oventrop

Valves, controls + systems

”Regtronic RQ“

Installation and operating instructions for the specialised installer

EN

Please read this manual carefully to get the best performance from this unit.

Please keep this manual carefully.

11209385

Safety advice

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

Instructions

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

Information about the product

Proper usage

The solar controller is designed for use in the Regumaq DHW exchange module in compliance with the technical data specified in this manual.

Improper use excludes all liability claims.

CE-Declaration of conformity

The product complies with the relevant directives and is therefore labelled with the CE mark.

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.

Target group

These instructions are exclusively addressed to authorised 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.

Subject to technical change. Errors excepted.

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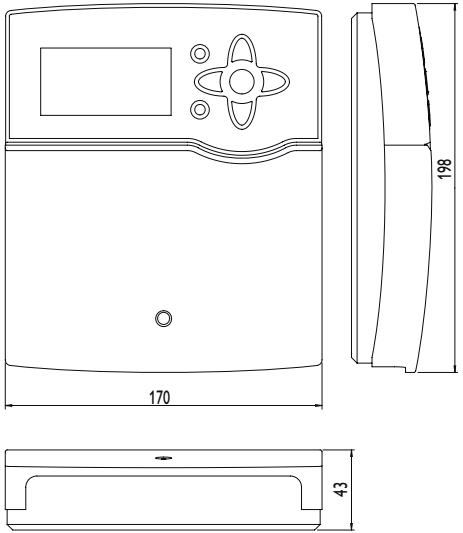
Overview



Technical data

Housing: plastic, PC-ABS and PMMA

Protection type: IP 20 / EN 60529

Protection class: I

Ambient temp.: 0 … 40 °C

Dimensions: 170 x 198 x 43 mm

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

Display: Full graphic display, control lamp (directional pad) and background illumination

Operation: 7 push buttons at the front of the housing

Functions: Controller for DHW heating. Functions such as: Circulation (demand, thermostatic, permanent), store afterheating (absolute, relative), thermal disinfection, sliding temperature control, heat pump mode, blocking protection, heat quantity measurement, stratified return, error relay, function blocks, data logging onto SD card, firmware updates over SD card.

Inputs: 7 inputs for Pt1000 temperature sensors, input for VTH flow rate sensor with frequency signal

Outputs: 3 semiconductor relays, 1 electromechanical relay, 4 bidirectional PWM outputs

Interfaces: S-Bus, SD card slot

Power supply: 100 … 240 V~, 50 … 60 Hz

Switching capacity per relay:
1 (1) A 100 … 240 V~ (semiconductor relay)
4 (1) A 100 … 240 V~ (electromechanical relay)

Total switching capacity: 4 A

Standby power consumption: 1.03 W

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

Degree of pollution: 2

Rated impulse voltage: 2,5 kV

Supply connection: type Y attachment

1 Installation

1.1 Mounting

The RQ DHW controller is already integrated in the Regumaq DHW exchange module. If the controller is to be installed outside of the DHW exchange module, please mind the following instructions.

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

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

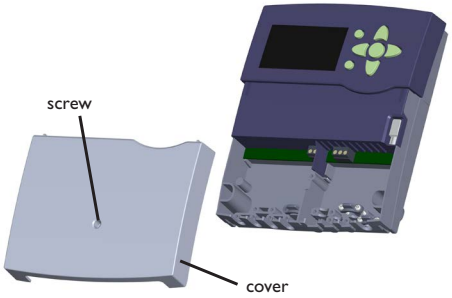
WARNING! **Electric shock!**

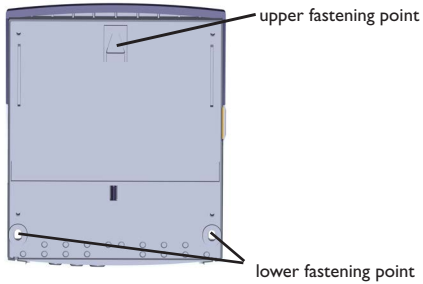
Upon opening the housing, live parts are exposed!

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

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

- ➔ Unscrew the cross-head 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 (centres 150 mm).
- ➔ Insert lower wall plugs.
- ➔ Fasten the housing to the wall with the lower fastening screws and tighten.
- ➔ Carry out the electrical wiring in accordance with the terminal allocation, see chap. 1.2.
- ➔ Put the cover on the housing.
- ➔ Attach with the cross-head screw.





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.

1.2 Electrical connection

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!**

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

Relays 1 … 3 are semiconductor relays, designed for pump speed control:

Conductor R1 … R3
Neutral conductor N (common terminal block)
Protective earth conductor PE ⏚ (common terminal block)

Relay 4 is an electromechanical relay:
Conductor R4
Neutral conductor N (common terminal block)
Protective earth conductor ⏚ (common terminal block)

Note:

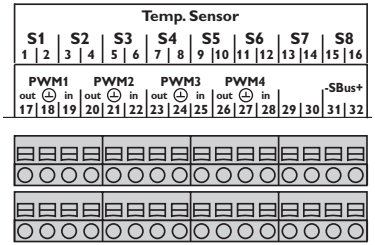
Connecting the device to the power supply must always be the last step of the installation!

Note:

The minimum pump speed must be set to 100 % when non-speed-controlled devices such as valves are connected.

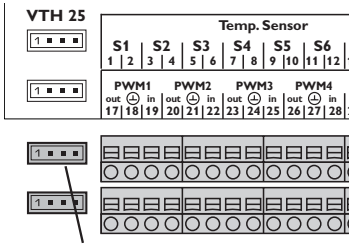
Note:
The cables of the controller are pre-connected. chap. 1.2 is for information purposes only.
Make sure the hydraulic system is properly grounded!

Note:
For more details about the initial commissioning procedure, see page 7.

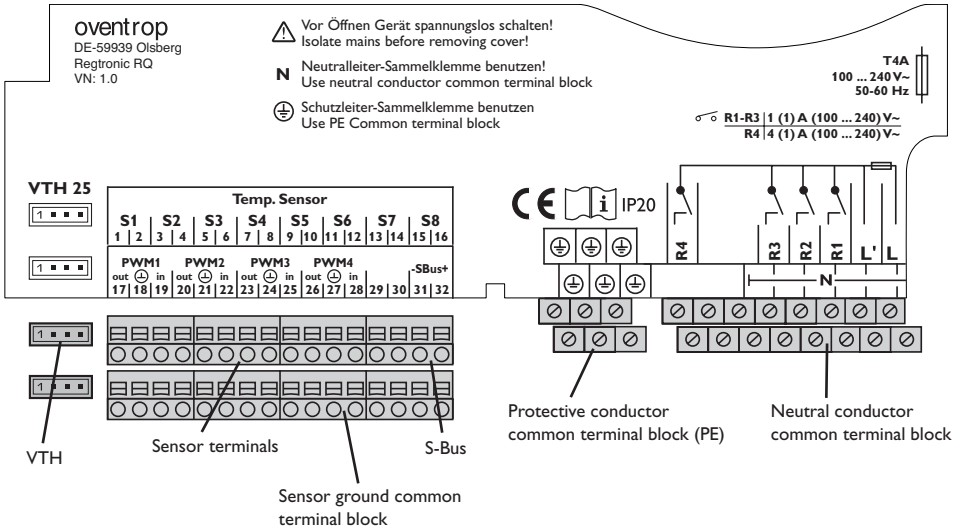


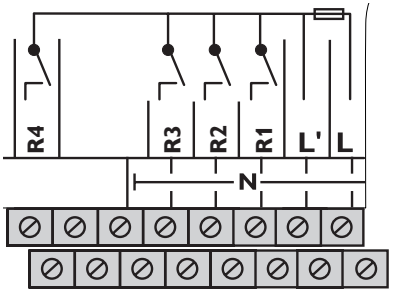
Mains and sensor cables are already connected to the device.

Additional **temperature sensors** (S3, S5 to S7) can be connected to the terminals S3, S5 to S7 (either polarity).



Connect the VTH flow rate sensor to the input marked **VTH**.





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

The mains connection is at the following terminals:

- Neutral conductor N
- Conductor L
- Protective earth conductor ⏚ (common terminal block)

WARNING! **Electric shock!**

L' is a fused contact permanently carrying voltage.

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

2 Commissioning

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

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

When the controller is commissioned for the first time or when it is reset (see page 32), it will run a commissioning menu after the initialisation phase. The commissioning menu leads the user through the most important adjustment channels needed for operating the system. For navigating in the commissioning menu, see page 8.

2.1 Step-by-step parameterisation

a. Running the commissioning menu

The commissioning menu is run after the first connection and after every reset (see page 32). It will request the following basic adjustments:

- Menu language
- Time
- Date
- Circulation
- Afterheating
- Disinfection

When the last item **Save** at the end of the commissioning menu is selected, a security enquiry appears. If the safety enquiry is confirmed, the adjustments are saved. For further information about the commissioning menu see page 13.

b. Activating the main functions

Adjustments for the main functions **Circulation**, **Afterheating** and **Disinfection** can be made. Main functions that have not been activated in the commissioning menu can now be activated here.

