HEXflo - Plate heat exchanger
Regtronic RQ - Controller

Please read and understand these instructions before commencing installation and leave this manual with the customer for future reference.

Andrews. Built to perform.

ANDREWS
WATER HEATERS

Andrews Water Heaters

Reproduction of any information in this publication by any method is not permitted unless prior written approval has been obtained from Andrews Water Heaters.

Andrews Storage Water Heaters have been designed and manufactured to comply with current international standards of safety. In the interests of the health and safety of personnel and the continued safe, reliable operation of the equipment, safe working practices must be employed at all times. The attention of UK users is drawn to their responsibilities under the Health and Safety Regulations 1993.

All installation and service on Andrews Water Heaters must be carried out by properly qualified personnel and, therefore, no liability can be accepted for any damage or malfunction caused as a result of intervention by unauthorised personnel.

Andrews Water Heaters' policy is one of continuous product improvement and, therefore, the information in this manual, whilst completely up to date at the time of publication, may be subject to revision without prior notice.

Further information and assistance can be obtained from:

Customer support
Monday - Friday
8am - 5pm

Sales: 0345 070 1055
Technical: 0345 070 1057
Email: service@baxicommercialdivision.co.uk
Website: www.andrewswaterheaters.co.uk
Twitter: @andrewsWH

Contents

HEXflo controller

Cascade control set

1   General and safety information

1.1   General information

Read installation and operating instructions carefully before installing the plate heat exchanger.

The installation and operating instructions as well as all other valid documents have to remain with the user of the system!

Information regarding installation and operating instructions

These installation and operating instructions give important advice as to the handling of the appliance.

Before working at or with the appliance, especially before installation and initial operation, these installation and operating instructions are to be read carefully.

For warranty terms and conditions, please refer to www.andrewswaterheaters.co.uk where the full warranty conditions are outlined.

1.2   British standards and codes of practice

1.2.1   HEXflo

BS 6700: 1997	Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages. This standard supersedes the following British Standards and Codes of Practice: CP99, CP310, CP324, 202, CP342 Part 2, Centralised Hot Water Supply.
BS 5440: 1990	Installation of flues and ventilation for gas appliances of rated output not exceeding 60kW.
BS 6644	Installation of gas fired hot water boilers of rated inputs between 60kW and 2MW.
BS 5546: 1990	Installation of gas hot water supplies for domestic purposes.
BS 6891	Installation of low pressure gas pipework of up to 28mm in domestic premises.
BS 7206: 1990	Specification for unvented hot water storage units and packages.
I/M2	Purging procedures for industrial and commercial gas installations.
I/M11	Flues for commercial and industrial gas fired boilers and air heaters.
I/M16	Notes on installation of gas pipework (excluding 25mm and below).
BS 6798	Installation of gas fired hot water boilers of rated input not exceeding 60kW.

ℹ Note
Consideration should be given to amendments or updates to the above standards.

1.3   Health and safety regulations 1993

It is the duty of manufacturers and suppliers of products for use at work to ensure, so far as is practicable, that such products are safe and without risk to health when properly used and to make available to users, adequate information about their safe and proper operation.

Andrews Water Heaters should only be used in the manner and purpose for which they were intended and in accordance with the instructions in this manual. Although the heaters have been manufactured with paramount consideration to safety, certain basic precautions specified in this manual must be taken by the user.

It is imperative that all users of the heater must be provided with all the information and instruction necessary to ensure correct and safe operation.

1.4   Effectiveness in combating legionella

Water systems in buildings have been associated with outbreaks of Legionnaires' Disease, particularly in health care facilities where occupants are significantly more susceptible to infection.

In recognition of the risks in hospitals, a Code of Practice for the Control of Legionella in Health Care premises has been issued by the Department of Health (1991). Codes of Practice applicable to other premises have been published by other organisations, principally the Health and Safety Executive (HS)(G70) and the Chartered Institute of Building Services Engineers (CIBSE, TM13).

All Codes of Practice draw attention to the design and operation of water systems with reference to avoidance of factors that favour colonisation by Legionella bacteria. These factors include stagnation, lukewarm conditions (20°C to 45°C) and the accumulation of debris, scale and corrosion in the base of tanks and calorifiers.

Andrews Water Heaters has commissioned an independent evaluation of their products to investigate their resistance to build-up of Legionella bacteria.

Experiments were conducted to determine whether, following a substantial challenge by legionella pneumophilia, after overnight and stagnation conditions, the system was rendered free from viable recoverable legionella. It was found that at 61°C, following a challenge of approximately 107 organisms per litre, within one hour, more than 99.999% of organisms had been killed. After a subsequent stagnation period, sampling did not reveal any residual contamination. For storage water heaters, the design of the base of the water heater precludes legionella colonisation, even after build-up of debris. The burner positioning ensures that the water at the bottom of the heater reaches the same, or higher temperature as in the rest of the heater.

Based on data obtained through experiment, the Andrews Water Heater can be described as legionella resistant as it is considered unlikely that, at the temperature tested, the organism would colonise the water heater and present a possible health risk.

1.5   Safety notes

1.5.1   Correct use

The safety in operation is only guaranteed if the plate heat exchanger is used correctly.

The product has been designed for use to generate domestic hot water via a plate heat exchanger via a buffer vessel and primary hot water circuit.

Any other use of the plate heat exchanger is prohibited and non compliant.

Claims against the manufacturer and/or his authorised representatives regarding damages caused by incorrect use of the plate heat exchanger will not be accepted.

The installation manual should be read and adhered to in order to comply with any warranty offered.

1.5.2   General safety information

The safety notes shown here as well as the warning notes in other chapters of the instructions are to be observed in order to reduce health risks and to avoid dangerous situations.

⚠ **Danger**
Risk of scalding!
Water pipes and the water drawn from the tap can become very hot (>60°C).
For this reason:
- Always wear protective clothing and safety gloves when working near hot components.
- Before starting work, please make sure that all components have cooled down to ambient temperature.
- Disinfection should be carried overnight whenever possible (see also controller manual).
- This water heater can deliver scalding temperature water at any outlet in the system.
- Be careful whenever using hot water to avoid scalding injury.
- To protect against injury, you should install approved mixing valves in the water system. These valves will reduce point of discharge temperature by mixing cold and hot water in branch supply lines. Such valves are available from your local plumbing supplier.

Suitable measures have to be taken so that the maximum operating temperatures and pressures are not exceeded.

1.5.2   General safety information

WATER QUALITY AND TREATMENT
When installing Andrews Water Heaters we would recommend the inclusion of water treatment and that a water treatment specialist is consulted to ensure the selection of the most appropriate system for each particular installation.
In hard water areas in particular, scale formation can occur in all hot water systems and various factors can influence this such as water temperature, amount of water used and the quality of the local water supply. B.S. 7953 states that provision should be made for water treatment where the local water hardness exceeds 150 parts per million (14 degree Clark).
For further information please refer to our Technical Data Sheet - T/D027 Water Quality and Treatment Data Sheet (available from www.andrewswaterheaters.co.uk).

⚠ **Warning**
Danger to life!
Improper installation may lead to extensive injuries to persons and damage to property.
For this reason:
Installation, initial operation and maintenance must only be carried out by qualified tradesmen.

THE LAW REQUIRES THAT INSTALLATION IS CARRIED OUT BY A PROPERLY QUALIFIED PERSON
Installations must be carried out in accordance with Gas Safety (Installation and Use) Regulations 1998, Building Regulations, The Water Supply (Water Fittings) Regulations 1999 and any requirements of the local Gas Supplier, Local Authority, Water and Fire Authorities and the current British Standards and Codes of Practice

1.5.3   Notes regarding installation

To ensure correct operation of HEXflo, please read and understand the following points:

- The pipework of the primary circuit should be connected at the highest, lateral nipple of the buffer storage cylinder.

- The pipework of the primary circuit should be as short as possible to guarantee quick heating up of the heat exchanger when drawing off water.

- HEXflo with copper brazed heat exchanger:
  Brazed copper is used in the heat exchanger of the HEXflo unit. For this reason, do not use steel pipes in the direction of flow behind the plate heat exchanger as dissolved copper ions can cause pitting of steel.

- The safety valve in the domestic hot water circuit (secondary circuit) must be connected to a discharge pipe in accordance with the current regulations in force.

1.5.4   Spare parts

> ⚠ **Warning**
> **Risk of injury!**
> Wrong or faulty spare parts may not only lead to damage, malfunction or a total loss of power but may also impair safety.
> For this reason:
>
> - Only use original Andrews Water Heaters spare parts.

> ℹ **Note**
> Spare parts are available from authorised dealers

See Section 15 - page 63 for full spare parts list and diagram.

2   Technical data

2.1   Appliance dimensions and connections

Plate heat exchanger	
General technical data	
Max. operating pressure (primary side)	6 bar
Max. operating pressure (secondary side)	10 bar
Max. operating temperature	95 °C
Max. pump head (primary side)	6 m
Max. pump head (secondary side)	4 m (only circulation)
Number of plates heat exchanger	30
Kv (primary side)	3.6
Kv (secondary side)	3.0
Fluid	
Primary side	Heating water
Secondary side	Domestic hot water
Check valves	
Resistance primary side	350 mm WG
Resistance secondary side	200 mm WG
Materials	
Valves	Brass/dezincification resistant brass
Seals	EPDM/AFREE 400
Insulation	EPP
Check valves	PPS / brass / dezincification resistant brass
Pipes	Stainless steel 1.4401
Heat exchanger stainless steel, copper brazed	Stainless steel 1.4401 Brazed copper
Heat exchanger completely made of stainless steel	Stainless steel 1.4401 Brazed stainless steel
Dimensions	
Connections (primary side)	G1 flat sealing
Connections (secondary side)	G1 flat sealing
Distance between pipe centres	100 mm
Width	500 mm
Height	860 mm
Depth	260 mm
Distance between pipe centres – wall (primary side)	130 mm
Distance between pipe centres – wall (secondary side)	80 mm

2.2   Flow rates

Fig. 1
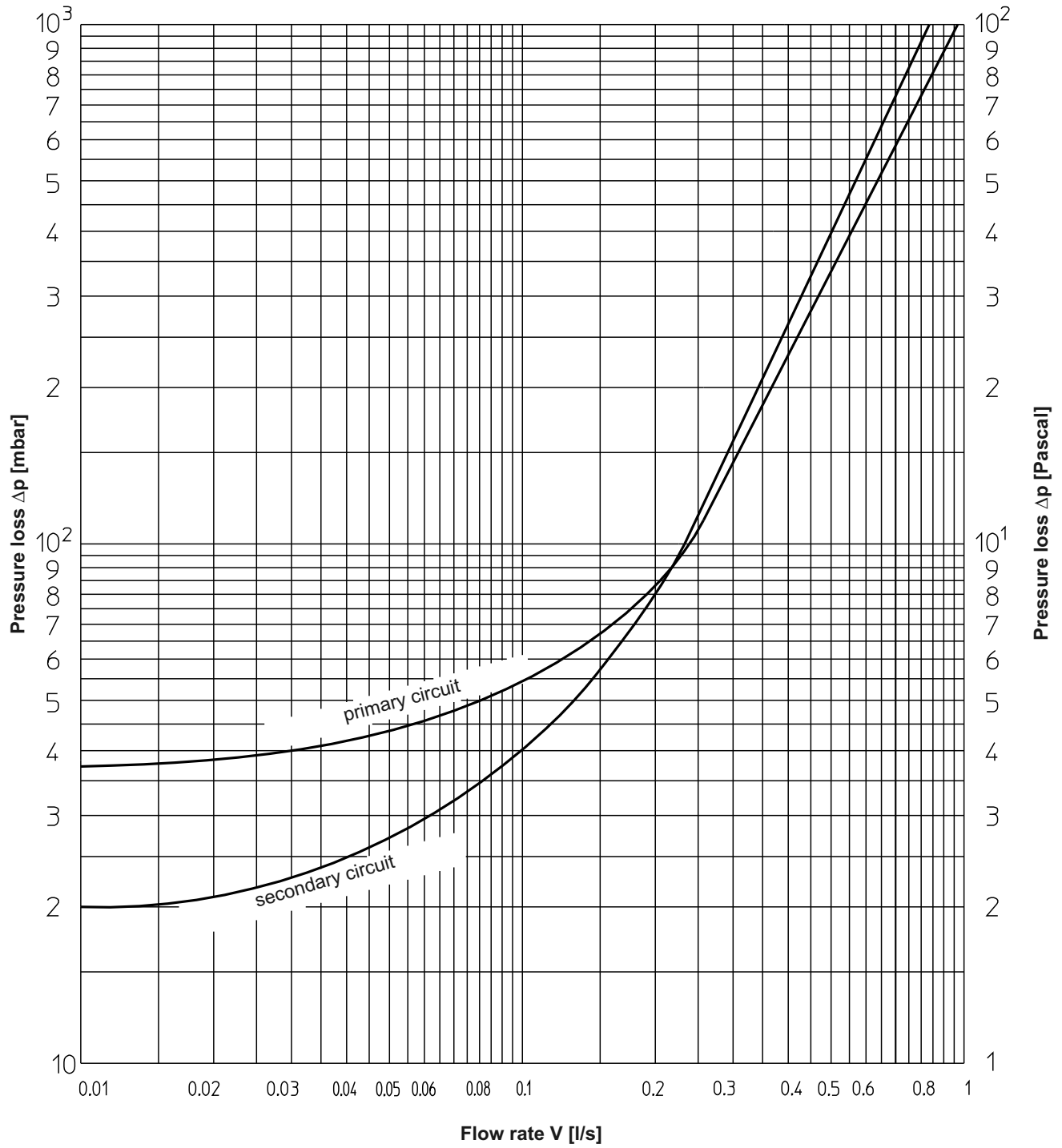
2.3   Pump characteristics

2.3.1   Wilo Yonas Para RS 15/7

Fig. 2

Pump characteristics Wilo Yonos Para RS 15/7
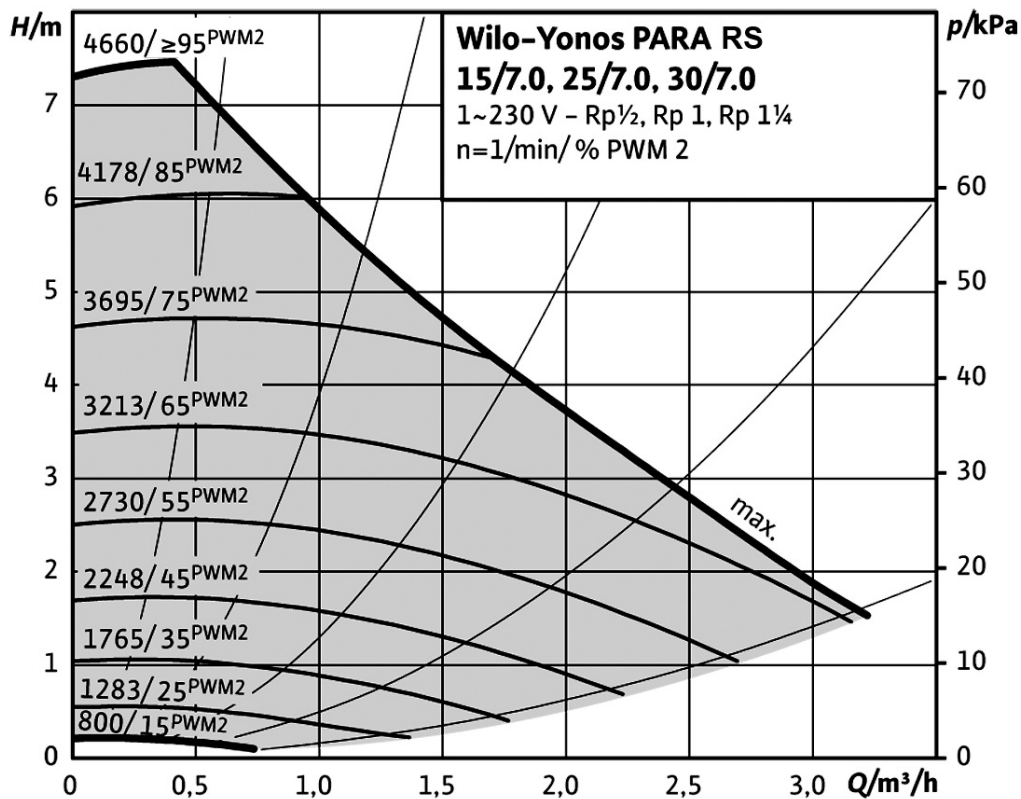
2.3.2   Wilo ZRS 15/4-3 Ku

Fig. 3

Pump characteristics Wilo ZRS 15/4-3 Ku
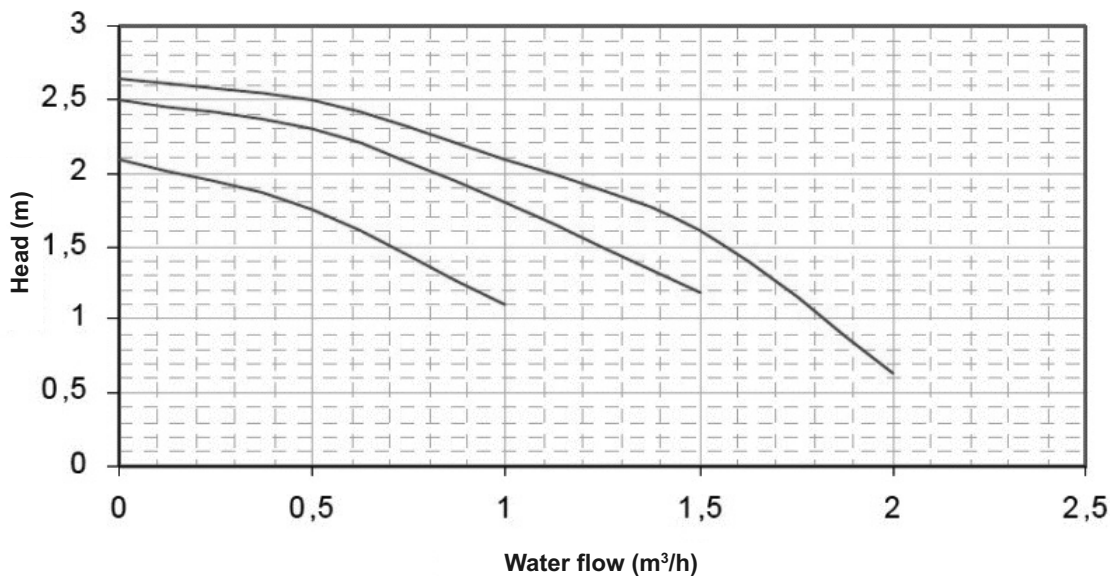
3   General description

3.1   HEXflo

Fig. 4
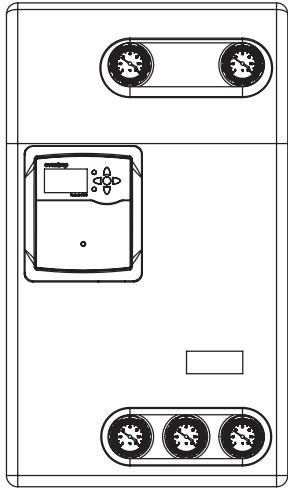
External view of product assembly

The plate heat exchanger unit with or without circulation is an electronically controlled product assembly with plate heat exchanger for the heating of domestic hot water.

