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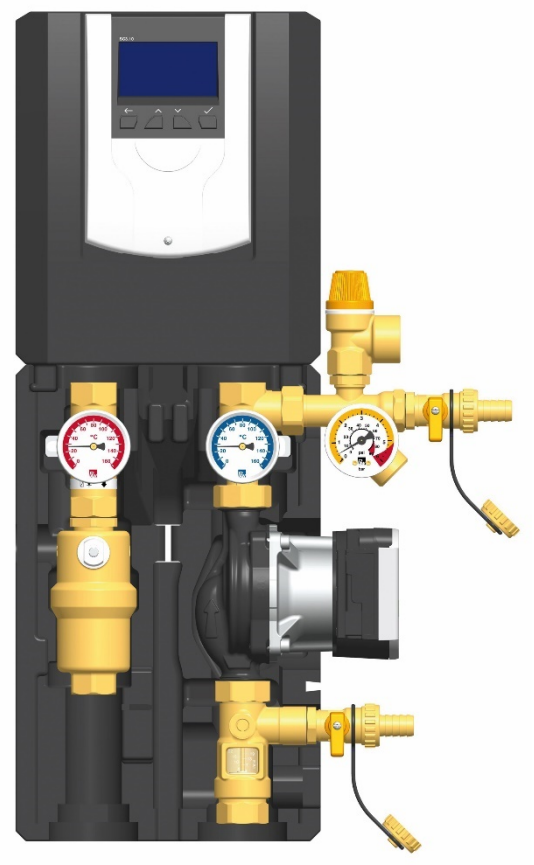
English

Installation and Operation Instructions

Solar stations

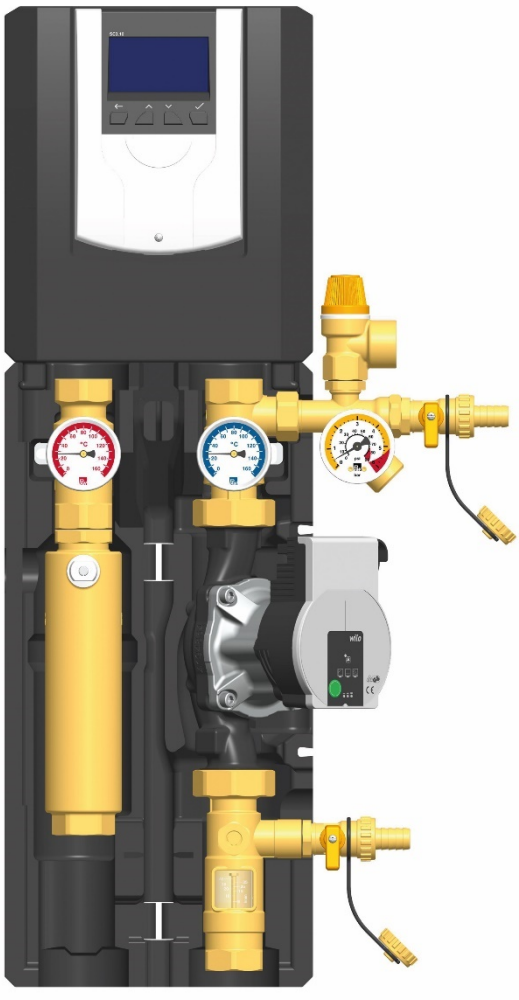
SolarBloC® midi Basic - DN 20

SolarBloC® maxi Basic - DN 25



SolarBloC® midi

DN 20



SolarBloC® maxi

DN 25

Item no. 997xx215xx-mub-en – Version V02 – Issued 2020/07

Translation of the original instructions

We reserve the right to make technical changes without notice!

PAW GmbH & Co. KG

Böcklerstraße 11

31789 Hameln - Germany

Contents

General Information

Carefully read these instructions before installation and commissioning.
Save these instructions in the vicinity of the installation for future reference.

1.1 About these instructions

These instructions describe the installation, commissioning, function and operation of the SolarBloC® midi (DN 20) and SolarBloC® maxi (DN 25) solar stations with basic equipment.
The chapters called [specialist] are intended for specialists only.
For other components of the solar installation, such as pumps, collectors, storage tanks, expansion tanks and controllers, please observe the instructions of the corresponding manufacturer.

1.2 About this product

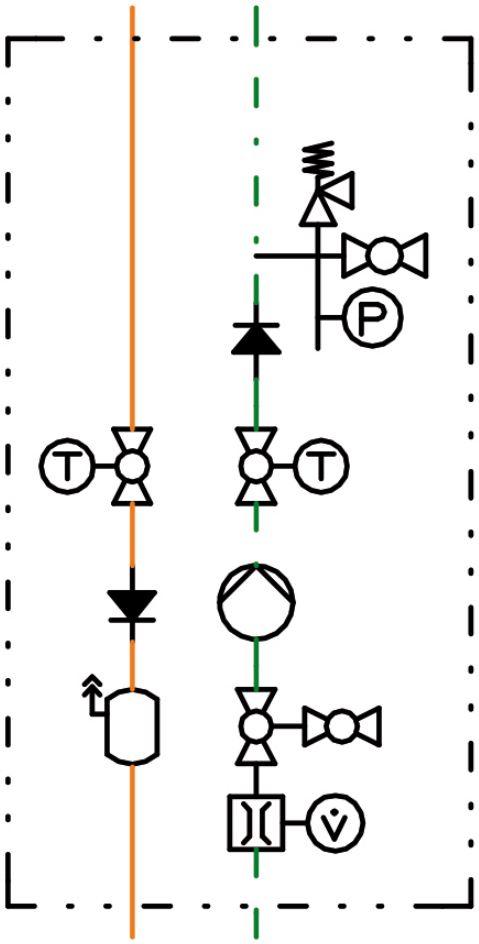
The station is a premounted group of fittings checked for tightness and used to circulate the solar fluid in the solar circuit. It is mounted on a wall bracket and fixed with clips.
The solar station is optionally equipped with a controller. The station contains important valves, fittings and safety devices for the operation of the installation:

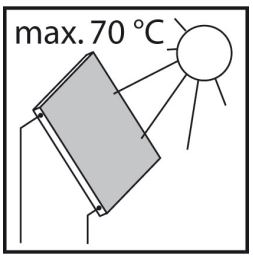
- Ball valves in the flow and return line with exchangeable spindle
- Check valves in the flow and return ball valves
- Thermometer in the flow and return
- Pressure gauge to display the installation pressure
- Flowmeter to display the flow rate
- Ball valve to restrict the flow rate
- Solar pressure relief valve
- Airstop for an easy venting
- Flush and fill valves

1.3 Designated use

The solar station may only be used in solar thermal systems as a pump station in the solar circuit, taking into consideration the technical limit values indicated in these instructions. Due to its design, the station must be mounted and operated in a vertical position with upward flow direction of the pump! Only use PAW accessories with the solar station.

Improper usage excludes any liability claims.





