

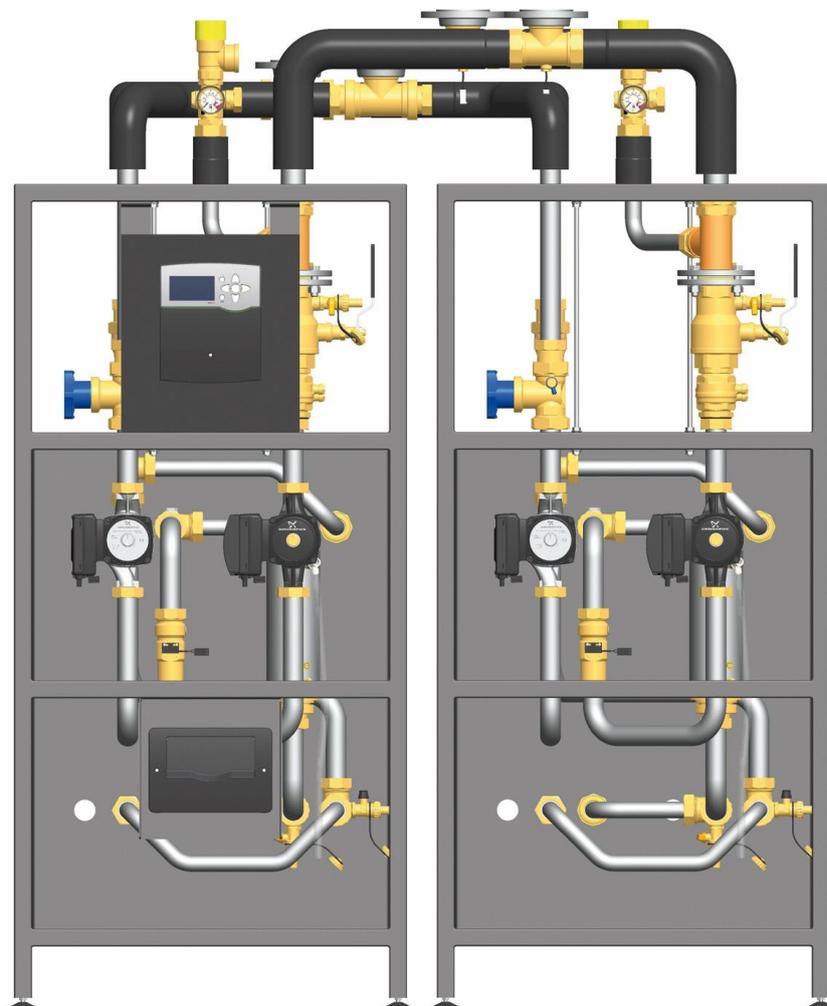


Installation and Commissioning Instructions

Solar transfer station

SolexMega-Kaskade TW

[Hydraulics]



Item no. 996098465-mub-en - Version V02 – Date 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	Scope of these instructions	4
1.2	About this product	5
1.3	Designated use	6
2	Safety instructions	7
3	Product description	9
4	Dimensioning and planning	12
5	Assembly and installation	13
5.1	Secondary side	16
5.2	Primary side	18
5.3	Piping with the installation	20
5.4	Controller connection	22
6	Commissioning [specialist]	23
6.1	Preparations before flushing and filling	24
6.2	Flushing and filling the storage tank circuit (connections secondary).....	24
6.3	Flushing and filling the solar circuit (connections primary).....	28
6.4	Parameters: SolexMega-Kaskade with controller SC5.14	32
7	Maintenance [specialist]	33
7.1	Draining the solar installation	35
7.2	Deinstallation.....	35
8	Spare parts [specialist]	36
8.1	Spare parts control.....	36
8.2	Spare parts hydraulics primary circuit.....	37
8.3	Spare parts hydraulics secondary circuit	38
8.4	Spare parts installation set	39
9	Technical data	40
10	Functioning of the check valves	41
11	Commissioning report	42



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

1 General Information

1.1 Scope of these instructions

These instructions describe the function, installation, commissioning and operation of the solar transfer station SolexMega-Kaskade TW.

The chapters called [specialist] are intended for specialists only.

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

Item number	Controller SC5.14	Maximum flow rate	Maximum collector surface
6098465		8000 l/h	400 m ²

1.2 About this product

The SolexMega-Kaskade is a premounted group of fittings checked for tightness and used to transfer the heat from the primary or solar circuit to the secondary or domestic hot water circuit. It consists of two parallel working cascade modules and contains a preset controller as well as important fittings and safety devices for the operation of the installation:

- Ball valves in the solar circuit (flow and return)
- Piston valves in the secondary circuit / domestic hot water circuit (flow and return)
- Check valves to avoid undesirable gravity circulation in the flow and return of the solar circuit as well as in the flow of the secondary circuit
- Pressure relief valves to prevent inadmissible overpressures
- Pressure gauge to display the system pressure in the solar circuit
- Fill and drain valves with caps to flush, fill and drain the solar circuit
- Vent valves to easily vent the secondary circuit
- Temperature sensors in the primary and secondary circuit
- Electronic flow rate sensors for heat quantity balancing (secondary) and speed control of the secondary pumps depending on the performance

The expansion tank required for operation must be adapted to the size and the requirements of the installation and must be ordered separately.

The cap-type valve (item no. 5301), which is also separately available, allows the expansion tank to be easily mounted and separated from the solar thermal system.

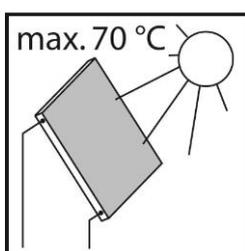
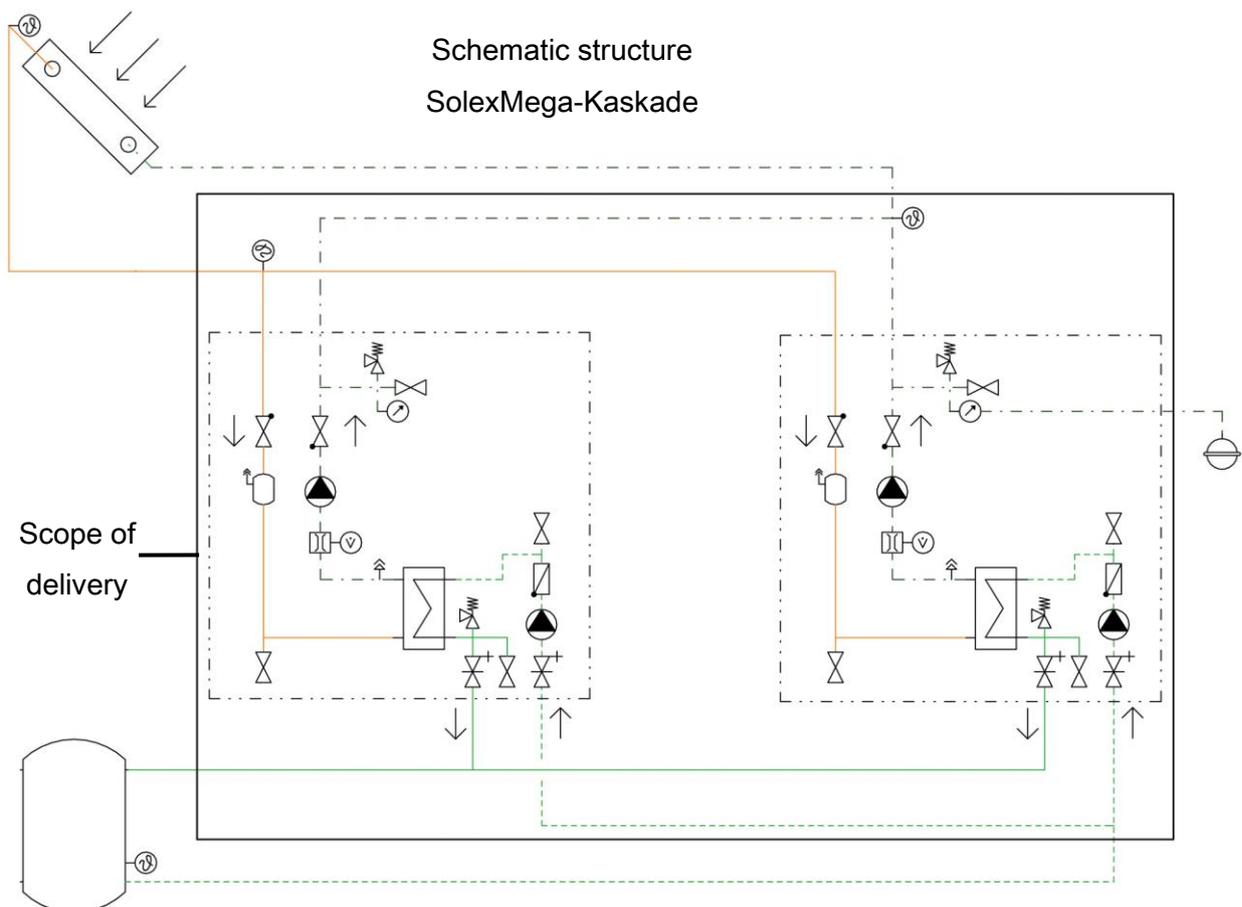
- The wrapping materials are made of recyclable materials and can be disposed of with recyclable materials.

1.3 Designated use

The SolexMega-Kaskade may only be used as a transfer station between the solar and the domestic hot water circuit (or heating circuit) in solar thermal systems taking into consideration the technical limit values indicated in these instructions. Due to its design, the station must only be mounted and operated as described in these instructions!

Only use original accessories with the transfer 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. Flush and fill the solar circuit only 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].

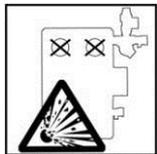
The following must be observed during installation and commissioning:

- relevant local and national regulations
- accident prevention regulations of the professional association
- instructions and safety instructions of this manual

	 WARNING
	<p>Danger of scalding due to vapour escape!</p> <p>With pressure relief valves, there is a 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"> ➤ For this purpose, please observe the instructions regarding the pressure relief valve. ➤ The pressures calculated by the installation planner for the expansion tank and the operating pressure of the installation must be set.

