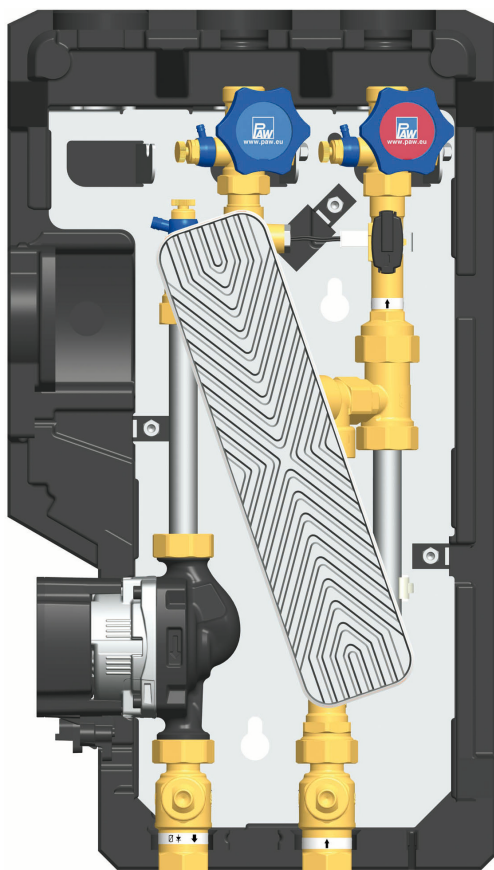


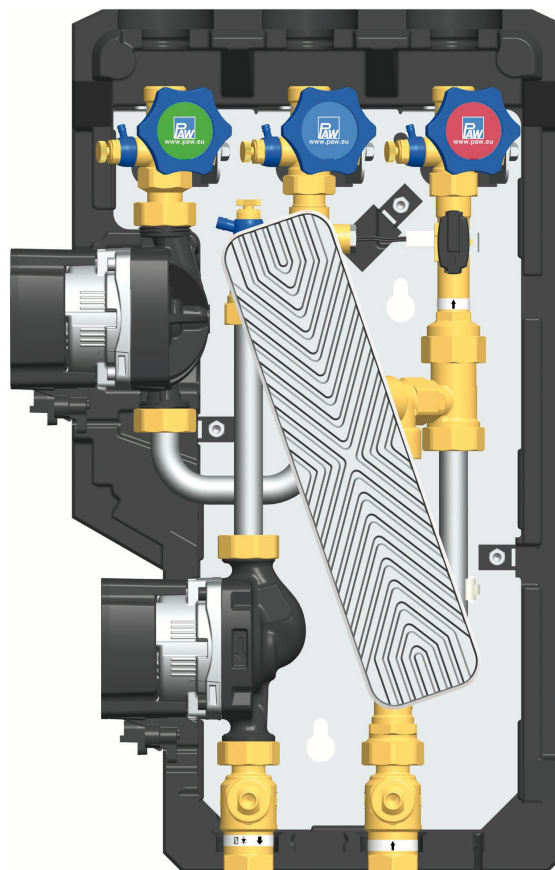


English

## Installation and Operation Instructions Domestic Hot Water Module DN 15 FriwaMini / FriwaMini with circulation



**FriwaMini**



**FriwaMini with circulation**

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## 1 General Information



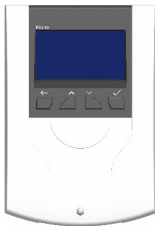
Carefully read these instructions before installation and commissioning.

Save these instructions in the vicinity of the installation for future reference.

### 1.1 Scope of these instructions

These instructions describe the installation, commissioning, function and operation of the FriwaMini domestic hot water module. The chapters called [specialist] are intended for specialists only.

For other components of the system, such as tanks, controllers and pumps, please observe the instructions of the corresponding manufacturer.

Station	Item number	Controller FC3.10	Primary pump	Circulation	Heat exchanger
FriwaMini	6401510		Grundfos UPM4 15-75	Optional: <b>6404111</b>	copper solder, 32 plates
	6401530				coated, 32 plates
FriwaMini with circulation	6401515		Grundfos UPM4 15-75	Grundfos UPM4 15-70 CIL3	copper solder, 32 plates
	6401535				coated, 32 plates

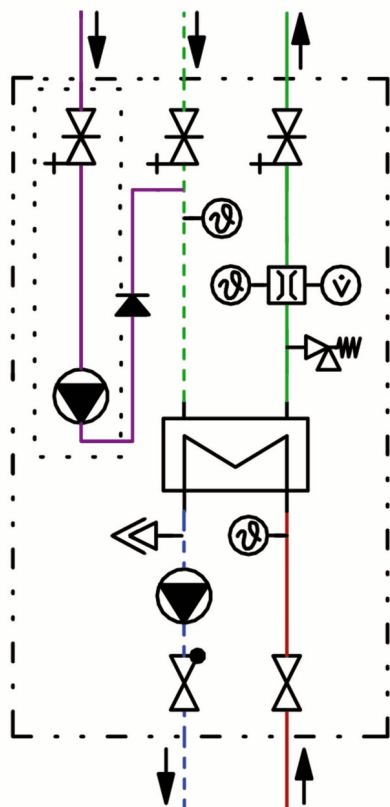
The domestic hot water module complies with the relevant directives and is therefore labelled with the CE mark. The Declaration of Conformity is available upon request, please contact the manufacturer.

### 1.2 About this product

The FriwaMini is a domestic hot water module operating on the principle of a flow-type water heater.

The domestic hot water module is a premounted group of fittings checked for tightness and used to transfer the heat between the buffer tank and the domestic hot water circuit.

It contains a preset controller and important valves and fittings and safety equipment to operate the unit:



- Ball valves in the primary circuit
- Piston valves in the secondary circuit
- Safety valve in the secondary circuit
- Premounted controller
- Temperature sensor at the cold water inlet
- Temperature sensor in the heating circuit flow line
- Flow meter at the domestic hot water outlet
- Primary and circulation pump, can be isolated
- Manual vent valve for venting the heat exchanger and the pump

### 1.3 Designated use

The domestic hot water module must only be mounted in heating installations between the buffer tank and the domestic hot water circuit. Due to its design, the station must be mounted and operated in a vertical position! The technical limit values specified in these instructions must be observed.

Only use PAW accessories with the domestic hot water module. Improper usage excludes any liability claims.

Do not put the module into operation in case of any visible damage.

## 2 Safety instructions

The installation and commissioning as well as the connection of electrical components require technical knowledge commensurate with a recognised vocational qualification as a fitter for plumbing, heating and air conditioning technology, or a profession requiring a comparable level of knowledge [specialist].

The following must be observed during installation and commissioning:

- relevant local and national regulations
- accident prevention regulations of the professional association
- instructions and safety instructions mentioned in these instructions

### NOTICE

#### **Material damage due to mineral oils!**

Mineral oil products cause lasting damage to seals made of EPDM, whereby the sealant properties are lost. We do not assume liability nor provide warranty for damage to property resulting from sealants damaged in this way.

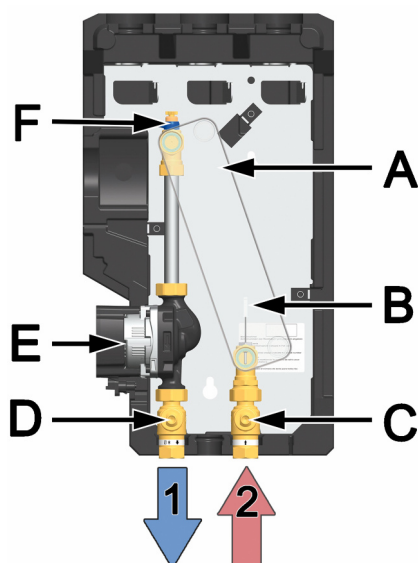
- ▶ It is imperative to prevent the EPDM sealing elements from making contact with substances containing mineral oils.
- ▶ Use a silicone- or polyalkylene-based lubricant free of mineral oil such as Unisilikon L250L and Syntheso Glep 1 from Klüber or a silicone spray.

### WARNING

#### **Malfunction!**

- ▶ The domestic hot water module must be integrated in the potential equalisation of the electric installation. This can be guaranteed by establishing a potential equalisation connection to the main potential connection according to regulations or by the connected pipe system.