Under the influence of solar radiation, the collectors can get very hot. The solar fluid in the circuit can heat up to more than 100 °C.

Only flush and fill the solar circuit when the collector temperatures are below 70 °C.

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 of this manual

WARNING

Danger of scalding due to vapour escape!

With pressure relief valves, there is risk of scalding due to vapour escape. During installation, check if the local conditions require the connection of a discharge line to the safety group.

- ➢ Please observe the instructions regarding the pressure relief valve.
- ➢ The pressures calculated by the installation planner for the expansion vessel and the operating pressure of the installation must be set.

CAUTION

Risk of burns!

The valves, fittings and the pump may heat up to more than 100 °C during operation.

- ➢ The insulating shell must remain closed during operation.

CAUTION

Personal injury and damage to property due to overpressure!

By closing the two ball valves in the primary circuit, the safety group is separated from the heat exchanger. A rise in temperature in the storage tank will cause high pressures which can result in personal injury or damage to property!

- Only close the ball valves for service and maintenance.

NOTICE

Material damage due to mineral oils!

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

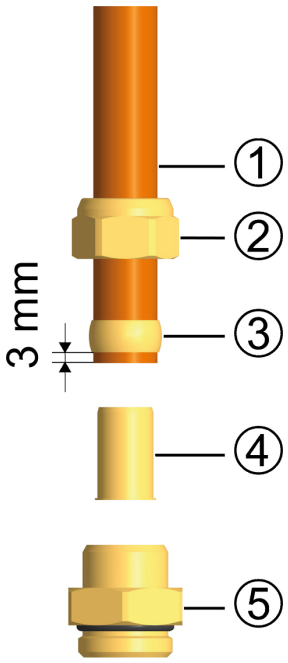
- It is imperative to avoid that EPDM gets in contact with substances containing mineral oils.
- Use a lubricant based on silicone or polyalkylene and free of mineral oils, such as Unisilikon L250L and Syntheso Glep 1 of the Klüber company or a silicone spray.

3 Assembly and installation [specialist]

NOTICE

Material damage due to high temperatures!

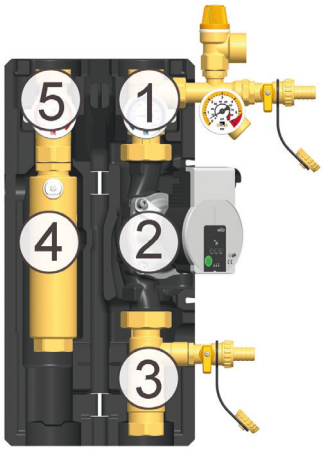
Install the fitting group at a sufficient distance from the collector field, since the solar fluid may be very hot near the collector. It may be necessary to install an intermediate tank to protect the expansion tank.



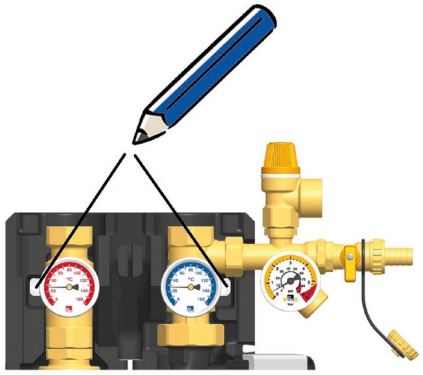
Not included in the scope of delivery!

Accessories: compression fitting

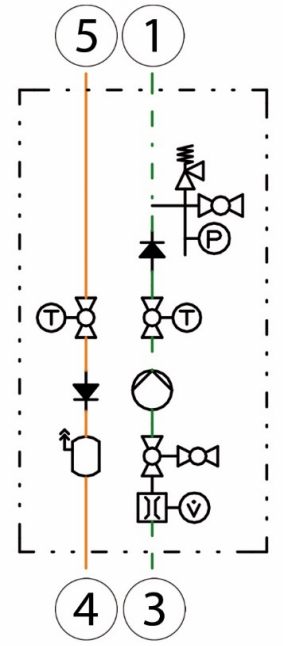
1. Push the union nut ② and the cutting ring ③ onto the copper pipe ①. The pipe must protrude at least 3 mm from the cutting ring in order to ensure the force transmission and the sealing.
2. Insert the support sleeve ④ into the copper pipe.
3. Insert the copper pipe with the plugged-on individual parts (②, ③ and ④) as far as possible into the housing of the compression fitting ⑤.
4. First, screw the union nut ② manually.
5. Tighten the union nut ② by rotating one full turn. Secure the housing of the compression fitting ⑤ against distort, in order to avoid damaging the sealing ring.



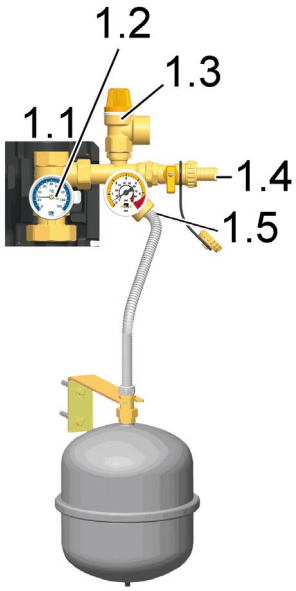
1. Remove the station from the packaging.
2. Remove the insulating front shell.



3. Copy the mounting holes of the solar station besides the thermometers to the mounting surface.
4. Drill the holes and mount the solar station to the wall with appropriate wall plugs and screws.



5. Connect the solar station to the installation by using the pipes:
   - ⑤ Flow from the collector field
   - ① Return to the collector field
   - ④ Flow to the storage tank
   - ③ Return from the storage tank



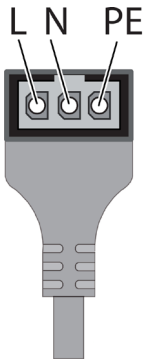
Not included in the scope of delivery!

6. Connect the pipe for the expansion tank below the pressure gauge [1.5] and fix the bracket for the expansion tank.
7. Adapt the initial pressure of the expansion tank to the installation and connect the expansion tank.
   Please observe the separate instructions regarding the expansion tank!
8. Check all thread connections and tighten them if necessary.

WARNING

Risk to life and limb due to electric shock!

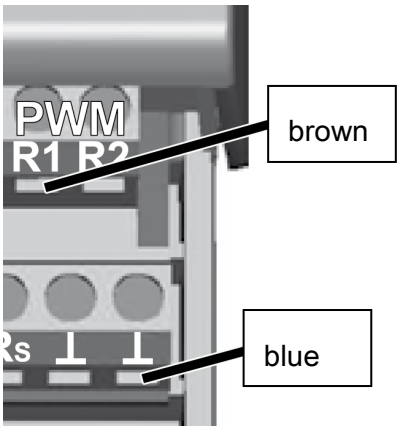
- Prior to commencing electrical work on the controller, pull the mains plug!
- Only after completing all installation work as well as the flushing and filling, the mains plug of the controller can be plugged into a socket.
  An unintentional start of the motors is thus avoided.