	 WARNING
	<p>Personal injury due to polluted potable water!</p> <p>Heating water contains harmful substances that must not be washed into the domestic hot water circuit.</p> <p>If the station has been used to charge a heating buffer tank, there is still heating water in the valves and fittings and in the pump of the secondary circuit, even after draining. The heating water can not be completely removed.</p> <ul style="list-style-type: none"> ➤ The station must not be connected to a domestic hot water circuit any more.

	<p style="background-color: yellow; padding: 2px;">⚠ CAUTION</p> <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.
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	<p style="background-color: yellow; padding: 2px;">⚠ CAUTION</p> <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 causes 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. ➤ If you close the ball valves in case of servicing, do also put the pumps out of operation and close the ball valves of the secondary circuit.
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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. 	

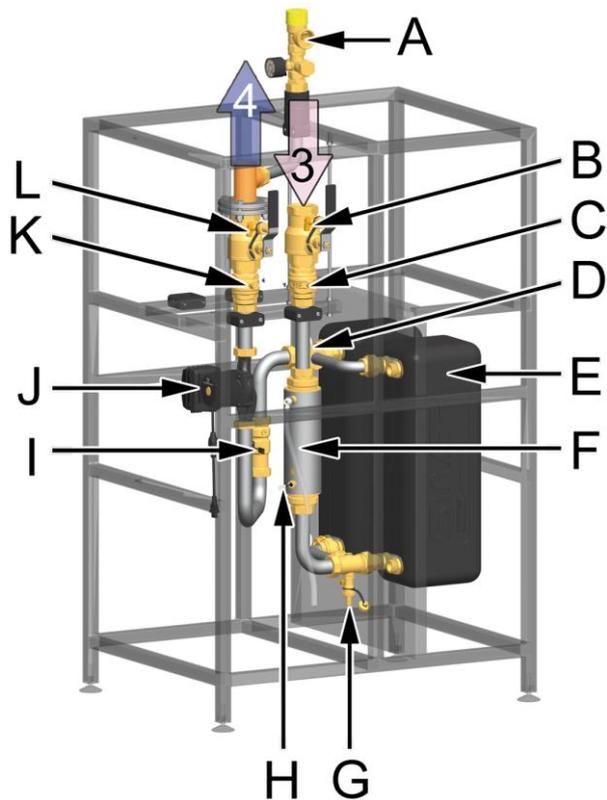
3 Product description



Connections

- 1 Secondary side:
Return from the storage tank
- 2 Secondary side:
Flow to the storage tank
- 3 Primary side:
Solar flow from the collector
- 4 Primary side:
Solar return to the collector

You will find the information on the equipment of the individual modules on the next pages.

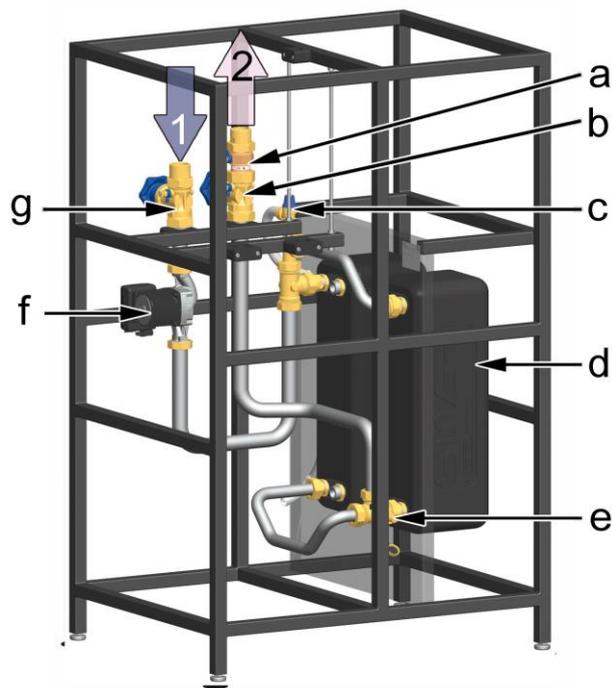


Connections primary circuit

- 3 Solar flow from the collector
- 4 Solar return to the collector

Equipment primary circuit

- A Safety group with pressure relief valve 6 bars, pressure gauge and connection for expansion tank
- B Flow ball valve with fill and drain valve
- C Check valve
- D Vent plug (manual vent valve)
- E Heat exchanger (2x)
- F Airstop with manual vent valve
- G Drain valve
- H Temperature sensor Pt1000
- I FlowRotor with Hall sensor
- J Primary pump
- K Check valve
- L Return ball valve with fill and drain valve



Connections secondary circuit

- 1 Return from the storage tank (cold)
- 2 Flow to the storage tank (hot)

Equipment secondary circuit

- a Non-return valve
 - b Piston valve with drain valve
 - c Pressure relief valve 10 bars, suitable for DHW modules
- Only for the protection of the station.
Does not replace the pressure relief valve that has to be mounted on site!**
- d Heat exchanger (2x)
 - e Drain valve
 - f Secondary pump
 - g Piston valve with drain valve

4 Dimensioning and planning

The SolexMega-Kaskade is a solar transfer station used to transfer the heat from the primary or solar circuit to the secondary or storage tank circuit.

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

Mounting example



5 Assembly and installation

During operation, the access to the control and safety equipment must be guaranteed at all time! The discharge lines of the pressure relief valves must be conducted into heat-resistant collecting containers of corresponding size. Thus, an uncontrolled discharging into the environment is avoided and the refilling of the circuits is facilitated!

	<p>WARNING</p> <p>Personal injury due to polluted potable water!</p> <p>Heating water contains harmful substances that must not be washed into the domestic hot water circuit.</p> <p>If the station has been used to charge a heating buffer tank, there is still heating water in the valves and fittings and in the pump of the secondary circuit, even after draining. The heating water can not be completely removed.</p> <ul style="list-style-type: none"> ➤ The station must not be connected to a domestic hot water circuit any more.
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NOTICE

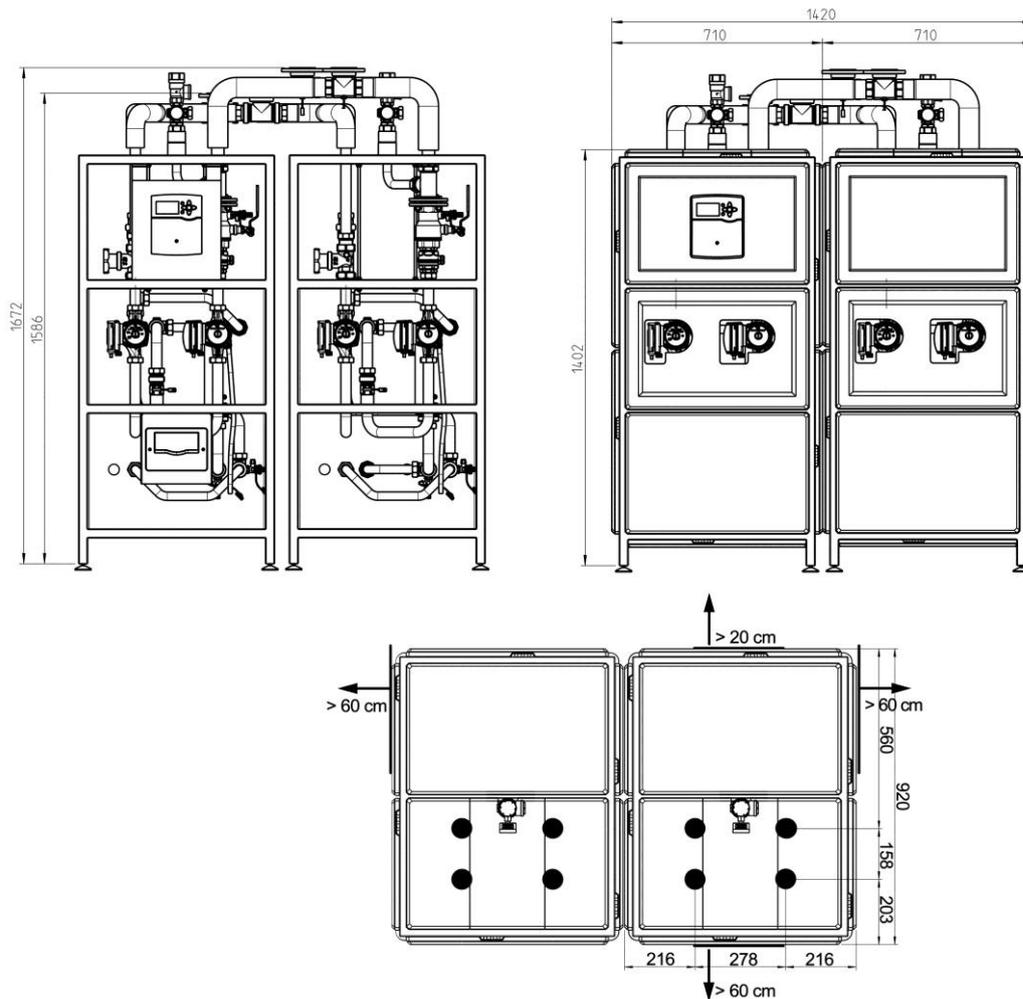
Material damage due to high temperatures!

