



English

Installation and Commissioning Instructions

Solar stations

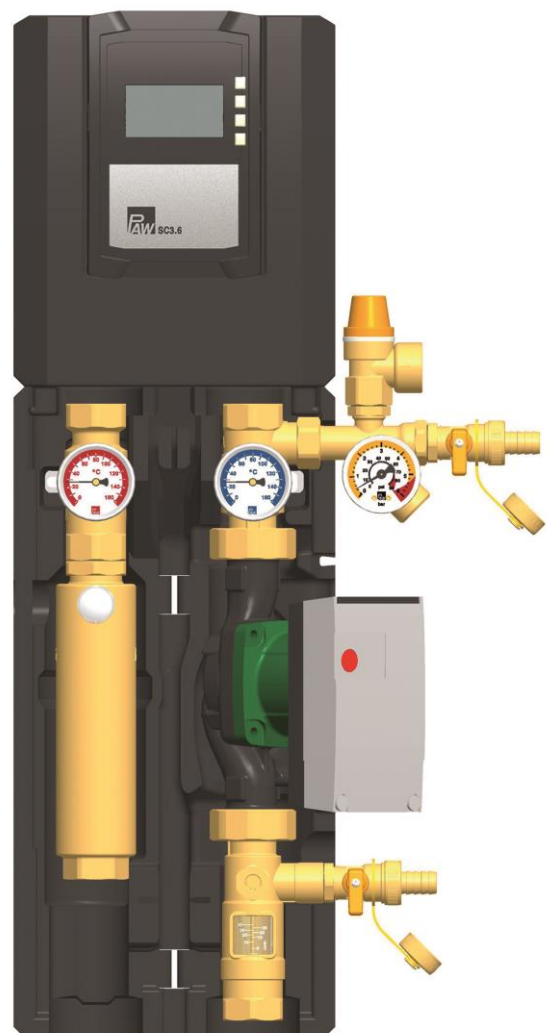
SolarBloC midi Basic - DN 20

SolarBloC maxi Basic - DN 25



SolarBloC midi

DN 20



SolarBloC maxi

DN 25

Item no. 99765xx-mub-en – Version V09 – Issued 2016/05

Translation of the original instructions

We reserve the right to make technical changes without notice!

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Contents

| | | |
|-----------|---|-----------|
| 1 | General information | 4 |
| 1.1 | About these instructions | 4 |
| 1.2 | About this product | 4 |
| 1.3 | Designated use | 5 |
| 2 | Safety instructions | 6 |
| 3 | Assembly and installation [specialist] | 8 |
| 4 | Commissioning [specialist] | 11 |
| 4.1 | Flushing and filling the solar circuit..... | 12 |
| 4.2 | Preparations before flushing..... | 14 |
| 4.3 | Flushing and filling | 14 |
| 4.4 | Adjustment of the solar installation | 17 |
| 4.5 | Parameters: SolarBloC midi Basic / SolarBloC maxi Basic with controller SC3.6 | 18 |
| 4.6 | Heat quantity measurement | 18 |
| 5 | Maintenance [specialist] | 19 |
| 5.1 | Draining the solar installation | 19 |
| 5.2 | Deinstallation..... | 19 |
| 6 | Spare parts [specialist] | 20 |
| 6.1 | SolarBloC midi Basic DN 20..... | 20 |
| 6.2 | SolarBloC maxi Basic DN 25..... | 21 |
| 6.3 | Controller extension | 22 |
| 7 | Assembly of the insulation | 22 |
| 8 | Technical data | 23 |
| 9 | Function check valves [specialist] | 25 |
| 10 | Commissioning report | 27 |

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 About these instructions

These instructions describe the installation, commissioning, function and operation of the solar stations SolarBloC midi (DN 20) and SolarBloC maxi (DN 25) 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. It 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
- Thermometers in the flow and return line
- Pressure gauge to display the system pressure
- Flow meter to display the flow rate
- Ball valve to reduce the flow rate
- Solar pressure relief valve
- Airstop for an easy venting
- Flush and fill valves

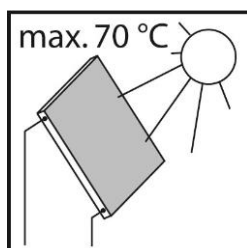
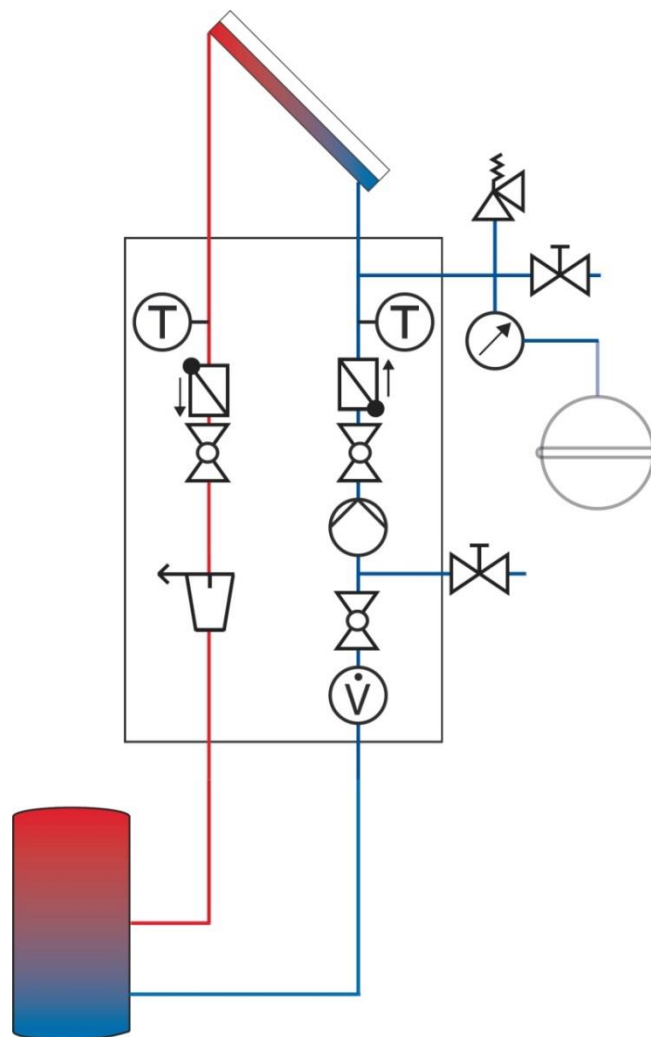
1.3 Designated use

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 solar circuit can heat up to more than 100 °C. Only flush and fill the solar circuit if the collector temperatures are below 70 °C.



