Installation and operating instructions

Fresh water controller
6 inputs, 3 outputs

These operating instructions are part of the product.

- ▶ Read these operating instructions carefully before use,
- ▶ keep them over the entire lifetime of the product,
- ▶ and pass them on to any future owner or user of this product.

Index

Product information

EC declaration of conformity

"This product conforms to the applicable European directives with regard to its design and its operating behaviour. This conformity has been verified. Further information in this regard can be obtained from your dealer."

1 Safety

1.1 Proper usage

The fresh water controller (hereinafter referred to as controller) is an independently installed electronic temperature controller for on-surface installation. It may only be used for controlling hot water temperatures in a fresh water circulation system within the permissible ambient conditions (see chapter 15 "Technical data").

The controller must not be operated in the following environments:

- outdoors,
- in damp rooms,
- in rooms where highly flammable gas mixtures can occur,
- in rooms in which the operation of electrical and electronic components may cause dangers to arise

1.2 Dangers during assembly/commissioning

⚠ ATTENTION

The controller does not replace any safety devices.

Measures such as frost protection, boiling protection, overtemperature protection, overpressure protection etc. may need to be installed on site.

▶ **Installation may only be performed by professional personnel.**

The following dangers exist during installation/commissioning of the controller and during operation (in case of installation errors):

- Risk of death by electrocution,
- risk of fire due to short-circuit,
- damage to any of the constructional fire safety measures present in the building due to incorrectly installed cables,
- damage to the controller and the connected devices due to improper ambient conditions, inappropriate power supply and the connection of prohibited devices, faulty devices, or devices not included in the device specifications, as well as incorrect assembly or installation.

NOTE

Observe the controller's type plate!

Therefore, all safety regulations apply when working on the mains supply. Only electricians may perform work that requires opening the controller (such as electrical connection work).

▶ When laying cables, ensure that no damage occurs to any of the constructional fire safety measures present in the building.
▶ Make sure that the permissible ambient conditions at the installation site are not exceeded (see chapter 15 "Technical data").
▶ Be sure to comply with the specified degree of protection.
▶ Labels and markings applied in the factory may not be altered, removed or rendered unreadable.
▶ Before connecting the device, make sure that the power supply matches the specifications on the type plate.
▶ Make sure that all devices which are connected to the controller conform to the technical data of the controller.
▶ Secure the device against unintentional start-up.
▶ All work on an open controller must be performed with the mains supply disconnected.
▶ Protect the controller against overloading and short-circuiting.

1.3 Detecting faults

- Regularly check the information on the display.
- In case of faults, isolate the cause (see chapter 11.1 "Causes of problems").
- As soon as it becomes evident that safe operation is no longer possible (e.g. if there is visible damage), remove the device from the power supply immediately.
- Have trained professional personnel remedy the fault.

1.4 Disposal

- Dispose of the controller in accordance with the regional regulations.

1.5 Exclusion of liability

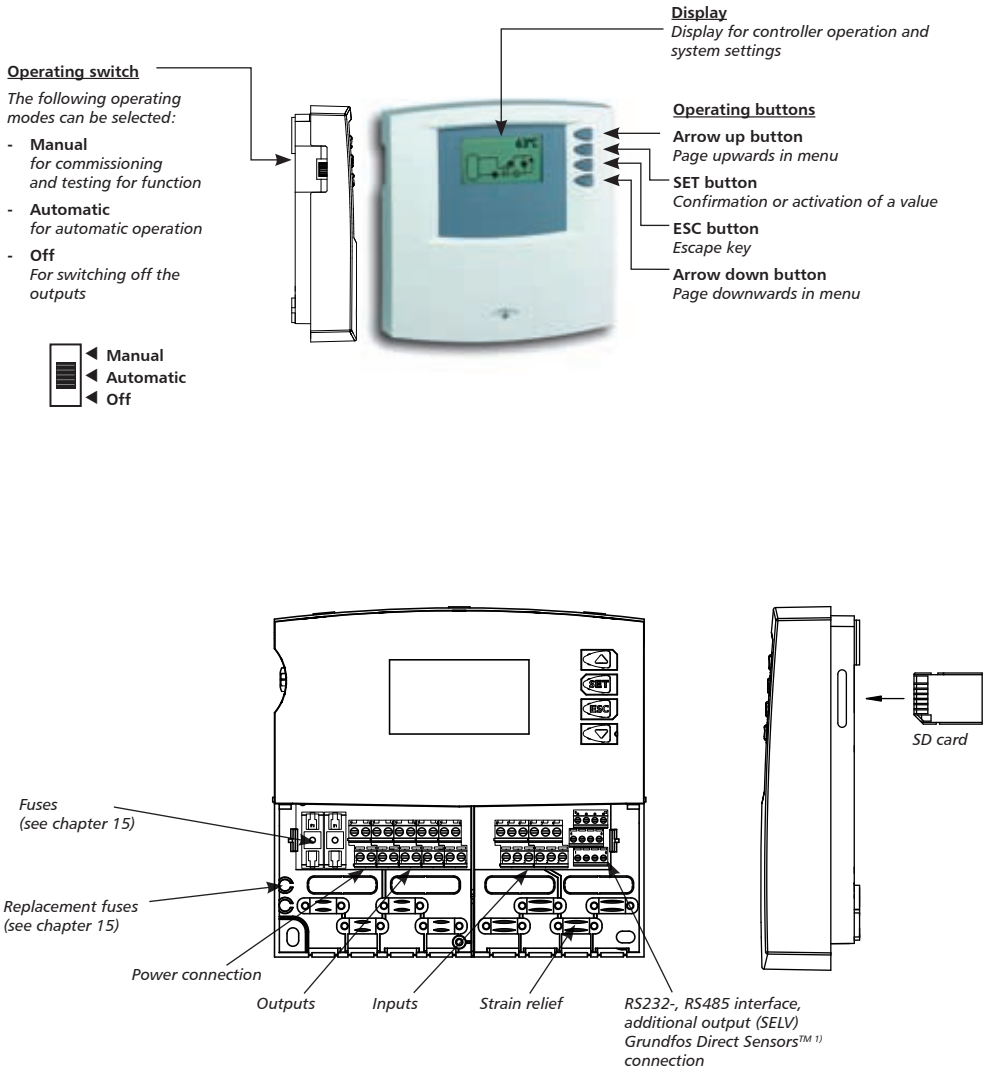
The manufacturer can neither monitor the compliance with this manual nor the conditions and methods during the installation, operation, usage and maintenance of the controller. Improper installation of the system may result in damage to property and, as a consequence, bodily injury.

Therefore, the manufacturer assumes no responsibility and liability for loss, damage or costs which result from or are in any way related to incorrect installation, incorrect execution of installation work, improper operation, and incorrect usage and maintenance.

Similarly, the manufacturer assumes no responsibility for patent right or other right infringements of third parties caused by usage of this controller.

The manufacturer reserves the right to make changes to the product, technical data or installation and operating instructions without prior notice.

2 Case overview



1) Grundfos Direct Sensors™: is a registered trademark of the Grundfos group.

3 About this manual

3.1 Applicability

This manual describes the installation, commissioning, function, operation, maintenance and dismantling of the fresh water controller for automatic regulation of the hot water temperature in a fresh water circulation system. For other components such as (e.g.) sensors, pumps and valves, be sure to observe the appropriate installation instructions provided by the manufacturer of each product.

3.2 Users of this manual

Installation, commissioning, maintenance and dismantling of the controller may only be performed by trained professional personnel. Before commissioning, the controller must be professionally assembled and installed by professional personnel in accordance with the applicable regional and transregional regulations as well as the safety instructions and general instructions within this installation and instruction manual. The professional personnel must be familiar with this operation manual.

The controller is maintenance-free.

Use the controller only after first thoroughly reading and understanding these operating instructions and the safety instructions. Adhere to all safety instructions and consult professional personnel in the event of any ambiguities.

This device is not intended for persons (or children) with physical, sensory, or mental disabilities, or who have inadequate experience and knowledge, unless they are instructed in the use of the device, and are initially supervised by a person responsible for their safety. Children should not be left alone with the device, to ensure that they do not play with it.

3.3 Description of symbols

3.3.1 The structure of the warning notices

⚠ SIGNAL WORD

Type, source and consequences of the danger!

▶ Measures for avoiding danger.

3.3.2 Danger levels in warning notices

Danger level	Likelihood of occurrence	Consequences of non-compliance
⚠ **DANGER**	Imminent threat of danger	Death, serious bodily injury
⚠ **WARNING**	Possible threat of danger	Death, serious bodily injury
⚠ **CAUTION**	Possible threat of danger	Minor bodily injury
CAUTION	Possible threat of danger	Damage to property

3.3.3 Notes

NOTE

Note on easier and safer working habits.

▶ Measures for easier and safer working habits.

3.3.4 Other symbols and markings

Symbol	Meaning
✓	Precondition for action
▶	Call to action
⇨	Result of action
•	List
Emphasis	Emphasis
△▽:	Press "Arrow up/down" for scrolling
▽:	Press "Arrow down" for scrolling through the menu or to adjust a value
△:	Press "Arrow up" for scrolling through the menu or to adjust a value
SET:	Press "SET" button to confirm or activate a value
ESC:	Press "ESC" button to cancel

4 Installation

4.1 Opening and closing the case

⚠ DANGER

Risk of death by electrocution!

- ▶ Disconnect the device from the power supply before opening the case.
- ▶ Make sure that the power supply cannot be unintentionally switched back on.
- ▶ Do not damage the case.
- ▶ Only switch the power supply back on after the case has been closed.

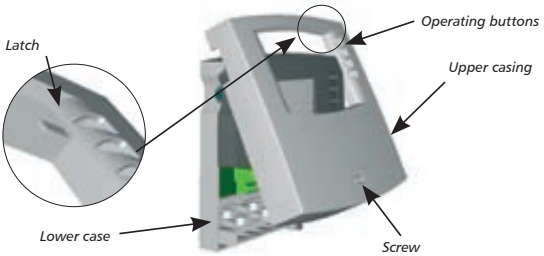
The upper case is connected to the lower case by two latches, and fastened with a screw.

