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English

Installation and Operation Instructions
Tank heat transfer module
Midi - DN 20 / Maxi - DN 25

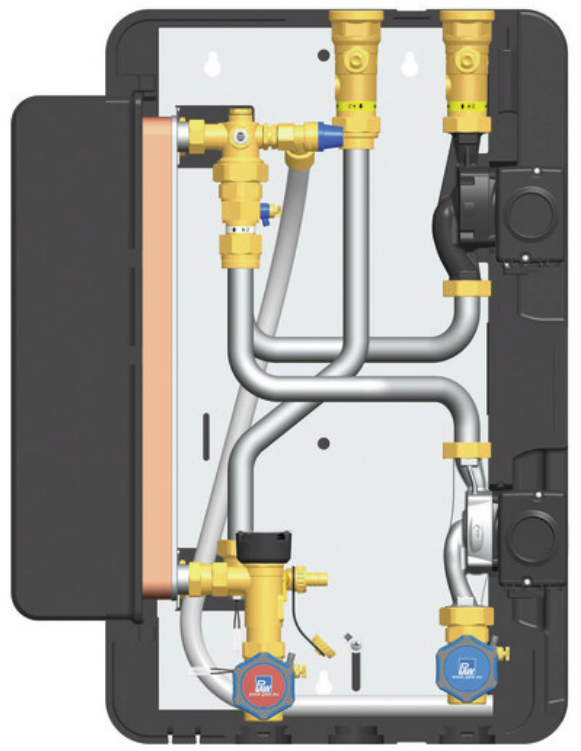


Table of Contents

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 tank heat transfer modules Midi and Maxi. The chapters marked with [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.

Type	Item number	Controller FC4.13	Primary pump	Secondary pump	Heat exchanger
Midi	**6435445**		Grundfos UPM2 25-75	Grundfos UPM2 15-75 CIL2	40 plates
Maxi	**6436465**		Grundfos UPML 25-105	Grundfos UPML 25-105 N	60 plates

These articles are covered by Article 4(3) of the Pressure Equipment Directive 2014/68/EU and are designed and manufactured in accordance with good engineering practice.

The tank heat transfer 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 product is a domestic hot water module operating on the principle of a flow-type water heater.

The tank heat transfer module is a premounted fitting group checked for tightness and used to transfer the heat between a heat source (e.g. buffer tank, boiler) and a (domestic hot water) storage tank.

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

- Ball valves in the primary circuit (heat source, e.g. buffer tank, boiler)
- Check valves to avoid undesired gravity circulation in the flow and return of the primary circuit
- Piston valves in the secondary circuit (domestic hot water circuit)
- Pressure relief valve in the secondary circuit to avoid inadmissible overpressures in the module
- Fill and drain valve to drain the heat exchanger
- Manual vent valve for venting the heat exchanger and the pump
- Electronic flow rate sensor FlowSonic in the secondary circuit as well as integrated temperature sensors for a performance-related speed control of the pumps and heat quantity measurement (secondary)

The switch valve (Midi: item no. 640423; Maxi: item no. 640424) for the stratified storage tank is not part of this module and must be ordered separately. The withdrawal valve (item no. 640422) for the sterile withdrawal of water according to the German Drinking Water Ordinance is also available separately.

1.3 Designated use

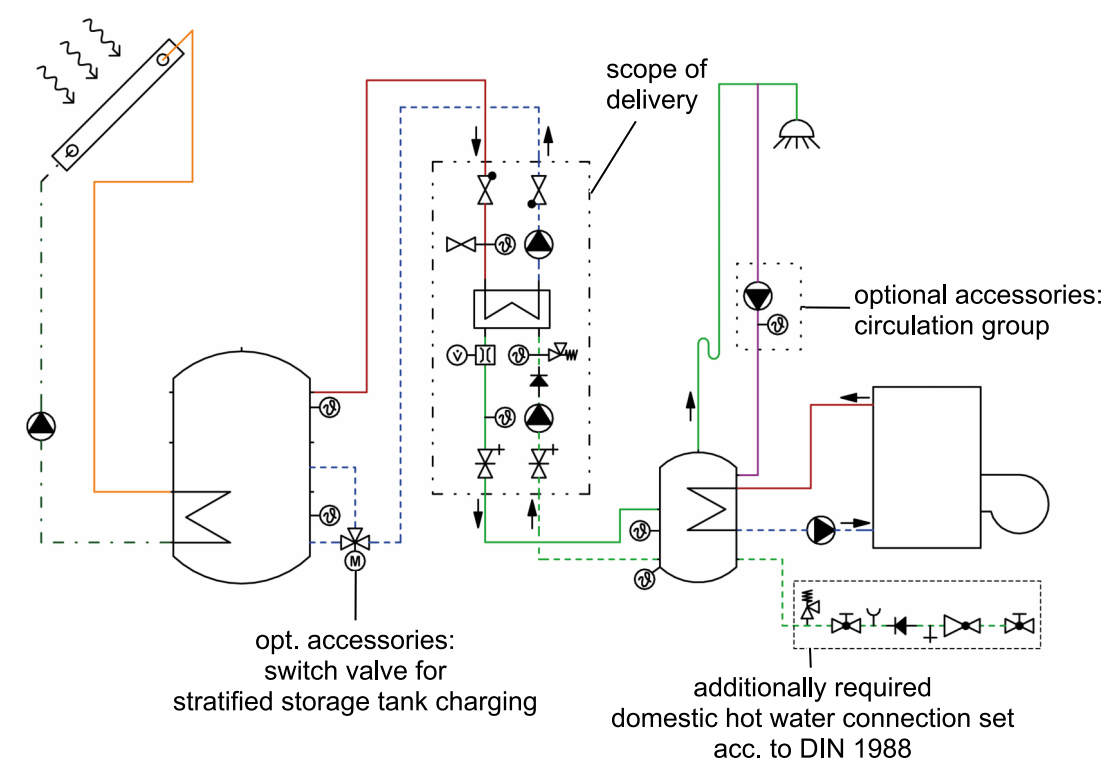
The tank heat transfer module may only be mounted in heating installations for the heat transfer between the heat source (e.g. buffer tank, boiler) and the domestic hot water tank. Due to its design, it may only be installed and operated as described in these instructions! The technical limit values specified in these instructions must be observed.

Only use PAW accessories with the product. Improper usage excludes any liability claims.

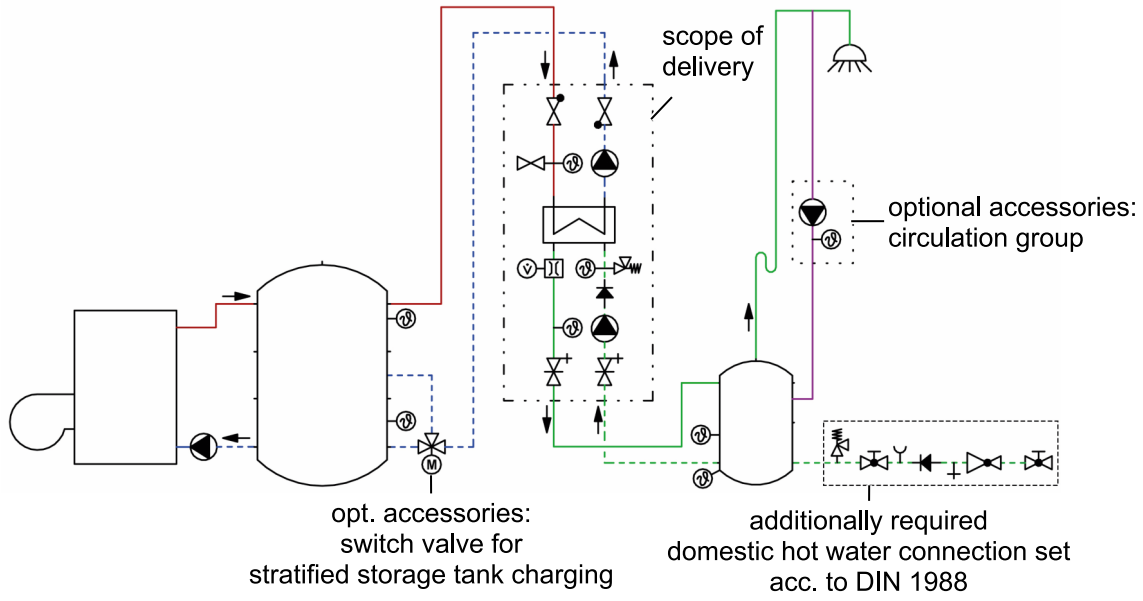
Do not put the module into operation in case of any visible damage.

The tank heat transfer module can be installed in different systems. It is mandatory to select the corresponding system in the controller (see controller instructions). The following figures show different connection options of the tank heat transfer module.