2 Safety instructions


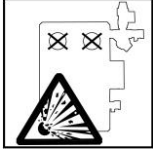
The installation and commissioning as well as the connection of electrical components require technical knowledge commensurate with a recognised vocational qualification as a fitter for plumbing, heating and air conditioning technology, or a profession requiring a comparable level of knowledge [specialist].

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 mentioned in this manual

| | |
|--|--|
|  |  WARNING |
| | <p>Danger of scalding due to vapour escape!</p> <p>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.</p> <ul style="list-style-type: none"> ➤ 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 |
| | <p>Risk of burns!</p> <p>The valves, fittings and the pump may heat up to more than 100 °C during operation.</p> <ul style="list-style-type: none"> ➤ The insulating shell must remain closed during operation. |

|  CAUTION | |
|--|---|
|  | <p>Personal injury and damage to property due to overpressure!</p> <p>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!</p> <ul style="list-style-type: none">➤ Only close the ball valves for service and maintenance. |

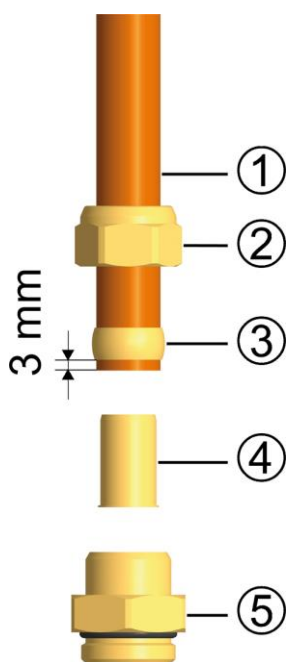
| NOTICE | |
|--|--|
| <p>Material damage due to mineral oils!</p> <p>Mineral oil products cause lasting damage to seals made of EPDM, whereby the sealant properties get lost. We do not assume liability nor provide warranty for damage to property resulting from sealants damaged in this way.</p> <ul style="list-style-type: none">➤ 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!

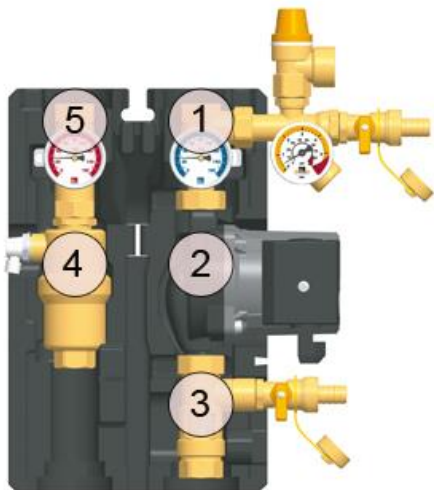
As the solar fluid can be very hot near the collector, the group of fittings must be installed at a sufficient distance from the collector field. It may be necessary to install an intermediate tank to protect the expansion tank.



Not included in
the scope of delivery!

Accessories: cutting-ring compression fitting

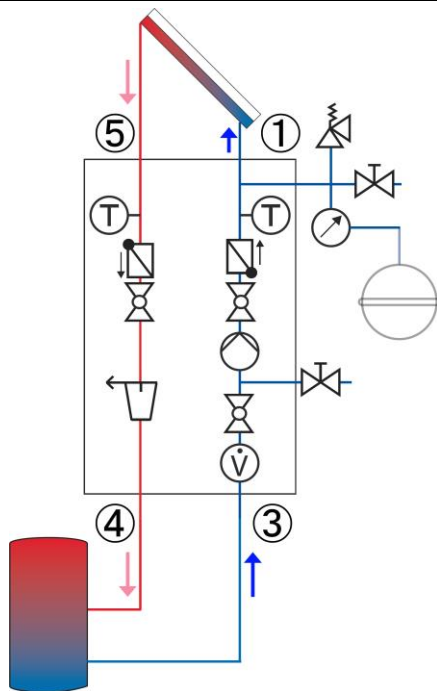
1. Push the union nut ② and the cutting ring ③ onto the copper pipe ①. The pipe must protrude at least 3 mm from the cutting ring in order to ensure the force transmission and the sealing.
2. Insert the support sleeve ④ into the copper pipe.
3. Insert the copper pipe with the plugged-on individual parts (②, ③ and ④) as far as possible into the housing of the cutting-ring 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.



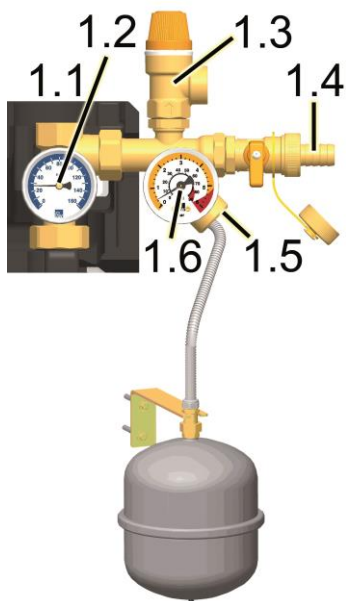
1. Remove the station from the packaging.
2. Remove the insulating front shell.



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.





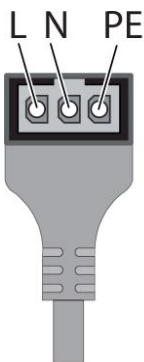
5. Connect the solar station to the installation:
 - ⑤ Flow from the collector field
 - ① Return to the collector field
 - ④ Flow to the storage tank
 - ③ Return from the storage tank



Optionally available!

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. Observe the separate instructions regarding the expansion tank!
8. Check all screw connections and tighten them if necessary.

| | |
|---|--|
|  | WARNING |
|  | <p>Risk to life and limb due to electric shock!</p> <ul style="list-style-type: none"> ➤ 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. <p>An unintentional start of the motors is thus avoided.</p> |



Supply cable - 230 V

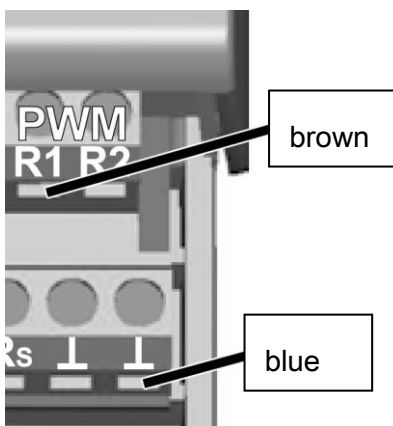
9. Slide the controller extension with the preassembled controller (optional) onto the solar station.