Supply cable - 230 V

9. Push the controller extension with the (optional) premounted controller onto the solar station.
10. Connect the supply cable to the pump.

L	brown
N	blue
PE	green-yellow



Connection of the control cable of the PWM pump ≤ 15 V

In addition, connect the control cable of the pump to the controller.

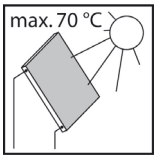
Signal	brown
GND	blue

11. Connect the sensors to the controller.

The assembly of the solar station is now completed and the station can be put into operation.

4 Commissioning [specialist]

Please observe the following safety instructions regarding the commissioning of the station:



WARNING

Risk of burning and scalding!

The valves and fittings can heat up to more than 100 °C. It is therefore not allowed to flush or fill the installation when the collectors are hot (intense solar radiation). Please note that hot solar fluid leaks from the pressure relief valves in case of too high system pressure! During venting, the solar fluid may escape as vapour and cause scalding!

- Only flush and fill the installation when the collector temperatures are below 70 °C.

NOTICE

Risk of frost!

It often happens that the solar system cannot be completely drained after flushing. There is thus risk of frost damage when flushing with water. Therefore, do only use the solar fluid used later to flush and fill the solar system.

- Use a water and propylene glycol mixture with maximum 50% of propylene glycol as solar fluid.

NOTICE

Note regarding the commissioning sequence

During commissioning, fill the heating circuit first and the solar circuit afterwards.
This guarantees that the heat possibly absorbed by the collectors during commissioning can be dissipated.

NOTICE

Note regarding the expansion tank

To prevent that dirt particles of the solar system are washed into the expansion tank, some manufacturers recommend to disconnect the expansion tank from the solar circuit during flushing and filling. Please observe the instructions of the manufacturer on this topic.

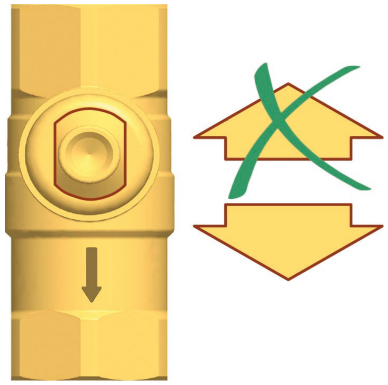
4.1 Flushing and filling the solar circuit

The fill and drain valves necessary to flush and fill the installation are integrated in the solar station.

To flush the dirt particles out of the installation, only use flush and fill stations with fine filters.

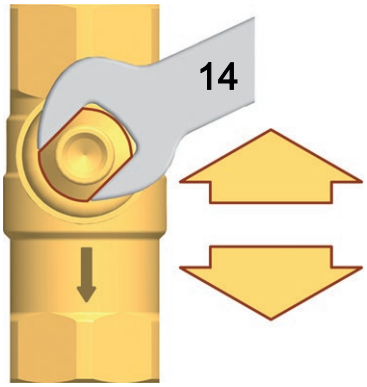
Ball valve with integrated flow check valve

(Normal flow direction in the figure: downwards)



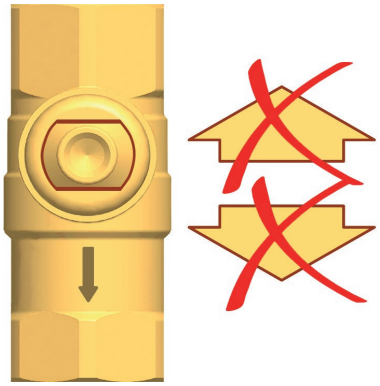
0°

Check valve is operating,
flow only in flow direction.



45°

Check valve is not operating,
flow in both directions.

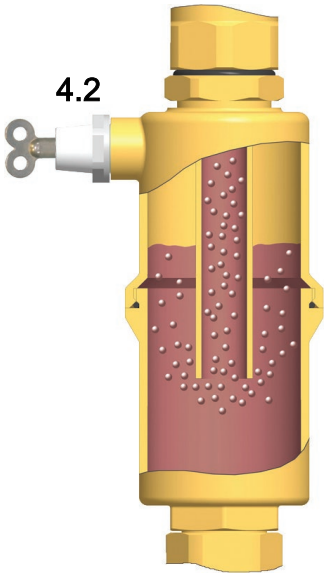


90°

Ball valve closed,
no flow.

Airstop

The Airstop with manual vent valve is used to vent the solar system. To ensure a perfect venting of the solar circuit, the flow velocity must be at least 0.3 m/s in the flow line.



Pipe diameter [mm]		Flow rate at 0.3 m/s	
∅ outside	**∅ inside**	l/h	**l/min**
15	**13**	~ 143	**~ 2.4**
18	**16**	~ 217	**~ 3.6**
22	**20**	~ 339	**~ 5.7**

The air liberated from the solar fluid is collected in the upper part of the Airstop and can be released at the vent plug [4.2].

WARNING

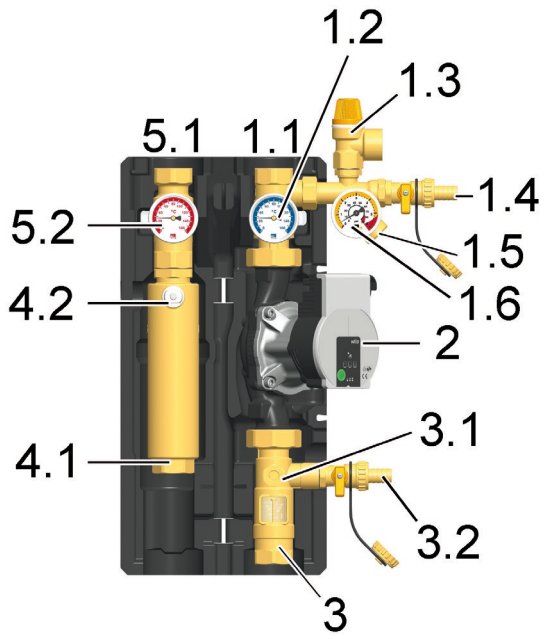
Danger of scalding due to vapour escape!

The escaping medium can reach temperatures of more than 100 °C and cause scalding.

- ➢ Carefully open the vent plug and close it again as soon as fluid escapes.

Venting the solar installation after commissioning

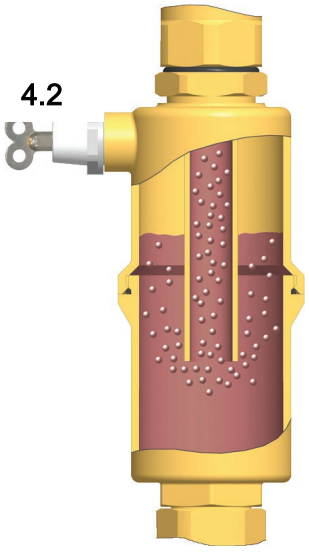
At the beginning, vent the solar installation daily and then weekly or monthly, depending on the quantity of vented air. An optimum operation of the solar installation is thus ensured. Check the system pressure after venting and increase it to the specified operating pressure if necessary.