### 3 Product description



Primary circuit

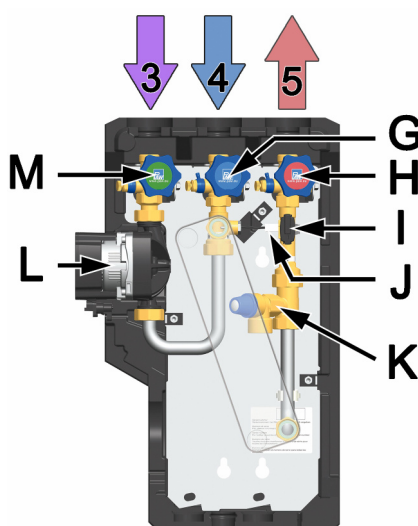
#### Connections

- 1 Primary side/heating side: Return to the buffer tank
- 2 Primary side/heating side: Flow from the buffer tank
- 3 Secondary side/DHW side: Hot water supply, circulation
- 4 Secondary side/DHW side: Cold water supply
- 5 Secondary side/DHW side: Hot water outlet

#### Equipment primary circuit

- A Heat exchanger
- B Temperature sensor Pt1000
- C Ball valve
- D Ball valve with check valve
- E Primary pump
- F Manual vent valve

#### Equipment secondary circuit



Secondary circuit

- G Piston valve with drain valve (cold water inlet)
- H Piston valve with drain valve (hot water outlet)
- I Analogue flow rate sensor, VFS 2-40 l/min
- J Temperature sensor Pt1000
- K Pressure relief valve 10 bars


**Only for protection of the domestic hot water module. Does not replace the pressure relief valve that has to be mounted on site!**

- L Circulation pump
- M Piston valve with drain valve (circulation)

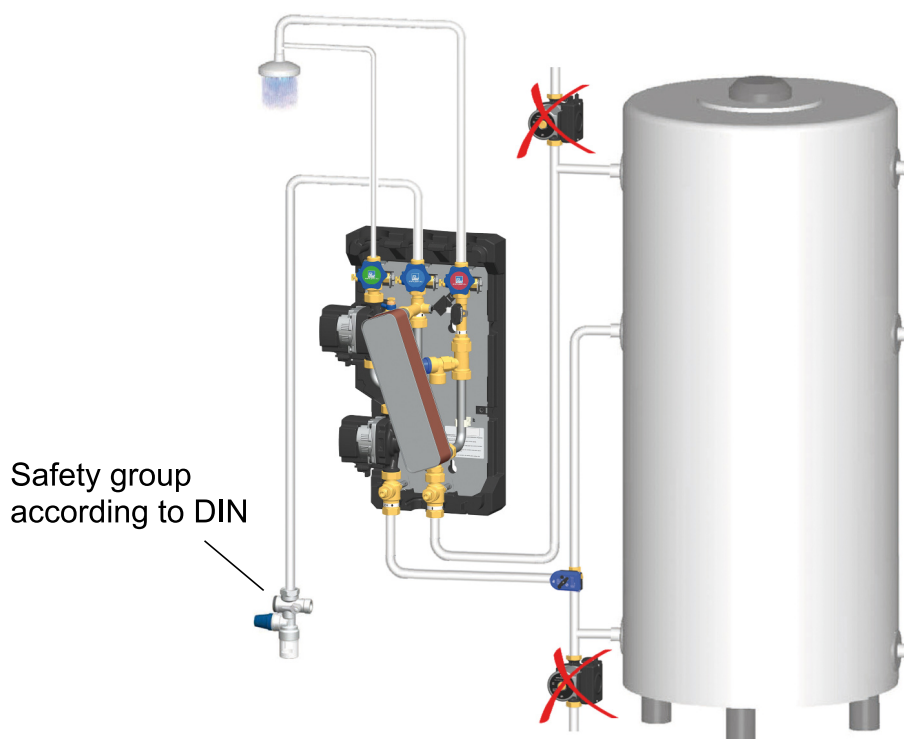
**Example: FriwaMini with circulation**

### 4 Dimensioning and planning

The DHW module will only work flawlessly if the installation meets certain requirements. Please take some time to plan the assembly.

WARNING	
	<p><b>Danger of scalding due to hot water!</b></p> <p>Undesirable circulation of water in the primary circuit can cause the exit of water of up to 90 °C at the withdrawal point.</p> <ul style="list-style-type: none"> <li>▶ External pumps must not be installed between the domestic hot water module and the buffer tank.</li> <li>▶ The domestic hot water module must not be connected to a distribution manifold of a heating circuit.</li> </ul>

#### Mounting example:



FriwaMini circulation with optional return distribution (item number 640425).

## NOTICE

### Use of trace heating tapes

Installations without a circulation line with an increased pipe content can cause a considerable drop of temperature in the pipes during longer withdrawal breaks. This leads to a delayed start behaviour of the domestic hot water module, which slows down the regulation of the set nominal temperature.

This effect can be reinforced when using electrical trace heating systems in combination with short withdrawals. There is a risk that different temperature ranges will develop in the domestic hot water line due to the delayed start behaviour. This can lead to initially fluctuating outlet temperatures during subsequent longer withdrawals.

Therefore, we do not recommend an electric trace heating system. If an installation is unavoidable, the following steps are recommended:

- ▶ For a pipe length > 4 m between the buffer storage tank and the domestic hot water module, the comfort function should be activated (increased tendency to calcification). We recommend the shortest possible installation routes between the buffer tank and the DHW module.
- ▶ Avoid short withdrawals.
- ▶ Instead of an over-dimensioned domestic hot water module, we recommend cascading several smaller modules.

## 4 Dimensioning and planning

### 4.1 Dimensioning of the tank

The following table helps you to calculate the approximately required volume of the buffer tank.

Temperature in the buffer tank	Domestic hot water temperature set at the controller	Required tank volume per litre of hot water (coated heat exchanger)
50 °C	45 °C	1.9 litres
60 °C*	<b>45 °C</b>	<b>1.1 litres</b>
	50 °C	1.5 litres
	55 °C	2.1 litres
70 °C	50 °C	1.0 litre
	55 °C	1.2 litres
	60 °C	1.6 litres
80 °C	50 °C	0.8 litre
	55 °C	0.9 litre
	60 °C	1.1 litres

#### \*Calculation example for the dimensioning of the buffer tank:

Temperature in the buffer tank: 60 °C

Maximum withdrawal quantity needed: 20 l/min

Domestic hot water temperature set at the controller: 45 °C

How large must be the tank to allow a continuous withdrawal during 20 minutes without post-heating?

$$20 \text{ l/min} \times 20 \text{ min} = 400 \text{ l}$$

$$400 \text{ l} \times 1.1 = 440 \text{ l}$$

The heated part of the buffer tank must have a volume of 440 litres.

## 4.2 Water quality requirements

The domestic hot water modules constructively decrease the precipitation of chalk in the heat exchanger. For installations with an elevated total hardness of the potable water and/or high temperatures, a water treatment is recommended. Depending on the chemical composition of the water at the installation site, the selection and adequacy of the plate heat exchanger has to be checked. Please observe the following table: **Influence of the water quality on the corrosion resistance for domestic hot water applications**

Water content	Concentration (mg/l or ppm)	Time limits	Heat exchanger with copper solder	Heat exchanger with Sealix® sealing
Alkalinity ( $\text{HCO}_3^-$ )	< 70	within 24 hours	0	+
	70-300		+	+
	> 300		0/+	+
Sulphate ( $\text{SO}_4^{2-}$ )	< 70	no limit	+	+
	70-300		0/-	+
	> 300		-	+
$\text{HCO}_3^- / \text{SO}_4^{2-}$	> 1.0	no limit	+	+
	< 1.0		0/-	+
Electrical conductivity	< 10 $\mu\text{S}/\text{cm}$	no limit	0	+
	10-500 $\mu\text{S}/\text{cm}$		+	+
	> 500 $\mu\text{S}/\text{cm}$		0	+
pH value	< 6.0	within 24 hours	0	+
	6.0-7.5		0	+
	7.5-9.0		+	+
	9.0-10		0	0
	> 10.0		0	-
Ammonium ( $\text{NH}_4^+$ )	< 2	within 24 hours	+	+
	2-20		0	+
	> 20		-	-