10. Connect the supply cable to the pump.

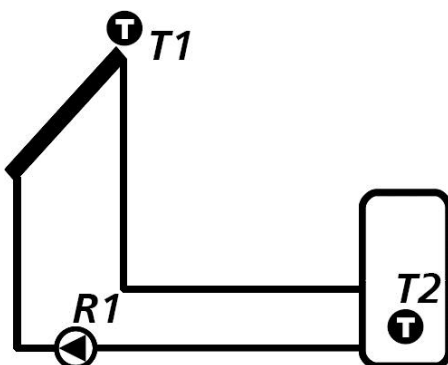
- L brown
- N blue
- PE yellow and green

Connect the control cable of the pump to the controller.

- Signal brown
- GND blue



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


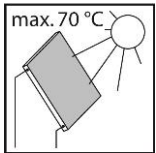


11. Connect the sensors to the controller.

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

4 Commissioning [specialist]

Observe the following safety instructions regarding the commissioning of the station:

| | |
|---|---|
|  | <p>! WARNING</p> |
|  | <p>Risk of burns and scalding!</p> <p>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, solar fluid may escape as vapour and cause scalding!</p> <ul style="list-style-type: none"> ➤ 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 can not be completely drained after flushing. There is thus a risk of late frost damage when flushing with water. Flush and fill the solar installation therefore only with the solar fluid used later.

- 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 heat that may possibly be 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!

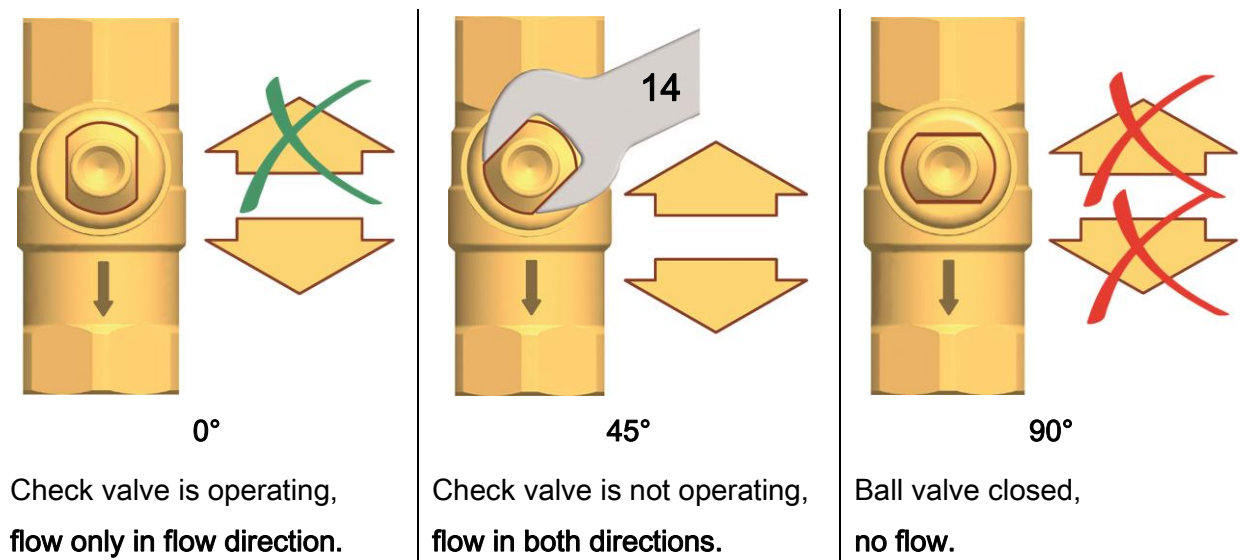
4.1 Flushing and filling the solar circuit

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

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

Ball valve with integrated flow check valve

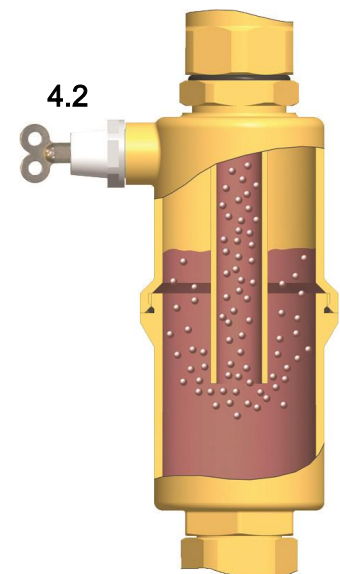
(Normal flow direction in the figure below: downwards)





Airstop

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

| 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 |

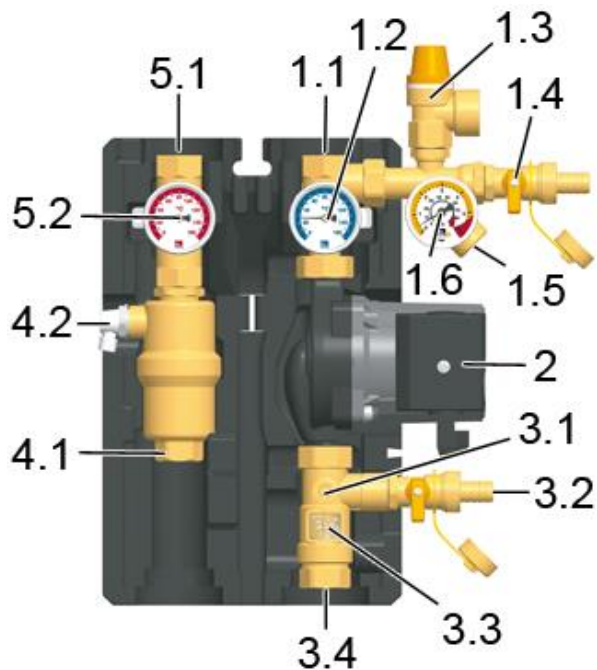


The air liberated from the solar fluid is collected in the upper part of the Airstop and can be released via the vent plug [4.2].