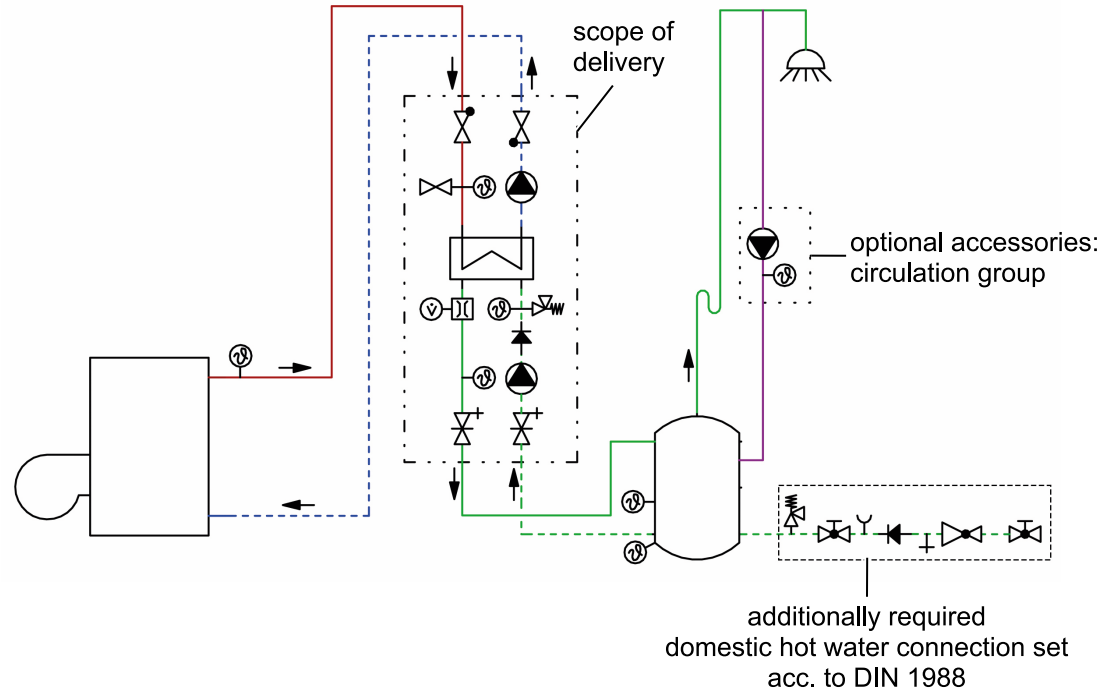
as preheating station = system 1 (scheme as an example):



as storage tank module with buffer tank= system 2 (scheme as an example):



as storage tank module without buffer tank= system 3 (scheme as an example):



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

⚠ CAUTION

Risk of burns!

Valves, fittings and pump may heat up to more than 95 °C during operation.

► The insulating shell must remain closed during operation.

⚠ WARNING

Malfunction!

► The 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.

NOTICE

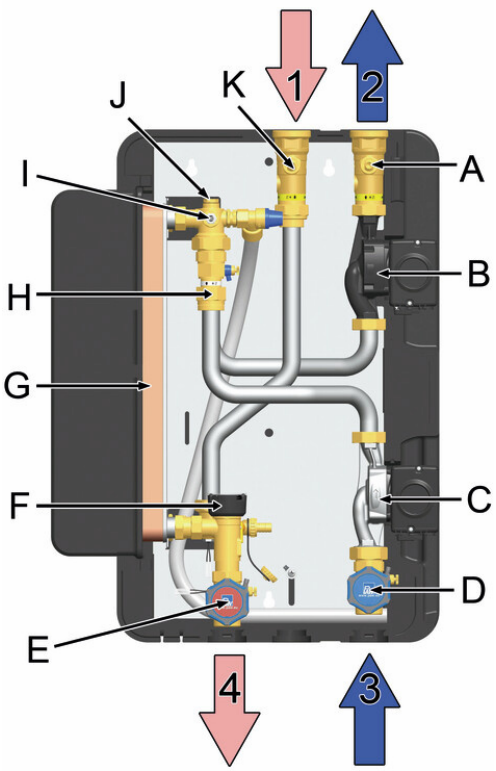
Material damage due to mineral oils!

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.

3 Product description



Connections

1 Primary side: Flow from the heat source

2 Primary side: Return to the heat source

3 Secondary side: Return from the DHW tank

4 Secondary side: Flow to the DHW tank

Equipment

A Ball valve with check valve

B Primary pump

C Secondary pump

D Piston valve with drain valve

E Piston valve with drain valve and temperature sensor

F Flow rate sensor FlowSonic

G Plate heat exchanger

H Non-return valve with drain valve

I Temperature sensor and pressure relief valve 10 bar, suitable for DHW

Only for the protection of the station. Does not replace the pressure relief valve that has to be mounted on site!

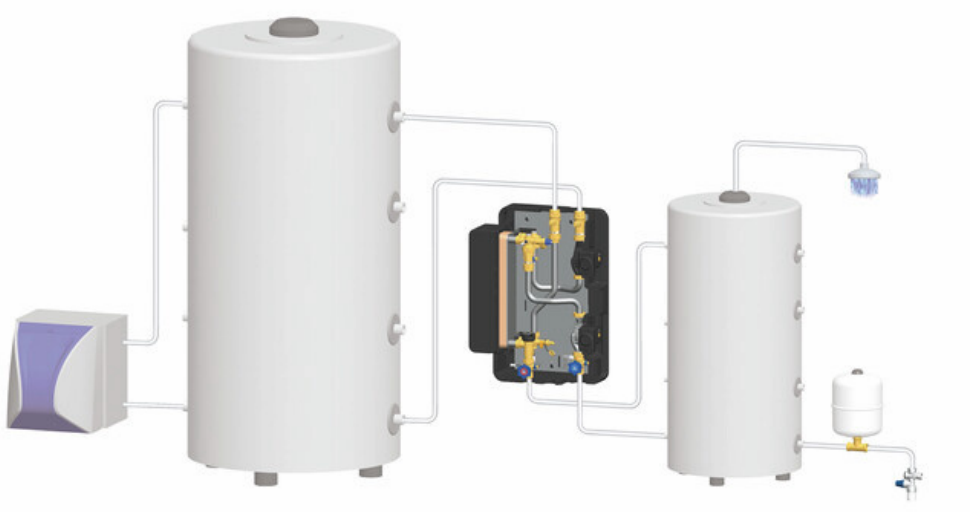
J Vent valve

K Ball valve with check valve

4 Dimensioning and planning

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

Mounting example:



Tank heat transfer module as storage tank module with buffer tank

4.1 Performance data tank heat transfer module Midi

T_{HW} set at the controller	Inlet T_{CW}	T_{FL} heat source	Max. transmissible output		T_{RET} heat source
50 °C	10 °C	55 °C	66.4 kW*1)	24.0 l/min	22.8 °C
		60 °C	83.7 kW*1)	30.2 l/min	19.2 °C
		70 °C	91.5 kW*2)	33.0 l/min	15.4 °C
55 C°	10 °C	60 °C	72.7 kW*1)	23.3 l/min	24.6 °C
		70 °C	102.9 kW*2)	33.0 l/min	18.3 °C
60 °C	10 °C	70 °C	97.7 kW*1)	28.2 l/min	22.2 °C
Recharging mode					
50 C°	45 °C	55 °C	11.4 kW*2)	33.0 l/min	45.2 °C
55 °C	50 °C	60 °C	11.4 kW*2)	33.0 l/min	50.2 °C
60 °C	55 °C	70 °C	11.3 kW*2)	33.0 l/min	55.0 °C

*1)Max. flow rate primary = 30 l/min - corresponds to 2.0 m of residual head of the primary pump

*2)Max. flow rate secondary = 33 l/min - corresponds to 2.0 m of residual head of the secondary pump

4.2 Performance data tank heat transfer module Maxi

T_{HW} set at the controller	Inlet T_{CW}	T_{FL} heat source	Max. transmissible output		T_{RET} heat source
50 °C	10 °C	55 °C	127.8 kW[*1)]	46.0 l/min	23.9 °C
		60 °C	162.9 kW[*1)]	58.7 l/min	20.4 °C
		70 °C	174.7 kW[*2)]	63.0 l/min	15.8 °C
55 C°	10 °C	60 °C	170.1 kW[*1)]	44.9 l/min	26.0 °C
		70 °C	196.6 kW[*2)]	63.0 l/min	19.4 °C
60 °C	10 °C	70 °C	190.1 kW[*1)]	54.9 l/min	23.6 °C
Recharging mode					
50 C°	45 °C	55 °C	21.6 kW[*2)]	63.0 l/min	45.2 °C
55 °C	50 °C	60 °C	21.6 kW[*2)]	63.0 l/min	50.2 °C
60 °C	55 °C	70 °C	21.6 kW[*2)]	63.0 l/min	55.1 °C

[*1)]Max. flow rate primary = 60 l/min - corresponds to 2.0 m of residual head of the primary pump

[*2)]Max. flow rate secondary = 63 l/min - corresponds to 2.0 m of residual head of the secondary pump

T_{HW}: domestic hot water temperature

T_{CW}: domestic cold water temperature

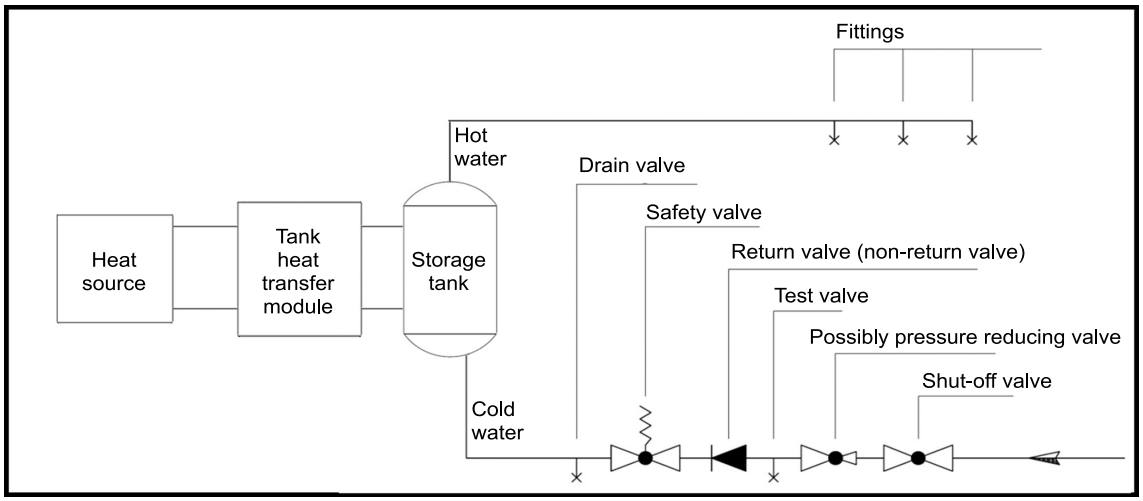
T_{FL}: Flow temperature

T_{RET}: Return temperature

5 Mounting and installation [specialist]

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

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

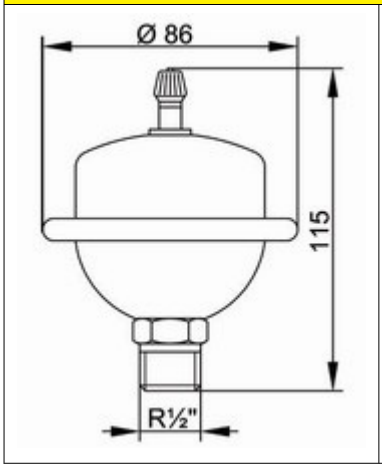


NOTICE

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 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!

