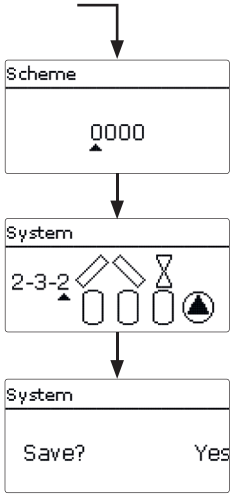

**6. Selection: System or Scheme**

➔ Choose whether the controller is to be configured with a scheme number or with a system and a variant.



**7a. Scheme (if 6. = Scheme):**

➔ Enter the scheme number of the desired system.




**7b. Selection of the solar system (if 6. = System):**

➔ Adjust the desired solar system (number of collectors and tanks, hydronic variants).

**8. Completing the commissioning menu:**

After the system has been selected or the scheme number has been entered, a security enquiry appears. If the security enquiry is confirmed, the adjustments will be saved.

➔ In order to confirm the security enquiry, press button (5).

➔ In order to reenter the commissioning menu channels, press button (7). If the security enquiry has been confirmed, the controller will be ready for operation and should enable an optimum system operation.

**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 44).

**Set the code to the customer code before handing over the controller to the customer (see page 93).**

## 5.1 Basic systems

The controller is pre-programmed for 13 basic systems. The selection depends on the number of heat sources (collector fields) and heat sinks (tanks, pool). Factory setting is system 1.1.1.

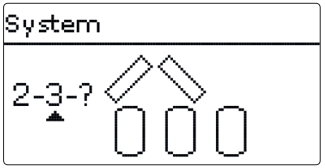
The selection of the basic solar system is one of the most important adjustments and is thus requested already in the commissioning menu.

First, the number of collector fields and tanks will have to be adjusted, then the hydronic variant.

**Note**

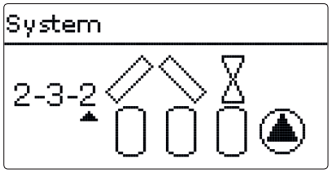
A solar system with tank stratification is implemented as a 2-tank system (tank top = tank 1; tank base = tank 2).

The system selected is visualized by the corresponding number of tank and collector symbols. The exemplary figure shows system 2.3.x with 2 collector fields and 3 tanks.




The hydronic variant refers to the different actuators that are to be controlled. They are visualized on the display by means of symbols, when the variant is selected. The upper symbol indicates the actuator belonging to the collector fields, the lower one the actuators belonging to the tanks.

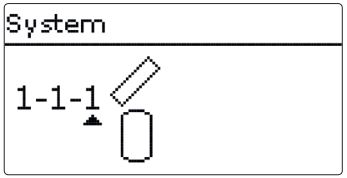
The exemplary figure shows the display indicated when system 2.3.2 has been selected.




In this case, each collector field has a 2-port valve, the tanks are loaded by means of pump logic.

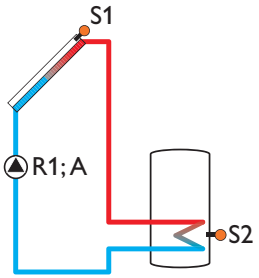
The controller allocates corresponding relay and sensor settings for each basic system. The allocations of all combinations are shown in chap. 5.2.

### System 1.1.1

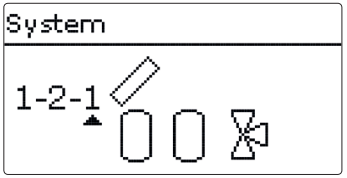



| Sensors | |
|---|---|
| Collector 1 | S1 |
| Tank base | S2 |

| Relays; PWM/0-10 | |
|---|---|
| Solar pump | R1;A |

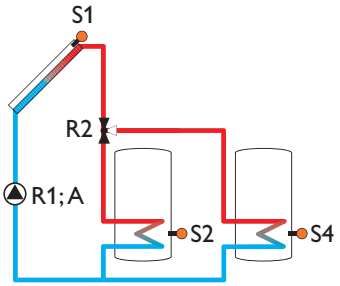



### System 1.2.1

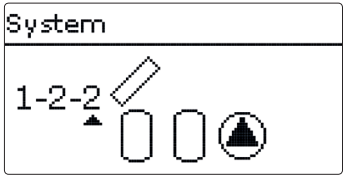



| Sensors | |
|---|---|
| Collector | S1 |
| Tank 1 base | S2 |
| Tank 2 base | S4 |

| Relays; PWM/0-10 | |
|---|---|
| Solar pump | R1;A |
| 3-PV tank 2 | R2 |

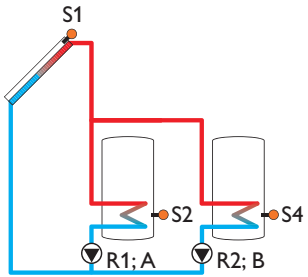


## System 1.2.2

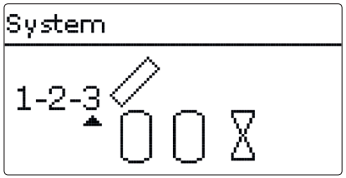



| Sensors | |
|---|---|
| Collector | S1 |
| Tank 1 base | S2 |
| Tank 2 base | S4 |

| Relays; PWM/0-10 | |
|---|---|
| Solar pump tank 1 | R1; A |
| Solar pump tank 2 | R2; B |

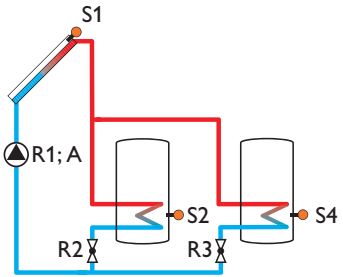



## System 1.2.3

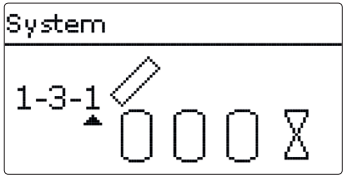



| Sensors | |
|---|---|
| Collector | S1 |
| Tank 1 base | S2 |
| Tank 2 base | S4 |

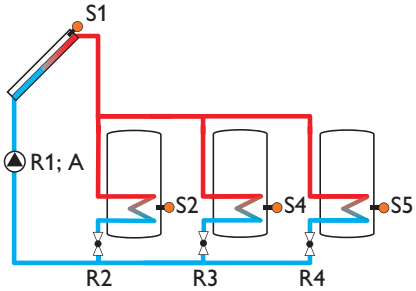
| Relays; PWM/0-10 | |
|---|---|
| Solar pump | R1; A |
| 2-PV tank 1 | R2 |
| 2-PV tank 2 | R3 |



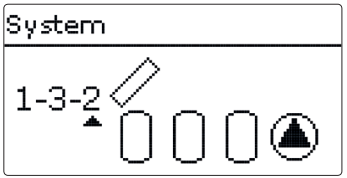
### System 1.3.1



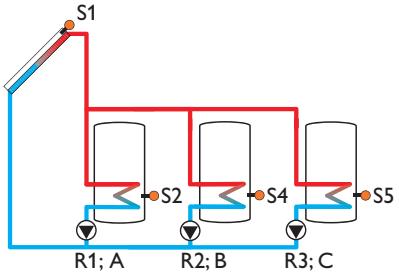

| Sensors | | Relays; PWM/0-10 | |
|---|---|---|---|
| Collector 1 | S1 | Solar pump | R1;A |
| Tank 1 base | S2 | 2-PV tank 1 | R2 |
| Tank 2 base | S4 | 2-PV tank 2 | R3 |
| Tank 3 base | S5 | 2-PV tank 3 | R4 |



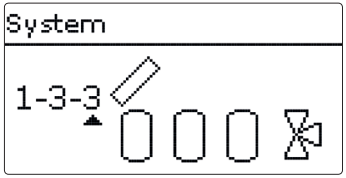

### System 1.3.2




| Sensors | | Relays; PWM/0-10 | |
|---|---|---|---|
| Collector 1 | S1 | Solar pump tank 1 | R1;A |
| Tank 1 base | S2 | Solar pump tank 2 | R2; B |
| Tank 2 base | S4 | Solar pump tank 3 | R3; C |
| Tank 3 base | S5 | | |

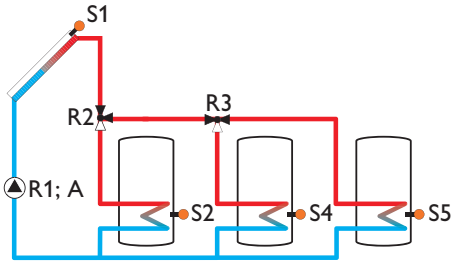


## System 1.3.3

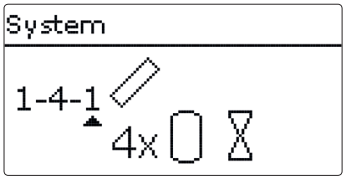



| Sensors | |
|---|---|
| Collector 1 | S1 |
| Tank 1 base | S2 |
| Tank 2 base | S4 |
| Tank 3 base | S5 |

| Relays; PWM/0-10 | |
|---|---|
| Solar pump | R1;A |
| 3-PV tank 1 | R2 |
| 3-PV tank 2 | R3 |

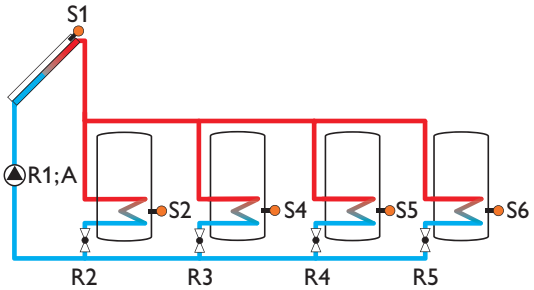



## System 1.4.1

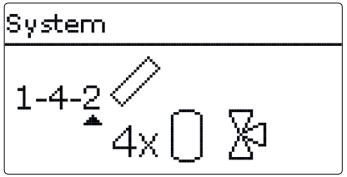



| Sensors | |
|---|---|
| Collector 1 | S1 |
| Tank 1 base | S2 |
| Tank 2 base | S4 |
| Tank 3 base | S5 |
| Tank 4 base | S6 |

| Relays; PWM/0-10 | |
|---|---|
| Solar pump | R1;A |
| 2-PV tank 1 | R2 |
| 2-PV tank 2 | R3 |
| 2-PV tank 3 | R4 |
| 2-PV tank 4 | R5 |

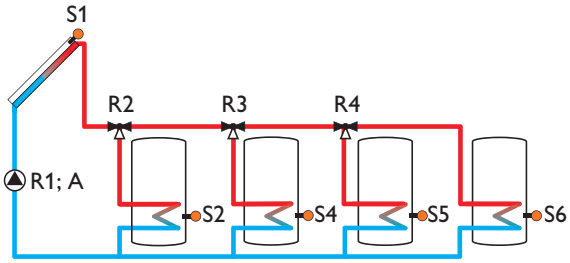


**System 1.4.2**

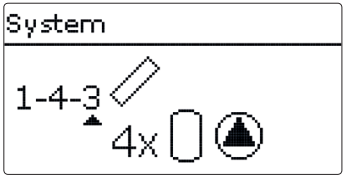



| Sensors | |
|---|---|
| Collector 1 | S1 |
| Tank 1 base | S2 |
| Tank 2 base | S4 |
| Tank 3 base | S5 |
| Tank 4 base | S6 |

| Relays; PWM/0-10 | |
|---|---|
| Solar pump | R1;A |
| 3-PV tank 1 | R2 |
| 3-PV tank 2 | R3 |
| 3-PV tank 3 | R4 |

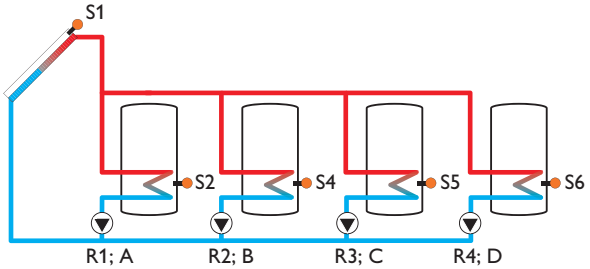



**System 1.4.3**

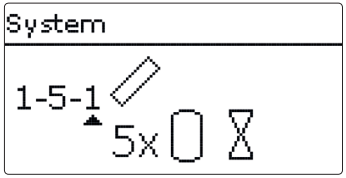



| Sensors | |
|---|---|
| Collector 1 | S1 |
| Tank 1 base | S2 |
| Tank 2 base | S4 |
| Tank 3 base | S5 |
| Tank 4 base | S6 |

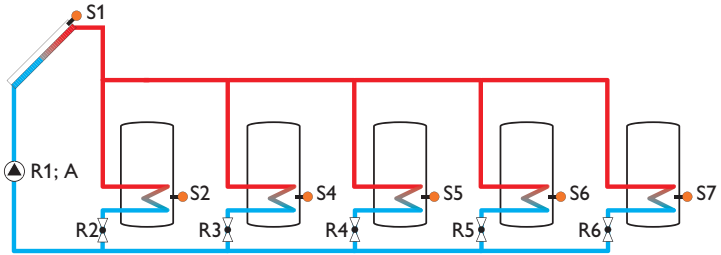
| Relays; PWM/0-10 | |
|---|---|
| Solar pump tank 1 | R1;A |
| Solar pump tank 2 | R2; B |
| Solar pump tank 3 | R3; C |
| Solar pump tank 4 | R4; D |



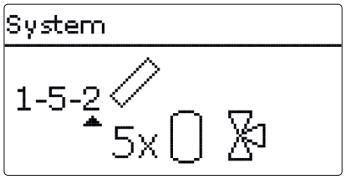
### System 1.5.1



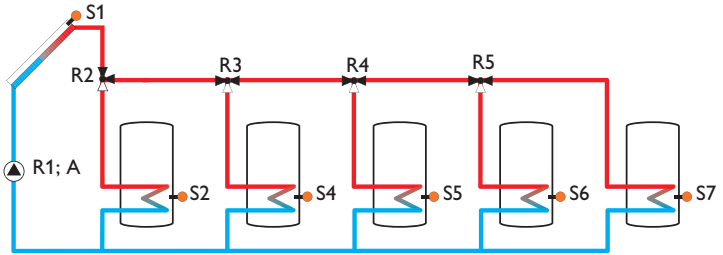

| Sensors | | Relays; PWM/0-10 | |
|---|---|---|---|
| Collector 1 | S1 | Solar pump | R1;A |
| Tank 1 base | S2 | 2-PV tank 1 | R2 |
| Tank 2 base | S4 | 2-PV tank 2 | R3 |
| Tank 3 base | S5 | 2-PV tank 3 | R4 |
| Tank 4 base | S6 | 2-PV tank 4 | R5 |
| Tank 5 base | S7 | 2-PV tank 5 | R6 |



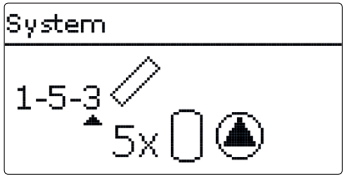

### System 1.5.2




| Sensors | | Relays; PWM/0-10 | |
|---|---|---|---|
| Collector 1 | S1 | Solar pump | R1;A |
| Tank 1 base | S2 | 3-PV tank 1 | R2 |
| Tank 2 base | S4 | 3-PV tank 2 | R3 |
| Tank 3 base | S5 | 3-PV tank 3 | R4 |
| Tank 4 base | S6 | 3-PV tank 4 | R5 |
| Tank 5 base | S7 | | |

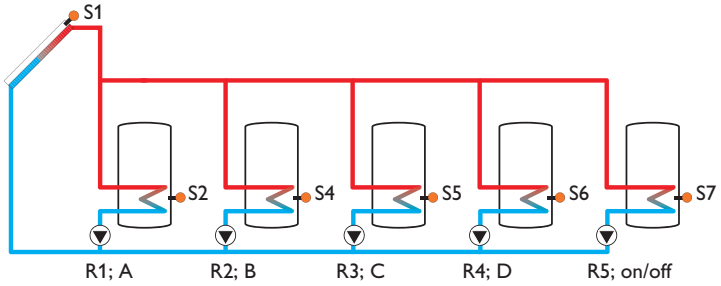


**System 1.5.3**

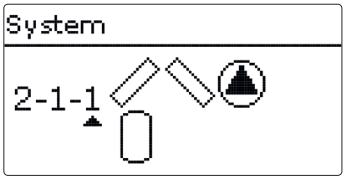



| Sensors | |
|---|---|
| Collector 1 | S1 |
| Tank 1 base | S2 |
| Tank 2 base | S4 |
| Tank 3 base | S5 |
| Tank 4 base | S6 |
| Tank 5 base | S7 |

| Relays; PWM/0-10 | |
|---|---|
| Solar pump tank 1 | R1; A |
| Solar pump tank 2 | R2; B |
| Solar pump tank 3 | R3; C |
| Solar pump tank 4 | R4; D |
| Solar pump tank 5 | R5; on/off |

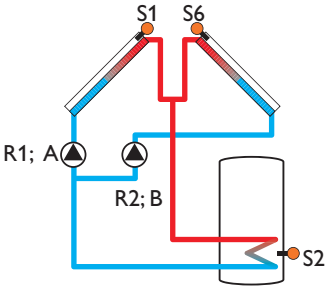



**System 2.1.1**

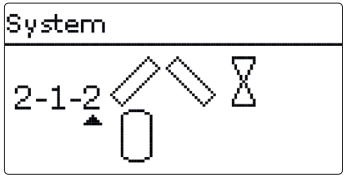



| Sensors | |
|---|---|
| Collector 1 | S1 |
| Tank base | S2 |
| Collector 2 | S6 |

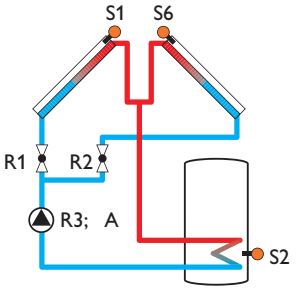
| Relays; PWM/0-10 | |
|---|---|
| Pump collector 1 | R1; A |
| Pump collector 2 | R2; B |



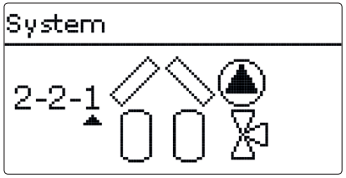
### System 2.1.2



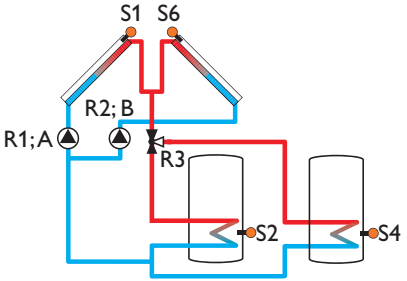

| Sensors | | Relays; PWM/0-10 | |
|---|---|---|---|
| Collector 1 | S1 | 2-PV collector 1 | R1 |
| Tank base | S2 | 2-PV collector 2 | R2 |
| Collector 2 | S6 | Solar pump | R3; A |



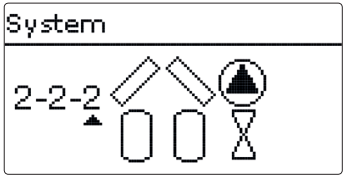

### System 2.2.1



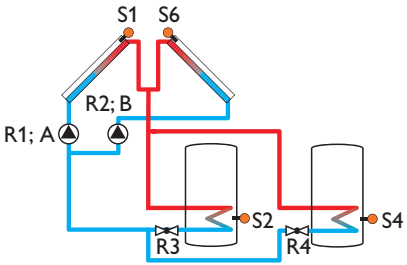

| Sensors | | Relays; PWM/0-10 | |
|---|---|---|---|
| Collector 1 | S1 | Pump collector 1 | R1; A |
| Tank 1 base | S2 | Pump collector 2 | R2; B |
| Tank 2 base | S4 | 3-PV tank 2 | R3 |
| Collector 2 | S6 | | |



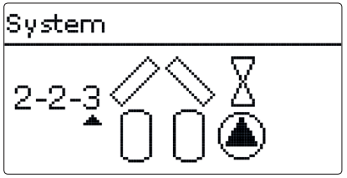
### System 2.2.2



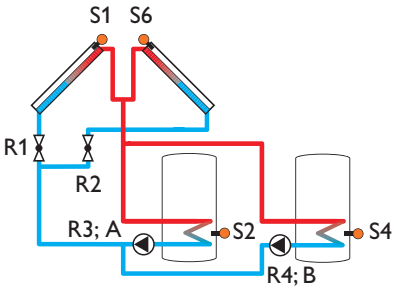

| Sensors | | Relays; PWM/0-10 | |
|---|---|---|---|
| Collector 1 | S1 | Pump collector 1 | R1; A |
| Tank 1 base | S2 | Pump collector 2 | R2; B |
| Tank 2 base | S4 | 2-PV tank 1 | R3 |
| Collector 2 | S6 | 2-PV tank 2 | R4 |



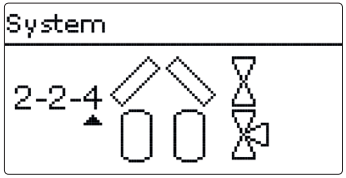

### System 2.2.3



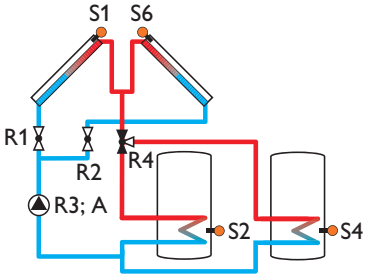

| Sensors | | Relays; PWM/0-10 | |
|---|---|---|---|
| Collector 1 | S1 | 2-PV collector 1 | R1 |
| Tank 1 base | S2 | 2-PV collector 2 | R2 |
| Tank 2 base | S4 | Solar pump tank 1 | R3; A |
| Collector 2 | S6 | Solar pump tank 2 | R4; B |



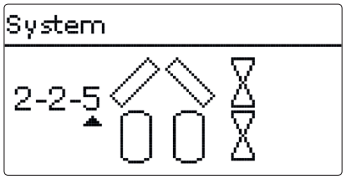
### System 2.2.4



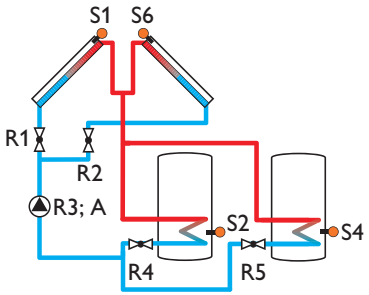

| Sensors | | Relays; PWM/0-10 | |
|---|---|---|---|
| Collector 1 | S1 | 2-PV collector 1 | R1 |
| Tank 1 base | S2 | 2-PV collector 2 | R2 |
| Tank 2 base | S4 | Solar pump | R3; A |
| Collector 2 | S6 | 3-PV tank 2 | R4 |



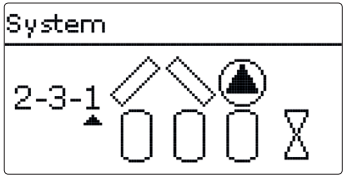

### System 2.2.5



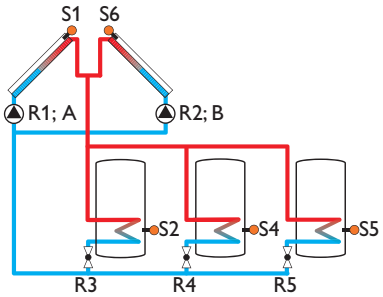

| Sensors | | Relays; PWM/0-10 | |
|---|---|---|---|
| Collector 1 | S1 | 2-PV collector 1 | R1 |
| Tank 1 base | S2 | 2-PV collector 2 | R2 |
| Tank 2 base | S4 | Solar pump | R3; A |
| Collector 2 | S6 | 2-PV tank 1 | R4 |
| | | 2-PV tank 2 | R5 |



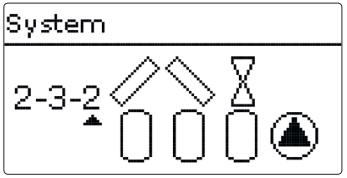
## System 2.3.1



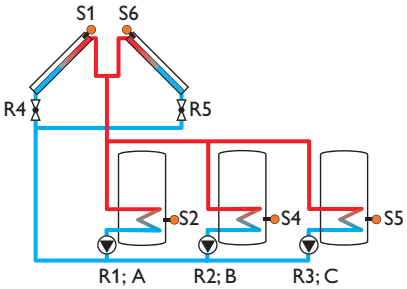

| Sensors | | Relays; PWM/0-10 | |
|---|---|---|---|
| Collector 1 | S1 | Pump collector 1 | R1; A |
| Tank 1 base | S2 | Pump collector 2 | R2; B |
| Tank 2 base | S4 | 2-PV tank 1 | R3 |
| Tank 3 base | S5 | 2-PV tank 2 | R4 |
| Collector 2 | S6 | 2-PV tank 3 | R5 |