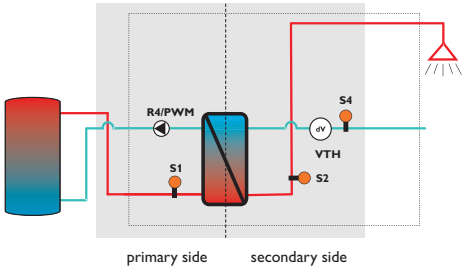
Free relays can be allocated to main functions which require a relay. The controller always suggests the numerically smallest free relay.

Sensors can be allocated to more than one function.

For further information about the main functions see page 17.

2.1.1 Overview of relay and sensor allocation

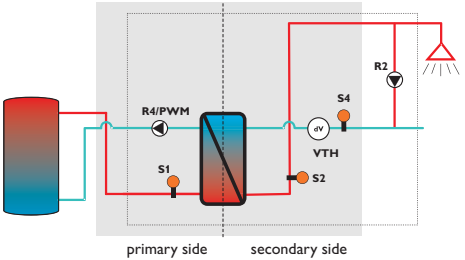
DHW heat exchange module without circulation



Relay / sensor allocation

Terminal	Description	Display screens
R4 + PWM	Primary pump	R4
S1	Store flow sensor	T-store flow
S2	Hot water flow sensor	T-HW
S4	Cold water sensor	T-CW
VTH	Flow rate sensor	Flow rate

DHW heat exchange module with circulation



Relay / sensor allocation

Terminal	Description	Display screens
R4 + PWM	Primary pump	R4
R2	Circulation pump	R2
S1	Store flow sensor	T-store flow
S2	Hot water flow sensor	T-HW
S4	Cold water sensor	T-CW
S4	Circulation sensor	Circ. return
VTH	Flow rate sensor	Flow rate

c. Activating additional functions

Only after the required main functions have been activated and adjusted, should the additional functions be activated.

Any free relay can be allocated to any of the main functions. The controller always suggests the numerically smallest free relay.

Sensors can be allocated to more than one function.

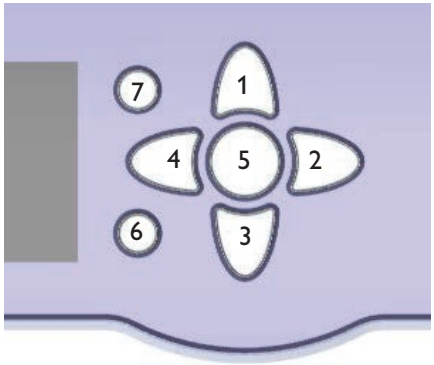
For further information about the additional functions see page 28.

2.2 Operation and function

2.2.1 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
Button (7) - escape button for changing into the previous menu



2.2.2 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 a few seconds, the display illumination goes out.

Press any key to reactivate the display illumination.

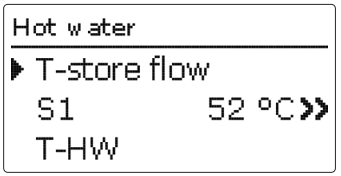
➔ In order to scroll though a menu or to adjust a value, press either buttons (1) and (3) or buttons (2) and (4)

➔ To open a sub-menu or to confirm a value, press button (5)

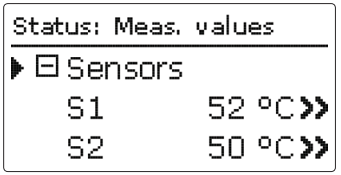
➔ To enter the status menu, press button (6) – unconfirmed adjustment will not be saved

➔ To switch one menu level upwards, press button (7) – unconfirmed adjustment 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.

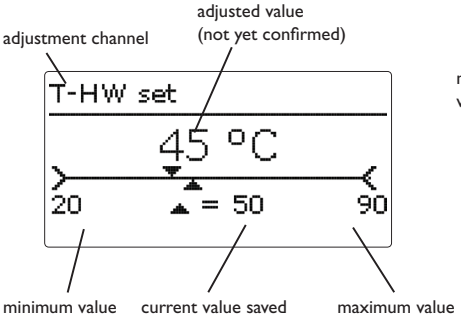


If the symbol » is shown behind a menu item, pressing button (5) will open a new sub-menu.



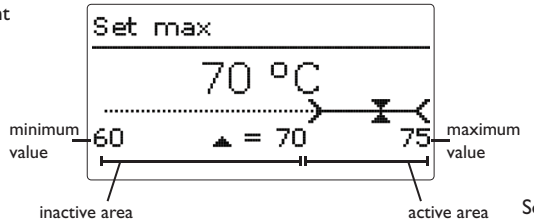
If the symbol ⊞ is shown in front of a menu item, pressing button (5) will open a new sub-menu. If it is already opened, a ⊟ is shown instead of the ⊞.

Values and adjustments can be changed in different ways:



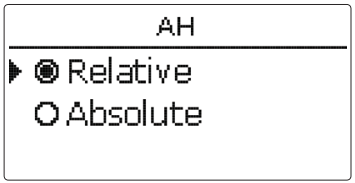
Numeric values can be adjusted by means of a slide bar. The minimum value is indicated to the left, the maximum value to the right. The large number above the slide bar indicates the current adjustment. By pressing buttons 2 or 4 the upper slide bar can be moved to the left or to the right.

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. The display jumps back to the former menu level.

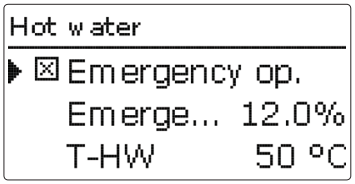


When two values are locked against each other, they will display a reduced adjustment range depending on the adjustment of the respective other value.

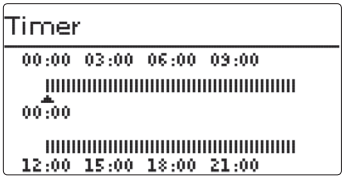
In this case, the active area of the slide bar is shortened, the inactive area is indicated as a dotted line. The indication of the minimum and maximum values will adapt to the reduction.



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. The selection will be saved if it is confirmed by pressing button 5 again. The display jumps back to the former menu level.



Some menu items are indicated with chackboxes. When an item has been selected, an **x** appears inside the checkbox.



The time frames for the timer can be adjusted in steps of 15 minutes on a time line.

The cursor can be moved along the time line by pressing buttons 2 or 4. The beginning of a time frame can be determined by pressing button 1.

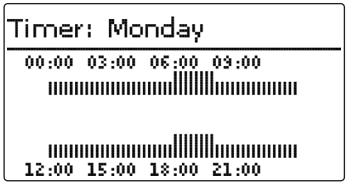
The end of a time frame can be determined by pressing button 5.

For more detailed information about the timer, see the next 2 pages.

2.2.3 Adjusting the timer

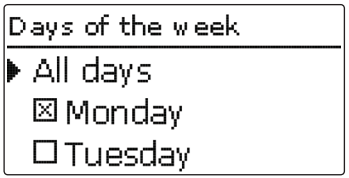
When the **Timer** option is activated, a timer is indicated in which time frames for the function can be adjusted.

First of all, an **overview** of the current adjustments is displayed. For each day of the week there is an overview display. The display can be switched back and forth between the different days by pressing buttons 2 or 4.

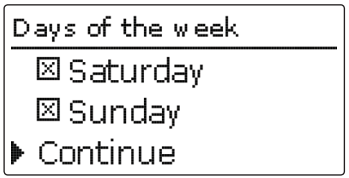


In order to adjust the timer, press button 5.

First the individual days of the week or all days of the week can be selected.



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



Adding a time frame:

The time frames can be adjusted in steps of 15 minutes.

In order to add an active time frame, proceed as follows:

➔ Move the cursor to the desired starting point of the time frame by pressing buttons 2 and 4. Confirm the starting point of the time frame by pressing button 1.

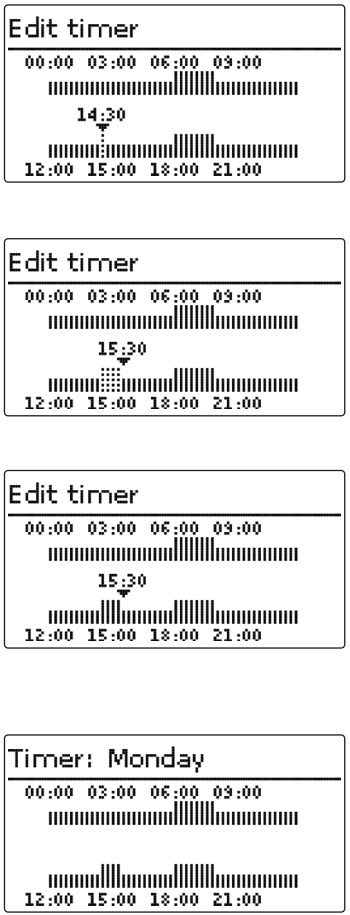
➔ Move the cursor to the desired ending point of the time frame by pressing buttons 2 and 4.

➔ The end of a time frame can be determined by pressing button 5.

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

Note:
In order to adjust a 24 h time frame, press button 1 once during the adjustment process.

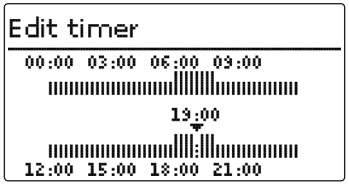
➔ In order to get back to the overview of current adjustments, press button 5 again.