#### 4 Dimensioning and planning

Water content	Concentration (mg/l or ppm)	Time limits	Heat exchanger with copper solder	Heat exchanger with Sealix® sealing
Chloride (Cl <sup>-</sup> )	< 100	no limit	+	+
	100-200		+	+
	200-300		+	+
	> 300		0/+	0
Free chlorine (Cl <sub>2</sub> )	< 1	within 5 hours	+	+
	1-5		0	0
	> 5		0/-	0
Hydrogen sulphide (H <sub>2</sub> S)	< 0.05	no limit	+	+
	> 0.05		0/-	0
Free (aggressive) carbon dioxide (CO <sub>2</sub> )	< 5	no limit	+	+
	5-20		0	+
	> 20		-	+
Total hardness (°dH)	4.0-8.5	no limit	+	+
Nitrate (NO <sub>3</sub> <sup>-</sup> )	< 100	no limit	+	+
	> 100		0	+
Iron (Fe)	< 0.2	no limit	+	+
	> 0.2		0	+
Aluminium (Al)	< 0.2	no limit	+	+
	> 0.2		0	+
Manganese (Mn)	< 0.1	no limit	+	+
	> 0.1		0	+

+ Good resistance under normal conditions

0 Corrosion may occur, especially if further factors are evaluated with 0

- Use is not recommended

## 5 Circulation mode

The domestic hot water module is equipped with a circulation pump. For the operation of the circulation pump, three possible operation modes are stored in the controller (see controller instructions, chapter *Circulation*).

- **Pulse-controlled operation** (depending on the demand / requirements):

The short actuation of a hot water tap (tap pulse: less than 5 sec.) starts the circulation pump. The circulation pump will then run for several minutes (adjustable).

- **Time-dependent operation:**

The operation of the circulation pump can be set on a week clock within freely selectable periods of time. In this operation mode, the circulation is activated at the beginning of the period of time chosen. The circulation will stop after the end of the chosen period of time.

- **Temperature-dependent operation:**

In this operation mode, the circulation is only activated if the adjustable minimum temperature at the circulation temperature sensor is not reached. The circulation stops after the adjustable switch-off temperature has been reached.

The operating modes can be combined with each other as wished, e.g. the time- and the temperature-dependent operating modes. The circulation is only activated if the temperature at the circulation temperature sensor falls below the required value and if the time window is active.

If the pulse-controlled operation mode is additionally activated, the circulation pump runs continuously during the time slot and can be activated by a tap pulse outside the time slot. The circulation prematurely stops if the adjusted switch-off temperature is exceeded.

### NOTICE

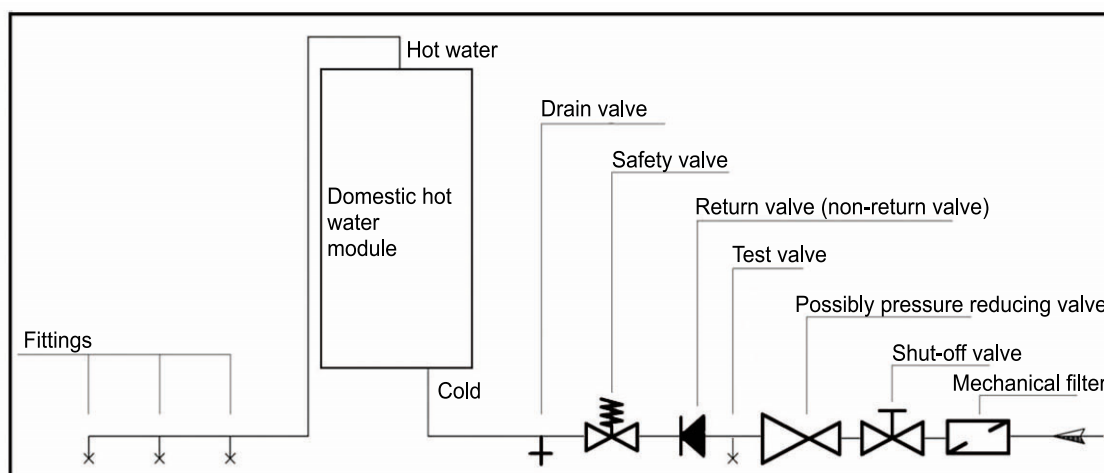
#### Damage to property!

When the DHW module is delivered, the circulation is not activated (see controller instructions, chapter *Circulation*). It is mandatory to select and preset the operation mode. The revolution speed of the circulation pump is defined via the PWM signal (factory setting: 100%).

### 6 Mounting and installation [specialist]

The domestic hot water module must only be connected with the storage tank by separate connections for the flow and return. External pumps must not be installed between the domestic hot water module and the buffer tank. The circulation of water causes considerable temperature fluctuations.

**The DHW connection must be carried out in accordance with the relevant norms (e.g. DIN 1988)!**

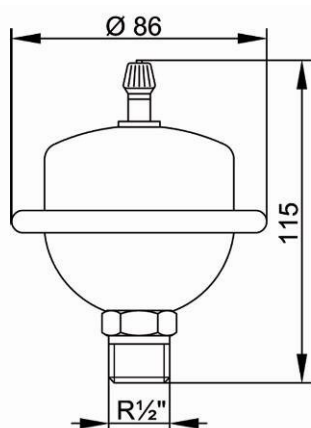


#### NOTICE

##### Damage to property!

The pressure relief valve integrated in the station does not replace the safety groups of the potable water connection as per DIN 1988. The pressure relief valve only protects the module from overpressures in case of servicing.

#### NOTICE



##### Damage to property!

If there are water supplies that may cause pressure surges (for example flush valves, washing machines or dishwashers) connected to the same mains as the domestic hot water module, we recommend the installation of water hammer arresters close to the place where these pressure surges may be caused.

## WARNING



### Risk to life and limb due to electric shock!

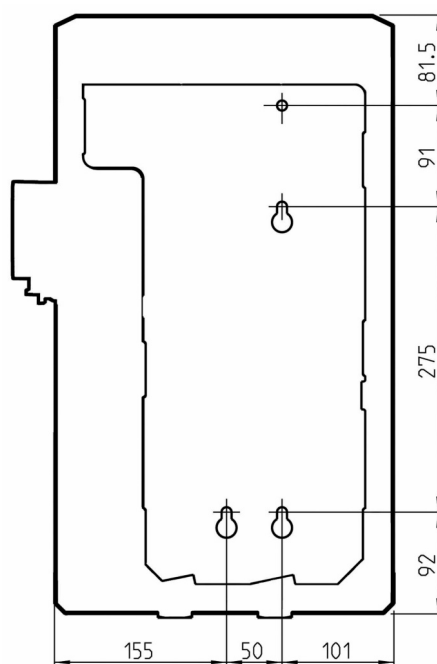
- ▶ Prior to commencing electrical work, pull the mains plug!
- ▶ Only after completing all work, plug the mains plug into a socket. This avoids an unintentional start of the motors.

## NOTICE

### Damage to property!

The installation site must be dry, stable, frost-proof and protected against ultraviolet radiation in order to prevent material damage of the installation.

1. Determine the mounting location of the domestic hot water module near the buffer tank. The pipes in the heating circuit must not exceed a length of 4 m for DN 20.
2. Copy the measures for the mounting holes to the wall. You can find a corresponding drilling template (see on the right) on the paper board under the domestic hot water module.
3. Drill the holes and insert adequate wall plugs into the holes.
4. Turn the screws into the wall plugs in such a way that about 40 mm of each screw still stick out.
5. Remove the insulating front shell.



drilling template

6. Hang the domestic hot water module onto the screws. Tighten the screws, so that the sides of the insulation are flush to the wall.
7. Connect the domestic hot water module with the installation by using the piping according to the adjacent figure.