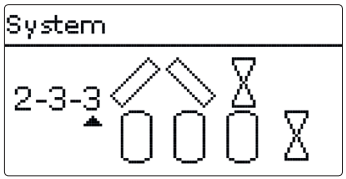

## System 2.3.2




| Sensors | | Relays; PWM/0-10 | |
|---|---|---|---|
| Collector 1 | S1 | Solar pump tank 1 | R1; A |
| Tank 1 base | S2 | Solar pump tank 2 | R2; B |
| Tank 2 base | S4 | Solar pump tank 3 | R3; C |
| Tank 3 base | S5 | 2-PV collector 1 | R4 |
| Collector 2 | S6 | 2-PV collector 2 | R5 |

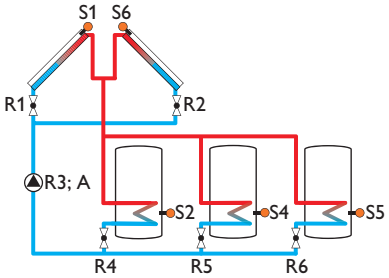


## System 2.3.3

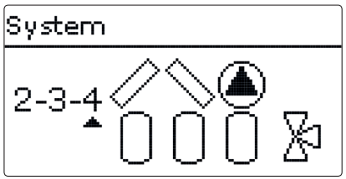



| Sensors | |
|---|---|
| Collector 1 | S1 |
| Tank 1 base | S2 |
| Tank 2 base | S4 |
| Tank 3 base | S5 |
| Collector 2 | S6 |

| Relays; PWM/0-10 | |
|---|---|
| 2-PV collector 1 | R1 |
| 2-PV collector 2 | R2 |
| Solar pump | R3;A |
| 2-PV tank 1 | R4 |
| 2-PV tank 2 | R5 |
| 2-PV tank 3 | R6 |

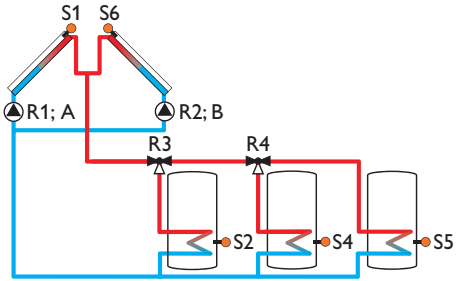



## System 2.3.4

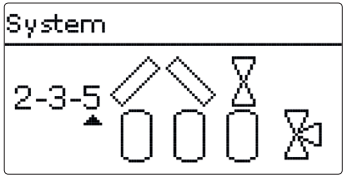



| Sensors | |
|---|---|
| Collector 1 | S1 |
| Tank 1 base | S2 |
| Tank 2 base | S4 |
| Tank 3 base | S5 |
| Collector 2 | S6 |

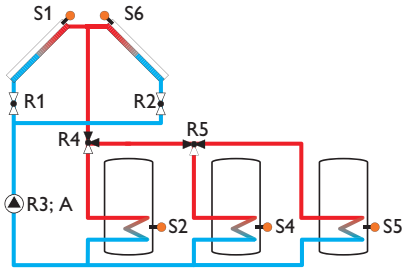
| Relays; PWM/0-10 | |
|---|---|
| Pump collector 1 | R1;A |
| Pump collector 2 | R2; B |
| 3-PV tank 1 | R3 |
| 3-PV tank 2 | R4 |



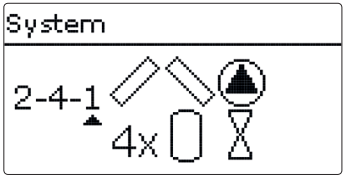
**System 2.3.5**



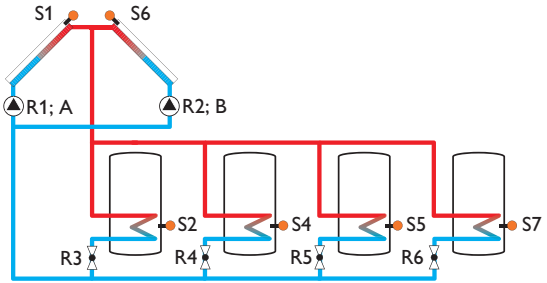

| Sensors | | Relays; PWM/0-10 | |
|---|---|---|---|
| Collector 1 | S1 | 2-PV collector 1 | R1 |
| Tank 1 base | S2 | 2-PV collector 2 | R2 |
| Tank 2 base | S4 | Solar pump | R3;A |
| Tank 3 base | S5 | 3-PV tank 1 | R4 |
| Collector 2 | S6 | 3-PV tank 2 | R5 |



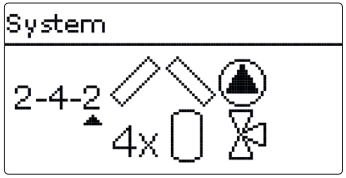

**System 2.4.1**



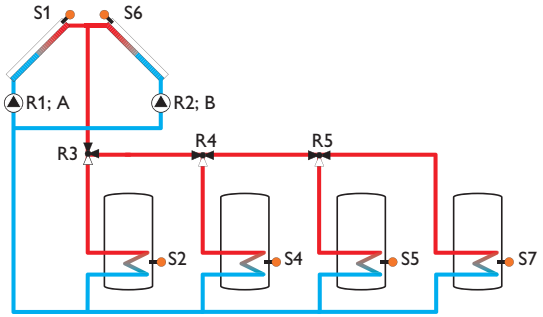

| Sensors | | Relays; PWM/0-10 | |
|---|---|---|---|
| Collector 1 | S1 | Pump collector 1 | R1;A |
| Tank 1 base | S2 | Pump collector 2 | R2; B |
| Tank 2 base | S4 | 2-PV tank 1 | R3 |
| Tank 3 base | S5 | 2-PV tank 2 | R4 |
| Collector 2 | S6 | 2-PV tank 3 | R5 |
| Tank 4 base | S7 | 2-PV tank 4 | R6 |



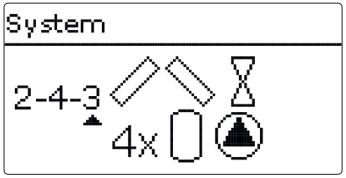
### System 2.4.2



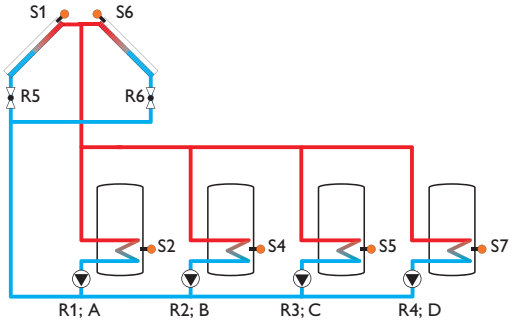

| Sensors | | Relays; PWM/0-10 | |
|---|---|---|---|
| Collector 1 | S1 | Pump collector 1 | R1; A |
| Tank 1 base | S2 | Pump collector 2 | R2; B |
| Tank 2 base | S4 | 3-PV tank 1 | R3 |
| Tank 3 base | S5 | 3-PV tank 2 | R4 |
| Collector 2 | S6 | 3-PV tank 3 | R5 |
| Tank 4 base | S7 | | |



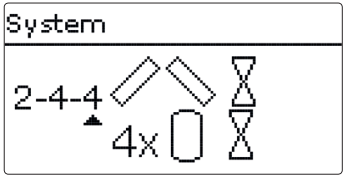

### System 2.4.3




| Sensors | | Relays; PWM/0-10 | |
|---|---|---|---|
| Collector 1 | S1 | Solar pump tank 1 | R1; A |
| Tank 1 base | S2 | Solar pump tank 2 | R2; B |
| Tank 2 base | S4 | Solar pump tank 3 | R3; C |
| Tank 3 base | S5 | Solar pump tank 4 | R4; D |
| Collector 2 | S6 | 2-PV collector 1 | R5 |
| Tank 4 base | S7 | 2-PV collector 2 | R6 |

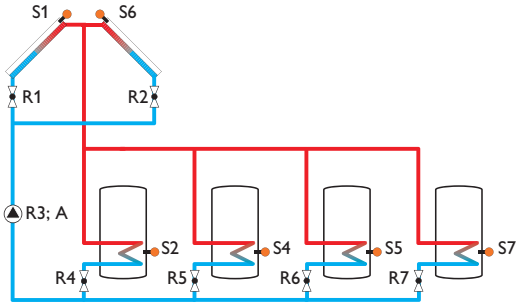


### System 2.4.4

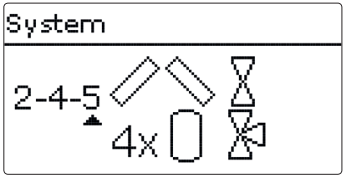



| Sensors | |
|---|---|
| Collector 1 | S1 |
| Tank 1 base | S2 |
| Tank 2 base | S4 |
| Tank 3 base | S5 |
| Collector 2 | S6 |
| Tank 4 base | S7 |

| Relays; PWM/0-10 | |
|---|---|
| 2-PV collector 1 | R1 |
| 2-PV collector 2 | R2 |
| Solar pump | R3; A |
| 2-PV tank 1 | R4 |
| 2-PV tank 2 | R5 |
| 2-PV tank 3 | R6 |
| 2-PV tank 4 | R7 |

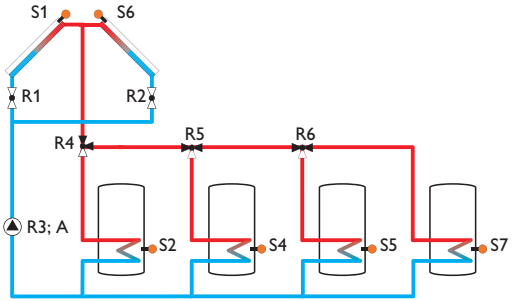



### System 2.4.5

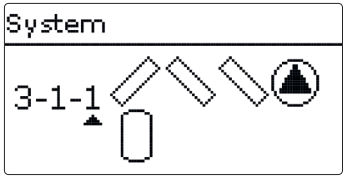



| Sensors | |
|---|---|
| Collector 1 | S1 |
| Tank 1 base | S2 |
| Tank 2 base | S4 |
| Tank 3 base | S5 |
| Collector 2 | S6 |
| Tank 4 base | S7 |

| Relays; PWM/0-10 | |
|---|---|
| 2-PV collector 1 | R1 |
| 2-PV collector 2 | R2 |
| Solar pump | R3; A |
| 3-PV tank 1 | R4 |
| 3-PV tank 2 | R5 |
| 3-PV tank 3 | R6 |

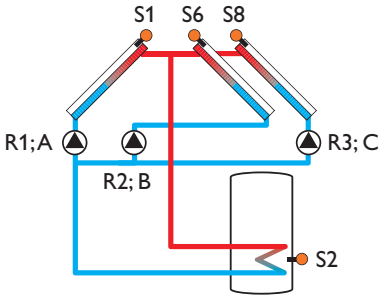


## System 3.1.1

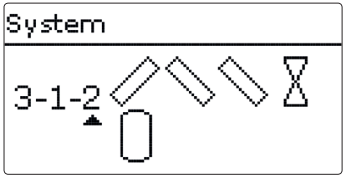



| Sensors | |
|---|---|
| Collector 1 | S1 |
| Tank base | S2 |
| Collector 2 | S6 |
| Collector 3 | S8 |

| Relays; PWM/0-10 | |
|---|---|
| Pump collector 1 | R1;A |
| Pump collector 2 | R2; B |
| Pump collector 3 | R3; C |

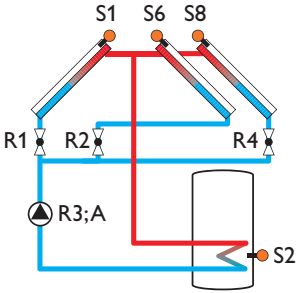



## System 3.1.2

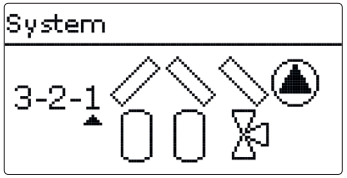



| Sensors | |
|---|---|
| Collector 1 | S1 |
| Tank base | S2 |
| Collector 2 | S6 |
| Collector 3 | S8 |

| Relays; PWM/0-10 | |
|---|---|
| 2-PV collector 1 | R1 |
| 2-PV collector 2 | R2 |
| Solar pump | R3;A |
| 2-PV collector 3 | R4 |

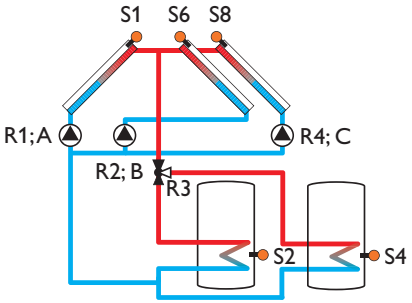


**System 3.2.1**

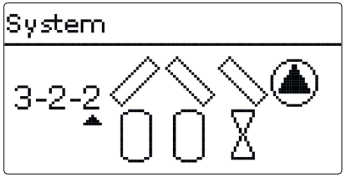



| Sensors | |
|---|---|
| Collector 1 | S1 |
| Tank 1 base | S2 |
| Tank 2 base | S4 |
| Collector 2 | S6 |
| Collector 3 | S8 |

| Relays; PWM/0-10 | |
|---|---|
| Pump collector 1 | R1; A |
| Pump collector 2 | R2; B |
| 3-PV tank 2 | R3 |
| Pump collector 3 | R4; C |

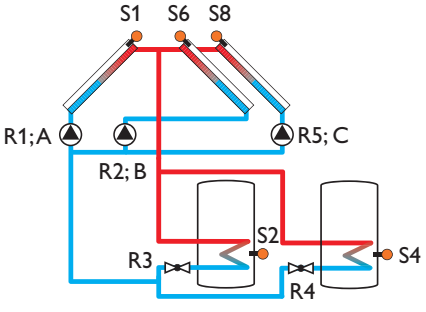



**System 3.2.2**

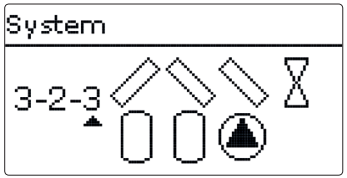



| Sensors | |
|---|---|
| Collector 1 | S1 |
| Tank 1 base | S2 |
| Tank 2 base | S4 |
| Collector 2 | S6 |
| Collector 3 | S8 |

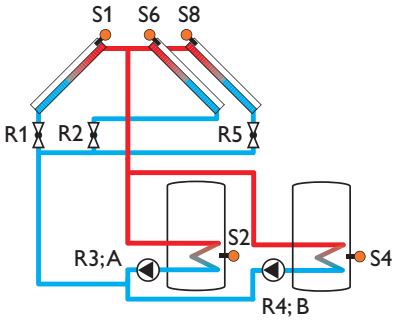
| Relays; PWM/0-10 | |
|---|---|
| Pump collector 1 | R1; A |
| Pump collector 2 | R2; B |
| 2-PV tank 1 | R3 |
| 2-PV tank 2 | R4 |
| Pump collector 3 | R5; C |



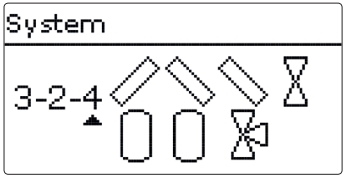
## System 3.2.3



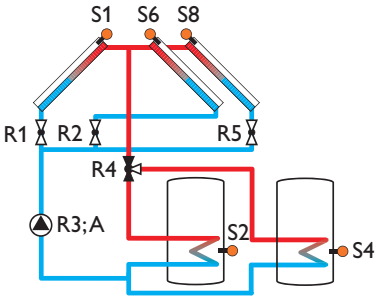

| Sensors | | Relays; PWM/0-10 | |
|---|---|---|---|
| Collector 1 | S1 | 2-PV collector 1 | R1 |
| Tank 1 base | S2 | 2-PV collector 2 | R2 |
| Tank 2 base | S4 | Solar pump tank 1 | R3;A |
| Collector 2 | S6 | Solar pump tank 2 | R4; B |
| Collector 3 | S8 | 2-PV collector 3 | R5 |



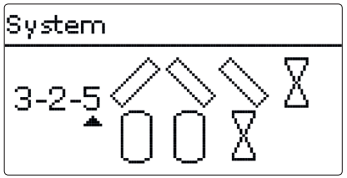

## System 3.2.4




| Sensors | | Relays; PWM/0-10 | |
|---|---|---|---|
| Collector 1 | S1 | 2-PV collector 1 | R1 |
| Tank 1 base | S2 | 2-PV collector 2 | R2 |
| Tank 2 base | S4 | Solar pump | R3;A |
| Collector 2 | S6 | 3-PV tank 2 | R4 |
| Collector 3 | S8 | 2-PV collector 3 | R5 |

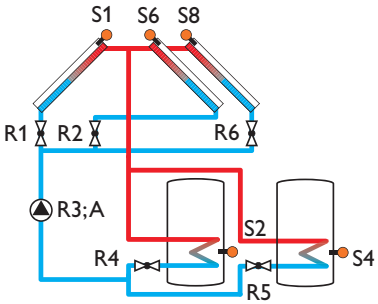


**System 3.2.5**

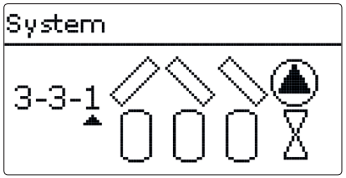



| Sensors | |
|---|---|
| Collector 1 | S1 |
| Tank 1 base | S2 |
| Tank 2 base | S4 |
| Collector 2 | S6 |
| Collector 3 | S8 |

| Relays; PWM/0-10 | |
|---|---|
| 2-PV collector 1 | R1 |
| 2-PV collector 2 | R2 |
| Solar pump | R3;A |
| 2-PV tank 1 | R4 |
| 2-PV tank 2 | R5 |
| 2-PV collector 3 | R6 |

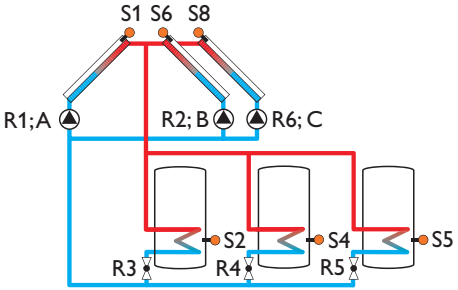



**System 3.3.1**

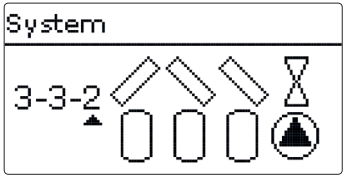



| Sensors | |
|---|---|
| Collector 1 | S1 |
| Tank 1 base | S2 |
| Tank 2 base | S4 |
| Tank 3 base | S5 |
| Collector 2 | S6 |
| Collector 3 | S8 |

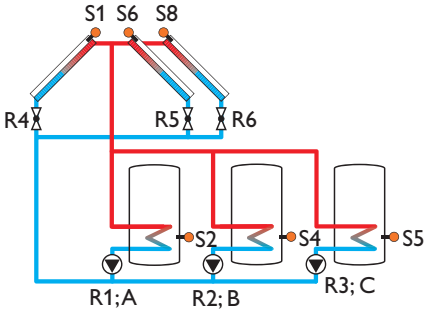
| Relays; PWM/0-10 | |
|---|---|
| Pump collector 1 | R1;A |
| Pump collector 2 | R2; B |
| 2-PV tank 1 | R3 |
| 2-PV tank 2 | R4 |
| 2-PV tank 3 | R5 |
| Pump collector 3 | R6; C |



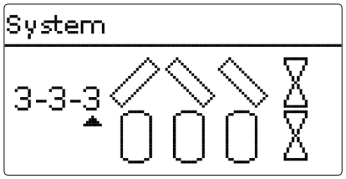
### System 3.3.2



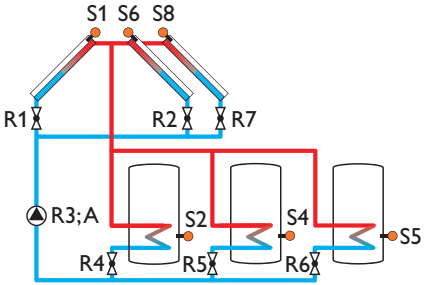

| Sensors | | Relays; PWM/0-10 | |
|---|---|---|---|
| Collector 1 | S1 | Solar pump tank 1 | R1; A |
| Tank 1 base | S2 | Solar pump tank 2 | R2; B |
| Tank 2 base | S4 | Solar pump tank 3 | R3; C |
| Tank 3 base | S5 | 2-PV collector 1 | R4 |
| Collector 2 | S6 | 2-PV collector 2 | R5 |
| Collector 3 | S8 | 2-PV collector 3 | R6 |



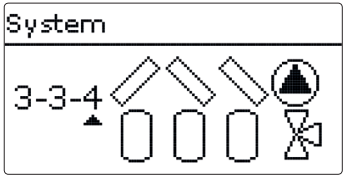

### System 3.3.3




| Sensors | | Relays; PWM/0-10 | |
|---|---|---|---|
| Collector 1 | S1 | 2-PV collector 1 | R1 |
| Tank 1 base | S2 | 2-PV collector 2 | R2 |
| Tank 2 base | S4 | Solar pump | R3; A |
| Tank 3 base | S5 | 2-PV tank 1 | R4 |
| Collector 2 | S6 | 2-PV tank 2 | R5 |
| Collector 3 | S8 | 2-PV tank 3 | R6 |
| | | 2-PV collector 3 | R7 |

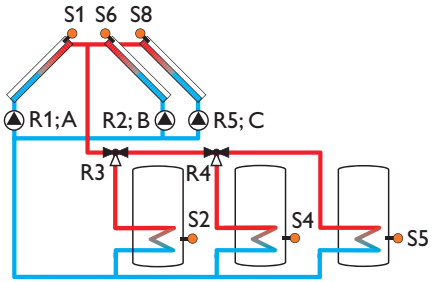


### System 3.3.4

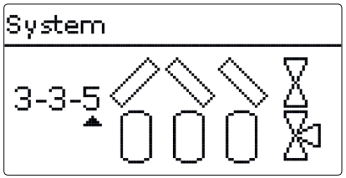



| Sensors | |
|---|---|
| Collector 1 | S1 |
| Tank 1 base | S2 |
| Tank 2 base | S4 |
| Tank 3 base | S5 |
| Collector 2 | S6 |
| Collector 3 | S8 |

| Relays; PWM/0-10 | |
|---|---|
| Pump collector 1 | R1; A |
| Pump collector 2 | R2; B |
| 3-PV tank 1 | R3 |
| 3-PV tank 2 | R4 |
| Pump collector 3 | R5; C |

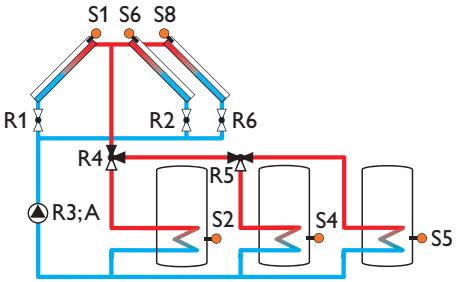



### System 3.3.5

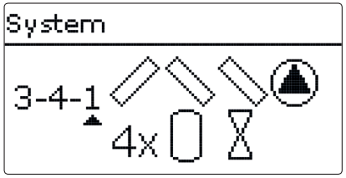



| Sensors | |
|---|---|
| Collector 1 | S1 |
| Tank 1 base | S2 |
| Tank 2 base | S4 |
| Tank 3 base | S5 |
| Collector 2 | S6 |
| Collector 3 | S8 |

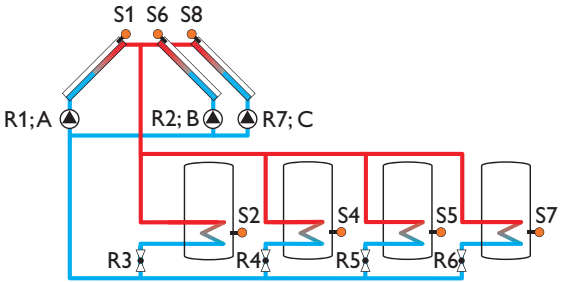
| Relays; PWM/0-10 | |
|---|---|
| 2-PV collector 1 | R1 |
| 2-PV collector 2 | R2 |
| Solar pump | R3; A |
| 3-PV tank 1 | R4 |
| 3-PV tank 2 | R5 |
| 2-PV collector 3 | R6 |



