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Installation and Commissioning Instructions

Transfer Station Solex HF

Item # 9960918x2US01 – Version V02 – Issued 2008/04

PAW GmbH & Co. KG

Böcklerstraße 11

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Contents

1 General

1.1 Scope of these instructions

These instructions describe the functioning, installation, commissioning and operation of the Solex transfer station with the listed versions. For other components of the solar system such as collectors, storage tanks, expansion tanks and controllers, please observe the instructions of the corresponding manufacturer. The chapters called [specialist] are directed to specialists only.

Solex versions

[High-Flow]	Item #	Heat exchanger	Collector surface (max.)
HF I	6091822US01	20 plates	30 m²
HF I	6091832US01	30 plates	50 m²

1.2 Product description

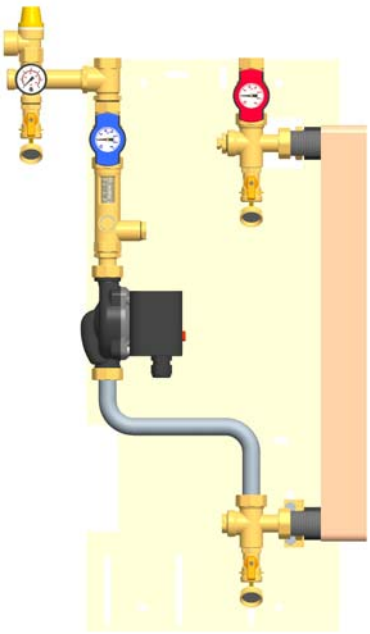
Solex is a premounted valves and fittings group checked for leakage and used to transfer the heat from the primary or solar circuit to the secondary or storage tank circuit. It contains a preset controller and important valves, fittings, pumps and safety equipment to operate the unit.

The expansion tank required for operation is not a part of the transfer station and must be ordered separately. The cap-type valve (Item no. 5302), which is also separately available, allows the expansion tank to be easily mounted and separated from the solar system.

An ASME stamped pressure relief valve must be mounted on site to protect the transfer station in case of high pressure in the secondary loop.

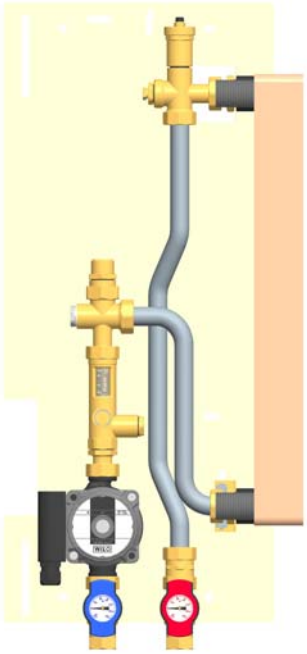
- The wrapping materials are made of recyclable materials and can be disposed of with recyclable materials.

The Solex transfer station consists of



the primary (solar) loop with

- ball valves with integrated temperature gauges
- high-temperature check valves in the return and supply to avoid involuntary gravity circulation
- flow meter (FlowCheck) to display and balance the flow rate
- pressure relief valve in the primary loop for avoiding inadmissible overpressures
- pressure gauge to display the installation pressure in the solar circuit
- fill and drain valves to flush, fill and drain the solar circuit