4.1.1 Opening the case

- ▶ Loosen the screw and remove the upper case in an upwards direction.

4.1.2 Closing the case

- ▶ Place the upper case over the lower case at an angle. Insert the latches into the recesses of the lower case.
- ▶ Pivot the upper case down and feed the operating buttons through the matching holes.
- ▶ Fasten the case tightly with the screw.



4.2 Installation

⚠ WARNING

Risk of electrical shock and fire if mounted in a damp environment!

- ▶ Only mount the controller in an area where the degree of protection is sufficient (see chapter 15 "Technical data").

4.2.1 Mounting the controller

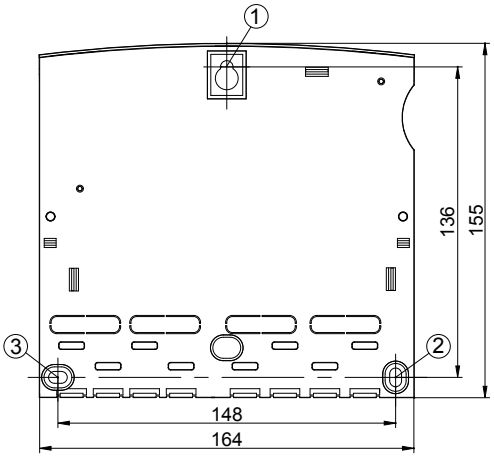
⚠ CAUTION

Risk of injury and damage to the casing when drilling!

- ▶ Do not use the casing as a drilling template.

- ▶ Choose a suitable mounting location.
- ▶ Drill the upper fastening hole.
- ▶ Screw in the screw.
- ▶ Remove the upper case.
- ▶ Hang the case in the recess ①.
- ▶ Mark the position of the lower fastening holes ②,③.
- ▶ Remove the case again.
- ▶ Drill the lower fastening holes.
- ▶ Re-hang the case in the recess ①.
- ▶ Screw the case firmly using the lower fastening holes ② and ③.

- ▶ Mount the upper case.



4.3 Electrical connection

⚠ DANGER

Risk of death by electrocution!

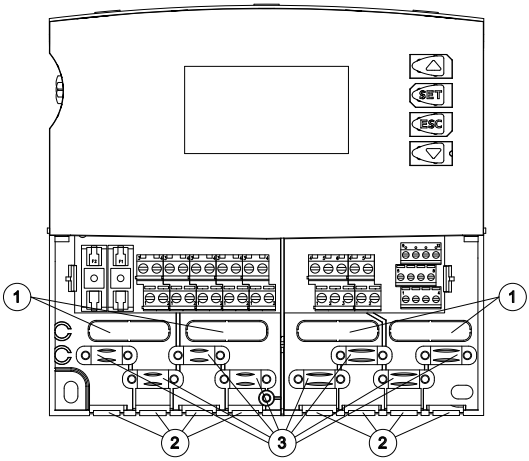
- ▶ Remove the controller from the power supply before opening the case.
- ▶ Observe all applicable legal guidelines and regulations of the local electricity supplier.

NOTE

The device is to be connected to the mains by means of a plug with grounding contact, or in the case of a fixed electrical installation, via a disconnection device for complete disconnection in accordance with the installation guidelines.

4.3.1 Preparing the cable feed

Depending on the type of installation, the cables may enter the device through the rear of the case ① or the lower side ② of the case.



Feeding the cable through the rear of the case:

- ▶ Remove the plastic flaps ① from the rear side of the case using an appropriate tool.

⚠ WARNING

Risk of electrical shock and fire due to cables coming loose!

- ▶ Install an external strain relief for the cables.

Feeding the cable through the lower side of the case:

- ▶ Cut the left and right plastic flaps ② using an appropriate tool and break them out of the case.
- ▶ Fasten cable at position ③ with the provided plastic links.

4.3.2 Connecting the cables

- ▶ If a protective conductor is provided or required for pumps/valves, connect it to the corresponding terminals of the controller. When connecting the protective conductor, observe the following points:
  - Make sure that the protective conductor is also connected to the controller's mains supply side.
- ▶ The terminal screws are approved for connection of cables as follows:
  - Each terminal may only be connected to a single connecting wire (max 2.5 mm^2).
  - single wire (solid): ≤ 2.5 mm^2
  - fine strand (with core end sleeves): ≤ 1.5 mm^2
- ▶ The cable must have a minimum outer diameter of 7 mm for the strain relief to work properly.
- ▶ Only use the original temperature sensors (Pt1000) that are approved for use with the controller.
- ▶ Observe the following points:
  - The polarity of the temperature sensor contacts is not important.
  - Do not lay sensor cables close to power cables (minimum separation: 100 mm).
  - If inductive effects are expected, e.g. from heavy current cables, overhead train cables, transformer substations, radio and television devices, amateur radio stations, microwave devices etc., then the sensor cables must be adequately shielded.
  - Sensor cables may be extended to a maximum length of 100 m.
- ▶ If adding extensions to sensor cables, select the following cable cross sections:
  - 0.75 mm^2 up to 50 m long
  - 1.5 mm^2 up to 100 m long
- ▶ The Grundfos Direct Sensors™ cable can be extended to a maximum length of 3 m using a cable with conductors having a cross section of 0.75 mm^2.
- ▶ Connect the cables according to the terminal diagram (see chapter 4.5 "Terminal diagrams")

4.4 Dismounting

⚠ DANGER

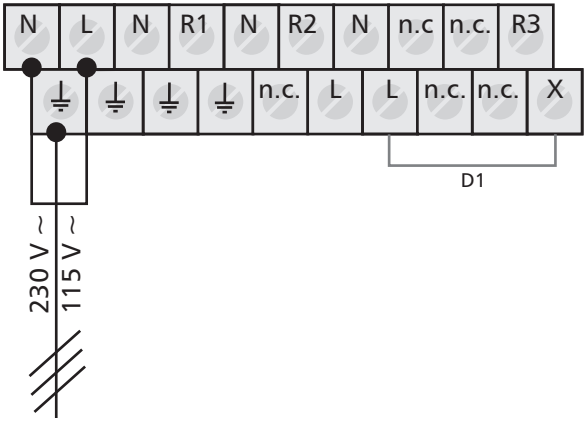
Risk of death by electrocution!

- ▶ Remove the controller from the power supply before dismounting it.
- ▶ To dismount the controller, follow the mounting instructions in the reverse order.

4.5 Terminal diagrams

4.5.1 Power connection

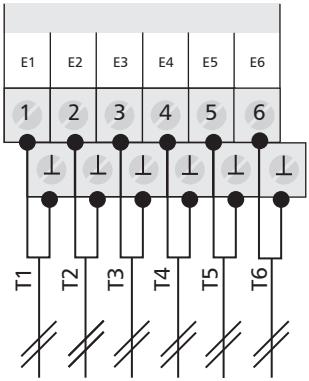
- Please refer to the type plate on the case to determine the type of power supply required.
- The protective conductor must also be connected.
- Cables conforming to at least type H05 VV-.... (NYM...) must be used.

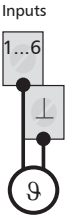


G1: mains
N: neutral conductor
L: phase
⏚: protective conductor
D1: wire bridge

4.5.2 Connection of the inputs

- Inputs 1 – 6: for Pt1000 temperature sensor





T1...T6
Temperature sensor Pt1000
(polarity irrelevant)

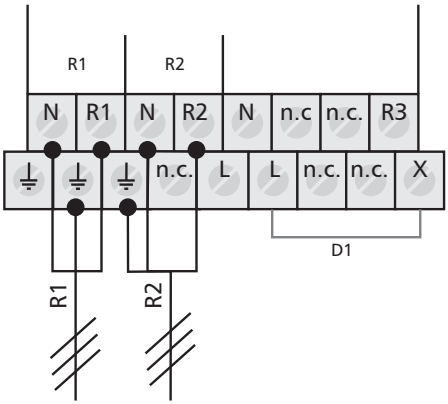
E1: input 1
E2: input 2
E3: input 3
E4: input 4
E5: input 5
E6: input 6

4.5.3 Connection of outputs R1, R2 and R3

Outputs R1 and R2

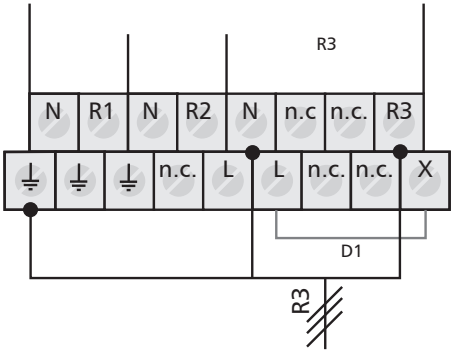
- Semiconductor relays (Triac); max. switching current: see type plate.

R1: output 1
R2: output 2
R3: output 3
D1: wire bridge

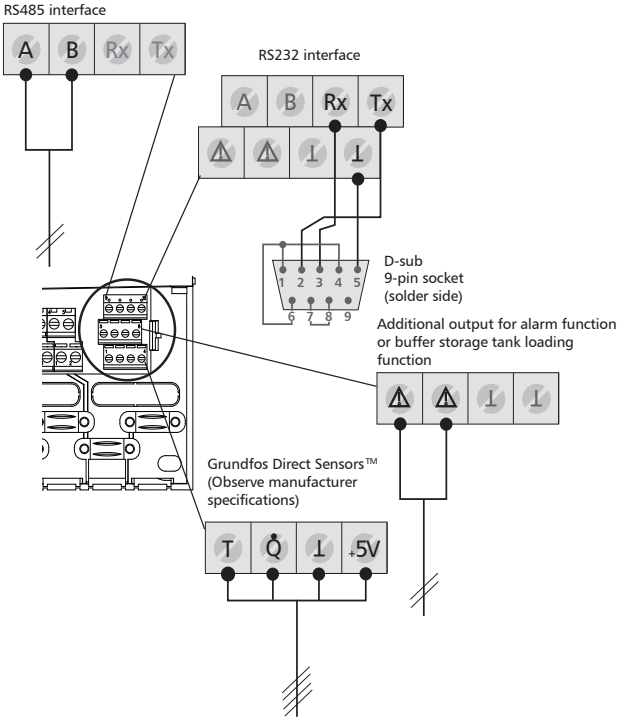


Output R3

- Switched output via electromechanical relay.
  Max. switching current: see type plate.
  Wire bridge must be connected.