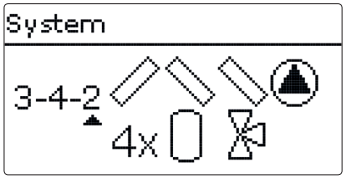
## System 3.4.1



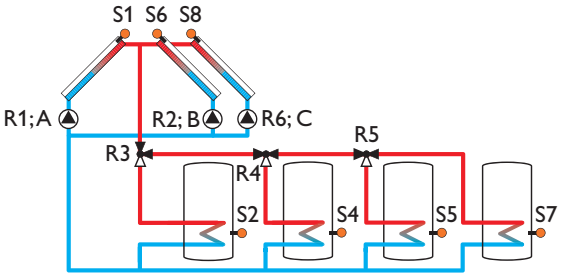

| Sensors | | Relays; PWM/0-10 | |
|---|---|---|---|
| Collector 1 | S1 | Pump collector 1 | R1; A |
| Tank 1 base | S2 | Pump collector 2 | R2; B |
| Tank 2 base | S4 | 2-PV tank 1 | R3 |
| Tank 3 base | S5 | 2-PV tank 2 | R4 |
| Collector 2 | S6 | 2-PV tank 3 | R5 |
| Tank 4 base | S7 | 2-PV tank 4 | R6 |
| Collector 3 | S8 | Pump collector 3 | R7; C |



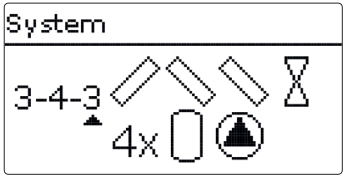

## System 3.4.2




| Sensors | | Relays; PWM/0-10 | |
|---|---|---|---|
| Collector 1 | S1 | Pump collector 1 | R1; A |
| Tank 1 base | S2 | Pump collector 2 | R2; B |
| Tank 2 base | S4 | 3-PV tank 1 | R3 |
| Tank 3 base | S5 | 3-PV tank 2 | R4 |
| Collector 2 | S6 | 3-PV tank 3 | R5 |
| Tank 4 base | S7 | Pump collector 3 | R6; C |
| Collector 3 | S8 | | |

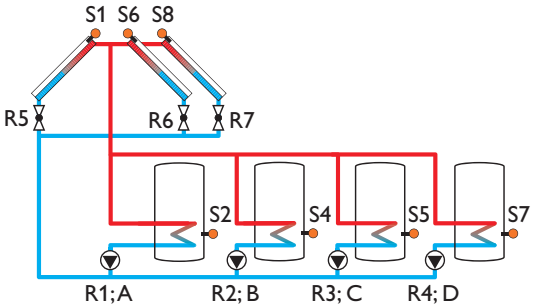


## System 3.4.3

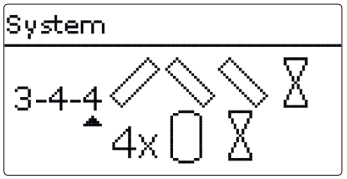



| Sensors | |
|---|---|
| Collector 1 | S1 |
| Tank 1 base | S2 |
| Tank 2 base | S4 |
| Tank 3 base | S5 |
| Collector 2 | S6 |
| Tank 4 base | S7 |
| Collector 3 | S8 |

| Relays; PWM/0-10 | |
|---|---|
| Solar pump tank 1 | R1; A |
| Solar pump tank 2 | R2; B |
| Solar pump tank 3 | R3; C |
| Solar pump tank 4 | R4; D |
| 2-PV collector 1 | R5 |
| 2-PV collector 2 | R6 |
| 2-PV collector 3 | R7 |

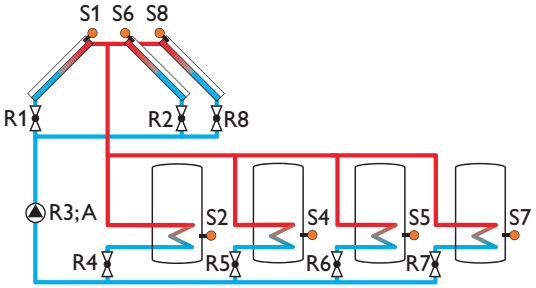



## System 3.4.4

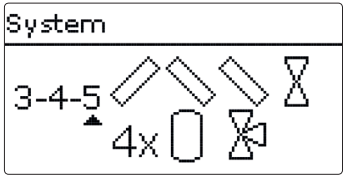



| Sensors | |
|---|---|
| Collector 1 | S1 |
| Tank 1 base | S2 |
| Tank 2 base | S4 |
| Tank 3 base | S5 |
| Collector 2 | S6 |
| Tank 4 base | S7 |
| Collector 3 | S8 |

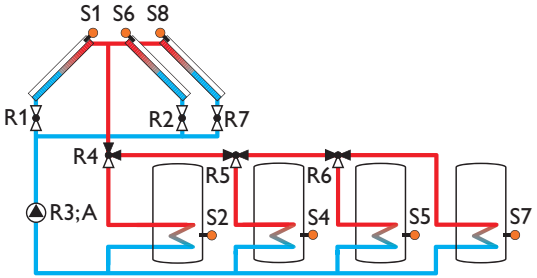
| Relays; PWM/0-10 | |
|---|---|
| 2-PV collector 1 | R1 |
| 2-PV collector 2 | R2 |
| Solar pump | R3; A |
| 2-PV tank 1 | R4 |
| 2-PV tank 2 | R5 |
| 2-PV tank 3 | R6 |
| 2-PV tank 4 | R7 |
| 2-PV collector 3 | R8 |



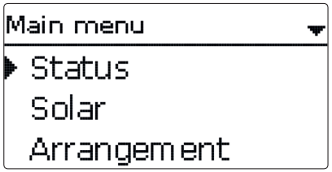
**System 3.4.5**




| Sensors | | Relays; PWM/0-10 | |
|---|---|---|---|
| Collector 1 | S1 | 2-PV collector 1 | R1 |
| Tank 1 base | S2 | 2-PV collector 2 | R2 |
| Tank 2 base | S4 | Solar pump | R3;A |
| Tank 3 base | S5 | 3-PV tank 1 | R4 |
| Collector 2 | S6 | 3-PV tank 2 | R5 |
| Tank 4 base | S7 | 3-PV tank 3 | R6 |
| Collector 3 | S8 | 2-PV collector 3 | R7 |




## 6 Main menu




In this menu, the different menu areas can be selected.

The following menus are available:

- Status
- Solar
- Arrangement
- Heating
- HQM
- Basic settings
- SD card
- Manual mode
- User code
- Inputs / Modules

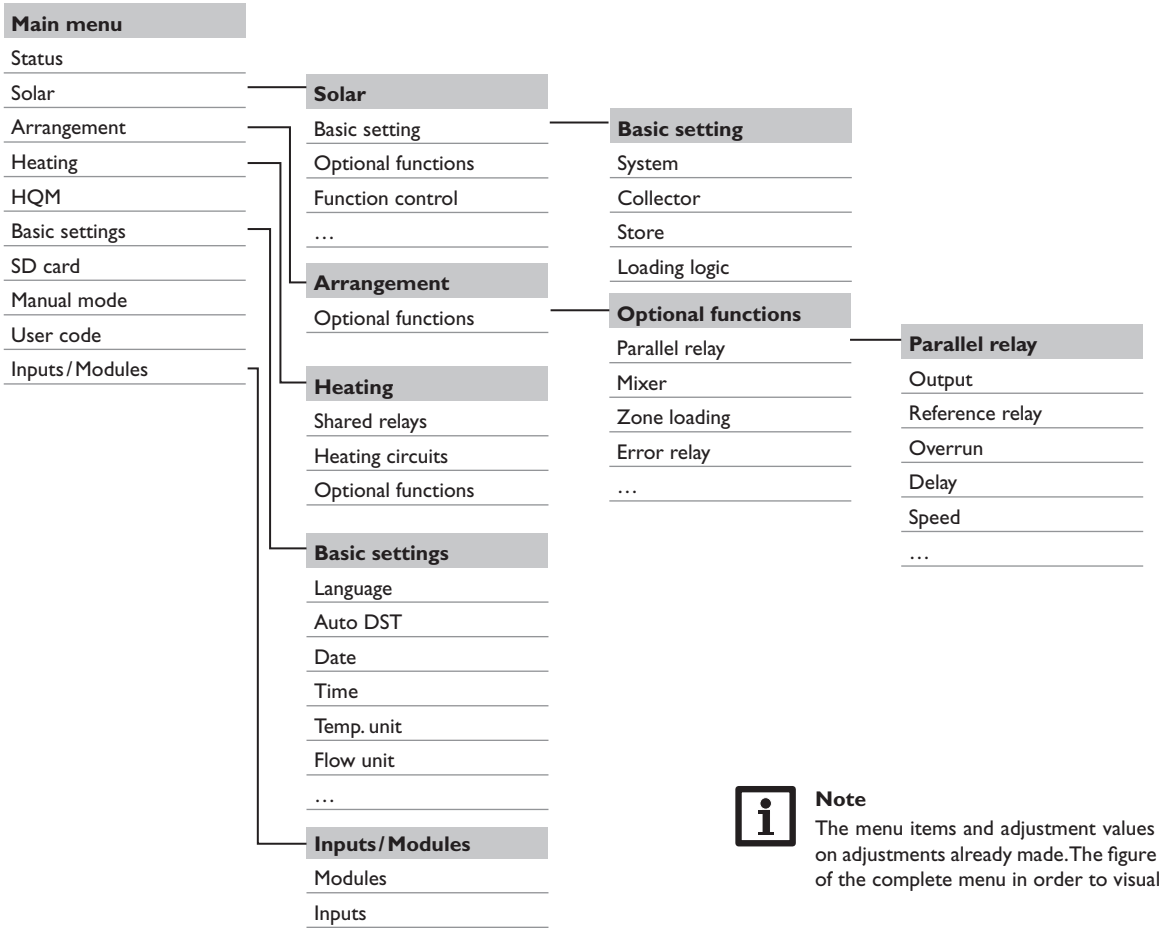
➔ Select the menu area by pressing buttons 1 and 3.

➔ Press button 5 in order to enter the menu area selected.

**Note**

If no button is pressed for 1 min, the display illumination goes out. After 4 further minutes, the controller will display the home screen (see page 47).

➔ In order to get from the status menu into the main menu, press button 7!



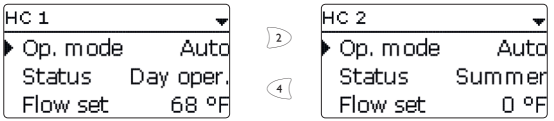

**Note**

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 visualize the menu structure.

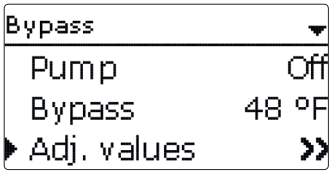
# 7 Status

In the status menu of the controller, the status messages for every menu area can be found.

Use the buttons 2 and 4 for scrolling through the status menu.




At the end of each submenu, the menu item **Adjustment values** can be found.




If **Adjustment values** is selected, the corresponding menu will open.

➔ In order to get back to the status menu, press button 7.

## 7.1 Measured / Balance values

In the **Status / Meas. / Balance values** 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 buttons 2 and 4 to scroll to these functions. The sensors and relays of the controller and all modules connected are listed in numerical order.

## 7.2 Solar

The **Status / Solar** menu shows all status information of the solar system and all optional functions activated.

## 7.3 Arrangement

The **Status / Arrangement** menu shows all status information of all activated optional functions of the arrangement.

## 7.4 Heating

In the **Status / Heating** menu, the status of the demands and heating circuits activated as well as of the selected optional functions is indicated.

## 7.5 HQM

In the **Status / HQM** menu, all current measured values of the flow and return sensors, flow rate and power as well as heat quantities are indicated.

## 7.6 Messages


In the **Status / Messages** menu, error and warning messages are indicated.

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

When a monitoring function from the functionality control is activated and detects a fault condition, a corresponding message will be indicated (see table page 61).

A message consists of the name of the monitoring function, a 4-digit error code and a short text description of the fault condition.

In order to acknowledge a message, proceed as follows:

➔ Select the code line of the desired message by pressing buttons 1 and 3.

➔ Acknowledge the message by pressing button 5.

➔ Confirm the security enquiry by selecting **Yes**.

When the installer user code has been entered, the menu item **Restarts** will appear below the messages. The value indicates the number of controller restarts since commissioning. This value cannot be reset.

| Error code | Display | Monitoring function | Cause |
|---|---|---|---|
| 0001 | !Sensor fault! | Sensor line break | Sensor line broken |
| 0002 | !Sensor fault! | Sensor short circuit | Sensor line short-circuited |
| 0011 | !DT too high! | ΔT too high | Collector 50 K [90 °R] > than tank to be loaded |
| 0021 | !Night circulation! | Night circulation | Betw. 11 p.m. and 5 a.m. col. temp > 40 °C [104 °F] |
| 0031 | !FL/RE interch.! | FL/RL interchanged | Col. temp. does not rise after switching on |
| 0041 | !Flow r. monit.! | Flow rate monitoring | No flow rate at sensor |
| 0051 | !Overpressure! | Overpressure monitoring | Max. system pressure exceeded |
| 0052 | !Low pressure! | Low pressure monitoring | System pressure below minimum |
| 0061 | !Data storage! | Storing and changing adjustments not possible | |
| 0071 | !RTC! | Time-controlled functions (e. g. night correction) not possible | |
| 0081 | !Store max. temp. | Maximum tank temperature | St. max has been exceeded |
| 0091 | Restarts | Restart counter (non-adjustable) | Number of restarts since commissioning |

**Note**

The functionality control **Flow and return interchanged** according to the VDI guidelines 2169 can only correctly detect and indicate the error **0031 !FL/RE interch.!** if the collector sensor measures the temperature directly in the fluid at the collector outlet. If the collector sensor is not correctly placed, a false message may occur.

➔ Place the collector sensor directly in the fluid at the collector outlet or deactivate the **Flow and return interchanged** functionality control.

### 7.7 Home screen

In the **Home screen** menu, the menu which will appear if no button is pressed for a longer period of time can be selected.

## 8 Solar

In this menu, all adjustments for the solar part of the arrangement can be made. The **Solar** menu consists of the following submenus:

- Basic setting
- Optional functions
- Function control
- Holiday function
- Expert

### 8.1 Basic setting

In this menu, all Basic settings for the solar part of the arrangement can be adjusted.

In this menu, the hydronic system, which is the basis for the arrangement, can be adjusted. The setting is divided into number of collector fields and tanks as well as hydronic variant.

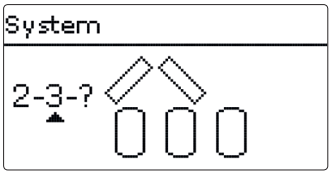
The number of collector fields and tanks as well as the hydronic variant have normally already been adjusted in the commissioning menu.

**Note**

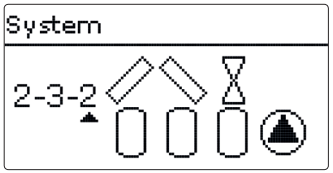
If the setting is changed later on, all adjustments for the solar part of the arrangement will be set back to their factory settings.

If the change causes the solar system to require a relay or a PWM / 0-10 V output that has been allocated to an arrangement or heating function before, the relay or the PWM / 0-10 V output respectively will be removed from the non-solar function.

The system selected is visualized by the corresponding number of tank and collector symbols. The exemplary figure shows system 2.3.x with 2 collector fields and 3 tanks.




Afterwards, the hydronic variant can be selected. The variant is visualized on the display by means of pump and valve symbols. The exemplary figure shows the display indicated when system 2.3.2 has been selected.

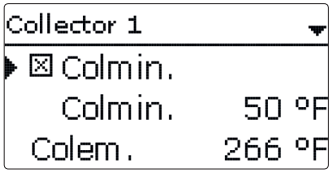



In this case, each collector field has a 2-port valve, the tanks are loaded by means of pump logic. For an overview of the systems and their variants see page 21.

The controller supports up to 3 collector fields and up to 5 solar tanks (with 2 or 3 collector fields only up to 4 solar tanks).

The following items in the **Solar / Basic setting** menu will adjust to the system selected.

**Collector (1 / 2 / 3)**



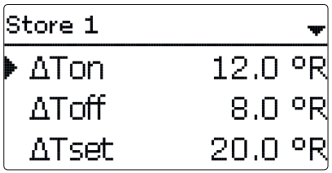

**Solar / Basic setting / Collector (1 / 2 / 3)**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Colmin. | Minimum collector limitation | Yes, No | Yes |
| Colmin. | Minimum collector temperature | 10 … 90 °C [50 … 194 °F] | 10 °C [50 °F] |
| Colem. | Collector emergency temperature | 80 … 200 °C [176 … 392 °F] | 130 °C [266 °F] |

In systems with 2 or 3 collector fields, up to 3 seperate menu items (Collector 1 and Collector 2) are displayed instead of **Collector**.

For each collector field, a Collector minimum limitation and a Collector emergency shutdown temperature can be adjusted.

**Store (1 / 2 / 3 / 4 / 5)**




**Solar / Basic setting / Store (1 / 2 / 3 / 4 / 5)**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| ΔTon | Switch-on temperature difference | 1.0 … 20.0 K [2.0 … 40.0 °R] | 6.0 K [12.0 °R] |
| ΔToff | Switch-off temperature difference | 0.5 … 19.5 K [1.0 … 39.0 °R] | 4.0 K [8.0 °R] |
| ΔTset | Set temperature difference | 1.5 … 30.0 K [3.0 … 60.0 °R] | 10.0 K [20.0 °R] |
| Stset | Set tank temperature | 4 … 95 °C [40 … 204 °F] | 45 °C [114 °F] |
| Stmax | Maximum tank temperature | 4 … 95 °C [40 … 204 °F] | 60 °C [140 °F] |
| Priority | Tank priority | 1 … 5 | system dependent |
| HysSt | Hysteresis set and maximum tank temperature | 0.1 … 10.0 K [0.2 … 20.0 °R] | 2.0 K [4.0 °R] |
| Rise | Rise value | 1.0 … 20.0 K [2.0 … 40.0 °R] | 2.0 K [4.0 °R] |
| tMin | Minimum runtime | 0 … 300 s | 30 s |
| Min. speed | Minimum speed | 20 … 100 % | 30 % |
| Store | Blocked for solar loading | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |

In systems with 2 or more tanks, the corresponding number of separate menu items (**Store 1** to **Store 5**) is displayed instead of **Store**.

For each tank, an individual ΔT control, a Set and a Maximum temperature, the Priority (in multi-tank systems), a Hysteresis, a Rise value, a Minimum runtime and a

Minimum pump speed can be adjusted.

In multi-tank systems with differing Set tank / Maximum tank temperatures, all tanks are first loaded up to their **Set tank** temperatures, then up to their **Maximum tank temperatures** (according to their priority and the tank sequence control). If one of the tanks does not reach its set temperature, e. g. because the temperature difference is not sufficiently high, the subsequent tank will be loaded past its set temperature up to its maximum temperature, if the switch-on condition is fulfilled.

The tank number refers to the corresponding tank sensor, not to the priority of the tank. In the **Priority** channel, the corresponding tank number is suggested as factory setting, but may be changed at will.

The tank numbers refer to the sensors as follows:

Tank 1 = Sensor S2

Tank 2 = Sensor S4

Tank 3 = Sensor S5

Tank 4 = Sensor S6 or S7

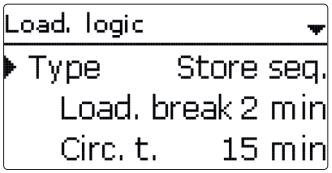
Tank 5 = Sensor S7

Each loading process will be carried out for the duration of the **Minimum runtime** at least, regardless of the switch-off condition.

**Note**

In order to prevent system damage, the controller is also equipped with an integrated tank emergency shutdown, deactivating the complete solar system if one of the tanks reaches 95 °C [200 °F].

**Loading logic**




**Solar / Basic setting / Load. logic**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Type | Loading logic type | Store seq./Succ. loading | Store seq. |
| Load. break | Loading break time | 1 … 5 min | 2 min |
| Circ. t. | Circulation time | 1 … 60 min | 15 min |
| Break speed | Break speed option | Yes, No | No |
| Speed | Loading break time speed | 20 … 100 % | 30 % |
| Spreaded loading | Spreaded loading option | Yes, No | No |
| ΔT | Spread temperature difference | 20 … 90 K [40 … 180 °R] | 40 K [80 °R] |
| Pump delay | Pump delay | Yes, No | No |
| Delay | Delay time | 5 … 600 s | 15 s |

In systems with 2 or more tanks, loading logic adjustments can be made in this menu.

In systems with 1 tank, only the menu item **Pump delay** will be available.

**Tank sequence control**

If the priority tank cannot be loaded, the subordinate tank next in priority will be checked. If useful heat can be added, it will be loaded for the circulation time. After the **Circulation time** has elapsed, the loading process will stop and the controller will monitor the increase in collector temperature during the **Loading break time**. If it increases by 2 K [4 °Ra], the break time timer will start again to allow the collector to gain more heat. If the collector temperature does not increase sufficiently, the subordinate tank will be loaded again for the **Circulation time** as before.

As soon as the switch-on condition of the priority tank is fulfilled, it will be loaded. If the switch-on condition of the priority tank is not fulfilled, loading of the subordinate tank will be continued. If the priority tank reaches its maximum temperature, tank sequence control will not be carried out.

**Successive loading**

Successive loading means that the priority tank will be loaded up to its maximum temperature. If it is reached, the next tank available for heating will be loaded. If the temperature of the priority tank falls below the set tank temperature, the next tank will no longer be loaded, regardless of whether the switch-on conditions of the priority tank or of the subordinate tank are fulfilled or not.

If all tank have been loaded to their set temperature, the same process will take place until the tanks have reached their maximum temperature.

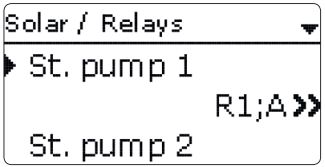
Each loading process will be carried out for the **Minimum runtime** (Solar / Basic setting / Store) at least, regardless of the switch-off condition.

**Spreaded loading option**

In multi-tank systems without 3-port valves, a spreaded loading function can be activated: As soon as the adjustable **Spread temperature difference** between the collector and the priority tank is reached, the next tank will be loaded in parallel unless it is blocked. If the temperature difference falls by 2 K [4 °Ra] below the DT value, the pump will be switched off.

The collector temperature has to be higher than the tank temperature.

**Relay**

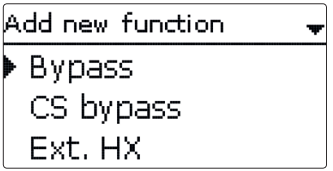



**Solar / Basic setting / Relay**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Relay | Relay display | system dependent | system dependent |
| PWM/0-10 V | PWM/0-10 V option | Yes, No | No |
| Output | Signal output selection | system dependent | system dependent |
| Signal | Signal type | PWM, 0-10 V | PWM |
| Profile | Characteristic curve | Solar, Heating | Solar |
| Speed | Speed control | Yes, No | system dependent |
| Min. | Minimum speed | 20 … 100 % | 20 % |
| Max. | Maximum speed | 20 … 100 % | 100 % |
| Adapter | Adapter option | Yes, No | No |
| Inverted | Inverted switching option | Yes, No | No |
| Blocking protection | Blocking protection option | Yes, No | No |
| Manual mode | Operating mode | Max, Auto, Min, Off | Auto |

This submenu indicates the components to which the ouputs of the system selected have been allocated. All adjustments required for the outputs can be made in this menu.

## 8.2 Optional functions



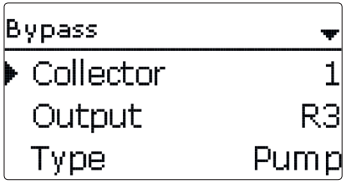

In this menu, additional functions can be selected and adjusted for the solar part of the arrangement.

The kind and number of optional functions offered depends on the previous adjustments.

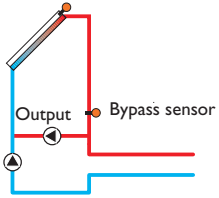
**Note**

For further information about adjusting optional functions, see page 14.

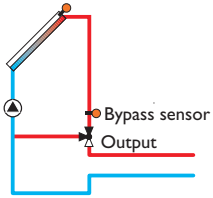
## Bypass



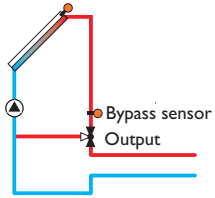

**Type pump**




**Type valve**




**Type valve (inverted)**

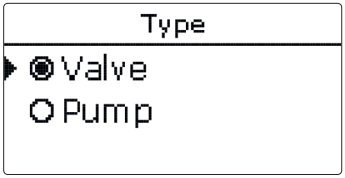



Exemplary schematics for the bypass variants

### Solar / Opt. functions / Add new function / Bypass

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Collector | Collector field | system dependent | system dependent |
| Output | Bypass output | system dependent | system dependent |
| Type | Variant (pump or valve logic) | Pump, Valve | Pump |
| Inverted | Valve logic inversion | Yes, No | No |
| Sensor | Bypass sensor | system dependent | system dependent |
| ΔTon | Bypass switch-on temperature difference | 1.0 … 20.0 K [2.0 … 40.0 °R] | 6.0 K [12.0 °R] |
| ΔToff | Bypass switch-off temperature difference | 0.5 … 19.5 K [1.0 … 39.0 °R] | 4.0 K [8.0 °R] |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |

The **Bypass** function can be used for avoiding an energy loss directly after the solar circuit has been switched on. The still cold heat transfer medium in the pipework is diverted through a bypass past the tank. Once the pipe is warm enough, the tank can be loaded.