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

NOTICE

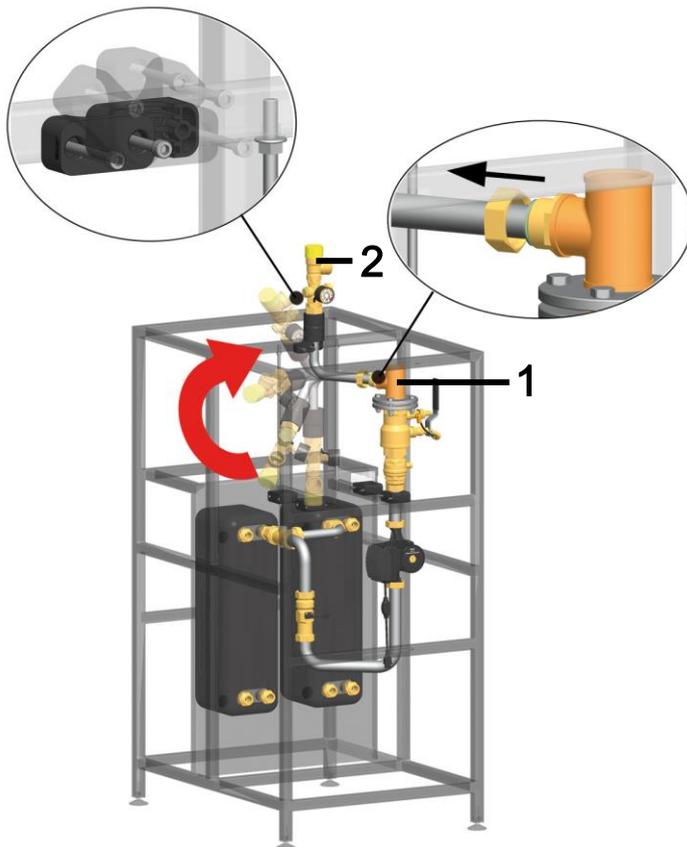
Damage to property!

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



Top view

1. Determine the mounting location of the transfer station near the buffer tank.
In long pipes, the transmission performance may be reduced due to higher pressure losses.
2. Remove the packaging.
3. Take the stations off the pallet.
4. Mount the enclosed stand feet in order to compensate the unevenness of the floor.
5. Position both modules side by side.
Note: The insulation between the frames remains mounted!
6. The station can be mounted in a corner. If you want to pull off the insulation shells, you have to leave a space of about 20 cm to the wall (see figure).
7. For the operation of the hydraulics and a subsequent servicing, you have to leave a space of at least 60 cm to the front (controller) and to both sides (see figure).
8. Remove the upper elements of the insulation at the connections of the modules.

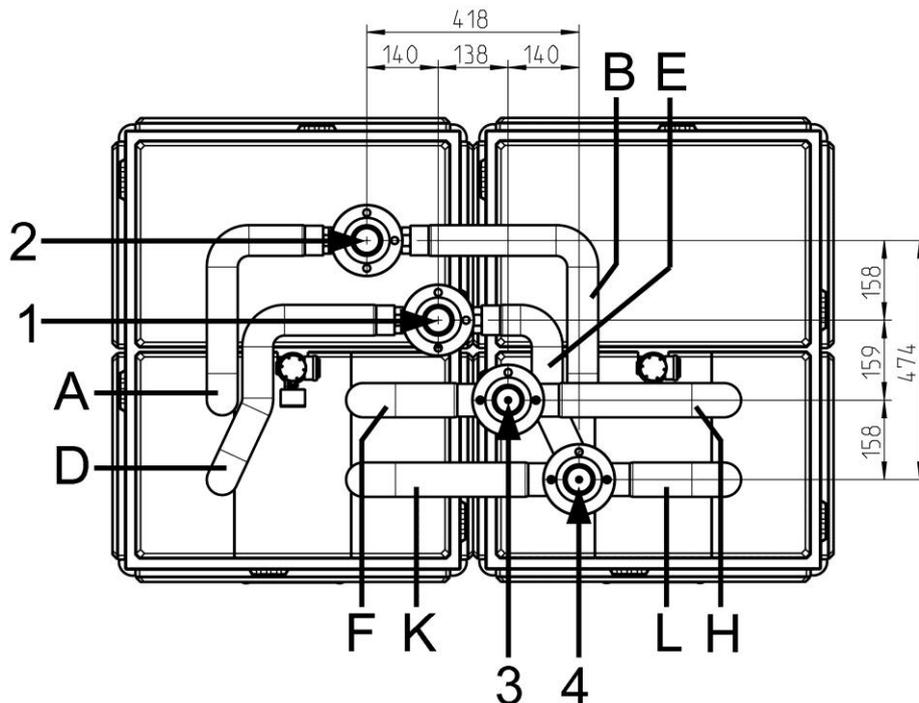


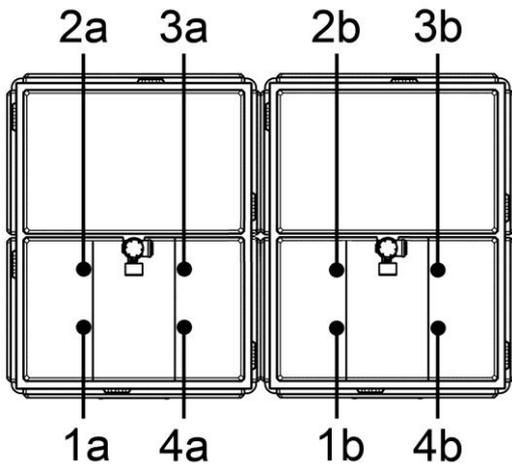
9. In order to prevent damage at the safety group, it is mounted in the stations in factory.

Commission the safety group as follows:

- a. Unscrew the pipe at the connecting T-piece [1] of the solar return.
- b. Mount the pipe at the T-piece [1] in such a way that the pressure relief valve [2] is in a vertical position.
- c. Fix the pipe with the plastic clamp at the frame (see figure).

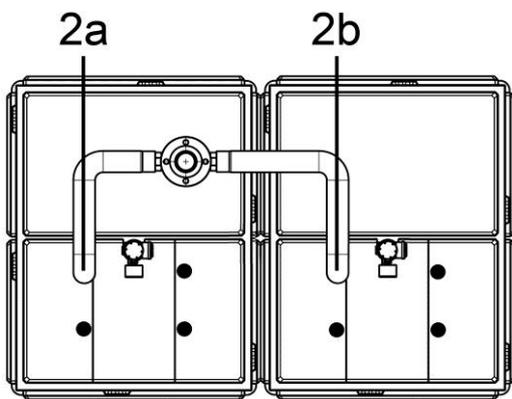
10. Connect the transfer station to the installation by using the piping, as shown in the figure below. When the station is delivered, the ball valves are fitted with caps in order to protect the module against dirt. Before connecting the pipes, make sure that the connections are free from dirt.





11. Mount the piping in the following order:

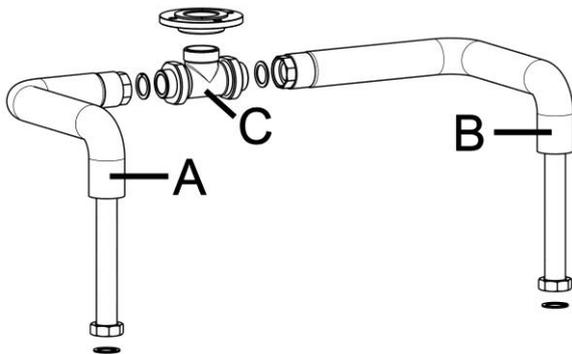
- Flow to the storage tank (2a and 2b)
- Return from the storage tank (1a and 1b)
- Solar flow from the collector (3a and 3b)
- Solar return to the collector (4a and 4b)

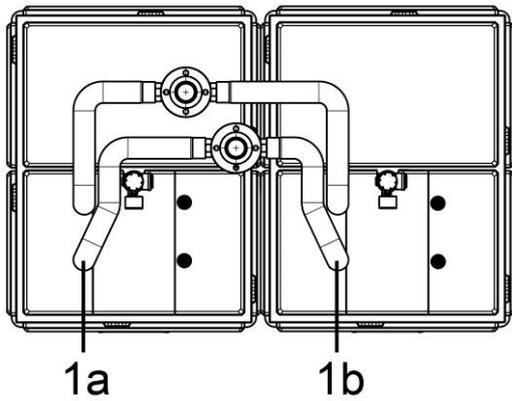


5.1 Secondary side

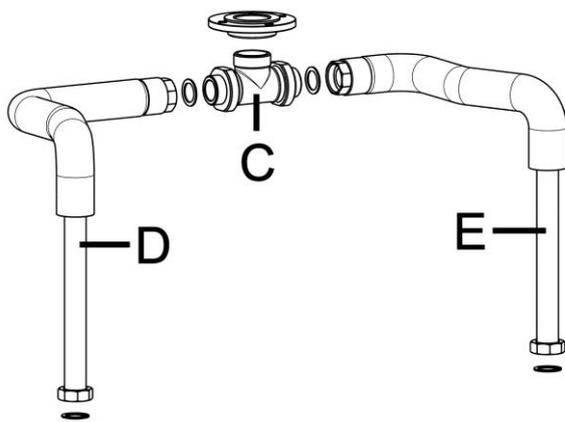
Connection flow piping to the storage tank:

1. Connect a T-piece [C] with transition thread connection with a short [A] and a long pipe [B]. Use the 1½" gaskets for this purpose.
2. Mount the connection pipe onto the connections (2a and 2b). Use the flange gaskets for this purpose.
3. Adjust the pipe and firmly tighten the screw connections.
4. Firmly tighten the screw connections at the T-piece [C].
5. The continuing piping can be connected to 2" external thread or to flange DN 50. For this purpose, an additional gasket must be added to the flange DN 50 on site.



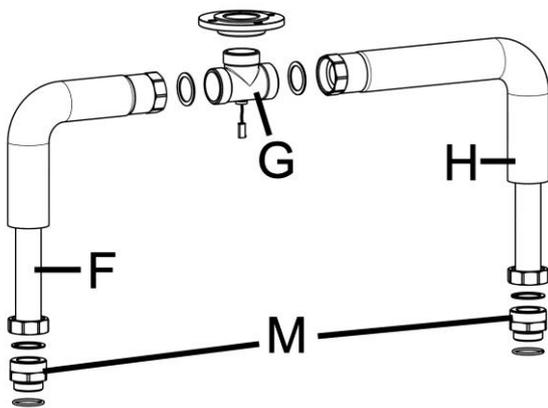
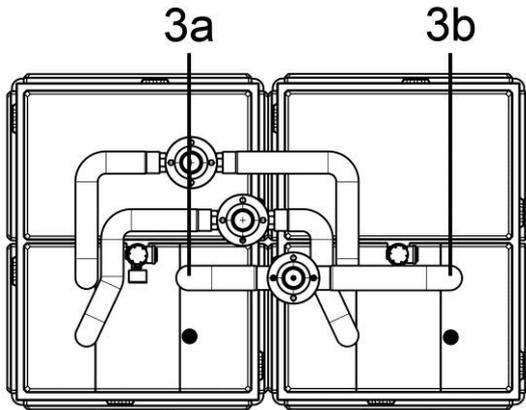
**Connection return piping from the storage tank:**

- Repeat the steps 1 - 5 for the connection of the return to the storage tank (connections 1a and 1b). For this purpose, use the pipes [D] and [E] as well as the T-piece [C] with transition thread connections.