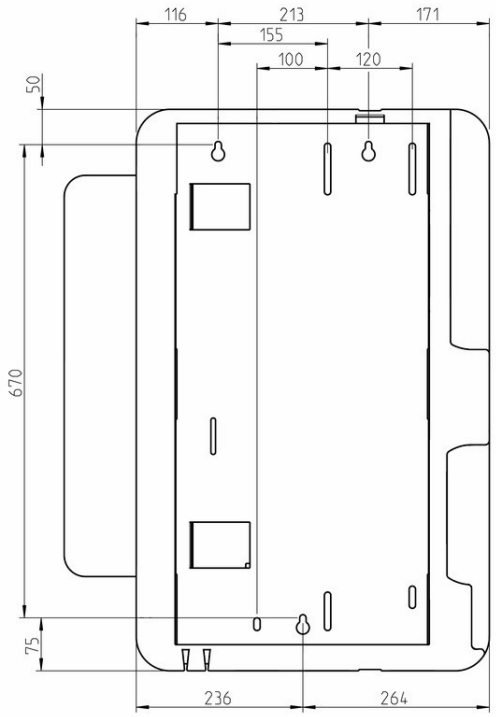
- ► Prior to commencing electrical work on the controller, pull the mains plug!
- ► Only after completing all work, plug the mains plug into a socket. This avoids an unintentional start of the motors.

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 tank heat transfer module near the heat source.
2. A drilling template can be used in order to facilitate the installation. You will find the drilling template on the module.
3. Copy the measures for the mounting holes to the wall.
4. Drill the holes and insert adequate wall plugs into the holes.
5. Turn the screws into the wall plugs in such a way that about 40 mm of each screw still stick out.
6. Remove the module from the packaging.
7. Remove the insulating front shell.
8. Hang the tank heat transfer module onto the screws. Tighten the screws, so that the sides of the insulation are flush to the wall.



drilling template

9. Connect the module to the installation by using the piping according to the adjacent illustration.

1 **Primary side:**
flow from the heat source
connection **Midi:** 1½" ext. thread,
connection **Maxi:** 2" ext. thread

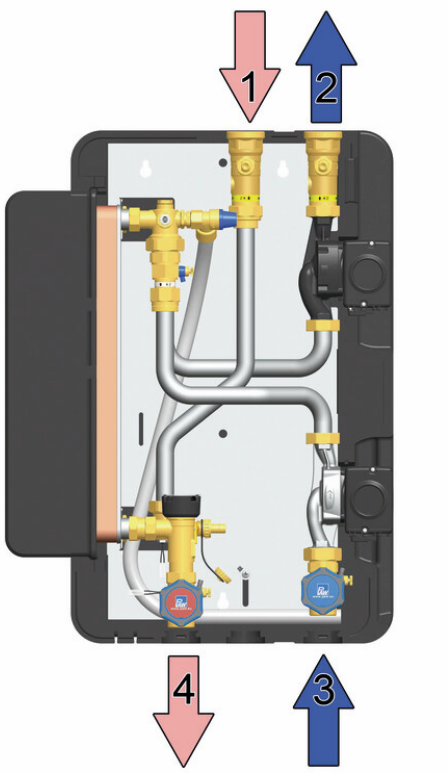
2 **Primary side:**
return to the heat source
connection **Midi:** 1½" ext. thread,
connection **Maxi:** 2" ext. thread

3 **Secondary side:**
return from the domestic hot water tank
connection **Midi:** 1" ext. thread, flat sealing,
Ccnnection **Maxi:** 1¼" ext. thread, flat sealing

4 **Secondary side:**
flow to the domestic hot water tank
connection **Midi:** 1" ext. thread, flat sealing,
connection **Maxi:** 1¼" ext. thread, flat sealing

Pipe distance to the wall

(primary) = 95 mm



Pipe distance to the wall

(secondary) = 167 mm

6 Commissioning [specialist]

NOTICE

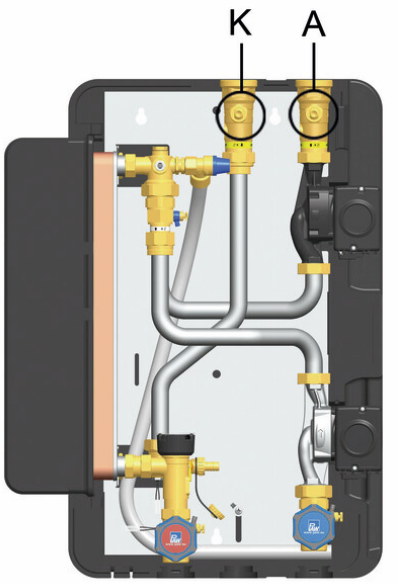
Open the valves in the pipes and in the module **slowly** in order to prevent pressure surges.

Function of the check valve

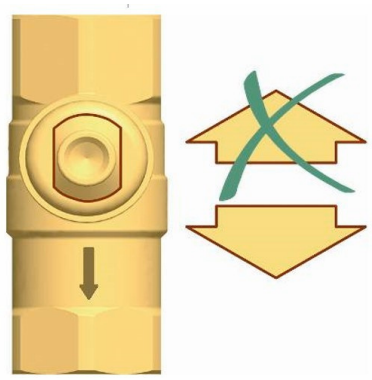
The ball valves (A) and (K) in the primary circuit are equipped with a check valve, in order to avoid unwanted gravity circulation.

To vent and flush the installation, the check valves must be open. For this purpose, turn the ball valves into **position 45°**. The check valve is not operating.

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

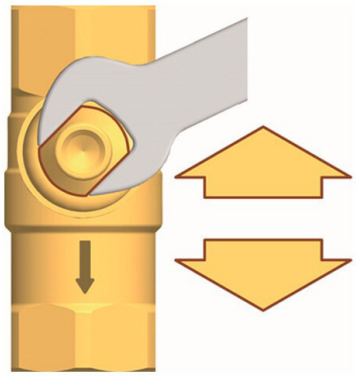


position 0°



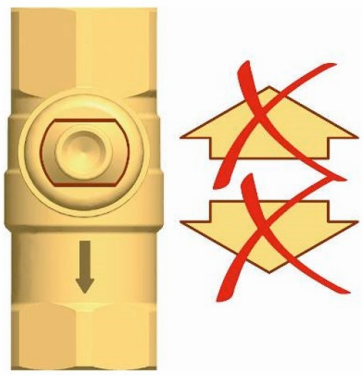
Check valve is operating, **flow only in flow direction.**

position 45°



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

position 90°



Ball valve closed, **no flow.**

6.1 Filling the primary circuit

⚠ WARNING

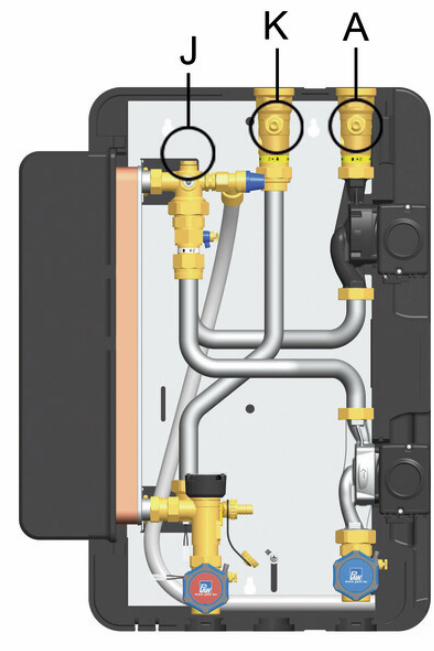
Danger of scalding due to hot water!

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. Open the ball valves [A] and [K] and put the check valves out of operation by turning them into **position 45°**.
2. Fill the storage tank using the fill valves available on site until an operating pressure of about 1.5 bar* is reached. Use heating water compliant with the standards VDI 2035 / ÖNorm H5195-1.
3. Carefully actuate the vent valve [J] and allow the air to escape.
4. Close the vent valve (J).
5. Check the operating pressure of the storage tank after the venting and increase the pressure if necessary.
6. Open the ball valves [A] and [K] completely by turning them into **position 0°**.