4.2 Preparations before flushing

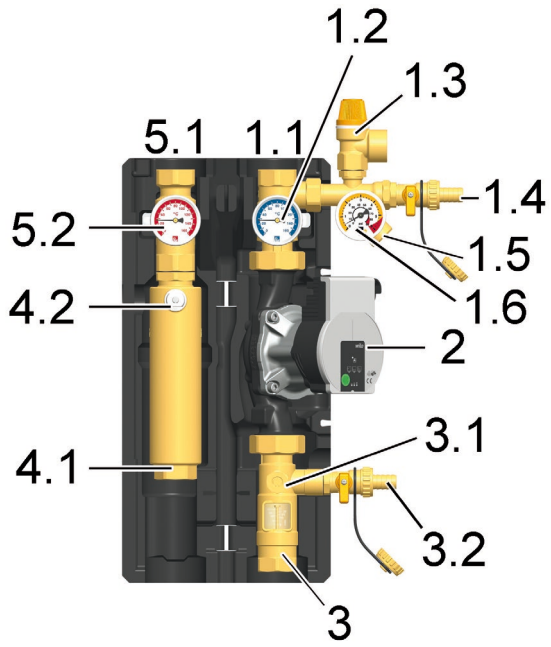
The solar circuit is flushed in the direction of flow.

1. Disconnect the expansion vessel from the solar installation. Please observe the instructions of the manufacturer on this topic.
2. Turn the check valve in the flow ball valve [5.2] into operating position (**0°**, see page 12).
3. Close the return ball valve [1.2] (**90°**, see page 12).
4. The ball valve [3.1] must be open.
5. Connect the fill station to the solar station:
   - Pressure hose to the fill valve [1.4]
   - Flush hose to the drain valve [3.2]

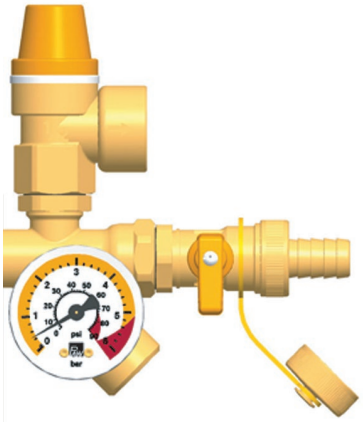


4.3 Flushing and filling

1. Open the fill and drain valves [1.4|3.2].
2. Put the flush and fill station into operation and flush the installation until clear solar fluid exits.
   Vent the solar installation several times at the vent plug of the Airstop [4.2] until the solar fluid exits without bubbles (see page 13).



3. Slowly open the return ball valve [1.2] to vent the pump section (**0°**, see page 12).
4. Close the drain valve [3.2] while the filling pump is running and increase the system pressure to maximum 5 bars. The system pressure is displayed on the pressure gauge. Close the fill valve [1.4] and switch off the pump of the flush and fill station.



Consider the pressure relief valve (6 bars)!

5. Check the pressure gauge to see if the system pressure decreases and eliminate leaks if necessary.
6. Reduce the pressure at the drain valve [3.2] to the operating pressure.

7. Connect the expansion tank to the solar circuit and set the operating pressure of the solar system by means of the flush and fill station (for the required operating pressure, see the manual of the expansion tank).
8. Close the fill and drain valves [1.4|3.2].
9. Turn the check valve in the return ball valve [1.2] into operating position (**0°**, see page 12).

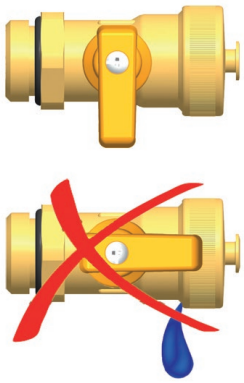
WARNING

Risk to life and limb due to electric shock!

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

optional

10. Connect the optional controller to the mains and set the solar circuit pump in the manual mode to Max. according to the controller instructions.
    Let the solar circuit pump run at maximum rotation speed for at least 15 minutes.
    Meanwhile, vent the solar installation several times at the vent plug of the Airstop until the solar fluid exits without bubbles
    (see page 13).
    If necessary, increase the system pressure to the operating pressure.
11. Remove the hoses of the flush and fill station and screw the sealing caps onto the fill and drain valves.
    The sealing caps only serve to protect the valves against dirt. They are not designed to take up high system pressures. The ball valves must be closed to guarantee tightness.

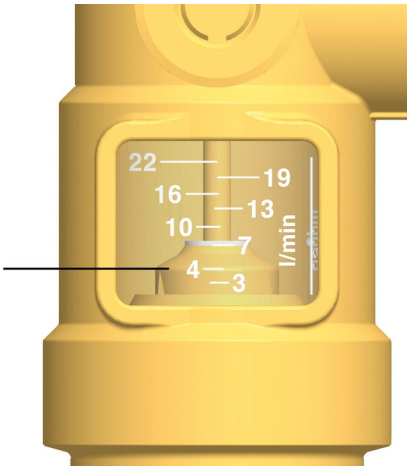


4.4 Setting the solar system

1. Set the desired revolution speed of the solar pump depending on the required flow rate.
   If necessary, the flow rate can be reduced by the ball valve [3.1] (only necessary if the pump is not speed-controlled).
   Please observe the specifications of the collector manufacturer for the correct adjustment of the flow rate.
2. Mount the insulating front shells of the solar station.
3. Set the controller to automatic mode (see controller instructions).

The commissioning of the solar installation is now completed. Please fill in completely the commissioning report on page 29.

Reading edge =
Round edge
of the float
Example: about
4 l/min



Scale DN 20:

3 – 22 l/min

Scale DN 25:

5 – 40 l/min

4.5 Parameter: SolarBloC® midi Basic / SolarBloC® maxi Basic with controller SC3.10

If the system 1.1 is used, the parameters of the sensors and the pumps are preset. For the use of additional functions, an adjustment of the system may be necessary.

If another system is selected and saved, the parameters are reset to the factory settings. In this case, the following parameters must be changed in the menu. A proper functioning of the installation is thus ensured.

Menu	Parameters	Settings after reset / change of system	Change to	Note
Para	P18	OFF	*Standard pump:* AC, SC: on *PWM pump:* PWM, Curve: AA, SC: on	Pump output 1
Func	F05	OFF	Type 3	Heat quantity measurement (calculation): Sensor warm: T1 Sensor cold: T2 min./max. flow rate

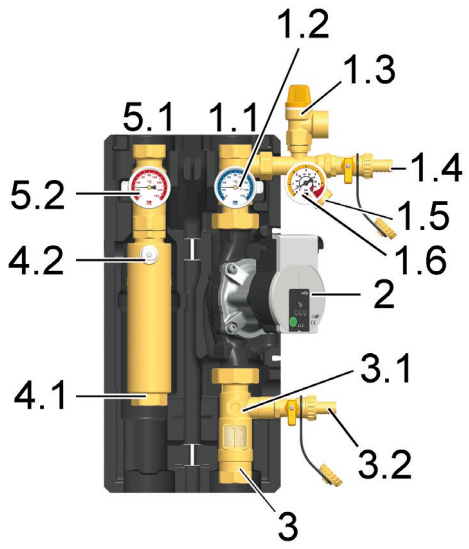
4.6 Heat quantity measurement

For an optimum use of the heat quantity measurement without flow sensor, the maximum flow rate of the installation can be entered in the controller.