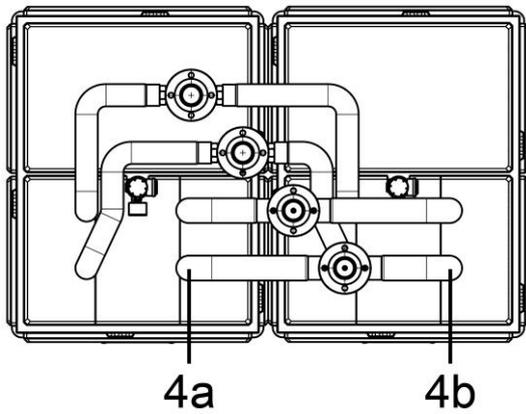


5.2 Primary side

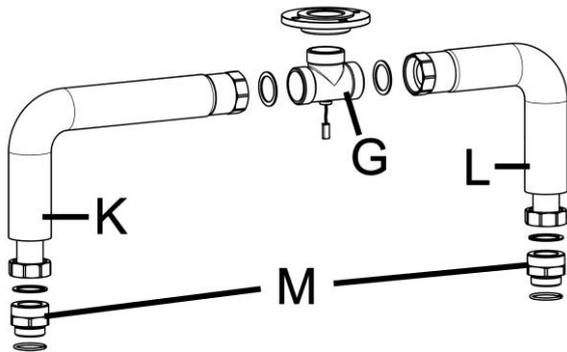
Connection flow piping from the collector:



1. Connect a T-piece [G] with a short [F] and a long pipe [H]. Use the 2" gaskets for this purpose.
2. Mount the transition thread connections [M] in the ball valves.
3. Mount the connection pipe onto the connections (3a and 3b). Use the flange gaskets for this purpose.
4. Adjust the pipe and tighten it firmly.
5. Firmly tighten the screw connections at the T-piece.
6. The continuing piping can be connected to 2" external thread or to flange DN 50. For this purpose, an additional gasket must be added to the flange DN 50 on site.
7. Mount a vent valve that can be isolated at the highest point in the pipeline on site.

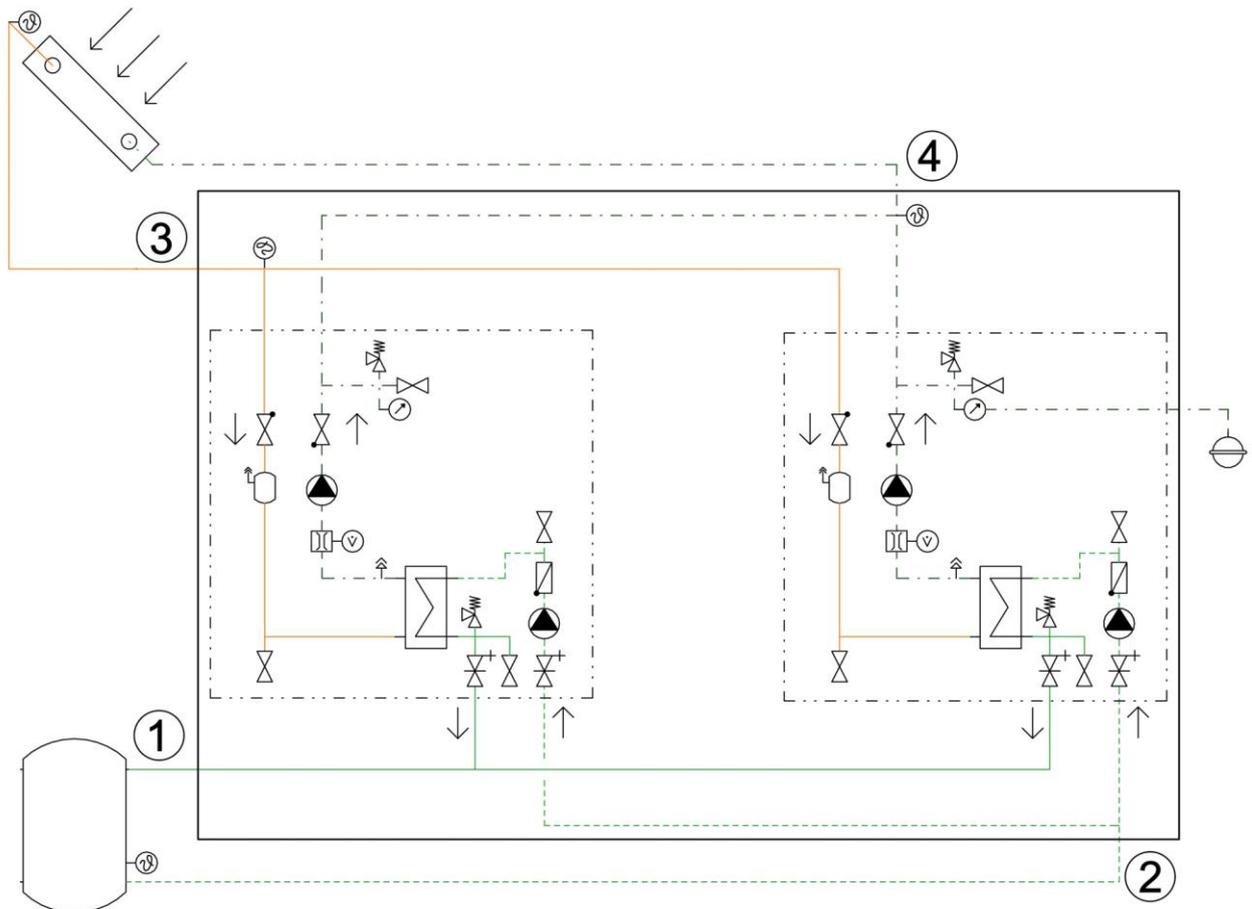
Connection return piping to the collector:

8. Repeat the steps 1 - 6 for the connection of the solar return to the collector (connections 4a and 4b). For this purpose, use the pipes [K] and [L] as well as the T-piece [G] with transition thread connections.



5.3 Piping with the installation

1. Connect the transfer station to the installation by using the piping as shown in the figure below. Before connecting the pipes, make sure that the connections are free from dirt. All thread connections of the cascade have 2" external threads. The continuing piping can be connected to 2" external thread or to flange DN 50. For this purpose, an additional gasket must be added to the flange DN 50 on site.



- ① Flow to the domestic hot water tank
- ② Return from the domestic hot water tank
- ③ Solar flow from the collector
- ④ Solar return to the collector



2. Connect the expansion tank at the T-piece of the pressure gauge of one of the two stations.
3. For service work on the expansion tank, we recommend the installation of a cap valve (item no. 5302) on the expansion tank.

NOTICE

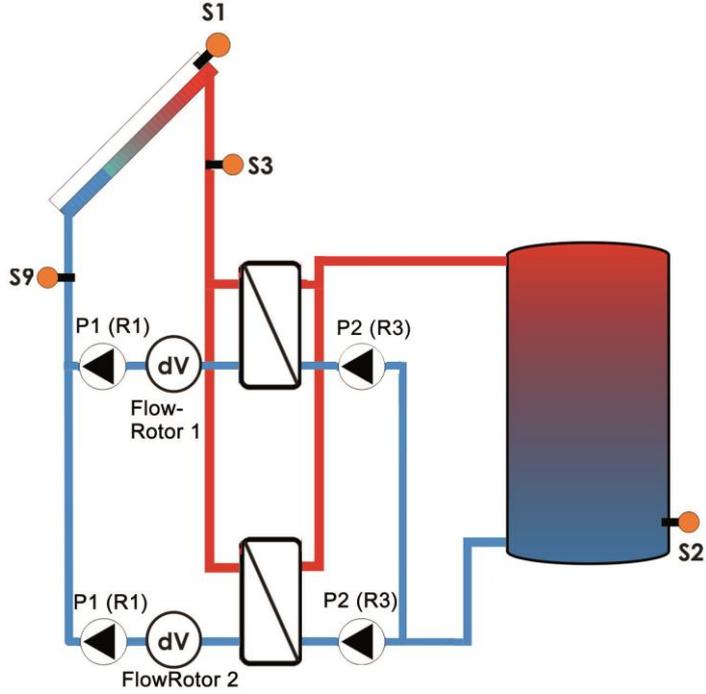
Note regarding the expansion tank

While flushing and filling the station, the expansion tank must not be connected in order to avoid that dirt particles are washed in.

4. 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!
5. Check all thread connections and tighten them if necessary.
6. Mount the upper insulation of the transfer stations. Make sure that the pipe insulation is flush with the insulation of the transfer station.

5.4 Controller connection

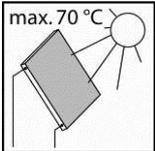
	WARNING
	<p>Risk to life and limb due to electric shock!</p> <ul style="list-style-type: none"> ➤ Prior to commencing electrical work on the controller, pull the mains plug! ➤ Only after completing all installation work as well as the flushing and filling, the mains plug of the controller can be plugged into a socket. <p>Thus, an unintentional start of the motors is avoided.</p>

Connection scheme of the cascade	
	
<p>Please observe the separate instructions of the controller SC5.14!</p> <ol style="list-style-type: none"> 1. Connect the temperature sensors to the controller: <ul style="list-style-type: none"> • Collector sensor S1 • Storage tank 1 bottom: S2 • In the piping set of the cascade: S3 + S9 • Only one FlowRotor is connected (bottom FlowRotor 2). 2. Tighten all union nuts and thread connections. 	

The installation of the transfer station is now completed and the station can be put into operation.

6 Commissioning [specialist]

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

	<p>WARNING</p>
	<p>Risk of burns and scalding!</p> <p>The fittings can heat up to more than 100 °C. Therefore, it is not allowed to flush or fill the system if the collectors are hot (intense solar radiation). Please note that hot solar fluid can leak from the pressure relief valve if the system pressure is too high! During venting, solar fluid may escape as vapour and cause scalding!</p> <ul style="list-style-type: none"> ➤ Flush and fill the installation only if the collector temperatures are below 70 °C.