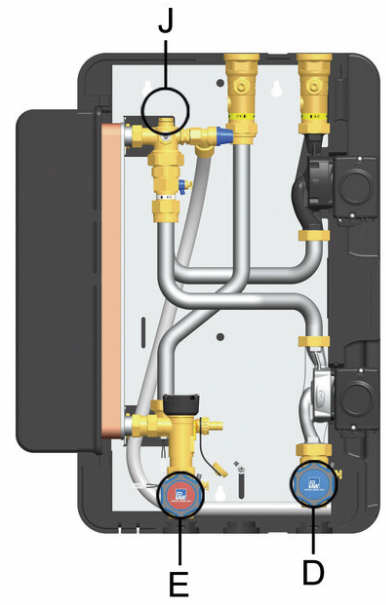
* 1.5 bar in the primary circuit = recommended minimum value

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

6.2 Filling the secondary circuit

The secondary circuit is filled via the valves at the domestic hot water tank. Make sure that only domestic water must be used. To avoid that dirt particles are washed into the heat exchanger, shut the piston valves of the module and wash out any present dirt particles / scale residues **prior to** the initial commissioning of the tank.

1. Open the piston valves [D|E].
2. Vent the secondary circuit by actuating the vent valve [J].
3. Fill the secondary circuit via the valves at the domestic hot water tank.
4. During commissioning, vent the station at the vent valve [J] to eliminate the air still present in the heat exchanger.



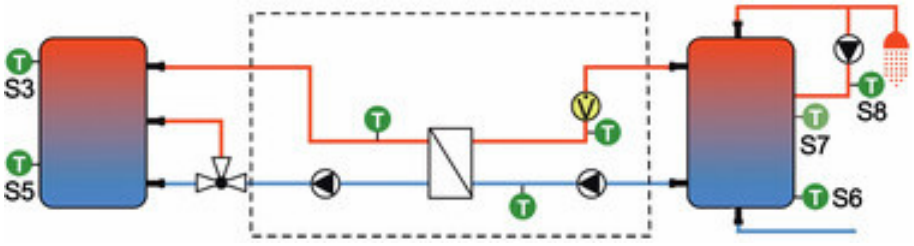
6.3 Controller connection

⚠ WARNING

Risk to life and limb due to electric shock!

- ► Prior to commencing electrical work on the controller, pull the mains plug!
- ► Only after completing all installation work as well as the flushing and filling, the mains plug of the controller can be plugged into a socket. This avoids an unintentional start of the motors.

Connection scheme of the tank heat transfer module



Basic system with optional stratification return and circulation pump

Please observe the separate instructions of the controller FC4.13!

1. Connect the temperature sensors to the controller:
   - S3: Flow heat source or boiler output
   - S6: Domestic hot water tank bottom
   - S7: Domestic hot water tank centre, below the circulation inlet

   Optional:
   - S5: for return stratification
   - S8: for circulation
2. Tighten all union nuts and thread connections.

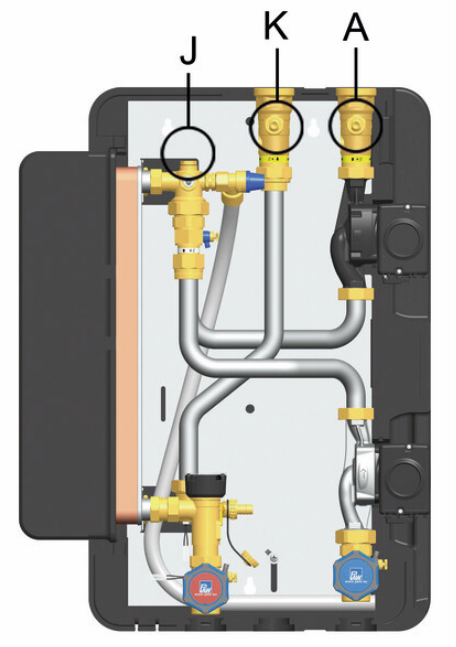
6.4 Commissioning of the controller

⚠ WARNING

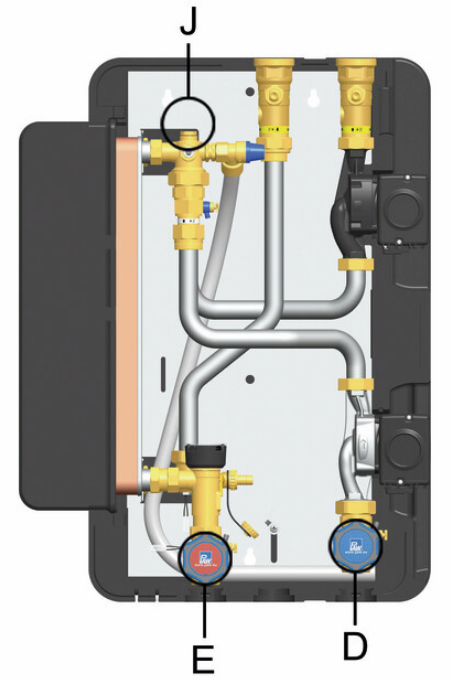
Risk to life and limb due to electric shock!

► Check if the sensors and the pumps are properly connected to the controller and if the controller housing is closed. Only under these circumstances, the mains plug of the controller can be plugged into a socket.

1. Make sure that the module is correctly integrated into the potential equalisation of the installation.
2. Connect the tank heat transfer module to the mains (230 V, 50 Hz) with the premounted connection cable.
3. Carry out the commissioning of the controller (see controller instructions, chapter *Commissioning*). Select "Manual mode" in the main menu of the controller and switch on the pump ("HE1", PWM signal = 100 %), see controller instructions, chapter *Manual mode*).
4. Let the pump run for several minutes to deaerate the module.
5. If the air noises do not stop, carefully manipulate the vent valve [J] while the pump is still running and let the air escape.



6. If the air noises have stopped, switch off the primary pump. For this purpose, select the manual mode ("HE1") in the main menu of the controller.
7. Repeat the steps 3 - 6 to vent the secondary circuit. For this purpose, select the manual mode ("HE2") in the main menu of the controller.
8. Set the pumps back to automatic operation. To do so, select *Manual mode* in the main menu of the controller and set the pumps to "AUTO".
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. Set the desired domestic hot water temperature at the controller (see following chapter). Please observe the separate controller instructions for the setting of further system-relevant parameters.
11. The tank heat transfer module is now ready for operation.

6.5 Adjustment of the temperature

During commissioning, set the desired (maximum) domestic hot water temperature in the commissioning menu of the controller (see controller instructions).

After commissioning, the desired (maximum) domestic hot water temperature can be adapted at the controller at **"Storage tank charging"** (see controller instructions).

⚠ 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 set at the controller and on the temperature available in the storage tank.

The following tables illustrate the relation between the flow temperature, the back-up heating capacity needed at the corresponding revolution speed of the secondary pump and the corresponding flow rate. The return temperature is calculated at a cold water temperature of 10 °C.
Please note:

- The maximum flow rate of the domestic hot water charging pump depends on the length and the type of the components integrated in the piping. A PWM signal of 90% corresponds to the maximum flow rate of the pump. An increase of the PWM signal above 90% does not lead to any performance increase of the pump.
- The outputs indicated in the following table serve only as approximate reference value for the dimensioning of the post-heating. Because of pressure losses and different insulations of the buffer charging circuit, the required outputs can be higher as indicated in order to assure a continuous domestic hot water supply.
- If the module is used as storage tank module without buffer tank (system 3), the performance of the module must be adapted to the performance of the boiler by means of the revolution speed of the secondary pump. Only in this way, a switching of the boiler is avoided and it is assured that the desired domestic hot water temperature is achieved.

6.6 Required post-heating capacity Midi

T_{FL} post-heating	Nominal temperature	Post-heating capacity required for x % secondary pump (PWM2) and corresponding flow rate (calculated for a cold water temperature of 10 °C)							T_{RET} to the buffer tank
		30 %	40 %	50 %	60 %	70 %	80 %	90 %	
		9 l/min	14 l/min	19 l/min	25 l/min	29 l/min	31 l/min	33 l/min	
45 °C	40 °C	18 kW	29 kW	39 kW	52 kW	60 kW	64 kW	68 kW	20 °C
50 °C	40 °C	18 kW	29 kW	39 kW	52 kW	60 kW	64 kW	68 kW	17 °C
	45 °C	21 kW	34 kW	46 kW	60 kW	70 kW	75 kW	80 kW	22 °C
55 °C	40 °C	18 kW	29 kW	39 kW	52 kW	60 kW	64 kW	68 kW	15 °C
	45 °C	21 kW	34 kW	46 kW	60 kW	70 kW	75 kW	80 kW	18 °C
	50 °C	24 kW	38 kW	52 kW	69 kW	80 kW	85 kW	91 kW	23 °C
60 °C	40 °C	18 kW	29 kW	39 kW	52 kW	60 kW	64 kW	68 kW	14 °C
	45 °C	21 kW	34 kW	46 kW	60 kW	70 kW	75 kW	80 kW	17 °C
	50 °C	24 kW	38 kW	52 kW	69 kW	80 kW	85 kW	91 kW	20 °C
	55 °C	28 kW	43 kW	59 kW	77 kW	90 kW	96 kW	102 kW	25 °C
65 °C	40 °C	18 kW	29 kW	39 kW	52 kW	60 kW	64 kW	68 kW	13 °C
	45 °C	21 kW	34 kW	46 kW	60 kW	70 kW	75 kW	80 kW	15 °C
	50 °C	**24 kW**	**38 kW**	**52 kW**	**69 kW**	**80 kW**	**85 kW**	**91 kW**	**18 °C**
	55 °C	28 kW	43 kW	59 kW	77 kW	90 kW	96 kW	102 kW	21 °C
	60 °C	31 kW	48 kW	65 kW	86 kW	100 kW	107 kW	114 kW	27 °C
70 °C	40 °C	18 kW	29 kW	39 kW	52 kW	60 kW	64 kW	68 kW	13 °C
	45 °C	21 kW	34 kW	46 kW	60 kW	70 kW	75 kW	80 kW	15 °C
	50 °C	24 kW	38 kW	52 kW	69 kW	80 kW	85 kW	91 kW	16 °C
	55 °C	28 kW	43 kW	59 kW	77 kW	90 kW	96 kW	102 kW	19 °C
	60 °C	31 kW	48 kW	65 kW	86 kW	100 kW	107 kW	114 kW	23 °C
75 °C	40 °C	18 kW	29 kW	39 kW	52 kW	60 kW	64 kW	68 kW	12 °C
	45 °C	21 kW	34 kW	46 kW	60 kW	70 kW	75 kW	80 kW	14 °C
	50 °C	24 kW	38 kW	52 kW	69 kW	80 kW	85 kW	91 kW	15 °C
	55 °C	28 kW	43 kW	59 kW	77 kW	90 kW	96 kW	102 kW	18 °C
	60 °C	31 kW	48 kW	65 kW	86 kW	100 kW	107 kW	114 kW	20 °C