4.5.4 RS232, RS485, additional output (SELV), Grundfos Direct Sensors™ input

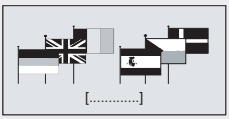


A: RS485 A
B: RS485 B
Rx: RS232 RxD
Tx: RS232 TxD
⚠: Additional output
⊥: Signal Ground
T: Grundfos Direct Sensors™ temperature
Q: Grundfos Direct Sensors™ flow rate
+5V: Grundfos Direct Sensors™ supply

5 Commissioning

▶ Make sure that the installation is finished completely and correctly, and that the switch on the controller is set to "OFF".

⇨ *The display for setting the language appears.*



Display: 6.1
[Deutsch]

5.1 Setting the language

✓ "*Deutsch*" *flashes in the display.*

▶ △▽: select a language.

▶ **SET:** confirm the language.

▶ **ESC:** finish the settings.

⇨ *The display for setting the time appears.*

Display: 1.1

5.2 Setting the time and date

✓ "*12:00*" *flashes in the display.*

▶ △▽: set the hours.

▶ **SET:** confirm the hours.

⇨ *The minutes display flashes.*

▶ △▽: set the minutes.

▶ **SET:** confirm the minutes.

⇨ *The year flashes.*

▶ △▽: set the year.

▶ **SET:** confirm the year.

⇨ *The month flashes.*

▶ △▽: set the month.

▶ **SET:**confirm the month.

⇨ *The day flashes.*

▶ △▽: set the day.

▶ **SET:** confirm the day.

▶ **ESC:** finish the settings.

⇨ *Display for activating the "automatic summer time change-over" appears.*

Display: 1.2
[Automatic summer time change-over]

5.3 Automatic summer time change-over

✓ *Display for "Automatic summer time change-over" appears.*

NOTE

The automatic summer time change-over relates to EU Directive 2000/84/EC and thus only applies to EU countries.

The controller can also be operated without activating the "automatic summer time change-over".

▶ **SET:** press button.

⇨ *"Automatic summer time change-over" is activated.*

▶ **ESC:** finish the settings.

⇨ *Display for system selection appears.*

5.4 System selection

NOTE

- ▶ The selected system can be subsequently changed at any later time.
- ▶ The layout, connections and configuration of the system are described in chapter 7.3.

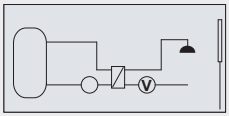
✓ *The first system appears in the display (2.1 Fresh water regulation without return valve).*

▶ △▽: select a system: "Fresh water regulation without return valve" or "Fresh water regulation with return valve".

▶ **SET:** confirm the system.

⇨ *A confirmation checkmark is displayed next to the selected system.*

▶ **ESC:** exit the settings menu.



Display: 2.1
Fresh water regulation without return valve

The commissioning is finished.

6 Modes of operation

The fresh water controller has a slide switch that can be used to select one of three operating modes.

- Slide switch fully down: "Off" mode
- Slide switch in the middle: "Automatic" mode
- Slide switch fully up: "Manual" mode

6.1 "Off" mode

In this mode all outputs are switched off. The buttons do not work. The software version and the selected layout are shown in the display.

▶ In order to switch off the outputs, slide the operating switch down.

⇨ *A new window appears in the display, which shows "OFF", as well as the controller software version number and the number of the chosen system. The display is backlit in red.*

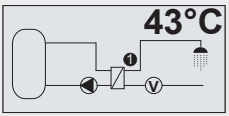
[Fresh water]

NOTE

The manufacturer supplies the device with this switch in the "Off" position.

6.2 "Automatic" mode

The controller detects a flow via the Grundfos Direct Sensors™. It compares that actual hot water temperature with the set target temperature. The controller attempts to adjust the temperature in the heat exchanger to match the set target temperature by adjusting the speed of the discharge pump.



CAUTION

Damage to pump caused by dry operation!

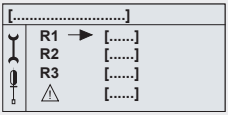
The controller may only be set to "Automatic" when the system has been filled.

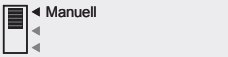
▶ In order to switch the outputs to "Automatic", slide the operating switch to the middle position.
⇨ *The status appears in the display.*

NOTE

Status displays and symbols used in automatic mode are described in more detail in chapter 8 "Symbols and status display".

During normal system operation, the operating switch is always set to "Automatic".





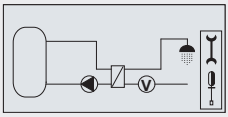
[Fresh water]
[auto/auto/auto/auto]

6.3 "Manual" mode

When operating the device for the first time, or when testing the function, the controller outputs can be manually switched.

In the "Manual" mode, all outputs are initially set to "auto".

Sensor measurements and set switching times have no effect in this operating mode. The speed can be defined for all speed-controlled outputs.



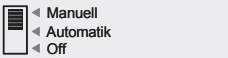
Status display
„Manual" mode active

The "Manual" mode is indicated by a red backlight in the status display and a flashing tool symbol.

CAUTION

Damage to pump caused by dry operation!

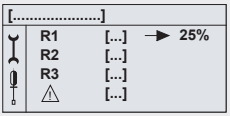
The controller may only be set to "Manual" when the system has been filled.



▶ In order to switch the outputs manually, slide the operating switch up.
⇨ *The display is backlit in red and a settings window is displayed.*
▶ △▽: choose the desired output.
▶ **SET:** switch the selected output to "on", "off" or "auto".

For output R1 when "on" is selected:

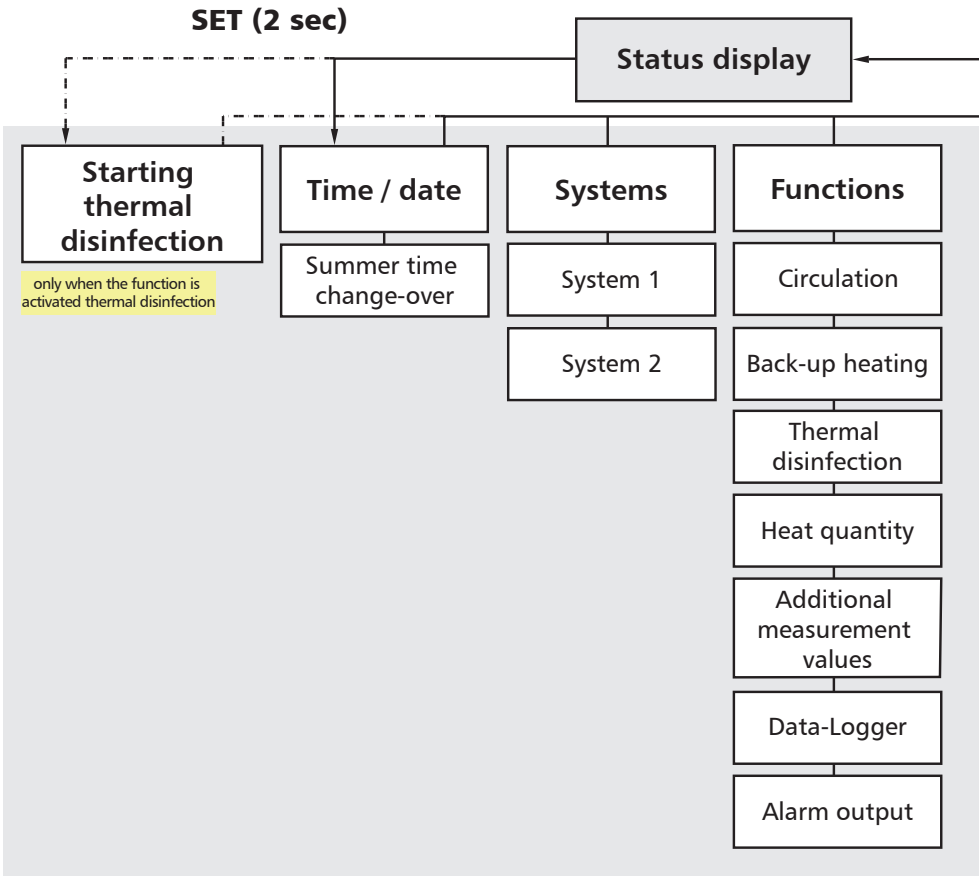
⇨ *The pump speed in % is displayed.*
▶ ▽: Jump to speed setting.
▶ **SET:** activate input.
⇨ *The pump speed entry blinks.*
▶ △▽: set the pump speed.
▶ **SET:** accept the set value.
▶ **ESC:** close the settings window.
▶ **SET:** reopen the settings window.