NOTICE

Risk of frost!

It is often not possible to completely drain solar installations after flushing. Thus, there is a risk of frost damage when flushing with water. Therefore, flush and fill the solar installation 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

Flush and fill the installation in the following order:

1. Flush the storage tank (to remove scale residues).
2. Fill the secondary circuit / storage tank circuit.
3. Vent the heat exchangers with the help of the pressure relief valves.
4. Flush and fill the heat exchangers in the solar circuit.
5. Flush and fill the collector field.
6. Flush and fill the (entire) solar circuit.

This avoids that dirt particles are flushed into the heat exchanger or the FlowRotor and guarantees that possibly absorbed heat can be dissipated.

6.1 Preparations before flushing and filling

NOTICE

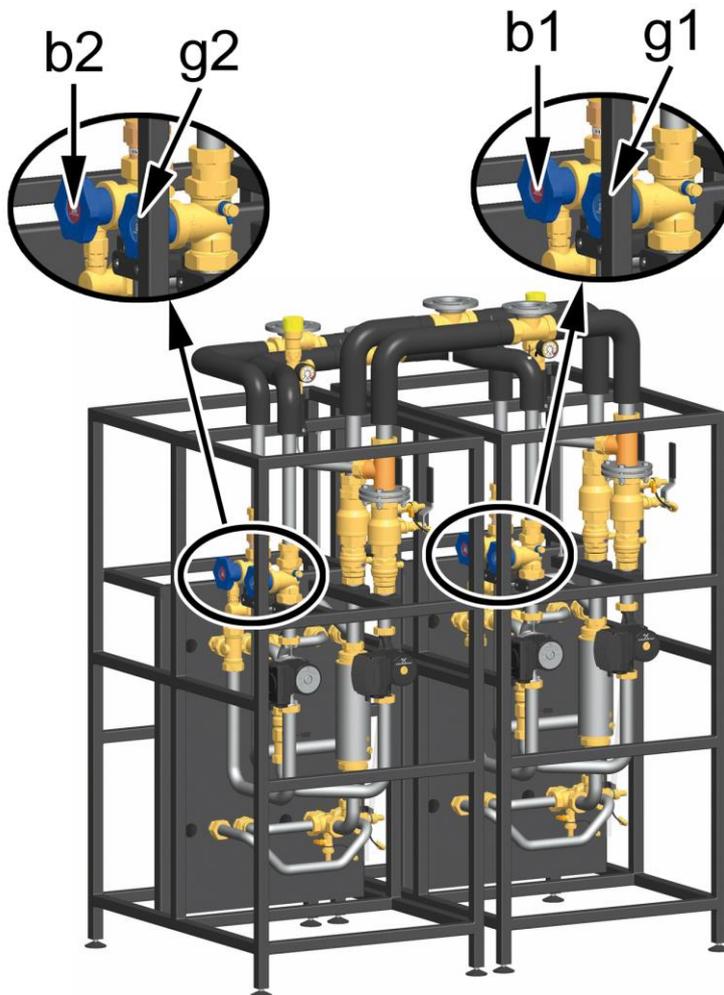
Note regarding the expansion tank

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.

6.2 Flushing and filling the storage tank circuit (connections secondary)

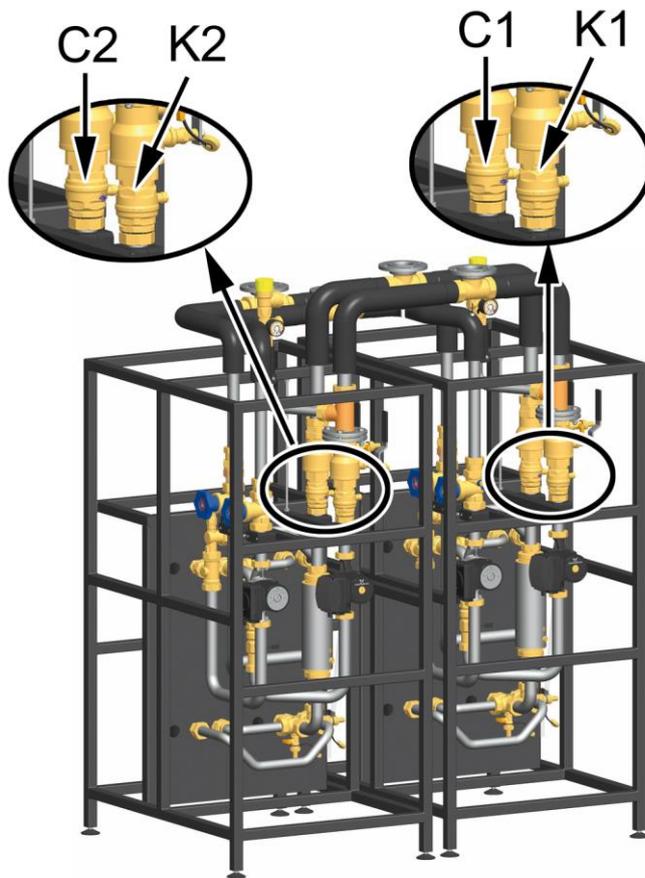
Depending on the application, the secondary circuit is filled (charging of a domestic hot water tank) via the valves at the domestic hot water tank or (charging of a buffer tank) via the valves of the heating installation. Make sure that only potable water must be used in the first case mentioned. In the second case mentioned, only heating water treated according to VDI 2035 / Ö-Norm H5195-1 must be used.

To avoid that dirt particles are washed into the heat exchanger, shut the piston valves of the station and flush out the dirt particles present in the tank **before** the first commissioning.



The storage tank circuit or secondary circuit can only be flushed in the direction of flow.

1. Open the piston valves [b1|b2] and [g1|g2].
2. Fill the secondary circuit via the valves at the domestic hot water tank or at the heating system.
3. Vent the secondary circuit by actuating the pressure relief valve. Make sure that the electrical components do not get wet.
4. Set the required operating pressure after filling the secondary circuit.
5. If necessary, vent the station at the pressure relief valve [c1|c2] during commissioning to eliminate the air still present in the heat exchanger.

Functioning check valve


The primary circuit is equipped with check valves [C1|C2] and [K1|K2], in order to avoid undesirable gravity circulation.

For venting and flushing the installation, the check valves must be open.

Turn the opening mechanism of the check valves into the position 180°.

The check valve is not operating.

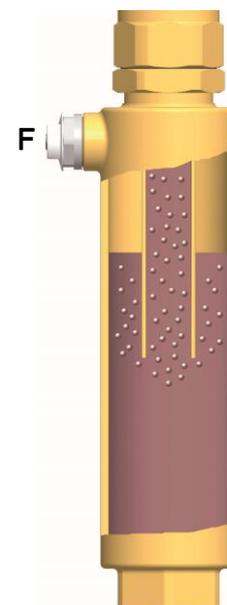
For the operation of the installation, all (ball) valves must be **completely** open and the check valves must be put into operating position (position 0°).

Check valve (normal flow direction in the figure: downwards)

<p>Position 0° Check valve is operating, flow only in direction of flow.</p>	<p>Position 180° Check valve is not operating, flow in both directions.</p>

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 0.6 m/s	
∅ outside	∅ inside	l/h	l/min
15	13	~ 143	~ 2.4
18	16	~ 217	~ 3.6
22	20	~ 339	~ 5.7
28	25	~ 530	~ 8.8
35	32	~ 869	~ 14.5
42	39	~ 1290	~ 21.5
54	50	~ 2121	~ 35.3

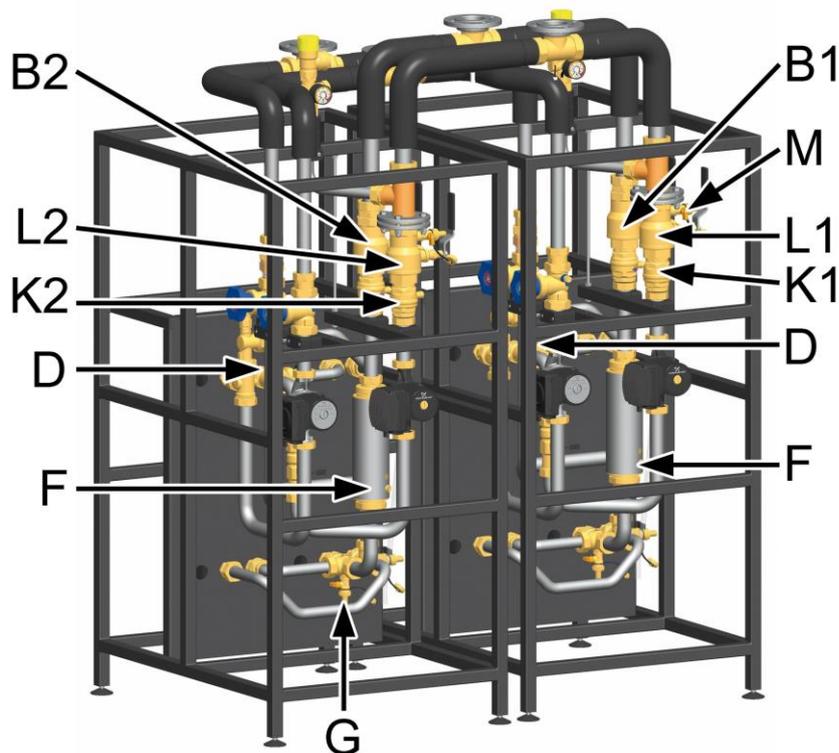
The air separated from the solar fluid is collected in the upper part of the Airstop and can be released at the vent plug [F].

	 WARNING
	<p>Danger of scalding due to vapour escape!</p> <p>The escaping fluid can heat up to 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 medium escapes.