Depending on whether the bypass is energized by a valve or by a second pump, a corresponding adjustment can be made in the menu item **Type**. Depending on the variant, different control logics are applied:

### Type pump

In this version, a bypass pump is placed in front of the solar pump.

The bypass pump is first activated when tank loading is possible. If the temperature difference between the **Bypass** sensor and the tank sensor reaches the **Bypass switch-on temperature difference**, the bypass pump is switched off and the solar pump is switched on instead.

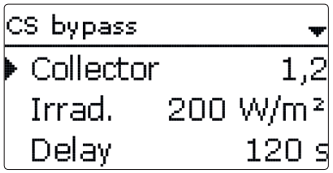
### Type valve

A bypass valve is placed into the solar circuit.

The solar heat exchanger is first bypassed when tank loading is possible. If the temperature difference between the **Bypass sensor** and the tank sensor reaches the **Bypass switch-on temperature difference**, the bypass relay operates the valve and solar loading starts.

When the Valve type is selected, the option **Inverted** will be additionally available. When the Inverted option and the bypass circuit are activated, the relay switches on. If the temperature difference between the **Bypass sensor** and the tank sensor reaches the **Bypass switch-on temperature difference**, the relay switches off.

**CS bypass**




**Solar / Opt. functions / Add new function / CS bypass**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Collector | Collector field | system dependent | system dependent |
| Irrad. | Switch-on irradiation | 100 … 500 W/m² | 200 W / m² |
| Delay | Delay time | 10 … 300 s | 120 s |
| Stmax off | Switch-on suppression | Yes, No | Yes |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |

The **CS bypass function** is a further possibility to activate the solar circuit.

**Note**
To enable the use of the CS bypass function, a CS10 irradiation sensor has to be connected.

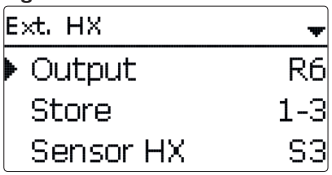
When the CS bypass function is activated, the Irradiation value is the switch-on condition for the collector circuit.

The output remains switched on if the irradiation value is exceeded for the Delay time. When solar loading begins or the irradiation value remains below the switch-on value for the delay time, the relay is switched off.

If the **Switch-on suppression** option off is activated, collector circuit activation will be suppressed as long as all tank temperatures are above their respective maximum temperatures.

**Note**
If both the CS bypass and the bypass function are activated, the CS bypass will only affect the bypass. For this purpose, use S1 as the bypass sensor.

**External heat exchanger**




**Solar / Opt. functions / Add new function / Ext. HX**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Output | Output selection | system dependent | system dependent |
| Store | Tank selection | system dependent | all stores |
| Sensor HX | Reference sensor external heat exchanger | system dependent | system dependent |
| Target temp. | Target temperature option | Yes, No | No |
| Sensor | Target temperature reference sensor | system dependent | system dependent |
| Targ. temp. | Target temperature | 15 … 95 °C [60 … 204 °F] | 60 °C [140 °F] |
| ΔTon | Switch-on temperature difference | 1.0 … 20.0 K [2.0 … 40.0 °R] | 10.0 K [20.0 °R] |
| ΔToff | Switch-off temperature difference | 0.5 … 19.5 K [1.0 … 39.0 °R] | 5.0 K [10.0 °R] |
| Overrun | Overrun time | 0 … 15 min | 2 min |
| Save / Delete function | Save or delete function | - | - |

This function is used to link loading circuits that are separated by an external heat exchanger.

The allocated **Output** will be energized if one of the selected tanks is being loaded and there is a temperature difference between the sensor of the corresponding tank and the **Reference sensor external heat exchanger**.

Any number of the solar tanks can be selected.

The output will be switched off if this temperature difference falls below the adjusted switch-off difference.

The **Reference sensor external heat exchanger** can be arbitrarily allocated.

**Note**
In systems in which tanks are equipped with their own loading pumps, the heat exchanger relay controls the primary circuit pump.

If the **Target temperature** option is activated, the pump speed control logic will change. The controller will remain at the minimum pump speed until the temperature at the allocated sensor exceeds the adjusted target temperature.

If the temperature at the **Reference sensor target temperature** exceeds the target temperature by 5 K [10 °R] , the speed of the primary pump will be increased by 10 %. If the temperature again increases by 5 K [10 °R], the speed of the secondary pump will be adapted, too. Each temperature increase by 5 K [10 °R] will lead to an alternating adaptation of the primary and secondary pump speeds. If the temperature falls, the speed will be reduced correspondingly.

The heat exchanger is protected by a non-adjustable antifreeze function.

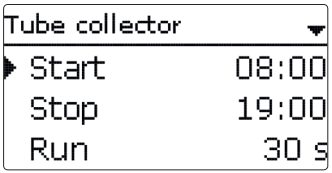
If the temperature at the heat exchanger sensor falls below the non-adjustable Antifreeze temperature 10 °C [50 °F], the controller will activate the secondary pump at 100 % speed. The Antifreeze function will use heat from the tank with the highest temperature. When all tanks have reached 10 °C [50 °F], the secondary pump will be switched off. If the temperature at the reference sensor external heat exchanger exceeds the antifreeze temperature by 2 K [4 °R], the secondary pump will be switched off.

The heat exchanger antifreeze function works independently from solar loading.

**Note**
Because of the special hydronics in systems with 2 or 3 collector fields, the **Target temperature** option will not work properly there.

**Note**
The heat exchanger is protected by a non-adjustable antifreeze function. Still, using a bypass is recommended.

**Evacuated tube collector function**




**Solar / Opt. functions / Add new function / Tube collector**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Start | Start time frame | 00:00 … 23:00 | 08:00 |
| Stop | Stop time frame | 00:30 … 23:30 | 19:00 |
| Run | Pump runtime | 5 … 600 s | 30 s |
| Break | Standstill interval | 1 … 60 min | 30 min |
| Collector | Collector field | system dependent | system dependent |
| Stmax off | Maximum tank temperature off | Yes, No | Yes |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |

This function is used for improving the switch-on behaviour in systems with non-ideal sensor positions (e. g. with some evacuated tube collectors).

This function operates within an adjusted time frame. It activates the collector circuit pump for an adjustable Runtime between adjustable Standstill intervals in order to compensate for the delayed temperature measurement.

If the runtime is set to more than 10 s, the pump will run at 100 % for the first 10 s of the runtime. For the remaining runtime, the pump will be run at the adjusted minimum speed.

If the collector sensor is defective or the collector is blocked, this function is suppressed or switched off.

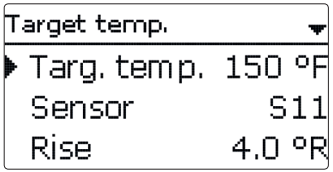
If the **Maximum tank temperature off** option is activated and the temperature of the tank to be loaded exceeds the maximum tank temperature, the evacuated tube collector function will be suppressed.

**2- and 3-collector systems**

In systems with 2 or 3 collector fields, the evacuated tube collector function will be available for each individual collector field.

The evacuated tube collector function will remain inactive for a collector field which is used for solar loading.

**Target temperature**



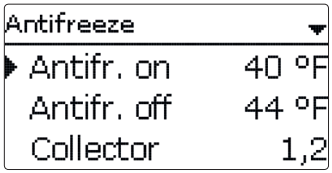

**Solar / Opt. functions / Add new function / Target temp.**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Targ. temp. | Target temperature | 20 … 110 °C [68 … 230 °F] | 65 °C [150 °F] |
| Sensor | Reference sensor | system dependent | system dependent |
| Rise | Rise value | 1.0 … 20.0 K [2.0 … 40.0 °R] | 2.0 K [4.0 °R] |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |

If the **Target temperature** function is activated, the pump speed control logic will change. The controller will remain at the minimum pump speed until the temperature at the allocated Sensor exceeds the adjusted Target temperature. Only then will the standard pump speed control start to operate. If the temperature at the allocated sensor changes by 1/10 of the adjusted rise value, the pump speed will be adjusted correspondingly.

If the **External heat exchanger** function with the **Target temperature** option (see page 52) is additionally activated, the target temperature control will pause while the external heat exchanger is being loaded. While the external heat exchanger is loaded, its own pump speed control will come into effect.

**Antifreeze**




**Solar / Opt. functions / Add new function / Antifreeze**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Antifr. on | Antifreeze switch-on temperature | -40 … +15 °C [-40 … +58 °F] | +4 °C [+40 °F] |
| Antifr. off | Antifreeze switch-off temperature | -39 … +16 °C [-39 … +60 °F] | +6 °C [+44 °F] |
| Collector | Collector field | system dependent | system dependent |
| Store (1 … 5) | Tank succession order | system dependent | system dependent |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |

The **Antifreeze** function activates the loading circuit between the collector and the tank when the collector temperature falls below the adjusted **Antifreeze switch-on temperature**. This will protect the fluid against freezing or coagulating. If the **Antifreeze switch-off temperature** is exceeded, the solar pump will be switched off again.

Heat will be extracted from the tanks according to the adjusted order. When all tanks have reached their minimum temperature of 5 °C [40 °F], the function becomes inactive.

If the function is activated, the pump will run at its maximum relative speed.

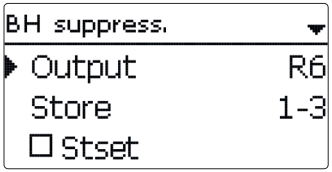
**Note**

Since this function uses the limited heat quantity of the tank, the antifreeze function should be used in regions with few days of temperatures around the freezing point.

**Note**

In systems with 2 or 3 collector fields, 2 or 3 separate menus will be displayed.

**Backup heating suppression**




**Solar / Opt. functions / Add new function / BH suppress.**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Output | Reference output | system dependent | system dependent |
| Store | Tank selection | system dependent | system dependent |
| Stset | Set tank temperature | Yes, No | No |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |

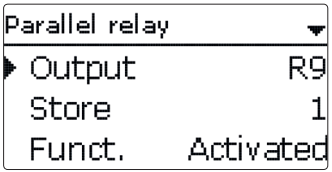
The **Backup heating suppression** blocks the conventional backup heating of a tank that is currently in solar loading.

This function is activated if a previously selected **Store** is being loaded by solar heat.

Solar loading means that tank loading is only carried out for energy supply and not for cooling purposes etc.

If the **Set temperature** option is activated, the backup heating will only be suppressed when the tank temperature exceeds the **Set tank temperature**.

**Parallel relay**




**Solar / Opt. functions / Add new function / Parallel relay**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Output | Parallel output | system dependent | system dependent |
| Store | Tank selection | system dependent | system dependent |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |

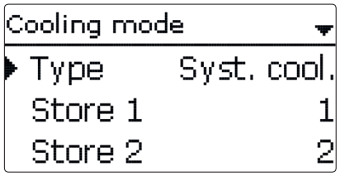
With this function, e. g. a valve can be controlled in parallel to a solar pump via a separate output.

Switch-on condition for the solar parallel relay function is that one or more of the selected tanks is being loaded. If one of the selected tanks is being loaded, the parallel output will be energized.

The parallel relay function operates regardless whether the tank is subjected to regular solar loading or to a loading caused by a solar optional function (such as the collector cooling).

**Note**
If a relay is in the manual mode, the selected parallel output will not be energized.

### Cooling mode




**Solar / Opt. functions / Add new function / Cooling mode**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Type | Cooling logic variant | Col. cool., Syst. cool., Off | Off |
| Tcolmax. | Collector maximum temperature | 70 … 190 °C [158 … 374 °F] | 100 °C [212 °F] |
| Store (1 … 5) | Tank succession order | system dependent | system dependent |
| St. cooling | Tank cooling option | Yes, No | No |
| ΔTon | Switch-on temperature difference | 1.0 … 30.0 K [2.0 … 60.0 °R] | 20.0 K [40.0 °R] |
| ΔToff | Switch-off temperature difference | 0.5 … 29.5 K [1.0 … 59.0 °R] | 15.0 K [30.0 °R] |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |

In the **Cooling mode** menu, different cooling functions are available. They can be used for keeping the solar system operational for a longer time during strong solar irradiation.

For this purpose, the adjusted maximum tank temperatures can be exceeded. The tank order for this overloading can be adjusted. Additionally, each individual tank can be excluded from this function.

2 variants are available for the cooling mode: **System cooling** and **Collector cooling**.

#### Type system cooling

If the system cooling variant has been selected and the **Switch-on temperature difference** is exceeded, tank loading will be continued even if the corresponding maximum temperature is exceeded, but only up to the emergency shutdown temperature. Tank loading will continue until all tanks have reached the emergency shutdown temperature or until the **Switch-off temperature difference** is reached.

#### Type collector cooling

If the collector cooling variant has been selected, tank loading will be continued or reactivated when the **Collector maximum temperature** is exceeded.

Tank loading will continue until all tanks have reached the **Emergency shutdown temperature** or until the collector temperature falls below the Collector maximum temperature by at least 5 K.

In systems with 2 or 3 collector fields, separate adjustments can be made for each collector field.

The control logic considers collector cooling operation as solar loading. The adjusted values for Delay, Minimum runtime etc. remain valid.

Additionally to each of the 2 variants, the **Store cooling option** can be activated.

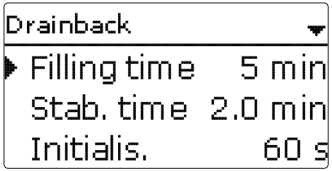
#### Store cooling option

When the store cooling option is activated, the controller aims to cool down the tank during the night in order to prepare it for solar loading on the following day.

When the store cooling option is activated, the solar pump will be switched on if the Maximum tank temperature is exceeded and the collector temperature falls below the tank temperature. The solar pump will remain active until the tank temperature falls below the adjusted Maximum tank temperature.

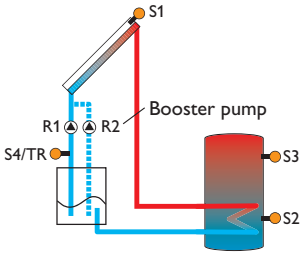
The tank order for the cooling is the same as in the overheating through system or collector cooling.

## Drainback option




**Solar / Opt. functions / Add new function / Drainback**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Filling time | Drainback flling time | 1 … 30 min | 5 min |
| Stab. time | Stabilization time | 1.0 … 15.0 min | 2.0 min |
| Initialis. | Initialization time | 1 … 100 s | 60 s |
| Booster | Booster option | Yes, No | No |
| Output | Output selection booster pump | system dependent | system dependent |
| Drain impulse | Drain impulse option | Yes, No | No |
| Delay | Delay time | 1 … 30 min | 3 min |
| Duration | Drain impulse loading duration | 1 … 60 s | 10 s |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Deactivated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |




Exemplary drainback system layout (R2 = booster pump)

In a drainback system the heat transfer fluid will flow into a holding tank if solar loading does not take place. The drainback option initiates the filling process if solar loading is about to start. If the drainback option is activated, the following adjustment can be made.

**Note**

A drainback system requires additional components such as a holding tank. The drainback option should only be activated if all components required are properly installed.

The filling time can be adjusted using the parameter **Filling time**. During this period, the pump runs at 100 % speed.

The parameter **Stabilization time** is used for adjusting the period during which the switch-off condition will be ignored after the filling time has ended.

The parameter **Initialization time** is used for adjusting the period during which the switch-on condition must be permanently fulfilled, before the filling process starts.

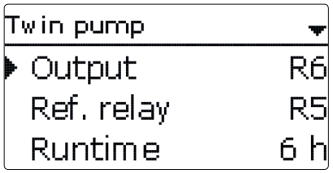
The **Booster** option is used for switching on a second pump when filling the solar system. The corresponding output is switched on at 100 % speed for the duration of the filling time.

After the system has been emptied and the delay time elapsed, the **Drain impulse** option will switch on the solar pump for an adjustable **Duration**. Thus, a hydrostatic head will form in the flow pipe. When it falls back into the holding tank, water pockets remaining in the collector will be sucked down into the holding tank.

**Note**

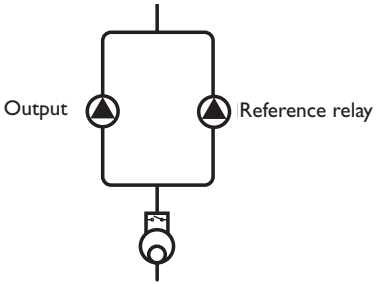
If the drainback option is used in multi tank systems, the **Break speed** option has to be activated in the **Solar / Basic setting / Loading logic** menu!

**Twin pump**




**Solar / Opt. functions / Add new function / Twin pump**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Output | Output selection | system dependent | system dependent |
| Ref. relay | Reference relay selection | system dependent | - |
| Runtime | Pump runtime | 1 … 48 h | 6 h |
| Flow rate mon. | Flow rate monitoring option | Yes, No | No |
| Sen. flow rate | Flow rate sensor selection | IMP1 … IMP3, Ga1, Ga2, Gd1, Gd2, FR1 (FlowRotor) | - |
| Delay | Delay time | 1 … 10 min | 5 min |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |




Exemplary figure of twin pumps in the solar flow with upstream flowmeter

The **Twin pump** function controls the equal distribution of pump runtime in systems with 2 equally usable pumps.

If the allocated **Output** has exceeded its adjusted **Runtime** and the next switch-on process is about to start, the **Reference relay** will be switched on instead. All characteristics are adopted.

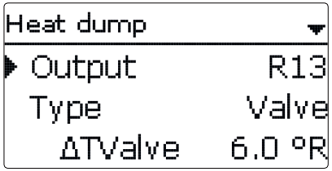
If the reference relay has in turn exceeded its runtime as well, the first output will be switched on again in the next switch-on process.

Additionally, the **Flow rate monitoring** option can be activated in order to activate the twin pump in the case of a flow rate error.

If the flow rate monitoring function is activated, an error message will appear when no flow rate is detected at the allocated **Flow rate sensor** after the **Delay time** has elapsed. The active output is considered as defective and will be blocked until the error message has been acknowledged. The second output will be activated instead. The twin pump function will pause until the error message has been acknowledged.

When the error message is acknowledged, the controller runs a test during which it will energize the corresponding output and again monitor the flow rate.

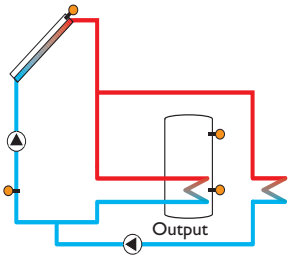
## Heat dissipator



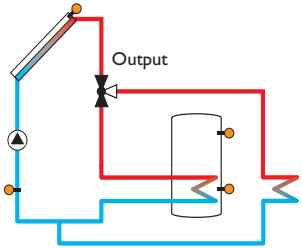

**Solar / Opt. functions / Add new function / Heat dump**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Output | Output selection | system dependent | system dependent |
| Type | Variant (pump or valve logic) | Valve, Pump | Valve |
| ΔTvalve | Valve logic temperature difference | 0.0 … 10.0 K [0.0 … 20.0 °R] | 3.0 K [6.0 °R] |
| Collector | Collector selection | system dependent | 1 |
| Tcol. | Collector overtemperature | 40 … 190 °C [104 … 374 °F] | 110 °C [230 °F] |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |

**Type pump**




**Type valve**




The **Heat dissipator** function can be used to direct excess heat generated by strong solar irradiation to an external heat exchanger (e. g. fan coil) in order to keep the collector temperature within the operating range.

Whether the heat dissipator is activated via an additional pump or a valve can be adjusted in the **Type** menu.

### Type pump

The allocated output will be energized with 100 %, if the collector temperature reaches the adjusted switch-on temperature.

If the collector temperature falls by 5 K [10 °R] below the adjusted **Collector overtemperature**, the output will be switched off. In the Pump variant, the heat dissipator function works independently from solar loading.

### Type valve

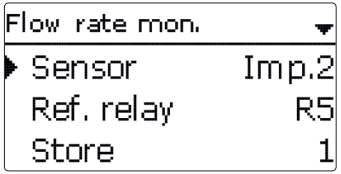
If the collector temperature reaches the value [Tcol. - ΔTValve], the allocated output will be switched-on in order to open the valve. If the collector temperature reaches the **Collector overtemperature**, the solar pump will be activated. If the collector temperature falls by 5 K [10 °R] below the adjusted **Collector overtemperature**, the solar pump will be switched off again. If the collector temperature falls by 10 K [20 °R] below the switch-on temperature, the valve will be put into its initial position.

If one of the tank temperatures exceeds its tank maximum temperature by more than 10 K [20 °R] while the heat dissipator function is active, the function will be deactivated and an error message will appear. If the temperature falls below this value by the **Hysteresis maximum tank temperature** (Solar / Basic setting / Store), the heat dissipator function will be released again.

**Note**

The Switch-on collector temperature must be adjusted at least by 10 K [10 °R] lower than the Emergency switch-off temperature.

### Flow rate monitoring




**Solar / Opt. functions / Add new function / Flow rate mon.**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Sensor | Flow rate sensor selection | system dependent | - |
| Ref. relay | Reference relay selection | system dependent | - |
| Store | Tank selection | system dependent | 1 |
| Time | Delay time | 1 … 300 s | 30 s |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |

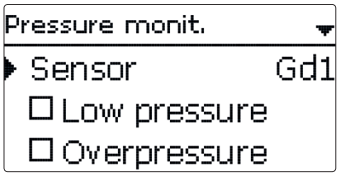
The **Flow rate monitoring** function can be used to detect malfunctions that impede the flow rate and to switch off the corresponding output. This will prevent system damage, e. g. through a dry run of the pump.

If the flow rate monitoring function is activated, an error message will appear when no flow rate is detected at the allocated flow rate sensor after the delay time has elapsed.

- If a **Reference relay** has been selected, the flow rate monitoring function will become active when the allocated relay switches on. In the case of an error, the complete solar system will be shut down.
- If both a **Store** and a **Reference relay** have been selected, the flow rate monitoring function will become active when the allocated relay switches on. In the case of an error, the allocated tank will be blocked until the error message has been acknowledged. The next tank free for loading will be loaded instead.

The error message will appear both in the **Status / Messages** menu and in the **Status / Solar / Flow rate monitoring** menu. It can be acknowledged in the **Status / Solar / Flow rate monitoring** menu. When the error message is acknowledged, the controller runs a test during which it will energize the relay and again monitor the flow rate.

### Pressure monitoring




**Note**
The Pressure monitoring function will only work when an RPD / RPS type Grundfos Direct Sensor™ is connected.

**Solar / Opt. functions / Add new function / Pressure monit.**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Sensor | Pressure sensor selection | S6 | - |
| Low pressure | Low pressure monitoring option | Yes, No | No |
| On | Switch-on threshold | 0.0 … 9.7 bar [0 … 71 psi] | 0.7 bar [10 psi] |
| Off | Switch-off threshold | 0.1 … 9.8 bar [1 … 72 psi] | 1.0 bar [15 psi] |
| Shutdown | Shutdown option | Yes, No | No |
| Overpressure | Overpressure monitoring option | Yes, No | No |
| On | Switch-on threshold | 0.3 … 10.0 bar [3 … 145 psi] | 5.5 bar [80 psi] |
| Off | Switch-off threshold | 0.2 … 9.9 bar [2 … 144 psi] | 5.0 bar [73 psi] |
| Shutdown | Shutdown option | Yes, No | No |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |

The **Pressure monitoring** function can be used for detecting overpressure or low pressure conditions inside the system, and if necessary to shut down the affected system components in order to avoid system damage.

**Low pressure monitoring**

If the system pressure falls below the adjustable switch-on value **On**, an error message will appear.

If the **Shutdown** option has been activated for the low pressure monitoring function, the solar system will be shut down as well in the case of a fault condition.

When the pressure reaches or exceeds the adjustable Switch-off value **Off**, the system is switched on again.

**Note**

For the **Low pressure monitoring** function, **Off** always is at least 0.1 bar [1 psi] higher than **On**. The corresponding adjustment ranges will automatically adapt to that.

**Overpressure monitoring**

If the system pressure exceeds the adjustable switch-on value **On**, an error message will appear.