T_{FL} post-heating	Nominal temperature	Post-heating capacity required for x % secondary pump (PWM2) and corresponding flow rate (calculated for a cold water temperature of 10 °C)							T_{RET} to the buffer tank
		30 %	40 %	50 %	60 %	70 %	80 %	90 %	
		9 l/min	14 l/min	19 l/min	25 l/min	29 l/min	31 l/min	33 l/min	
80 °C	40 °C	18 kW	29 kW	39 kW	52 kW	60 kW	64 kW	68 kW	12 °C
	45 °C	21 kW	34 kW	46 kW	60 kW	70 kW	75 kW	80 kW	13 °C
	50 °C	24 kW	38 kW	52 kW	69 kW	80 kW	85 kW	91 kW	15 °C
	55 °C	28 kW	43 kW	59 kW	77 kW	90 kW	96 kW	102 kW	16 °C
	60 °C	31 kW	48 kW	65 kW	86 kW	100 kW	107 kW	114 kW	19 °C
85 °C	40 °C	18 kW	29 kW	39 kW	52 kW	60 kW	64 kW	68 kW	11 °C
	45 °C	21 kW	34 kW	46 kW	60 kW	70 kW	75 kW	80 kW	12 °C
	50 °C	24 kW	38 kW	52 kW	69 kW	80 kW	85 kW	91 kW	14 °C
	55 °C	28 kW	43 kW	59 kW	77 kW	90 kW	96 kW	102 kW	15 °C
	60 °C	31 kW	48 kW	65 kW	86 kW	100 kW	107 kW	114 kW	17 °C
90 °C	40 °C	18 kW	29 kW	39 kW	52 kW	60 kW	64 kW	68 kW	11 °C
	45 °C	21 kW	34 kW	46 kW	60 kW	70 kW	75 kW	80 kW	12 °C
	50 °C	24 kW	38 kW	52 kW	69 kW	80 kW	85 kW	91 kW	13 °C
	55 °C	28 kW	43 kW	59 kW	77 kW	90 kW	96 kW	102 kW	15 °C
	60 °C	31 kW	48 kW	65 kW	86 kW	100 kW	107 kW	114 kW	16 °C
95 °C	40 °C	18 kW	29 kW	39 kW	52 kW	60 kW	64 kW	68 kW	11 °C
	45 °C	21 kW	34 kW	46 kW	60 kW	70 kW	75 kW	80 kW	12 °C
	50 °C	24 kW	38 kW	52 kW	69 kW	80 kW	85 kW	91 kW	13 °C
	55 °C	28 kW	43 kW	59 kW	77 kW	90 kW	96 kW	102 kW	14 °C
	60 °C	31 kW	48 kW	65 kW	86 kW	100 kW	107 kW	114 kW	16 °C

Example for system 1 and system 2:

Flow temperature post-heating (heat source): 65 °C

Domestic hot water temperature set at the controller: 50 °C

- Maximum withdrawal flow rate: 33 l/min (for maximum revolution speed of the secondary pump ≥ 90% [PWM2])
- Transmission performance: 91 kW
- Primary return temperature for a withdrawal of 33 litres of domestic hot water/minute: 18 °C.

Example for system 3:

Flow temperature of the heat source = minimum nominal temperature set at the boiler = 65 °C

Domestic hot water temperature set at the controller: 50 °C

NOTICE

For a boiler with a performance of 75 kW, the maximum revolution speed of the secondary pump must be set!

If the revolution speed of the secondary pump (PWM2) is set too high, the domestic hot water temperature set at the controller will not be achieved!

If the revolution speed of the secondary pump (PWM2) is set too low, the boiler starts to switch because the performance is not transmitted.

Calculation of the adjustment value:

10 % PWM2 correspond to 11 kW in this range of performance (69 kW - 80 kW)

1 % PWM2 correspond to approx. 1.1 kW

Increase needed: 75 kW - 69 kW = 6 kW

6 kW : 1.1 kW = approx. 5

69 kW = 60 % PWM2 -> 75 kW = 65 % PWM2

⚠ CAUTION

Damage to property!

This adjustment value must be checked during commissioning!

Minimally lower domestic hot water temperatures are possibly harmless. If necessary, the maximum boiler temperature must be increased in order to avoid a switching of the boiler!

If the tank heat transfer module operates directly at a heating device (system 3), it must be checked during the planning if it is allowed to run the heating device with the achievable cold return temperatures. Otherwise, a return flow temperature maintenance **and** a hydraulic separator may be necessary!

6.7 Required post-heating capacity Maxi

T_{FL} post-heating	Nominal temperature	Post-heating capacity required for x % secondary pump (PWM2) and corresponding flow rate (calculated for a cold water temperature of 10 °C)							T_{RET} to the buffer tank
		30 %	40 %	50 %	60 %	70 %	80 %	90 %	
		8 l/min	18 l/min	30 l/min	40 l/min	50 l/min	60 l/min	64 l/min	
45 °C	40 °C	17 kW	38 kW	63 kW	83 kW	104 kW	125 kW	133 kW	20 °C
50 °C	40 °C	17 kW	38 kW	63 kW	83 kW	104 kW	125 kW	133 kW	17 °C
	45 °C	19 kW	44 kW	73 kW	97 kW	121 kW	146 kW	155 kW	22 °C
55 °C	40 °C	17 kW	38 kW	63 kW	83 kW	104 kW	125 kW	133 kW	15 °C
	45 °C	19 kW	44 kW	73 kW	97 kW	121 kW	146 kW	155 kW	18 °C
	50 °C	22 kW	50 kW	83 kW	111 kW	139 kW	166 kW	178 kW	23 °C
60 °C	40 °C	17 kW	38 kW	63 kW	83 kW	104 kW	125 kW	133 kW	14 °C
	45 °C	19 kW	44 kW	73 kW	97 kW	121 kW	146 kW	155 kW	17 °C
	50 °C	22 kW	50 kW	83 kW	111 kW	139 kW	166 kW	178 kW	20 °C
	55 °C	25 kW	56 kW	94 kW	125 kW	156 kW	187 kW	200 kW	25 °C
65 °C	40 °C	17 kW	38 kW	63 kW	83 kW	104 kW	125 kW	133 kW	13 °C
	45 °C	19 kW	44 kW	73 kW	97 kW	121 kW	146 kW	155 kW	15 °C
	50 °C	**22 kW**	**50 kW**	**83 kW**	**111 kW**	**139 kW**	**166 kW**	**178 kW**	**18 °C**
	55 °C	25 kW	56 kW	94 kW	125 kW	156 kW	187 kW	200 kW	21 °C
	60 °C	28 kW	62 kW	104 kW	138 kW	173 kW	208 kW	222 kW	27 °C
70 °C	40 °C	17 kW	38 kW	63 kW	83 kW	104 kW	125 kW	133 kW	13 °C
	45 °C	19 kW	44 kW	73 kW	97 kW	121 kW	146 kW	155 kW	15 °C
	50 °C	22 kW	50 kW	83 kW	111 kW	139 kW	166 kW	178 kW	16 °C
	55 °C	25 kW	56 kW	94 kW	125 kW	156 kW	187 kW	200 kW	19 °C
	60 °C	28 kW	62 kW	104 kW	138 kW	173 kW	208 kW	222 kW	23 °C
75 °C	40 °C	17 kW	38 kW	63 kW	83 kW	104 kW	125 kW	133 kW	12 °C
	45 °C	19 kW	44 kW	73 kW	97 kW	121 kW	146 kW	155 kW	14 °C
	50 °C	22 kW	50 kW	83 kW	111 kW	139 kW	166 kW	178 kW	15 °C
	55 °C	25 kW	56 kW	94 kW	125 kW	156 kW	187 kW	200 kW	18 °C
	60 °C	28 kW	62 kW	104 kW	138 kW	173 kW	208 kW	222 kW	20 °C