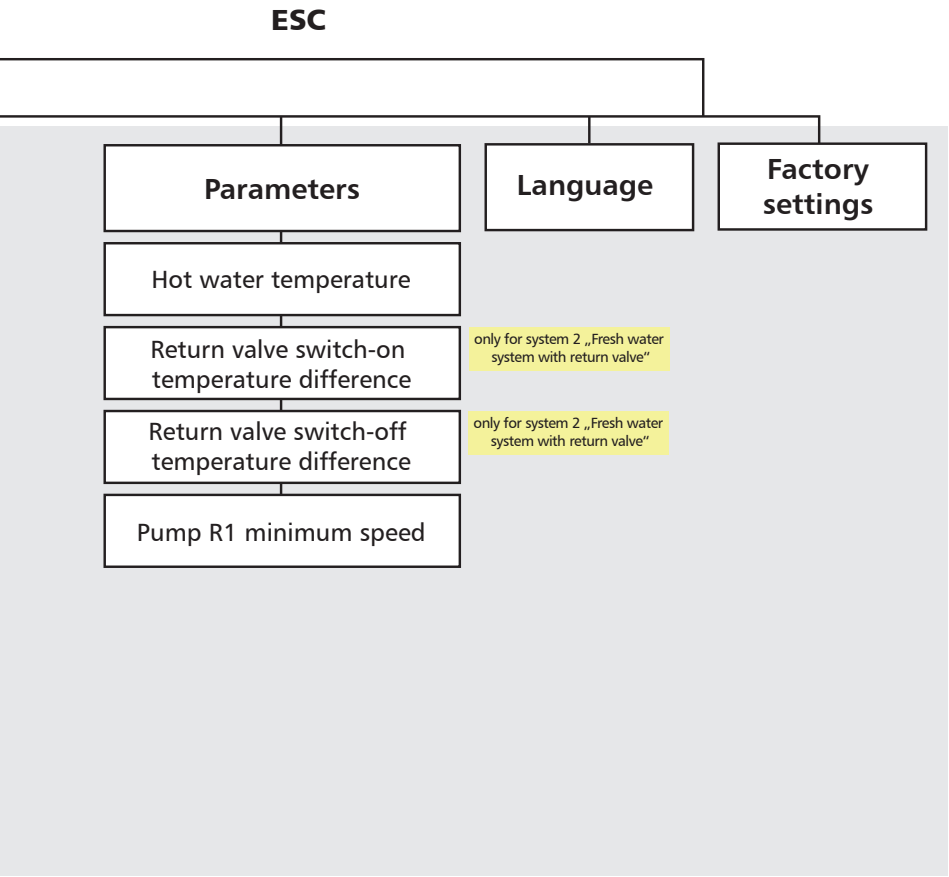


[Fresh water]
[on]

7 Settings

7.1 Menu overview

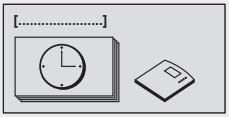



ESC
Parameters
Language
Factory settings
Hot water temperature
Return valve switch-on temperature difference
only for system 2 „Fresh water system with return valve“
Return valve switch-off temperature difference
only for system 2 „Fresh water system with return valve“
Pump R1 minimum speed

7.2 Time/date

7.2.1 Setting the time and date

- ▶ **SET:** press button for approx. 2 sec.
  - ⇨ *The "Time" menu item is displayed.*
- ▶ **SET:** press button.
  - ⇨ *The current time is displayed.*
- ▶ **SET:** press button to confirm.
  - ⇨ *The hour display blinks after the time has been confirmed.*
- ▶ △▽: set the hours.
- ▶ **SET:** press button to confirm.
  - ⇨ *The minutes display flashes after confirmation of the hours.*
- ▶ △▽: set the minutes.
- ▶ **SET:** press button to confirm.
  - ⇨ *The year display flashes after confirmation of the minutes.*
- ▶ △▽: set the year.
- ▶ **SET:** press button to confirm.
  - ⇨ *The month display flashes after confirmation of the year.*
- ▶ △▽: set the month.
- ▶ **SET:** press button to confirm.
  - ⇨ *The day display flashes after confirmation of the month.*
- ▶ △▽: set the day.
- ▶ **SET:** confirm the time and date.



Display: 1
[Time/date]

Display: 1.1

7.2.2 Automatic summer time change-over

- ▶ △▽: press button.
  - ⇨ *The display for "Automatic summer time change-over (for EU)" appears.*
- ▶ **SET:** press to activate or deactivate the automatic summer time change-over.
  - ⇨ *A cross in the control box shows that the automatic summer time change-over is active.*
- ▶ **ESC:** exit the "automatic summer time change-over" submenu.
- ▶ **ESC:** exit the "Time / Date" menu item.

Display: 1.2
[Automatic summer time change-over (for EU)]

NOTE

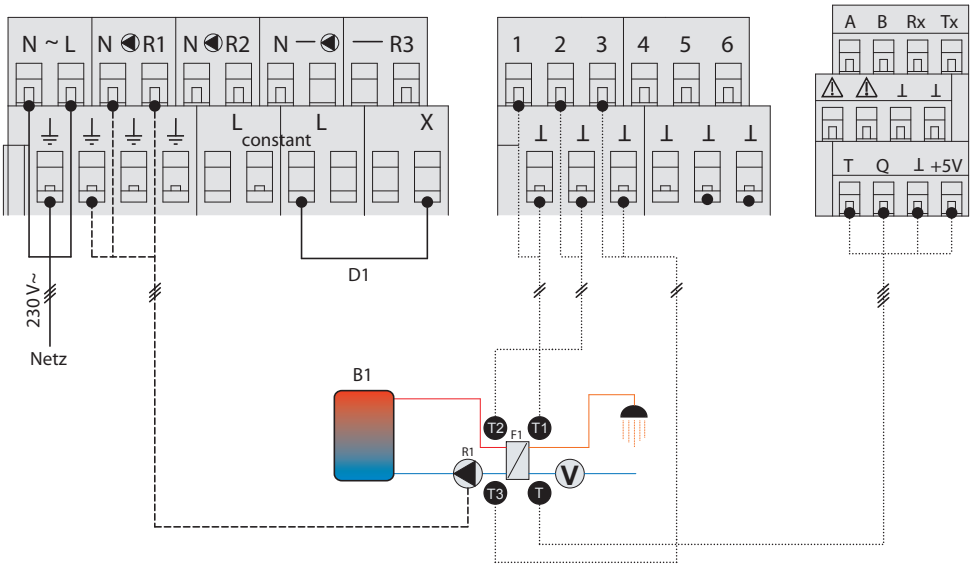
The automatic summer time change-over relates to EU Directive 2000/84/EC and thus only applies to EU countries.

The controller can also be operated without activating the "automatic summer time change-over".

7.3 Systems

7.3.1 System 1 "System without return valve"

As soon as the controller detects a flow via the Grundfos Direct Sensors™ the pump R1 is switched on in order to adjust the temperature at sensor 1 to match the set water temperature. Pump R1 switches off again when a flow is no longer detected or a safety limit is reached.

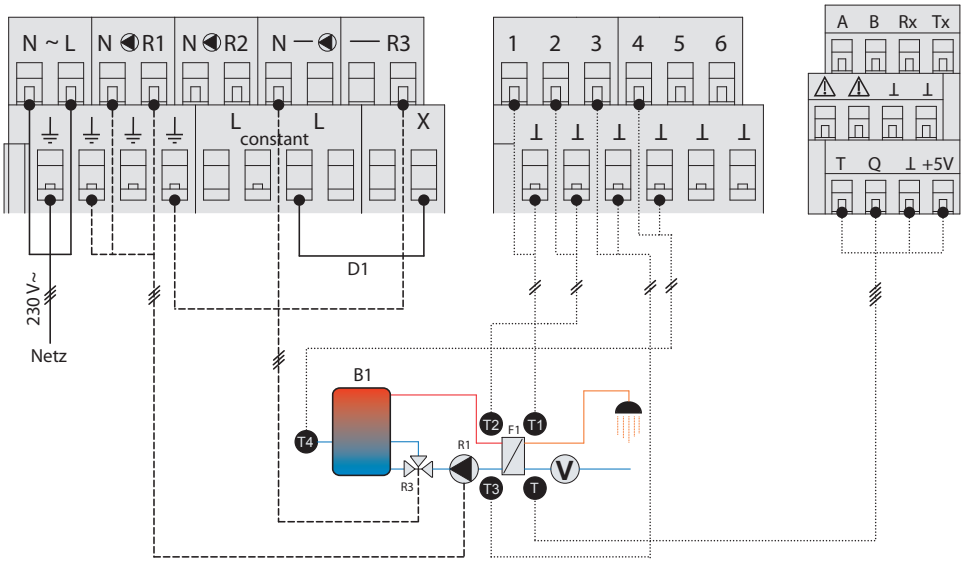


N: neutral conductor
L: phase
⏚: protective conductor
D1: wire bridge
R1: storage tank pump R1
F1: heat exchanger F1
B1: storage tank B1

T1: hot water temperature sensor
T2: buffer storage tank supply temperature sensor
T3: buffer storage tank return temperature sensor
T: cold water temperature sensor
V: Grundfos Direct Sensors™ flow meter

7.3.2 System 2 "System with return valve"

The water temperature is regulated as described in section 7.4.1. The 3-way valve is switched on when the set switch-on temperature difference is reached (in the figure, the difference between sensor 3 and sensor 4). The valve returns to the starting position when the switch-off temperature difference is reached.



N: neutral conductor
L: phase
⏚: protective conductor
D1: wire bridge
R1: storage tank pump R1
F1: heat exchanger F1
B1: storage tank B1
R3: return valve
T1: hot water temperature sensor
T2: buffer storage tank supply temperature sensor
T3: buffer storage tank return temperature sensor
T4: buffer storage tank sensor
T: cold water temperature sensor
V: Grundfos Direct Sensors™ flow meter

NOTE

When no voltage is present, the valve must be adjusted so that water flows through lower part of the storage tank.

7.3.3 System selection

The desired fresh water system is selected via the "Systems" submenu. Two different systems are available for selection.

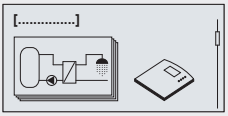
NOTE

When a new system is selected, all functions and parameters are automatically reset to the factory settings (see also chapter 16 "Parameters").

▶ Check the settings again!

Selecting a system

▶ **SET:** press button for approx. 2 sec.
▶ △▽: select the menu item "Systems".
▶ **SET:** call up the system selection.
▶ **SET:** press button to confirm.
▶ △▽: select a system:
▶ **SET:** press button to confirm.
  ⇨ *A small checkmark appears in the upper right of the display to confirm the selection of the system.*
▶ **ESC:** exit the "Systems" menu item.

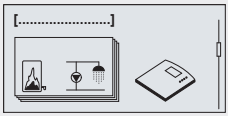


Display: 2
[System]

7.4 Functions

Additional controller settings can be made in the "Functions" submenu.

An overview of the factory settings and the ranges of possible settings can be found in the table in chapter 16 "Parameters".



Display: 3
[Functions]

7.4.1 Accessing a function

You must perform the following steps in order to make settings within a particular function:

Select a function

▶ **SET:** press button for approx. 2 sec.
▶ △▽: select the menu item "Functions".
▶ **SET:** open the "Functions" submenu.
▶ △▽:select the desired function.