| | |
|---|---|
|  |  WARNING |
| | <p>Danger of scalding due to vapour escape!</p> <p>The escaping fluid can reach temperatures of more than 100 °C and cause scalding.</p> <ul style="list-style-type: none"> ➤ Carefully open the vent plug and close it again as soon as fluid escapes. |

Venting the solar installation after commissioning

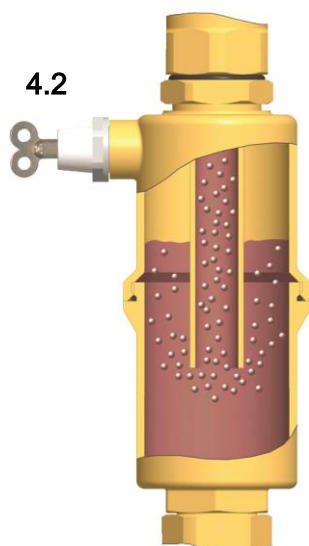
At the beginning, vent the solar installation daily and then weekly or monthly, depending on the quantity of vented air. An optimum operation of the solar installation is thus ensured. Check the system pressure after venting and increase it to the specified operating pressure if necessary.



4.2 Preparations before flushing

The solar circuit is flushed in the direction of flow.

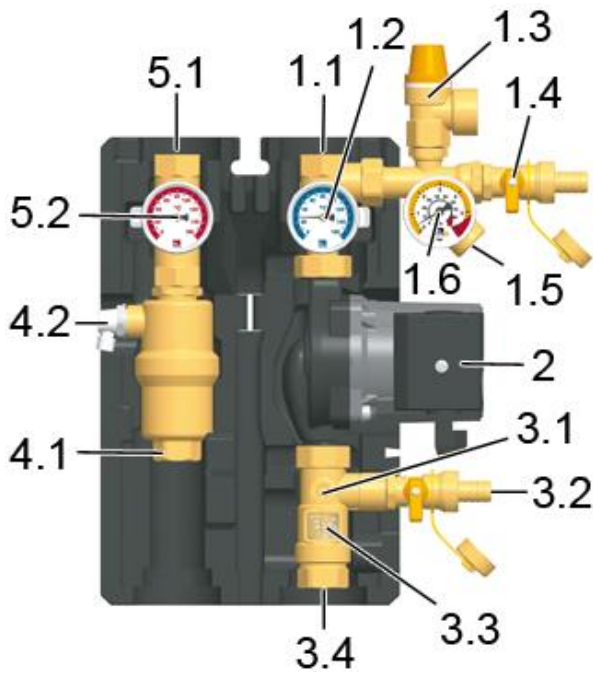
1. Disconnect the expansion tank from the solar installation. Please observe the instructions of the manufacturer.
2. Turn the check valve in the flow ball valve [5.2] into operating position (0° , see page 12).
3. Close the return ball valve [1.2] (90° , see page 12).
4. The ball valve [3.1] must be 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]



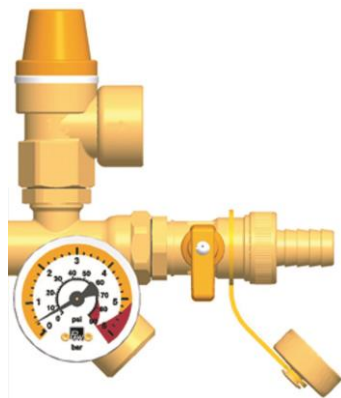
4.3 Flushing and filling

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. To vent the pump section, slowly open the return ball valve [1.2] (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.



Observe 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 instructions 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 |
|  | <p>Risk to life and limb due to electric shock!</p> <ul style="list-style-type: none"> ➤ 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. |

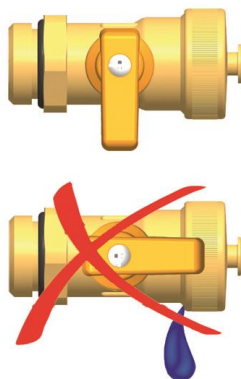


optional

10. Connect the optional controller to the mains and set the pump of the solar circuit in the manual mode to Max. according to the controller instructions. Let the pump of the solar circuit 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 serve only to protect the valves against dirt. They are not designed to take up high system pressures. The ball valves must be closed.



4.4 Adjustment of the solar installation

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).

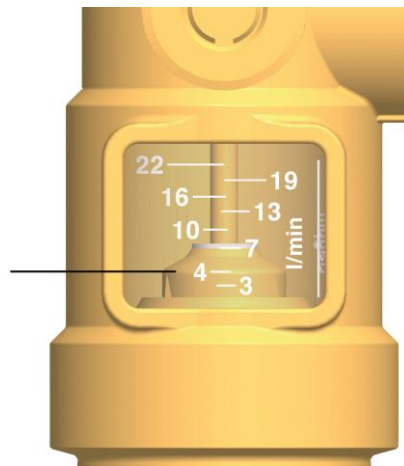
Please observe the specifications of the collector manufacturer for the correct adjustment of the flow rate.

2. Mount the insulating front shell of the 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 27.

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 Parameters: SolarBloC midi Basic / SolarBloC maxi Basic with controller SC3.6

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.

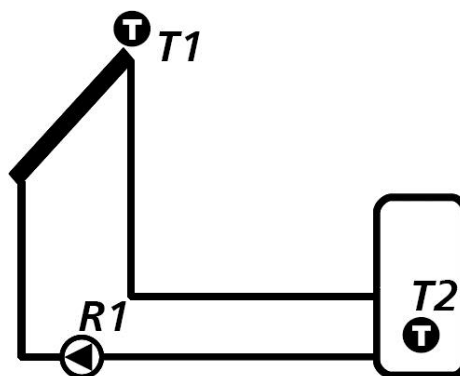
In this case, the following parameters must be changed in the menu. A proper functioning of the installation is thus ensured.

| Menu | Parameters | Settings after reset / change of the system | Change to | Note |
|------|------------|---|---|---|
| Para | P18 | OFF | <i>Standard pump:</i> AC, SC: on <i>PWM pump:</i> PWM, Curve: AA, SC: on | Pump output 1 |
| Func | F05 | OFF | Type 3 | Heat quantity measurement (calculation): Sensor warm side: T1 Sensor cold side: T2 Min./Max. flow rate |