## 6 Mounting and installation [specialist]

### 1 Primary side:

Return to the buffer tank,

Connection  $\frac{3}{4}$ " int. thread, piping:

at least DN 20: 22 x 1 mm

**recommended DN 25: 28 x 1.5 mm**

### 2 Primary side:

Flow from the buffer tank,

Connection  $\frac{3}{4}$ " int. thread, piping:

at least DN 20: 22 x 1 mm

**recommended DN 25: 28 x 1.5 mm**

### 3 Secondary side:

Hot water inlet circulation,

Connection  $\frac{3}{4}$ " ext. thread, flat sealing

### 4 Secondary side:

Cold water inlet,

Connection  $\frac{3}{4}$ " ext. thread, flat sealing

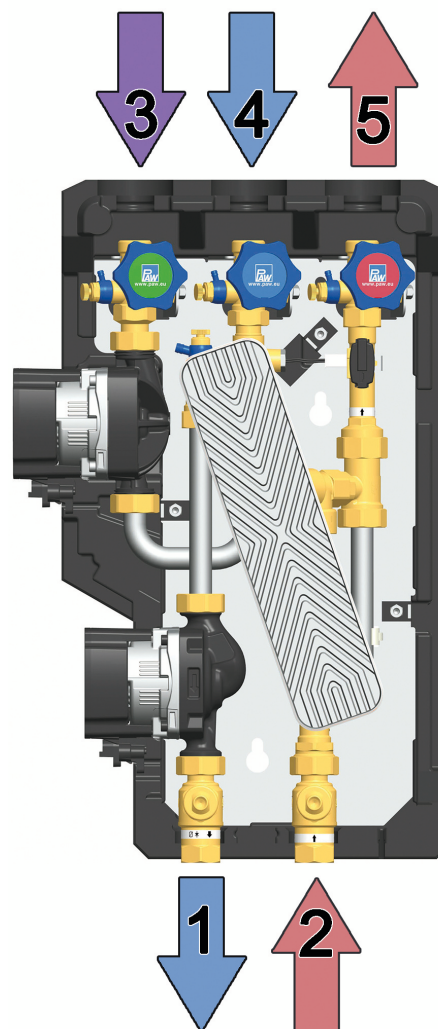
### 5 Secondary side:

Hot water outlet,

Connection  $\frac{3}{4}$ " ext. thread, flat sealing

Pipe distance to the wall

(secondary) = 72 mm



Pipe distance to the wall

(primary) = 112 mm

## 7 Commissioning [specialist]

### NOTICE

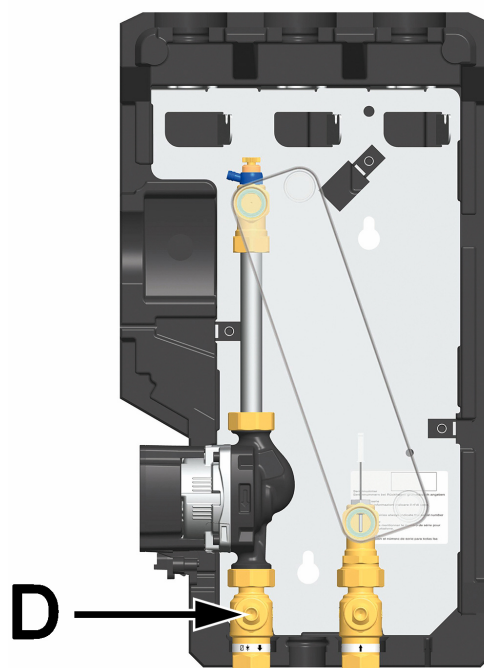
Open the valves in the pipes and in the module **slowly** in order to prevent pressure surges.

#### Functioning check valve

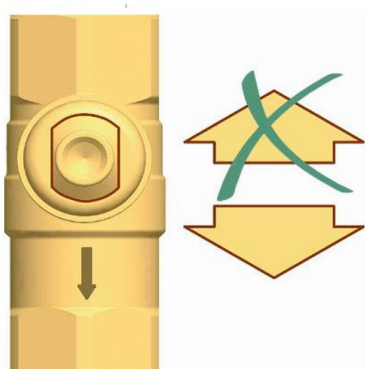
The primary circuit is equipped with a check valve in the ball valve (D), in order to avoid unwanted gravity circulation.

For venting and flushing the installation, the check valve must be open. For this purpose, turn the ball valve into **position 45°**. In this position, the check valve is not operating.

For the operation of the installation, all valves must be **completely** open (**position 0°**).

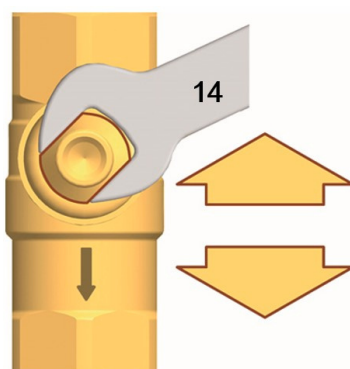


#### Position 0°



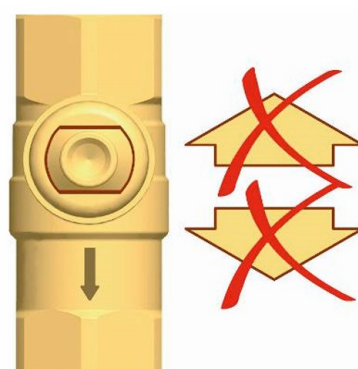
Check valve is operating, **flow only in flow direction.**

#### Position 45°



Check valve not operating, **flow in both directions.**

#### Position 90°



Ball valve closed, **no flow.**

## 7 Commissioning [specialist]

### 7.1 Filling the primary circuit

#### WARNING

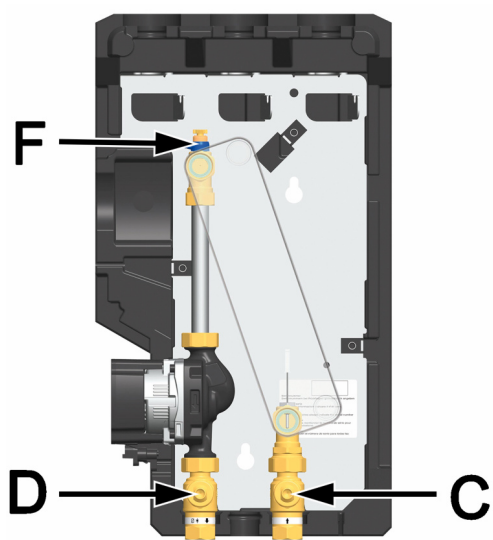


#### Danger of scalding due to hot water!

The system is under pressure. By opening the safety / vent valve, hot water with a temperature of up to 90 °C may exit and cause personal injury.

- Open each valve slowly and with sufficient distance.

#### If the storage tank is (partly) filled

1. Slowly open the ball valve (C) by turning it into **position 0°**.
  2. Fill the storage tank using the fill valves available on site until an operating pressure of about 1.5 bars\* is reached. Use heating water compliant with the standards VDI 2035 / ÖNorm H5195-1.
  3. Manipulate the vent valve (F) cautiously to let the air escape.
  4. Close the vent valve (F).
  5. Close the ball valve (C) by turning it into **position 90°**.
- 
- Primary circuit**
6. Slowly open the ball valve (D) by turning it into **position 45°**.
  7. Manipulate the vent valve (F) cautiously to let the air escape.
  8. Close the vent valve (F).
  9. Check the operating pressure of the storage tank after the venting and increase the pressure if necessary.
  10. Open the ball valves (C) and (D) completely by turning them into **position 0°**.

\* 1.5 bars in the primary circuit = recommended minimum value

The pressure also depends on the individual system pressures and on the components of the heating installation!

## 7.2 Commissioning of the controller

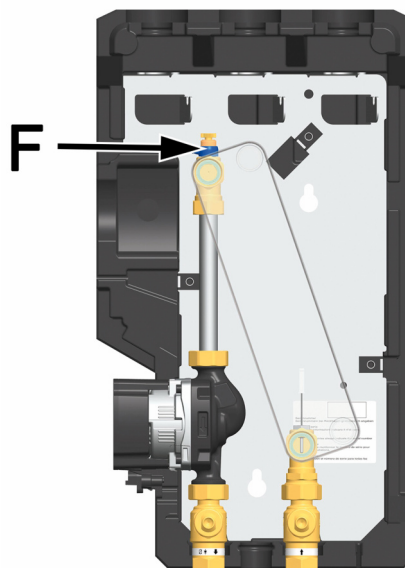
### WARNING



#### Risk to life and limb due to electric shock!

- Check whether the sensors and pumps have been connected to the controller and the controller housing is closed.
- Only under these circumstances, the mains plug of the controller can be plugged into a socket.