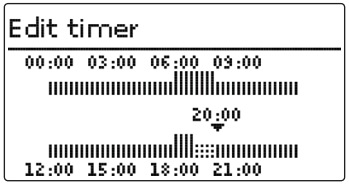
Removing a time frame:

In order to remove an active time frame, proceed as follows:

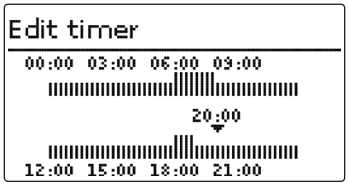
➔ Determine the point from which on the time frame is to be removed by pressing button 3.



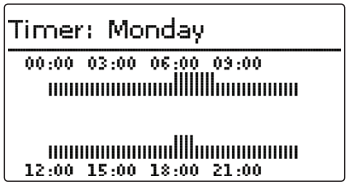
➔ Move the cursor to the desired ending point of the time frame by pressing buttons 2 and 4.



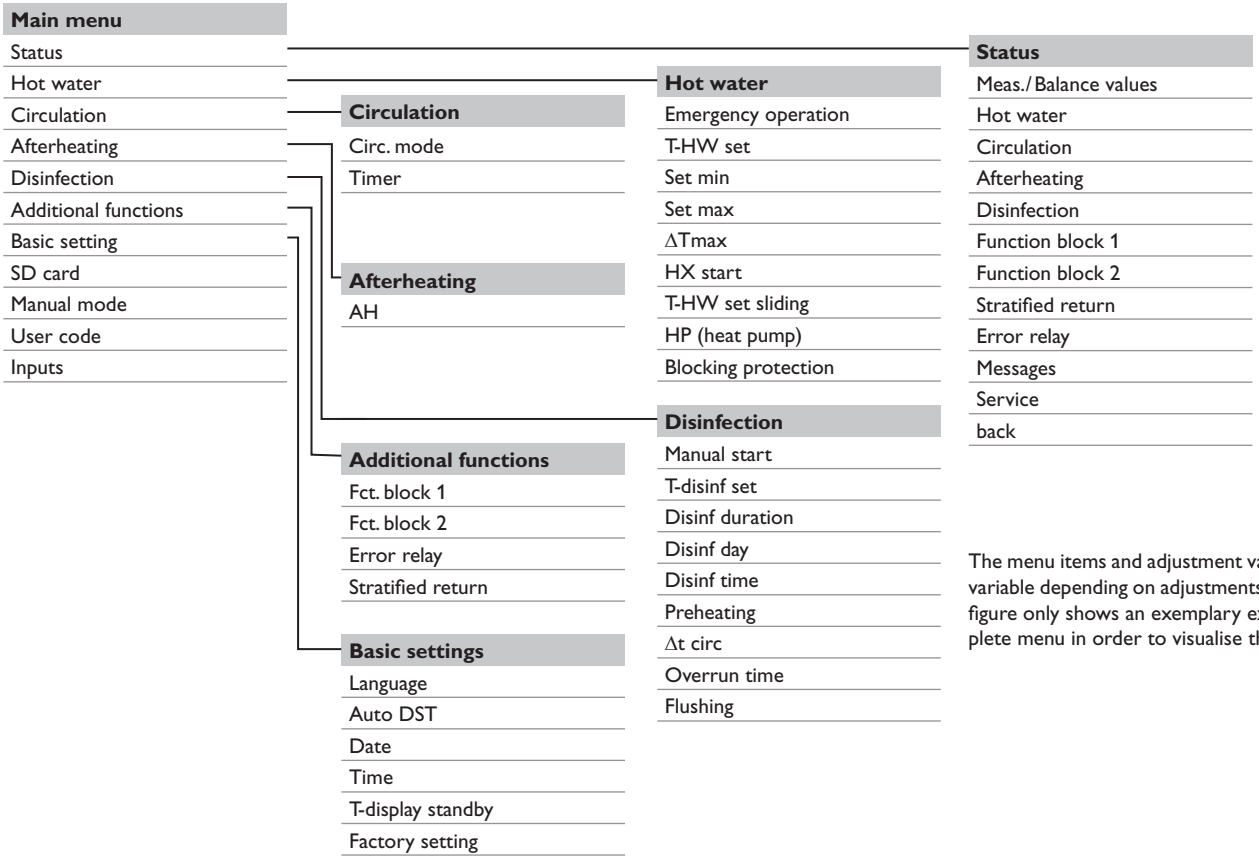
➔ In order to conclude removing the time frame, press button 5 upon reaching the desired ending point.



➔ In order to get back to the overview of current adjustments, press button 5 again.



2.2.4 Menu structure



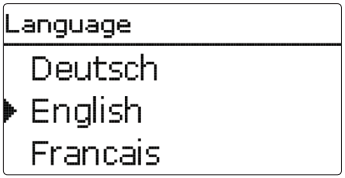
The menu items and adjustment values selectable are variable depending on adjustments already made. The figure only shows an exemplary excerpt of the complete menu in order to visualise the menu structure.

2.3 Commissioning menu

The commissioning menu consists of the channels described here. They can be entered and adjusted line by line.

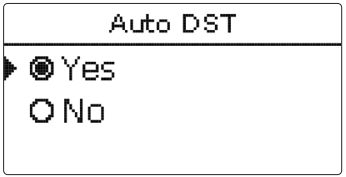
1. Language:

➔ Adjust the desired menu language.



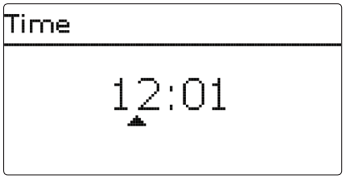
2. Daylight savings time adjustment:

➔ Activate or deactivate the automatical daylight savings time adjustment.



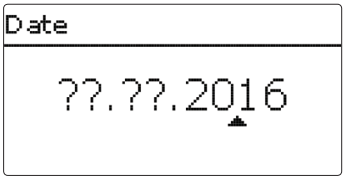
3. Time:

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



4. Date:

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



5. Circulation:

➔ Activate the circulation and select the circulation mode.

For detailed information see page 22.

6. Afterheating:

➔ Activate the store afterheating. Adjust the afterheating mode, the reference sensor and the relay that is to be switched.

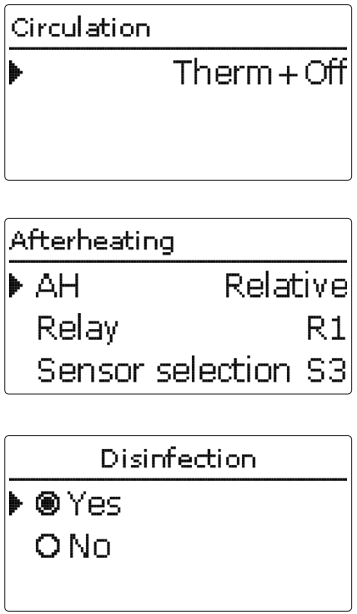
For detailed information see page 24.

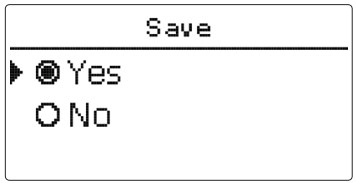
7. Thermal disinfection:

➔ Activate the thermal disinfection. More adjustments for this function can be made when the commissioning menu has been completed.

For detailed information see page 25.

Note:
In order to use the thermal disinfection function, the circulation function has to be activated.





8. Completing the commissioning menu:

If the security enquiry is confirmed, the adjustments are saved.

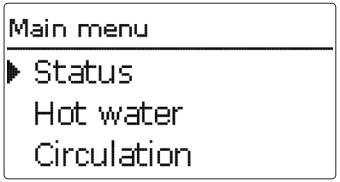
➔ In order to confirm the security enquiry, select **Yes** and press button (5).

➔ In order to get back to the parameters of the commissioning menu, select **No** or press button (7). When the security enquiry has been confirmed, the controller is ready for operation.

All adjustments made in the commissioning menu can, if necessary, be changed later on in the corresponding menus.

3 Adjustments

3.1 Main menu



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

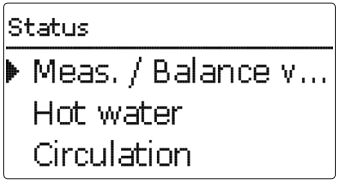
The following menus are available:

Status
Hot water
Circulation
Afterheating
Disinfection
Additional functions
Basic setting
SD card
Manual mode
User code
Inputs

Note:
If no button is pressed for the adjustable time **T-display standby** (see page 32), the display illumination goes out. After 3 more minutes, the controller switches to the Status menu.

➔ In order to get from the Status/Hot water menu into the Main menu, press button (7).

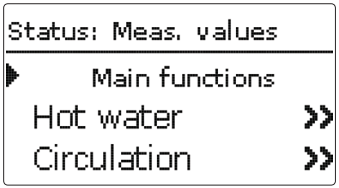
3.2 Status menu



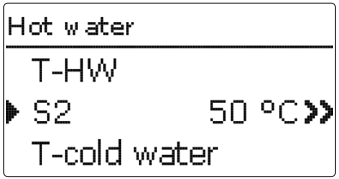
In the **Status** menu of the controller, the status messages for every menu area can be found.