4.6 Heat quantity measurement

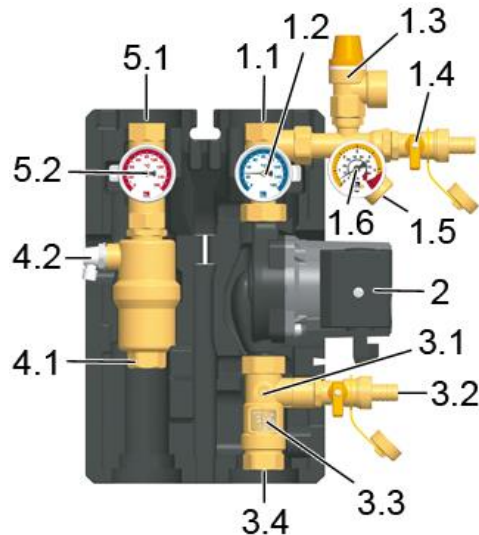
For an optimum use of the heat quantity measurement without flow sensor, the maximum flow rate of the installation can be entered in the controller.

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 installation



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 valve [5.2|1.2] by turning them into position 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.

| | |
|---|--|
|  | <p>! WARNING</p> |
| | <p>Danger of scalding due to hot solar fluid!</p> <p>The escaping solar fluid may be very hot.</p> <ul style="list-style-type: none"> ➤ Place and secure the heat-resistant collecting container in such a way that people standing nearby are not endangered during the draining of the solar installation. |

4. Open the lowest drain valve 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.

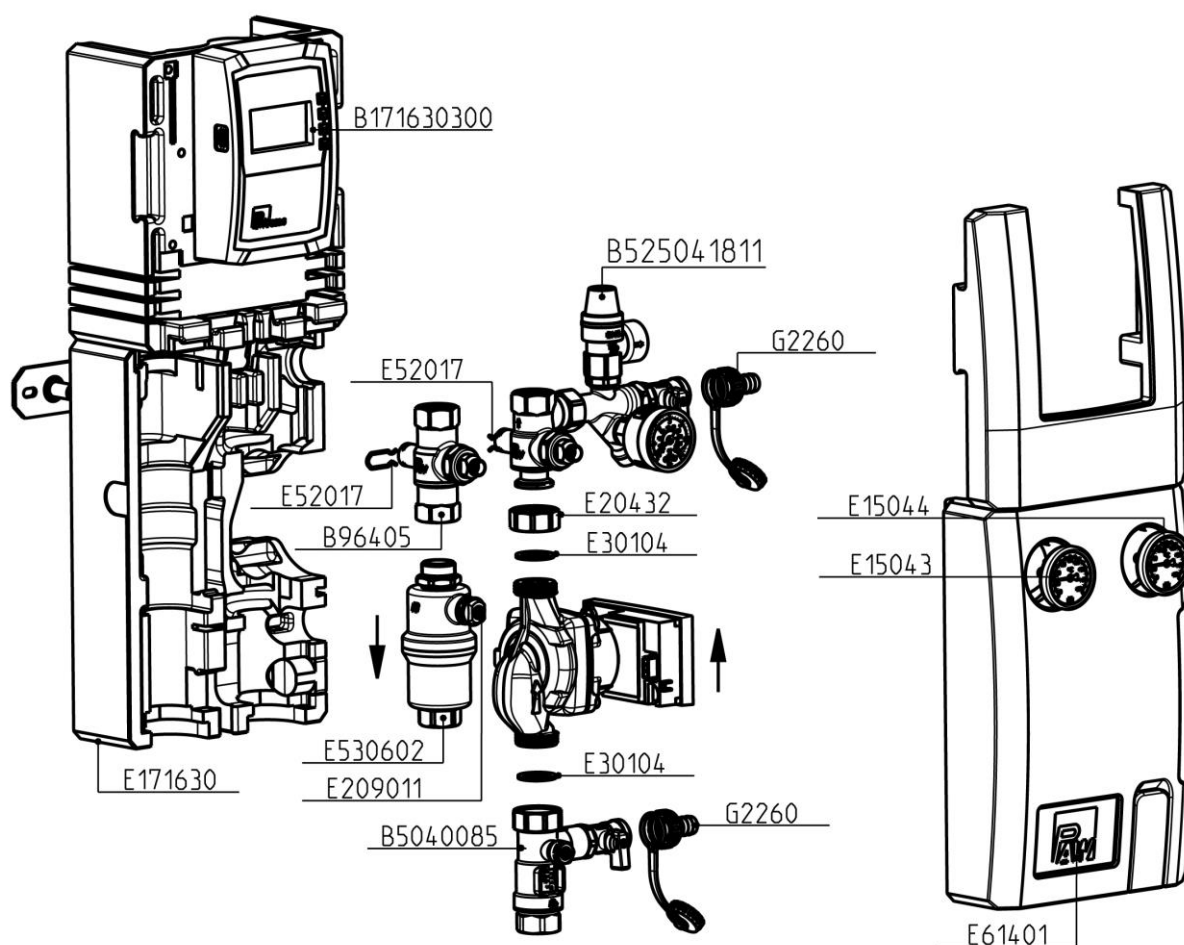
6 Spare parts [specialist]

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.