1. Connect the domestic hot water module to the mains (230 V, 50 Hz) by using the premounted connection cable.
2. Make sure that the domestic hot water module is correctly integrated into the potential equalisation of the installation.
3. Carry out the commissioning of the controller (see controller instructions, chapter *Commissioning*). After that, start the pump in the automatic/manual mode (PWM signal = 100 %, see controller instructions chapter *Automatic / manual mode*).
4. Let the pump run for several minutes to vent the domestic hot water module.
5. When the air noises do not stop, carefully manipulate the vent valve (F) while the pump is still running and let the air escape.



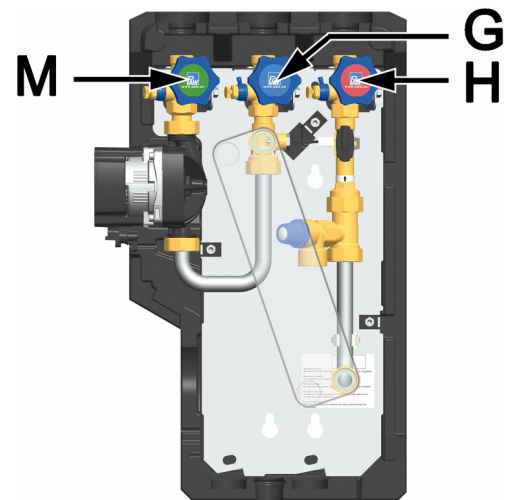
**Primary circuit**

## 7 Commissioning [specialist]

6. If the air noises have stopped, the pump can be switched off.
7. To do so, in the automatic/manual mode, set the pump to "Automatic".
8. Slowly open the piston valves on the secondary side (G and H).
9. Open a withdrawal point for domestic hot water (for example a tap) with a flow rate of at least 10 l/min and let the water run for about 2 minutes to vent the secondary circuit. Close all withdrawal points of the secondary circuit afterwards.
10. The domestic hot water module is now ready for operation.

\* 1.5 bars in the primary circuit = recommended minimum value

The pressure also depends on the individual system pressures and on the components of the heating installation!



**Secondary circuit**

### 7.3 Adjustment of the temperature

Set the desired (maximal) domestic hot water temperature at the controller at **"Main menu / Hot water / Nominal temperature"** (see controller instructions, chapter *Hot water*).

#### WARNING



#### **Danger of scalding due to hot water!**

In order to avoid scalding at the tap, the maximum domestic hot water temperature must not exceed **60 °C**

Recommendation for comfort optimisation: For high buffer tank temperatures (e.g. solar thermal system), the hot water temperature must be set as high as possible (max. 60 °C).

#### **Primary side**

The required temperature on the primary side in the buffer tank depends on the desired domestic hot water temperature and on the required tap quantity. The temperature in the buffer tank must be at least 5 K above the desired domestic hot water temperature.

#### **Secondary side:**

The possible withdrawal flow rate [l/min] at the tap depends on the domestic hot water temperature adjusted at the controller and on the temperature available in the buffer tank.

Due to the system, considerable modifications of the domestic water flow rate cause fluctuations of the hot water outlet temperature. These fluctuations are usually compensated by the piping network in the building or by adding cold water at the fittings.

The recommended maximum domestic hot water flow rate through the domestic hot water module is ~42 l/min.

## 7.4 Maximum withdrawal flow rate

Buffer tank temperature	Nominal temperature	max. output capacity*	Transmission performance	req. V <sub>storage tank</sub> per litre of HW	for an inlet temperature of 10 °C (cold water temperature) - max. withdrawal quantity** at the mixing valve at				Return temperature
					40 °C	45 °C	50 °C	55 °C	
<b>45 °C</b>	40 °C	17 l/min	36 kW	1.8 l	-	-	-	-	28 °C
<b>50 °C</b>	40 °C	24 l/min	51 kW	1.3 l	-	-	-	-	27 °C
	45 °C	16 l/min	40 kW	1.9 l	19 l/min	-	-	-	31 °C
<b>55 °C</b>	40 °C	30 l/min	64 kW	1.0 l	-	-	-	-	26 °C
	45 °C	23 l/min	56 kW	1.4 l	26 l/min	-	-	-	29 °C
	50 °C	16 l/min	44 kW	2.0 l	21 l/min	18 l/min	-	-	35 °C
<b>60 °C</b>	40 °C	36 l/min	76 kW	0.9 l	-	-	-	-	25 °C
	45 °C	28 l/min	69 kW	1.1 l	32 l/min	-	-	-	28 °C
	50 °C	22 l/min	60 kW	1.5 l	28 l/min	24 l/min	-	-	32 °C
	55 °C	15 l/min	48 kW	2.1 l	22 l/min	19 l/min	17 l/min	-	38 °C
<b>65 °C</b>	40 °C	42 l/min***	88 kW	0.6 l	-	-	-	-	24 °C
	45 °C	33 l/min	81 kW	0.9 l	38 l/min	-	-	-	27 °C
	<b>50 °C</b>	<b>27 l/min</b>	<b>74 kW</b>	<b>1.2 l</b>	<b>35 l/min</b>	<b>30 l/min</b>	-	-	<b>31 °C</b>
	55 °C	21 l/min	65 kW	1.5 l	30 l/min	26 l/min	23 l/min	-	35 °C
	60 °C	15 l/min	52 kW	2.1 l	24 l/min	21 l/min	18 l/min	16 l/min	41 °C
<b>70 °C</b>	40 °C	42 l/min***	88 kW	0.5 l	-	-	-	-	24 °C
	45 °C	38 l/min	93 kW	0.8 l	44 l/min	-	-	-	27 °C
	50 °C	31 l/min	87 kW	1.0 l	41 l/min	35 l/min	-	-	30 °C
	55 °C	25 l/min	79 kW	1.2 l	37 l/min	32 l/min	28 l/min	-	33 °C
	60 °C	20 l/min	69 kW	1.6 l	33 l/min	28 l/min	24 l/min	22 l/min	38 °C

Buffer tank temperature	Nominal temperature	* max. output capacity	Transmission performance	req. V <sub>storage tank</sub> per litre of HW	for an inlet temperature of 10 °C (cold water temperature) - max. withdrawal quantity** at the mixing valve at				Return temperature
					40 °C	45 °C	50 °C	55 °C	
75 °C	40 °C	42 l/min***	88 kW	0.5 l	-	-	-	-	24 °C
	45 °C	42 l/min***	102 kW	0.6 l	49 l/min	-	-	-	26 °C
	50 °C	36 l/min	99 kW	0.9 l	47 l/min	40 l/min	-	-	29 °C
	55 °C	29 l/min	92 kW	1.1 l	44 l/min	37 l/min	32 l/min	-	32 °C
	60 °C	24 l/min	84 kW	1.3 l	40 l/min	34 l/min	30 l/min	26 l/min	36 °C
80 °C	40 °C	42 l/min***	88 kW	0.4 l	-	-	-	-	23 °C
	45 °C	42 l/min***	102 kW	0.5 l	49 l/min	-	-	-	26 °C
	50 °C	40 l/min	111 kW	0.8 l	52 l/min	45 l/min	-	-	28 °C
	55 °C	33 l/min	105 kW	0.9 l	50 l/min	42 l/min	37 l/min	-	31 °C
	60 °C	28 l/min	98 kW	1.1 l	46 l/min	39 l/min	34 l/min	31 l/min	34 °C
85 °C	40 °C	42 l/min***	88 kW	0.4 l	-	-	-	-	23 °C
	45 °C	42 l/min***	102 kW	0.5 l	49 l/min	-	-	-	25 °C
	50 °C	42 l/min***	117 kW	0.6 l	56 l/min	47 l/min	-	-	28 °C
	55 °C	37 l/min	117 kW	0.8 l	55 l/min	47 l/min	41 l/min	-	30 °C
	60 °C	32 l/min	110 kW	1.0 l	52 l/min	45 l/min	39 l/min	35 l/min	33 °C
90 °C	40 °C	42 l/min***	88 kW	0.4 l	-	-	-	-	23 °C
	45 °C	42 l/min***	102 kW	0.4 l	49 l/min	-	-	-	25 °C
	50 °C	42 l/min***	117 kW	0.5 l	56 l/min	47 l/min	-	-	27 °C
	55 °C	41 l/min	128 kW	0.6 l	61 l/min	52 l/min	45 l/min	-	30 °C
	60 °C	35 l/min	122 kW	0.9 l	58 l/min	50 l/min	43 l/min	38 l/min	32 °C

Buffer tank temperature	Nominal temperature	* max. output capacity	Transmission performance	req. V <sub>storage tank</sub> per litre of HW	for an inlet temperature of 10 °C (cold water temperature) - max. withdrawal quantity** at the mixing valve at				Return temperature
					40 °C	45 °C	50 °C	55 °C	
95 °C	40 °C	42 l/min***	88 kW	0.3 l	-	-	-	-	23 °C
	45 °C	42 l/min***	102 kW	0.4 l	49 l/min	-	-	-	25 °C
	50 °C	42 l/min***	117 kW	0.5 l	56 l/min	47 l/min	-	-	27 °C
	55 °C	42 l/min***	132 kW	0.6 l	63 l/min	53 l/min	47 l/min	-	29 °C
	60 °C	38 l/min	134 kW	0.8 l	64 l/min	54 l/min	47 l/min	42 l/min	32 °C

\* The max. output capacity depends on the pressure drop on the primary side.