The HEXflo has an integrated circulation pump.

3.2   **Primary circuit**

Fig. 5
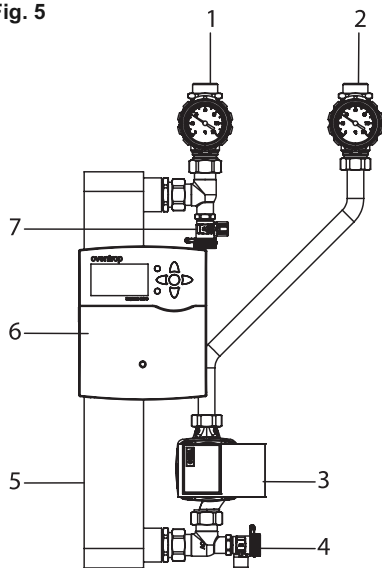
Primary circuit

1. Ball valve with temperature sensor connection and thermometer inside handle

2. Ball valve with check valve, temperature sensor connection and thermometer inside handle

3. Pump (circuit)

4. Flushing, filling and draining connection

5. Plate heat exchanger

6. Electronic controller

7. Flushing, filling and draining connection

3.3   Secondary circuit (water circuit)
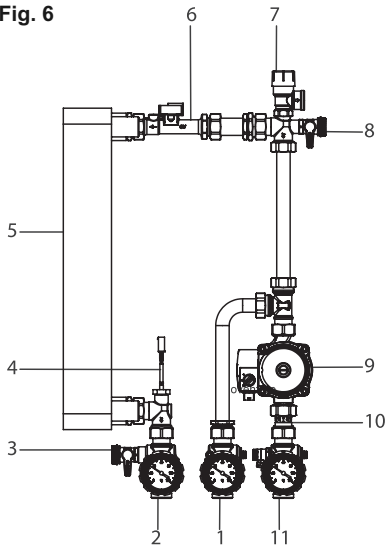
Secondary circuit

1. Ball valve with temperature sensor connection and thermometer inside handle

2. Ball valve with temperature sensor connection and thermometer inside handle

3. Flushing, filling and draining connection

4. Temperature sensor

5. Plate heat exchanger

6. Flow sensor

7. Potable water safety valve (10 bar)

8. Flushing, filling and draining connection

9. Circulation pump

10. Non-return check valve

11. Ball valve with temperature sensor connection, thermometer inside handle and draining valve

Pos. 9, 10 and 11 only for "HEXflo".

3.4   System illustration
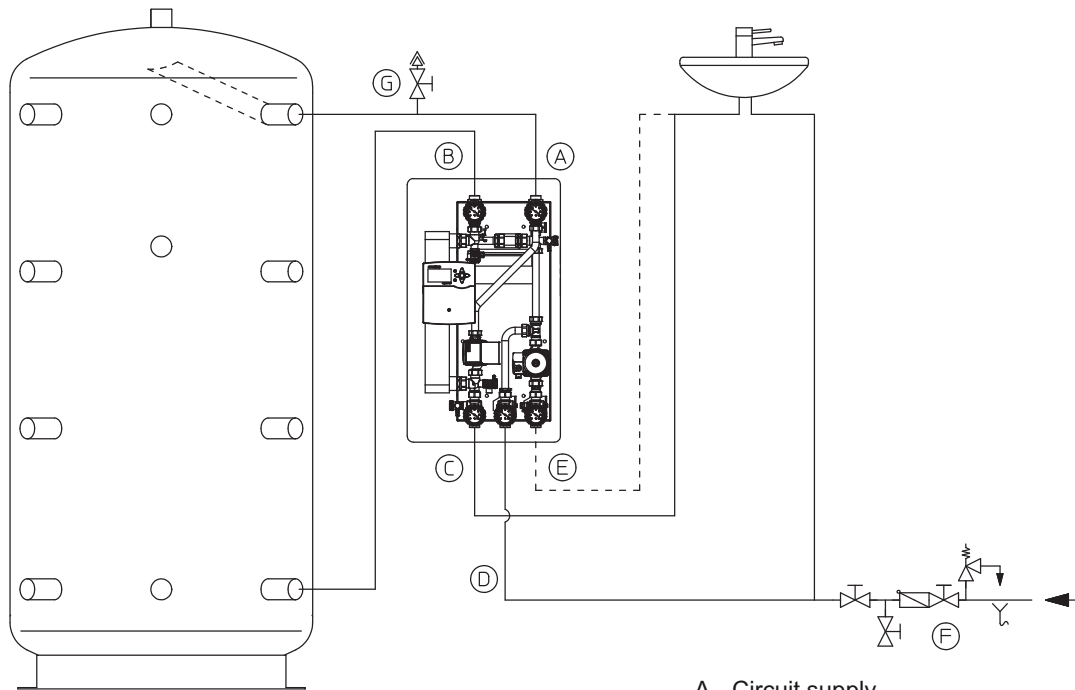
Fig. 7

A   Circuit supply

B   Circuit return

C   Domestic hot water outlet - hot

D   Domestic hot water entry - cold

E   Return (only for "HEXflo")

F   Safety group potable water connection

G   Deaerator

4   Installation

4.1   Important notes

Fig. 8
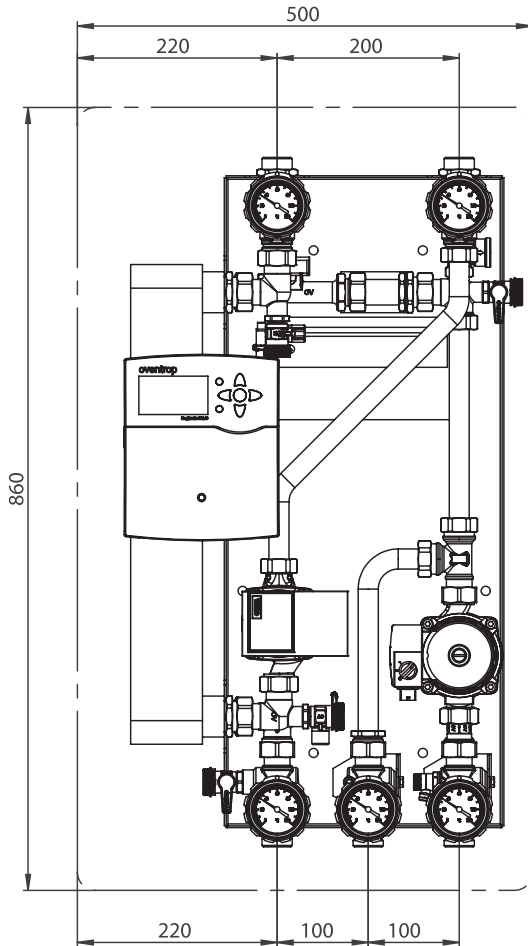
> ⚠️ **Danger**
> **Risk of injury!**
> Improper installation may lead to extensive injuries to persons and damage to property.
> For this reason:
>
> • Installation should only be carried out by a competent person.
>
> • Any electrical works must be carried out by a suitably qualified electrician to the current regulations in force.

Before installation of HEXflo units:

1. Determine positioning and route of all supply and return pipes to the plate heat exchanger. Connecting pipes to the storage cylinder should be as short as possible.

2. Determine the positioning of the plate heat exchanger.

3. Ensure that a suitable sized fused power supply is available.

4.2   Installation

Fig. 9
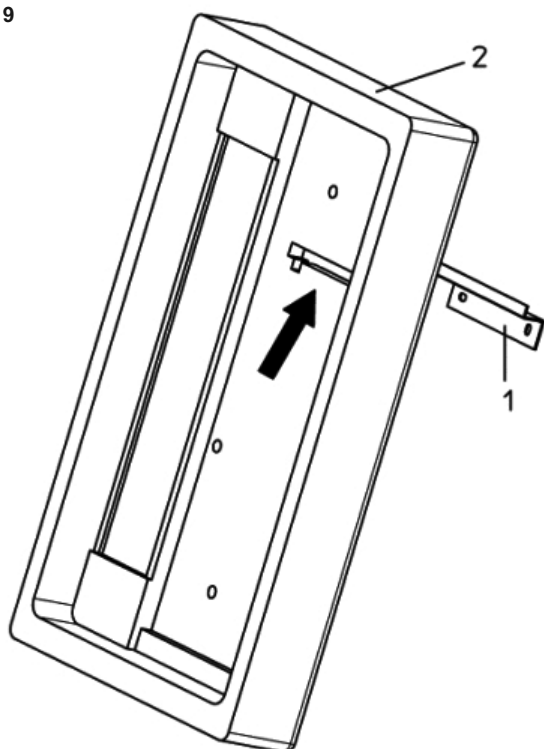
Rear insulation shell, angled wall bracket

Fig. 10
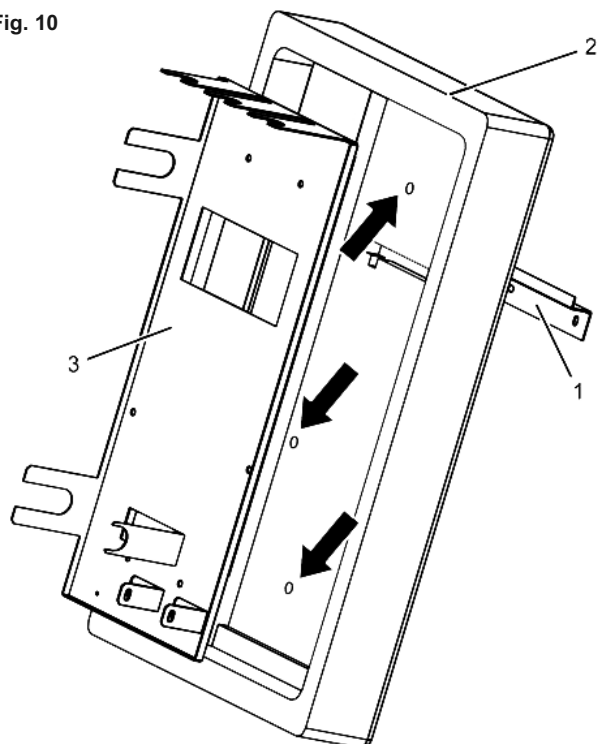
Rear insulation shell, angled wall bracket

1. After removal of the packaging material, take off front insulation shell.

2. Lift product assembly out of rear insulation shell.

3. Fix enclosed angled wall bracket (1) into rear insulation shell (2) (arrow) from behind and click into position.

4. Hold rear insulation shell to required installation place and position.

5. Adjust perpendicular position of the rear insulation shell with the help of the spirit level.

6. Mark drill holes for the angled wall bracket on the wall.

7. Take rear insulation shell off the wall.

8. Drill holes for the angled wall bracket.

9. Remove angled wall bracket for the rear insulation shell and mount onto the wall using screws M 8 x 70 and the enclosed washers.

10. Suspend rear insulation shell in the angled wall bracket and use a drilling jig for the fixing screws of the product assembly.

11. Choose four drill holes (arrows Fig. 9) for fixing the product assembly and mark them on the wall.

12. Take off rear insulation shell. Drill holes for the fixing screws of the product assembly.

13. Suspend rear insulation shell in the angled wall bracket.

14. Suspend product assembly (3) in the angled wall bracket and mount onto the wall with the help of screws M 8 x 100 and the enclosed washers.

15. Install pipework according to the installation scheme, see "Connection of supply pipes" (see 4.3).

A mounting frame can be purchased as an accessory designed to install HEXflo units and cascade accessories, please contact your supplier for more information.

4.3   Connection of supply pipes

Fig. 11

Connection of supply pipes
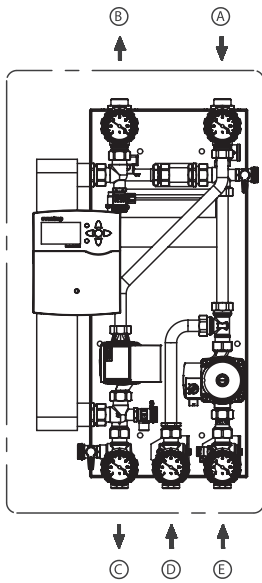
A   Circuit supply

B   Circuit return

C   Domestic hot water outlet

D   Cold water service

E   Return

4.4   Electrical connections

> ⚠️ **Warning**
> **Danger to life!**
> Improper installation may lead to extensive injuries to persons and damage to property.
> For this reason:
>
> • Installation should only be carried out by a qualified electrician.
>
> • Before starting work, please ensure that all components are disconnected from power supply.

4.4.1   Connection

1. Connection:
   Connection is carried out using the pre-assembled cable with earthed plug.

2. Plate heat exchanger must be earthed!

Fig. 12
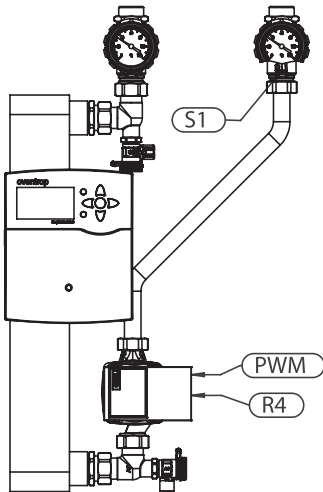
4.4.2   Layout

When leaving the factory, the plate heat exchanger is ready for connection at the following points (see also controller manual).

R4   Pump primary circuit

S1   Temperature primary side supply

R2   Circulation pump (only "HEXflo")

S2   Temperature hot water outlet

VFD   Temperature cold water supply/return circulation

VFD   Flow sensor

Secondary

Fig. 13
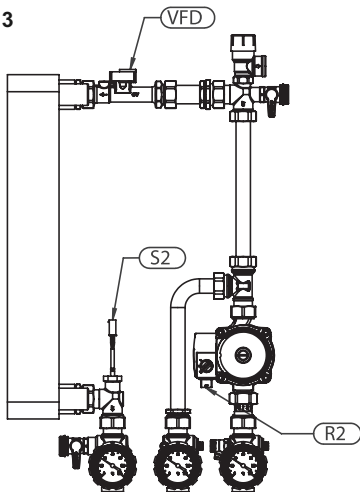
4.4.3   Temperature sensor / outputs

If additional temperature sensors are required please refer to the controller section at the rear of this manual.

5   Operation

5.1   Initial operation

⚠ **Caution**
Ensure the product is installed correctly in accordance with this manual and good plumbing practice before filling and commissioning process is undertaken.

Before initial operation, the following conditions are to be checked:

- All ball valves must be opened.

- All check valves must be closed (operating position).

The HEXflo units are pressure tested when leaving the factory.

- Check all connections before initial operation and re-tighten if necessary.

- Before initial operation, the complete installation must be pressure tested to ensure tightness of connections.

⚠ **Warning**
Flush all pipework with an appropriate system cleanser before the initial fill and a suitable corrosion inhibitor must be used in the primary circuit.

The installation of an automatic or manual air vent should be competed at the highest point in the circuit. Corresponding components (deaerator…) are to be installed.

⚠ **Danger**
Risk of scalding!
Suitable protection against scalding should be used within the system, pipework can reach temperatures in excess of 60 degrees C.

5.2   Flushing, filling

5.2.1   Filling and bleeding of primary circuit

1. Open check valve in ball valve (2) by turning the handle to 45° (see 5.2.4 – check valves).

2. Open ball valve (1).

3. Fill primary circuit via the filling and flushing valve (4).

4. Bleed primary circuit at the highest point.

5. Let the primary circuit pump (3) run for some time during manual operation (see controller manual) and bleed system thoroughly.

6. Fill installation slowly until it reaches the required pressure.

7. After bleeding, close ball valve (4) and set ball valve (2) to operating position.

Fig. 14
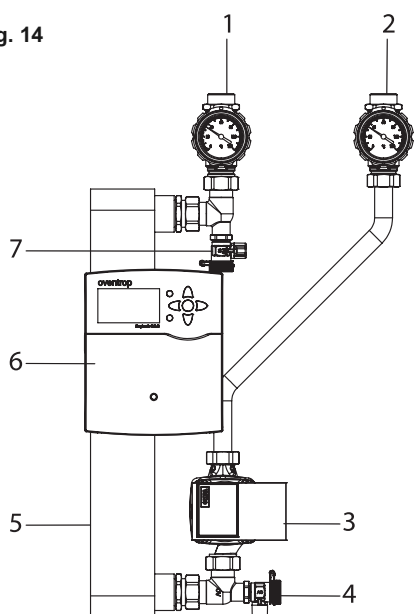
Fig. 15
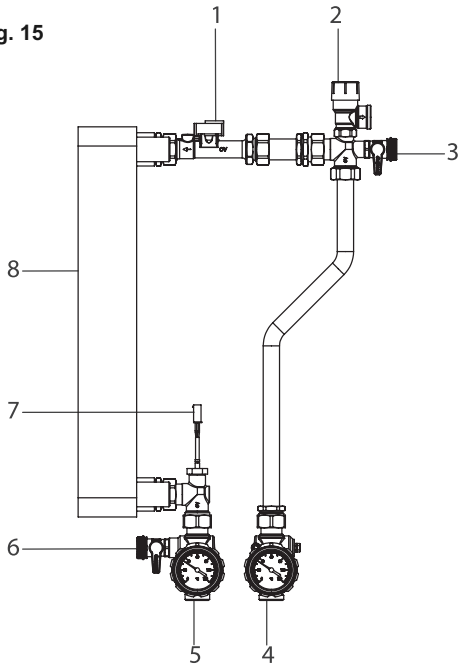
5.2.2   Filling and bleeding of secondary circuit

1. Open ball valve (5) of secondary circuit.

2. Open ball valve (4) slowly and fill system.

3. To bleed the heat exchanger, open filling and flushing valve (3) slowly so that the air may escape.

4. To bleed the pipework, open a draw off point so that the air may escape.

5. Close ball valve (3) once bleeding is complete.

Fig. 16
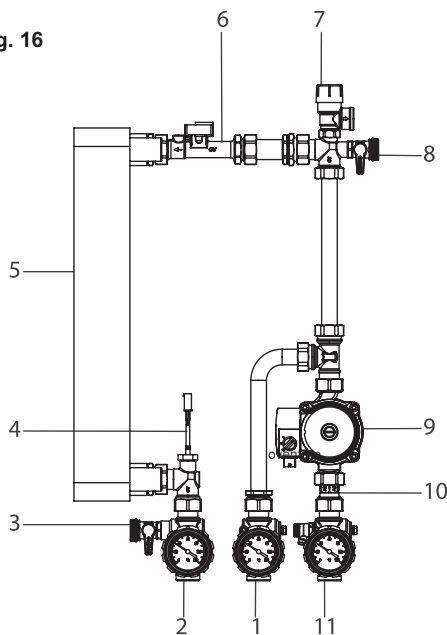
5.2.3   System filling

1. Open ball valve (2) of secondary circuit.

2. Open ball valve (1) slowly and fill system.

3. To bleed the heat exchanger, open filling and flushing valve (8) slowly so that the air may escape.

4. Bleed circulation pipe via the valve (11).

5. To bleed the pipework, open a draw off point so that the air may escape.

6. After bleeding, close ball valve (8) and draining valve (11).

5.2.4   Check valves

Fig. 17
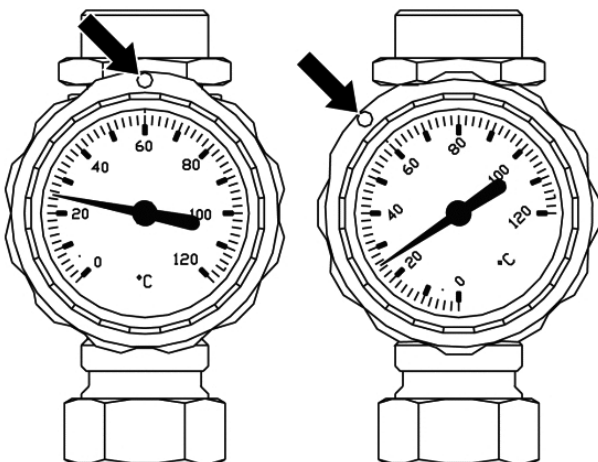
> ⚠ **Warning**
>
> **Check valves must be in operating position during operation!**
>
> For this reason:
> •   Check valves must be set to operating position after filling or flushing.