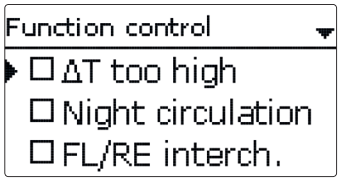
If the **Shutdown** option has been activated for the overpressure monitoring function, the solar system will be shut down as well in the case of a fault condition.

When the pressure reaches or falls below the adjustable Switch-off value **Off**, the system is switched on again.

**Note**

For the **Overpressure monitoring** function, **On** always is at least 0.1 bar [1 psi] higher than **Off**. The corresponding adjustment ranges will automatically adapt to that.

## 8.3 Functionality control




**Note**

Only if the installer code is entered (see page 93), will the functionality control menu be available.

**Solar / Function control**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| ΔT too high | DT monitoring option | Yes, No | No |
| Night circulation | Night circulation monitoring option | Yes, No | No |
| FL/RL interch. | FL / RE interchange monitoring option | Yes, No | No |
| Stmax | Maximum tank temperature monitoring option | Yes, No | Yes |
| Store | Tank selection | system dependent | system dependent |

**ΔT monitoring option**

This function is used for monitoring the temperature difference. The message **ΔT too high** will be shown if solar loading has been carried out for a period of 20 min with a differential higher than 50 K [100 °R]. Normal operation is not cancelled or inhibited, but the system should be checked for the cause of the warning.

Possible causes are:
- pump power too weak
- hydronic blockage of a system component
- circulation problems in the collector
- air inside the system
- defective valve / defective pump

**Night circulation**

This function can be used for detecting thermal circulation inside the solar circuit that leads to an unwanted cooling of the tank. A warning message will appear when one of the following conditions has been detected for at least 1 min during the period between 11 p.m. and 5 a.m.:

- collector temperature exceeds 40 °C [104 °F]
- the temperature difference exceeds ΔTon

The delay time of 1 min ensures that the message is not triggered by short-term fault conditions.

Possible causes are:

- defective non-return valves
- defective valve
- wrongly adjusted time

**Flow and return interchanged**

This function is used for detecting an interchange of the flow and return pipe or a badly placed collector sensor. For this purpose, the collector temperature is monitored for plausibility during the switch-on phases of the solar pump. The message **FL/RE interchanged** will appear, when the plausibility criteria have not been met 5 times in a row.

**Note**

The functionality control **Flow and return interchanged** according to the VDI guidelines 2169 can only correctly detect and indicate the error **0031 !FL/RE interchanged!** if the collector sensor measures the temperature directly in the fluid at the collector outlet. If the collector sensor is not correctly placed, a false message may occur.

➔ Place the collector sensor directly in the fluid at the collector outlet or deactivate the **Flow and return interchanged** functionality control.

**Maximum tank temperature**

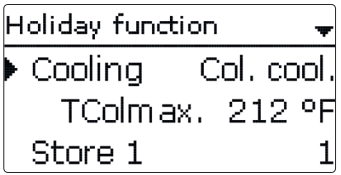
This function is used for detecting and indicating if the adjusted maximum tank temperature has been exceeded. The controller compares the current tank temperature to the adjusted maximum tank temperature, thus monitoring the tank loading circuits.

The maximum tank temperature is considered exceeded when the temperature measured at the tank sensor exceeds the adjusted maximum tank temperature by at least 5 K [10 °R]. The monitoring becomes active again as soon as the tank temperature falls below the adjusted maximum tank temperature.

In the **Store** channel, the tank or tanks to be monitored can be selected.

A possible cause for an unwanted exceedance of the maximum tank temperature is a defective valve.

## 8.4 Holiday function




**Solar/Holiday function**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Cooling | Cooling logic variant | Col. cool., Syst. cool., Off | Off |
| TColmax. | Collector maximum temperature | 70 … 190 °C [158 … 374 °F] | 100 °C [212 °F] |
| Store (1 … 5) | Tank succession order | system dependent | system dependent |
| St. cooling | Tank cooling option | Yes, No | Yes |
| ΔTon | Switch-on temperature difference | 1.0 … 30.0 K [2.0 … 60.0 °R] | 20.0 K [40.0 °R] |
| ΔToff | Switch-off temperature difference | 0.5 … 29.5 K [1.0 … 59.0 °R] | 15.0 K [30.0 °R] |
| Stmax (1 … 5) | Tank cooling temperature | 4 … 95 °C [40 … 204 °F] | 40 °C [104 °F] |
| Heat dump | Tank heat dissipator | Yes, No | No |
| Output | Output selection | system dependent | - |
| Sensor | Sensor selection | system dependent | - |
| TStoreOn | Switch-on temperature | 5 … 95 °C [42 … 204 °F] | 65 °C [150 °F] |
| TStoreOff | Switch-off temperature | 4 … 94 °C [40 … 202 °F] | 45 °C [114 °F] |

The holiday function is used for operating the system when no water consumption is expected, e. g. during a holiday absence. This function cools down the system in order to reduce the thermal load.

Only if the holiday function has been activated with the parameter Days of absence will the adjustments described in the following become active.

4 cooling functions are available: system cooling, collector cooling, tank cooling and tank heat dissipator.

**Type system cooling**

If the system cooling variant has been selected and the switch-on temperature difference is exceeded, tank loading will continue even if the corresponding maximum temperature is exceeded, but only up to the emergency shutdown temperature. Tank loading continues until all tanks have reached the emergency shutdown temperature or until the switch-off temperature difference is reached.

**Type collector cooling**

If the collector cooling variant has been selected, tank loading will continue when the collector maximum temperature is exceeded.

Tank loading continues until all tanks have reached the emergency shutdown temperature or until the collector temperature falls below the collector maximum temperature by at least 5 K [10 °R].

The control logic regards collector cooling operation as solar loading. The adjusted values for delay, minimum runtime, etc. remain valid.

Additionally to each of the two variants, the **Tank cooling option** can be activated.

**Tank cooling option**

When the tank cooling option is activated, the controller aims to cool down the tank during the night in order to prepare it for solar loading on the following day.

When the tank cooling option is activated, the solar pump will be switched on if the Maximum tank temperature is exceeded and the collector temperature falls below the tank temperature. The solar pump will remain active until the tank temperature falls below the adjusted Maximum tank temperature.

The tank order for the cooling is the same as in the overheating through system- or collector cooling.

**Tank heat dissipator option**

The tank heat dissipator option can be used to direct excess heat generated by strong solar irradiation from the tank to an external heat exchanger (e. g. fan coil) or radiator in order to prevent the collectors from overheating. The tank heat dissipator function is independent of the solar system and can be activated with the parameter **Heat dump**. The function uses the adjustable switch-on and switch-off temperature differences **TStoreOn** and **TStoreOff**.

If the temperature measured at the sensor selected reaches the switch-on temperature, the output selected will be energized until the temperature difference falls below the switch-off value. The parameter Days of absence can be used for entering the number of days for a holiday absence.

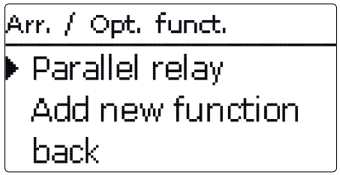
If the parameter is set to a value higher than 0, the function becomes active using the adjustments that have previously been made in the Holiday menu. The days will be counted backwards at 00:00. If the value is set to 0, the function is deactivated.

**Note**

The parameter **Days of absence** can be accessed via button (7).

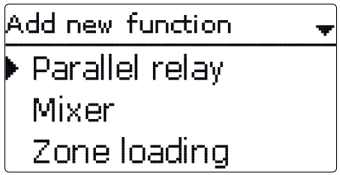
The remaining days of absence will be indicated in the status menu.

## 9 Arrangement




In this menu, all adjustments for the non-solar part of the arrangement can be made. Up to 16 optional functions can be selected and adjusted.

### 9.1 Optional functions

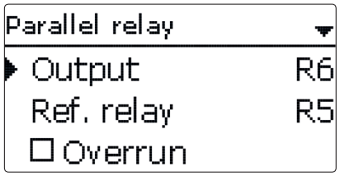



In this menu, optional functions can be selected and adjusted for the arrangement. The kind and number of optional functions offered depends on the previous adjustments.

**Note**

For further information about adjusting optional functions, see page 14.

### Parallel relay




**Arrangement / Opt. functions / Add new function / Parallel relay**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Output | Output selection | system dependent | system dependent |
| Ref. relay | Reference relay selection | system dependent | - |
| Overrun | Overrun option | Yes, No | No |
| Duration | Overrun time | 1 … 30 min | 1 min |
| Delay | Delay option | Yes, No | No |
| Duration | Delay time | 1 … 30 min | 1 min |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |

The **Parallel relay** function can be used for operating an allocated **Output** alongside a selected **Reference relay**. With this function, e. g. a valve can be controlled in parallel to the pump via a separate output.

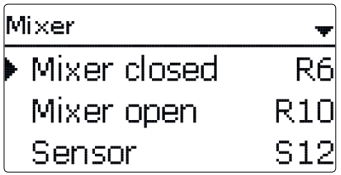
If the **Overrun** option is activated, the **Output** remains switched on for the adjusted **Overrun time** after the **Reference relay** has been switched off.

If the **Delay** option is activated, the **Output** will be energized after the adjusted **Duration** has elapsed. If the **Reference relay** is switched off again during the delay time, the Parallel output will not be switched on at all.

**Note**

If a relay is in the manual mode, the selected output will not be energized.

### Mixer

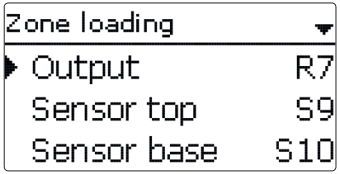



**Arrangement / Opt. functions / Add new function / Mixer**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Mixer closed | Output selection mixer closed | system dependent | system dependent |
| Mixer open | Output selection mixer open | system dependent | system dependent |
| Sensor | Sensor selection | system dependent | system dependent |
| TMixer | Mixer target temperature | 0 … 130 °C [32 … 266 °F] | 60 °C [140 °F] |
| Interval | Mixer interval | 1 … 20 s | 4 s |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |

The **Mixer** function can be used to adjust the actual flow temperature to the desired **Mixer target temperature**. The mixer is opened or closed in pulses depending on this deviation. The pulses are determined by the adjustable **Interval.** The pause is determined by the difference between the actual value and the set value.

### Zone loading




**Arrangement / Opt. functions / Add new function / Zone loading**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Output | Output selection | system dependent | system dependent |
| Sensor top | Top sensor selection | system dependent | system dependent |
| Sensor base | Base sensor selection | system dependent | system dependent |
| Ton | Switch-on temperature | 0 … 94 °C [32 … 202 °F] | 45 °C [114 °F] |
| Toff | Switch-off temperature | 1 … 95 °C [34 … 204 °F] | 60 °C [140 °F] |
| Timer | Timer option | Yes, No | No |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |

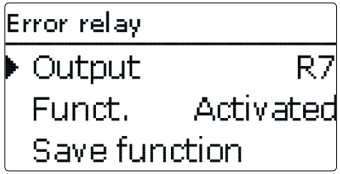
The **Zone loading** function can be used for loading a tank zone between 2 sensors. For monitoring the switch-on and switch-off conditions, 2 sensors are used. The switch-on and switch-off temperatures are used as reference parameters.

If the measured temperatures at both allocated sensors fall below the adjusted **Switch-on temperature**, the output will be energized. The output will be switched off again if the temperature at both sensors has exceeded the **Switch-off temperature**.

If one of the two sensors is defective, zone loading is suppressed or switched off.

**Note**
For information on timer adjustment see page 12.

### Error relay



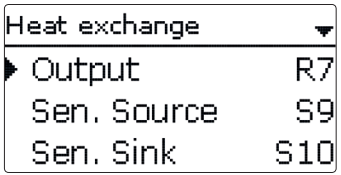

**Arrangement / Opt. functions / Add new function / Error relay**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Output | Output selection | system dependent | system dependent |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |

The **Error relay** function can be used for operating an output in the case of an error. Thus, e. g. a signaling device can be connected in order to signal errors.

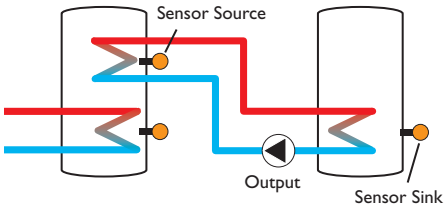
If the error relay function is activated, the allocated output will operate when a fault occurs. If the Flow rate monitoring and/or Pressure monitoring function is additionally activated, the allocated Output will also operate in the case of a flow rate or pressure error.

## Heat exchange




**Arrangement / Opt. functions / Add new function / Heat exchange**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Output | Output selection | system dependent | system dependent |
| Sen. source | Heat source sensor selection | system dependent | system dependent |
| Sen. sink | Heat sink sensor selection | system dependent | system dependent |
| ΔTon | Switch-on temperature difference | 1.0 … 30.0 K [2.0 … 60.0 °R] | 6.0 K [12.0°R] |
| ΔToff | Switch-off temperature difference | 0.5 … 29.5 K [1.0 … 59.0 °R] | 4.0 K [8.0°R] |
| ΔTset | Set temperature difference | 1.5 … 40.0 K [3.0 … 80.0 °R] | 10.0 K [20.0°R] |
| TMax | Maximum temperature of the tank to be loaded | 10 … 95 °C [50 … 204 °F] | 60 °C [140 °F] |
| TMin | Minimum temperature of the tank to be loaded | 10 … 95 °C ' [50 … 204 °F] | 10 °C [50 °F] |
| Timer | Timer option | Yes, No | No |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |




The **Heat exchange** function can be used for transferring heat from a heat source to a heat sink.

The allocated **Output** is energized when all switch-on conditions are fulfilled:

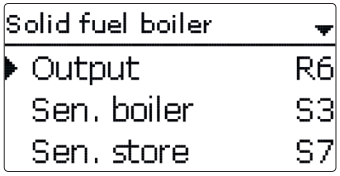
- the temperature difference between the allocated sensors has exceeded the switch-on temperature difference
- the temperature difference between the allocated sensors has not fallen below the switch-off temperature difference
- the temperature at the heat source sensor has exceeded the minimum temperature
- the temperature at the heat sink sensor is below the maximum temperature
- one of the adjusted time frames is active (if the Timer option is selected)

If the **temperature difference** exceeds the adjusted **Set** value by 1/10 of the rise value, the pump speed increases by one step (1 %).

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

**Note**
For information on timer adjustment see page 12.

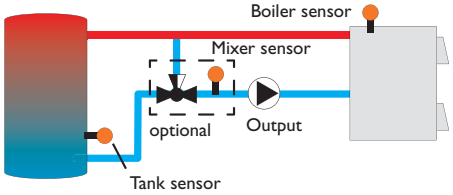
**Solid fuel boiler**




**Arrangement / Opt. functions / Add new function / Solid fuel boiler**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Output | Output selection | system dependent | system dependent |
| Sen. boiler | Solid fuel boiler sensor selection | system dependent | system dependent |
| Sen. store | Tank sensor selection | system dependent | system dependent |
| ΔTon | Switch-on temperature difference | 2.0 … 30.0 K [4.0 … 60.0 °R] | 6.0 K [12.0 °R] |
| ΔToff | Switch-off temperature difference | 1.0 … 29.0 K [2.0 … 58.0 °R | 4.0 K [8.0 °R] |
| ΔTset | Set temperature difference | 3.0 … 40.0 K [6.0 … 80.0 °R | 10.0 K [20.0 °R] |
| TStoremax | Maximum temperature | 10 … 95 °C [50 … 204 °F] | 60 °C [140 °F] |
| TMin boiler | Minimum temperature | 10 … 95 °C [50 … 204 °F] | 60 °C [140 °F] |
| Target temp. | Target temperature option | Yes, No | No |
| Targ. temp. | Target temperature | 30 … 85 °C [86 … 186 °F] | 65 °C [150 °F] |
| Sensor | Reference sensor | system dependent | system dependent |
| Mixer | Mixer option | Yes, No | No |
| Mixer closed | Output selection mixer closed | system dependent | system dependent |
| Mixer open | Output selection mixer open | system dependent | system dependent |
| Sensor | Mixer sensor selection | system dependent | system dependent |
| ΔTopen | Temperature difference mixer open | 0.5 … 30.0 K [2.0 … 60.0 °R] | 5.0 K [10.0 °R] |
| ΔTclosed | Temperature difference mixer closed | 0.0 … 29.5 K [1.0 … 59.0 °R] | 2.0 K [4.0 °R] |

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Interval | Mixer interval | 1 … 20 s | 4 s |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |




The **Solid fuel boiler** function can be used for transferring heat from a solid fuel boiler to a tank.

The allocated **Output** is energized when all switch-on conditions are fulfilled:

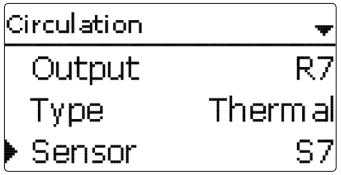
- the temperature difference between the allocated sensors has exceeded the switch-on temperature difference
- the temperature difference between the allocated sensors has not fallen below the switch-off temperature difference
- the temperature at the solid fuel boiler sensor has exceeded the minimum temperature
- the temperature at the tank sensor is below the maximum temperature
- one of the adjusted time frames is active (if the Timer option is selected)

When the **Set temperature difference** is exceeded, pump speed control starts. For every deviation by 1 / 10 of the adjusted rise value, the pump speed will be adjusted by 1 %.

If the **Target temperature** option is activated, the pump speed control logic will change. The controller will remain at the minimum pump speed until the temperature at the allocated sensor exceeds the adjusted target temperature.

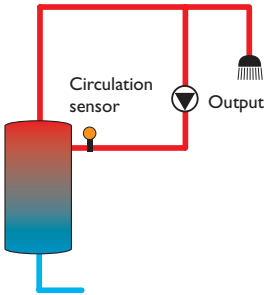
The **Mixer** option can be used to keep the boiler return temperature above **TMin boiler**. The pulses are determined by the adjustable **Interval**.

## Circulation




**Arrangement / Opt. functions / Add new function / Circulation**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Output | Output selection | system dependent | system dependent |
| Type | Variant | Demand, Thermal, Timer, Therm.+Timer, Dem.+-Timer | Thermal |
| Sensor | Circulation sensor selection | system dependent | system dependent |
| Ton | Switch-on temperature | 10 … 59 °C [50 …138 °F] | 40 °C [104 °F] |
| Toff | Switch-off temperature | 11 … 60 °C [52 … 140 °F] | 45 °C [114 °F] |
| Timer | Timer option | Yes, No | No |
| Delay | Demand switch-on delay | 0 … 3 s | 0 s |
| Runtime | Circulation pump runtime | 01:00 … 15:00 min | 03:00 min |
| Break time | Circulation pump break time | 10 … 60 min | 30 min |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |




The **Circulation** function can be used for controlling a circulation pump.

For the control logic, 5 variants are available:

- Thermal
- Timer
- Thermal + Timer
- Demand
- Demand + Timer

If one of the variants is selected, the corresponding adjustment channels will appear.

### Thermal

The temperature at the allocated Sensor is monitored. The allocated output switches on when the temperature falls below the adjusted Switch-on temperature. If the temperature exceeds the Switch-off temperature, the output switches off.

### Timer

The output switches on during the adjusted time frames, outside of them it switches off.

### Thermal + Timer

The output operates when the switch-on conditions of both above-mentioned variants are fulfilled.

### Demand

The allocated flow switch is monitored for circuit continuity. If circuit continuity is detected at the flow switch, the output will switch on for the adjusted Runtime. After the runtime has ended, the output switches off. During the adjusted Break time, the output remains switched off even if continuity is detected at the flow switch.

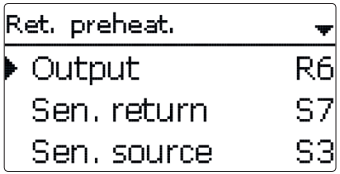
### Demand + Timer

The output operates when the switch-on conditions of both above-mentioned variants are fulfilled. When the **Timer**, **Therm. + Timer** or **Demand + Timer** variant is activated, a timer is indicated in which time frames for the function can be adjusted.

**Note**
If the flow switch is connected to the input S1 … S12, continuity must be detected for at least 5 s for the controller to react, 1s if the flow switch is connected to an impulse input.

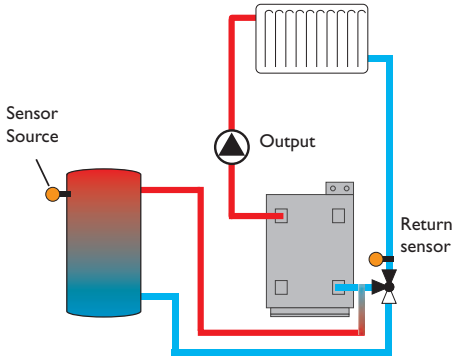
**Note**
For information on timer adjustment see page 12.

## Return temperature offset




**Arrangement / Opt. functions / Add new function / Ret. preheat.**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Output | Output selection | system dependent | system dependent |
| Sen. return | Return sensor selection | system dependent | system dependent |
| Sen. source | Heat source sensor selection | system dependent | system dependent |
| ΔTon | Switch-on temperature difference | 2.0 … 30.0 K [4.0 … 60.0 °R] | 6.0 K [12.0 °R] |
| ΔToff | Switch-off temperature difference | 1.0 … 29.0 K [2.0 … 58.0 °R] | 4.0 K [8.0 °R] |
| Summer off | Summer switch-off option | Yes, No | No |
| Sensor | Outdoor sensor selection | system dependent | system dependent |
| Toff | Switch-off temperature | 10 … 60 °C [50 … 140 °F] | 20 °C [68 °F] |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |



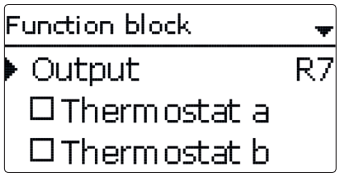

The **Return temperature offset** function can be used for transferring heat from a heat source to the heating circuit return.

The allocated output is energized when all switch-on conditions are fulfilled:

- the temperature difference between the allocated sensors has exceeded the switch-on temperature difference
- the temperature difference between the allocated sensors has not fallen below the switch-off temperature difference
- if Summer off is activated, the temperature at the outdoor temperature sensor falls below the adjusted outdoor temperature value

With the Summer switch-off option, the return temperature offset can be suppressed outside the heating period.

**Function block**




**Arrangement / Opt. functions / Add new function / Function block**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Output | Output selection | system dependent | system dependent |
| Thermostat a | Thermostat a option | Yes, No | No |
| Th-a on | Switch-on temperature thermostat a | -40 … +250 °C [-40 … +482 °F] | +40 °C [104 °F] |
| Th-a off | Switch-off temperature thermostat a | -40 … +250 °C [-40 … +482 °F] | +45 °C [114 °F] |
| Sensor | Sensor thermostat a | system dependent | system dependent |
| Thermostat b | Thermostat b option | Yes, No | No |
| Th-b on | Switch-on temperature thermostat b | -40 … +250 °C [-40 … +482 °F] | +40 °C [104 °F] |
| Th-b off | Switch-off temperature thermostat b | -40 … +250 °C [-40 … +482 °F] | +45 °C [114 °F] |
| Sensor | Sensor thermostat b | system dependent | system dependent |
| ΔT function | Differential function | Yes, No | No |
| ΔTon | Switch-on temperature difference | 1.0 … 50.0 K [2.0 … 100.0 °R] | 5.0 K [10.0 °R] |
| ΔToff | Switch-off temperature difference | 0.5 … 49.5 K [1.0 … 99.0 °R] | 3.0 K [6.0 °R] |
| ΔTset | Set temperature difference | 3 … 100 K [6 … 200 °R] | 10 K [20 °R] |
| Sen. source | Heat source sensor | system dependent | system dependent |
| Sen. sink | Heat sink sensor | system dependent | system dependent |
| Timer | Timer option | Yes, No | No |
| Ref. output | Reference output option | Yes, No | No |
| Mode | Reference output mode | OR, AND, NOR, NAND | OR |
| Output | Reference output 1 | all outputs | - |
| Output | Reference output 2 | all outputs | - |
| Output | Reference output 3 | all outputs | - |
| Output | Reference output 4 | all outputs | - |
| Output | Reference output 5 | all outputs | - |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |

In addition to the pre-defined optional functions, function blocks consisting of thermostat functions, timer, differential and reference output functions are available. With the help of these function blocks, further components and functions respectively can be controlled.

To each function block, sensors and outputs available can be allocated. Sensors already in use can be allocated again without impeding their control functions.

Within a function block the functions are interconnected (AND gate). This means that the switching conditions of all the activated functions have to be fulfilled for switching the allocated output. As soon as one condition is not fulfilled, the output will switch off.

**Thermostat function**

The switching condition for the thermostat function is considered fulfilled when the adjusted switch-on temperature (Th(x) on) is reached.

The switching condition for the thermostat function is considered unfulfilled when the adjusted switch-off temperature (Th(x)off) is reached.