\*\* The max. withdrawal quantity at the mixing valve depends on the length and the insulation of the pipes.

\*\*\* Max. flow rate: 42 l/min, with pressure drop of the Friwa of 1000 mbars (for hydraulic reasons, higher values are only partly possible, measuring limit of the flow rate sensor ~42 l/min)

### How to read the table (example):

The temperature in the heating storage tank (primary) is 65 °C and the nominal hot water temperature set at the controller is 50 °C (secondary):

- With a storage temp. of 65 °C, a max. of 27 litres of domestic water per minute can be heated to 50 °C.
- This withdrawal corresponds to a performance of 74 kW.
- In order to obtain 1 litre (or 100 litres) of hot water with a temp. of 50 °C, the heating buffer tank must contain 1.2 litres (or 120 litres) with a temp. of 65 °C.
- These 27 litres of hot water per minute with 50 °C can be mixed with cold water (10 °C) at the tap (mixing valve) to obtain 30 litres per minute with 45 °C.
- The primary return temp. for a withdrawal of 27 litres of domestic hot water/minute is 31 °C.

## **8 Maintenance**

### **Optimal operation of the station**

In order to guarantee an optimal control, no additional hydraulic pressure losses should occur on the primary side (f. ex. due to the installation of a mud strainer, a strainer or a mixing valve).

### **NOTICE**

#### **Hygiene recommendation**

At temperatures below 60 °C, legionella bacteria can occur. After a longer downtime such as holidays, it is recommended to thoroughly flush all pipes for some minutes.

### **Optical control**

It is recommended to visually check the fresh water station every two months to ensure its proper operation. If you notice any problems on the system, consult a specialist.

### **Cleaning the station**

Clean the station with a damp cloth without any detergent.

## 9 Scope of delivery [specialist]

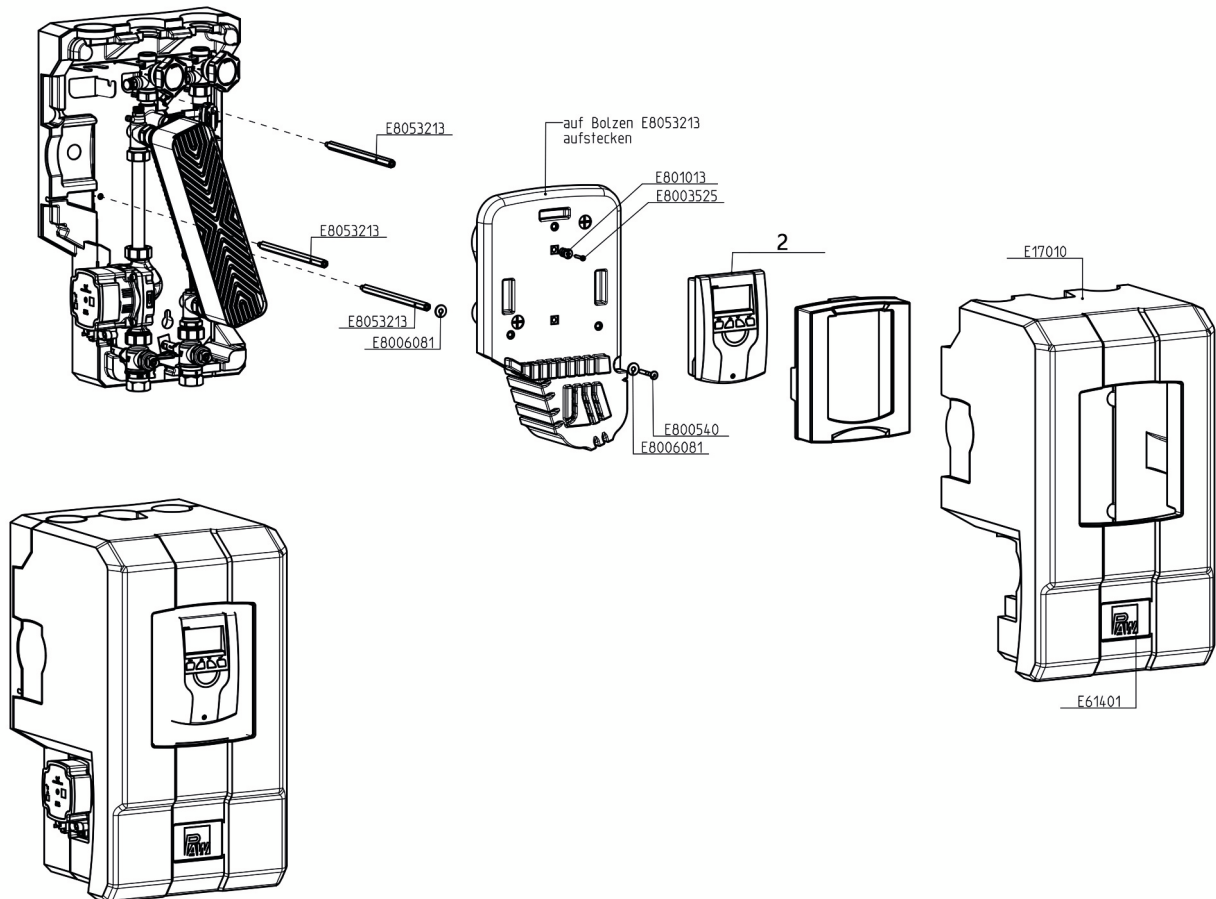
### NOTICE

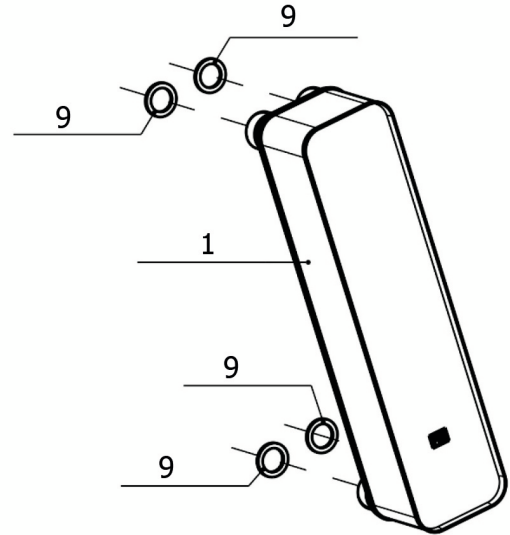
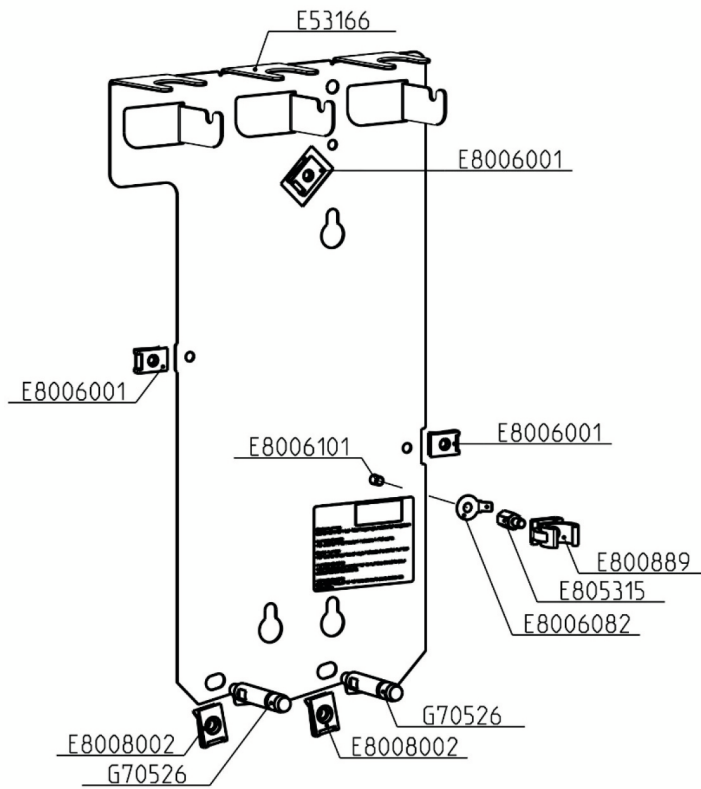
#### Serial number

Complaints and requests/orders of spare parts will only be processed with information on the serial number!