The ball valve in the primary circuit is equipped with a check valve. In operating position, (Fig. 17 on the left), the fluid is only transported in the direction of flow.
For filling and flushing the installation, the check valve can be opened by turning the handle to 45° (Fig. 17 on the right).

Example illustration:
Left hand side =   Check valve closed (operating position)
Right hand side = Check valve opened, handle turned to 45°

6   Maintenance

6.1   Maintenance

Andrews Water Heaters recommend HEXflo units should be serviced annually to ensure correct and safe operation of the system. Service plans can be purchased from Andrews Water Heaters or your installer.

The following work should be done:

- Leakage test: All components and couplings.

- Functional control and of the heat exchanger if required,

7   Appendix

7.1   Dismantling, disposal and recycling

> **⚠ Warning**
> Only qualified competent persons should remove and dismantle the appliance.

Before removing and dismantling please ensure you safely remove the power supply and isolated the appliance from the water connections.

Dispose of the appliance correctly according to the laws and regulations in force. The appliance and accessories cannot be discarded along with normal waste and should be recycled where appropriate.

More than 90% of the materials that make up the appliance are recyclable.

8   Technical data

8.1   Overview

Fig. 1
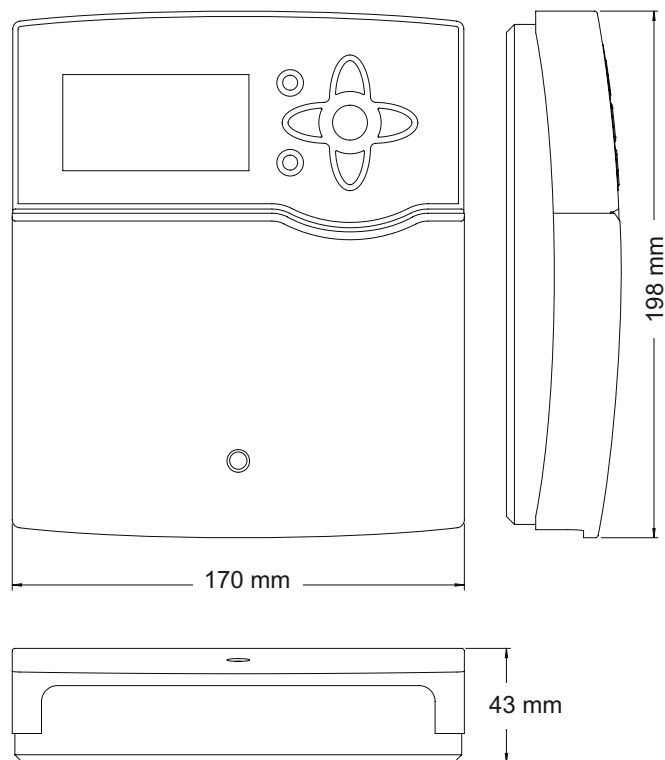
Housing: plastic, PC-ABS and PMMA

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), thermal 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: 8 inputs for Pt1000 temperature sensors, input for 1 digital Grundfos Direct Sensor TMVFD2-40l

Outputs: 4 semiconductor relays, 1 PWM output

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)

Total switching capacity: 4 A

Standby power consumption: < 1W

Mode of operation: type 1.Y

Degree of pollution: 2

Rated impulse voltage: 2,5 kV

Supply connection: type Y attachment

> **i** **Note**
> An SD card is not included with the controller.

9   Installation

9.1   Mounting
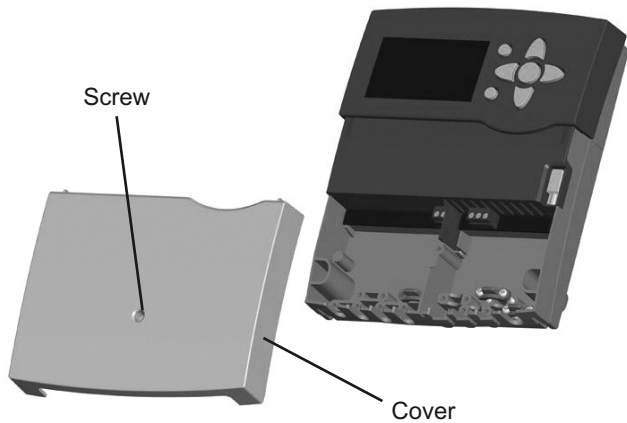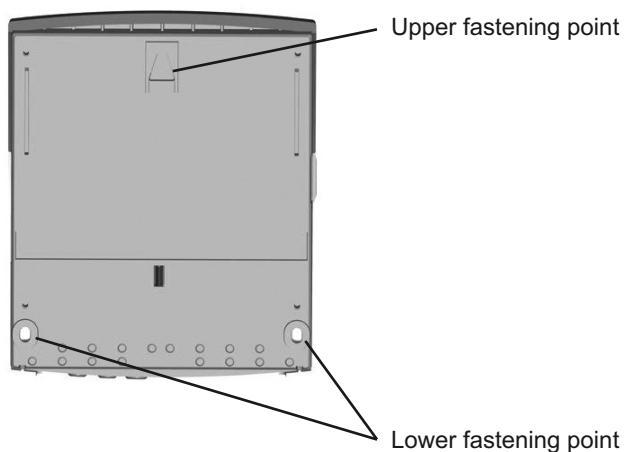
The HEXflo controller is already integrated in the module. If the controller is to be installed remotely to the HEXflo unit, please use the following instructions.

The controller must additionally be supplied from a double pole switch with contact gap of at least 3mm. Please pay attention to separate routing of sensor cables and mains cables.

Fig. 2

Screw

Cover

⚡ **Danger of 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

Fig. 3

Upper fastening point

Lower fastening point

- 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. 9.2

- Put the cover on the housing

- Attach with the fastening screw

ℹ️ **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 during installation or during operation.

9.2   Electrical connection

> **Warning**
> **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 external loads such as pumps, valves, etc. can be connected:

Relays 1 ... 4 are semiconductor relays, designed for pump speed control:
Conductor R1 ... R4
Neutral conductor N (common terminal block)
Protective earth conductor PE (common terminal block)

> **Note**
> Connecting the device to the power supply must always be the last step of the installation!
>
> The minimum pump speed must be set to 100% when non-speed-controlled devices such as valves are connected.
>
> The cables of the controller are pre-connected section 10.2 is for information purposes only. Make sure the hydraulic system is properly grounded!

> **See**
> For more details about the initial commissioning procedure, see page 29.

Fig. 4
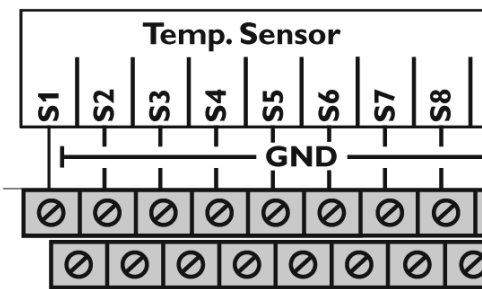
Fig. 5
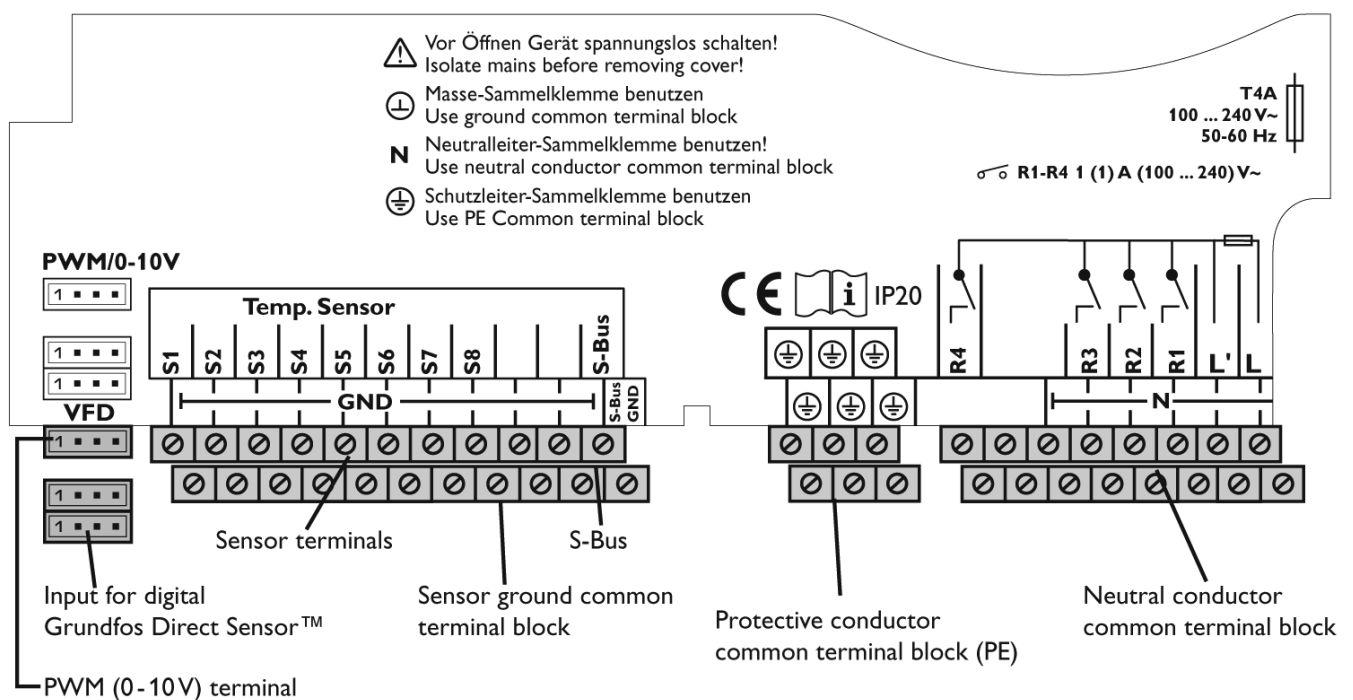
Fig. 6
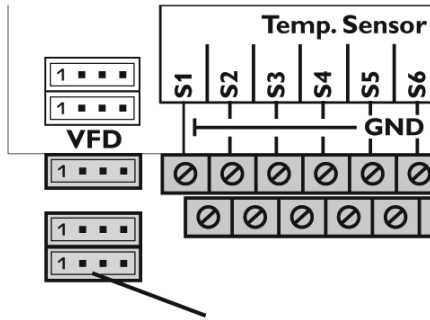
Connect the **digital Grundfos Direct Sensor**™ **VFD 2-40 l Fast** to the input marked VFD.

Fig. 7

Mains and sensor cables are already connected to the device. **Additional temperature sensors (S3 to S8)** can be connected to the terminals S3 ... S8 and GND (either polarity).
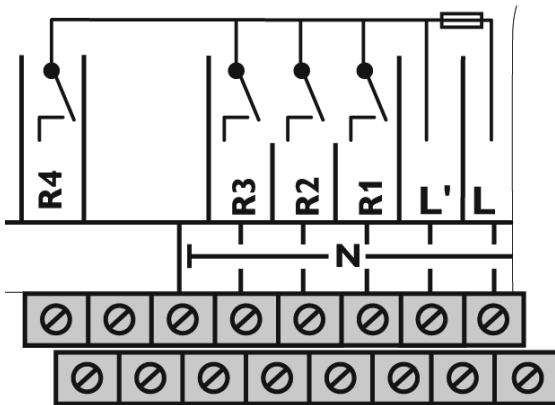
> **i** **Note**
> When Grundfos Direct Sensors™ are used, the sensor ground common terminal block must be connected to PE.

> ⚡ **Danger of electric shock**
> L' is a fused contact permanently carrying voltage.
>
> • **Always disconnect the controller from power supply before opening the housing.**

The controller is supplied with power via a mains cable. The power supply of the device must be 100 ... 240 V~ (50 ... 60 Hz).
The mains connection is at the terminals:
Neutral conductor N
Conductor L
Conductor L' (L' is not connected with the mains cable. L' is a fused contact permanently carrying voltage)
Protective earth conductor PE (common terminal block)

10   Commissioning

10.1   Step-by-step parameter menu

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, 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.

See
For navigating in the commissioning menu, see page 35.

a. Running the commissioning menu
The commissioning menu is run after the first connection and after every reset. 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.

See
For further information about the commissioning menu see page 35.

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.

See
For further information about the main functions see page 40.

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.

See
For further information about the additional functions see page 39.

10.1.1   Overview of relay and sensor allocation

Fig. 8

HEXflo without circulation

primary side   secondary side

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
VFD	Cold water sensor	T-CW
VFD	Flow rate sensor	Flow rate

Fig. 9

HEXflo with circulation

primary side   secondary side
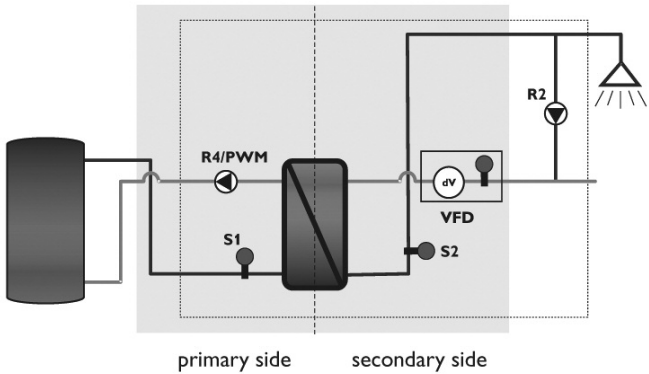
Relay / sensor allocation		
Terminal	**Description**	**Display screens**
R4+PWM	Primary pump	R4
R2	Circulation pump	R2
S1	Store flow sensor	T-store flow
S2	Hot water flow sensor	T-HW
VFD	Cold water sensor	T-CW
VFD	Flow rate sensor	Flow rate

10.2   Operation and function

Fig. 10
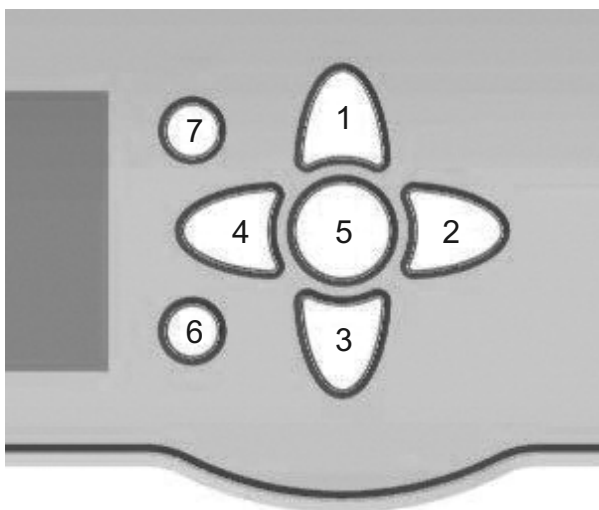
10.2.1   Buttons

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

10.2.2 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 ⓵ and ⓷ or buttons ⓶ and ⓸

- To open a sub-menu or to confirm a value, press button ⓹

- To enter the status menu, press button ⓺ – unconfirmed adjustment will not be saved

- To switch one menu level upwards, press button ⓻ – 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.

Fig. 11

```
Hot water
────────────────────
▶ T-store flow
   S1        52 °C》
   T-HW
```

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

Fig. 12

```
Status: Meas. values
────────────────────
▶ ⊟ Sensors
   S1        52 °C》
   S2        50 °C》
```
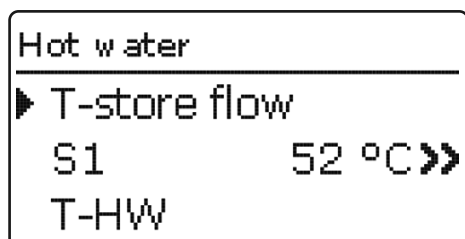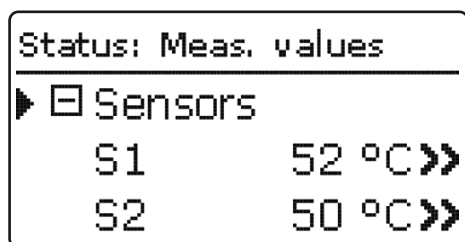
If the symbol ⊞ is shown in front of a menu item, pressing button ⓹ will open a new sub-menu. If it is already opened, a ⊟ is shown instead of the ⊞.

Fig. 13

Adjustment channel
Adjusted value (not yet confirmed)

```
T-AH on
────────────────────
       45 °C
>    ▼            ⟨
20    ▲ = 50    90
```

Minimum value   Current value saved   Maximum value
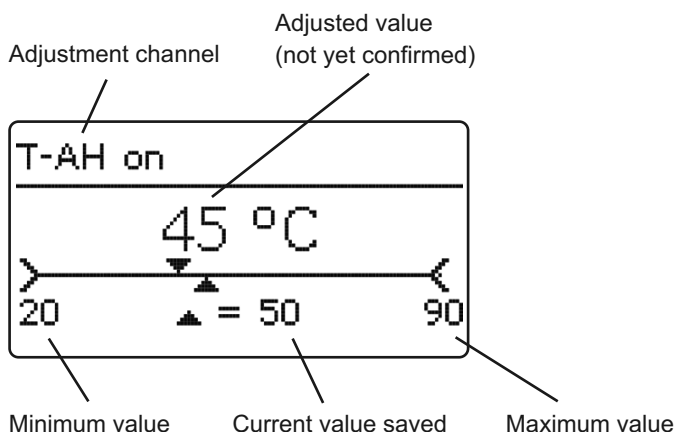
Values and adjustments can be changed in different ways:

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 ⓶ or ⓸ the upper slide bar can be moved to the left or to the right.

Only after the adjustment has been confirmed by pressing button ⓹ will the number below the slide bar indicate the new value. The new value will be saved if it is confirmed by pressing button ⓹ again. The display jumps back to the former menu level.