3.2.1 Meas./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 sub-menu.

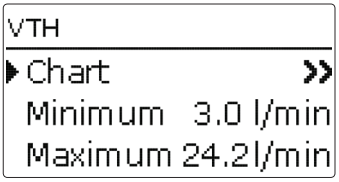


All measured values for the main and additional functions, the allocation of sensors and relays as well as the operating hours counter are displayed.



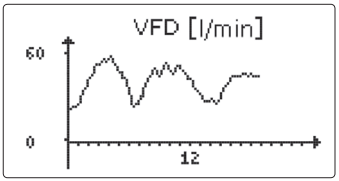
If, for example, **Hot water** is selected, a sub-menu with the sensors and relays allocated to the system will open. In the sub-menu, the current temperatures and the current pump speed are indicated.

When a line with a measurement value is selected, another sub-menu will open.



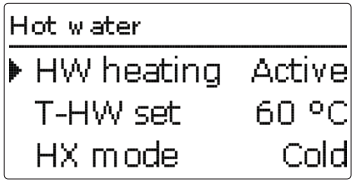
If, for example, **VTH** is selected, a sub-menu indicating the minimum and maximum values will open.

When the item **Chart** is selected, a progression chart appears.



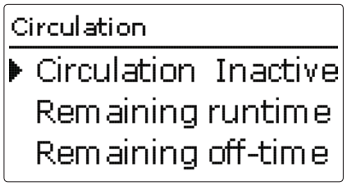
The progression chart shows the development at the corresponding sensor over the last 24 hours. Press buttons (2) and (4) to switch back and forth between a chart of the current day and one of the day before.

3.2.2 Hot water



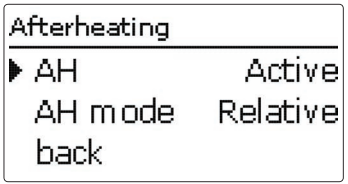
In the Status / Hot water menu, the status of the DHW heating is indicated.

3.2.3 Circulation



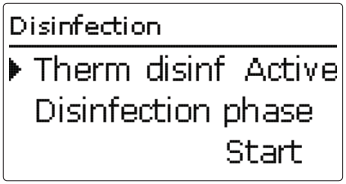
In the Status / Circulation menu, the status of the circulation, the circulation mode selected as well as, if applicable, remaining runtimes and blocking times are indicated.

3.2.4 Afterheating



In the Status / Afterheating menu, the status of the afterheating as well as the afterheating mode selected are indicated.

3.2.5 Disinfection

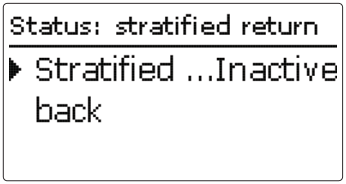


In the Status / Disinfection menu, the status and the progression of the thermal disinfection, different runtimes as well as the number of starting processes are indicated.

3.2.6 Additional functions

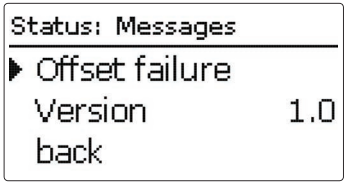
In this position, status menus for additional functions appear, if additional functions have been activated. The menu items appear with the name of the corresponding function:

- Fct. block 1
- Fct. block 2
- Stratified return
- Error relay



In the corresponding menu, status values of the selected function are indicated.

3.2.7 Messages



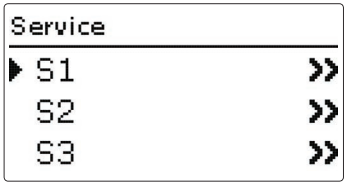
In the Status / Messages menu, error and warning messages are indicated.

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

A line break or short circuit in a sensor line is indicated as **!Sensor fault**. A precise error code can be found in the Status / Meas.- / Balance values menu.

In the case of an error, the LED of the directional pad flashes red.

3.2.8 Service

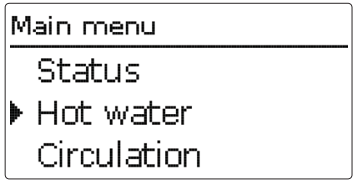


In the Status / Service menu, each sensor and relay is indicated with the component or function it has been allocated to.

Relays and sensor inputs that are not used will not be indicated here.

3.3 Main functions

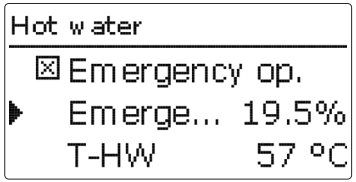
3.3.1 Hot water



In this menu, all adjustments for the DHW heating can be made. The following parameters and functions are available:

- Emergency operation
- Hot water set temperature
- Minimum hot water set temperature
- Maximum hot water set temperature
- Maximum exceedance of the hot water set temperature
- Heat exchanger mode start
- Sliding hot water set temperature
- Heat pump mode
- Blocking protection

Emergency operation



Main menu / Hot water / Emergency op.

Adjustment channel	Description	Adjustment range / selection	Factory setting
Emergency op.	Activation of the function	Yes, No	No
Emergency speed	Pump speed for emergency operation	1.5 … 100.0 %	12.0 %
T-HW	Indication of the current hot water flow temperature for the offset of the emergency speed	-	-

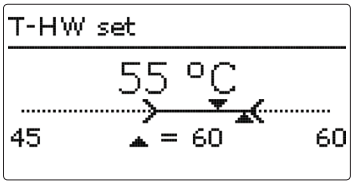
back

The **Emergency operation** function can be used for ensuring the DHW supply in the case of a sensor fault. In this case, the primary pump will be permanently run at the adjustable **Emergency speed**. For this function, the emergency speed must be aligned with the resulting hot water temperature. The display channel **T-HW** enables this alignment directly in the Hot water menu, as soon as the emergency operation has been activated.

Note:
If a sensor fault that inhibits DHW heating has occurred, activate the emergency operation in the **Emergency op.** channel.

In order to ensure a quick entry to emergency operation in the case if an emergency, perform the alignment of the emergency speed as early as possible.
The emergency speed is also available for selection in the R4 adjustment channel of the manual mode menu. This way, the speed of the primary pump can be limited for manual operation in order to ensure a scald protection.

Hot water set temperature (T-HW set)

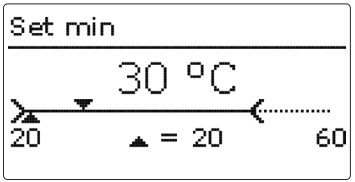


This parameter can be used for adjusting the **T-HW set** temperature which is to be reached at the HW flow sensor S2. The controller then determines the pump speed of the primary pump such that the temperature at the HW flow sensor on the secondary side continuously keeps the required set temperature T-HW set.

Main menu / Hot water / T-HW set

Adjustment channel	Description	Adjustment range / selection	Factory setting
T-HW set	Hot water set temperature (T-HW set)	20 … 75 °C	60 °C

Minimum hot water set temperature



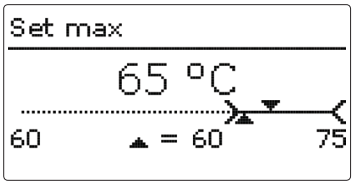
This parameter determines the minimum limitation for the adjustment of the hot water set temperature **T-HW set**.

Note:
In order to prevent the hot water set temperature from being adjusted too low, Set max must be adjusted to suit the system upon commissioning!

Main menu / Hot water / Set max

Adjustment channel	Description	Adjustment range / selection	Factory setting
Set min	Minimum hot water set temperature	20 … 75 °C	20 °C

Maximum hot water set temperature



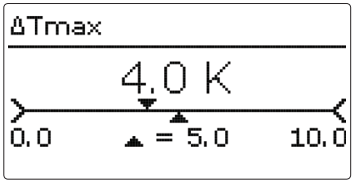
This parameter determines the maximum limitation for the adjustment of the hot water set temperature.

Note:
In order to prevent the hot water set temperature from being adjusted too high, **Set max** must be adjusted to suit the system upon commissioning!

Main menu / Hot water / Set max

Adjustment channel	Description	Adjustment range / selection	Factory setting
Set max	Maximum hot water set temperature	20 … 75 °C	60 °C

Maximum limitation for exceedance of the hot water set temperature (T-HW set)



Main menu / Hot water / ΔTmax

Adjustment channel	Description	Adjustment range / selection	Factory setting
Max. limitation	Maximum limitation option	Yes, No	Yes
tmax	Switch-on condition time period	5 … 300 s	180 s
ΔTmax	Maximum exceedance of the hot water set temperature T-HW set	3.0 … 8.0 K	5.0 K

This function can be used for preventing draw-off water temperatures that massively exceed the hot water set temperature (scald protection).

Note:
The switch-on condition for the maximum limitation will only become valid if the hot water flow temperature is ≥ 60°C.

When the temperature measured at the HW flow sensor S2 exceeds the hot water set temperature **T-HW set** by the maximum temperature difference **ΔTmax**, the primary pump R4 is switched off.

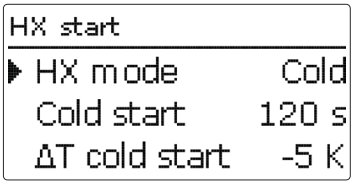
Example:
T-HW > T-HW set + ΔTmax ➔ primary pump off

When the maximum limitation is active, no DHW heating takes place. In the Status / Messages menu, the error message Emergency shutdown appears. In order to enable DHW heating again, acknowledge the error message by pressing button (5).