1. Set the rotation speed of the pump (R1) in the manual mode to "1" and read the maximum flow rate in the solar circuit on the display.
2. Only after reset or change of the system: Select the menu item "Type 3" in the menu "Func/F05".
   Assign the sensors (warm, cold) again.
3. Enter and set the indicated maximum value in l/min in the menu "Func/F05".

5 Maintenance [specialist]

5.1 Draining the solar system



1. Switch off the controller and make sure that a restart is not possible.
2. Open the check valves in the flow and return ball valves [5.2|1.2] by turning them into position **45°** (**45°**, see page 12).
3. Connect a heat-resistant hose to the lowest drain valve of the solar installation (possibly drain valve [3.2]).
   Make sure that the solar fluid is collected in a heat-resistant container.

WARNING

Danger of scalding due to hot solar fluid!

The escaping solar fluid may be very hot.

- ➢ Place and fix the heat-resistant collecting container such that people standing nearby are not endangered when the solar thermal system is being emptied.

4. Open the drain valve at the lowest point of the solar installation.
5. To accelerate the draining of the solar circuit, the vent valve possibly present at the highest point of the solar installation can be opened.
6. Dispose of the solar fluid observing the local regulations.

5.2 Deinstallation

1. Drain the solar installation as described above.
2. Disconnect the pipe connections to the solar system.
3. To remove the solar station from the wall bracket, pull out the clip springs laterally with a screwdriver.
4. Remove the station by pulling it forward.

6 Spare parts [specialist]

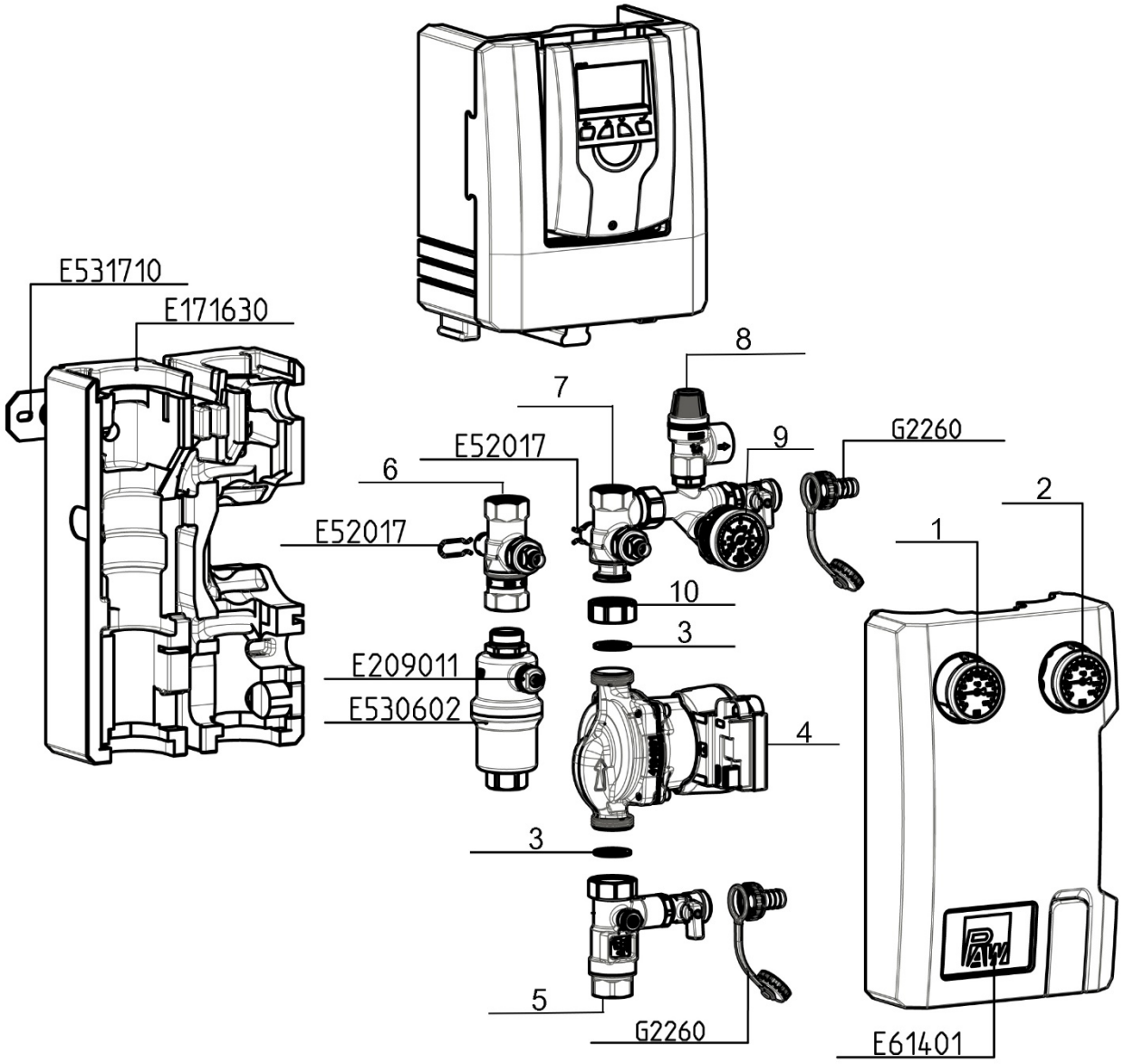
NOTICE

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

The serial number is placed on the safety group of the solar station.