Activating/deactivating a function

▶ **SET:** press button.
  ⇨ *The display for activating (on) or deactivating (off) the function is shown.*
▶ **SET:** press button for approx. 2 sec.
  ⇨ *The function is activated or deactivated.*

NOTE

An information window is displayed if the function cannot be activated (see chapter 12 "Information windows").

Change the setting values

- ▶ ▽: press button.
  - ⇨ *The display for setting values appears.*
- ▶ **SET:** press button.
  - ⇨ *The setting flashes.*
- ▶ △▽: select the desired value.
- ▶ **SET:** press button to confirm.

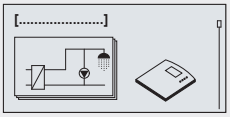
NOTE

Outputs: All outputs are permanently defined and their assignments cannot be changed.

Inputs: All inputs can be double-assigned. This is also displayed in an information window (see chapter 12 "Information windows").

Leave the menu

- ▶ **ESC:** press button.



Display: 3.1
[Circulation]

7.4.2 "Circulation" function

The circulation function allows circulation of the water in the drinking water circuit. This means that hot water is always immediately available at all tap connections.

The output is preset to R2 at the factory.

The "Circulation" function can be time, temperature or pulse controlled. The types of control can be combined together.

Time controlled

3 time windows can be defined using the timer. The start time must be set before the end time.

See chapter 16.1 "Parameter values for functions" for the setting ranges and factory settings.

Temperature controlled

When the temperature in the circulation return falls below the "on" value, then the pump is switched on until the "off" temperature is reached.

See chapter 16.1 "Parameter values for functions" for the setting ranges and factory settings.

Pulse controlled

If the circulation function is started via an impulse (e.g. from a flow switch or push-button switch) then the pump runs for the set circulation time.

The circulation time and wait time can be set.

See chapter 16 "Parameters" for the setting ranges and factory settings.

Activating "Circulation"

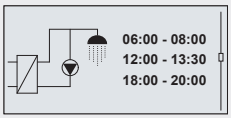
✓ *"Functions" submenu selected, see "Selecting functions" (chapter 7.4.1).*

✓ *"Circulation" activated, see "Activating functions" (chapter 7.4.1).*

✓ *"Circulation" selection activated.*

"Time controlled" option

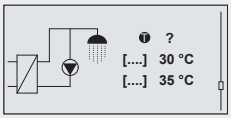
▶ ▽: press button.
▶ **SET:** press this to activate the "Time controlled" option
▶ ▽: press this to enter the time.
▶ **SET:** press button.
⇨ *The time input flashes in the display.*
▶ △▽: set the hours/minutes.
▶ **SET:** press this to move to the next field.
▶ **ESC:** leave the "Time controlled" setting menu.



Display: 3.1.3.1

"Temperature controlled" option

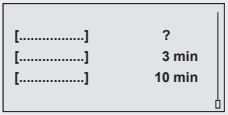
▶ ▽: press button.
▶ **SET:** press this to activate the "Temperature controlled" option
▶ ▽: press button.
▶ **SET:** press button.
⇨ *The input selection flashes in the display.*
▶ △▽: press this to select the desired input.
▶ **SET:** press button.
⇨ *The switch-on temperature threshold value flashes in the display.*
▶ △▽: set the temperature.
▶ **SET:** press button.
⇨ *The switch-off temperature threshold value flashes in the display.*
▶ △▽: set the temperature.
▶ **SET:** press button.



Display: 3.1.4.1
[on]
[off]

"Pulse controlled" option

▶ ▽: press button.
▶ **SET:** press this to activate the "Pulse controlled" option
▶ ▽: press button.
▶ **SET:** press button.
⇨ *The input selection flashes in the display.*
▶ △▽: press this to select the desired input.
▶ **SET:** press button.
⇨ *The circulation time value flashes in the display.*
▶ △▽: set the circulation time.
▶ **SET:** press button.
⇨ *The wait time value flashes in the display.*
▶ △▽: set the wait time.
▶ **SET:** press button.



Display: 3.1.5.1
[Input]
[Circulation]
[Wait time]

Leave the "Circulation" menu

▶ **ESC:** press button.

Display: 3.2
[Back-up heating]

7.4.3 "Back-up heating" function

The "Back-up heating" function allows thermostatic control of a pump for additional heating via an oil or gas boiler.

The sensor to be used must be selected after the function has been activated. An optional second sensor in the lower part of the storage tank can also be set.

This function can also be limited to specific times by using additional time control. The time control occurs using a timer with three time windows.

NOTE
The "Back-up heating" function cannot be used if the "Alarm output" function is activated.

One temperature sensor

In the fresh water controller a temperature input is selected that will be used to acquire the temperature in the upper region of the buffer tank. If this temperature falls below the loading temperature threshold then the additional output (SELV switching output) is activated to load the buffer tank. The loading remains activated until the temperature in the upper region of the buffer tank reaches the loading temperature threshold plus a hysteresis value.

Two temperature sensors

A second sensor in the lower region of the tank can also be selected in addition to the temperature sensor in the upper region of the tank. If the temperature at the upper temperature sensor falls below the loading temperature threshold then the additional output (SELV switching output) is activated to load the buffer tank. The loading remains activated until both temperatures reach the loading temperature threshold.

The advantage of this is that the buffer tank is fully loaded, which reduces the amount of loading cycles.

Activating "Back-up heating"

✓ *"Functions" submenu selected, see "Selecting functions" (chapter 7.4.1).*

Display: 3.2.2
[optional]

✓ *"Back-up heating" activated, see "Activating functions" (chapter 7.4.1).*

✓ *"Back-up heating" selection activated.*

▶ ▽: press button.

▶ **SET:** press button.
⇨ *"T" flashes in the display (upper sensor temperature input).*

▶ △▽: choose the desired input.

Display: 3.2.3
[Time controlled]

▶ **SET:** press button.
⇨ *"T" flashes in the display (lower sensor temperature input).*

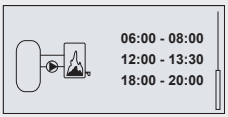
▶ △▽: choose the desired input.

▶ **SET:** press button.

▶ ▽: press button.
⇨ *The display for selecting "Time controlled" appears.*

Time controlled back-up heating

- ▶ **SET:** press this to select "Time controlled".
- ▶ ▽: press button.
  - ⇨ *The display for setting the back-up heating times appears.*
- ▶ **SET:** press button.
- ▶ △▽: set the time.
- ▶ **SET:** press this to move to the next entry field.
- ▶ **ESC:** press this: leave the time setting.
- ▶ **ESC:** leave the "Back-up heating" submenu.



Display: 3.2.3.1

7.4.4 "Thermal disinfection" function

According to the DVGW guideline, hot water at 70 °C must be extracted from all hot water tap connections for at least 3 minutes to provide thermal disinfection.

There are 2 variants of the "Thermal disinfection" function:

Display: 3.3

[Thermal disinfection]

Without circulation function

After starting the "Thermal disinfection" function the hot water temperature is adjusted to the target value set for thermal disinfection.

NOTE

Before starting this function, make sure that the tank temperature is sufficiently high to ensure that the set target temperature for thermal disinfection is reached.

Make sure that boiling protection is present before starting the function.

With circulation function

After starting the "Thermal disinfection" function the hot water temperature is adjusted to the target value set for thermal disinfection. The circulation pump is also started.

NOTE

Before starting this function, make sure that the tank temperature is sufficiently high to ensure that the set target temperature for thermal disinfection is reached.

Make sure that boiling protection is present before starting the function.

The complete circulation network must be heated to 70 °C to ensure that the complete circulation network is thermally disinfected.

Activating "Thermal disinfection"

NOTE

When the function is activated the main menu is extended with a new "Start thermal disinfection" menu item.

Navigating to the main menu will always cause the menu selection to jump to display 7 "Start thermal disinfection)" while this function is activated.

The other menu items are accessed via the △▽ button.

✓ *"Functions" submenu selected, see "Selecting functions" (chapter 7.4.1).*

✓ *"Thermal disinfection" activated, see "Activating functions" (chapter 7.4.1).*

✓ *"Thermal disinfection" selection activated.*

Without circulation function

Display: 3.3.2

[Target]

⇨ *The target temperature value flashes in the display.*

▶ △▽: select the temperature.

▶ **SET:** press button.

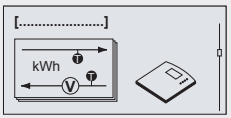
▶ **ESC:** activates the function and adds it to the main menu.

▶ **ESC:** press button.

⇨ *The new menu item "Start thermal disinfection?" appears in the display.*

▶ **ESC:** leave the "Thermal disinfection" submenu.

The use of the "Thermal disinfection" function is described in chapter 7.8.



Display: 3.4

[Heat quantity]

7.4.5 "Heat quantity" function

The energy transferred from the heat exchanger to the drinking water circuit can be measured using the "Heat quantity" function. To measure this, the temperature values at the supply and return and also the flow rate must be measured.

The temperature and flow rate sensor inputs are already permanently defined. See chapter 16 "Parameters" for information on sensor assignment.

Activating "Heat quantity"

✓ *"Functions" submenu selected, see "Selecting functions" (chapter 7.4.1).*

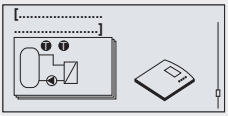
✓ *"Heat quantity" activated, see "Activating functions" (chapter 7.4.1).*

✓ *"Heat quantity" activated.*

▶ **ESC:** leave the "Heat quantity" submenu.

7.4.6 "Additional measurement values" function

In addition to controlling the required temperature values, two additional values can be selected and displayed.



Display: 3.5

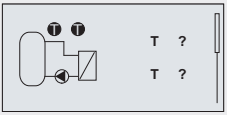
[Additional measurement values]

Activating "Additional measurement values"

✓ *"Functions" submenu selected, see "Selecting functions" (chapter 7.4.1).*

✓ *"Additional measurement values" activated, see "Activating functions" (chapter 7.4.1).*

▶ ▽: press button.
⇨ *The displays for setting the inputs appear.*



Display: 3.5.1

▶ **SET:** press button.