Note:
The maximum limitation will not become active during and up until 1 hour after the completion of a thermal disinfection.

Note:
The maximum limitation does not affect the control of the circulation pump.

Heat exchanger mode



The **HX start** sub-menu can be used to adjust all values for the operation of the heat exchanger.

3 heat exchanger modes are available. They enable different temperature conditions of the heat exchanger at the beginning of a draw-off.

Main menu / Hot water / HX start

Adjustment channel	Description	Adjustment range / selection	Factory setting
HX mode	Heat exchanger mode	Cold, Hot, Time	Cold
Cold start	Cold start pump runtime	10 … 600 s	120 s
ΔT cold start	Cold start temperature difference	-30 … +30 K	-5 K
Speed cold	Cold start pump speed	30 … 100 %	100 %
HX set value	Heat exchanger set temperature	10 … 60 °C	40 °C
HX set hyst	Heat exchanger hysteresis	1 … 10 K	2 K
Speed hot	Speed hot mode	15 … 100 %	25 %
Timer	Timer	-	-
Days of the week	Day selection	All days, Monday … Sunday, Continue	-
Timer	Time frame adjustment	00:00 … 23:59	-

back

HX mode Cold

The primary pump is only activated when there is a draw-off (cold start). At first, the pump is run at the adjusted **Speed cold**. As soon as the **Cold start** time has elapsed or the adjustable temperature difference **ΔT cold start** (reference sensors are S1 and S2) is exceeded, the cold start phase is completed. The controller switches to the pump speed calculated.

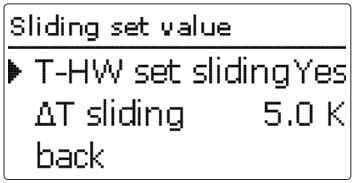
HX mode Hot

The heat exchanger is permanently kept at the adjusted **HX set** temperature (hot start). For that purpose, the temperature at the store flow sensor is measured. If the temperature at this sensor falls below the adjusted HX set value, the primary pump is run at the adjusted **Speed hot**. When **HX set** + **HX set hyst** is exceeded, the primary pump is switched off.

HX mode Time

This mode is a combination of the other two modes. With the timer, different days and time frames can be adjusted. Within the time frames, the HX mode Hot is active, outside the time frames, the HX mode Cold is active.

Sliding set value



The **Sliding set value** function can be used for adapting the hot water set temperature in the case of insufficient store temperature. The function prevents the primary pump from being run at 100 %, which would unnecessarily mix the store contents and thus destroy the store stratification.

If the store flow temperature falls below the limit value **T-HWset** + **ΔT sliding**, T-HW set will be decreased accordingly. The primary pump speed is then controlled such that the new set value is permanently kept.

When the HX mode Cold is activated, the sliding set value adaptation will start only if the cold start phase has been completed.

T-HW set will only be decreased down to the lower limit temperature of 20 °C.

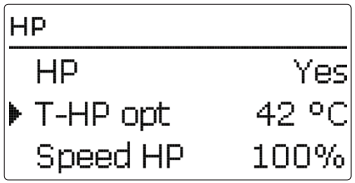
Main menu / Hot water / Sliding set value

Adjustment channel	Description	Adjustment range / selection	Factory setting
T-HW set sl.	Activation of the function	Yes, No	No
ΔT sliding	Temperature difference	2.0 … 20.0 K	5.0 K

back

Note:
In some systems it is recommended not to activate the **sliding set value** mode or to place an additional Pt1000 sensor into the upper store zone respectively and to connect it to the terminal S1. This sensor has the function of the immersion sensor in the throttle valve.

Heat pump mode



Main menu / Hot water / HP

Adjustment channel	Description	Adjustment range / selection	Factory setting
HP	Activation of the function	Yes, No	No
T-HP opt	Limit temperature for the heat pump control (store mixing)	20 … 75 °C	45 °C
Speed HP	Store mixing pump speed	30 … 100 %	100 %
back			

The **HP mode** can be used to force an afterheating, when a heat pump is used for the store afterheating. For that purpose, the store contents are mixed in order to decrease the store temperature, which leads to a heat pump demand.

When the heat pump mode has been activated, the optimum operating temperature of the heat pump **T-HP opt** must be adjusted in order to determine the store flow sensor temperature from which on the heat pump mode becomes active. When the heat pump mode is active, the primary pump is run at the adjustable **Speed HP**.

The heat pump mode becomes active in the following cases:

- During sliding set value adaptation, the temperature at the store flow sensor falls below T-HP opt.
- T-HW set has been adjusted lower than T-HP opt and the temperature at the store flow sensor falls below the set temperature calculated.

Only after the cold start phase has been completed, will the heat pump mode become active.

Blocking protection

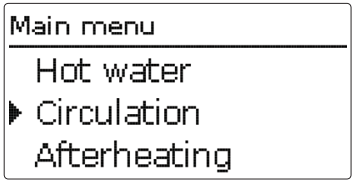
Main menu / Hot water / Blocking protection

Adjustment channel	Description	Adjustment range / selection	Factory setting
Blocking protection	Activation of the function	Yes, No	No

The **Blocking protection** function can be used for protecting the pumps against blocking after standstill. Blocking protection is executed daily at 12 o'clock. It will energise relay 4 (primary pump) and, if the circulation has been activated, relay 2 (circulation pump) as well.

Pump runtime is 3 seconds. First, the circulation pump starts. Then, the primary pump starts. The HW heating, the hot start of the heat exchanger and the circulation have a higher priority than the blocking protection. In the case of a draw-off, the blocking protection for the corresponding pumps is aborted.

3.3.2 Circulation



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

For the circulation, 3 circulation modes are available in 6 combinations:

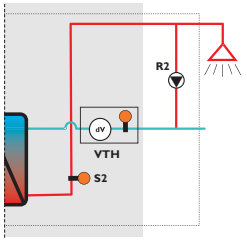
Circulation modes:
- **Permanent**
- **Thermostatic**
- **Demand**

Each combination of the 3 circulation modes has a timer function by means of which time frames can be adjusted. In any combination, the circulation mode named first is active within the adjusted time frames. The second mode is active outside of the adjusted time frames:

Active within the time frames		Active outside the time frames
1. Permanent	+	Off
2. Therm	+	Off
3. Demand	+	Off
4. Permanent	+	Therm
5. Permanent	+	Demand
6. Therm	+	Demand

When one of the circulation modes is selected, the corresponding adjustment channels will appear.

Note:
The circulation function must be activated in order to use the thermal disinfection function.



secondary side

Permanent

The circulation pump is permanently active.

Thermostatic

When the temperature at the circulation return sensor falls below the adjusted value **T-circ therm** by the non-adjustable hysteresis of -2 K, the circulation pump is switched on.
The controller aims to keep the temperature at the HW flow sensor at T-HW set.
When the temperature at the circulation return sensor exceeds the adjusted value **T-circ therm** by the non-adjustable hysteresis of +2 K, the circulation pump is switched off.
The sensors S3 or S5 to S7 can be used as the reference sensor.

Note:
T-HW set is blocked against **T-circ therm** when the circulation mode Thermal is activated. The set value can only be decreased down to a minimum limit which calculates as follows:
T-circ therm + 2 K + ΔT circ
(see page 23)

Demand

A draw-off that takes less than 2 s ist detected as a draw-off impulse.

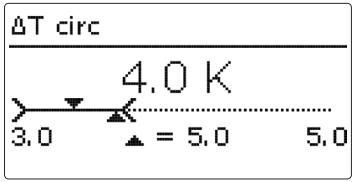
If the VFD registers a draw-off impulse, the circulation pump will be activated for the adjustable **Circ. runtime**.

The demand can also be triggered by means of a switch. For this purpose, connect the switch to the S8 input.

If the circulation has ended after having been active because of a demand, any further draw-off impulses will be ignored for the adjustable **Circ. off-time**.

When a draw-off takes place while the circulation is active, the circulation pump is not switched off.

ΔT circ – circulation pipe temperature loss



The Δ**T circ** adjustment value can be used to compensate the temperature loss in the circulation pipe.

When the switching condition for a function is fulfilled at the **cold water sensor S4** (T-CW), the ΔT circ value determines the temperature loss value that is to be calculated into the control logic in order to ensure that the switching condition can be met.

Main menu / Circulation

Adjustment channel	Description	Adjustment range / selection	Factory setting
[empty]	Circulation mode selection	Circulation off; Permanent + Off Therm + Off Demand + Off Permanent + Therm Permanent + Demand Therm + Demand	Circulation off
T-circ therm	Temperature for the thermal circulation	15 … 70 °C	38 °C
Δt circ	Compensation of the temperature loss of the circulation pipe	3.0 … 10.0 K	5.0 K
Circ. runtime	Circulation runtime	0 … 600 s	60 s
Circ. off-time	Off-time before a new circulation demand	0 … 60 min	10 min
Timer	Timer	-	-
Days of the week	Day selection	All days, Monday … Sunday, Continue	-
Timer	Time frame adjustment	00:00 … 23:59	-

back

➔ Read the correct value for ΔT circ from the table below.