Allocate the reference sensor in the **Sensor** channel.

Adjust the maximum temperature limitation with Th(x)off > Th(x)on and the minimum temperature limitation with Th(x)on> Th(x)off. The temperatures cannot be set to an identical value.

### ΔT function

The switching condition for the ΔT function is considered fulfilled when the adjusted switch-on temperature (ΔTon) is reached.

The switching condition for the ΔT function is considered unfulfilled when the adjusted switch-off temperature (ΔToff) is reached.

The ΔT function is equipped with a speed control function. A set temperature difference and a minimum speed can be adjusted. The non-adjustable rise value is 2 K [4 °R].

### Reference output

Up to 5 Reference outputs can be selected. Whether the reference outputs are to be switched in series (AND), in parallel (OR), in series + inverted (NAND) or in parallel + inverted (NOR) can be adjusted in the **Mode** channel.

### OR mode

If at least one of the reference outputs is switched on, the switching condition for the reference output function is considered fulfilled.

If none of the reference outputs is switched on, the switching condition for the reference output function is considered unfulfilled.

### NOR mode

If none of the reference outputs is switched on, the switching condition for the reference output function is considered fulfilled.

If at least one of the reference outputs is switched on, the switching condition for the reference output function is considered unfulfilled.

### AND mode

If all reference outputs are switched on, the switching condition for the reference output function is considered fulfilled.

If at least one of the reference outputs is switched off, the switching condition for the reference output function is considered unfulfilled.

### NAND mode

If at least one of the reference outputs is switched off, the switching condition for the reference output function is considered fulfilled.

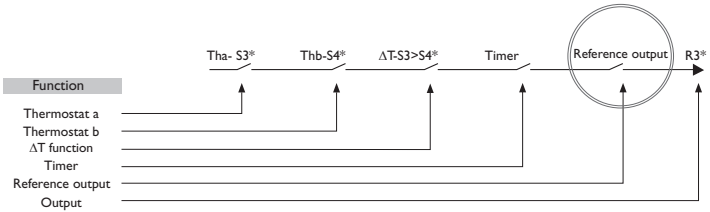
If all reference outputs are switched on, the switching condition for the reference output function is considered unfulfilled.

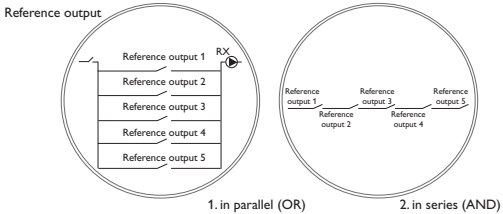
**Note**

If more than one function block has been activated, outputs of numerically higher function blocks may not be used as reference outputs.

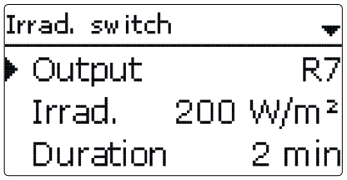
**Note**

For information on timer adjustment see page 12.



### Irradiation switch




**Arrangement / Opt. functions / Add new function / Irrad. switch**

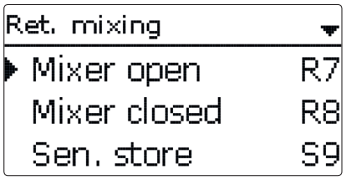
| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Output | Output selection | system dependent | system dependent |
| Irrad. | Switch-on irradiation | 50 … 1000 W/m² | 200 W / m² |
| Duration | Switch-on duration | 0 … 30 min | 2 min |
| Inverted | Inverted switching option | Yes, No | No |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |

The **Irradiation switch** function can be used for operating an output depending on the measured irradiation value.

The allocated output will be switched on if the adjusted irradiation value remains exceeded for the adjusted duration. If the irradiation falls below the adjusted irradiation value for the adjusted duration, the output will be switched off.

If the **Inverted** option is activated, the output will operate vice versa.

### Return mixing function




**Arrangement / Opt. functions / Add new function / Ret. mixing**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Mixer open | Output selection mixer open | system dependent | system dependent |
| Mixer closed | Output selection mixer closed | system dependent | system dependent |
| Sen. store | Tank sensor allocation | system dependent | system dependent |
| Sen. HC ret. | HC return sensor allocation | system dependent | system dependent |
| Sen. boiler ret. | Boiler return sensor allocation | system dependent | system dependent |
| ΔTon | Switch-on temperature difference | 1.0 … 25.0 K [2.0 … 50.0 °R] | 5.0 K [10.0 °R] |
| ΔToff | Switch-off temperature difference | 0.5 … 24.0 K [1.0 … 48.0 °R] | 3.0 K [6.0 °R] |
| ΔTset | Set temperature difference | -20 … +25 K [-40 … +50 °R] | +5 K [14.0 °R] |
| Tmax | Maximum boiler return temperature | 10 … 80 °C [50 … 176 °F] | 60 °C [140 °F] |
| Interval | Mixer interval | 1 … 20 s | 2 s |
| HC intern. | Detection controller heating circuit active | Yes, No | No |
| HC intern. | Heating circuit allocation | HC1 … HC7 | - |
| Runtime | Mixer runtime | 10 … 600 s | 105 s |
| Time | Time of automatic adjustment | 00:00 … 23:45 | 00:00 |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |

The **Return mixing** function can be used for solar heating backup.

Solar heat from the tank is mixed into the heating circuit return by means of a mixing valve in order to add heat to the heating circuit. The controller compares the temperature in the center of the tank to the heating circuit return temperature. If the tank temperature exceeds the heating circuit return temperature by the **Switch-on temperature difference**, the mixer will be used to add solar heat from the tank to the heating circuit return. The mixer will be opened or closed in pulses depending on this deviation. The pulses are determined by the adjustable **Interval**. The pause is determined by the difference between the actual value and the set value.

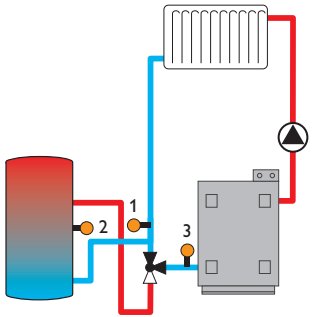
Thus, the heating circuit return temperature increases by the ΔT**set** value. The adjustable **Maximum boiler return temperature** limits the mixing temperature. If the tank temperature falls below the heating circuit return temperature by the **Switch-off temperature difference**, the mixer will close.

If the mixing temperature exceeds **TMax** by more than 5 K [10 °R], a message will appear in the status menu.

The **Runtime** defines the time needed for the mixer to switch from its initial position to the end position. The **Time** defines the point in time when the mixer is set to its initial or ending position respectively.

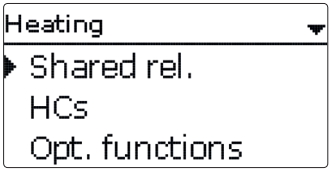
### HC internal option

If the **HC internal** option is activated, the return mixing function will only become active when a selectable heating circuit connected to the same controller is active, too. For this purpose, the heating circuit selected has to be controlled by the controller or by a module connected.




1: Sen. HC ret.
2: Sen. tank
3: Sen. boiler ret.

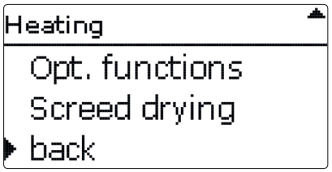
## 10 Heating



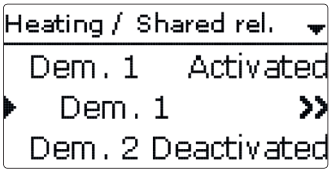

In this menu, all adjustments for the heating part of the arrangement or for the heating circuits respectively can be made.

Shared relays for demands, loading pumps or valves can be activated, heating circuits can be configured and optional functions can be selected and adjusted.

In this menu, the screed drying function can be activated and adjusted.




### 10.1 Shared relays

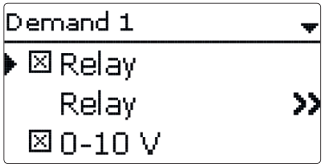



In this menu, adjustments for heat generators which are shared by several heating circuits and their optional functions can be made.

Shared relays will be available for selection under **Virtual** in the heating circuits and in the relay allocation channels of the corresponding optional functions of the Heating menu. This way, several heating circuits and optional functions (heating) can demand the same heat source.

**Note**

Activate and adjust the shared relays first. They will then be available in the heating circuits and optional functions.




**Heating/Shared rel.**

| Adjustment channel | Description | Adjustment range/ selection | Factory setting |
|---|---|---|---|
| Dem. 1 (2) | Demand 1 (2) | Activated, Deactivated | Deacti-vated |
| Relay | Relay option | Yes, No | No |
| Relay | Relay submenu | - | - |
| Relay | Relay selection | system dependent | system dependent |
| Boiler pr. min | Option for boiler protection min | Yes, No | No |
| Tmin | Minimum boiler temperature | 10 … 90 °C [50 … 194 °F] | 55 °C [132 °F] |
| Boiler pr. max | Option for boiler protection max | Yes, No | No |
| Tmax | Maximum boiler temperature | 20 … 95 °C [68 … 204 °F] | 90 °C [194 °F] |
| Sen. boiler | Boiler sensor selection | system dependent | S4 |
| 0-10 V | 0-10 V option | Yes, No | No |
| 0-10 V | 0-10 V submenu | - | - |
| Output | Output selection | -, A, B, C, D | - |
| TSet 1 | Lower boiler temperature | 10 … 85 °C [50 … 180 °F] | 10 °C [50 °F] |
| Volt 1 | Lower voltage | 1.0 … 10.0 V | 1.0 V |
| TSet 2 | Upper boiler temperature | 15 … 90 °C [60 … 190 °F] | 80 °C [180 °F] |
| Volt 2 | Upper voltage | 1.0 … 10.0 V | 8.0 V |
| Tmin | Minimum value set boiler temperature | 10 … 89 °C [50 … 192 °F] | 10 °C [50 °F] |
| Tmax | Maximum value set boiler temperature | 11 … 90 °C [52 … 194 °F] | 80 °C [176 °F] |
| ΔTFlow | Increase for the set flow temperature | 0 … 20 K [0 … 40 °R] | 5 K [10 °R] |
| Sen. flow | Flow sensor option | Yes, No | No |
| Sensor | Flow sensor selection | system dependent | S4 |
| Interval | Monitoring period | 10 … 600 s | 30 s |
| Hysteresis | Correction hysteresis | 0.5 … 20.0 K [1.0 … 40.0 °R] | 1.0 K [2.0 °R] |
| Correction | Correction of the voltage signal | 0.0 … 1.0 V | 0.1 V |
| Min. runtime | Minimum runtime option | Yes, No | No |
| tMin. | Minimum runtime | 0 … 120 min | 10 min |
| Manual mode | Operating mode for shared relays | Max, Auto, Off, Min | Auto |
| back | | | |

In this menu, up to 2 heating demands can be activated and adjusted.

**Activated demands will be available for selection in the output allocation channels of the backup heating in heating circuits and heating optional functions. This way, several heating circuits and optional functions can demand the same heat source.**

Every 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 submenu **Relay** will appear, 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** has to be selected.

The **Boiler protection min** option is used for protecting an older type boiler against cooling. If the temperature falls below the adjusted minimum temperature, the allocated relay will be energized until the minimum temperature is exceeded by 5 K [10 °R].

The **Boiler protection max** option is used for protecting an older type boiler against overheating. If the adjusted Maximum temperature is exceeded, the allocated relay will be switched off until the temperature falls by 5 K below the maximum temperature.

Example:

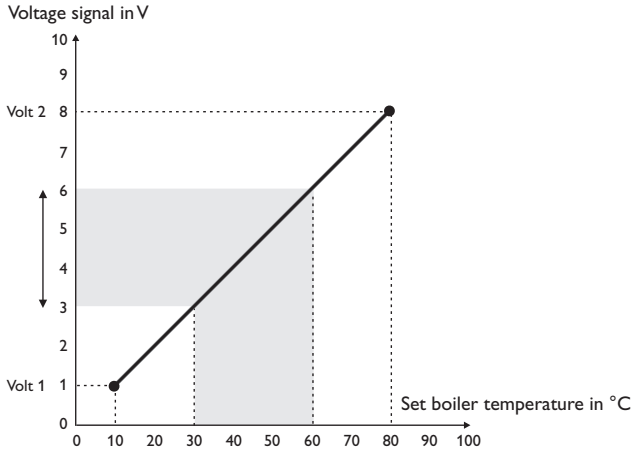
The dry-contact relay 14 can be allocated to the shared relay **Demand** 1. R14 will then become available for dry-contact boiler demand in the heating circuits and e. g. the DHW heating function.

**0-10 V option**

If the **0-10 V** option is activated, the submenu 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 set boiler temperature is 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.




By means of the adjustment channels **TMax** and **TMin** the maximum and minimum values for the set boiler temperature can be defined.

When the **Flow sensor 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 set boiler temperature.

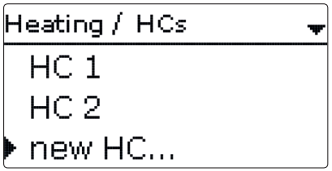
When the **Minimum runtime** option is activated, a **Minimum runtime** can be adjusted for the demand.

**Note**

If the 0-10 V demand is used for DHW heating, the voltage signal will always be identical to **Tmax**.

## 10.2 Heating circuits

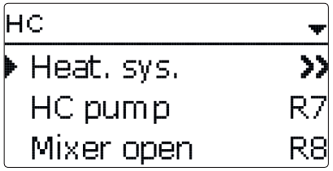
The controller has 2 mixed weather-compensated heating circuits and is able to control up to 5 external mixed heating circuits by means of extension modules.




If one or more extension modules are connected, they have to be registered with the controller. Only registered modules will be available in the heating circuit selection.

If **new HC...** is selected for the first time, the first heating circuit is allocated to the controller.

In the heating circuit menu, relays for the heating circuit pump and the heating circuit mixer can be selected.




3 free relays are required for a mixed heating circuit.

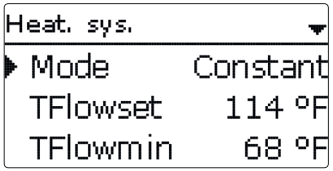
If the measured flow temperature deviates from the Set flow temperature, the mixer will be activated in order to adjust the flow temperature correspondingly.

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

**Heating system submenu**

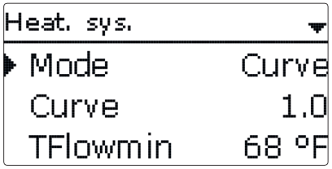
In the **Heating system** submenu, a **Mode** for the heating circuit control can be selected and adjusted. 5 modes are available:

- Constant
- Characteristic curve
- Linear
- Room influence
- Room




The **Constant** mode aims to keep the set flow temperature at a constant value which can be adjusted by means of the parameter TFlowset.

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




If the **Curve** mode is selected, the controller will calculate a set flow temperature by means of the outdoor temperature and the **Heating curve selected**. In both cases, the dial setting of the remote control and the controller Day correction or Night correction will be added.

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

The Remote control allows manual adjustment of the heating curve (± 15 K [30 °R]). Furthermore, the heating circuit can be switched off or a rapid heat-up can be carried out by means of the remote control.

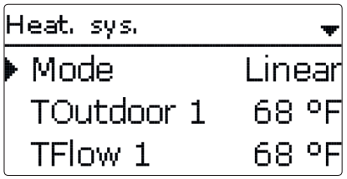
Heating circuit switched off means that the heating circuit pump is switched off and the mixer closed. The flow temperature is boosted to maximum for rapid heat-up when the remote control is set to rapid heat-up.

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

Maximum flow temperature ≥ set flow temperature ≥ minimum flow temperature

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 [-10 °R] is assumed as the set flow temperature in the **Curve** and **Linear** mode.

In the **Linear** mode the flow temperature curve will be calculated depending on the outdoor temperature by 2 points. At a temperature of **TOutdoor 1** the set flow temperature is **TFlow 1**. At a temperature of **TOutdoor 2** the set flow temperature is **TFlow 2**. The controller automatically calculates the characteristic curve resulting from these values.



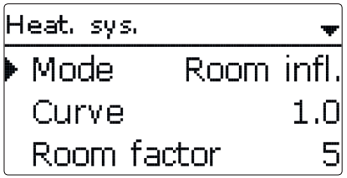

By means of the adjustment channels **TFlowmax** and **TFlowmin** the maximum and minimum values for the set flow temperature can be defined.

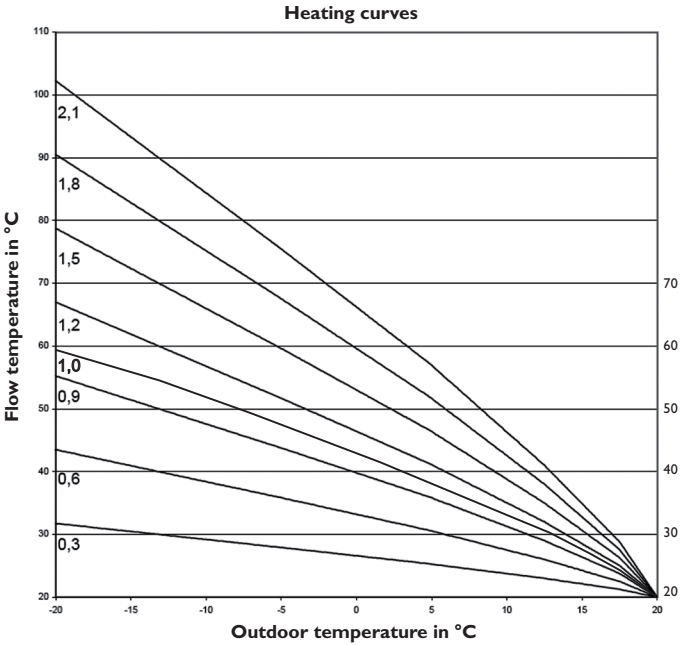
In the **Room influence** mode, the weather-compensated set flow temperature will be expanded by a demand-based room control. The parameter **Room factor** can be used for determining the intensity of the room influence.

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.

In order to calculate the deviation of the room temperature from the adjusted set value, at least one sensor-type room thermostat is required. The adjustments can be made in the **Room thermostats** submenu, **Room therm. (1 … 5)**.

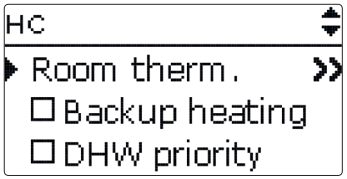



In the **Room** mode, the controller will calculate the set flow temperature by means of the room temperature, the outdoor temperature will not be taken into account.

The parameters **Day**/**Night correction** and **Timer** will not be indicated.

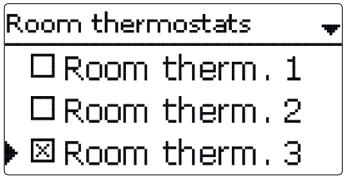
The start value of the set flow temperature can be influenced by the parameter **TStart**.




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 **RTH(1 … 5).** For this purpose, select **Sensor** in the **Type** adjustment channel.

The adjustments of all activated room thermostats will be taken into account. The controller will calculate the average value of the deviations measured and correct the set flow temperature correspondingly.

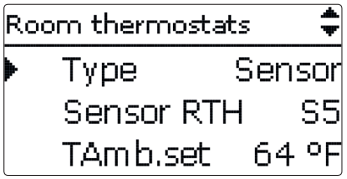
**Room thermostat option**




With the **Room thermostat** option, up to 5 room thermostats can be integrated into the control logic.

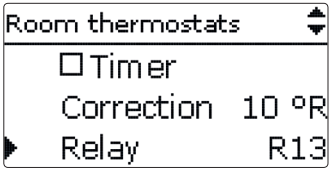
To each room thermostat, a sensor input can be allocated. The temperature at the allocated sensor is monitored. If the measured temperature exceeds the adjusted **Set room temperature** at all activated room thermostats and if the parameter **HC off** is activated, the heating circuit will switch off.

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

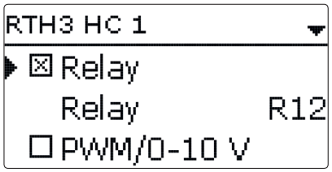



When the **Timer** option is activated, a timer is indicated in which time frames for the function can be adjusted. Outside these time frames, the adjusted room temperature decreases by the **Correction** value.

**Note**
For information on timer adjustment see page 12.



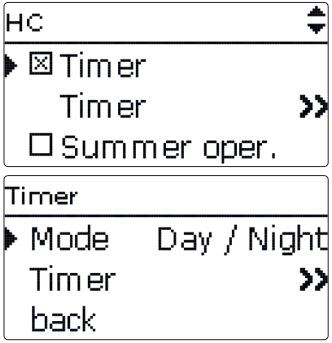

To each room thermostat, an additional relay can be allocated. The relay will switch on when the temperature falls below the adjusted room temperature. This way, the room in question can be excluded from the heating circuit via a valve as long as the desired room temperature is reached.




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).



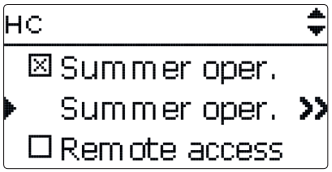

The parameter **Mode** is used for selecting between the following correction modes:

**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.

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

**Summer operation**

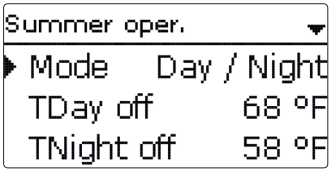



For summer operation, 2 different modes are available:

**Day:** If the outdoor temperature exceeds the **Summer temperature day**, the heating circuit will switch off.

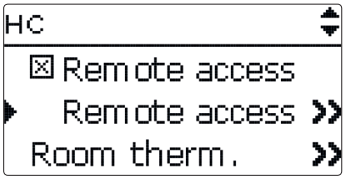
**Day / Night:** The parameters **Daytime on** and **Daytime off** can be used for adjusting a time frame for the summer operation. If the outdoor temperature exceeds the **Summer temperature day** within the adjusted time frame, the heating circuit will switch off.

Outside the adjusted time frame the **Summer temperature night** is valid.



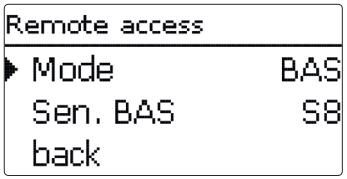

**Remote access**

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




**Note**

In the sensor selection menu, only outputs which have previously been selected as the input for remote access in the **Inputs / Modules** menu will be available.




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.

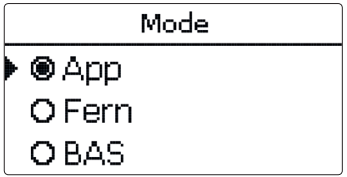
➔ In order to use a remote control, set the **Mode** to **Fern**.

**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 **Mode** 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 will only allow the activation of the operating mode **Holiday**.

**App:** An app can be used for remote access.




➔ In order to use an app, set the **Mode** to **App**.

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

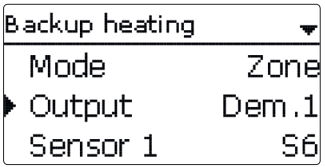
### Backup heating

For the **Backup heating** of the heating circuit, 3 modes are available:

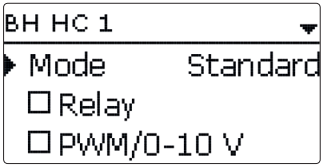
In the **Thermostat** mode, the set flow temperature will be compared to a tank reference sensor.

In the **Zone** mode, the set flow temperature will be compared to 2 tank reference sensors. The switching conditions have to be fulfilled at both reference sensors.

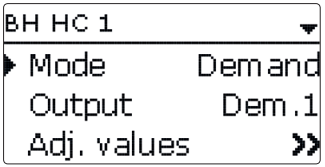
In the **On / Off** mode, the backup heating will be activated when the heating circuit pump is switched on for heating.



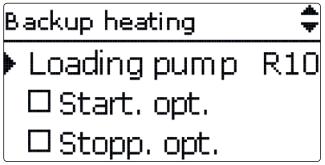

In the **Demand** submenu, the modes **Standard** and **Demand** are available. If **Standard** is selected, the output can be adjusted.



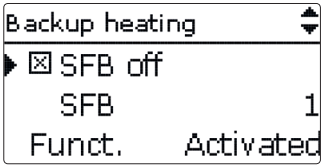

If **Demand** is selected, a demand has to be activated and adjusted in the **Heating / Shared relays** menu first. If Adjustment values is selected, the **Heating / Shared relays / Demand** menu will open.



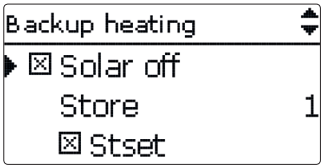

In the correction mode **Day / Off** (see page 79) the heating circuit and the backup heating will be completely switched off during the night operation. The **Starting optimization** option can be used for activating the backup heating before the day operation in order to heat the tank to a sufficiently high temperature. The **Stopping optimization** option can be used for deactivating the backup heating before the start of the night operation.