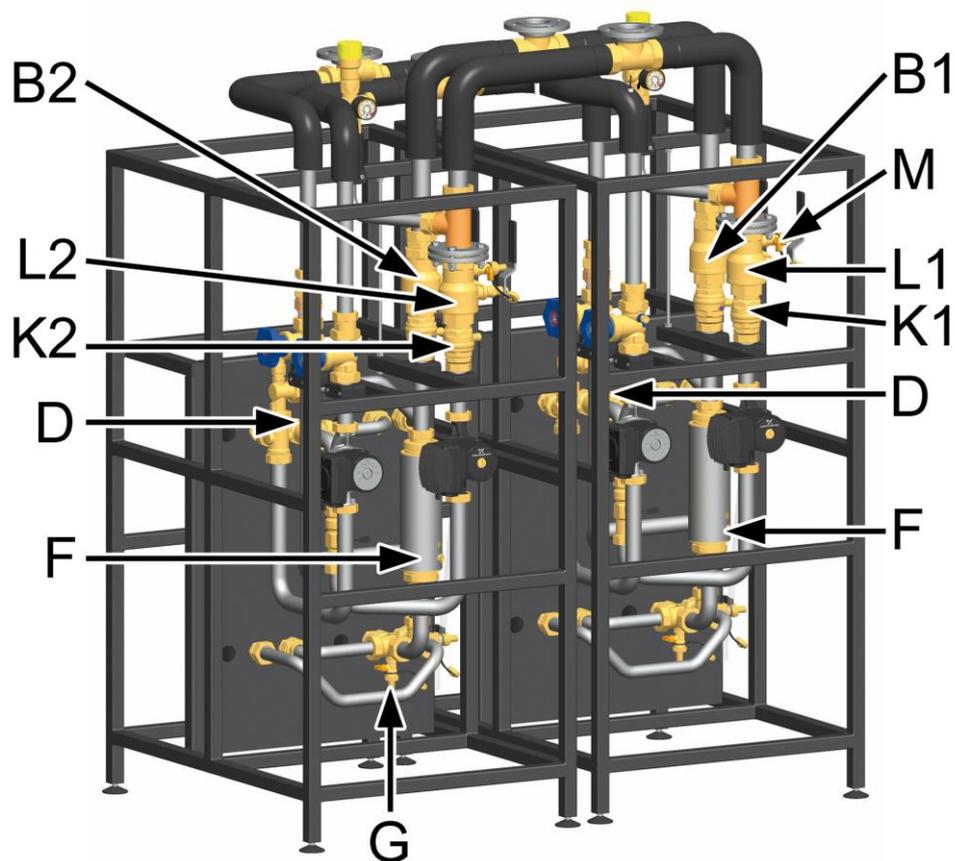
Venting the solar installation after commissioning

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

6.3 Flushing and filling the solar circuit (connections primary)



1. Switch off the pump of the solar circuit.
2. Disconnect the expansion tank from the solar installation. This avoids that dirt particles still present in the pipes are washed into the expansion tank. Please observe the separate instructions regarding the expansion tank!
3. Connect the flush and fill station:
 - Pressure hose to the drain valve [G], f. ex. of the left module
 - Flush hose to the fill and drain valve [M] at the ball valve [L1], f. ex. of the right module
- Note:** Connect the pressure hose and the flush hose to different modules, in order to assure a correct flushing and filling!
4. Open the flow and return ball valves [B1|B2] and [L1|L2] on both stations.
5. Put the check valves [K1|K2] out of operation on both stations (position 180°, see page 26).
6. Open the fill and drain valves [G|M] and put the flush and fill station in operation.
7. Vent both stations first at the T-piece [D] and then at the Airstop [F] until the solar fluid exits.
8. As soon as the solar fluid exists without bubbles from the fill and drain valve [M], close the return ball valves [L1|L2] of both stations.



9. Fill the installation slowly and vent it at the collector, as the air can only escape slowly. Otherwise, the mixture of air and water spreads over the entire solar circuit. If the filling process is completed, you can start flushing the installation.
10. Flush the solar circuit until the solar fluid exits without bubbles (see page 26).
11. Open the return ball valves [L1|L2] during flushing to vent the pump section.
12. Close the fill and drain valve [M] while the filling pump is running and increase the system pressure to about 5 bars. The system pressure is displayed on the pressure gauge.
13. Close the fill and drain valve [G] and switch off the pump of the flush and fill station.
14. Check the pressure gauge to see if the system pressure decreases and eliminate leaks if necessary.
15. Vent both stations respectively at the T-piece [D] and at the Airstop [F].
16. Reduce the pressure at the fill and drain valve [G] to the operating pressure if necessary.
17. 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).

18. Close the fill and drain valves [G|M].
19. Put the check valves [K1|K2] at the return ball valves [L1|L2] into operating position (position 0°, see page 26).
20. Open the return ball valves [L1|L2] of both stations.
21. Make sure that all shut-off valves have been put into operating position.

	 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. <p>Only then, the mains plug of the controller can be plugged into a socket.</p>



SC5.14

22. Connect the controller to the mains and set the solar circuit pumps in the manual mode to ON according to the controller instructions.
23. 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 T-piece [D] and at the Airstop [F], until the solar fluid exits without bubbles (see page 26).
24. If necessary, increase the system pressure to the operating pressure.



25. 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 to guarantee tightness.

26. Mount all the elements of the insulation.

27. Set the controller to automatic mode (see controller instructions).

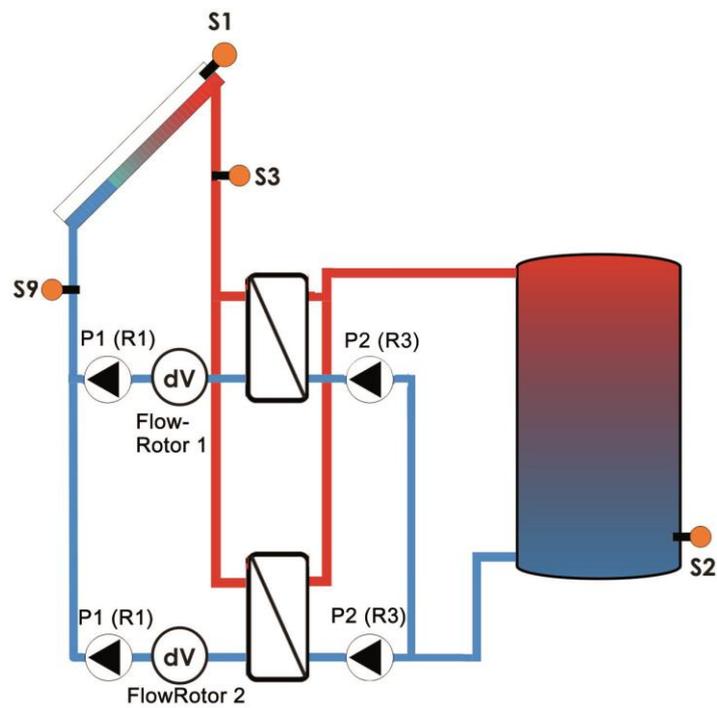
The commissioning of the solar installation is now completed.

Please fill in completely the commissioning report on page 42.

6.4 Parameters: SolexMega-Kaskade with controller SC5.14

The parameters for the sensors and pumps are preset in the controller. If you select and save another system, the parameters are reset to the factory settings. In this case, the parameters must be modified in the menu. Thus, a proper functioning of the installation is ensured. You will find a detailed description of the operation of the controller in the separate controller manual.

Preset system SolexMega-Kaskade

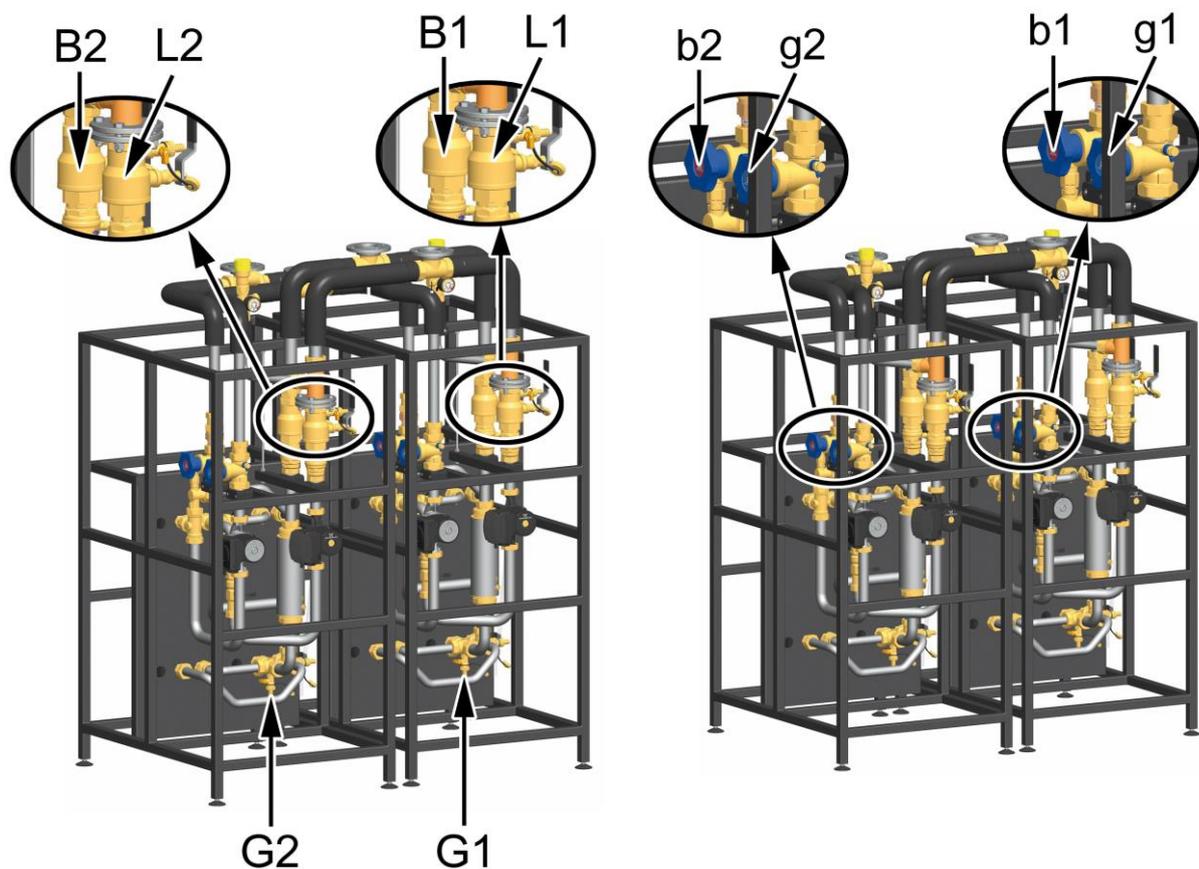


7 Maintenance [specialist]

For service and maintenance work on the station, depressurise the installation and shut off the expansion tank.