During thermal disinfection, the parameters **T-circ therm** and **T-HW set** are blocked against each other by Δ**TCirc + 2K** in order to ensure that the switch-off temperature **T-circ therm** can be reached at the reference sensor.

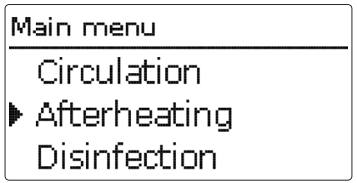
During thermal disinfection, the set temperature for the HW flow sensor is increased by ΔT circ for the stabilisation phase, in order to ensure that the disinfection temperature can also be reached at the cold water sensor S4.

Note:
The ΔT circ value has to be adapted to the individual system and must thus be adjusted by specialised craftsmen only.

ΔT circ per 10 m copper pipe depending on the HW flow temperature and for different pipe diameters

Pipe	T-HW FL = 45°C	T-HW FL = 60°C
10 x 1 mm, 50 % insulation	0.2	0.3
10 x 1 mm, 100 % insulation	0.2	0.3
15 x 1 mm, 50 % insulation	0.3	0.4
15 x 1 mm, 100 % insulation	0.2	0.3
22 x 1 mm, 50 % insulation	0.3	0.5
22 x 1 mm, 100 % insulation	0.2	0.4
28 x 1.5 mm, 50 % insulation	0.3	0.5
28 x 1.5 mm, 100 % insulation	0.3	0.4

3.3.3 Afterheating



The **Afterheating** function can be used to reheat the upper store zone through a heat source, if necessary. It works independently from the hot water heating and can be activated by the user.
When the function has been activated, the corresponding relay and the afterheating sensor have to be allocated.

Main menu/Afterheating

Adjustment channel	Description	Adjustment range/selection	Factory setting
AH	Afterheating activation/Afterheating mode selection	Off, Absolute, Relative	Off
Relay	Relay selection	R1, R3	system dependent
Sensor	Sensor selection	system dependent	S3
Boiler max.	Maximum afterheating temperature	20 … 95 °C	85°C during boiler afterheating
T-AH on	Afterheating switch-on temperature	20 … 95 °C	45 °C
ΔT absolute	Afterheating mode Absolute switch-off threshold	3 … 30 K	5 K
ΔT relative	Afterheating mode Relative switch-off threshold	3 … 30 K	3 K

back

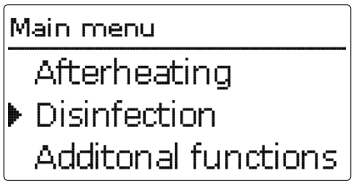
Maximum boiler temperature
The maximum boiler temperature **Boiler max.** determines the highest temperature which can be reached at full boiler capacity. That prevents the calculation or adjustment of an afterheating temperature that cannot be provided by the boiler.

For the afterheating, 2 afterheating modes are available:

Afterheating mode Absolute
As soon as the temperature at the allocated afterheating sensor falls below the adjustable switch-on temperature **T-AH on**, the afterheating is activated and the allocated relay switches on. The store is then heated up to an absolute store set temperature calculated from the adjustable temperature difference **ΔT absolute**. When the store set temperature is reached, the afterheating is deactivated and the allocated relay switches off.

Afterheating mode Relative
For this afterheating mode, a relative switch-on temperature depending on the current set temperature **T-HW set** is used. As soon as the temperature at the allocated afterheating sensor falls below the relative switch-on temperature, the afterheating is activated and the allocated relay is switched on.
The store is then heated up to a store set temperature which is by the adjustable temperature difference **ΔT relative** higher than the switch-on temperature mentioned above. Afterwards, the afterheating is deactivated and the allocated relay is switched off.

3.3.4 Disinfection



Main menu / Disinfection

Adjustment channel	Description	Adjustment range / selection	Factory setting
Disinfection	Activation of the function	Yes, No	No
Manual start	Manual start of the disinfection	-	-
T-disinf set	Set temperature for thermal disinfection	65 … 75 °C	70 °C
Disinf duration	Duration of the thermal disinfection	1 … 30 min	3 min
Disinf day	Sub-menu for selecting the disinfection day	-	-
Disinfection day	Selecting the disinfection day	Mo, Tu, We, Th, Fr, Sa, Su	Mo, Tu, We, Th, Fr, Sa, Su
back			
Disinf time	Starting time for the thermal disinfection	00:00 … 23:59	01:00
Preheating	Activation of the store afterheating	Yes, No	No
Δt circ	Time constant of the circulation pipe	60 … 900 s	300 s
Overrun time	Overrun time for both pumps	60 … 600 s	60 s
Flushing	Sub-menu for the flushing process after a completed thermal disinfection	-	-
Flushing	Activation of the function	Yes, No	No
Relay 1	Relay selection for the flushing process	system dependent	system dependent
Flushing time	Indication of the flushing time	-	correlates with the overrun time
back			
back			

This function helps to prevent the spread of Legionella in DHW and circulation pipes on the secondary side of the heat exchanger. When the thermal disinfection function is active, the speed of the primary pump is controlled such that the adjustable temperature **T-disinf set** is reached. The controller activates the circulation pump in order to disinfect the circulation pipe for the adjustable time Disinf duration.

The thermal disinfection function starts automatically when the adjusted **Disinf time** on the adjusted **Disinf day** has arrived. By means of the menu item **Manual start**, the disinfection can be started manually at any time.

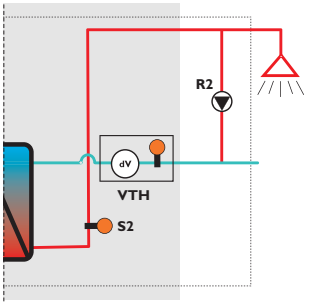
When the thermal disinfection function is active, it can be aborted at any time by means of the menu item **Abort**. All runtimes counted and conditions fulfilled will be reset in that case.

WARNING!

During and up until 1 hour after the completion of a thermal disinfection, increased DHW temperatures may occur. Ensure a scald protection during and up until 1 hour after the completion of a thermal disinfection. After thermal disinfection is completed, return the system to normal operation.

The thermal disinfection process

1. Store preheating
2. Primary pump speed control to reach disinfection temperature
3. Store afterheating, if necessary
4. Stabilisation and heating-up of the circulation pipe
5. Disinfection of the circulation pipe
6. Overrun



secondary side

The thermal disinfection function can be started by means of the **Preheating** option in order to heat the store up to a sufficient temperature level before the thermal disinfection begins. Regardless of that, afterheating is started if an insufficient store temperature is detected during thermal disinfection (see page 24).

When the preheating option is activated, the thermal disinfection will start automatically 30 minutes before the adjusted **Disinf time** with store afterheating. When the thermal disinfection function is started manually, it will also begin with store afterheating. For store afterheating, the reference sensor of the main function **Afterheating** is used. As soon as the required afterheating set temperature is exceeded at the reference sensor, preheating is completed.

The controller will now control the primary pump such that the temperature required for disinfection is provided, and will monitor the temperature at the S1 store flow sensor. If the temperature at S1 is sufficiently high for disinfection, the controller starts stabilising the circulation pipe temperature. If the temperature is insufficient, the controller starts afterheating again with a higher afterheating set temperature and then monitors again, whether the temperature at sensor S1 is sufficiently high for disinfection. The increased afterheating set temperature is limited by the parameter **Boiler max.**

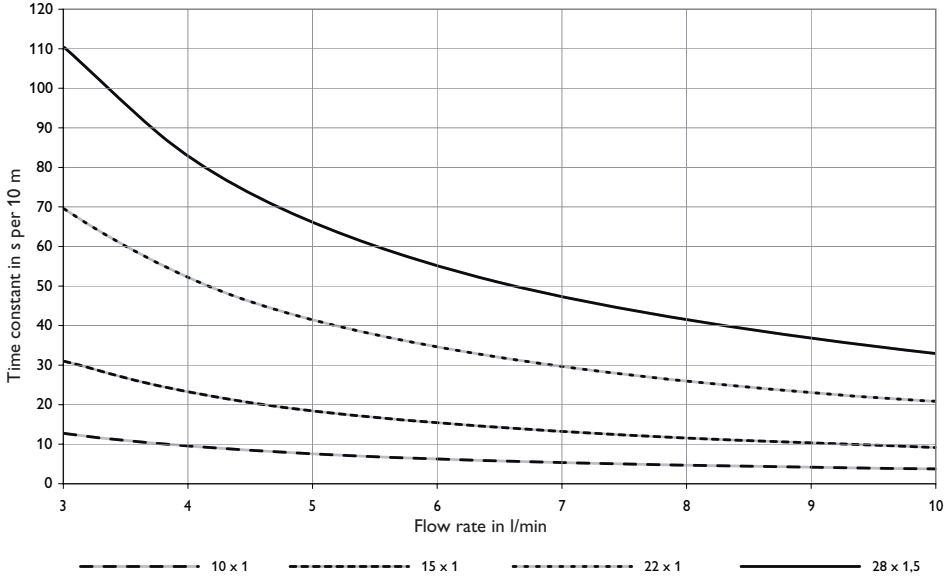
If the temperature at sensor S1 is sufficiently high for disinfection and the controller starts the circulation pipe stabilisation, the temperature **T-CW** at the circulation return sensor is monitored. The circulation pump is activated during this process. If the temperature measured at the circulation return sensor reaches the required temperature **T-disinf set**, circulation pipe stabilisation is considered complete and fully heated, so that the actual thermal disinfection can begin.