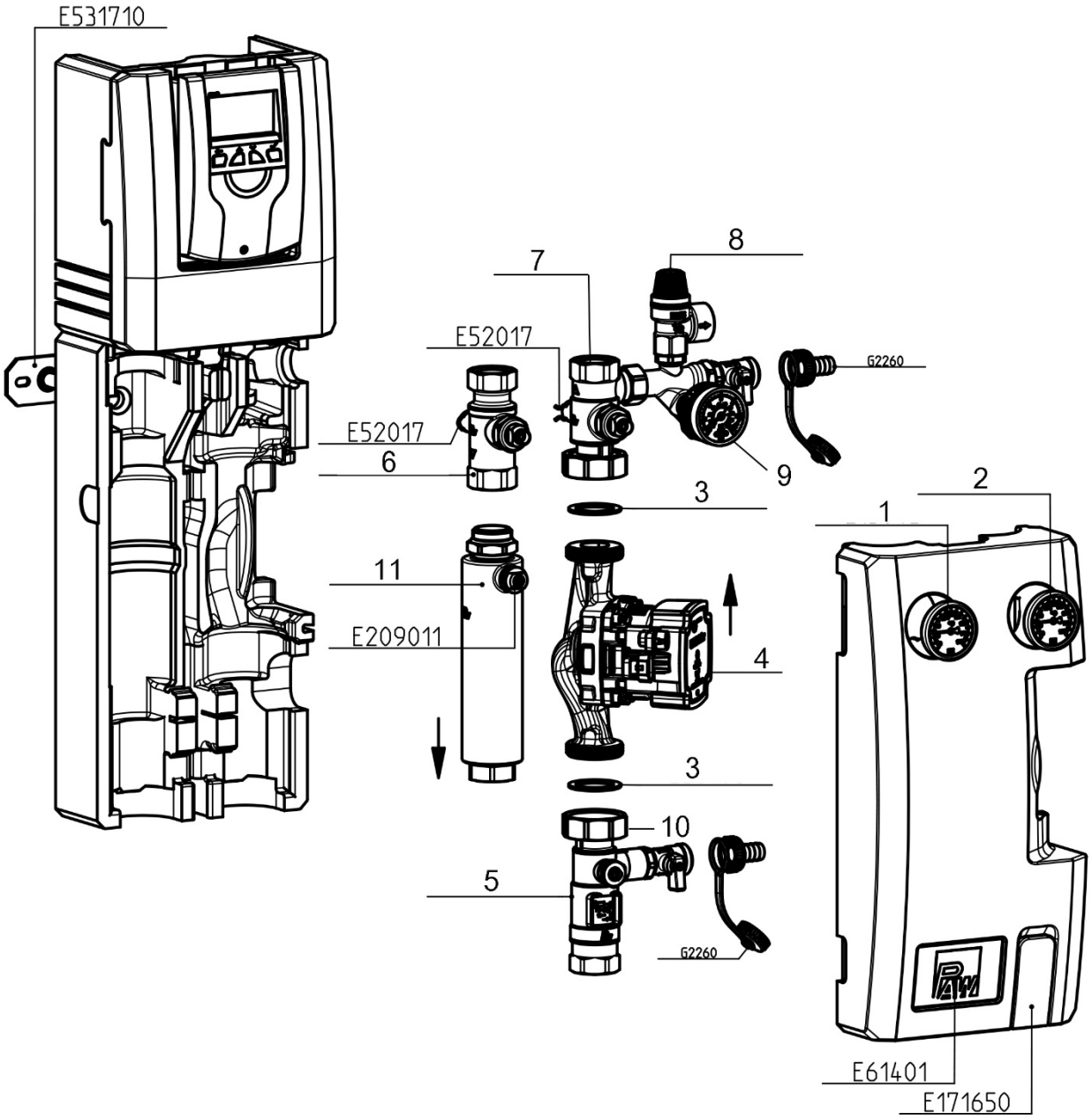
- In case of a complaint, please send us the entirely completed commissioning report on page 29.

6.1 SolarBloC® midi Basic DN 20



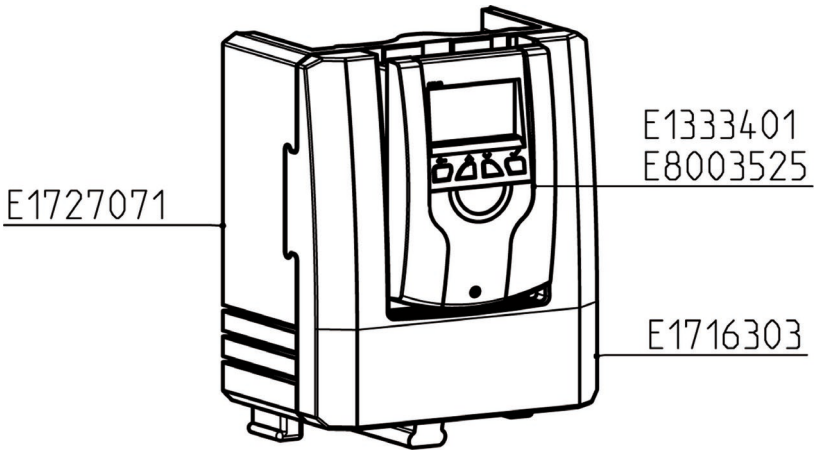
Position	Spare part	Item number
1	Dial thermometer, red scale, d = 50 mm, 0-160 °C	N00193
2	Dial thermometer, blue scale, d = 50 mm, 0-160 °C	N00194
3	Sealing kit, 10 pieces, ½", for thread connection 1"	N00024
4	**Alternative pumps:**	
	Wilo Para ST 15-130/7-50 iPWM2	N00150
	Wilo Para ST 15-130/13 iPWM2	N00299
	Grundfos UPM3 Solar 15-75	N00025
	Grundfos UPM3 Solar 15-145	N00215
5	Flowmeter ¾", 3-22 l/min, 1” M x ¾" int. thread x ½", with fill and drain valve and seal	N00225
6	Flow ball valve DN 20, ¾" int. thread x ¾" int. thread	N00291
7	Return ball valve DN 20, ¾" int. thread x F ¾" x ¾" ext thread on the right	N00290
8	Pressure relief valve ½" x ¾", 6 bars	N00300
9	Pressure gauge 0-6 bars, with automatic isolation ⅜" ext. thread; d = 50 mm, 130°C	N00301
10	Union nut G1“, for PAW flange F ¾"	N00302

6.2 SolarBloC® maxi Basic DN 25



Position	Spare part	Item number
1	Dial thermometer, red scale, d = 50 mm, 0-160 °C	N00193
2	Dial thermometer, blue scale, d = 50 mm, 0-160 °C	N00194
3	Sealing kit, 10 pieces, 1", for thread connection 1½"	N00036
4	**Alternative pumps:**	
	Wilo Para ST 25-180/8-75 iPWM2	N00263
	Wilo Stratos Para 25/1-11 T11	N00303
	Grundfos UPM3 Solar 25-75	N00035
	Grundfos UPM3 Solar 25-145	N00304
	Grundfos Solar PML 25-145	N00226
5	Flowmeter 1", 5-40 l/min, 1½" union nut x 1" int. thread x ½" int. thread with fill and drain valve and seal	N00227
6	Flow ball valve DN 25, 1“ int. thread x 1“ int. thread	N00305
7	Return ball valve DN 25, F1“ x 1“ int. thread	N00306
8	Pressure relief valve ½" x ¾", 6 bars	N00300
9	Pressure gauge 0-6 bars, with automatic isolation ⅜" ext. thread; d = 50 mm, 130°C	N00301
10	Union nut G1½"	N00269
11	Airstop DN 25: 1“ ext. thread x 1“ int. thread	565571