The serial number is placed on the support sheet of the station.

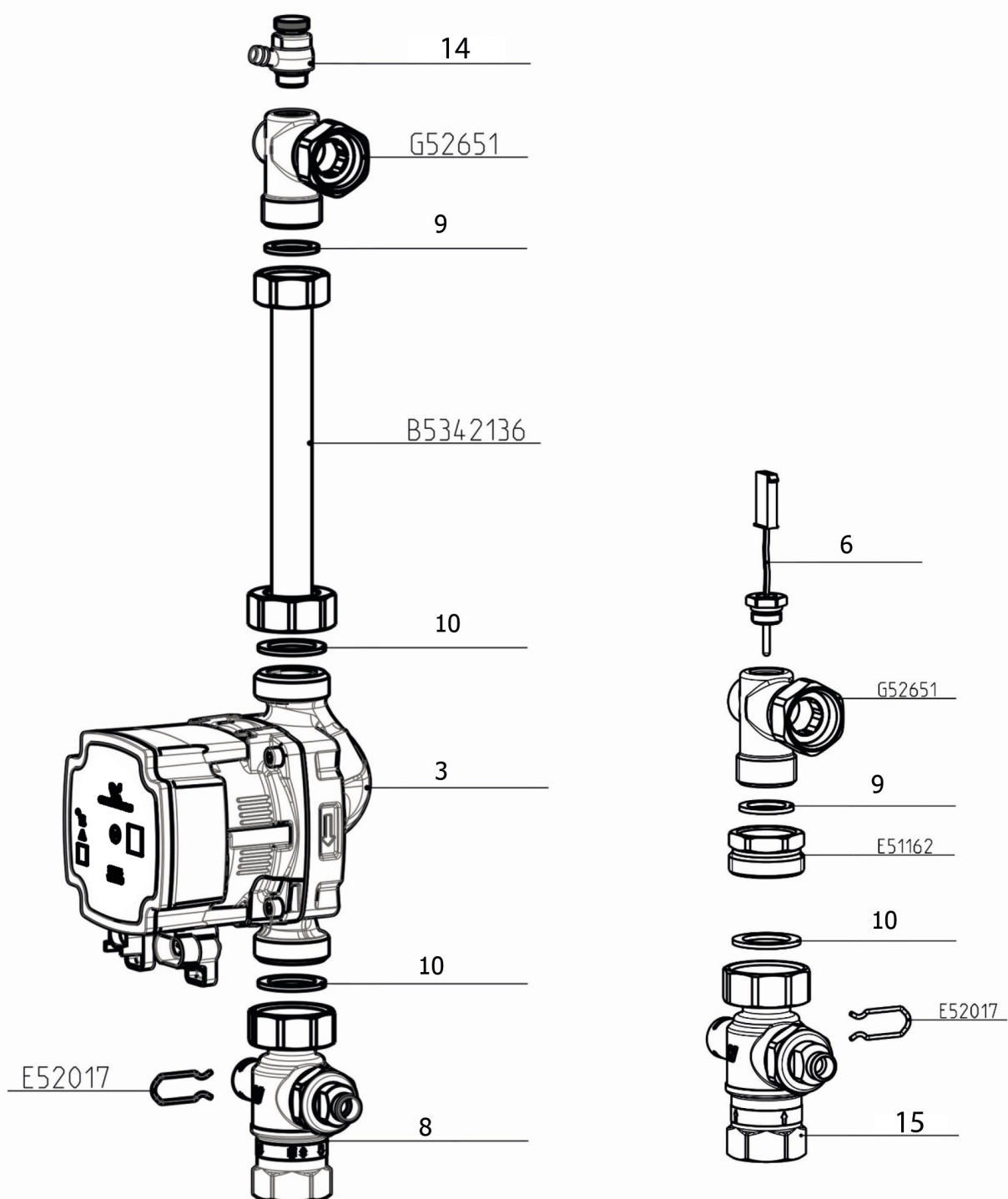
#### 9.1 Spare parts controller and insulation



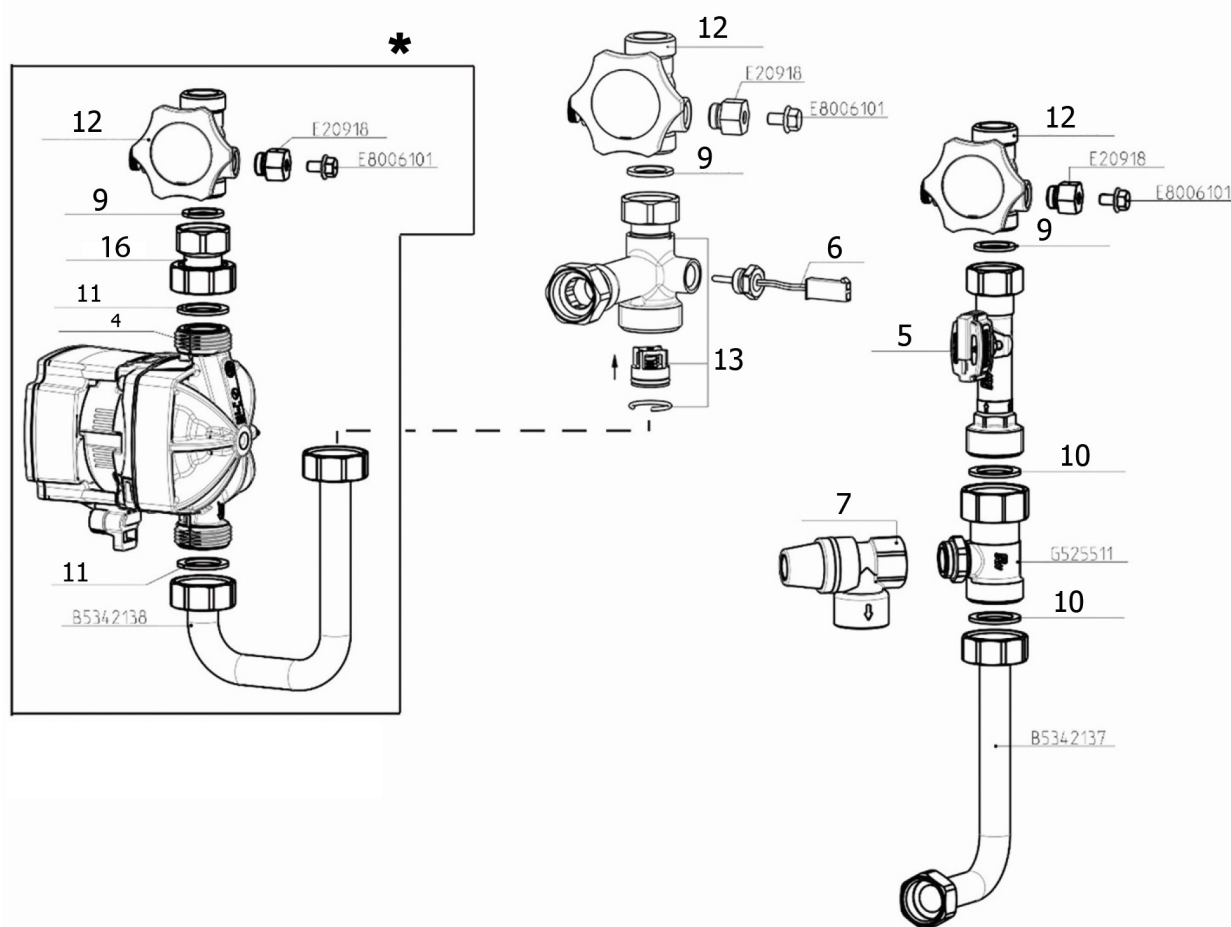


## 9 Scope of delivery [specialist]

### 9.2 Spare parts primary circuit



### 9.3 Spare parts secondary circuit



\*only included in the scope of delivery of 6401515 and 6401535

Position	Spare part	Item no.
1	Heat exchanger, copper solder, for station 6401510 + 6401515, with seals	N00173
	Coated heat exchanger for 6401530 + 6401535, with seals	N00255
2	Controller FC3.10 with wiring harness	N00252
3	Primary pump Grundfos UPM4 15-75, with seals	N00004
4	Circulation pump Grundfos UPM4 15-70 CIL3, with seals	N00003
5	VFS sensor, 2-40l/min, with sensor cable analogue	N00026
6	Temperature sensor Pt1000-B, with connection cable	N00005
7	Pressure relief valve ½" x ¾", MSV 10 bars	N00008