The controller now aims to keep the required set temperature at the hot water flow sensor S2 and starts the **Disinf. duration** countdown. For keeping the required temperature at the S2 sensor, the parameter **ΔT circ** is taken into account in order to compensate the temperature loss of the circulation pipe between flow and return (page 23). When the countdown Disinf. duration reaches the adjusted value **Disinf. duration**, the thermal disinfection is considered as completed.

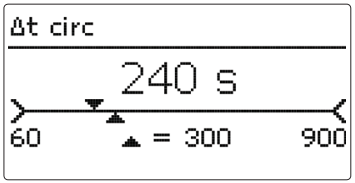
Now the **Overrun** starts. The primary pump and the circulation pump remain active for the adjustable **Overrun time**. In order to flush a further pipe line, the additional **Overrun** option can be activated if there is a free relay available. When the additional option is activated, the allocated relay is energised during the overrun time.
When the overrun time has elapsed, the overrun and, if activated, the flushing (**Flushing time**) ends.

The thermal disinfection is now fully completed.

Time constant Δt circ per 10 m copper pipe depending on the flow rate and for different pipe diameters

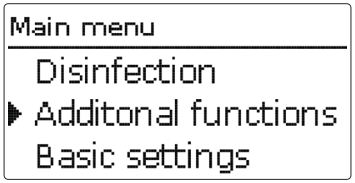


ΔT circ – circulation pipe time constant



The adjustment value **Δt circ** determines the time a heat impulse needs to pass through the entire circulation pipe between the HW flow sensor and the circulation return sensor. The controller takes this time into account when stabilising the circulation system to the required disinfection temperature **T-disinf set**. The controller waits until T-disinf set is reached at the circulation return sensor. The Δt circ value determines the maximum waiting time. When the set value **T-disinf set** is not reached at the circulation return sensor after the waiting time has elapsed, the controller increases the pump speed of the primary pump and thus the temperature at the HW flow sensor.

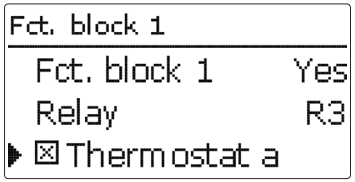
3.4 Additional functions



In this menu, additional functions can be selected and adjusted, as long as there are free relays available. The following additional functions are available:

- Function block 1
- Function block 2
- Stratified return
- Error relay

Function block



In addition to the pre-defined optional functions, up to 2 function blocks consisting of thermostat functions, timer and differential functions are available. With the help of these function blocks, further components and functions respectively can be controlled.

To each function block, sensors and free relays 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 conditions of all the activated functions have to be fulfilled (e. g. thermostat and timer) for switching the allocated relay. As soon as one condition is not fulfilled, the relay switches off.

Thermostat function

The relay allocated to the function block switches on, when the adjusted switch-on temperature (Th(x)on) is reached. It switches off when the adjusted switch-off temperature (Th(x)off) is reached. The switching conditions of all other activated functions of the function block have to be fulfilled as well.

Adjust the heating function with Th(x)off > Th(x)on, the cooling function with Th(x)on > Th(x)off. The temperatures cannot be set to an identical value.

ΔT function

The relay allocated to the function block is switched on as soon as the adjusted switch-on temperature difference (ΔTh(x)on) is reached. It is switched off as soon as the adjusted switch-off temperature difference (ΔTh(x)off) is reached.

If the switch-on difference is reached, the pump is activated at full speed for 10 s. Then, the speed is reduced to the adjusted minimum pump speed value. If the temperature difference reaches the adjusted nominal temperature difference, the pump speed increases by one step (10%). If the temperature difference increases by the adjustable **Rise** value, the pump speed increases by 10% respectively until the maximum pump speed of 100% is reached.

Timer

The relay allocated to the function block switches on when the current operating time is within the adjusted time frame.

Flow rate dependent de-/activation

The relay allocated to the function block switches on when the adjusted switch-on flow rate **dVon** is reached at the flow rate sensor. It switches off when the adjusted switch-off flow rate **dVoff** is reached.

If the **Inverted** option is activated, the relay operates vice versa.

The **Sensor dV** channel indicates the flow rate sensor currently used.

Reference relay

Up to 3 reference relays can be selected. Whether the reference relays 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.

In the OR mode, the switch-on condition for the reference relay function is considered fulfilled when at least one of the reference relays is active.

If none of the reference relays is active, the switch-on condition for the reference relay function is considered unfulfilled.

In the NOR mode, the switch-on condition for the reference relay function is considered fulfilled when none of the reference relays is active.

As soon as at least one of the reference relays is active, the switch-on condition for the reference relay function is considered unfulfilled.

In the AND mode, the switch-on condition for the reference relay function is considered fulfilled when none of the reference relays is inactive.

As soon as at least one of the reference relays is inactive, the switch-on condition for the reference relay function is considered unfulfilled.

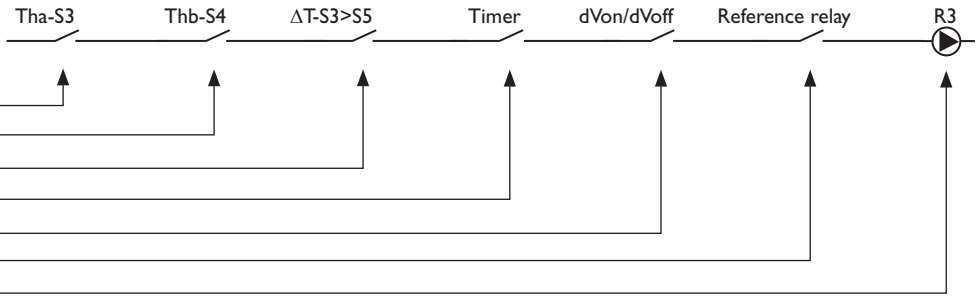
In the NAND mode, the switch-on condition for the reference relay function is considered fulfilled when at least one of the reference relays is inactive.

If none of the reference relays is inactive, the switch-on condition for the reference relay function is considered unfulfilled.

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

Example:

Funktion
Thermostat a
Thermostat b
Differential function ΔT
Timer
Flow rate dependent de-/activation
Reference relay
Relais

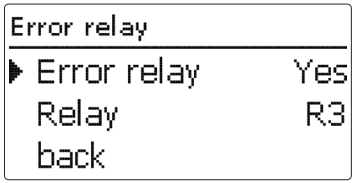


Main menu/Additional functions/Function block

Adjustment channel	Description	Adjustment range/selection	Factory setting
Function block 1	Activating the function block	Yes, No	No
Relay	Relay	system dependent	system dependent
Thermostat a	Thermostat a	Yes, No	No
Th-a on	Switch-on temperature Thermostat a	-40 … +250 °C	40 °C
Th-a off	Switch-off temperature Thermostat a	-40 … +250 °C	45 °C
Sensor	Sensor thermostat a	S1 … S7	S1
Thermostat b	Thermostat b	Yes, No	No
Th-b on	Switch-on temperature Thermostat b	-40 … +250 °C	40 °C
Th-b off	Switch-off temperature Thermostat b	-40 … +250 °C	45 °C
Sensor	Sensor thermostat b	S1 … S7	S1
ΔT function	Differential function	Yes, No	No
ΔTon	Switch-on temperature difference	1.0 … 50.0 K	5.0 K
ΔToff	Switch-off temperature difference	0.5 … 49.5 K	3.0 K
ΔTset	Set temperature difference	2.0 … 100 K	10.0 K
Min. speed	Minimum loading pump speed	30 … 100 %	30 %
Sensor source	Heat source sensor	S1 … S7	S1
Sensor sink	Heat sink sensor	S1 … S7	S1
Rise	Rise (speed control)	1,0 … 20,0 K	2,0 K
Timer	Timer	-	-
Days of the week	Day selection	All days, Monday … Sunday, Continue	-
Timer	Time frame adjustment	00:00 … 23:45	-
Flow rate	Flow rate detection option	Yes, No	No
dVon	Switch-on flow rate	2,0 … 39,5	8,0
dVoff	Switch-off flow rate	2,5 … 40,0	20,0
Sensor dV	Flow rate sensor display	VTH	VTH
Inverted	Inverted switching option	Yes, No	No
Ref. relay	Reference relay option	Yes, No	No
Mode	Reference relay mode	AND, OR, NAND, NOR	AND
Relay 1	Reference relay	system dependent	system dependent

back

Error relay



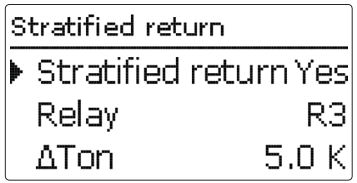
The **Error** relay function can be used to operate a relay in the case of an error. Thus, e. g. a signalling device can be connected to signal errors.