Controller extension

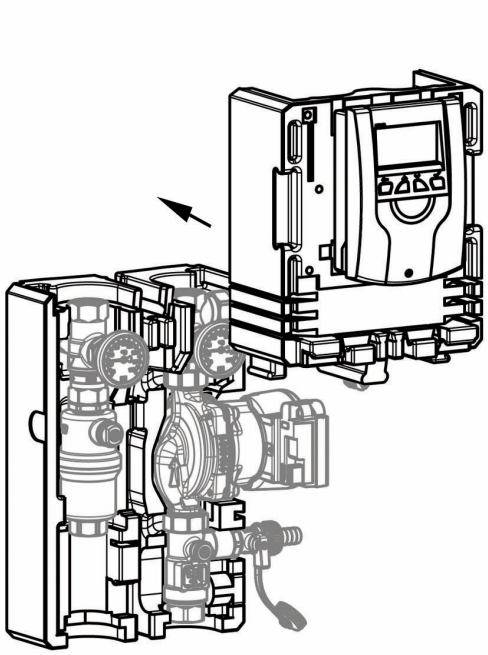


Connection of the PWM pumps

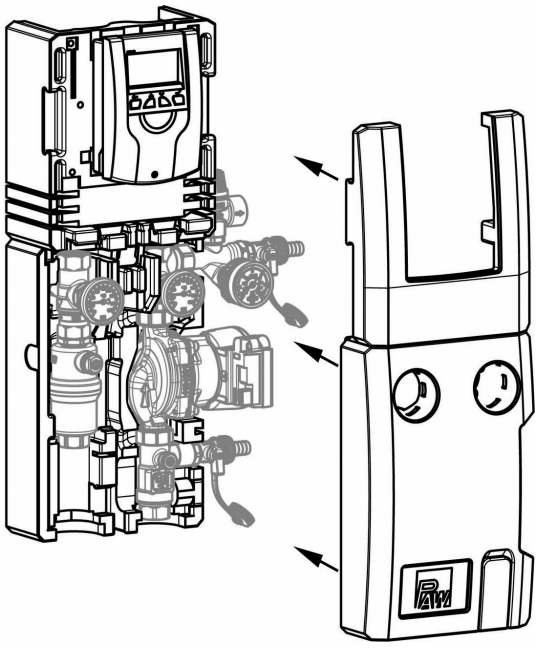
PWM	Brown
GND	Blue

7 Assembly of the insulation

1.



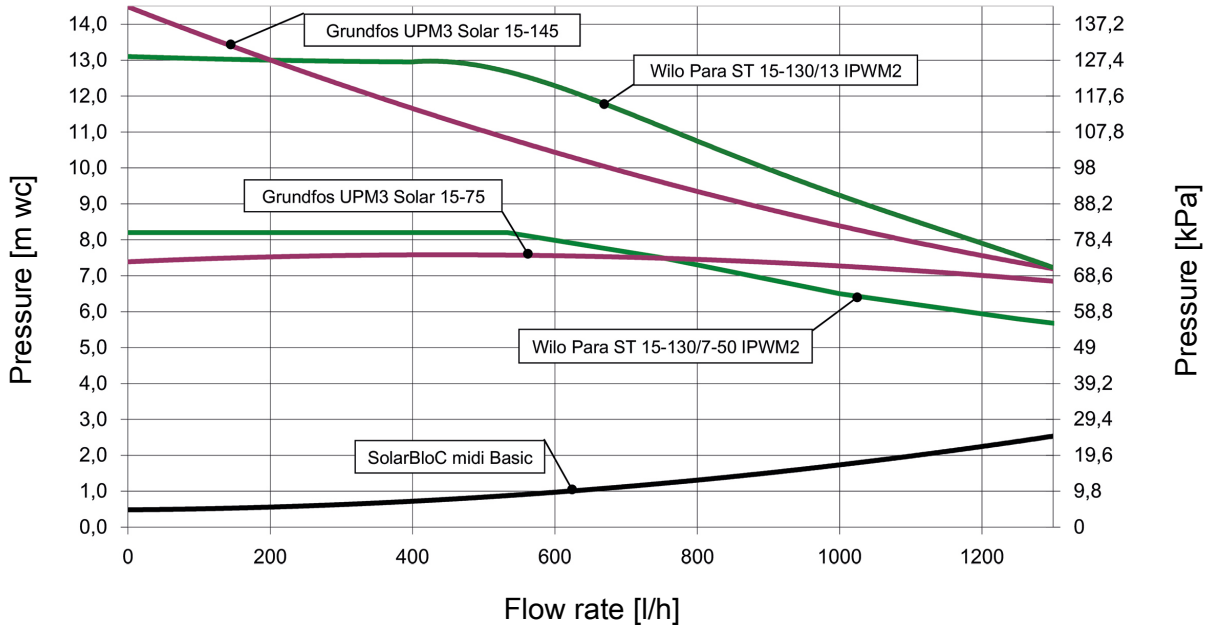
2.



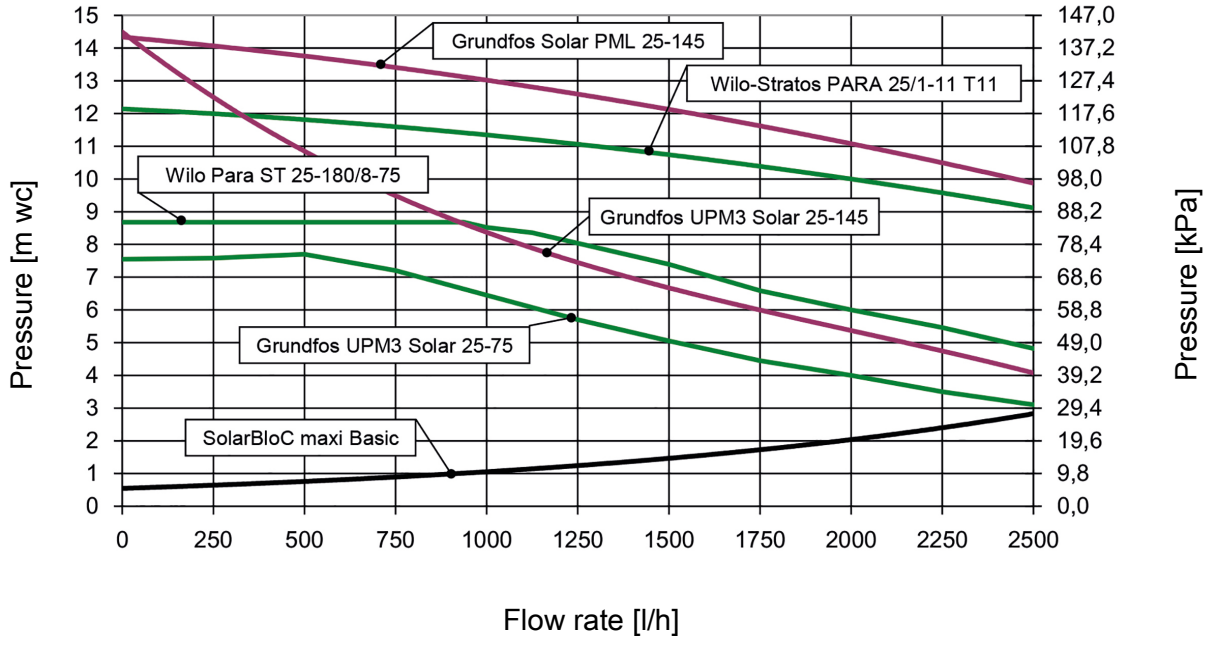
8 Technical data and pressure drop characteristic curve