Fig. 14

```
T-HW set
        50 °C
........>‑<........
 45      ▲ = 50    60
```

Minimum value — Maximum value

Inactive area   Active area
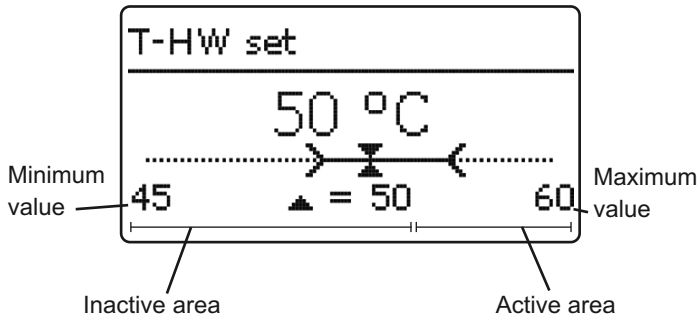
When two values are locked against each other, they will display a reduced adjustment range depending on the adjustment of the respective other value.
In this case, the active area of the slide bar is shortened, the inactive area is indicated as a dotted line. The indication of the minimum and maximum values will adapt to the reduction.

Fig. 15

```
        AH
▶ ◉ Relative
  ○ Absolute
  ○ Off
```
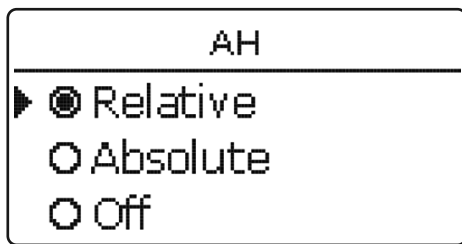
If only one item of several can be selected, they will be indicated with "radio buttons". When one item has been selected, the radio button in front of it is filled. The selection will be saved if it is confirmed by pressing button ⑤ again. The display jumps back to the former menu level.

Fig. 16

```
Hot water
▶ ⊠ Emergency op.
    Emerge... 12.0%
    T-HW      50 °C
```
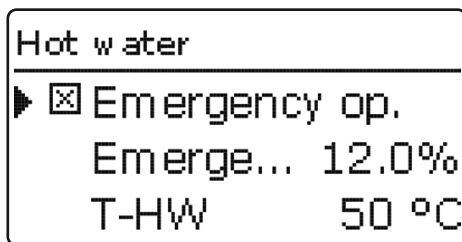
Some menu items are indicated with checkboxes. When an item has been selected, an x appears inside the checkbox.

Fig. 17

```
Timer: Monday
 00:00 03:00 06:00 09:00
 ▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐
 ▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐
 12:00 15:00 18:00 21:00
```
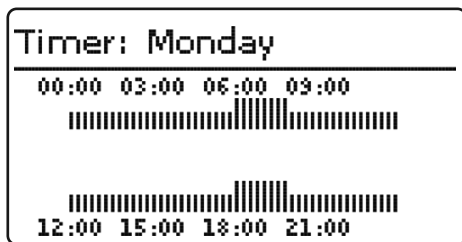
10.2.3   Adjusting the timer

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〈 .

Fig. 18

```
Days of the week
▶ All days
  ⊠ Monday
  ☐ Tuesday
```
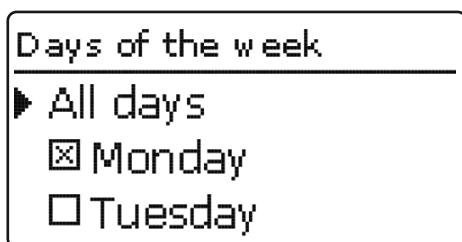
In order to adjust the timer, press button ⑤ . First the individual days of the week or all days of the week can be selected.

Fig. 19

```
┌─────────────────────────────┐
│ Days of the week            │
│  ⊠ Saturday                 │
│  ⊠ Sunday                   │
│ ▶ Continue                  │
└─────────────────────────────┘
```
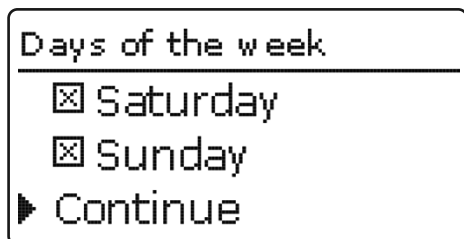
The last menu item after the list of days is **Continue**. If Continue is selected, the **Edit timer** menu opens, in which the time frames can be adjusted.

Fig. 20

```
┌─────────────────────────────┐
│ Edit timer                  │
│ ───────────────────────     │
│ 00:00 03:00 06:00 09:00     │
│ ‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖         │
│      14:30                  │
│        ▼                    │
│ ‖‖‖‖‖‖‖‖‖:‖‖‖‖‖‖‖‖          │
│ 12:00 15:00 18:00 21:00     │
└─────────────────────────────┘
```

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⟨ .
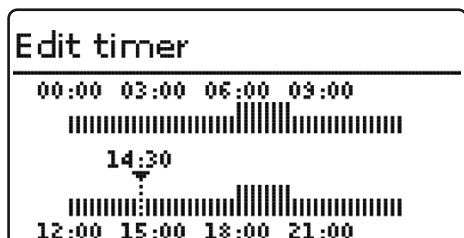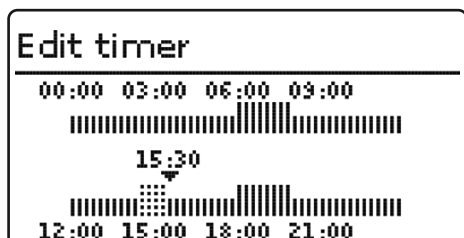
Fig. 21

```
┌─────────────────────────────┐
│ Edit timer                  │
│ ───────────────────────     │
│ 00:00 03:00 06:00 09:00     │
│ ‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖         │
│      15:30                  │
│        ▼                    │
│ ‖‖‖‖‖‖‖:::‖‖‖‖‖‖‖            │
│ 12:00 15:00 18:00 21:00     │
└─────────────────────────────┘
```

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

Fig. 22

```
┌─────────────────────────────┐
│ Edit timer                  │
│ ───────────────────────     │
│ 00:00 03:00 06:00 09:00     │
│ ‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖         │
│      15:30                  │
│        ▼                    │
│ ‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖            │
│ 12:00 15:00 18:00 21:00     │
└─────────────────────────────┘
```
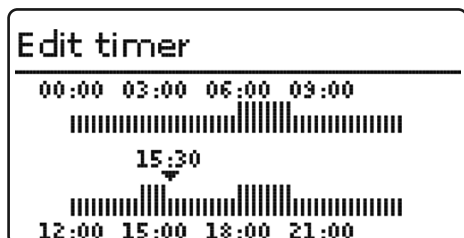
- The end of a time frame can be determined by pressing button ⑤ .

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

Fig. 23
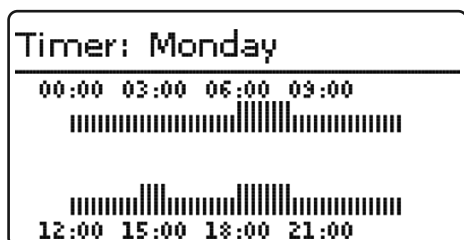
```
┌─────────────────────────────┐
│ Timer: Monday               │
│ ───────────────────────     │
│ 00:00 03:00 06:00 09:00     │
│ ‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖         │
│                             │
│                             │
│ ‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖            │
│ 12:00 15:00 18:00 21:00     │
└─────────────────────────────┘
```

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

Fig. 24

```
┌─────────────────────────────┐
│ Edit timer                  │
│ ───────────────────────     │
│ 00:00 03:00 06:00 09:00     │
│ ‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖         │
│      13:00                  │
│        ▼                    │
│ ‖‖‖‖‖‖‖‖‖‖‖‖‖:‖‖‖            │
│ 12:00 15:00 18:00 21:00     │
└─────────────────────────────┘
```
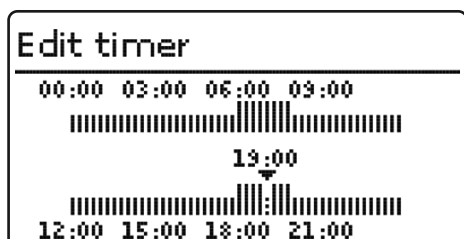
Removing a time frame:

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⟩ .
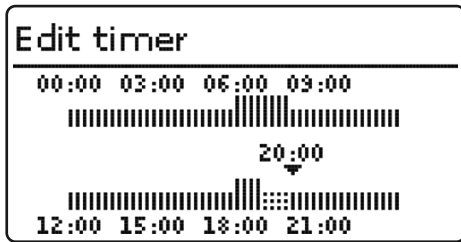
Fig. 25

```
┌─────────────────────────────────────┐
│ Edit timer                          │
│ ─────────────────────────────────── │
│  00:00  03:00  06:00  09:00         │
│  ▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌       │
│                    20:00            │
│                     ▼               │
│  ▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌░░░░▌▌▌▌▌▌▌▌      │
│  12:00  15:00  18:00  21:00         │
└─────────────────────────────────────┘
```

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

Fig. 26

```
┌─────────────────────────────────────┐
│ Edit timer                          │
│ ─────────────────────────────────── │
│  00:00  03:00  06:00  09:00         │
│  ▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌       │
│                    20:00            │
│                     ▼               │
│  ▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌        │
│  12:00  15:00  18:00  21:00         │
└─────────────────────────────────────┘
```
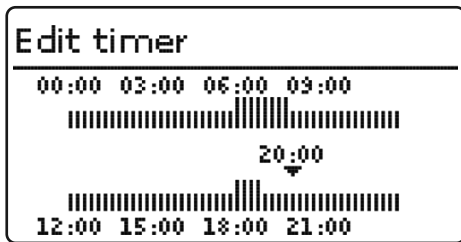
• In order to conclude removing the time frame, press button ⑤ upon reaching the desired ending point.

Fig. 27

```
┌─────────────────────────────────────┐
│ Timer: Monday                       │
│ ─────────────────────────────────── │
│  00:00  03:00  06:00  09:00         │
│  ▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌        │
│                                     │
│  ▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌▌        │
│  12:00  15:00  18:00  21:00         │
└─────────────────────────────────────┘
```
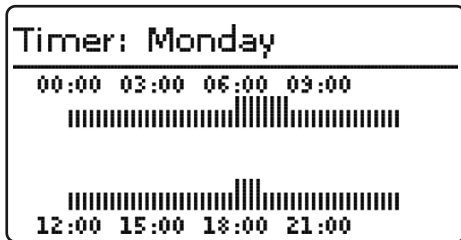
• In order to get back to the overview of current adjustments, press button ⑤ again.

10.2.4   Menu structure

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

Circulation
Circ . mode
Circ. flow rate
T-circ set
Timer

Afterheating
AH

Additional functions
Fct. block 1
Fct. block 2
Error relay
Stratified return

Basic settings
Language
Auto DST
Date
Time
T-display standby
Factory setting

Hot water
Emergency operation
T-HW set
Set min
Set max
ΔTmax
HX start
T-HW set sliding
HP (heat pump)
Blocking protection

Disinfection
Manual start
T-disinf set
Disinf duration
Disinf day
Disinf time
Preheating
Δt circ
Overrun time
Flushing

Status
Meas./Balance values
Hot water
Circulation
Afterheating
Disinfection
Function block 1
Function block 2
Stratified return
Error relay
Messages
Service
back

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.

10.3   Commissioning menu

Fig. 28
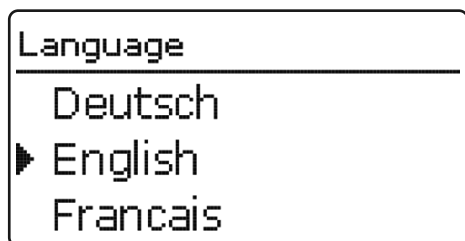
The commissioning menu consists of the channels described here. They can be entered and adjusted line by line.

1. Language:
• Adjust the desired menu language.

Fig. 29
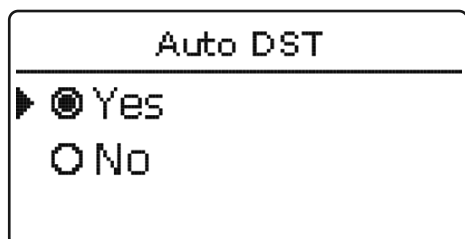
2. Daylight savings time adjustment:
• Activate or deactivate the automatical daylight savings time adjustment.

Fig. 30

```
┌─────────────────────────────┐
│ Time                        │
│ ──────────────────────────  │
│                             │
│        12:01                │
│           ▲                 │
│                             │
└─────────────────────────────┘
```

Fig. 31

```
┌─────────────────────────────┐
│ Date                        │
│ ──────────────────────────  │
│                             │
│      ??.??.2012             │
│             ▲               │
│                             │
└─────────────────────────────┘
```

Fig. 32

```
┌─────────────────────────────┐
│ Circulation                 │
│ ──────────────────────────  │
│ ▶            Therm + Off     │
│ Circ. flow rate      ---     │
│ Offset            Start      │
└─────────────────────────────┘
```

Fig. 33

```
┌─────────────────────────────┐
│ Afterheating                │
│ ──────────────────────────  │
│ ▶ AH          Relative       │
│ Relay              R1        │
│ Sensor selection  S3         │
└─────────────────────────────┘
```

Fig. 34

```
┌─────────────────────────────┐
│      Disinfection           │
│ ──────────────────────────  │
│ ▶ ◉ Yes                     │
│   ○ No                      │
│                             │
└─────────────────────────────┘
```

Fig. 35

```
┌─────────────────────────────┐
│        Save                 │
│ ──────────────────────────  │
│ ▶ ◉ Yes                     │
│   ○ No                      │
│                             │
└─────────────────────────────┘
```
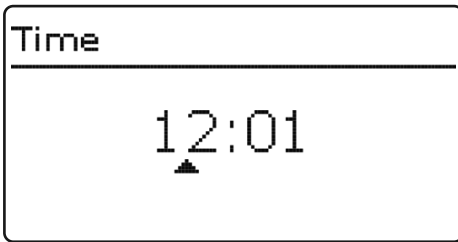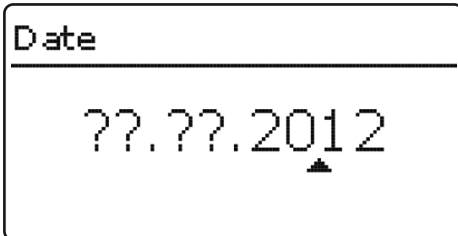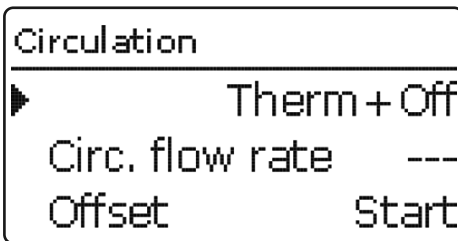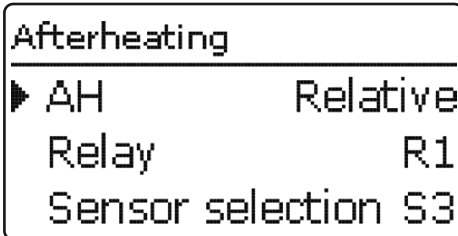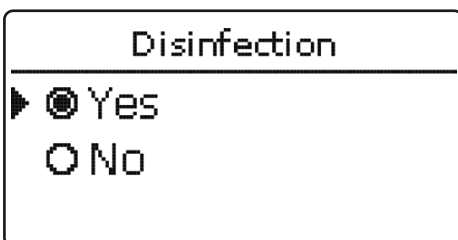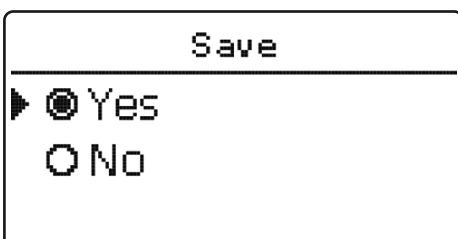
3. Time:
- Adjust the clock time. First of all adjust the hours, then the minutes.

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.

- Run an automatic offset to detect the maximum flow rate of the circulation pump.

See
For detailed information see page 44.

6. Afterheating:
- Activate the store afterheating. Adjust the afterheating mode, the reference sensor and the relay that is to be switched.

See
For detailed information see page 47.

7. Thermal disinfection:
- Activate the thermal disinfection. More adjustments for this function can be made when the commissioning menu has been completed.

See
For detailed information see page 48.

Note
In order to use the thermal disinfection function, the circulation and afterheating functions have 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.

11 Adjustments

11.1 Main menu

Fig. 36

```
Main menu
▶ Status
  Hot water
  Circulation
```
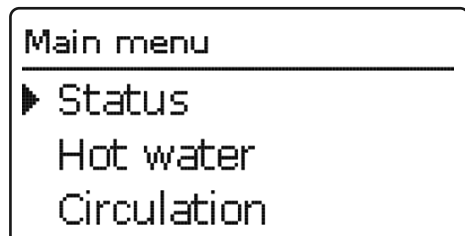
In this menu, the different menu areas can be selected.

The following menus are available:

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

> **ℹ Note**
>
> If no button is pressed for the adjustable time **T-display standby**, 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 .

11.2 Status menu

Fig. 37

```
Main menu
▶ Status
  Hot water
  Circulation
```
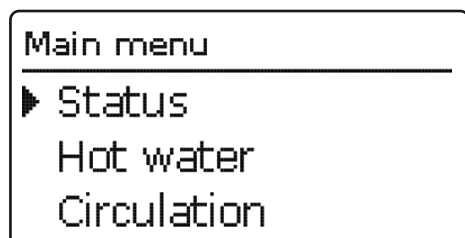
In the **Status** menu of the controller, the status messages for every menu area can be found.

Fig. 38

```
Status
▶ Meas. / Balance v...
  Hot water
  Circulation
```
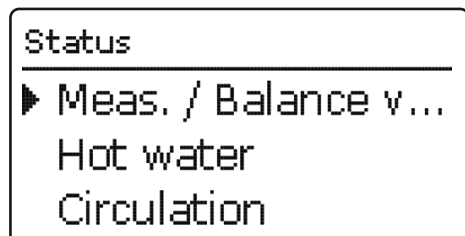
11.2.1 Meas. / Balance values

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.

Fig. 39

```
Status: Meas. values
▶    Main functions
  Hot water        ≫
  Circulation      ≫
```
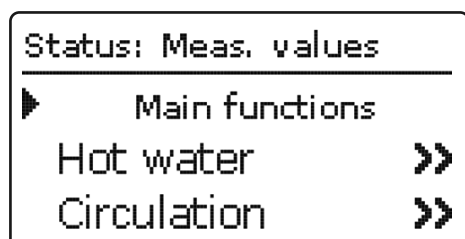
All measured values for the main and additional functions, the allocation of sensors and relays as well as the operating hours counter are displayed.

Fig. 40

```
Hot water
  T-HW
▶ S2          50 °C》
  T-cold water
```
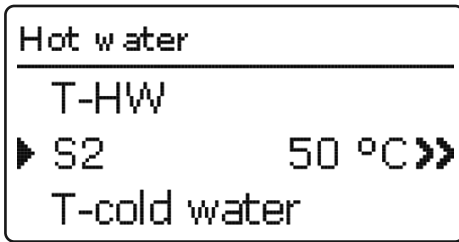
If, for example, **Hot water** is selected, a sub-menu with the sensors and relays allocated to the system will open. In the sub-menu, the current temperatures and the current pump speed are indicated.