If **SFB off** is activated, backup heating will be suppressed when a selected solid fuel boiler is active.




If **Solar off** is activated, backup heating will be suppressed when a selected **Store** is being loaded.




If the **Set temperature** option is activated, the backup heating will only be suppressed when the tank temperature exceeds the **Set tank temperature**.

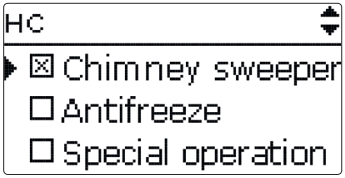
At first, backup heating is activated and can be temporarily deactivated.

### DHW priority

If the parameter **DHW priority** is activated, the heating circuit will be switched off and the backup heating be suppressed as long as DHW heating takes place which has previously been activated in the **Heating / Optional functions** menu.

### Chimney sweeper function

The chimney sweeper function can be used for enabling a quick access to measurement conditions without menu operation for the chimney sweeper.




The chimney sweeper function is activated in all heating circuits by default. The chimney sweeper mode can be activated by pressing button (6) for 5 s

In the chimney sweeper mode, the heating circuit mixer opens, the heating circuit pump and the backup heating contact are activated. While the chimney sweeper mode is active, the directional pad is flashing red. 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, button (6) is again pressed for more than 5 s, the chimney sweeper mode will stop.

### Antifreeze function

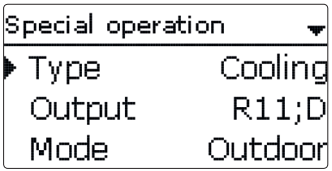
The antifreeze function of the heating circuit can be used to temporarily activate an inactive heating circuit during sudden temperature drop in order to protect it against frost damage.

The temperature at the sensor selected will be monitored. If the temperature falls below the adjusted antifreeze temperature, the heating circuit will be activated until the antifreeze temperature is exceeded by 2 K [4 °R], but at least for 30 min.

### Special operation

For the **Special operation** option, 2 variants are available:

- Cooling
- Heat dissipator (heat dump)



The **Cooling** variant is used for cooling via the heating circuit. 3 modes are available:

- Outdoor
- External switch
- Both

In the **Outdoor** mode, cooling will be activated if the **outdoor temperature cooling** is exceeded.

In the **External switch** mode, cooling will be activated by means of an external switch.

In the **both** mode, both switching conditions are valid for cooling.

In the **Cooling system** submenu, the cooling logic can be adjusted. For the cooling logic, 2 modes are available:

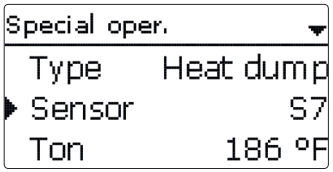
- Linear
- Constant

In the **Linear** mode, the set flow temperature will be calculated as in the heating system mode **Linear**.

The **Constant** mode aims to keep the set flow temperature at a constant value which can be adjusted by means of the parameter **TFlow**.

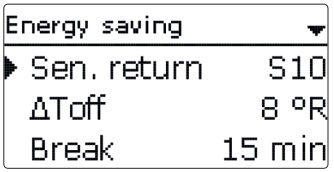
If the **Timer** option is activated, a time frame can be adjusted in which the cooling will be active.

If the **Dew point switch** option is activated, an output can be allocated to the dew point switch. If the dew point switch detects condensation, cooling will be interrupted.




The **Heat dump** variant is used for diverting excess heat to the heating circuit in order to keep the system temperatures within the operating range. For this purpose, the temperature measured at the allocated sensor **Sensor** will be monitored. If the temperature at the allocated sensor exceeds the **Switch-on temperature**, the **Set flow temperature** will be controlled to reach the adjusted value. If the temperature at the allocated sensor falls below the adjusted **Switch-off temperature**, the heat dissipator function will switch off.

**Energy saving operation**




The **Energy saving operation** is used for optimising the energy consumption of the heating circuit pump. For this purpose an additional sensor in the heating circuit return is required. The controller monitors the temperature difference between the flow and the return of the heating circuit. If the temperature difference falls below the **Switch-off difference**, the controller will deactivate the heating circuit pump for the adjusted **Break time**. After the break time has elapsed, the pump will be activated for the **Runtime**. If the temperature difference is higher than the switch-off difference, the pump will remain active. If the temperature difference is below the switch-off difference, the break time will start again.

**Heating / Heating circuits / New HC... / Internal or Module 1 … 5**

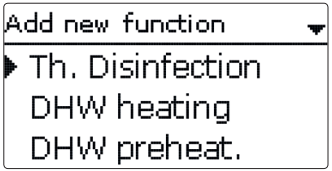
| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Heat. sys. | Heating system submenu | - | - |
| Mode | Heating system operating mode | Linear, Constant, Curve, Room , Room infl. | Characteristic curve |
| Curve | Heating curve | 0.3 … 3.0 | 1.0 |
| Room factor | Room influence factor | 1 … 10 | 5 |
| TFlowset | Set flow temperature | 10 … 90 °C [50 … 194 °F] | 45 °C [114 °F] |
| TOutdoor 1 | Lower outdoor temperature | -20 … +20 °C [-4 … +68 °F] | +20 °C [+68 °F] |
| TFlow 1 | Lower set flow temperature | 20 … 90 °C [68 … 194 °F] | 20 °C [68 °F] |
| TOutdoor 2 | Upper outdoor temperature | -20 … +20 °C [-4 … +68 °F] | -20 °C [-4 °F] |
| TFlow 2 | Upper set flow temperature | 20 … 90 °C [68 … 194 °F] | 70 °C [158 °F] |
| TStart | Start temperature | 20 … 60 °C [68 … 140 °F] | 40 °C [104 °F] |
| TFlowmin | Minimum flow temperature | 20 … 89 °C [68 … 192 °F] | 20 °C [68 °F] |
| TFlowmax | Maximum flow temperature | 21 … 90 °C [70 … 194 °F] | 50 °C [122 °F] |
| Interval | Mixer interval | 1 … 20 s | 4 s |
| HC pump | Heating circuit pump output selection | system dependent | system dependent |
| Mixer open | Output selection mixer open | system dependent | system dependent |

| Adjustment channel | Description | Adjustment range/ selection | Factory setting |
|---|---|---|---|
| Mixer closed | Output selection mixer closed | system dependent | system dependent |
| Sen. flow | Flow sensor selection | system dependent | system dependent |
| Sen. outd. | Outdoor sensor selection | system dependent | system dependent |
| Day corr. | Correction for day operation | -5…+45K [-10…+90°R] | 0K [0°R] |
| Night corr. | Correction for night operation | -20…+30K [-40…+60°R] | -5K [-10°R] |
| Timer | Timer option | Yes, No | No |
| Timer | Timer submenu | - | - |
| Mode | Correction mode | Day/Night, Day/Off | Day/Night |
| Summer oper. | Summer operation option | Yes, No | No |
| Summer oper. | Summer operation submenu | - | - |
| Mode | Summer operating mode | Day/Night, Day | Day |
| TDay off | Summer temperature day | 0…40 °C [32…104 °F] | 20 °C [68 °F] |
| TNight off | Summer temperature night | 0…40 °C [32…104 °F] | 14 °C [58 °F] |
| Daytime on | Day time frame on | 00:00…23:45 | 00:00 |
| Daytime off | Day time frame off | 00:00…23:45 | 00:00 |
| Remote access | Remote access option | Yes, No | No |
| Remote access | Remote access submenu | - | - |
| Mode | Remote access mode | BAS, Fern, App | BAS |
| Sen. BAS | Allocation operating mode switch input | all inputs type = BAS | - |
| Sen. RC | Allocation remote control input | all inputs type = Fern | - |
| Room therm. | Room thermostats submenu | - | - |
| Room therm. 1…5 | Room thermostat option (1…5) | Yes, No | No |
| Type | Room thermostat type selection | Sensor, Switch | Sensor |
| Sensor RTH | RTH input allocation | system dependent | system dependent |
| TAmbSet | Set room temperature | 10…30°C [50…86 °F] | 18 °C [64 °F] |
| Hysteresis | RTH hysteresis | 0.5…20.0K [1.0…40.0°R] | 0.5 K [1.0 °R] |
| Timer | RTH timer | Yes, No | No |
| Correction | Correction value | 1…20K [2…40°R] | 5K [10°R] |

| Adjustment channel | Description | Adjustment range/ selection | Factory setting |
|---|---|---|---|
| Relay | RTH relay selection | system dependent | system dependent |
| RTH | Room thermostat | Activated, Deactivated | Activated |
| HC off | Heating circuit off option | Yes, No | Yes |
| Backup heating | Backup heating option | Yes, No | No |
| Backup heating | Backup heating submenu | - | - |
| Mode | Backup heating mode selection | Therm., Zone, On/Off | Therm. |
| Output | Output selection | system dependent | system dependent |
| Sensor 1 | Allocation reference sensor 1 | system dependent | system dependent |
| Sensor 2 | Allocation reference sensor 2 (if mode = Zone) | system dependent | system dependent |
| ΔTon | Switch-on temperature difference | -15.0…+44.5 K [-30.0…+89.0 °R] | 5.0 K [10.0 °R] |
| ΔToff | Switch-off temperature difference | -14.5…+45.0 K [-29.0…+90.0 °R] | 15.0 K [30.0 °R] |
| Loading pump | Boiler loading pump option | Yes, No | No |
| Start. opt. | Starting optimization option | Yes, No | No |
| Time | Time starting optimization | 0…300min | 60 min |
| Stopp. opt. | Stopping optimization option | Yes, No | No |
| Time | Time stopping optimization | 0…300min | 60 min |
| Solar off | Solar off option | Yes, No | No |
| Store | Allocation solar tank | all solar tanks | - |
| Stset | Set temperature option | Yes, No | No |
| SFB off | Solid fuel boiler off option | Yes, No | No |
| SFB | Allocation solid fuel boiler | all solid fuel boilers | - |
| DHW priority | DHW priority option | Yes, No | No |
| Chimney sweeper | Chimney sweeper option | Yes, No | Yes |
| Antifreeze | Antifreeze option | Yes, No | No |
| Sensor | Antifreeze sensor | Flow, Outdoor | Flow |
| TAntifr | Antifreeze temperature | -20…+10°C [-4…+50°F] | +4°C [+40°F] |
| TFlowset | Set flow temperature antifreeze | 10…50°C [50…122°F] | 20°C [68°F] |
| Special oper. | Special operation option | Yes, No | No |
| Special oper. | Special operation submenu | - | - |

| Adjustment channel | Description | Adjustment range/ selection | Factory setting |
|---|---|---|---|
| Type | Special operation variant | Cooling, Heat dump | |
| Output | Output selection | system dependent | system dependent |
| Mode | Cooling mode | Outdoor, Ext. switch, Both | - |
| Sensor | Switch input selection | - | - |
| Inverted | Inverted switching option | Yes, No | No |
| TDay off | Outdoor temperature cooling | 20…40 °C [68…104 °F] | 20 °C [68 °F] |
| Cooling system | Cooling system submenu | - | - |
| Mode | Mode | Linear, Constant | Constant |
| TFlow | Cooling flow temperature | 5…25 °C [40…76 °F] | 20 °C [68 °F] |
| TOutdoor 1 | Lower outdoor temperature | 15…45 °C [60…114 °F] | 20 °C [68 °F] |
| TFlow 1 | Lower set flow temperature | 5…25 °C [40…76 °F] | 20 °C [68 °F] |
| TOutdoor 2 | Upper outdoor temperature | 15…45 °C [60…114 °F] | 40 °C [104 °F] |
| TFlow 2 | Upper set flow temperature | 5…25 °C [40…76 °F] | 10 °C [50 °F] |
| TFlowmin | Minimum flow temperature | 5…29 °C [40…84 °F] | 10 °C [50 °F] |
| TFlowmax | Maximum flow temperature | 6…30 °C [42…86 °F] | 25 °C [76 °F] |
| Timer | Timer option cooling | Yes, No | No |
| tOn | Switch-on time cooling | 00:00…23:45 | 00:00 |
| tOff | Switch-off time cooling | 00:00…23:45 | 00:00 |
| Dew point switch | Dew point switch (DPS) option | Yes, No | No |
| Sensor | Allocation DPS input | system dependent | system dependent |
| Output | Output selection | system dependent | system dependent |
| Sensor | Allocation heat dissipator sensor | system dependent | system dependent |
| Ton | Switch-on temperature heat dissipator | 25…95 °C [78…204 °F] | 85 °C [186 °F] |
| Toff | Switch-off temperature heat dissipator | 20…90 °C [68…194 °F] | 50 °C [122 °F] |
| TFlowset | Set flow temperature heat dissipator | 5 … 90 °C [40…194 °F] | 50 °C [122 °F] |
| Energy saving | Energy saving operation option | Yes, No | No |
| Energy saving | Energy saving operation submenu | - | - |
| Sen. return | HC return sensor allocation | system dependent | system dependent |
| ΔToff | Switch-off temperature difference energy saving operation | 1…49 K [2…98 °R] | 4 K [8 °R] |
| Break | Break time energy saving operation | 0…60 min | 15 min |
| Runtime | Runtime energy saving operation | 0…60 min | 2 min |
| Funct. | De/activation of the heating circuit | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save/Delete function | Save or delete function | - | - |

### 10.3 Optional functions




In this menu, optional functions can be selected and adjusted for the heating part of the arrangement.

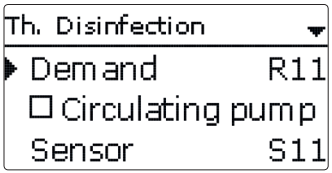
The kind and number of optional functions offered depends on the previous adjustments.

**Note**
For further information about adjusting optional functions, see page 14.

In the **Demand** submenu, the modes **Standard** and **Demand** are available. If **Standard** is selected, the output can be adjusted. If **Demand** is selected, a demand has to be activated and adjusted in the **Heating/ Shared rel.** first. If **Adjustment values** is selected, the **Heating/ Shared rel./ Demand** will open.

**Note**
For information on the output selection see page 16.

**Thermal disinfection**




This function helps to contain the spread of Legionella in DHW tanks by systematically activating the backup heating.

One **Sensor** and one output or **Demand** respectively can be selected for this function.

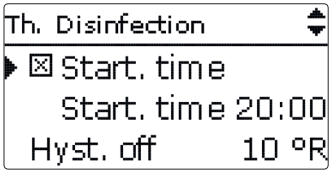
For thermal disinfection, the temperature at the allocated sensor has to be monitored. Protection is ensured when, during the **Monitoring period**, the **Disinfection temperature** is continuously exceeded for the entire **Disinfection period**.

The monitoring period starts as soon as the temperature at the allocated sensor falls below the disinfection temperature. If the monitoring period ends, the **Demand** will activate the backup heating. The Disinfection period starts when the temperature at the allocated Sensor exceeds the disinfection temperature.

Thermal disinfection can only be completed when the Disinfection temperature is exceeded for the duration of the Disinfection period without any interruption.

The parameter **Cancellation** is used for adjusting the period after which the non-completed backup heating will be cancelled. If the backup heating is cancelled, an error message will be displayed.

**Starting time delay**



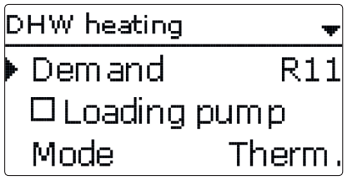

If the **Starting delay** option is activated, a starting time for the thermal disinfection with starting delay can be adjusted. The activation of the backup heating is then delayed until that starting time after the monitoring period has ended.

If the monitoring period ends, for example, at 12:00 o'clock, and the starting time has been set to 18:00, the reference relay will be energized with a delay of 6 hours at 18:00 instead of 12:00 o'clock.

**Heating / Opt. functions / Add new function / Th. Disinfection**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Demand | Demand relay selection | system dependent | system dependent |
| Circulating pump | Circulating pump option | Yes, No | No |
| Output | Circulating pump output selection | system dependent | system dependent |
| Sensor | Disinfection sensor selection | system dependent | system dependent |
| Interval | Monitoring period | 0 … 30, 1 … 23 (dd:hh) | 1d 0h |
| Temperature | Disinfection temperature | 45 … 90 °C [114 … 194 °F] | 60 °C [140 °F] |
| Duration | Disinfection period | 0.5 … 24.0 h | 1.0 h |
| Cancellation | Cancellation option | Yes, No | No |
| Cancellation | Cancellation interval | 1.0 ... 48.0 h | 2.0 h |
| Start. time | Starting delay option | Yes, No | No |
| Start. time | Starting time | 00:00 … 23:30 | 20:00 |
| Hyst. off | Switch-off hysteresis | 2 … 20 K [4 … 40 °R] | 5 K [10 °R] |
| Hyst. on | Switch-on hysteresis | 1 … 19 K [2 … 38 °R] | 2 K [4 °R] |
| TD holid. off | Thermal disinfection off when holiday function is active | Yes, No | No |
| BAS | Operating mode switch option | Yes, No | No |
| Sensor | Allocation operating mode switch input | system dependent | system dependent |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |

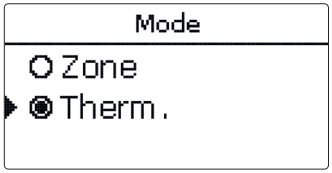
**DHW heating**




The **DHW heating** is used for demanding a backup heating for heating the DHW tank.

If the **Loading pump** option is activated, another adjustment channel will appear, in which an output can be allocated to the loading pump. The allocated output will switch on and off with the demand relay.

If the **Overrun time** option is activated, another adjustment channel will appear, in which the overrun time can be adjusted. If the overrun time option is activated, the loading pump relay will remain switched on for the adjusted duration after the demand relay has been switched off.




For the DHW heating, 2 modes are available:

**Thermal mode**

The allocated demand relay will be switched on when the temperature at the allocated **Sensor 1** falls below the adjusted switch-on temperature. If the temperature at the allocated sensor 1 exceeds the adjusted switch-off temperature, the relay will be switched off.

**Zone mode**

If the zone mode has been selected, another sensor can be allocated in the channel **Sensor 2**. The switch-on, or the switch-off conditions respectively, then have to be fulfilled at both sensors in order for the output to be switched on or off.

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

If **SFB off** is activated, DHW heating will be suppressed when a selected solid fuel boiler is active.

If **Solar off** is activated, DHW heating will be suppressed when a selected tank is being loaded.

If the **Set temperature** option is activated, the DHW heating will only be suppressed when the tank temperature exceeds the **Set tank temperature**.

With the **Manual heating** option, DHW heating can be activated outside the adjusted time frame once by means of a switch, if the temperature has fallen below the switch-off value.

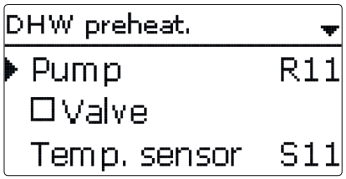
**Note**
For information on timer adjustment see page 12.

With the **BAS off** option, DHW heating can be switched from automatic mode to off by means of the operating mode switch.

**Heating / Opt. functions / Add new function / DHW heating**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Demand | Output selection demand | system dependent | - |
| Loading pump | Loading pump option | Yes, No | No |
| Output | Output selection loading pump | system dependent | - |
| Overrun time | Overrun option | Yes, No | No |
| Duration | Overrun time | 1 … 10 min | 1 min |
| Mode | Operating mode | Zone, Therm. | Therm. |
| Sensor 1 | Allocation reference sensor 1 | system dependent | system dependent |
| Sensor 2 | Allocation reference sensor 2 (if mode = Zone) | system dependent | system dependent |
| Ton | Switch-on temperature | 0 … 94 °C [32 … 202 °F] | 40 °C [104 °F] |
| Toff | Switch-off temperature | 1 … 95 °C [34 … 204 °F] | 45 °C [114 °F] |
| Timer | Timer option | Yes, No | No |
| Timer | Timer | - | - |
| Man. heating | Manual heating option | Yes, No | No |
| Sensor | Allocation switch input | system dependent | system dependent |
| DHW holid. off | DHW heating off when holiday function is active | Yes, No | No |
| BAS off | Operating mode switch off option | Yes, No | No |
| Solar off | Solar off option | Yes, No | No |
| Store | Allocation solar tank | all solar stores | - |
| Stset | Set temperature option | Yes, No | No |
| SFB off | Solid fuel boiler off option | Yes, No | No |
| SFB | Allocation solid fuel boiler | all solid fuel boilers | - |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |

## DHW preheating




The **DHW preheating** function uses heat from a buffer tank to heat the cold water inlet of the DHW tank.

The controller monitors the flow rate at the selected **Flow rate sensor**. If a flow rate is detected, the pump will switch on with the **Starting speed**.

If the temperature at the **Temperature sensor** selected exceeds the adjusted **DHW maximum temperature**, the speed will be decreased by the **Increment** value. The interval to the next measurement and adaptation can be adjusted by means of the parameter **Delay**.

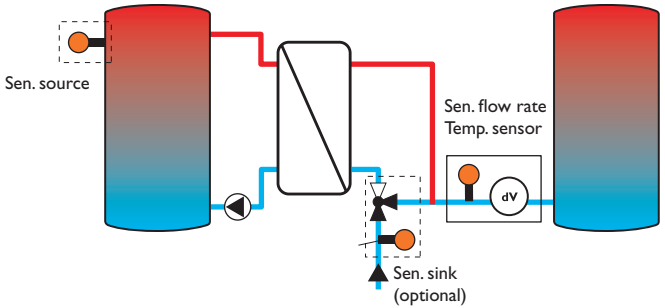
If the DHW maximum temperature is not reached after the delay time has elapsed, the speed will be increased by the increment value. The speed will not be increased or decreased respectively within the **Hysteresis**.

If the **ΔT function** is activated, the pump will switch on only if **ΔTon** is exceeded, and switch off if the temperature difference falls below **ΔToff**.

If the **Valve** option is activated, the output selected will be activated when the pump is activated.

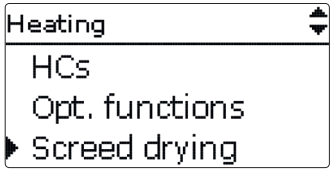
**Heating / Opt. functions / Add new function / DHW preheat.**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Pump | Output selection pump | system dependent | - |
| Valve | Valve option | Yes, No | No |
| Valve | Output selection valve | system dependent | - |
| Temp. sensor | Temperature sensor | system dependent | - |
| Sen. flow rate | Flow rate sensor | IMP1 … IMP3, Ga1, Ga2, Gd1, Gd2, FR1 (FlowRotor) | - |
| Tmax. DHW | DHW maximum temperature | 20 … 90 °C [68 … 194 °F] | 60 °C [140 °F] |
| Starting speed | Starting speed DHW preheating | 20 … 100 % | 50 % |
| Increment | Increment speed adaptation | 1 … 100 % | 10 % |
| Hysteresis | Hysteresis speed adaptation | 0.5 … 10.0 K [1.0 … 20.0 °R] | 5.0 K [10.0 °R] |
| Delay | Delay time | 1 … 10 s | 5 s |
| ΔT function | Activation ΔT function | Yes, No | No |
| ΔTon | Switch-on temperature difference | 1.0 … 50.0 K [2.0 … 100.0 °R] | 5.0 K [10.0 °R] |
| ΔToff | Switch-off temperature difference | 0.5 … 49.5 K [1.0 … 99.0 °R] | 3.0 K [3.0 °R] |
| Sen. source | Heat source sensor selection | system dependent | - |
| Sen. sink | Heat sink sensor selection | system dependent | - |
| Funct. | Activation / Deactivation | Activated, Deactivated, Switch | Activated |
| Sensor | Switch input selection | - | - |
| Save / Delete function | Save or delete function | - | - |

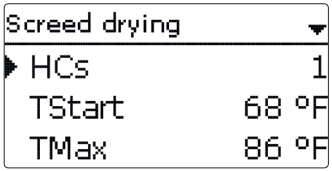


## 10.4 Screed drying

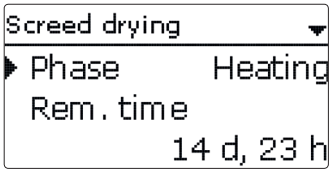
This function is used for time- and temperature-controlled screed drying in selectable heating circuits.



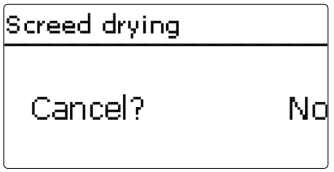

The heating circuits can be selected in the **Heating / Screed drying** menu. At the end of this menu, the function can triggered by using **Start**.