▶ △▽: select the first input.

▶ **SET:** press button.

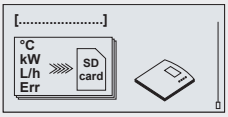
▶ △▽: select the second input.

▶ **SET:** press button.

▶ **ESC:** leave the "Additional measurement values" submenu.

7.4.7 "Data logger" function

This function (see chapter 10) allows the following controller data to be stored on an SD card.



Display: 3.6

[Data logger]

- Temperature of all sensors
- Flow rate of the volumetric flow meter
- Output (current value of the heat meter)
- Operating status of the outputs

NOTE

Only the data of the selected measurement values are stored.

Activating "Data logger"

✓ *"Functions" submenu selected, see "Selecting functions" (chapter 7.4.1).*

✓ *"Data logger" activated, see "Activating functions" (chapter 7.4.1).*

▶ ▽: press button.
⇨ *The display for selecting the inputs/outputs appears.*

Display: 3.6.2

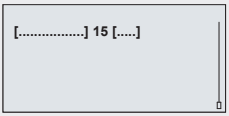
▶ △▽: select the inputs/outputs for data logging.

▶ **SET:** press this to select/deselect inputs/outputs.

▶ ▽: press this to select further inputs/outputs.

▶ **SET:** press this to select/deselect inputs/outputs.

▶ ▽: press button.
⇨ *The display for setting the recording interval appears.*



Display: 3.6.5

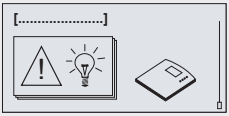
[Interval] [min]

▶ **SET:** press button.
⇨ *The input value for the recording interval flashes.*

▶ △▽: Select the recording interval.

▶ **SET:** press button.

▶ **ESC:** leave the "Data logger" submenu.



Display: 3.7
[Alarm output]

7.4.8 "Alarm output" function

The alarm output is switched on when the controller detects a fault and the alarm for the respective fault has been activated in the menu.

The SELV output is permanently defined as the output.

The following faults can be detected by the controller:

- sensor fault at a temperature input (short circuit, open circuit, no sensor connected),
- clock fault,
- heat source fault (the hot water temperature is not reached at the primary side of the heat exchanger),
- heat exchanger fault (the hot water temperature is not reached at the primary side of the heat exchanger and no temperature increase is measured at the secondary side).

Error messages are displayed in information windows and are described in more detail in chapter 12 "Information windows".

NOTE

The "Alarm output" function cannot be used if the "Back-up heating" function is activated.

Display: 3.7.1
[Alarm if:]
[Sensor fault]
[Clock fault]
[Heat exchanger fault]

Activating the "Alarm output"

✓ *"Functions" submenu selected, see "Selecting functions" (chapter 7.4.1).*

✓ *"Alarm output" activated, see "Activating functions" (chapter 7.4.1).*

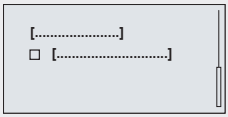
✓ *"Alarm output" selection activated.*

▶ ▽: press button.
⇨ *Error selection display is shown.*

▶ △▽: select an error type.

▶ **SET:** press this to select/deselect errors.

▶ ▽: press button.
⇨ *The display for additional error selection appears.*



Display: 3.7.2
[Heat exchanger fault]

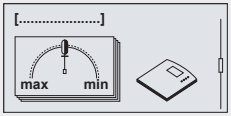
▶ **SET:** press this to select/deselect errors.

▶ **ESC:** leave the "Alarm output" submenu.

7.5 Parameters

In the factory, the controller is configured in such a manner that it can be used in most applications without changes to these parameter values.

All parameters can be modified to a certain extent to suit the individual requirements of the system. If modifications are realised, the operating data of the components used must be observed!



Display: 4
[Parameters]

NOTE

The parameter settings depend on the type of fresh water system selected. This means that not all parameter settings are available for all types of solar energy systems.

An overview of all parameters is provided in chapter 16 "Parameters".

The following parameters can be accessed and adjusted:

- Hot water temperature
- Return valve switch-on temperature difference
- Return valve switch-off temperature difference
- Pump R1 minimum speed

7.5.1 Accessing and adjusting parameters

All parameters can be set using the same procedure as described below:

Accessing parameters

▶ **SET:** press button for approx. 2 sec.
▶ △▽: select the menu item "Parameters".
▶ **SET:** open the submenu.
▶ △▽: select a parameter.

Setting a parameter value

✓ *Submenu "Parameters" selected (see "Accessing parameters").*
▶ **SET:** press button.
⇨ *The display with the selected system and the corresponding parameter value flashes.*
▶ △▽: set the value.
▶ **SET:** press button to confirm.

Exiting the parameter

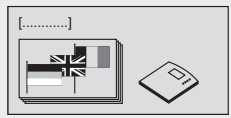
▶ **ESC:** press button to confirm.

7.6 Language

The display and menu language of the controller can be set.

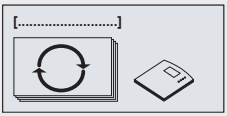
Accessing and selecting the language

▶ **SET:** press button for approx. 2 sec.
▶ △▽: select menu item "Language".
▶ **SET:** press button.
⇨ *The "Language" display appears.*
▶ **SET:** press button.
⇨ *The set language flashes.*
▶ △▽: select a language.



Display: 5
[Language]

- ▶ **SET:** press button to confirm.
- ▶ **ESC:** leave the "Language" submenu.



Display: 6

[Factory settings]

7.7 Factory settings

Resetting the factory settings

- ▶ **SET:** press button for approx. 2 sec.
- ▶ △▽: select the menu item "Factory settings".
- ▶ **SET:** press button.
  - ⇨ *The display "Reset all values?" appears.*
- ▶ **SET:** press button.
  - ⇨ *All values are reset to the factory settings.*
    The controller performs a restart and must be configured once more, in the same manner as when first commissioned (see chapter 5 "Initial commissioning").

Display: 6.1

[Reset all values?]

[yes] [no]

NOTE

When the controller is reset to factory settings, all settings return to the values they had upon delivery of the controller.

The following values are retained:

- The min/max values of the temperature sensors
- The outputs' operating hours
- Max. heat output
- Heat quantities

7.8 Starting thermal disinfection

NOTE

This menu item only appears when the "Thermal disinfection" function has been activated. See chapter 7.4.4 "Activating thermal disinfection". Please observe the notes in chapter 7.4.4 before starting "Thermal disinfection".

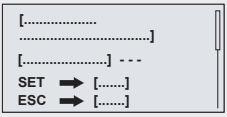
Make sure that boiling protection is present before starting the function.

The "Thermal disinfection" function must be ended by the operator by pressing the ESC button. Otherwise, the function stops automatically after 1 hour.

Display: 7

[Starting thermal disinfection?]

- ▶ **SET:** press button for approx. 2 sec.
  - ⇨ *"Start thermal disinfection?" appears in the display.*
- ▶ **SET:** press button.
  - ⇨ *"Start thermal disinfection? Last start ---" appears in the display.*
- ▶ **SET:** press button.
  - ⇨ *In the display appears "Are you sure? Have you ensured boiling protection?"*
- ▶ **SET:** press this to confirm the warning message and start the function.
  - ⇨ *"Thermal disinfection active" appears in the display.*
- ▶ **ESC:** Stop the "Thermal disinfection" function.



Display: 7.1

[Starting thermal disinfection]

[Last start]

[yes]

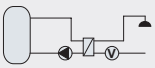
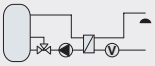
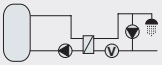
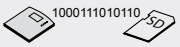
[no]

8 Symbols and status display

8.1 Symbols

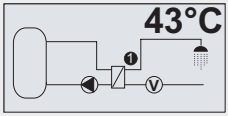
In automatic mode the display shows the selected fresh water system as a status display. The △ and ▽ buttons can be used to call up (e.g.) the values and states of individual sensors and runtimes of pumps at the individual outputs.

Additional function-specific data may also be displayed depending on additional functions that may be activated.

Symbol	Explanation
	Fresh water system without return valve
	Fresh water system with return valve
	System with activated circulation function
	Circulation
	Back-up heating
	Calorimetry
	Data logger

8.2 Status display

The status display shows measurements from and statuses of the sensors and running times of the pumps at the outputs.



Status display (example)

Switching the display screen

▶ △▽: press button.

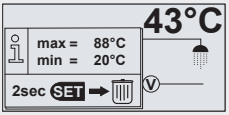
⇨ *The following values and displays appear one after another:*

- The temperature sensors of the system set, and the corresponding current temperature values.
- Outputs and associated running times of the pumps.
- Functions, and their additional measured values.

⇨ *The additionally set functions are displayed.*

▶ **ESC:** press this to return to the status display.

8.3 Temperature sensor min/max display

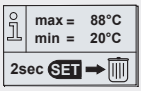


Display:

max./min. display (example)

Display of the min/max values

- ▶ △▽: choose the desired temperature sensor.
- ▶ **SET:** access the information window.
  - ⇨ *The min/max values are displayed.*



Display:

Resetting values (example)

Resetting values

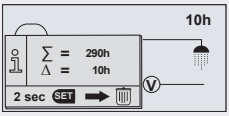
- ▶ **SET:** press button for approx. 2 sec.
  - ⇨ *Values are reset to the current temperature.*
- ▶ **ESC:** press this to close the information window.

NOTE

The minimum and maximum values of the connected temperature sensor are always logged and accessible.

The stored values can be reset at any time.

8.4 Operating hours display for pumps switching valves

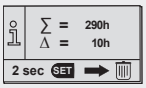


Display:

Operating hours display (example)

Display of the operating hours

- ▶ △▽: choose the desired pump or valve.
- ▶ **SET:** access the information window.
  - ⇨ *The hours-of-operation logger is displayed.*



Display:

Resetting values (example)

Resetting the operating hours

✓ *Operating hours called up.*

- ▶ **SET:** press button for approx. 2 sec.
  - ⇨ *Delta value (Δ) is reset to zero*.