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

Fig. 41

```
VFD dV
▶ Chart         》
  Minimum  3.0 l/min
  Maximum 24.2l/min
```
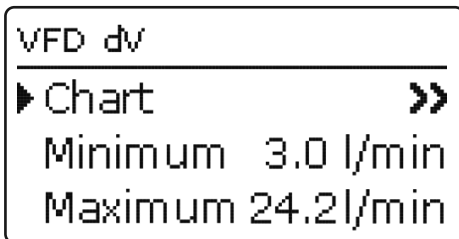
If, for example, **VFD** is selected, a sub-menu indicating the minimum and maximum values will open. When the item **Chart** is selected, a progression chart appears.

Fig. 42

```
     VFD [°C]
60

 0
       12
```
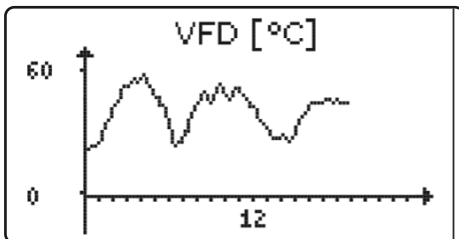
The progression chart shows the development of the temperature at the corresponding sensor over the last 24 hours. Press buttons 〉2〉 and 〈4〈 to switch back and forth between a chart of the current day and one of the day before.

Fig. 43

```
Hot water
▶ HW heating  Active
  T-HW set     60 °C
  HX mode       Cold
```
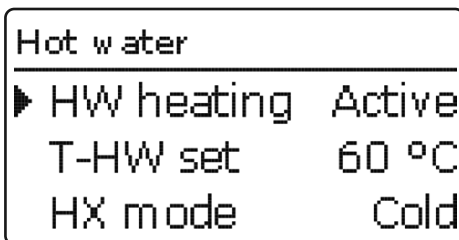
11.2.2   Hot water

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

Fig. 44

```
Circulation
▶ Circulation Inactive
  Remaining runtime
  Remaining off-time
```
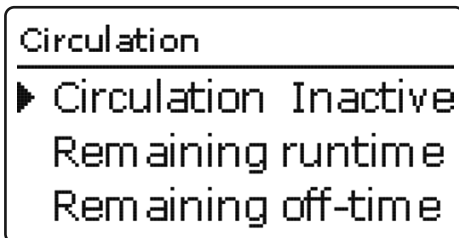
11.2.3   Circulation

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.

Fig. 45

```
Afterheating
▶ AH         Inactive
  AH mode    Relative
  back
```
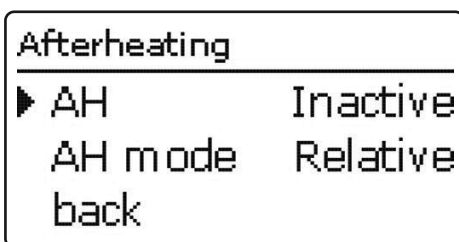
11.2.4   Afterheating

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

Fig. 46

```
Disinfection
────────────────────
▶ Therm disinf Active
  Disinfection phase
              Start ≫
```

Fig. 47

```
Status: stratified return
────────────────────
▶ Stratified ...Inactive
  back
```

Fig. 48

```
Status: Messages
────────────────────
▶ Offset failure
  Version      1.01
  back
```

Fig. 49

```
Service
────────────────────
▶ S1           ≫
  S2           ≫
  S3           ≫
```
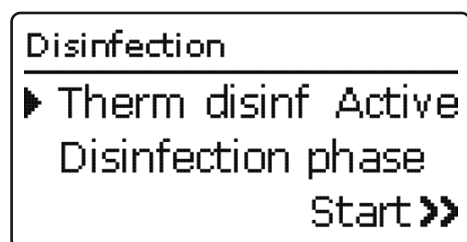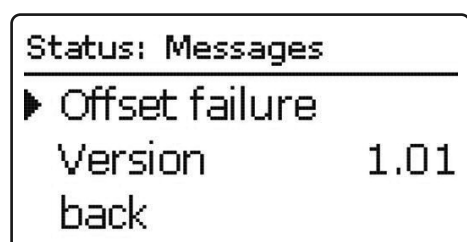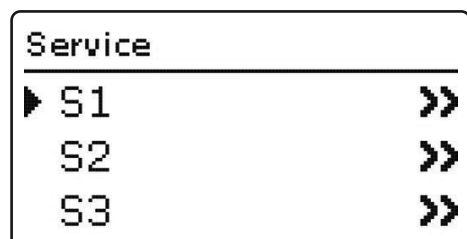
11.2.5   Disinfection

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.

11.2.6   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.

11.2.7   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.

11.2.8   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.

11.3   Main functions
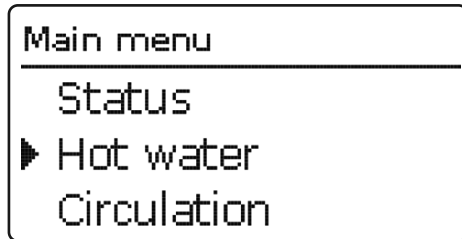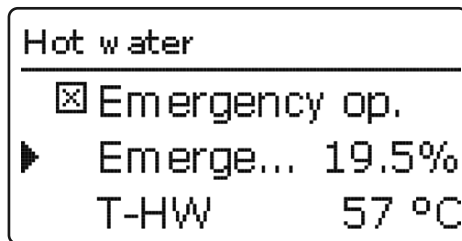
11.3.1   Hot water

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

Fig. 50

```
Main menu
  Status
▶ Hot water
  Circulation
```

- 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

Fig. 51

```
Hot water
  ⊠ Emergency op.
▶   Emerge... 19.5%
    T-HW     57 °C
```

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.

> **i** **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.

Main menu / Hot water / Emergency op.

Adjustment channel	Description	Adjustment range / selection	Factory setting
Emergency operation	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			

Fig. 52

```
T-HW set
       55 °C
··············>·····▼·····◁·····
45      ▲ = 60       60
```
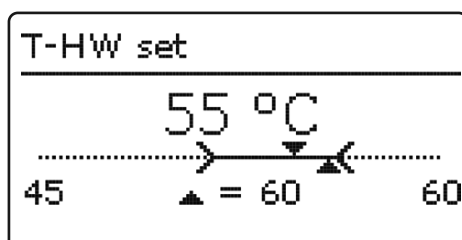
Hot water set temperature (T-HW set)

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

Fig. 53
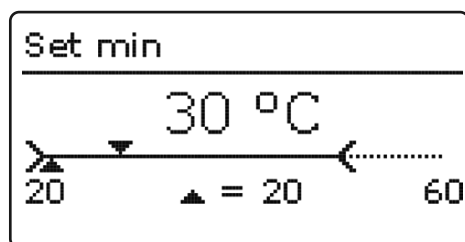
Minimum hot water set temperature

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

ℹ️ **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

Fig. 54
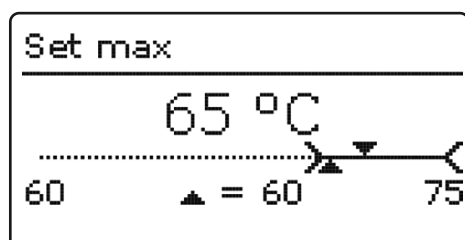
Maximum hot water set temperature

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

ℹ️ **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

Fig. 55
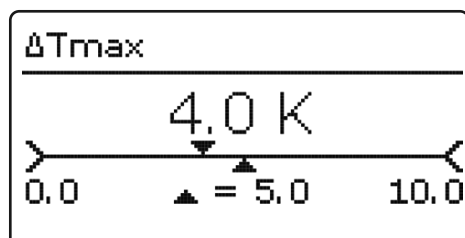
Maximum limitation for exceedance of the hot water set temperature (T-HW set)

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

ℹ️ **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
Δ**Tmax**, 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 .

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

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

Fig. 56

```
┌─────────────────────────────┐
│ HX start                    │
│─────────────────────────────│
│ ▶ HX mode          Cold     │
│   Cold start       120 s    │
│   ΔT cold start    -5 K     │
└─────────────────────────────┘
```

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.

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 Δ**T 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.

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...600s	120s
ΔT cold start	Cold start temperature difference	-30...+30K	-5K
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...10K	2K
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			

Fig. 57

```
Sliding set value
━━━━━━━━━━━━━━━━━━
▶ T-HW set slidingYes
  ΔT sliding      5.0 K
  back
```

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 thermal store contents and thus destroy the thermal store stratification.

If the thermal store flow temperature falls below the limit value **T-HW set + 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 (see. page 42) 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 sliding	Activation of the function	Yes, No	No
ΔT Sliding	Temperature difference	2.0...20.0K	5.0K
Back			

Fig. 58

```
HP
━━━━━━━━━━━━━━━━━━
  HP            Yes
▶ T-HP opt    42 °C
  Speed HP    100%
```

Heat pump mode

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

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	Thermal store mixing pump speed	30...100%	100%

Fig. 59

```
Hot water
  HP              »
▶ ⊠ Blocking protec...
  back
```
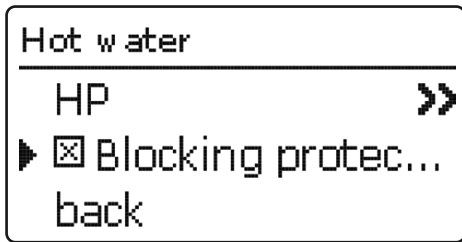
Blocking protection

The **Blocking protection** function can be used for protecting the pumps against seizure 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.

Main menu / Hot water / Blocking protection

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

11.3.2   Circulation

Fig. 60

```
Main menu
  Hot water
▶ Circulation
  Afterheating
```
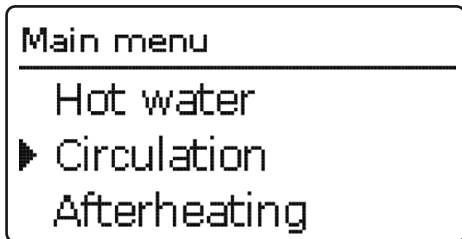
The **Circulation** function can be used for controlling a circulation pump. For the circulation to function correctly, it is necessary to detect the flow rate in the circulation pipe, when the circulation pump is active, by means of an automatic offset.

Circulation flow rate

An active circulation will be stopped if the VFD detects a flow rate higher than the **Circ. flow rate** value. The automatic circulation flow rate detection is done by means of an offset. The flow rate is measured at the VFD while the circulation pump is being run at 100 % speed for 60 s. The 60 s will be indicated counting backwards. When the countdown has been completed, the flow rate will be saved and indicated as Circ. flow rate. From that moment on, the value will be used as a limit value for the detection of a draw-off when the circulation pump is active. When the draw-off flow rate exceeds the reference value Circ. flow rate while the circulation pump is active, the controller detects a draw-off and switches off the circulation pump.

Running an automatic offset:

> **i** **Note**
> During the offset (60s), no draw-off must be performed.
> All ball valves of the station must be fully open (normal position).
> The offset has to be made only once during commissioning.

•   In order to run an automatic offset, select the menu item **Start offset** in **Main menu / Circulation / Circ. flow rate.**

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

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

Fig. 61

secondary side
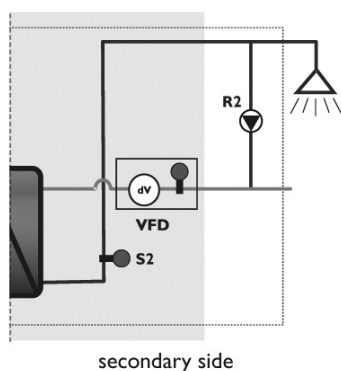
Circulation modes:

- **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:

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

> **i Note**
> The circulation function must be activated in order to use the thermal disinfection function.

Circulation set temperature
After the circulation has been activated, **T-circ set** must be adjusted. When both circulation and the circulation pump are active, the controller aims to control the pump speed such that the temperature at the HW flow sensor S2 reaches the T-circ set value.

> **i Note**
> The set value **T-circ set** is blocked against the hot water set temperature **T-HW set.**
> T-circ set cannot be adjusted higher than T-HW set.
> If T-HW set is reduced down to T-circ set, the controller will decrease both set values in the case of a further reduction.

Permanent
The circulation pump is permanently active. When a draw-off flow rate higher than Circ. flow rate is detected at the VFD while the circulation is active, the circulation pump is switched off.

Thermostatic
When the **T-CW** temperature at the VFD 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-circ set.**

When the T-CW temperature at the VFD exceeds the adjusted value T-circ therm by the non-adjustable hysteresis of +2 K, the circulation pump is switched off.

When a draw-off flow rate higher than Circ. flow rate is detected at the VFD during an active circulation, the circulation pump is switched off.

> **i Note**
> **T-circ set** and **T-HW set** are blocked against **T-circ therm** when the circulation mode Thermal is activated. Both set values can only be decreased down to a minimum limit which calculates as follows:
> **T-circ therm + 2 K + ΔT circ** (see page 46).

Demand

A draw-off that takes less than 2s is 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.**

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 flow rate higher than Circ. flow rate is detected at the VFD while the circulation is active, the circulation pump is switched off.

If the draw-off flow rate measured falls below Circ. flow rate within 2 s, the circulation pump is activated again. If Circ. flow rate is exceeded for more than 2 s, the circulation pump remains deactivated.switched off.

ΔT circ–circulation pipe temperature loss

The ΔT 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 VFD sensor (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.

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

During thermal disinfection, the circulation set temperature T-circ set for the HW flow sensor is blocked against decrease by ΔT circ in order to ensure that the switch-off temperature T-circ therm + 2 K can be reached at the VFD.

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 VFD.

> **i 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

Fig. 62

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
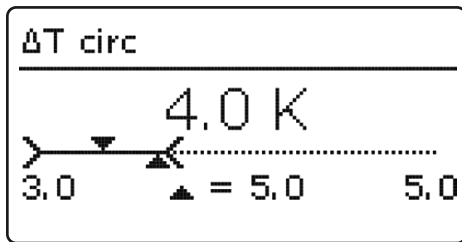
Main menu / Circulation

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
Circ. flow rate	Sub-menu Circ. flow rate	-	-
Circ. flow rate	Indication of the flow rate measured during the last offset	Indication range: 0 ... 40 l/min	-
last	Date of the last offset	Indication DD.MM.YYYY	-
Offset	Start / Abort offset	Start, Abort	Abort
Back			
T-circ set	Circulation set temperature	25 ... 75 °C	45 °C
T-circ therm	Temperature for the thermal circulation	5 ... 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			

Fig. 63

```
Main menu
  Circulation
▶ Afterheating
  Disinfection
```

11.3.3   Afterheating

The **Afterheating** function can be used to reheat the upper thermal 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.

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 thermal store is then heated up to an absolute thermal store set temperature
calculated from the adjustable temperature difference Δ**T absolute.** When the thermal 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 thermal store is then heated up to a thermal store set temperature which is by the adjustable temperature difference ∆**T relative** higher than the switch-on temperature mentioned above. Afterwards, the afterheating is deactivated and the allocated relay is switched off.

i	**Note**
	The afterheating function must be activated in order to use the thermal disinfection function.

Fig. 64

Main menu
  Afterheating
▶ Disinfection
  Additonal functions
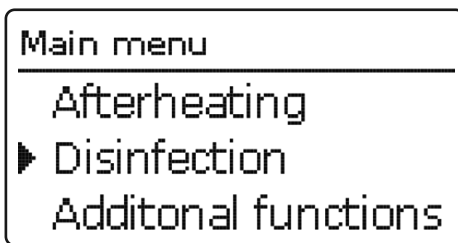
11.3.4   Disinfection

This function helps to contain 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.

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 thermal store afterheating	Yes, No	No
Δt circ	Time constant of the circulation pipe	60...900s	300s
Overrun time	Overrun time for both pumps	60...600s	60s
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 dependant	System dependant
Flushing time	Indication of the flushing time	-	Correlates with the overrun time
Back			
Back			

Fig. 65

secondary side

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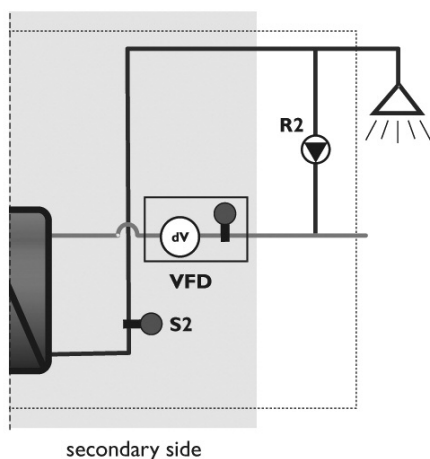
1. Thermal store preheating
2. Primary pump speed control to reach disinfection temperature
3. Thermal store afterheating, if necessary
4. Stabilisation and heating-up of the circulation pipe
5. Disinfection of the circulation pipe
6. Overrun

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 thermal store temperature is detected during thermal disinfection (see page 48).

When the preheating option is activated, the thermal disinfection will start automatically 30 minutes before the adjusted **Disinf time** with thermal store afterheating. When the thermal disinfection function is started manually, it will also begin with thermal store afterheating. For thermal 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 thermal 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 VFD in the circulation return is monitored. The circulation pump is activated during this process. If the temperature measured at the VFD 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 Δ**T circ** is taken into account in order to compensate the temperature loss of the circulation pipe between flow and return (page 45). 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.

Fig. 66

Time constant Δt circ per 10 m copper pipe depending on the flow rate and for different pipe diameters
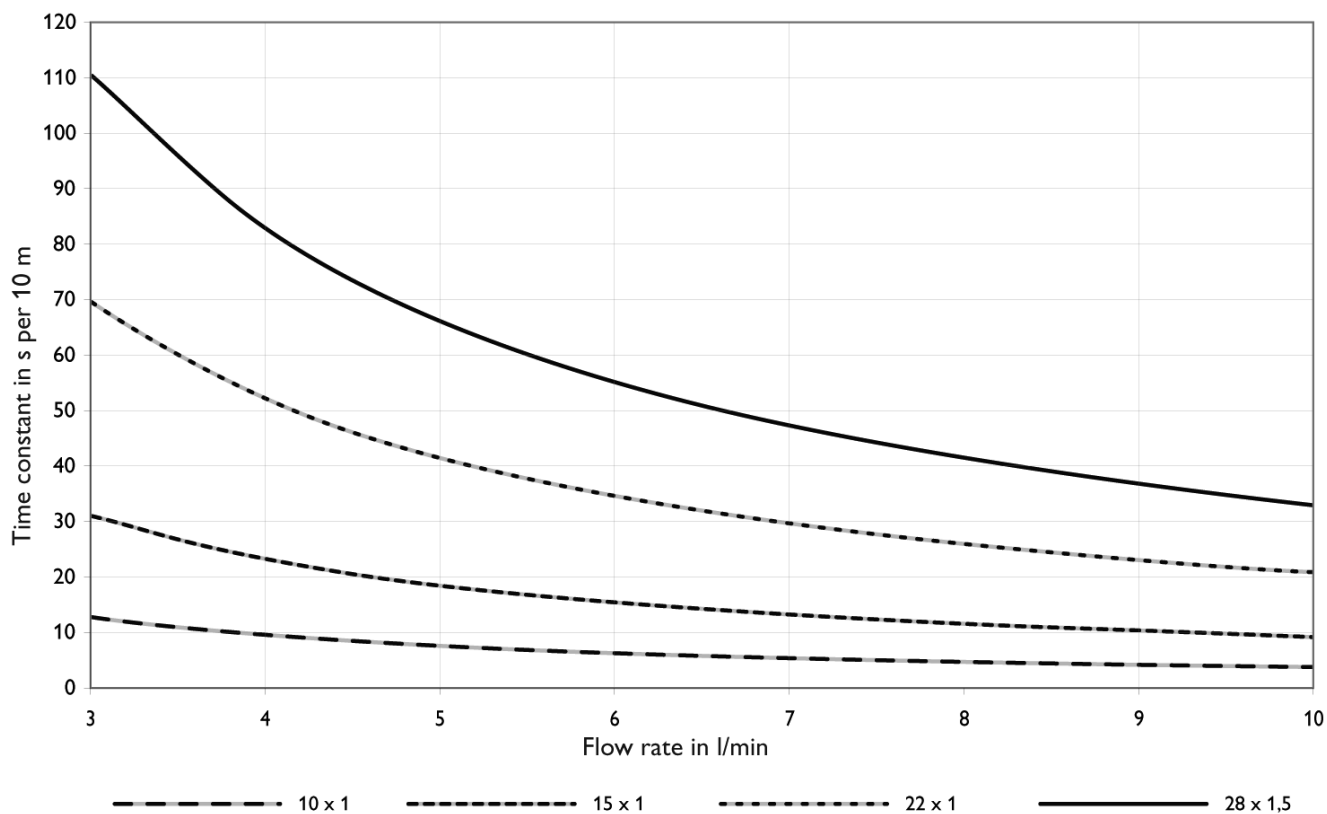
Fig. 67
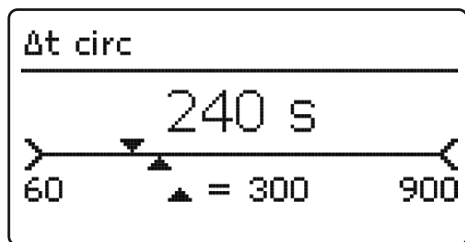
ΔT circ–circulation pipe time constant

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 VFD in the circulation return. 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 VFD. The Δt circ value determines the maximum waiting time. When the set value T-disinf set is not reached 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.