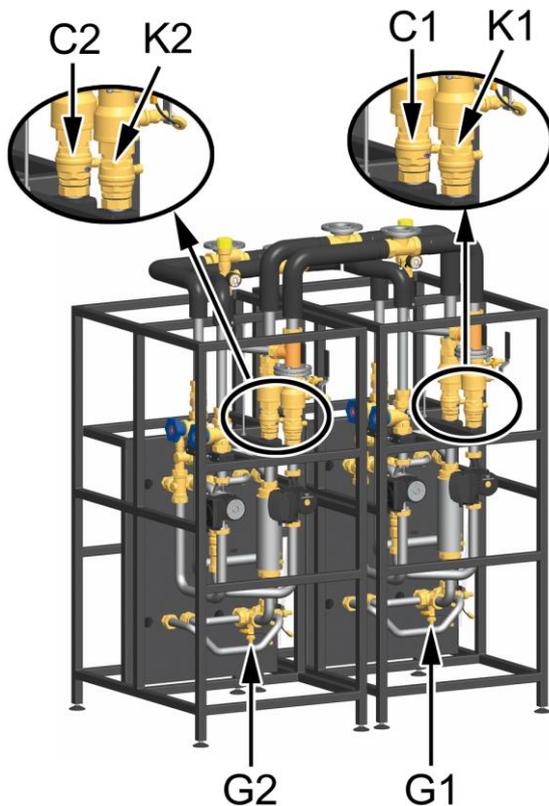
	 WARNING
	<p>Risk to life and limb due to electric shock!</p> <ul style="list-style-type: none">➤ Prior to commencing electrical work on the controller, pull the mains plug!➤ Only after completing all installation work as well as the flushing and filling, the mains plug of the controller can be plugged into a socket. <p>Thus, an unintentional start of the motors is avoided.</p>

	 WARNING
	<p>Risk of burns and scalding!</p> <p>The valves, fittings and the solar fluid can heat up to more than 100 °C. The solar fluid can escape as vapor and cause scalding.</p> <ul style="list-style-type: none">➤ Only carry out maintenance work if the collector temperatures are below 50 °C.➤ Wait until the solar fluid has cooled down to maximum 50 °C.



1. Close the ball valves [B1|B2] and [L1|L2] or the piston valves [b1|b2] and [g1|g2] and release the solar fluid at a fill and drain valve [G1|G2]. Make sure that the solar fluid is collected in a heat-resistant container.
2. Replace the faulty part by the new part. Fill the station as described in the chapters **6.2 Flushing and filling the storage tank circuit (connections secondary)** and **6.3 Flushing and filling the solar circuit (connections primary)**.

7.1 Draining the solar installation



1. Switch off the controller and make sure that a restart is not possible.
2. Open the check valves [C1|C2] and [K1|K2] by turning them into position 180° (see page 26).
3. Connect a heat-resistant hose to the drain valves [G1|G2] of the transfer stations.

Make sure that the solar fluid is collected in a heat-resistant container.

 WARNING	<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.
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4. Open the drain valves [G1|G2] of the transfer stations.
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.

7.2 Deinstallation

1. Drain the solar installation as described above.
2. Disconnect the pipe connections to the solar system.
3. Disconnect the cable connections between the controller and the sensors (collector/storage tank).

8 Spare parts [specialist]

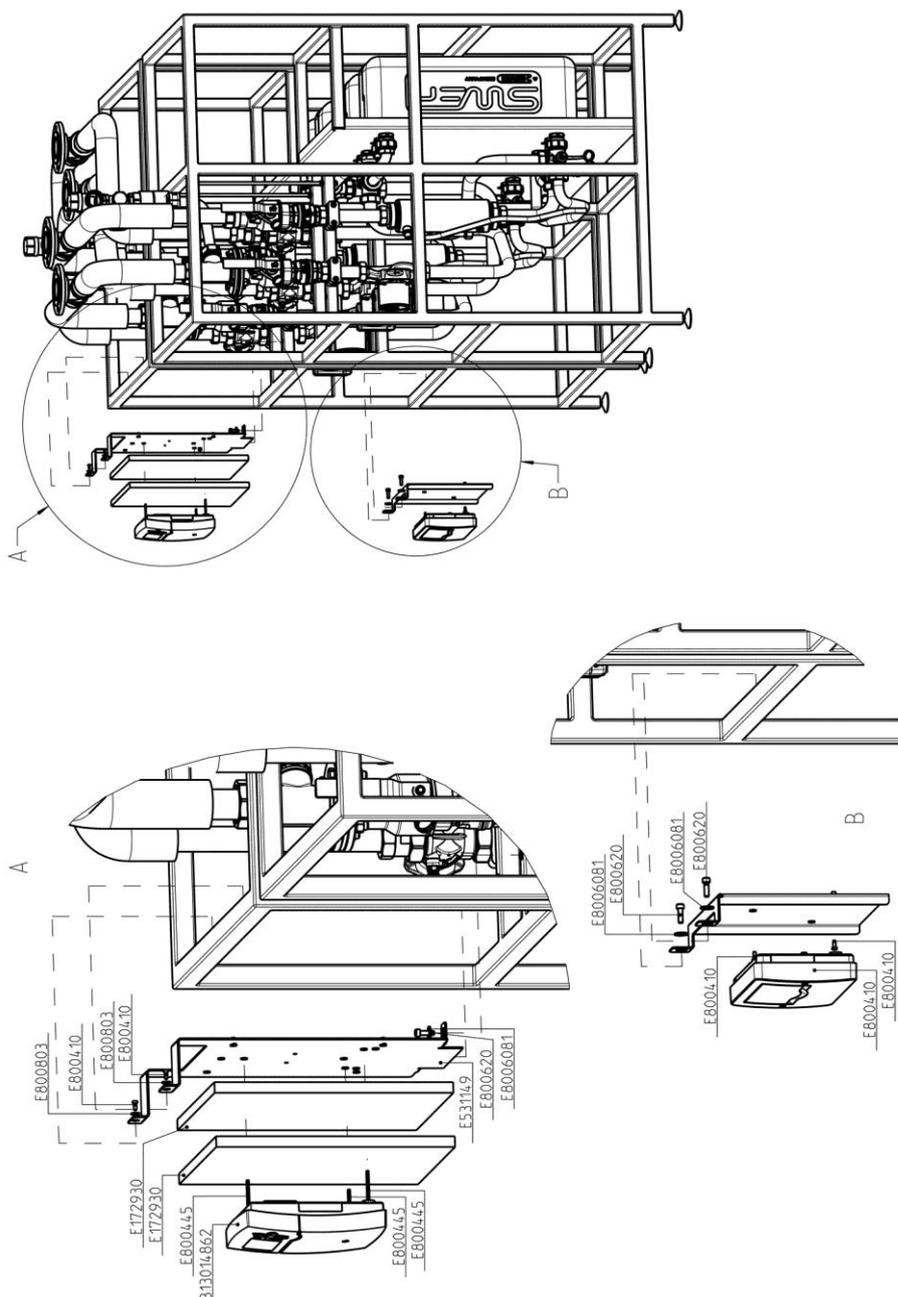
NOTICE

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

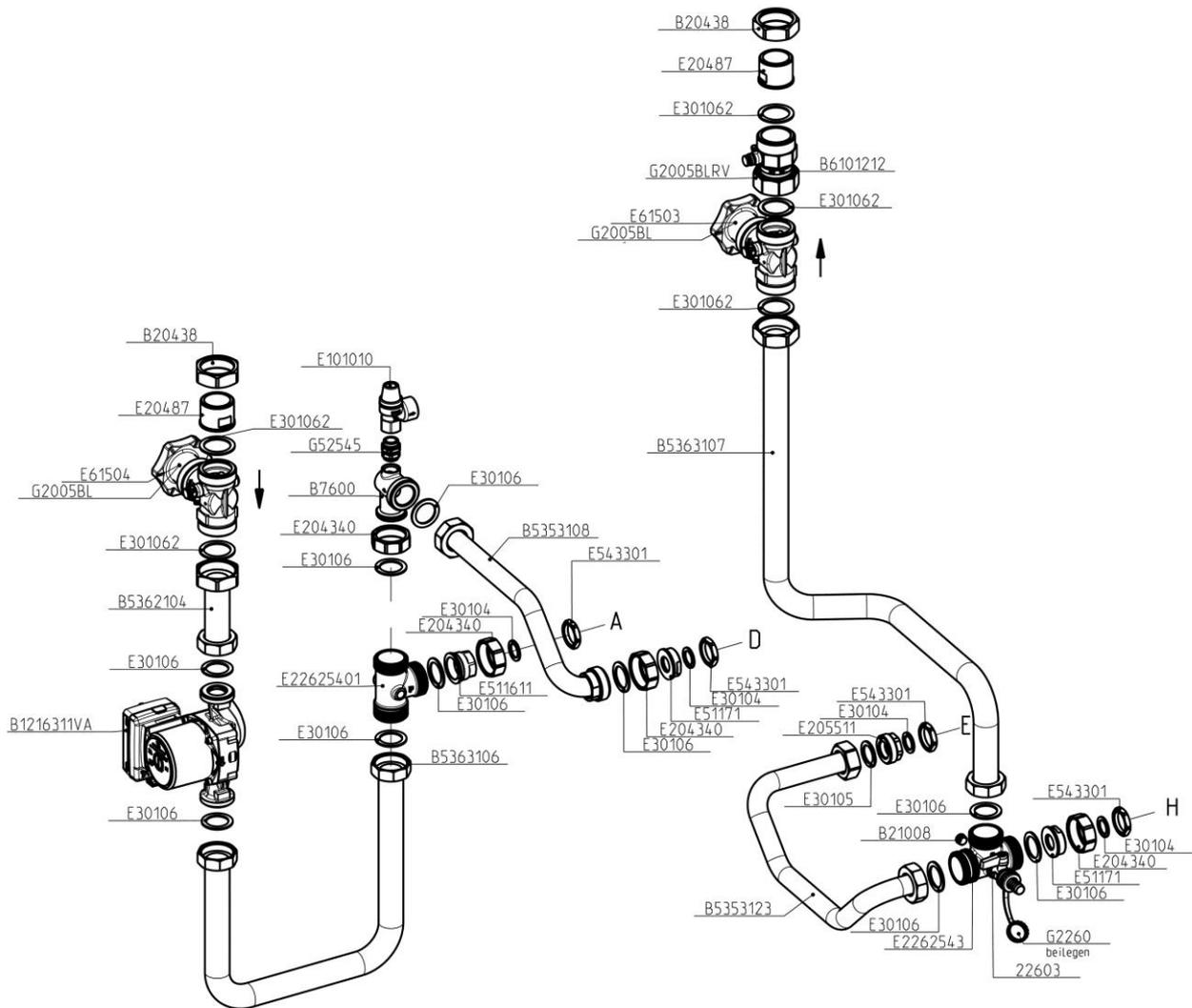
The serial number is placed in the upper right corner of the support sheet of the station.