T_{FL} post-heating	Nominal temperature	Post-heating capacity required for x % secondary pump (PWM2) and corresponding flow rate (calculated for a cold water temperature of 10 °C)							T_{RET} to the buffer tank
		30 %	40 %	50 %	60 %	70 %	80 %	90 %	
		8 l/min	18 l/min	30 l/min	40 l/min	50 l/min	60 l/min	64 l/min	
80 °C	40 °C	17 kW	38 kW	63 kW	83 kW	104 kW	125 kW	133 kW	12 °C
	45 °C	19 kW	44 kW	73 kW	97 kW	121 kW	146 kW	155 kW	13 °C
	50 °C	22 kW	50 kW	83 kW	111 kW	139 kW	166 kW	178 kW	15 °C
	55 °C	25 kW	56 kW	94 kW	125 kW	156 kW	187 kW	200 kW	16 °C
	60 °C	28 kW	62 kW	104 kW	138 kW	173 kW	208 kW	222 kW	19 °C
85 °C	40 °C	17 kW	38 kW	63 kW	83 kW	104 kW	125 kW	133 kW	11 °C
	45 °C	19 kW	44 kW	73 kW	97 kW	121 kW	146 kW	155 kW	12 °C
	50 °C	22 kW	50 kW	83 kW	111 kW	139 kW	166 kW	178 kW	14 °C
	55 °C	25 kW	56 kW	94 kW	125 kW	156 kW	187 kW	200 kW	15 °C
	60 °C	28 kW	62 kW	104 kW	138 kW	173 kW	208 kW	222 kW	17 °C
90 °C	40 °C	17 kW	38 kW	63 kW	83 kW	104 kW	125 kW	133 kW	11 °C
	45 °C	19 kW	44 kW	73 kW	97 kW	121 kW	146 kW	155 kW	12 °C
	50 °C	22 kW	50 kW	83 kW	111 kW	139 kW	166 kW	178 kW	13 °C
	55 °C	25 kW	56 kW	94 kW	125 kW	156 kW	187 kW	200 kW	15 °C
	60 °C	28 kW	62 kW	104 kW	138 kW	173 kW	208 kW	222 kW	16 °C
95 °C	40 °C	17 kW	38 kW	63 kW	83 kW	104 kW	125 kW	133 kW	11 °C
	45 °C	19 kW	44 kW	73 kW	97 kW	121 kW	146 kW	155 kW	12 °C
	50 °C	22 kW	50 kW	83 kW	111 kW	139 kW	166 kW	178 kW	13 °C
	55 °C	25 kW	56 kW	94 kW	125 kW	156 kW	187 kW	200 kW	14 °C
	60 °C	28 kW	62 kW	104 kW	138 kW	173 kW	208 kW	222 kW	16 °C

Example for system 1 and system 2:

Flow temperature post-heating (heat source): 65 °C

Domestic hot water temperature set at the controller: 50 °C

- Maximum withdrawal flow rate: 64 l/min (for maximum revolution speed of the secondary pump ≥ 90 % [PWM2])
- Transmission performance: 178 kW
- Primary return temperature for a withdrawal of 64 litres of domestic hot water/minute: 18 °C.

Example for system 3:

Flow temperature of the heat source = minimum nominal temperature set at the boiler = 65 °C

Domestic hot water temperature set at the controller: 50 °C

NOTICE

For a boiler with a performance of 150 kW, the maximum revolution speed of the secondary pump must be set!

If the revolution speed of the secondary pump (PWM2) is set too high, the domestic hot water temperature set at the controller will not be achieved!

If the revolution speed of the secondary pump (PWM2) is set too low, the boiler starts to switch because the performance is not transmitted.

Calculation of the adjustment value:

10 % PWM2 correspond to 27 kW in this range of performance (166 kW - 139 kW)

1 % PWM2 correspond to approx. 2.7 kW

Increase needed: 150 kW - 139 kW = 11 kW

11 kW : 2.7 kW = 4

139 kW = 70 % PWM2 -> 150 kW = 74 % PWM2

⚠ CAUTION

Damage to property!

This adjustment value must be checked during commissioning!

Minimally lower domestic hot water temperatures are possibly harmless. If necessary, the maximum boiler temperature must be increased in order to avoid a switching of the boiler!

If the tank heat transfer module operates directly at a heating device (system 3), it must be checked during the planning if it is allowed to run the heating device with the achievable cold return temperatures. Otherwise, a return flow temperature maintenance **and** a hydraulic separator may be necessary!

7 Circulation mode

The controller can optionally actuate a circulation pump.

For the operation of the circulation pump, three possible operation modes are stored in the controller (see controller instructions, chapter *Circulation*).

- **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 the 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.

- **Time- and temperature-dependant operation:**

  This operation mode combines the time- and the temperature-dependant operation.
  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.

NOTICE

Damage to property!

When the 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%).

8 Maintenance [specialist]

PAW modules are low in maintenance. Nevertheless, the following work needs to be carried out at regular intervals. For this, we recommend concluding a maintenance agreement with PAW GmbH & Co. KG.

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.

8.1 Inspection

The following table provides recommendations for the frequency of inspection activities.

Component	Check	Interval
Pipes	• Visual inspection for leaks, corrosion and other damaging effects • Check of the insulation • For removable sections: check for stone formation or corrosion from the inside	Annually
Heat exchanger (tightness of the partition walls)	• Control of the system pressure on the primary side	Semi-annually
Heat exchanger (stone formation)	• Comparison of the set with the real hot water temperature	Semi-annually
Noise generation	• Check the station for critical noises during the tapping process, e.g. trapped air	Semi-annually
Temperature / flow rate sensors	• Comparison of the information on the display and plausibility check	Semi-annually
Electronic components and plug connections	• Check if the cable plug connections of all components are firmly in place and intact	Semi-annually

8.2 Maintenance

The following table provides recommendations for the frequency of maintenance activities.

Component	Check	Interval
Safety valve	• Check for leaks by manual actuation • Actuation of the venting device to ensure that the valve is not stuck or calcified • Check whether the valve closes automatically after actuation and the water drains off completely	Semi-annually
Shut-off valves	• Check for mobility by opening and closing	Annually
Return stratification valve	• Check the functionality by manually activating the relay in the menu "Automatic/manual mode"	Semi-annually

Clean the station with a damp cloth without any detergent.

⚠ WARNING

Risk to life and limb due to hot fluids!

Depending on the conditions, temperatures of up to 95 °C can develop in the product and escape. There is a risk of burns!

► When carrying out any service, maintenance or repair work, ensure that you are equipped with the necessary protective equipment (gloves / goggles).

► Before carrying out service, maintenance or repair work, take the product out of operation and let cool down.