11.4   Additional functions

Fig. 68

```
Main menu
  Disinfection
▶ Additonal functions
  Basic settings
```

Fig. 69

```
Fct. block 1
  Fct. block 1      Yes
  Relay             R3
▶ ⊠ Thermostat a
```
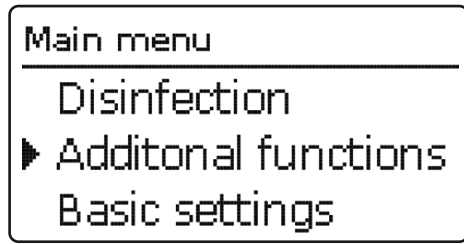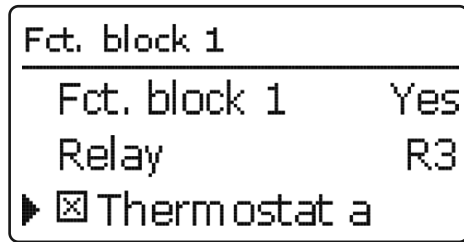
In this menu, additional functions can be selected and adjusted, as long as there are free relays available. The following additional functions are available:

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

ΔT function
The 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 10s. 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.

Fig. 70

Example:

Function	Function block 1		
Thermostat	Thermostat a- S3		
	Thermostat b- S4		
Differential function ΔT	ΔT	Sen. 3	
		Sen. 4	
Timer	Timer		
Relay	3		
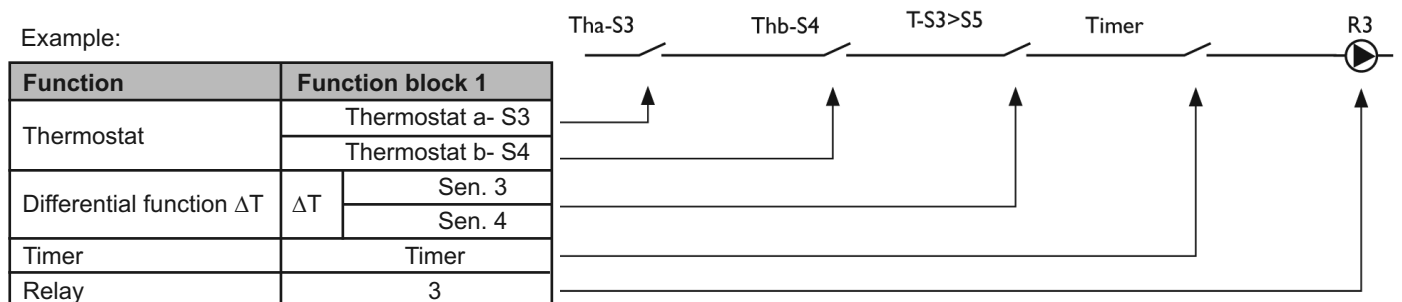
Main menu/Additional functions/Function block

Adjustment channel	Description	Adjustment range / selection	Factory setting
Function block 1	Activating the function block	Yes, No	No
Relay	Relay	System dependant	System dependant
Thermostat a	Thermostat a	Yes, No	No
Th-a on	Switch-on temperature Thermostat a	-40...+250°C	40°C
Th-a off	Switch-on temperature Thermostat a	-40...+250°C	45°C
Sensor	Sensor thermostat a	S1...S8	S5
Thermostat b	Thermostat b	Yes, No	No
Th-b on	Switch-on temperature Thermostat b	-40...+250°C	40°C
Th-b off	Switch-on temperature Thermostat b	-40...+250°C	45°C
Sensor	Sensor thermostat b	S1...S8	S5
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%
Sen. Source	Heat source sensor	S1...S8	S5
Sen. Sink	Heat sink sensor	S1...S8	S5
Rise	Rise (pump 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	-
Back			

Fig. 71


```
Error relay
───────────────────
▶ Error relay      Yes
  Relay            R3
  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 dependant	System dependant
Back			

Fig. 72

```
Stratified return
▶ Stratified return Yes
  Relay           R3
  ΔTon         5.0 K
```

Fig. 73

primary side   secondary side
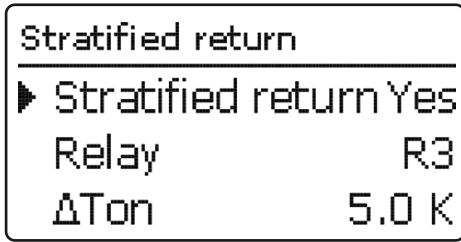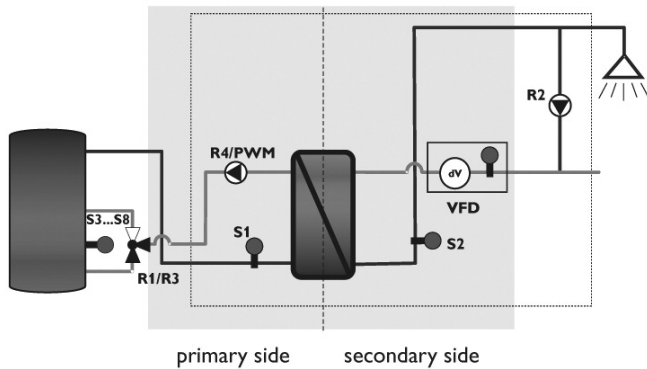
Stratified return

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

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

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

The stratified return function can be activated once. The corresponding relay can be allocated to either R1 or R3, as long as these relays are 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 dependant	System dependant
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
Store sensor	Thermal store sensor selection	System dependant	S5
Back			

11.5 Basic settings

Fig. 74

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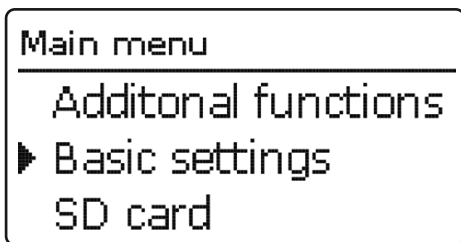
In the **Basic settings** menu, all basic parameters for the controller can be adjusted. Normally, these settings have been made during commissioning. They can be subsequently changed in this menu.

Basic settings

Adjustment channel	Description	Adjustment range / selection	Factory setting
Language	Selection of the menu language	Deutsch, English, Francais,	Deutsch
		Espanol, Italiano	
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			

11.6   SD card

Fig. 75

```
Main menu
  Basic settings
▶ SD card
  Manual mode
```
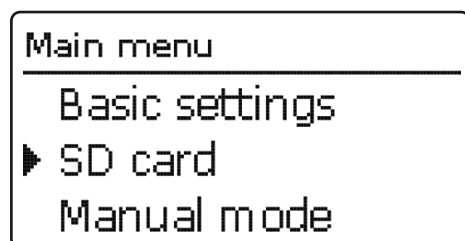
The controller is equipped with an SD card slot for SD memory cards.

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.

• Thermal 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.

> **i** **Note**
> The controller will only recognise a firmware update file if it is stored in a folder named "RQ" on the first level of the SD card.
>
> • Create a folder named "RQ" 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.

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

Storing controller adjustments
• To store the controller adjustments on 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.

> **i** **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	-	-

11.7   Manual mode

Fig. 76

```
Main menu
  SD card
▶ Manual mode
  User code
```

Fig. 77

```
        Relay 1
  ○ On
▶ ◉ Auto
  ○ Off
```
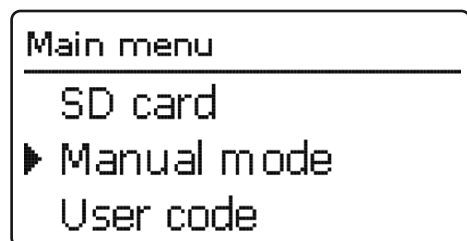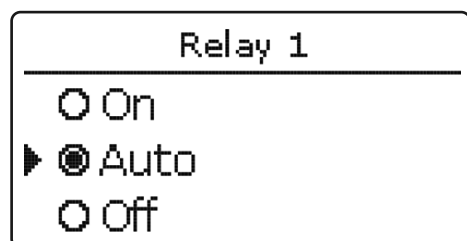
In the **Manual mode** menu, the operating mode of all relays in the controller and in modules connected can be adjusted.

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

In the 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 Off = Power supply 100%, flexible pump speed control via PWM output

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

> **i** **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 Emergency speed (R4 only)	Auto

11.8   User code

Fig. 78

```
Main menu
   Manual mode
 ▶ User code
   Inputs
```
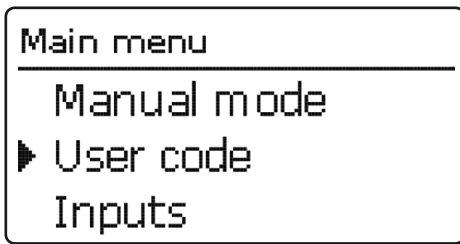
In the **User code** menu, a user code can be entered.

Fig. 79

```
User code


      0000
       ▲
```
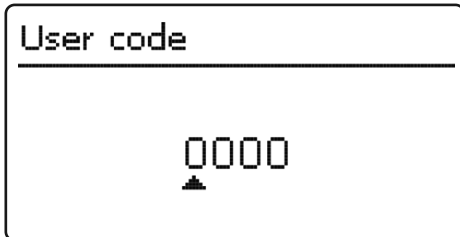
Each number of the 4-digit code must be individually adjusted and confirmed. After the last digit has been confirmed, the menu automatically jumps to the superior menu level.
To access the menu areas of the expert level, the expert user code must be entered:

Expert user code: 2962

| i | **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

11.9   Inputs

Fig. 80

```
Main menu
   Manual mode
   User code
 ▶ Inputs
```
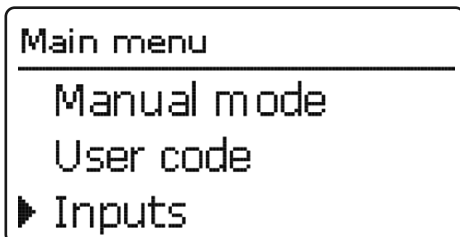
In the **Inputs** menu, sensor offsets can be adjusted.

Fig. 81

```
Inputs
 ▶ Offset S1      0.0 K
   Offset S2      0.0 K
   Offset S3      0.0 K
```
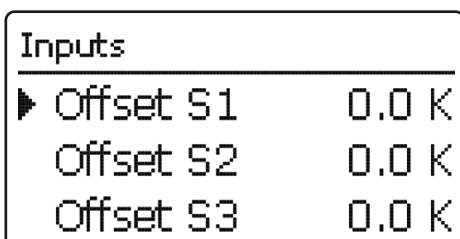
Inputs

Adjustment channel	Description	Adjustment range / selection	Factory setting
Offset S1...S8	Sensor offset	-15.0...+15.0 K	0.0 K

12   Data communication

12.1   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-BS6 Datalogger
- EM Extension module.

> ⚡ **Danger of electric shock**
> L' is a fused contact permanently carrying voltage.
>
> - **Always disconnect the controller from power supply before opening the housing!**

12.2   SD card slot

The controller is equipped with an SD card slot.

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

Fig. 82

- 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.

An SD card is not included with the controller.

13   Troubleshooting

13.1   Fuse holder

Fig. 83
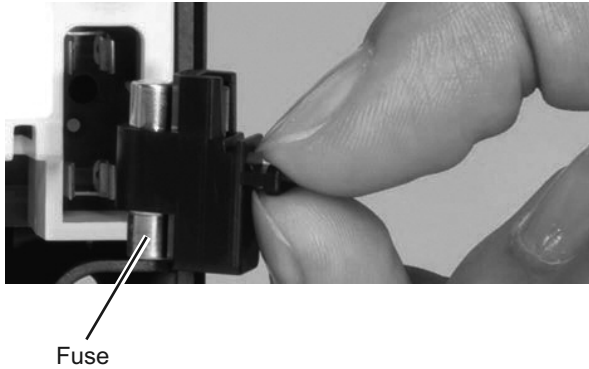
Fuse

⚠ **Danger of 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.

13.2   Directional pad flashes red

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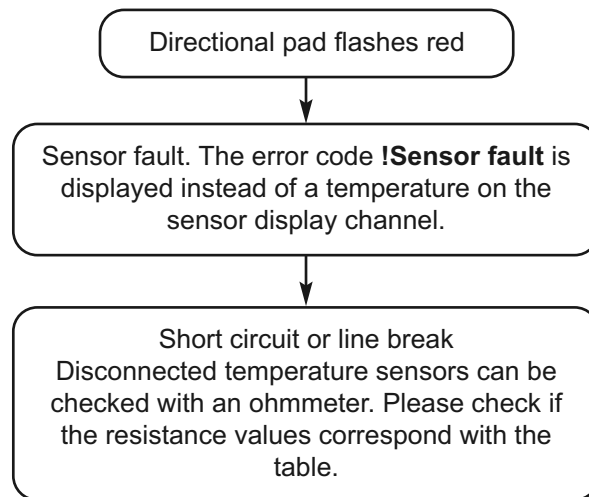
°C	°F	Ω Pt1000		°C	°F	Ω Pt1000
-10	14	961		55	131	1213
-5	23	980		60	140	1232
0	32	1000		65	149	1252
5	41	1019		70	158	1271
10	50	1039		75	167	1290
15	59	1058		80	176	1309
20	68	1078		85	185	1328
25	77	1097		90	194	1347
30	86	1117		95	203	1366
35	95	1136		100	212	1385
40	104	1155		105	221	1404
45	113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

13.3   The display is permanently off