- In case of a complaint, please send us the entirely completed commissioning report on page 42.

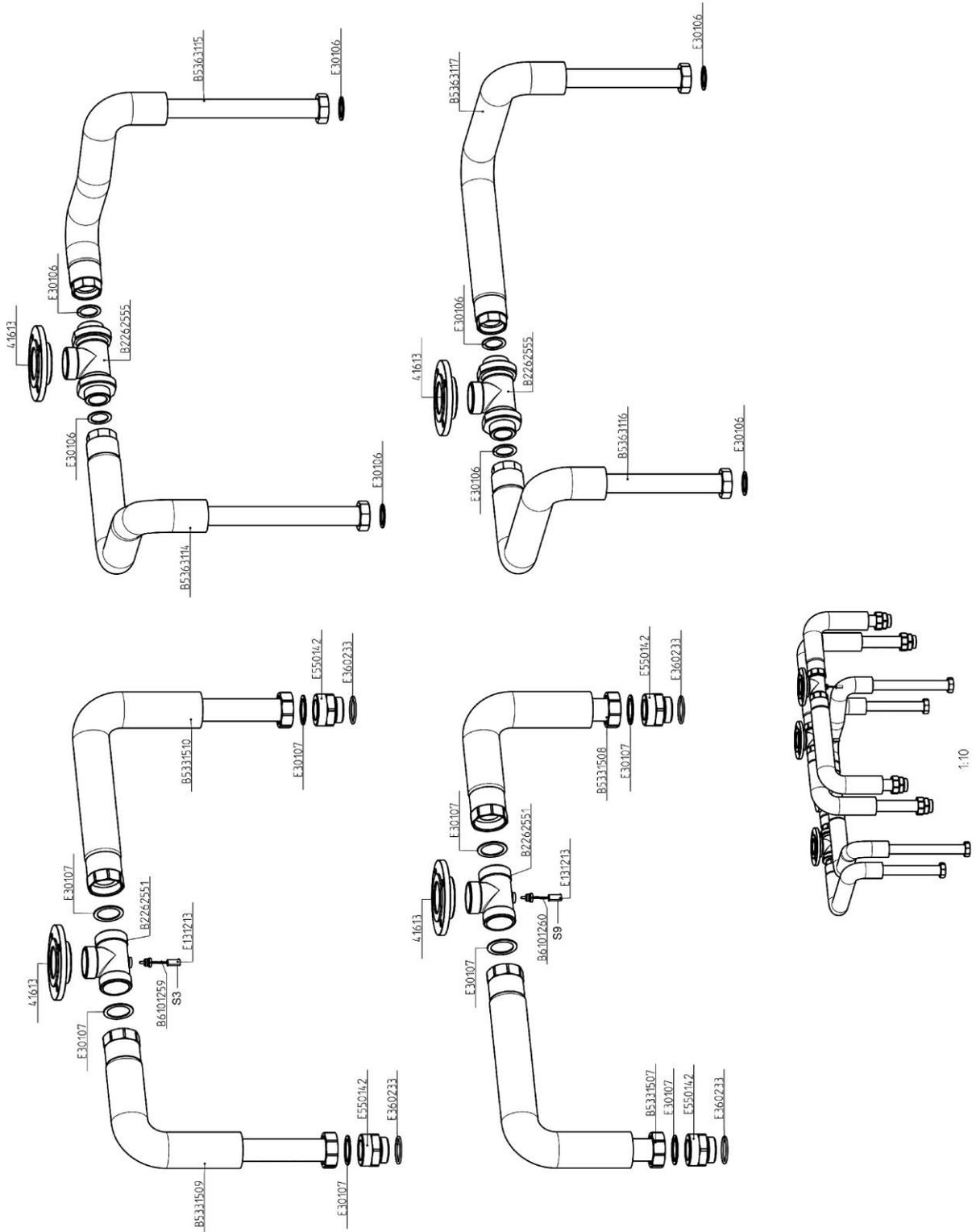
8.1 Spare parts control



8.3 Spare parts hydraulics secondary circuit



8.4 Spare parts installation set



9 Technical data

Dimensions	SolexMega Kaskade
Height (total)	1672 mm + adjustment of the stand feet approx. 15 mm
Width (total)	1420 mm
Depth (total)	920 mm
Centre distance, flow/return	120 mm
Pipe connections primary	2" external thread / flange DN 50
Pipe connections secondary	2" external thread / flange DN 50
Connection for expansion tank	1" external thread, flat sealing
Outlet pressure relief valve	1¼" internal thread
Operating data	
Maximum admissible pressure	Prim.: 6 bars / sec.: 10 bars
Maximum operating temperature	Prim.: 120 °C / sec.: 95 °C
Maximum stagnation temperature	130 °C
Maximum propylene glycol content	50 %
Operating temperature sensors	-25 °C to +120 °C
Equipment	
Pressure relief valve	Prim.: 6 bars / sec.: 10 bars
Pressure gauge	0-6 bars
Flow rate measurement device	Prim.: 2 x FlowRotor: 5-130 l/min
Sensors	2 x Pt1000 (integrated), 4 x Pt1000 (enclosed)
Check valves	Prim.: 4 x 200 mm wc, can be opened Sec.: 2 x 150 mm wc, can be opened
Materials	
Valves and fittings	Brass, suitable for DHW modules
Pipes and pumps	Stainless steel
Gaskets	EPDM
Check valves	Prim.: brass; sec.: plastic
Insulation	EPP, $\lambda = 0.041 \text{ W/(m K)}$

10 Functioning of the check valves

Within its application range, the check valve of each cascade module prevents undesirable gravity circulation.

The efficiency of the check valve depends on:

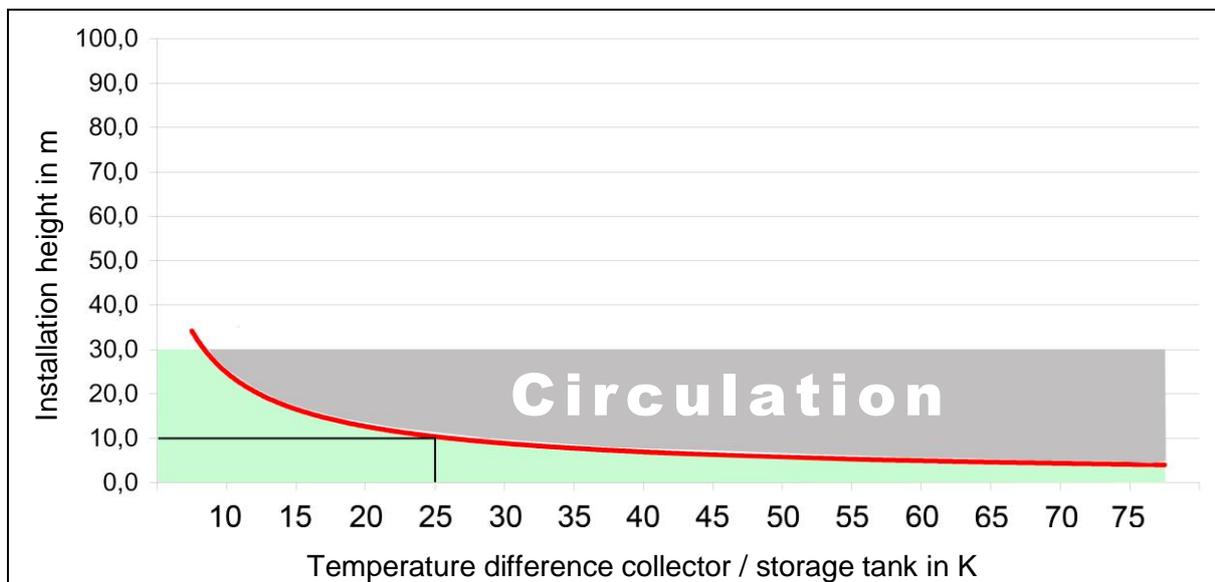
- the installation height
- the temperature difference between the storage tank and the collector
- the heat transfer fluid used

The diagram below indicates if the check valve integrated in the modules is sufficient for your installation. If the check valve is not sufficient, additional components must be installed in order to prevent gravity circulation.

Components such as syphons ("heat traps") or additional check valves can be installed for this purpose. Make sure that the collector field is not separated from the safety group by the additional valves.

Example:

- Each cascade module is equipped with a check valve (200 mm wc) in the return line.
- 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 valve prevents gravity circulation up to a temperature difference of **about 25 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 valve is pushed open.

11 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	Serial numbers	
Flow rate	l/m	Station	
Pump (type)	_____	Controller	
Pump speed level (I, II, III)	_____	Software version	
System pressure	mbars		
Expansion tank (type)	_____		
Initial pressure	mbars		
Pressure relief valve	<input type="checkbox"/> Checked		
Check valves	<input type="checkbox"/> Checked		

Plumbing company

Date, signature



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