9 Scope of delivery [specialist]

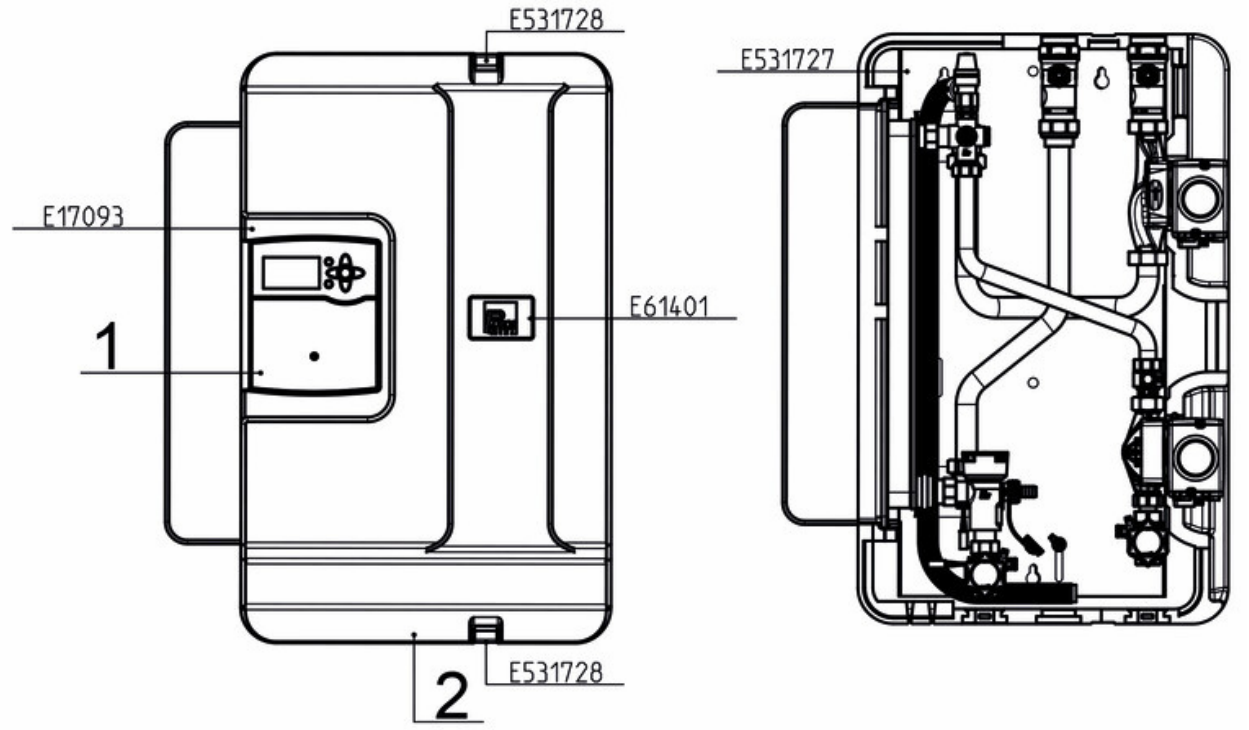
NOTICE

Serial number

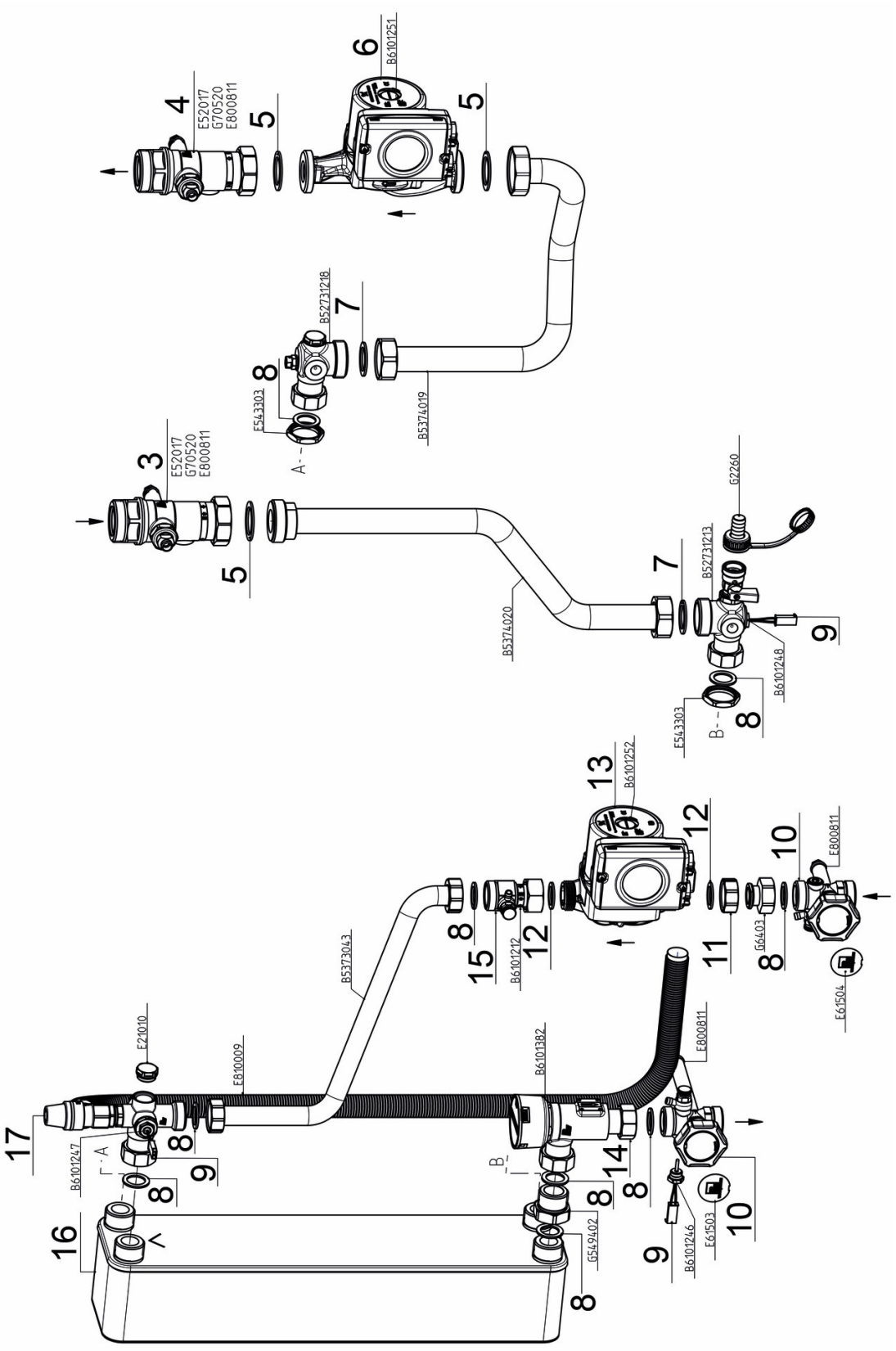
Complaints and requests/orders of spare parts will only be processed with information on the serial number!