```
┌─────────────────────────────────────┐
│    The display is permanently off    │
└─────────────────────────────────────┘
                   │
                   ▼
┌─────────────────────────────────────────┐
│   Press button ⑤ . Display illuminated?  │
└─────────────────────────────────────────┘
          │                      │
          ▼                      ▼
     ┌────────┐             ┌────────┐
     │   No   │             │  Yes   │
     └────────┘             └────────┘
          │                      │
          │                      ▼
          │        ┌─────────────────────────┐
          │        │   Controller has been in │
          │        │  standby, everything o.k.│
          │        └─────────────────────────┘
          ▼
┌─────────────────────────────────────────┐
│   Check the power supply of the controller. │
│            Is it disconnected?            │
└─────────────────────────────────────────┘
          │                      │
          ▼                      ▼
     ┌────────┐             ┌────────┐
     │   No   │             │  Yes   │
     └────────┘             └────────┘
          │                      │
          ▼                      ▼
┌──────────────────────┐  ┌──────────────────────┐
│ The fuse of the      │  │ Check the supply line │
│ controller could     │  │    and reconnect it.  │
│ be blown. The fuse   │  └──────────────────────┘
│ holder (which holds  │
│ the spare fuse)      │
│ becomes accessible   │
│ when the cover is    │
│ removed. The fuse can│
│ then be replaced.    │
└──────────────────────┘
```

14   Overview of Parameters

14.1   Key

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
$\Delta Tmax$	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	Thermal store flow temperature
T-HP opt	Optimum operating temperature of the heat pump
T-HW	Hot water flow temperature
T-HW set	Hot water set temperature
T-HW set sliding	Sliding adaptation of the hot water set temperature
T-circ set	Circulation set temperature
Flow	Flow
HP	Heat pump (function)
Circ. flow rate	Circulation flow rate

15 Spare Parts List

Fig. 84
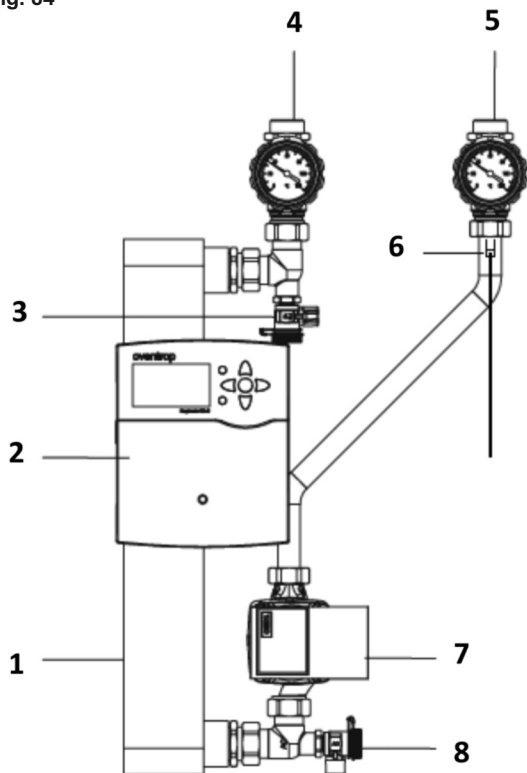
Primary Circuit Spares

Item Number	Part Number	Description
1	5142680	Plate Heat Exchanger
2	5142681	Controller
3 & 8	5142682	Drain Valve
4	5142683	Return Ball Valve
5	5142684	Supply Ball Valve
6	5142685	PT1000 Sensor
7	5142686	Primary Pump

Fig. 85
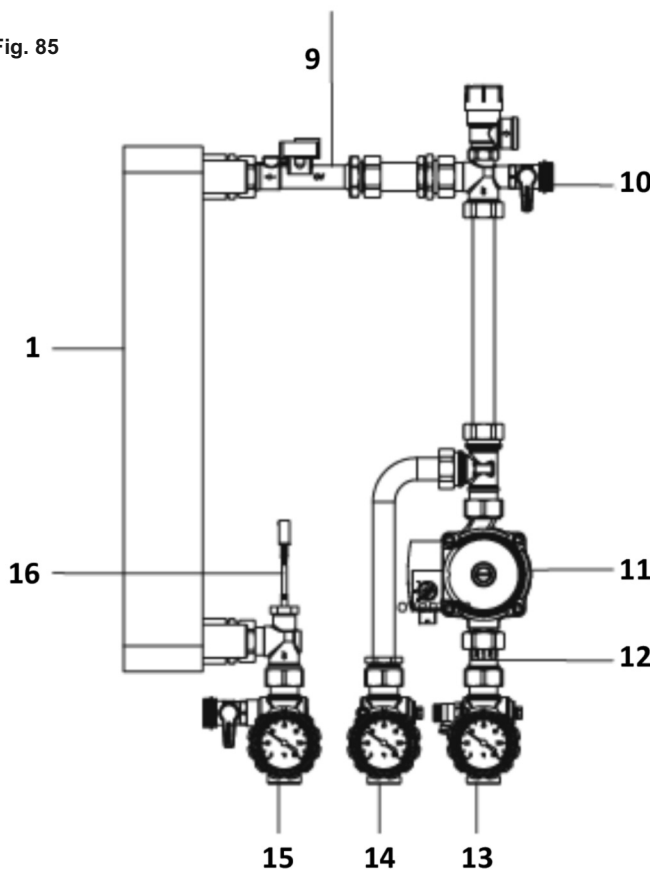
Secondary Circuit Spares

Item Number	Part Number	Description
9	5142687	Volume Flow Sensor
10	5142688	Drain Valve
11	5142689	Secondary Pump
12	5142690	Check Valve
13	5142691	HWS Return Ball Valve
14	5142692	Cold Water Inlet Ball Valve
15	5142693	HWS Supply Return Ball Valve
16	5142694	HWS Temperature Sensor

16   General Information

16.1   Information regarding installation and operating instructions

> ⚠️ **Warning**
> **Read installation and operating instructions in their entirety before installing the cascade control set!**
>
> **Installation, initial operation, service and maintenance must only be carried out by qualified tradesmen!**
>
> **The installation and operating instructions, as well as other valid documents must remain with the user of the system!**

These installation and operating instructions serve the installer to install the cascade control set "Regumaq K" professionally and to put it into operation.
It contains important information on using the system.
A fresh water cascade consists of several fresh water stations "Regumaq X-30-B" or "Regumaq XZ-30-B" and the cascade control set "Regumaq K".
The instructions apply for systems from 2 up to 4 fresh water stations.
On request up to 7 stations can be cascadable.
The operation of the electronic controller "Regtronic PQ" must be known before the initial operation of the fresh water station.
You can obtain further information on the fresh water station and its control in the corresponding operating instructions and at www.oventrop.com.

Other valid documents – manuals of all system components as well as valid technical rules – must be observed:

- Installation and operating instructions fresh water station "Regumaq"
- Technical data sheets for fresh water stations "Regumaq X-30B" and "Regumaq XZ-30-B"
- DVGW work sheets W551 and W553
- Decree for Potable Water DIN 1988 or EN 806
- DIN VDE 0100

If applicable, additional standards, regulations and safety directives depending on the type of building and the type of energy supply, must be observed.

16.2   Keeping of documents

These installation and operating instructions should be kept by the user of the system.

16.3   Copyright

The installation and operating instructions are copyrighted.

17   What's in the Box

17.1   Contents

Contents cascade control set "Regumaq KX":
(X = number of HEXflo units)

Number	Item Number	Component	Marking on Plug
1	138108X11	Actuator „Master"	Master
X - 1	13810826..	Actuator „Slave"	Bus
X	138108214	Ball valve	
X	138108222	Bus connection cable	Bus
1	138108223	Distribution box	Diverse
X	138108224	T distributor	
1	138108231	Transformer	24 V / 5 V
1	13810843	Flow sensor	VFS
1	138108280	Installation and operating instructions	

18   Technical Data

18.1   Performance data complete system

Max. operating pressure: Safety valve in the domestic hot water circuit:	PN 10 10 bar
Max. operating temperature: (heating water - supply)	95 ˚C
Min. cold water pressure:	2.5 bar
Possible domestic hot water temperature: (control range)	20-60 ˚C
Recommended nominal domestic hot water temperature:	60˚ C
Recommended circulation temperature:	60˚ C
Min. storage cylinder flow temperature = Nominal domestic hot water value +3K	
Max. flow rate storage cylinder circuit per HEXflo unit:	30 l/min.
Max. flow rate domestic hot water circuit per HEXflo unit approximately:	30 l/min.

18.2   Performance range for cascade systems

A cascade of 2 HEXflo units: Max. discharge capacity: Max. transferable heat output capacity at dT=50K:	 60 l/min 210 kW
A cascade of 3 HEXflo units: Max. discharge capacity: Max. transferable heat output capacity at dT=50K:	 90 l/min 315 KW
A cascade of 4 HEXflo units: Max. discharge capacity: Max. transferable heat output capacity at dT=50K:	 120 l/min 420 KW
Fluid primary side: Fluid secondary side:	Heating water Domestic hot water

18.3   Materials

Plate heat exchanger:	Stainless steel 1.4401 / brazed copper
Pipes:	Stainless steel 1.4404 / 1.4401
Valves and fittings:	Brass / brass resistant to dezincification
Seals:	EPDM / PTFE

18.4   Connections

To and from the HEXflo unit: G1 flat sealing
to and from the cascade ball valves: G1¼ flat sealing

> ⚠ **Warning**
> Suitable measures (e.g. safety valves) have to be taken to ensure that the maximum operating pressures and maximum and minimum operating temperatures are not exceeded.

18.5   System Example

HEXflo Plate heat exchanger cascade – Hydraulics
Plate heat exchanger HEXflo with integrated circulation pumps

> ℹ **Note**
> Ensure the cable lengths are not exceeded

Activate circulation function at all controllers!

Carry out circulation adjustment at all controllers!

Fig. 86

Illustration of the components and pipework, for HEXflo plate heat exchangers with integrated circulation pumps

> ℹ **Note**
> The system examples 4.5, 4.6 and 4.7 show the basic positioning of the components and do not contain all safety devices required.

The design documents must be observed!

18.6   System Example

HEXflo Plate heat exchanger cascade – Hydraulics
Plate heat exchanger HEXflo with integrated circulation pumps

i   **Note**
Ensure the cable lengths are not exceeded

Connection of the circulation pipe each with individual check valves and T-pieces to the cold water supply pipe.

Installation of the ball valves in the cold water supply pipe in front of the T-pieces!

Activation of the external circulation pump via one controller.

Activate circulation function at all controllers!

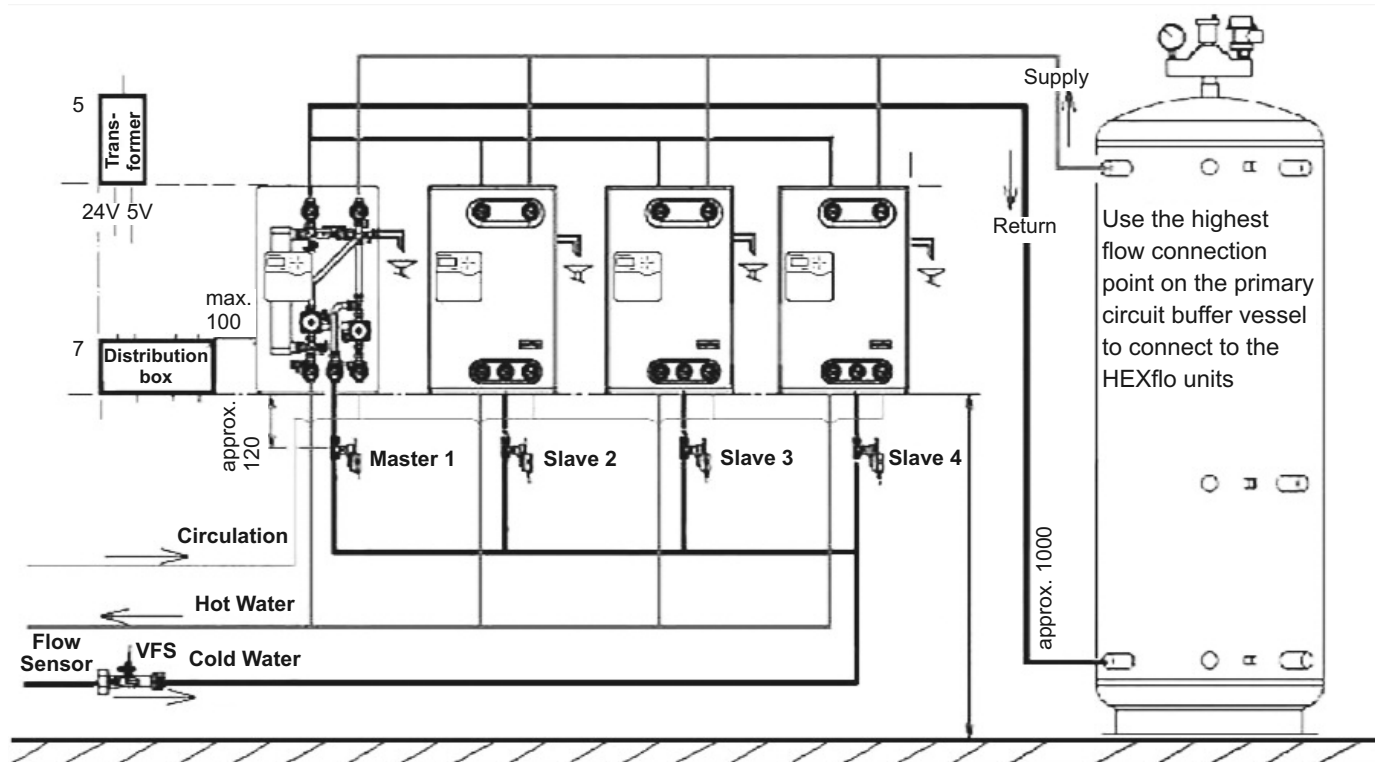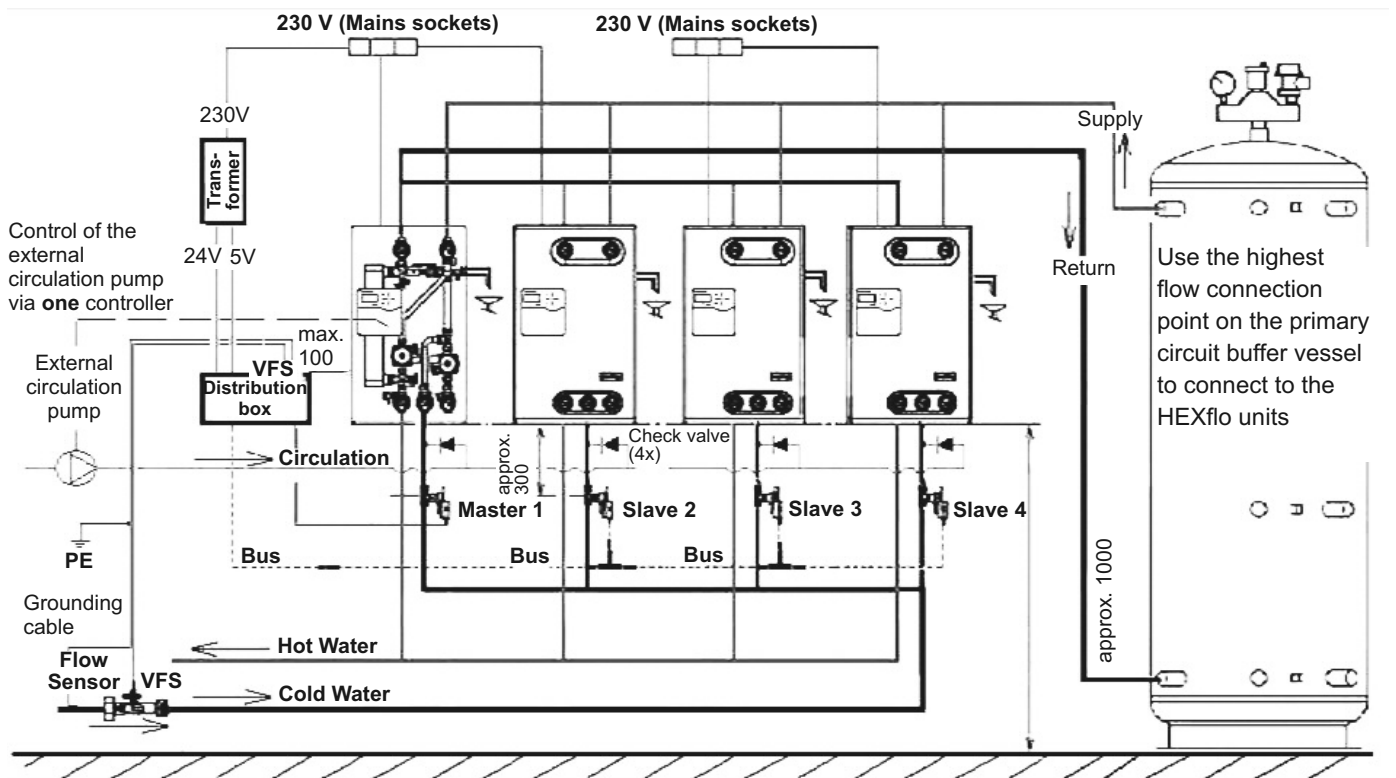Carry out circulation adjustment at all controllers!

Fig. 87

Illustration of the components and pipework, for HEXflo plate heat exchangers with integrated circulation pumps

18.7   System Example

HEXflo Plate heat exchanger cascade – Hydraulics
Plate heat exchanger HEXflo with integrated circulation pumps

> **i** **Note**
> Observe the usable cable lengths for installation!

Useable cable lengths incl. plug	[mm]
Fresh water station, power supply cable	2000
Master actuator, Marking "Master"	1000
Slave actuators, Marking "Bus"	1000
Flow sensor, Marking "VFS"	2000
Bus connecting cable, Marking "Bus"	700
Transformer, power supply cable	3000
Transformer, exit cable, Marking "24V"	2000
Transformer, exit cable, Marking "5V"	2000

Fig. 88
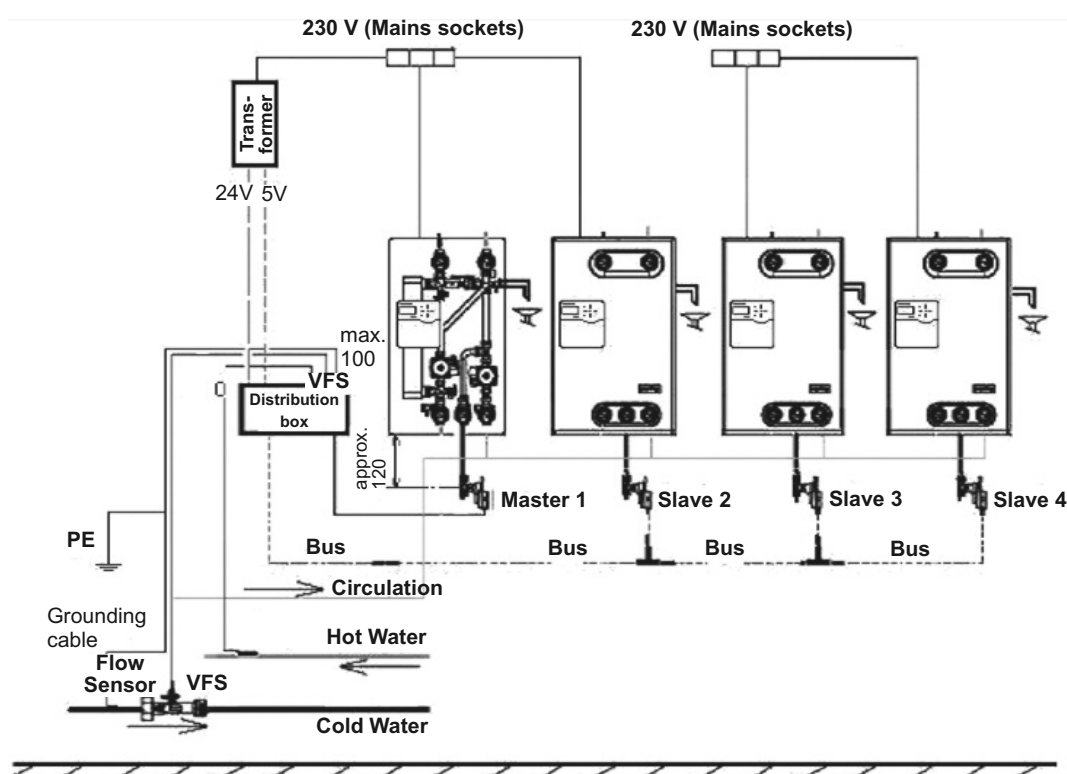
Illustration of the cabling of the electronic components

On system example 4.6 HEXflo with external circulation pump
Alternatively to the illustrated installation option, the pipework set can also be used if an external circulation pump shall be installed.

The set includes a prefabricated T-pipe with check valve, a ball valve with integrated thermometer as well as seals and an insulation screen for a time-saving integration into the HEXflo units.

The external circulation pump is activated by one controller Regtronic RQ-B.

All settings must be carried out at **all** controllers of the cascade and the circulation adjustment has to be carried out at **all** controllers of the cascade!

19   Construction and Summary

19.1   Summary and functional description

In hot water supply systems, the required discharge capacity may exceed the nominal capacity of a single HEXflo unit. In this case, several units are connected into one cascade.

Depending on the withdrawal quantities, the cascade control set serves the distribution of the cold water to the HEXflo units according to requirements.

Due to the construction, a constant hot water temperature is guaranteed even if the withdrawal quantities fluctuate as the individual units are primarily operated at medium or high capacity.

The maximum discharge capacity of the complete system is determined by the sum of the performances of the individual units and their operating parameters.

19.2   Mode of operation

HEXflo units installed in parallel are activated or inactivated via motor-operated ball valves according to requirements. At least one of the ball valves with actuator installed in the cold water pipe is always open. It is referred to as "primary actuator" and changes daily to ensure a balanced utilisation of all HEXflo units. The remaining actuators which are idle when the system is not in operation, are referred to as "secondary actuators".

The individual actuators communicate via a bus system. The flow sensor installed in the cold water supply pipe constantly measures the cold feed volume and passes the information on to the master actuator marked "1" in the cascade control system. All actuators in the system are controlled by the master actuator.

The slave actuators are marked with "2", "3" and "4". If the cold feed volume exceeds a fixed preset value, the master slave sends a switching command via the bus. Now a secondary actuator opens in addition to the primary actuator. If the cold feed volume increases, further secondary actuators open and the individual HEXflo units are activated successively. If the cold feed decreases, the units are inactivated in the reverse order by the closing ball valves.

The actuators react to changes in the cold feed volume with a delay of a few seconds.

The actuators of the cascade control and the controllers of the HEXflo units are autonomous.

19.3   Optional additional functions:

19.3.1   Emergency operation

Each actuator (master and slave) can be opened and closed manually after having pressed the acknowledgement button (see 2. to 4. sub-point in chapter 6.3). This status is recognised by the cascade control and it adapts to the new operating status. By isolating a HEXflo unit with the acknowledgement button engaged, a cascade with four units for instance becomes a cascade with three units.

The remaining units continue to work as usual.

This way, maintenance is simplified and operational safety is increased.

With the accessories set switching module

19.3.2   Fault monitoring

If the temperature sensor in the common hot water pipe does not reach a minimum temperature within in a specific time after having started to draw off water, the switching module closes two volt free contacts. A fault message can bet sent to the centralised building management system or a signalling unit via these contacts.

19.3.3   Return layering

During circulation operation with no water being drawn off, the return flow water of the storage cylinder can be fed into the centre of the storage cylinder by use of a diverting valve with actuator. As the return temperature during circulation operation is higher than during hot water operation, temperature layering of the buffer storage cylinder is optimised.

If the functions "fault monitoring" and "return layering" are not required, the switching module and the temperature sensor PT 1000 can be left out. The functional efficiency of the cascade control set is not impaired.

19.4   Advice regarding planning and design

The design of the HEXflo cascade is the responsibility of the consultant or public health engineer who is designing the overall system.

Andrews Water Heaters accept no responsibility for the design of any element of the scheme.

Current design practices and guidance from CIBSE should be followed, particular precautions should be given to ensuring that the domestic hot water temperatures are

20   Installation

20.1   Installation of HEXflo units

> ⚠ **Warning**
> - The components might be sharp.
>
> - Wear safety gloves to avoid injury!

> ⚠ **Danger**
> Installation, initial operation, maintenance and repair must only be carried out by qualified tradesmen.

- Lower edge height of the insulation shell approx. 1000 mm above the floor (upper edge of the controller at eye level).

- Max. distance between the stations 200 mm.

- Feed the drainage pipe from the safety valve out of the insulation to the outside.

- Installation of the flow sensor in the common cold water supply pipe with due consideration of the direction of flow and the length of the cable (approx. 2 m).

- To avoid problems caused by condensation, the flow sensor has to be installed with the cable pointing upwards!

20.2   Installation of the ball valves
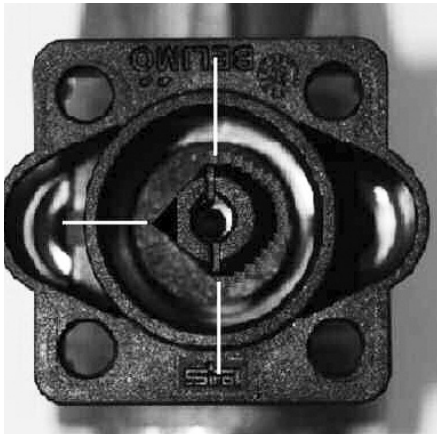
Fig. 89

Fig. 90

- One ball valve each is installed in the individual cold water supply pipes.

- The ball valve is installed vertically.

- The symbol indicating the direction of flow must be observed!

- The distance between the centre of the ball valve and the lower edge of the insulation shell depends on the positioning of the circulation pumps, see 4.5 or 4.6.

- The square of the vertically mounted ball valve has to be turned so that the triangular gap and the two markings of the square are at the 6 o'clock, 9 o'clock and 12 o'clock position:

Fig. 89:   The stem of the ball valve is now aligned to position "open".

- The rotary handle can be removed from the actuator and can be used as a tool for turning the stem.

Fig. 90:   Ball valve and rotary handle

20.3   Fitting of the actuators onto the ball valves

Fig. 91

- The 24 V transformer for the actuators must not yet be connected to the power supply!
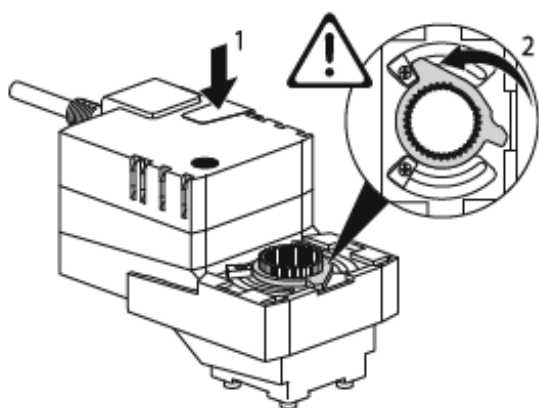
- The actuators open through an anticlockwise rotation and close through a clockwise rotation.

- The actuator is disengaged by pressing button a; a manual adjustment of the actuator is possible in this position.

- Press button a and lock with lock catch b:!

Fig. 92

- Set internal gear to position "open" by turning the rotary knob anticlockwise.

- Now the rotary movement limiter (sheet metal ring with stop dogs) has to touch the left stop, see 2 in Fig. 92:

- Release button a by pressing it once.

- Remove rotary handle from the actuator.

> **i** **Note**
> Positioning of the actuators:
> The master actuator no. 1 is mounted onto the ball valve nearest to the distribution box. Now the slave actuators 2, 3 and 4 are mounted in sequence.
>
> This sequence must be strictly followed!
>
> See 18.5 system example.

Fig. 93

- Press the aligned actuator in a vertical position (writing faces upwards) onto the aligned and vertically mounted ball valve whilst holding the mechanical stop ring tight.

Fig. 94
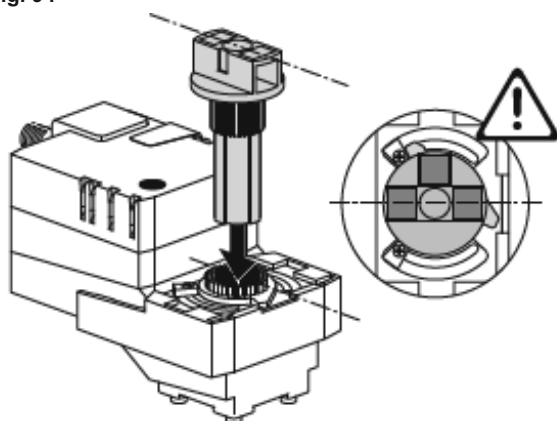
- Insert the rotary handle into the internal gear of the actuator so that the markings on the rotary handle are in the same positions than the markings on the square (see Fig. 92 and 93).

Fig. 95
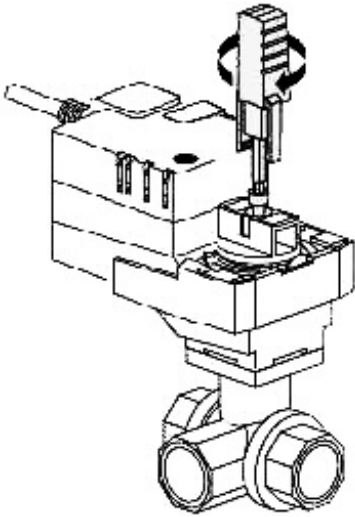
- The rotary handle and the ball valve are now aligned to position "open".

- Screw the actuator to the ball valve by tightening the hexagon socket screw with the help of the enclosed knob or an Allen key (size 3).

Fig. 96
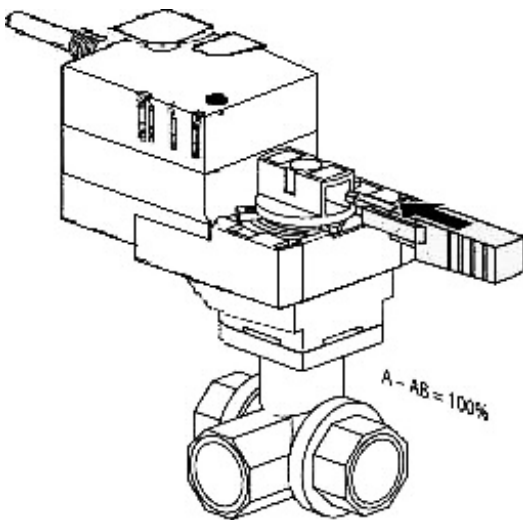
- After having tightened the screw, the knob has to be inserted into the rotary handle:

> **i** **Note**
> Control of the correct positioning of the actuator on the ball valve is part of the initial operation and is described under point 22.5!

21   Electrical Installation

21.1   Number of electrical connections required

See
See 18.7 system example.
The useable cable lengths must be observed!

⚠ **Danger**
Installation, initial operation, maintenance and repair must only be carried out by qualified tradesmen.

The plug-in connectors for the low voltage part of the cascade control set must never be connected to other electrical installations!

• Mains connections to be provided:

1 per HEXflo unit
1 for the transformer of the cascade control set
1 for servicing purposes (recommended)

thus provide at least 5 and if possible 6 mains sockets for a cascade with 4 units.

21.2   Installation of the electrical distribution box

• Install distribution box in a dry place, protected from water jets and condensation, preferably next to the HEXflo unit to which the master actuator is connected.

A positioning of the electric components according to 18.7 system example with due consideration of the useable cable lengths is recommended.

• To simplify allocation, the sockets of the distribution box are marked with the designation of the corresponding plug.

21.3   Electrical connection of the actuators

• Plug the grey plug marked "Master" into the correspondingly marked grey socket of the distribution box.

• Plug one of the black bus connecting cables marked "Bus" into the correspondingly marked black socket of the distribution box and extend it using an additional bus connecting cable.

• Extend the bus line by alternately using the T-connectors and bus connecting cables.

• Connect all plugs of the slave actuators marked "Bus" to the bus line.

• Depending on the positioning of the components, a bus connecting cable or a T-connector might be left over.

• If required, the plugs and T-connectors can be stored within the insulation shells of the HEXflo unit.

21.4   Connection of the flow sensor

- Plug the flow sensor "VFS" plug into the grey socket marked "VFS" of the distribution box.

- Fix the cable lug of the grounding cable at a suitable location; for instance at a metal cold water supply pipe or the housing of the VFS sensor using cable retainers.

  Alternatively, the cable lug may be removed and the stripped end of the grounding cable may be connected to a PE-terminal of a "Regtronic RQ-B" controller or to an appropriate earth bonding point subject to electrical regulations.

21.5   Installation and connection of the transformer

- Install transformer in a dry place next to the distribution box, preferably above the hydraulic installation at a location protected from water jets and condensation.

- The transformer must not yet be connected to the 230 V power supply!

- Plug the 24 Volt plug of the transformer into the black socket marked "24 V" of the distribution box.

- Plug the 5 Volt plug of the transformer into the red socket marked "5 V" of the distribution box.

21.6   Optional: Connection of an external circulation pump

- Disconnect the power plugs of all fresh water stations from their sockets.

- Remove the insulation shell from the fresh water station nearest to the distribution box, pull controller housing out of the insulation block (plug disconnected ?!!?) and open the cover of the controller.

- Break a cable conduit out of the controller housing and insert the free cable end of the circulation pump.

- Connect the cable of the circulation pump to output 2 (relay 2) on the circuit board and provide a clamp or cable tie inside the housing for strain relief of the cable. Depending on the controller model, the output is marked "2", "A2" or "R2".

- Max. switching capacity of the output relay R2 = 1A. If a higher switching capacity is required for the circulation pump, the relay R2 provides the control voltage for a corresponding relay or protective control.

22 Initial Operation

22.1 Filling and bleeding of the system

- Flush storage cylinder circuit and domestic hot water circuit thoroughly before initial operation!

- Check all connections for leaks and re-tighten if required.

- Heat buffer storage cylinder to a minimum temperature of 70 °C.

22.2 Setting of controller parameters

- Do not yet connect the transformer of the cascade control to the 230 V power supply!

- Disconnect the power plugs of all "Regtronic" controllers from their sockets.

- Set the following values at all HEXflo controllers.

Controller parameters	
Nominal hot water temperature:	60 °C
Circulation:	On
Circulation temperature:	60 °C
Type of circulation:	Cycle
Circulation cycle:	24 hours / daily
Time:	Current data
Disinfection:	According to the specifications and the responsibility of the user of the system

- Start circulation adjustment once simultaneously at all stations.

- To avoid malfunctions, the settings at all controllers must be identical!

- The cascade control set (consisting of actuators, ball valves, transformer, flow sensor VFS and cabling) is configured at works and does not require any further settings.

> ⚠ **Danger**
> Imminent danger to life and limb!
>
> Never operate a HEXflo cascade installation with controller parameters that differ from the Andrews Water Heaters specifications. The temperature in the circulation return has to achieve at least 55 °C. Optimise circulation system if required!
>
> During thermal disinfection, the maximum permissible temperatures of the pipework and installation must be observed. Set the corresponding maximum values in the menu point "disinfection"!

22.3   Circulation adjustment

- No hot water must be drawn off during circulation adjustment (duration approx. 60 sec.).

- If required, the cascade ball valves below the HEXflo units have to be closed temporarily (see chapter 20.3) so that the circulation adjustment is not disturbed by an inadvertent water withdrawal.

- First, select the menu point "circulation adjustment start" at each controller but do not yet start the adjustment!

- Now start the circulation adjustment at all controllers - if possible simultaneously. Should the process not run simultaneously at all stations, cancel and repeat.

- Once the circulation adjustment has been completed, all controllers have to display a measured volume flow. The individual values might deviate slightly from another.

- Return to the main menu by pressing the key escape.

- If required, re-open the cascade ball valves by pressing the locked acknowledgement buttons once. The actuators will return to their designed position.

- Should air noises occur in the circulation pump or in the domestic hot water pipes during circulation adjustment, the process has to be repeated once all air has been removed from the domestic hot water pipes.

> **i** | **Note**
> All air might possibly only have been removed from the **domestic hot water** circuit after having operated the system for several days.
>
> To avoid malfunctions in operation, repeat the circulation adjustment once more after all air has been removed from the **domestic hot water** pipes!

22.4   Functional control and initialisation of the cascade control

> ⚠ **Warning**
> The rotary handles might rotate unexpectedly during operation. This may lead to injuries caused by crushing.
>
> Do not touch the area between the rotary handle and the housing whilst the actuators are running!
>
> Prevent access to the system for untrained persons.
>
> Disconnect the 24 V transformer from the power supply during installation work.

- Connect each of the 24 V transformer into the mains supply.

- Each time the power supply has been interrupted, the cascade control carries out an automatic initialisation for functional control. This takes about 5 minutes.

- Observe and compare the initialisation of the actuators for functional control:

Step 1:	all actuators close
Step 2:	all actuators open one after the other
Step 3:	all actuators close
Step 4:	the master actuator opens
Duration of initialisation:	about 5 min.
(The day after initialisation, the master actuator will be the primary actuator)	

22.5   Checking the correct installation of the actuators on the ball valves:

- Open one draw off point so that hot water flows.

- Press and engage the acknowledgement button at all actuators, close ball valve. (see sub-points 3 and 4 in chapter 20.3).

- Does the hot water stop flowing at the draw off point?

  1. Ok, all ball valves are aligned correctly.

  2. Close draw off point and press all acknowledgement buttons once, check is complete.

- Does the hot water not stop flowing at the draw off point?

  1. At least one ball valve has not been aligned correctly.

  2. The ball valve can be localised by reading the volume flow display at the individual controllers.

  3. Close the draw off point, remove each actuator individually and fit them according to point 20.3, repeat check.

23   Operation, Maintenance and Warranty

23.1   Operation

- The fresh water cascade does not have to be operated during normal use. Operation starts automatically once connected to the power supply.

- Should a malfunction occur, each actuator can be opened and closed.

- For the temporary suspension of a HEXflo unit (maintenance, malfunction at a station) within the cascade assembly, press and engage the acknowledgement button at the corresponding actuator and close the ball valve by turning it clockwise (see also "emergency operation" under point 19.3).

- All designed functions of the cascade control set are now carried out by the remaining HEXflo units. When changing the primary unit, the units which are faulty are ignored, so that the hot water supply is always guaranteed.

- If a HEXflo unit is not in operation for a longer time, there is a risk of contamination of the system.

23.2   Maintenance

To guarantee a perfect operation of the HEXflo cascade, it is recommended to have the units and the complete system maintained by Andrews Water Heaters service team or an Andrews Water Heaters nominated service agent once a year.

The following work should be done:

- Leakage test of all components and connections of the individual HEXflo units.

- Leakage test of the cascade ball valves.

- Check whether the set nominal temperature is kept at all units.

- Check whether the supply and circulation return temperatures are valid and correct.

- Cascade control check:

  When drawing off water with increasing quantity, all ball valves of the cascade must open one after the other.

  If the power supply has been interrupted, all actuators have to carry out an initialisation.

  See
  See information in chapter 22.4 under "Initial operation".

23.3   Warranty

Please review www.andrewswaterheaters.co.uk for warranty terms and conditions.

24 Notes

Date:	Engineer name:			
Actual temperature [ºC] at max. draw off quantity	HEXflo 1		HEXflo 2	
	HEXflo 3		HEXflo 4	
Return temperature [ºC] Circulation during circulation operation	HEXflo 1		HEXflo 2	
	HEXflo 3		HEXflo 4	
Remarks:				

Date:	Engineer name:			
Actual temperature [ºC] at max. draw off quantity	HEXflo 1		HEXflo 2	
	HEXflo 3		HEXflo 4	
Return temperature [ºC] Circulation during circulation operation	HEXflo 1		HEXflo 2	
	HEXflo 3		HEXflo 4	
Remarks:				

Date:	Engineer name:			
Actual temperature [ºC] at max. draw off quantity	HEXflo 1		HEXflo 2	
	HEXflo 3		HEXflo 4	
Return temperature [ºC] Circulation during circulation operation	HEXflo 1		HEXflo 2	
	HEXflo 3		HEXflo 4	
Remarks:				

Date:	Engineer name:			
Actual temperature [ºC] at max. draw off quantity	HEXflo 1		HEXflo 2	
	HEXflo 3		HEXflo 4	
Return temperature [ºC] Circulation during circulation operation	HEXflo 1		HEXflo 2	
	HEXflo 3		HEXflo 4	
Remarks:				

Date:	Engineer name:			
Actual temperature [ºC] at max. draw off quantity	HEXflo 1		HEXflo 2	
	HEXflo 3		HEXflo 4	
Return temperature [ºC] Circulation during circulation operation	HEXflo 1		HEXflo 2	
	HEXflo 3		HEXflo 4	
Remarks:				

Date:	Engineer name:			
Actual temperature [ºC] at max. draw off quantity	HEXflo 1		HEXflo 2	
	HEXflo 3		HEXflo 4	
Return temperature [ºC] Circulation during circulation operation	HEXflo 1		HEXflo 2	
	HEXflo 3		HEXflo 4	
Remarks:				

Date:	Engineer name:			
Actual temperature [ºC] at max. draw off quantity	HEXflo 1		HEXflo 2	
	HEXflo 3		HEXflo 4	
Return temperature [ºC] Circulation during circulation operation	HEXflo 1		HEXflo 2	
	HEXflo 3		HEXflo 4	
Remarks:				

Date:	Engineer name:			
Actual temperature [ºC] at max. draw off quantity	HEXflo 1		HEXflo 2	
	HEXflo 3		HEXflo 4	
Return temperature [ºC] Circulation during circulation operation	HEXflo 1		HEXflo 2	
	HEXflo 3		HEXflo 4	
Remarks:				

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Register now to activate your warranty **www.andrewswaterheaters.co.uk/register-a-warranty.**
Please make sure you attach proof of purchase for your warranty to be monitored.

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May 2016

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