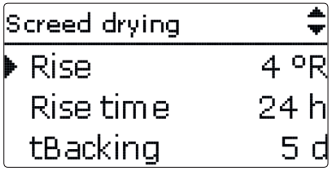

The controller will automatically change to the screed drying status menu. The current **Phase** will be indicated on the display and the **Remaining time** will be indicated as a countdown (dd:hh). During this process, the directional pad is flashing green.




At the end of the menu, **Cancel** will be indicated instead of start. If Cancel is selected, screed drying will be cancelled immediately. For this reason, a security enquiry will appear. If you wish to cancel the screed drying function, confirm the security enquiry.




At the beginning of the screed drying function, the heating circuits selected are 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.




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 directional pad 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 |

During screed drying of the heating circuits selected, the other heating circuits run corresponding to their operating modes.

Button (7) 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 corresponding heating circuits will change to their operating modes selected.

Screed drying will automatically be deactivated. The chimney sweeper function will be activated in all heating circuits.

**Note**
Make sure the heating circuits are supplied with heat from a heat source (backup heating).

**Note**
If an SD card has been inserted into the slot, a screed protocol will be generated.

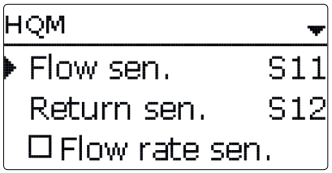
**Heating / Screed drying**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| HC | Heating circuit selection | HC 1 … 7 | system dependent |
| TStart | Start temperature | 10 … 30 °C [50 … 86 °F] | 20 °C [68 °F] |
| TMax | Holding temperature | 20 … 60 °C [68 … 140 °F] | 30 °C [86 °F] |
| Rise | Rise value | 1 … 10 K [2 … 20 °R] | 2 K [4 °R] |
| Rise time | Rise duration | 1 … 24 h | 24 h |
| tBacking | Tmax holding time | 1 … 20 d | 5 d |
| Start | Activation / Deactivation | Yes, No | No |

## 11 HQM


In the **HQM** menu, up to 7 internal energy meterings can be activated and adjusted.

By selecting the menu item **new HQM...**, a new energy metering can be activated.




A menu will open in which all adjustments required for the energy metering can be made.

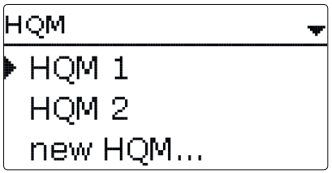
If the **Flow rate sensor** option is activated, an impulse input or, if available, a Grundfos Direct Sensor™ or a FlowRotor can be selected. The FlowRotor and the Grundfos Direct Sensors™ will only be available if they have been previously registered in the **Inputs / Modules** menu. The impulse rate must be adjusted in that menu as well.

If the **Flow rate sensor** option is deactivated, the controller will calculate the heat quantity by means of a fixed flow rate value. This is called energy metering. For this purpose, the flow rate must be read from the flowmeter at 100 % pump speed and adjusted in the adjustment channel **Flow rate**. In addition to that, a **Relay** must be allocated. Energy metering is in effect whenever the allocated relay is active.

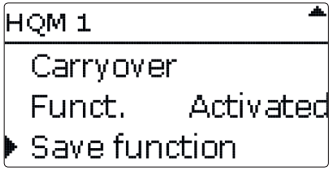
In the adjustment channel **Fluid type** the heat transfer fluid must be selected. If either propylene glycol or ethylene glycol is selected, the adjustment channel **Concentration** is indicated in which the antifreeze ratio of the heat transfer fluid can be adjusted.

If a calorimeter is being configured for the first time or after the overall quantity has been reset, the parameter **Carryover** will appear. A former value which is to be added to the overall quantity, can be entered.

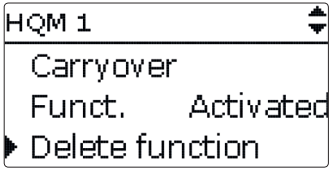
When the **Alternative unit** is activated, the controller will convert the heat quantity into the quantity of fossil fuels (coal, oil or gas) saved, or the $CO_2$ emission saved respectively. The alternative **Unit** can be selected. A **Conversion factor** must be adjusted for the calculation. The conversion factor depends on the arrangement in use and has to be determined individually.



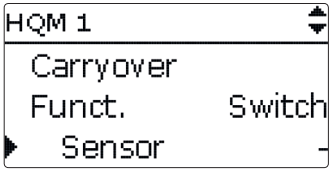
Energy meterings already saved will appear in the HQM menu above the menu item **new HQM...** in numerical order.
If an energy metering already saved is selected, the above mentioned submenu with all adjustment values will re-open.




At the end of each HQM submenu, the menu items **Function** and **Save function** are available.
In order to save an energy metering, select **Save function** and confirm the security enquiry by selecting **Yes**. In energy meterings already saved, the menu item **Delete function** will appear instead.




In order to delete an energy metering already saved, select **Delete function** and confirm the security enquiry by selecting **Yes**. The energy metering deleted will disappear from the list and become available for selection in the **new HQM...** menu again.

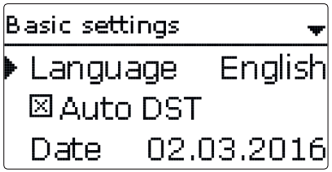



With the menu item **Function**, an energy metering already saved can be temporarily deactivated or re-activated respectively. In this case, all adjustments will remain stored.
By selecting **Switch**, the energy metering can be activated or deactivated respectively by means of an external switch. If **Switch** is selected, the channel **Sensor** will appear. In this channel, the sensor input to which the switch is to be connected can be allocated to the function.

**HQM / new HQM...**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Sen. flow | Flow sensor selection | system dependent | system dependent |
| Sen. ret. | Return sensor selection | system dependent | system dependent |
| Sen. flow rate | Flow rate sensor option | Yes, No | No |
| Sen. flow rate | Flow rate sensor selection | IMP1 … IMP3, Ga1, Ga2, Gd1, Gd2, FR1 | - |
| Fl.rate | Flow rate (only if Sen. flow rate = No) | 1.0 … 500.0 l/min [0.3 … 132.0 gal/min] | 3.0 l/min [0.7 gal/min] |
| Relay | Relay selection | system dependent | - |
| Fluid type | Heat transfer fluid | Tyfocor LS, Propyl., Ethyl., Water | Water |
| Concentr. | Glycol concentration in the heat transfer fluid (only if fluid type = Propyl. or Ethyl) | 20 … 70% | 40% |
| Alternative unit | Alternative unit option | Yes, No | No |
| Carryover | Carryover value (for the first-time configuration or after a HQM reset only) | - | - |
| Unit | Alternative display unit | Coal, Gas, Oil, $CO_2$ | $CO_2$ |
| Factor | Conversion factor | 0.0000001 … 100.0000000 | 0.5000000 |
| Funct. | Activation / Deactivation | Activated, Deactivated | Activated |

## 12 Basic settings

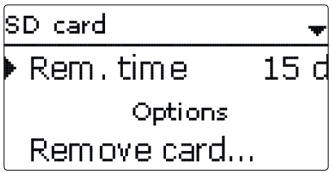



In the **Basic settings** menu, all basic parameters for the controller can be adjusted. Normally, these settings have been made during commissioning. They can be subsequently changed in this menu.

**Basic settings**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Language | Selection of the menu language | Deutsch, English, Français, Italiano, Español, Nederlands, Suomi | Deutsch |
| Auto DST | Daylight savings time selection | Yes, No | Yes |
| Date | Adjustment of the current date | 01.01.2001 … 31.12.2099 | 01.01.2012 |
| Time | Adjustment of the current time | 00:00 … 23:59 | - |
| Temp. unit | Temperature unit | °C, °F | °C |
| Flow unit | Volume unit | Gallons, Liter | Liter |
| Press. unit | Pressure unit | psi, bar | bar |
| Energy unit | Energy unit | Wh, BTU | Wh |
| Blocking protection | Blocking protection submenu | - | - |
| Start. time | Blocking protection starting time | 00:00 … 23:59 | 12:00 |
| Runtime | Blocking protection runtime | 1 … 30 s | 10 s |
| Reset | back to factory setting | Yes, No | No |
| Scheme | Scheme selection | 0000 … 9999 | 0000 |

## 13 SD card




The controller is equipped with an SD card slot for SD memory cards.

With an SD 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 visualized, e. g. in a spreadsheet.
- Store adjustments and parameterizations on the SD card and, if necessary, retrieve them from there.
- Running firmware updates on the controller.

**Firmware updates**

The current software can be downloaded from www.resol.com/firmware. When an SD card with a firmware update is inserted, the enquiry **Update?** is indicated on the display.

➔ To run the update, select **Yes** and confirm by pressing button (5).

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 initialization phase.

**Note**
Only remove the card when the initialization phase has been completed and the main menu is indicated on the controller display!

➔ To skip the update, select **No**.

The controller starts normal operation.

**Note**
The controller will only recognize a firmware update file if it is stored in a folder named **RESOL** on the first level of the SD card.
➔ Create a folder named **RESOL** on the SD card and extract the downloaded ZIP file into this folder.

**Starting the logging**

➔ Insert the SD card into the slot.

➔ Adjust the desired logging type and interval.

Logging will start immediately.

**Completing the logging process**

➔ Select the menu item **Remove card...**

➔ 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.

**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 an SD 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 SD card.

**Loading controller adjustments**

➔ To load controller adjustments from an SD card, select the menu item **Load adjustments**.

The **file selection** window will appear.

➔ Select the desired .SET file.

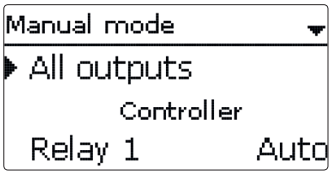
While the adjustments are being loaded, first **Please wait**, then **Done!** will be indicated on the display.

**Note**
To safely remove the SD 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 | Logging interval | 00:01 … 20:00 (mm:ss) | 01:00 |
| Logging type | Logging type | Cyclic, Linear | Linear |

## 14 Manual mode




In the **Manual mode** menu, the operating mode of all outputs in the controller and in modules connected can be adjusted.

All outputs are displayed in numerical order, first those of the controller, then those of the individual modules connected. Modules are listed in numerical order.

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

Off = Output is switched off (manual mode)
Auto = Output is in automatic mode


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

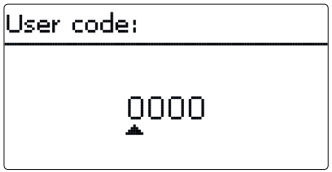
Off = Output is switched off (manual mode)
On = Output is active at 100% speed (manual mode)
Auto = Output is in automatic mode

**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 relay | On, Auto, Off | Auto |
| Output A … D | Operating mode signal output | On, Auto, Off | Auto |
| Demand 1 (2) | Operating mode demand | Max, Auto, Min, Off | Auto |
| All outputs… | Selection operating mode of all relays | Auto, Off | Off |

## 15 User code




In the **User code** menu, a user code can be entered. Each number of the 4-digit code must be individually adjusted and confirmed. After the last digit has been confirmed, the menu automatically jumps to the superior menu level.

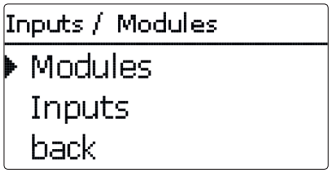
To access the menu areas of the installer level, the installer user code must be entered:

Installer: 0262

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

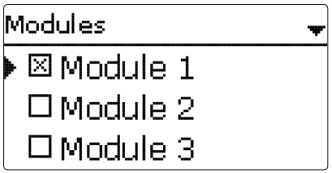
Customer: 0000

## 16 Inputs / Modules




In the **Inputs / Modules** menu, external modules can be registered and sensor offsets be adjusted.

### 16.1 Modules




In this menu, up to 5 external modules can be registered.

All modules connected and acknowledged by the controller are available.

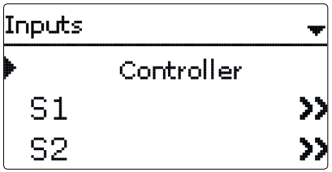
➔ To register a module, select the corresponding menu item by pressing button (5).

The checkbox indicates the selection. If a module is registered, all its sensor inputs and relay outputs will be available in the corresponding controller menus.

**Inputs / Modules / Modules**

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| Module 1 … 5 | Registering external modules | - | - |

### 16.2 Inputs




In this submenu, the type of the sensor connected can be adjusted for each individual input. The following types can be selected:

- S1 … S12: Switch, Fern (remote control), BAS (operating mode switch), Pt1000, Pt500, KTY, None
- S13 / IMP1 … S15 / IMP3: Impulse, Switch, Fern (remote control), BAS (operating mode switch), Pt1000, Pt500, KTY, None
- CS10: A … K
- Ga1, Ga2: RPS, VFS, None
- Gd1, Gd2: RPD, VFD, None
- FR1: DN20, DN25, DN32, None

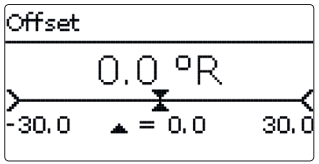
**ATTENTION! System damage!**

Selecting the wrong sensor type will lead to unwanted control behaviour. In the worst case, system damage can occur!

➔ **Make sure that the right sensor type is selected!**

If **KTY**, **Pt500** or **Pt1000** is selected, the channel **Offset** will appear, in which an individual offset can be adjusted for each sensor.

➔ In order to select a sensor for the offset adjustment, select the corresponding menu item by pressing button (5).




➔ To adjust the sensor offset, select the desired value by pressing buttons (2) or (4), then confirm by pressing button (5).

**Note**

If a sensor is used as the temperature sensor of a function, the sensor types **Switch**, **Fern**, **BAS**, **Impulse** and **none** will not be available for the corresponding input.

**ATTENTION! Damage to the device!**

Sensor inputs which have been set to the sensor type switch can only be used for connecting dry-contact switches.

➔ **Make sure no voltage is applied!**

If **Switch** is selected, the **Inverted** option will appear and can be used for inverting the behaviour of the switch.

### CS sensor offset

If a CS10 irradiation sensor is to be connected, an offset has to be carried out before the connection is made.

To carry out the offset, proceed as follows:

➔ Adjust the CS type in the **Type** channel.

➔ Select the **Offset** channel.

➔ Confirm the **Reset** enquiry with **Yes**.

➔ Select **back** to return to the **Inputs** menu, then connect the CS sensor.

**Note**

When Grundfos Direct Sensors™ are used, connect the sensor ground common terminal block to PE (see page 7).

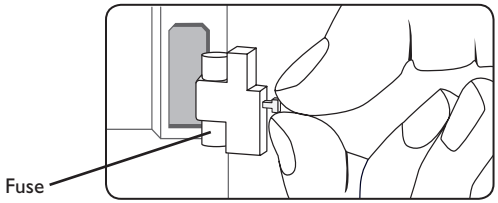
### Inputs / Modules / Inputs

| Adjustment channel | Description | Adjustment range / selection | Factory setting |
|---|---|---|---|
| S1 … S12 | Sensor input selection | - | - |
| Type | Sensor type selection | Switch, Fern, BAS, KTY, Pt500, Pt1000, None | Pt1000 |
| Offset | Sensor offset | -15.0 … +15.0 K [-30.0 … +30.0 °R] | 0.0 K [0.0 °R] |
| IMP1 … IMP3 | Impulse input selection | - | - |
| Type | Sensor type selection | Impulse, Switch, Fern, BAS, KTY, Pt500, Pt1000, None | Impulse |
| Inverted | Switch inversion (only when Type = Switch) | Yes, No | No |
| Vol./Imp. | Impulse rate | 0.1 … 100.0 | 1.0 |
| CS10 | CS10 input | - | - |
| Type | CS type | A … K | E |
| Offset | Delete offset | Yes, No | No |
| Ga1, 2 | Analog Grundfos Direct Sensor™ 1, 2 | - | - |
| Type | Grundfos-Direct-Sensor™ type | RPS, VFS, None | None |
| Max. | Maximum pressure (if Type = RPS) | 0.0 … 16.0 bar | 6 bar |
| Min. | Minimum flow rate (if Type = VFS) | 1 … 399 l/min | 2 l/min |
| Max. | Maximum flow rate (if Type = VFS) | 2 … 400 l/min | 40 l/min |
| Gd1, 2 | Digital Grundfos Direct Sensor™ 1, 2 | - | - |
| Type | Grundfos-Direct-Sensor™ type | RPD, VFD, None | None |
| | if Type = VFD: Measuring range selection | 10 - 200 l/min, 5 - 100 l/min, 2 - 40 l/min, 2 - 40 l/min (fast), 1 - 20 l/min, 1 - 12 l/min* | 1 - 12 l/min |

* For the Inputs Gd1 and Gd2, the following sensor combinations are possible:
- 1 x RPD, 1 x VFD
- 2 x VFD, but with different measuring ranges only

## 17 Troubleshooting

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




**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.

### Directional pad flashes red.

Sensor fault. The message **!Sensor fault** 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 Pt500 | Ω Pt1000 | Ω KTY | °C | °F | Ω Pt500 | Ω Pt1000 | Ω KTY |
|---|---|---|---|---|---|---|---|---|---|
| -10 | 14 | 481 | 961 | 1499 | 55 | 131 | 607 | 1213 | 2502 |
| -5 | 23 | 490 | 980 | 1565 | 60 | 140 | 616 | 1232 | 2592 |
| 0 | 32 | 500 | 1000 | 1633 | 65 | 149 | 626 | 1252 | 2684 |
| 5 | 41 | 510 | 1019 | 1702 | 70 | 158 | 636 | 1271 | 2778 |
| 10 | 50 | 520 | 1039 | 1774 | 75 | 167 | 645 | 1290 | 2874 |
| 15 | 59 | 529 | 1058 | 1847 | 80 | 176 | 655 | 1309 | 2971 |
| 20 | 68 | 539 | 1078 | 1922 | 85 | 185 | 664 | 1328 | 3071 |
| 25 | 77 | 549 | 1097 | 2000 | 90 | 194 | 634 | 1347 | 3172 |
| 30 | 86 | 559 | 1117 | 2079 | 95 | 203 | 683 | 1366 | 3275 |
| 35 | 95 | 568 | 1136 | 2159 | 100 | 212 | 693 | 1385 | 3380 |
| 40 | 104 | 578 | 1155 | 2242 | 105 | 221 | 702 | 1404 | 3484 |
| 45 | 113 | 588 | 1175 | 2327 | 110 | 230 | 712 | 1423 | 3590 |
| 50 | 122 | 597 | 1194 | 2413 | 115 | 239 | 721 | 1442 | 3695 |

### The display is permanently off.

Press button (5). Display illuminated?

- no → 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.
- yes → Controller has been in standby, everything o.k.

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

- no → Check the supply line and reconnect it.
- yes

**Note**

For answers to frequently asked questions (FAQ) see www.resol.com.

**Pump is overheated, but no heat transfer from the collector to the tank, flow and return have the same temperature; perhaps also bubbling in the lines.**

- Air or gas bubbles in the system?
  - no → Is the collector circuit blocked at the dirt trap?
  - yes → Vent the system; increase the system pressure to a static primary pressure of at least plus 0.5 bar; if necessary continue to increase pressure; switch the pump on and off for a short time.
- Is the collector circuit blocked at the dirt trap?
  - yes → Clean dirt trap

**Pump starts up very late.**

- Switch-on temperature difference ΔTon too large?
  - no → Non-ideal position of the collector sensor (e. g. flatscrew sensor instead of sensor in sensor wells).
  - yes → Change ΔTon and ΔToff correspondingly.
- Non-ideal position of the collector sensor (e. g. flatscrew sensor instead of sensor in sensor wells).
  - yes → Activate evacuated tube collector function if necessary.
- Activate evacuated tube collector function if necessary.
  - o.k.

**Pump starts for a short moment, switches off, switches on again, etc.**

- Temperature difference at the controller too small?
  - no → Wrong position of collector sensors?
  - yes → Change ΔTon and ΔToff correspondingly.
- Change ΔTon and ΔToff correspondingly.
  - no → o.k.
- Wrong position of collector sensors?
  - no → Plausibility control of the option evacuated tube collector function
  - yes → Mount the collector sensor at solar flow (warmest collector output); use sensor well of the respective collector.

**The temperature difference between tank and collector increases enormously during operation; the collector circuit cannot dissipate the heat.**

- Collector circuit pump defective?
  - no → Heat exchanger calcified?
  - yes → Check / replace it
- Heat exchanger calcified?
  - no → Heat exchanger blocked?
  - yes → Decalcify it
- Heat exchanger blocked?
  - no → Heat exchanger too small?
  - yes → Clean it
- Heat exchanger too small?
  - yes → Replace with correctly sized one.

## The solar circuit pump does not work, although the collector is considerably warmer than the tank.

Display illuminated?
If not, press button (5). Display illuminated again?
- yes → Does the pump start up in manual operation?
- no → There is no current; check fuses / replace them and check power supply.

Does the pump start up in manual operation?
- no → Is the pump current enabled by the controller?
- 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 → Controller might be defective - replace it.
- yes → Is the pump stuck?

Is the pump stuck?
- yes → Turn the pump shaft using a screwdriver; now passable?

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

## Tanks cool down at night.

Collector circuit pump runs during the night?
- no → Collector temperature at night is higher than the outdoor temperature.
- yes → Check controller

Collector temperature at night is higher than the outdoor temperature.
- no → Sufficient tank insulation?
- yes → Check the non-return valves in the flow and the return pipe for functional efficiency.

Sufficient tank insulation?
- yes → a
- no → Increase insulation.

a

Insulation close enough to the tank?
- yes → Are the tank connections insulated?
- no → Replace insulation or increase it.

Are the tank connections insulated?
- yes → Warm water outflow upwards?
- no → Insulate the connections.

Warm water outflow upwards?
- no → Does the DHW circulation run for a very long time?
- yes → Change connection and let the water flow sidewards or through a siphon (downwards); less tank losses now?

Change connection and let the water flow sidewards or through a siphon (downwards); less tank losses now?
- no → Does the DHW circulation run for a very long time?
- yes → o.k.

Does the DHW circulation run for a very long time?
- no → Circulation pump and blocking valve should be switched off for 1 night; less tank losses?
- yes → Use the circulation pump with timer and switch-off thermostat (energy-efficient circulation).

Circulation pump and blocking valve should be switched off for 1 night; less tank losses?
- yes → Check the non-return valve in warm water circulation - o.k.
- no → Check whether the pumps of the after-heating circuit run at night; check whether the non-return valve is defective; problem solved?

Check whether the pumps of the after-heating circuit run at night; check whether the non-return valve is defective; problem solved?
- no → Further pumps which are connected to the solar tank must also be checked.

Check the non-return valve in warm water circulation - o.k.
- yes → The gravitation circulation in the circulation line is too strong; insert a stronger valve in the non-return valve or an electrical 2-port valve behind the circulation pump; the 2-port valve
- no → Clean or replace it.

The gravitation circulation in the circulation line is too strong; insert a stronger valve in the non-return valve or an electrical 2-port valve behind the circulation pump; the 2-port valve
- is open when the pump is activated, otherwise it is closed; connect pump and 2-port valve electrically in parallel; activate the circulation again. Deactivate pump speed control!

# 18 Accessories

### DL3 Datalogger

For visualization via VBus.net, incl. SD card, power supply adapter, network and VBus® cable.

### DL2 Datalogger

For visualization via VBus.net, incl. SD card and network cable, power supply adapter and VBus® cable pre-connected.

### EM Extension Module

Sensor and relay Extension module with 5 outputs and 6 inputs

### TS10 Dew point switch

For condensation detection in a heating circuit used for cooling purposes.

### VFS/RPS & VFD/RPD Grundfos Direct Sensors™

Analog/digital sensors in different versions

### V40 Flowmeter

The V40 is a measuring instrument for detecting the flow of water or water/glycol mixtures.

### AM1 Alarm module

Alarm module for signaling system failures

### SD3/SDFK Smart Display/GA3 Large Display

The SD3 Smart Display is used for visualizing data issued by the controller: collector temperature, tank temperature and energy yield of the solar thermal system.

The SDFK Smart Display indicates the solid fuel boiler temperature and the bottom/top tank temperatures as well as the pump status.

The GA3 is a completely mounted large display module for visualization of collector- and tank temperatures as well as the heat quantity yield of the solar system.

### SP10 Overvoltage protection device

Overvoltage protection device, suitable for mounting outdoors.

### 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.

### 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 sensor well.

## 19 Index

Distributed by:

**RESOL – Elektronische Regelungen GmbH**

Heiskampstraße 10
45527 Hattingen / Germany

Tel.: +49 (0) 23 24 / 96 48 - 0
Fax: +49 (0) 23 24 / 96 48 - 755

www.resol.com
info@resol.com

**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.

**Imprint**

This mounting- and operation manual including all parts is copyrighted. Another use outside the copyright requires the approval of **RESOL – Elektronische Regelungen GmbH**. This especially applies for copies, translations, micro films and the storage into electronic systems.