The outputs' operating hours are always stored.

Here, a distinction is made between total operating hours (∑) and delta operating hours (Δ). The total operating hours cannot be reset. Delta operating hours can be reset to zero at any time.

9 Service

Updating the controller software

The controller is programmed in the factory with the latest controller software at the time of production. Therefore, the software does not usually have to be updated.

However, if you would like to use newer controller software or if an update is recommended for technical reasons, you can transfer new controller software to the controller via the RS232 interface.

Further information in this regard can be obtained from your dealer.

10 Data logger

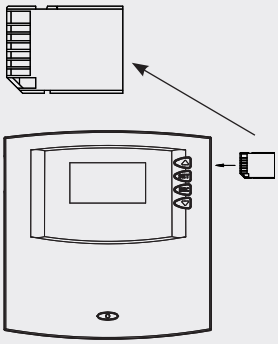
An SD card enables you to save all the measurement data collected by the controller over a long period of time. The data logger enables detailed system control e.g. chronological sequence of yields. In addition, you can use the stored measurements to optimise the settings of the fresh water station and thus achieve the highest possible efficiency of the system.

10.1 Handling the SD card

All standard SD cards up to a maximum of 2GB can be used. SD cards must be formatted with the FAT16 file system and there should be no existing data on the SD card.

To insert an SD card in your controller, push the SD card, with the contact surface at the front, into the side slot of the controller until the card engages – see illustration.

Insert the SD card with the contact surface at the front.



To remove the card press it slightly inwards until it is released and pushed out by spring-action. The card can now be removed.

Before you remove the card make sure that the data logger function is deactivated (see chapter 7.4.1). This will prevent any possible loss of data.

NOTE

SD cards are very sensitive. Ensure that you do not soil the contacts and that no pressure is applied to the card. Observe the instructions of the card manufacturer.

The controller manufacturer accepts no responsibility for claims for damages resulting from defective or lost data.

10.2 Displayed screen

The controller can recognise the different statuses of the SD card:

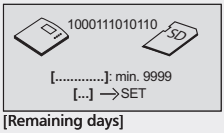
An hourglass symbol shows that the controller is accessing the SD card and calculating the remaining days. During this time keypad entries are not possible and the display is not updated. During this time the outputs remain at the status they were before the controller accessed the SD card.

The hourglass symbol is displayed after the following actions:

- Inserting an SD card
- Changing the interval time for data collection
- Changing the date
- Switching on the controller
- Resetting the operating switch from "OFF" to "Automatic" after formatting
- Switching on the data logger function
- Changing the clock from 23:59 to 00:00

If an SD card is inserted in the controller, the "Data-Logger" function is activated and no SD card error has occurred, a window showing the data transfer from the controller to the SD card appears in the status display. This is illustrated by an animation. A help window can be accessed by pressing the SET button. Here it is pointed out that the data logger

function should be switched off before the removal of the SD card in order to exclude the possible loss of data. The help window is closed again by pressing any button.

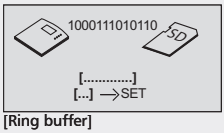


[Remaining days]
[Help]

For calculating the remaining days it is assumed that all selectable data will be collected.

Examples for calculating the remaining days:

Interval time 1 minute, storage capacity 1GB: approx. 13 years
Interval time 1 minute, storage capacity 128MB: approx. 2 years
Interval time 5 minutes, storage capacity 1GB: approx. 65 years
Interval time 5 minutes, storage capacity 128MB: approx. 10 years



[Ring buffer]
[Help]

If the memory capacity on the SD card is not sufficient for a new data collection, then the oldest month folder including its contents is deleted (so-called ring buffer). "Ring buffer" instead the remaining days appears in the display.

Errors that can occur in the connection with the SD card are shown by corresponding error displays. See chapter 11 for description and measures.

10.3 Formatting

Note that all the data stored on the card is deleted when you reformat the card. The manufacturer does not accept any responsibility for the loss of data.

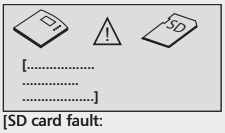
10.3.1 Formatting the SD card with the computer

SD cards can be formatted with any standard PC or laptop with an appropriate reading point.

NOTE

The SD card must be formatted with the FAT16 file system. This is equivalent to the FAT format in Windows XP.

10.3.2 Formatting the SD card with the controller



[SD card fault:
No SD card
inserted]

✓ *"Functions" submenu selected, see "Selecting functions" (chapter 7.4.1).*

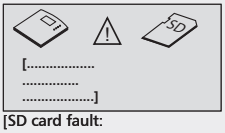
✓ *"Data logger" activated, see "Activating functions" (chapter 7.4.1).*

⇨ *The message "No SD card inserted" is displayed.*

▶ Insert SD card.

▶ If the following message is shown:

⇨ *"Permissible sizes: max 2GB, formatting: FAT16 only" the SD card must be formatted.*

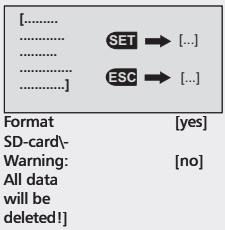


[SD card fault:
Permissible sizes: max. 2 GB,
formatting: FAT 16 only]

NOTE

The SD card can only be formatted in the controller if this error message is displayed.

- ▶ Push the operating switch downwards (position “OFF”).
  - ⇨ *The following message "Format SD card? Warning: all data will be deleted!".*
- ▶ **SET:** press to start formatting,
  ESC: press to cancel.
  - ⇨ *"SDMC: formatting..." appears during formatting.*
  - ⇨ *"SDMC: format OK" appears after the formatting has been completed.*
- ▶ Slide the operating switch back to the middle position ("Automatic" position).



NOTE

If formatting of the SD card is not successful, the message "SDMC: format error" appears on the display (see information window).

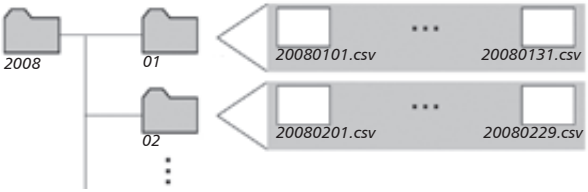
If no error message is displayed the controller starts automatically with the data recording (see chapter 10.2).

In the event of another error message see information windows, chapter 12.

10.4 Data evaluation

The controller automatically creates the following folder structure on the SD card.

A separate folder is created on the SD card for every year. This can contain up to 12 month folders. The day files are stored in the month folders. The name of a day file is composed of the year, month and day, e.g.: for 18 February 2008: "20080218.csv".



Explanation of the column arrangement if a day file is opened with a spreadsheet programme, e.g. Excel:

1. Column: date and time
2.-7. Column: temperature sensor measurements (T1 to T6 in °C)
8. Column: Grundfos Direct Sensors™ temperature (Tds in °C)
9. Column: flow rate of the volumetric flow meter (V in l/min)
10. Column: output of the measurement of heat quantities (P in W)
11-13. Column: operating status of the outputs (R1 to R3 in %)
14. Column: operating status of the alarm output (R! in %)

NOTE

Information on further programmes for data evaluation can be obtained from your dealer.

11 Fault finding

The controller is a quality product, conceived for years of continuous trouble-free operation. If a problem occurs, the cause of the problem often lies not in the controller but in the peripheral components. The following description of some causes of problems should help the installer and operator to isolate the problem so that the system can be repaired as quickly as possible and to avoid unnecessary costs. Of course, not all possible causes of problems can be listed here. However, here you will find the most common causes of problems that cover the majority of possible faults. Contact your sales representative when you are sure that the fault is not one of those described above.

See chapter 14 "Legal guarantee" for more information.

⚠ DANGER

Risk of death by electrocution!

- ▶ All work on an open controller must be performed by professional personnel.
- ▶ Remove the controller from the power supply before opening the case.

11.1 Causes of problems

Controller does not appear to function at all:

Fault	Secondary symptoms	Possible cause	Procedure
Controller does not appear to function at all.	Display shows nothing.	Controller power supply is interrupted.	Check the mains cable. Check the fuse in the controller. (replacement fuse is located in the case). Check the fuse for the power supply

Pump

Fault	Secondary symptoms	Possible cause	Procedure
Pump is not running but drinking water is being drawn off.	The pump symbol in the display rotates.	Pump power supply is interrupted.	Check the pump power cable. Check the fuse in the controller (replacement fuse is located in the case).
		Pump has seized up.	Get the pump working again.
	The pump symbol in the display does not rotate.	Hot water temperature has been reached.	No fault.
	The pump symbol in the display does not rotate. The display illumination is red. A "Tool symbol" flashes in the display.	Operating switch is set to "Manual" mode and the pump output is set to "Off".	Set the operating switch to "Automatic".
	The pump symbol in the display does not rotate. The display illumination flashes red.	Short circuit or interruption of a temperature sensor.	On the controller, request the current values from all connected temperature sensors. Check the sensors and cables.

Fault	Secondary symptoms	Possible cause	Procedure
Pump is running but drinking water is not being drawn off.	The pump symbol in the display rotates.	Pump is running due to blockage protection.	No fault.
	Grundfos Direct Sensors™ shows a flow but no drinking water is being drawn off.	Grundfos Direct Sensors™ not correctly grounded.	Additionally ground the Grundfos Direct Sensors™.
	The pump symbol in the display rotates. Display is backlit in red: Tool symbol is displayed.	Operating switch is set to "Manual" mode and the pump output is set to "On".	Set the operating switch to "Automatic".
No heat transport in heat exchanger, pump is running, drinking water is being drawn off.	The pump symbol in the display rotates.	Air in system.	Check the primary circuit for air.
		The isolating valve is closed.	Check/open the isolating valve.
		Heat exchanger is dirty or calcified.	Flush/clean the heat exchanger in accordance with the manufacturer's instructions.
Pump shows cycle behaviour.	---	Air in system.	Check the primary circuit for air.
		The isolating valve is closed.	Check/Open the isolating valve.
		Heat exchanger is dirty or calcified.	Flush/clean the heat exchanger in accordance with the manufacturer's instructions.