Dimensions	SolarBloC® midi DN 20	SolarBloC® maxi DN 25
Height (with controller extension)	557 mm	656 mm
Height (without controller extension)	320 mm	474 mm
Width (with insulation)	334 mm	335 mm
Depth (with insulation)	155 mm	160 mm
Centre distance, flow / return	100 mm	100 mm
Pipe connections	¾” internal thread	1" internal thread
Connection for expansion vessel	¾" external thread, flat sealing	
Outlet pressure relief valve	¾” internal thread	
Operating data		
Max. admissible pressure	PN 10	
Maximum operating temperature	120 °C	
Max. short-time temperature	160 °C, < 15 minutes	
Max. propylene glycol content	50 %	
Equipment		
Solar pressure relief valve	6 bars	
Pressure gauge	0-6 bars	
Check valves	2 x 200 mm wc, can be opened	
Flow meters	3 - 22 l/min	5 - 40 l/min
Materials		
Valves and fittings	Brass	
Gaskets	EPDM	
Check valves	Brass	
Insulation	EPP, l = 0.041 W/(m K)	

SolarBloC® midi Basic DN 20



SolarBloC® maxi Basic DN 25



9 Function of the check valves [Expert]

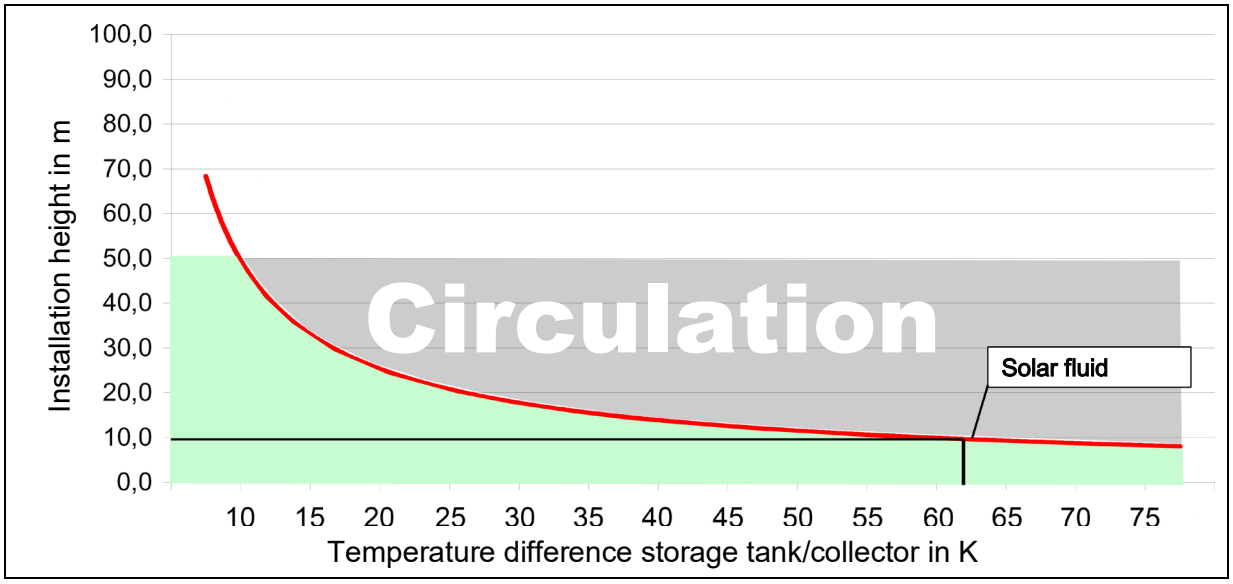
Within their application range, the check valves in this station prevent unwanted gravity circulation. The efficiency of the check valves depends on:

- the installation height
- the temperature difference between the storage tank and the collector
- the type of heat transfer medium

The diagram below indicates if the check valves integrated in the station are sufficient for your installation. If the check valves are not sufficient, additional components must be installed to prevent gravity circulation. Components such as siphons ("heat traps"), 2-way valves (zone valves) or additional check valves can be installed for this purpose.

Example:

- The station is equipped with two check valves (2 x 200 mm wc = **400 mm wc**).
- A mixture of water and 40% of propylene glycol is used as a **solar fluid**.
- The installation height between the collector and the storage tank is **10 m**.



Result:

The check valves prevent gravity circulation up to a temperature difference of **about 62 K**.
If the temperature difference between the collector and the tank is larger, the difference in density of the solar fluid will be so large that the check valves are pushed open.

Do you need to know it exactly?

The density of the solar fluid decreases with rising temperature. In high installations with large temperature differences, the difference in density will cause gravity circulation. This circulation can lead to a cooling down of the storage tank.

Calculation example: $\Delta p = \Delta \rho * g * h$

Collector temperature: 5 °C → Density solar fluid $\rho 1 = 1042$ kg/m³

Storage tank temperature: 67 °C → Density of the solar fluid $\rho 2 = 1002.5$ kg/m³

$\Delta \rho = \rho 1 - \rho 2 = 39.5$ kg/m³

$g = 9.81$ m/s²

Installation height $h = 10$ m

$\Delta p = 3875$ Pa = 395 mm wc

The two check valves of the station (2 x 200 mm wc) are sufficient for an installation height of 10 m and a temperature difference of up to 62 K between the collector and the tank.

10 Commissioning report

Operator of the installation _____

Location of installation _____

_____

Collectors (number / type) _____

Collector surface _____ m²

Installation height _____ m (Height difference between the station and the collector field)

Piping ⌀ = _____ mm l = _____ m

Venting (collector field) ☐ Manual vent valve ☐ Automatic vent valve

☐ No ☐ Vented

Bleeding device (station) ☐ Vented

Solar fluid (type) _____ % glycol

Antifreeze (tested up to): _____ °C

Flow rate _____ l/m

Pump (type) _____

Pump speed level (I, II, III) _____

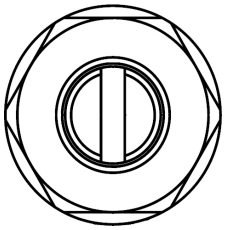
System pressure _____ mbar

Expansion tank (type) _____

Initial pressure _____ mbar

Solar pressure relief valve ☐ Checked

Check valves ☐ Checked

Serial numbers	
Station	
Controller	
Software version	
Restrictor position:	

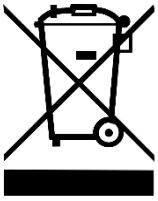
Plumbing company

Date, signature

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 you return it.

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.

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