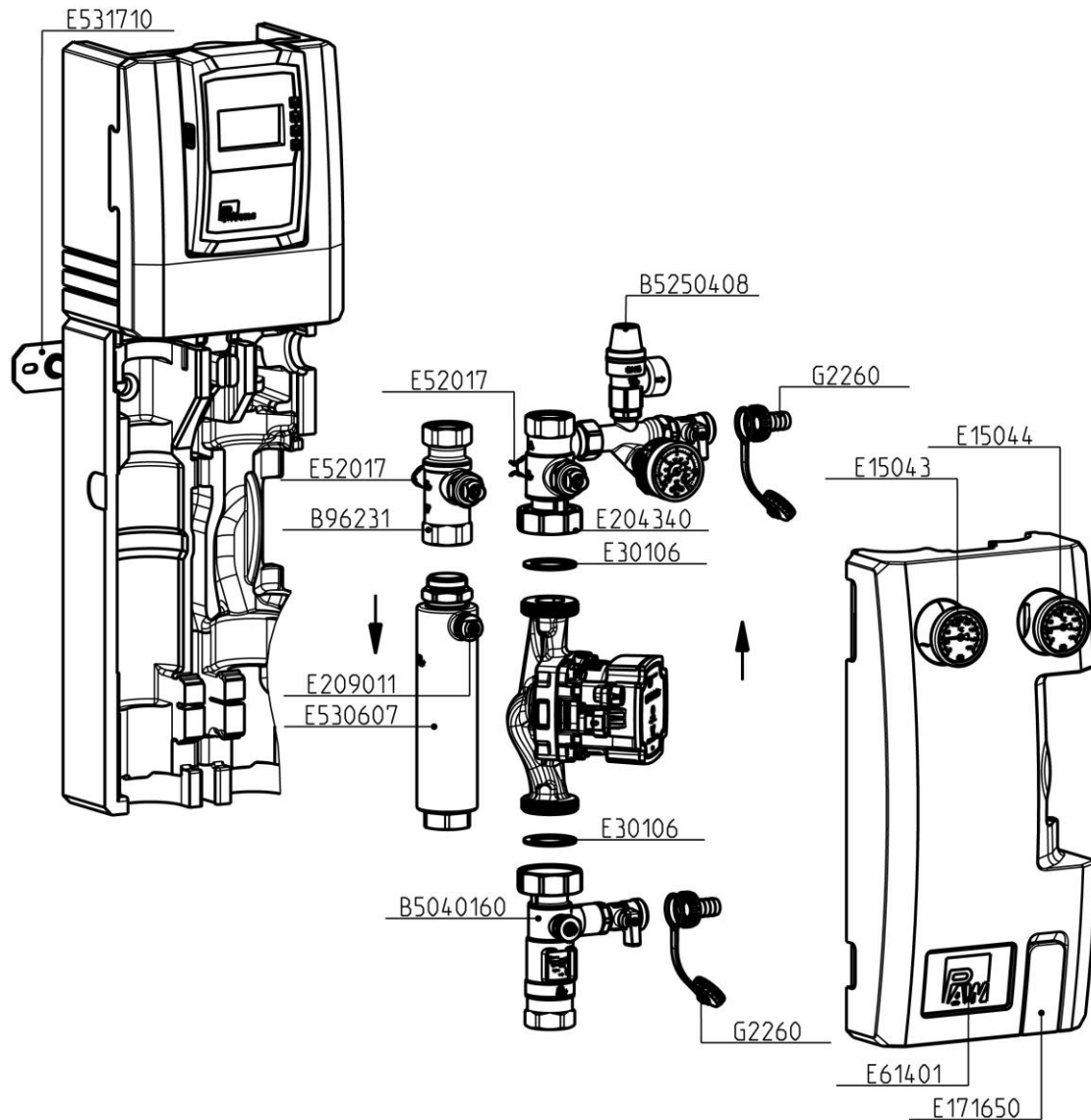
- In case of a complaint, please send us the entirely completed commissioning report on page 27.

6.1 SolarBloC midi Basic DN 20



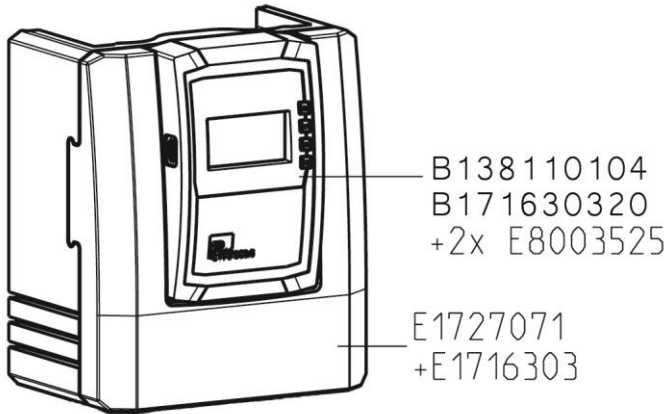
| Pumps DN 20 | Item number |
|------------------------------|-------------|
| Wilo-Yonos PARA ST 15/7 PWM | E123207MO |
| Wilo-Yonos PARA ST 15/13 PWM | E12320135 |
| Grundfos UMP3 Solar 15-75 | E121617 |
| Grundfos UMP3 Solar 15-145 | E121620 |

6.2 SolarBloC maxi Basic DN 25



| Pumps DN 25 | Item number |
|--------------------------------|-------------|
| Wilo-Stratos PARA 25/1-11, T11 | E12395112 |
| Wilo-Yonos PARA ST 25/7.5 | E12320875 |
| Grundfos UPM3 Solar 25-75 | E121630 |
| Grundfos UPM3 Solar 25-145 | E1216313 |
| Grundfos Solar PML 25-145 | E1216314 |