## 9 Scope of delivery [specialist]

Position	Spare part	Item no.
8	Thermometer ball valve with check valve	N00282
9	Gasket 24.0 x 17.0 x 2.0, ¼", for thread connection ¾", AFM, 10 pieces	N00030
10	Gasket 30.0 x 21.0 x 2.0, ½", for thread connection 1", AFM, 10 pieces	N00024
11	Gasket 30.0 x 21.0 x 2.0, ½", for thread connection 1", EPDM, 10 pieces	N00129
12	Piston valve DN 15; 2 x ¾" ext. thread; with seals	N00006
13	T-piece, flat sealing, 2 x ¾" union nut x 1" ext. thread, with seals, snap ring and non-return valve	N00002
14	Drain valve, ¼" ext. thread, self-sealing	N00519
15	Thermometer ball valve DN 20, F ¾" x ¾" int. thread	N00579
16	Flange socket, 1" union nut x ¾" int. thread, flat sealing, self-sealing	N00171

### Optional accessories

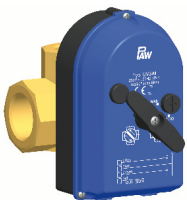



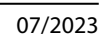
Illustration	Scope of delivery	Item no.
	<b>Return distribution set DN 25</b> 3-way valve with actuator, K <sub>V</sub> value: 11	640425
	<b>Safety group for domestic hot water tank</b> DN 20, opening pressure 7 bars, brass body, chromed	563907

Illustration	Scope of delivery	Item no.
	<p><b>Sampling valve</b></p> <p>flame-resistant, ¼" ext. thread, self-sealing, 5 mm square-head wrench</p> <p><b>Note:</b> One sampling valve is required for each piston valve.</p>	640422
	<p><b>Circulation set for internal retrofitting</b></p> <p>with high-efficiency pump Grundfos UPM4 15-70 CIL3, with piston valve</p>	6404111

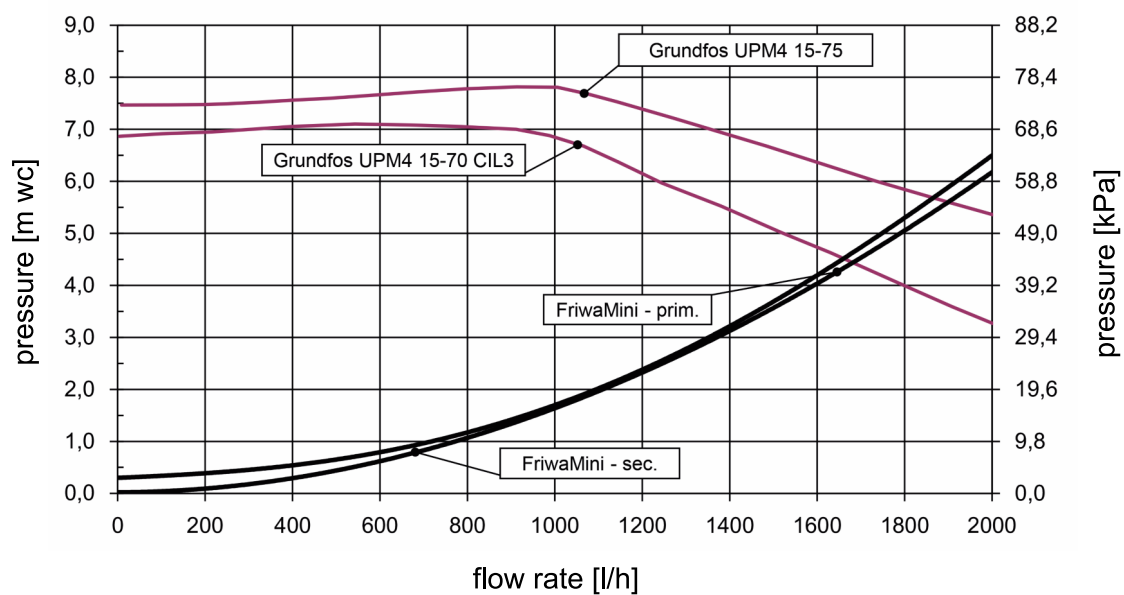
## 10 Technical data

Dimensions	FriwaMini	FriwaMini with circulation
Height (with insulation)	539 mm	
Width	309 mm	345 mm
Depth (with insulation)	324 mm	
Centre distance prim./sec.	90 mm	
Pipe connections		
Primary circuit (storage tank circuit)	¾" internal thread	
Secondary circuit (DHW circuit)	¾" external thread, flat sealing	
Secondary circuit (circulation)	--	¾" external thread, flat sealing
Operating data		
Max. admissible pressure	primary: 3 bars, secondary: 10 bars	
Operating temperature	2 – 95 °C	
K <sub>VS</sub> value primary	3.1	
K <sub>VS</sub> value secondary	2.4	
Equipment		
Check valve	1 x 200 mm wc	
Primary pump	High-efficiency pump with PWM control, 2-63 W	
Secondary pump	--	High-efficiency pump with PWM control, 2-54 W
Heat exchanger	32 plates	
Flow rate sensor	1 x VFS 2-40 l/min	
Temperature sensor	2 x Pt1000, rapid	
Materials		
Valves and fittings	Brass	
Seals: o-rings	EPDM	

## 10.1 Dimensional drawing

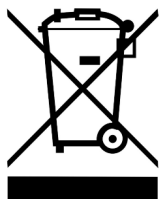


## 10.2 Pressure drop and pump characteristic curves



## 11 Disposal

### NOTICE



Electrical and electronic devices must not be disposed of in the household waste.

For your return, there are free collection points for electrical appliances and, if necessary, additional points of acceptance for the reuse of the devices in your area. The addresses can be obtained from your city or communal administration.

If the old electrical or electronic device contains personal data, you are responsible for deleting it before returning the device.

Batteries and rechargeable batteries must be removed prior to the disposal of the product. Depending on the product equipment (partly with optional accessories), single components can also contain batteries and rechargeable batteries.

Please observe the disposal symbols on the components.

### Disposal of transport and packaging materials

The packaging materials are made of recyclable materials and can be disposed of with recyclable materials.

## 12 Commissioning report

System operator		
Location of installation		
Serial numbers:		
• Domestic hot water module		
• Flow rate sensor		
• Controller		
• Software version		
Pipes primary	Diameter =                      mm; Length =                      m	
Pipes secondary	Diameter =                      mm; Length =                      m	
Pipes circulation	Diameter =                      mm; Length =                      m	
Other additionally installed components	<input type="checkbox"/> Return distribution set	
	Other	
Have both circuits been flushed and vented correctly? (no air noises in the pump)		<input type="checkbox"/> vented
Are all shut-off valves open in the cold water line?		<input type="checkbox"/> open
Is there a pressure of at least 1.5 bars on the primary side?		<input type="checkbox"/> checked
Is there a pressure of at least 2.5 bars on the secondary side?		<input type="checkbox"/> checked
Is the potential equalisation processed according to regulations?		<input type="checkbox"/> checked
Is there an error message on the display?		<input type="checkbox"/> no message
Installation company	Date, signature	

Item no. 99640151x-mub-en

Translation of the original instructions

We reserve the right to make technical changes without notice!

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