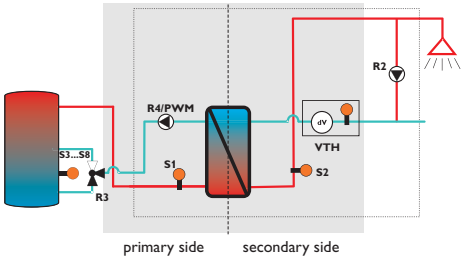
If the error relay function is activated, the allocated relay will switch on when an error occurs.

Main menu/Additional functions/Error relay

Adjustment channel	Description	Adjustment range/selection	Factory setting
Error relay	Activating the function	Yes, No	No
Relay	Relay selection	system dependent	system dependent
back			

Stratified return





The **Stratified return** function can be used for maintaining the stratification inside the store. When the return temperature in the HW line of the secondary side is very high, the store contents might be mixed.

If the difference between the temperatures at the station sensor and the store sensor exceeds the adjusted switch-on difference (Ton), the allocated relay is energised. The store return will be led in at a higher level.

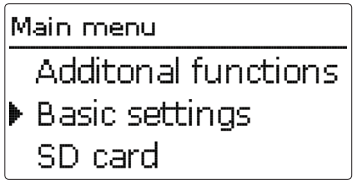
The relay is switched off when the controller detects no flow rate at the VTH sensor or the temperature difference falls below the adjusted switch-off difference **Toff.**

The stratified return function can be activated once. The corresponding relay can be allocated to R3, as long as this relay is not used for other functions.

Main menu/Additional functions/Stratified return

Adjustment channel	Description	Adjustment range/selection	Factory setting
Stratified return	Activating the function	Yes, No	No
Relay	Relay selection	system dependent	system dependent
ΔTon	Switch-on temperature difference	1.0 … 50.0 K	5.0 K
ΔToff	Switch-off temperature difference	0.5 … 49.5 K	3.0 K
Station sensor	Station sensor selection	system dependent	S4
Store sensor	Store sensor selection	system dependent	S5
back			

3.5 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.

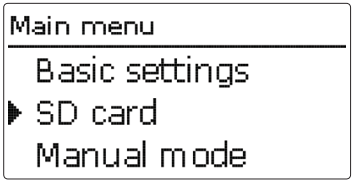
Reset

By means of the reset function, all adjustments can be set back to their **factory settings**.
All adjustments that have previously been made will be lost! For this reason, a security enquiry will appear after the reset function has been selected.
Only confirm the security enquiry if you are sure you want to set back all adjustment to the factory setting.

Basic settings

Adjustment channel	Description	Adjustment range / selection	Factory setting
Language	Selection of the menu language	Deutsch, English, Francais, Espanol, Italiano	Deutsch
Auto DST	Automatic daylight saving time adjustment	Yes, No	Yes
Date	Adjustment of the current date	01.01.2001 … 31.12.2099	01.01.2010
Time	Adjustment of the current time	00:00 … 23:59	-
T-display standby	Display illumination time	10 … 300 s	30 s
Factory setting	back to the factory settings	Yes, No	No
back			

3.6 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 in the csv format. After the transfer to a computer, the values can be opened and visualised, e. g. in a spreadsheet.
- Store adjustments and parameterisations on the SD card and, if necessary, retrieve them from there.
- Running firmware updates on the controller.

Firmware updates

When an SD card with a firmware update is inserted, the enquiry **Update?** is indicated on the display. The setting can be changed between **Yes** and **No** by pressing buttons 2 and 4.

➔ 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 initialisation phase.

➔ To skip the update, select **No**.

The controller starts normal operation.

Note:
The controller will only recognise a firmware update file if it is stored in a folder named "OVENTROP/RQBXXL" on the first level of the SD card.

➔ Create a folder named "OVENTROP/RQBXXL" 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.

Stopping the logging

➔ 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 is indicated.

➔ Select the desired .SET file.

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

Formatting the SD card

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

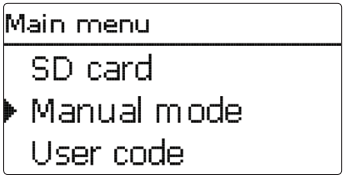
The content of the card will be deleted and the card will be formatted with the FAT file system.

Note:
To 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	00:05 … 20:00 (mm:ss)	01:00
Logging type	Logging type	Cyclic, Linear	Linear
Format card	Format card	-	-

3.7 Manual mode



In the **Manual mode** menu, the operating mode of all relays of the controller can be adjusted.

All relays are listed in numerical order.

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

Off = Relays are switched off (manual mode)

Auto = Relays are in automatic mode

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

Off = Relay is switched off (manual mode)

Auto = Relay is in automatic mode

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

When the operating mode for relay 4 is set to **On**, **Emerg** or **Auto**, the change only applies to the pump speed control signal sent to the primary pump via the PWM output. The power supply to the pump via relay 4 remains at 100%.

Operating modes for relay 4:

On = Power supply 100%, pump speed control signal via PWM output 100%

Emerg = Power supply 100%, pump speed control signal via PWM output as adjusted in **Hot water / Emergency** operation

Auto = Power supply 100%, flexible pump speed control via PWM output

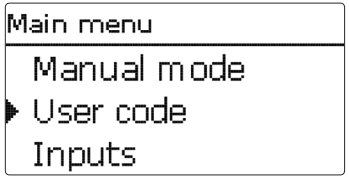
Off = Power supply 0%, pump speed control signal via PWM output 0%

Note:
After service and maintenance work, the relay mode must be set back to **Auto**. Otherwise normal operation will not be possible.

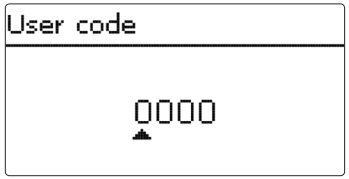
Manual mode

Adjustment channel	Description	Adjustment range / selection	Factory setting
All relays...	Operating mode of all relays	Auto, Off	Auto
Controller			
Relay (1 … 4)	Operating mode selection for the individual relays	On, Auto, Off Emergengy speed (R4 only)	Auto

3.8 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.

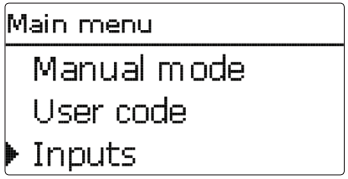
To access the menu areas of the expert level, the expert user code must be entered:

Expert user code: 2962

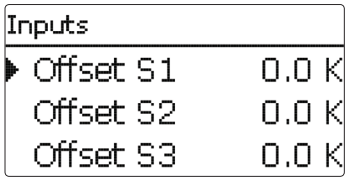
Note:
For safety reasons, the user code should generally be set to the customer code before the controller is handed to the customer!

Customer user code: 0000

3.9 Inputs



In the **Inputs** menu, sensor offsets can be adjusted.



Inputs

Adjustment channel	Description	Adjustment range / selection	Factory setting
Offset S1 … S7	Sensor offset	-15.0 … +15.0 K	0.0 K

4 Data communication

4.1 Data communication / Bus

The controller is equipped with the **S-Bus** for data transfer with and energy supply to external modules. The connection is carried out at the two terminals marked "S-Bus" and "**GND**" (either polarity). One or more S-Bus modules can be connected via this data bus:

- CS-BS Datalogger

WARNING! **Electric shock!**

L' is a fused contact permanently carrying voltage.

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

4.2 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 visualised, e. g. in a spreadsheet.
- Store adjustments and parameterisations on the SD card and, if necessary, retrieve them from there.
- Download firmware updates from the Internet and install them on the controller.

For more information about using an SD card, see page 32.

5 Troubleshooting

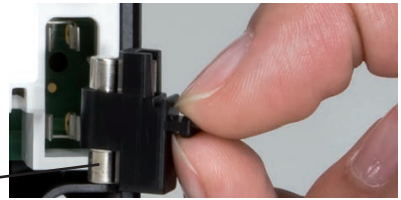
WARNING! **Electric shock!**

Upon opening the housing, live parts are exposed!

➔ **Always disconnect the controller 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.

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



Directional pad flashes red.

Sensor fault. The error code **!Sensor fault** is displayed instead of a temperature on the sensor display channel.

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

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

The display is permanently off.

Press button (5). Display illuminated?

- no → Check the power supply of the controller. Is it disconnected?
  - 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 → Check the supply line and reconnect it.
- yes → Controller has been in standby, everything o.k.

6 Overview of parameters

Abbreviation	Description
ΔT absolute	Afterheating temperature in the afterheating mode "Absolute"
ΔT sliding	Temperature difference for the sliding adaptation of the hot water set temperature
ΔT relative	Afterheating temperature in the afterheating mode "Relative"
ΔT circ	Temperature loss of the circulation pipe
Δt circ	Time constant of the circulation pipe
ΔTmax	Maximum exceedance of the hot water set temperature
Fct.block	Function block
Boiler max.	Maximum afterheating temperature of the boiler
AH	Afterheating
Return	Return
T-circ therm	Switch-on/-off temperature for the thermal circulation
T-disinf set	Set temperature for the thermal disinfection
T-AH on	Switch-on temperature for the afterheating
T-store flow	Store flow temperature
T-HP opt	Optimum operating temperature of the heat pump
T-HW	Hot water flow temperature
T-CW	Cold water temperature
T-HW set	Hot water set temperature
T-HW set sl.	Sliding adaptation of the hot water set temperature
Flow	Flow
HP	Heat pump (function)

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