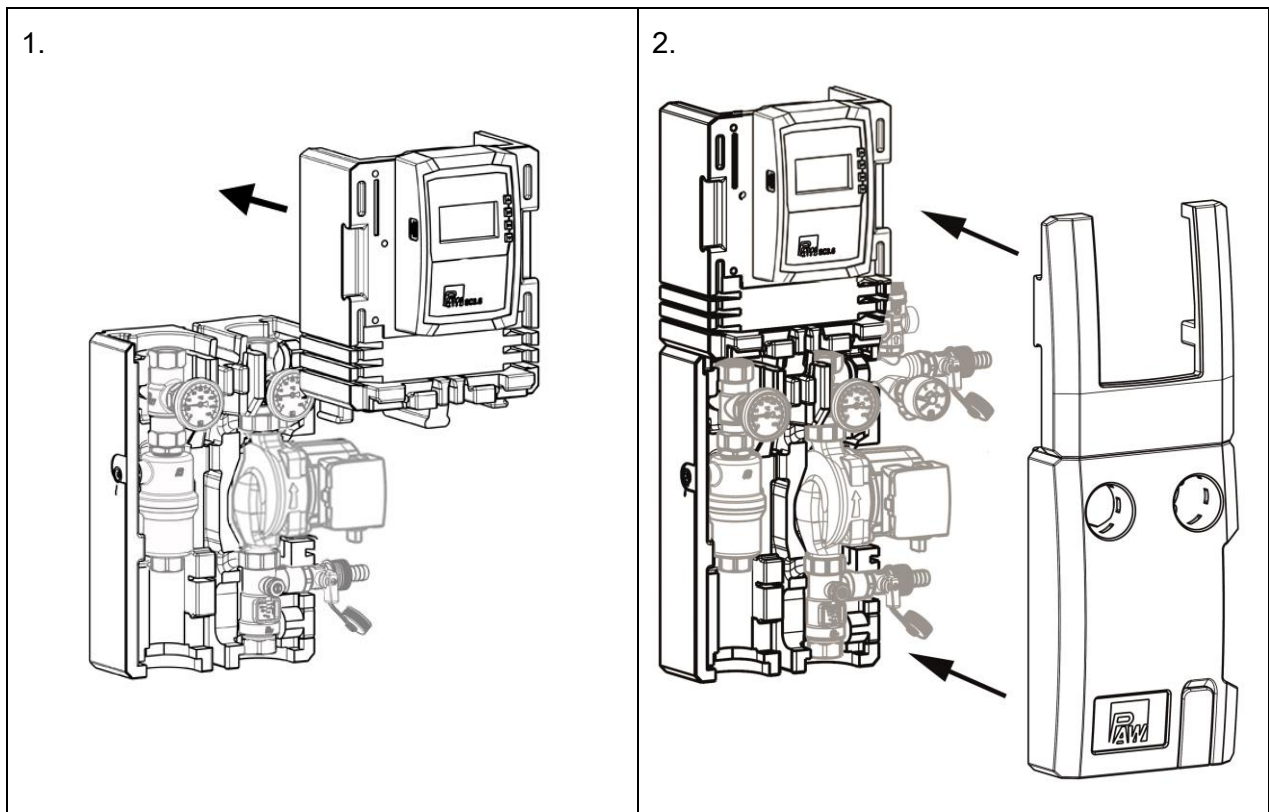
6.3 Controller extension



Connection of PWM pumps

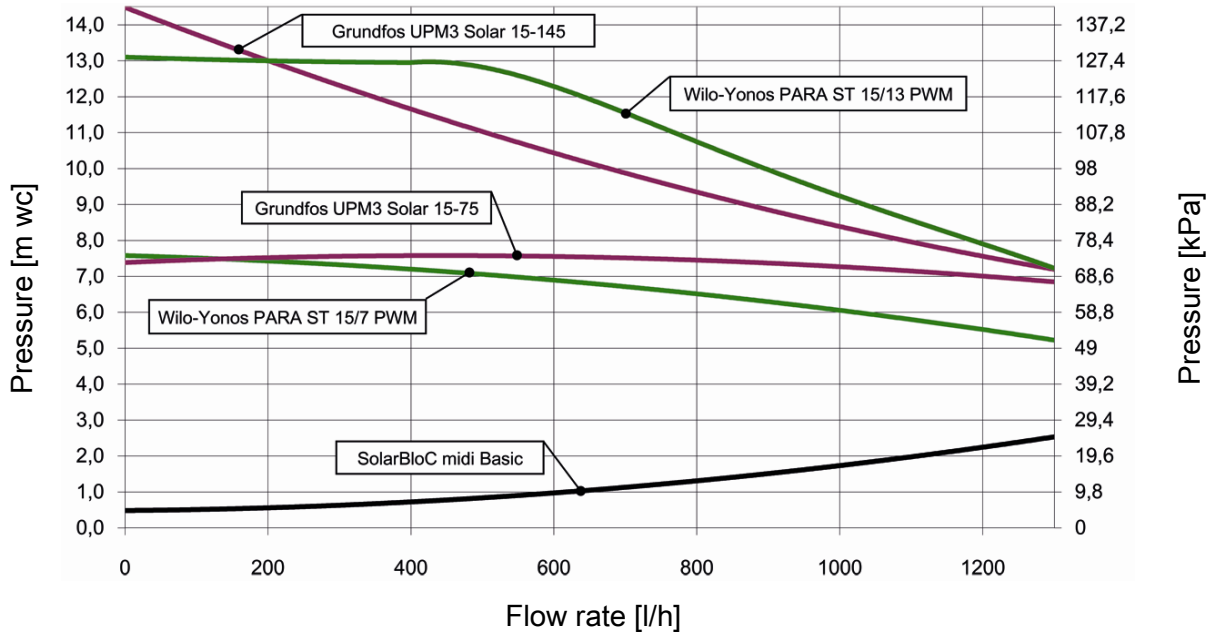
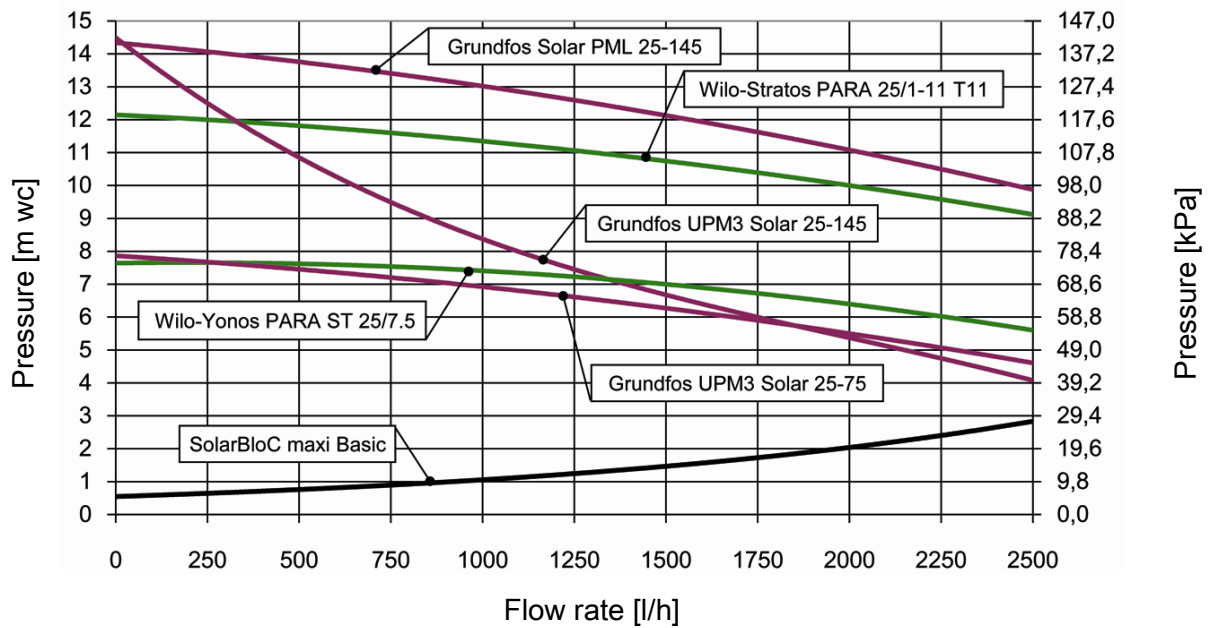
| | |
|-----|-------|
| PWM | brown |
| GND | blue |