Sensors

Short circuits and open circuits are only detected in sensors that are actually used by the system or by a function. The display message is automatically confirmed and disappears when the fault has been corrected.

Fault	Secondary symptoms	Possible cause	Procedure
Display shows 	---	Sensor short circuit.	Check sensor.
Display shows 	---	Interruption of sensor cable.	Check/repair sensor cable.

11.2 Pt1000 temperature sensor fault finding

A potentially defective sensor can be checked using an ohmmeter To do this, the sensor must be disconnected, its resistance measured, and the value compared with the figures in the table below. Small deviations are acceptable.

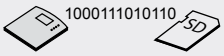
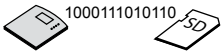
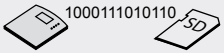
Temperature [°C]	-30	-20	-10	0	10	20	30	40	50	60	70
Resistance [Ω]	882	922	961	1000	1039	1078	1117	1155	1194	1232	1271

Temperature [°C]	80	90	100	110	120	130	140	150	160	170	180
Resistance [Ω]	1309	1347	1385	1423	1461	1498	1536	1573	1611	1648	1685

12 Information windows

Information windows are displayed whenever a function's settings are incomplete, activation of a function is not possible, errors occur in the system, or certain functions are currently activated.

Display text	Description	Measures
Caution: diverse settings have to be repeated after changing system!	All function settings and parameters are reset to default values when the system is replaced.	Check and adjust the necessary settings of all previously noted settings in the "Functions" and "Parameters" menus.
Info: Double allocation/contradictory settings	The internal settings check has identified conflicting settings, or double allocation of sensors.	Check the time settings of the functions. Double allocation of sensors is permitted, and this is only intended as information.
Activation not possible. Settings are incomplete!	Function cannot be activated because the associated settings are incomplete. Function was deactivated again.	Make all settings for the corresponding function.
Back-up heating and alarm functions cannot be activated at the same time.	Both functions cannot be used at the same time.	Check the system concept.
Hygiene flushing of the circulation.	System is conducting hygiene-flushing of the circulation pipe.	No fault.
Sensor or sensor cable fault detected!	A sensor is defective.	Identify the affected sensor via the status menu and test/replace it.
Sensor cable interruption or no sensor connected!	Sensor cable is interrupted, incorrectly connected, or the sensor is possibly defective.	Check connection and/or sensor cable. Possibly check sensor and sensor cable using an ohmmeter.
Sensor cable short circuit!	Sensor cable has short-circuited or the sensor is possibly defective.	Check the connection and the sensor cable. Check the sensor and cable with an ohmmeter and replace if necessary.
Heat source error: buffer storage tank does not supply sufficient energy.	The primary circuit rated supply temperature has not been reached.	Check the temperature in the buffer storage tank. Check the pump for correct operation.
Heat exchanger error: heat exchanger may be calcified.	The target hot water temperature has not been reached.	Check the heat exchanger for calcification.
Note: Thermal disinfection: Target temperature has not been reached.	The temperature at the supply sensor (sensor 2) has not been reached after 5 min.	Check the supply sensor, heat exchanger, buffer storage tank temperature, tank pump and shut-off valve. Possibly air in the pipes.
Note: Thermal disinfection: circulation target temperature has not been reached.	The temperature at the return sensor (sensor 3) has not been reached after 30 min.	Check the supply sensor, circulation pump and shut-off valve. Possibly air in the pipes. Keep all outlets closed.
Note: Thermal disinfection: no flow detected.	No flow has been detected by the Grundfos Direct Sensors™ (Q) 1 minute after starting the circulation pump.	Check the Grundfos Direct Sensors™, circulation pump and shut-off valve. Possibly air in the pipes.
"Data logger" function must be activated!	SD card has been inserted, but the data logger function has not yet been activated.	Activate the data logger function in order to store data on the SD card (see chapter 7.4.7).
SD card fault: No SD card inserted.	Data logger function has been activated, but no SD card has been inserted.	Insert an SD card for data storage into the controller.
SD card cannot be read.	The controller is unable to access the SD card.	Use another SD card.
SD card and hourglass symbol.	Controller accesses the SD card.	No fault. Wait a few seconds.
SD card fault: SD card is write-protected.	The write-protection on the SD card is active.	Deactivate the write-protection on the SD card.
SDMC: formatting.	The SD card is being formatted.	None.

Display text	Description	Measures
SDMC: format error.	The formatting failed. The SD card may be defective.	Use another SD card.
SDMC: format OK.	Formatting has been successfully completed.	None.
	Controller stores the data on the SD card.	None.
 Ring buffer	Insufficient storage capacity on the SD card. The folder for each oldest month will be deleted in order to created storage space.	Remove the SD card and back up the data onto a computer.
 Remaining days: min. 9999	Display of the number of days remaining before ring buffer operation is activated.	None – information only.

13 Plausibility indices

The internal plausibility check ascertains whether conflicting settings have been detected in the controller. In this event, an information window displays an error code. The reasons which cause the information window to appear, along with each corresponding error code, are described in the following table. Check your settings at the controller, and correct them if necessary.

P 1	Circulation "ON" and no time control, temperature control and pulse control

14 Legal guarantee

In accordance with German statutory regulations, there is a 2-year legal guarantee on this product for the customer.

The seller will remove all manufacturing and material faults that occur in the product during the legal guarantee period and affect the correct functioning of the product. Natural wear and tear does not constitute a malfunction. No legal guarantee can be offered if the fault can be attributed to third parties, unprofessional installation or commissioning, incorrect or negligent handling, improper transport, excessive loading, use of improper equipment, faulty construction work, unsuitable construction location or improper operation or use. Legal guarantee claims shall only be accepted if notification of the fault is provided immediately after it is discovered Guarantee claims are to be directed to the seller.

The seller must be informed before guarantee claims are processed. For processing a guarantee claim an exact fault description and the invoice/delivery note must be provided.

The seller can choose to fulfil the legal guarantee either by repair or replacement. If the product can neither be repaired or replaced, or if this does not occur within a suitable period in spite of the specification of an extension period in writing by the customer, the reduction in value caused by the fault shall be replaced, or, if this is not sufficient taking the interests of the end customer into consideration, the contract is cancelled.

Any further claims against the seller based on this legal guarantee obligation, in particular claims for damages due to lost profit, loss-of-use or indirect damages are excluded, unless liability is obligatory by German law.

15 Technical data

15.1 Technical data

Fresh water controller	
Rated voltage (system voltage)	230 V~, 50 Hz [optional 115 V~, 60 Hz] (see type plate)
Max. own consumption	≤ 2 W
Inputs	6 T1 - T6: temperature recording (Pt1000)
Additional inputs	1 x Grundfos Direct Sensors™ input (flow rate and temperature)
Outputs	3 R1 and R2: Triac output for speed control, max. switching current 1.1 A~ R3: relay switched output, max. switching current 3,47 A~
Additional outputs	1 x alarm output / back-up heating output (⚠ - ⚠ : ⏦), potential-free contact for SELV max. 42 V, max. 2 A
Pre-defined hydraulic schemes	2
Interfaces	RS232, RS485
Protection degree	IP 20 / DIN 40050
Protection class	I
overvoltage category	Class II (2500 V)
Permitted ambient temperature	0 to +45 °C
Display	animated graphic LCD with backlighting
Dimensions L x W x H [mm]	170 x 170 x 46
Software class	A
Type of action	type 1.B
Type of fastening for permanently connected cables	type X
Degree of pollution	2
Ball pressure test temperature	850 °C

15.2 Performance data

Output	Power	Fuse
R1	250 W (230 V~) / 125 W (115 V~)	Internal fuse: 2.5 A T, 250 V or T 2.5 A H 250 V (Littelfuse: 21502.5)
R2	250 W (230 V~) / 125 W (115 V~)	
R3	800 W (230 V~) / 125 W (115 V~)	Internal fuse: 4 A T, 250 V or T 4 A H 250 V (Littelfuse: 215004)

16 Parameter values

16.1 Parameter values for functions

16.1.1 Circulation

Time controlled

Time window	Setting range	Factory settings
1	00:00 ... 23:59 Hours	06:00 ... 08:00 Hours
2	00:00 ... 23:59 Hours	12:00 ... 13:30 Hours
3	00:00 ... 23:59 Hours	18:00 ... 20:00 Hours

Temperature controlled

Temperature threshold	Factory settings	Setting range
"On" switch-on threshold	30 °C	0 °C ... "Off" -2 K
"Off" switch-off threshold	35 °C	"On" +2 K ... 95 °C

Pulse controlled

Times	Factory settings	Setting range
Circulation time	2 min	0 ... 60 min
Wait time	10 min	10 min

16.1.2 Back-up heating

Time window	Setting range	Factory settings
1	00:00 ... 23:59 Hours	06:00 ... 08:00 Hours
2	00:00 ... 23:59 Hours	12:00 ... 13:30 Hours
3	00:00 ... 23:59 Hours	18:00 ... 20:00 Hours

16.1.3 Thermal disinfection

Target temperature	Factory settings	Setting range
Hot water temperature	70 °C	60 °C ... 80 □

16.1.4 Heat quantity

Measurements	Preset sensor
Supply temperature	Sensor 1
Return temperature	Temperature sensor of the Grundfos Direct Sensors™ (T)
Flow rate	Grundfos Direct Sensors™ **(Q)**

16.1.5 Data-Logger

Interval	Setting values	Factory settings
	1, 2, 3, 4, 5, 10, 15, 20, 30, 60 min	15 min

16.2 Parameters

Parameters	Description	Setting range		Initialisation / factory settings
		min.	max.	
Return valve switch-on temperature difference (STDon)	The switching valve switches to the buffer storage tank middle position when the switch-on temperature difference between the buffer storage tank return temperature sensor and the buffer storage tank sensor is reached.	STDoff return valve +2 K	50 K	6 K
Return valve switch-off temperature difference (STDoff)	The switching valve returns to the initial position when the switch-off temperature difference between the buffer storage tank return temperature sensor and the buffer storage tank sensor is reached.	0 K	STDon return valve	3 K
Hot water temperature	The controller attempts to adjust the hot drinking water temperature to the set target value.	0 °C	70 °C	50 °C

17 Notes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