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

9.1 Spare parts control and insulation Midi

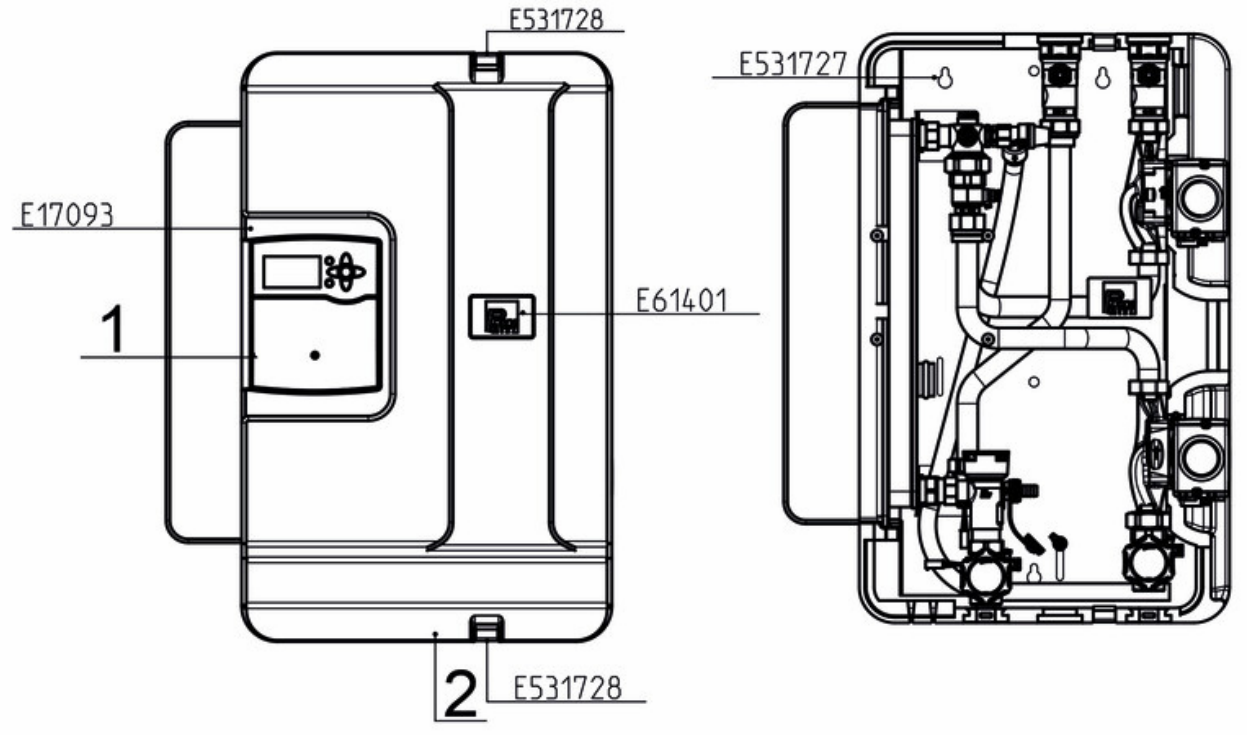


9.2 Spare parts hydraulics Midi

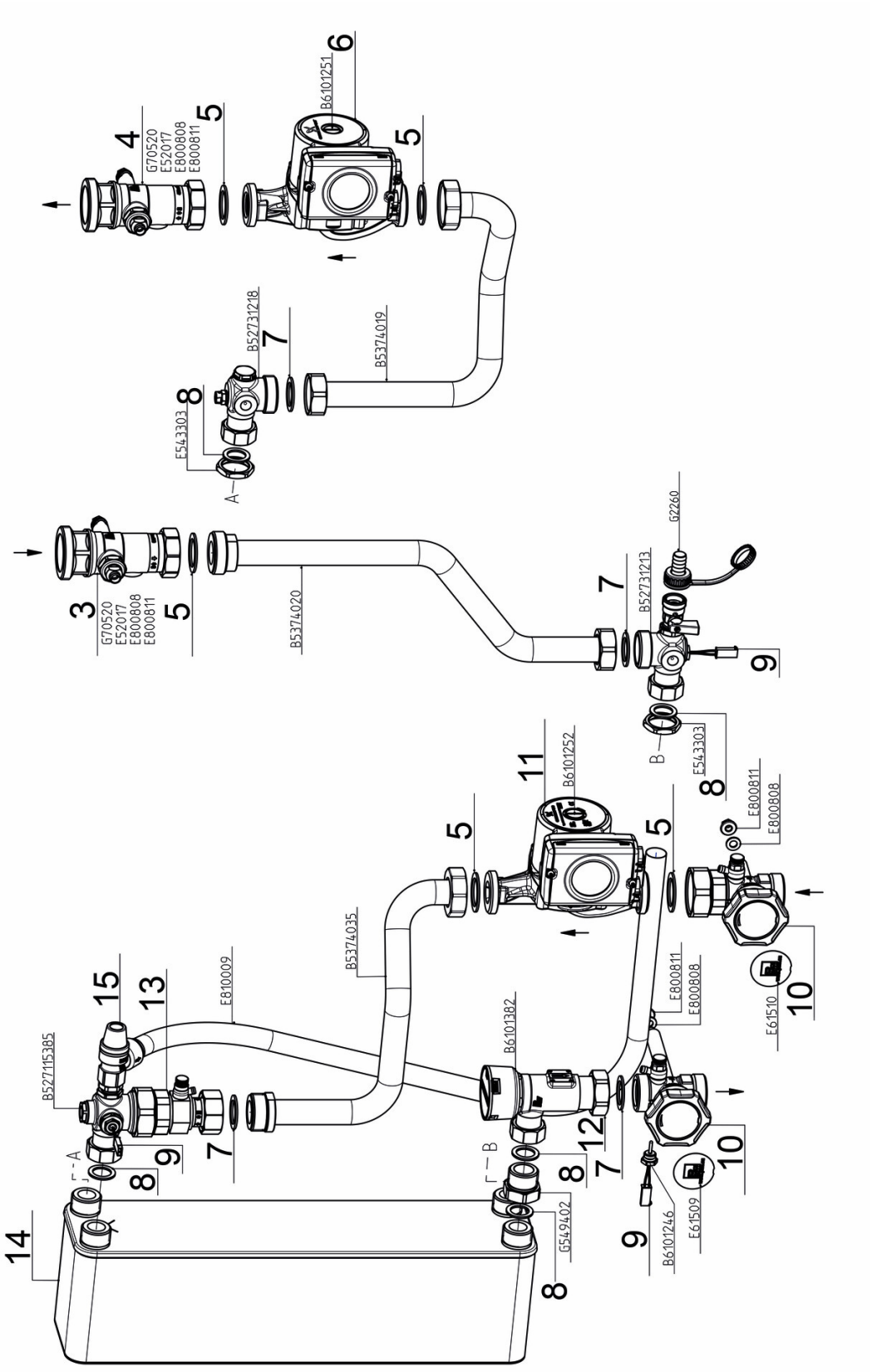


Position	Spare part	Item no.
1	Controller FC4.13	130142
2	Insulation	N00249
3	Ball valve DN 32 with check valve at the flange, 1½" nut x 1½" ext. thread, 190 mm wc	N00377
4	Ball valve DN 32 with check valve at the head piece, 1½" nut x 1½" ext. thread, 190 mm wc	N00378
5	Seal 44.0 x 32.0 x 2.0, 1", for thread connection 1½", AFM, 10 pieces	N00036
6	Primary pump Grundfos UPM2 25-75, with seals	N00273
7	Seal 38.0 x 27.0 x 2.0; ¾"; for thread connection 1¼", 10 pieces	N00174
8	Seal 30.0 x 21.0 x 2.0, ½", for thread connection 1", AFM, 10 pieces	N00024
9	Temperature sensor Pt1000	N00360
10	Piston valve DN 20; 2x 1" ext. thread, blue handle, 1 x brass plug, with draining	N00211
11	Union nut G 1", passage 28.1 mm, wrench size 37, octagonal	N00302
12	Seal 30.0 x 21.0 x 2.0, ½", for thread connection 1", EPDM, 10 pieces	N00129
13	Secondary pump Grundfos UPM2 15-75 CIL2, with seals	N00275
14	FlowSonic DN 20, with seals	N00276
15	Non-return valve DN 20 for circulation line	N00283
16	Heat exchanger copper solder, with seals	N00600
17	Pressure relief valve ½" x ¾", MSV 10 bar	N00008
18	Piston valve DN 25; 2x 1¼" ext. thread, blue handle, 1 x brass plug, with draining	N00574

9.3 Spare parts control and insulation Maxi



9.4 Spare parts hydraulics Maxi

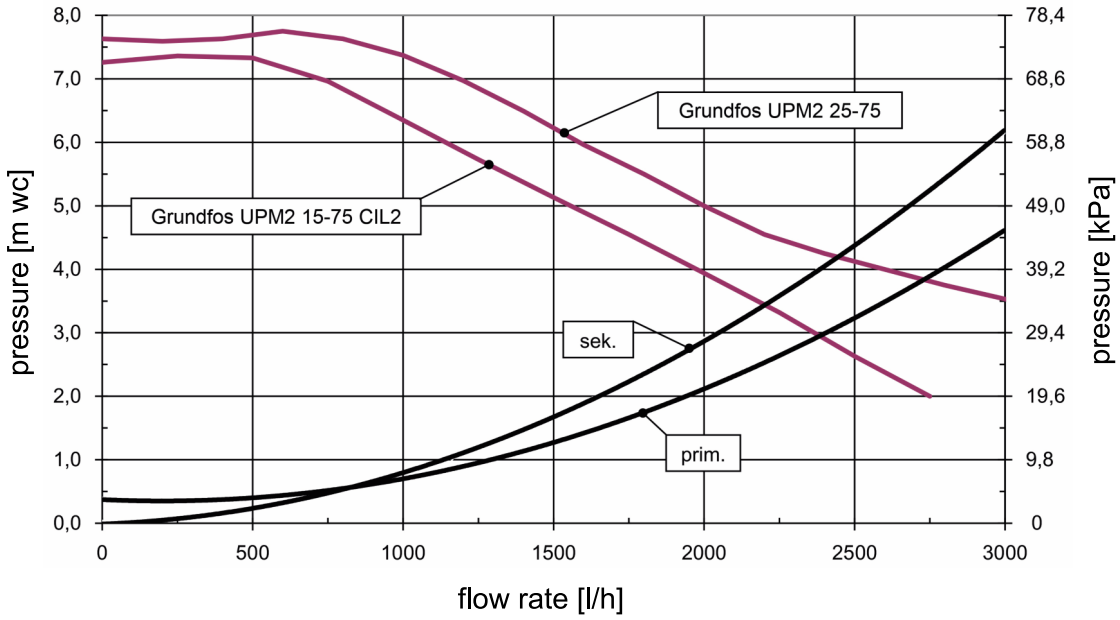


Position	Spare part	Item no.
1	Controller FC4.13	130142
2	Insulation	N00249
3	Ball valve DN 32 with plastic check valve at the flange, 1½" nut x 2" ext. thread, 400 mm wc	N00364
4	Ball valve DN 32 with plastic check valve at the head piece, 1½" nut x 2" ext. thread, 400 mm wc	N00365
5	Seal 44.0 x 32.0 x 2.0, 1", for thread connection 1½", AFM, 10 pieces	N00036
6	Primary pump Grundfos UPML 25-105, with seals	N00274
7	Seal 38.0 x 27.0 x 2.0; ¾"; for thread connection 1¼", 10 pieces	N00174
8	Seal 30.0 x 21.0 x 2.0, ½", for thread connection 1", AFM, 10 pieces	N00024
9	Temperature sensor Pt1000	N00360
10	Piston valve DN 25; 2x 1¼" ext. thread, blue handle, 1 x brass plug, with draining	N00574
11	Secondary pump Grundfos UPML 25-105 N, with seals	N00357
12	FlowSonic DN 25, with seals	N00277
13	Non return valve DN 25, 1¼" ext. thread x 1¼" union nut, with seals	N00167
14	Heat exchanger copper solder, with seals	N00601
15	Pressure relief valve ½" x ¾", MSV 10 bar	N00008

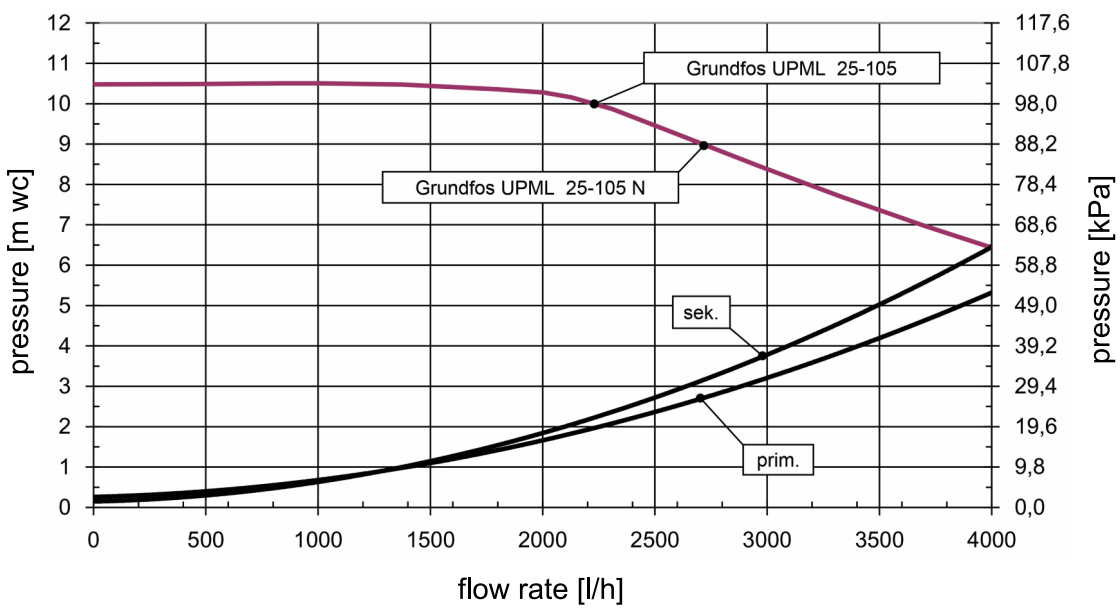
10 Technical data

Module	Tank heat transfer module Midi	Tank heat transfer module Maxi
Dimensions		
Height (with insulation)	795 mm	
Width (with insulation)	602 mm	
Depth (with insulation)	298 mm	
Centre distance top	120 mm	
Centre distance bottom	220 mm	
Pipe connections		
Prim. circuit (storage tank circuit)	1½" external thread	2" external thread
Sec. circuit (DHW circuit)	1" ext. thread, flat sealing	1¼" ext. thread, flat sealing
Operating data		
Max. admissible pressure	primary: 3 bar, secondary: 10 bar	
Operating temperature	2 – 95 °C	
Equipment		
Check valve	primary: 2 x 200 mm wc secondary: 1 x 150 mm wc	
Primary pump	High-efficiency pump with PWM control, 4-70 W	High-efficiency pump with PWM control, 3-140 W
Secondary pump	High-efficiency pump with PWM control, 4-70 W	High-efficiency pump with PWM control, 3-140 W
Heat exchanger	40 plates	60 plates
Flow meter	FlowSonic, measuring range: 1-133 l/min	
Temperature sensor	3 x Pt1000 (integrated), 3 x Pt1000 (enclosed)	
Materials		
Valves and fittings	Brass	
Seals: o-rings	Klingersil / EPDM	
Flat seals	AFM34, asbestos-free	
Plate heat exchanger	uncoated: stainless steel 1.4401 / solder: 99.99% Cu	
Insulation	EPP	
Check valve	Brass	

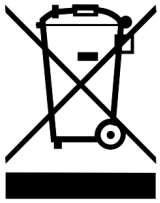
10.1 Pressure drop and pump characteristic curves Midi



10.2 Pressure drop and pump characteristic curves Maxi



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.

NOTICE	
	**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 [specialist]

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

Item no. 99643x4x5-mub-en
Translation of the original instructions

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