7 Assembly of the insulation



8 Technical data

| Dimensions | SolarBloC midi DN 20 | SolarBloC maxi DN 25 |
|---------------------------------------|--|----------------------|
| Height (with controller extension) | 560 mm | 656 mm |
| Height (without controller extension) | 383 mm | 474 mm |
| Width (with insulation) | 334 mm | 334 mm |
| Depth (with insulation) | 150 mm | 160 mm |
| Centre distance flow / return | 100 mm | 100 mm |
| Pipe connections | ¾" internal thread | 1" internal thread |
| Connection for expansion tank | ¾" external thread, flat sealing | |
| Outlet pressure relief valve | ¾" internal thread | |
| Operating data | | |
| Maximum admissible pressure | PN 10 | |
| Maximum operating temperature | 120 °C | |
| Maximum short-time temperature | 160 °C, < 15 minutes | |
| Maximum propylene glycol content | 50 % | |
| Equipment | | |
| Pressure relief valve | 6 bars | |
| Pressure gauge | 0 – 6 bars | |
| Check valves | 2 x 200 mm wc, can be opened | |
| Flow meter | 3-22 l/min | 5-40 l/min |
| Materials | | |
| Valves and fittings | Brass | |
| Gaskets | EPDM | |
| Check valves | Brass | |
| Insulation | EPP, $\lambda = 0.041 \text{ W/(m K)}$ | |

Pressure drop characteristic curve SolarBloC midi Basic DN 20

Pressure drop characteristic curve SolarBloC maxi Basic DN 25


9 Function check valves [specialist]

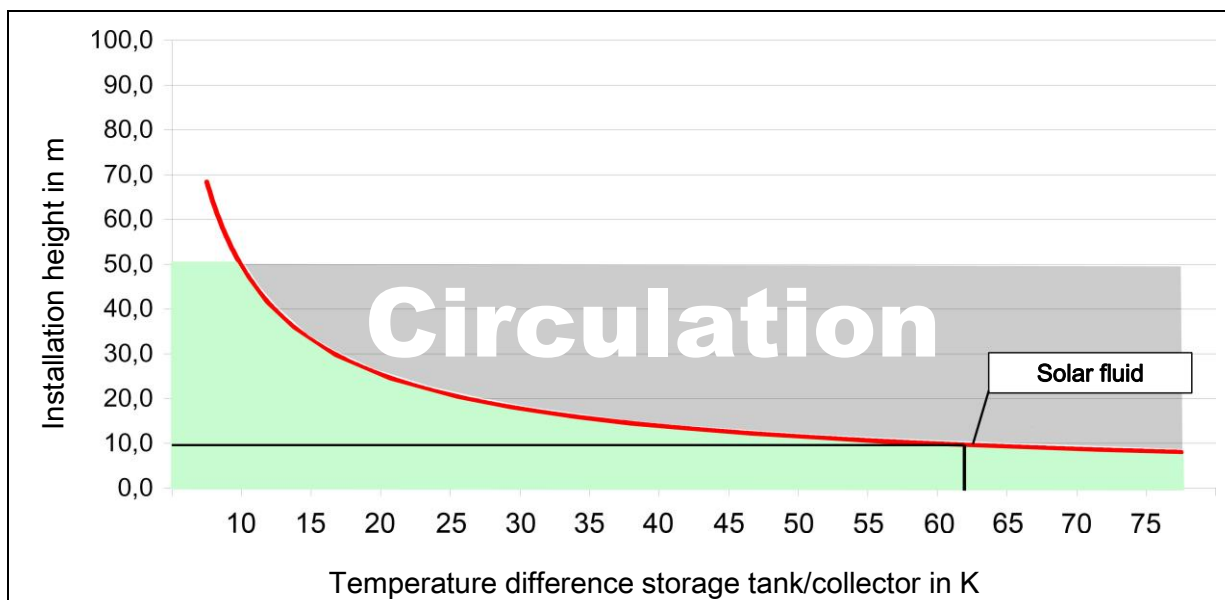
Within their application range, the check valves of this station prevent unwanted gravity circulation. The functioning of the check valves depends on:

- the installation height
- the temperature difference between the storage tank and the collector
- the heat transfer fluid used

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 in order 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).
- You use a mixture of water and 40 % of propylene glycol as **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 storage tank is larger, the difference in density of the solar fluid will be so large that the check valves are pushed open.



Do you wish to get further information?

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

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

Collector temperature: 5 °C → Density solar fluid $\rho_1 = 1042 \text{ kg/m}^3$

Storage tank temperature: 67 °C → Density solar fluid $\rho_2 = 1002.5 \text{ kg/m}^3$

$\Delta \rho = \rho_1 - \rho_2 = 39.5 \text{ kg/m}^3$

$g = 9.81 \text{ m/s}^2$

Installation height $h = 10 \text{ m}$

$\Delta p = 3875 \text{ Pa} = 395 \text{ mm wc}$

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 storage tank.



10 Commissioning report

Installation operator _____

Location of installation _____

Collectors (number / type) _____

Collector surface _____ m²

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

Pipes $\varnothing =$ _____ mm $l =$ _____ m

Venting (collector field) Manual vent valve Automatic vent valve
 No Vented

Airstop (station) Vented

Solar fluid (type) _____ % glycol

Antifreeze tested up to: _____ °C

Flow rate _____ l/m

Pump (type) _____

Pump speed level (I, II, III) _____

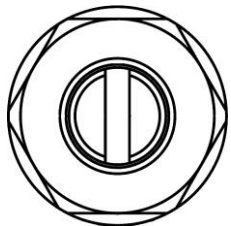
System pressure _____ mbars

Expansion tank (type) _____

Initial pressure _____ mbars

Pressure relief valve Checked

Check valves Checked

| Serial numbers | |
|----------------------|---|
| Station | |
| Controller | |
| Software version | |
| Restrictor position: |  |

Plumbing company

Date, signature

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