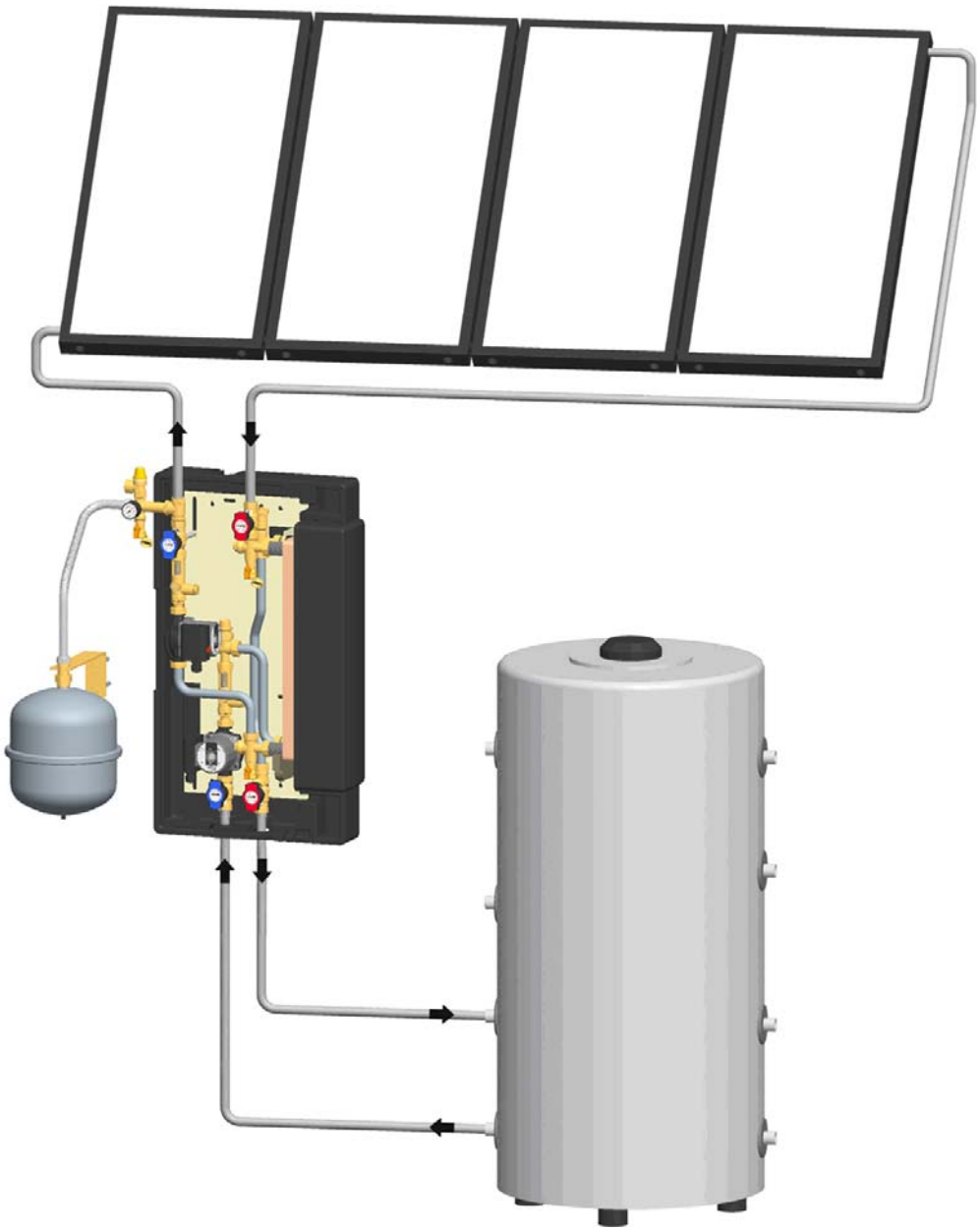


the secondary (storage tank) loop with

- ball valves with integrated temperature gauges
- high-temperature check valves in the return and supply to avoid involuntary gravity circulation
- flow meter (FlowCheck) to display and balance the flow rate inside the primary and secondary loop.
- automatic deaerator for permanent venting

1.3 Designated use

Solex may only be used as transfer station between the solar and heating circuit in solar thermal systems taking into consideration the technical limit values indicated in these instructions. It **must not** be used in potable water applications. Improper usage excludes any liability claims.



2 Safety instructions

The installation and commissioning of the solar station as well as the connection of electrical components require technical knowledge commensurate with 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 prescriptions
- Accident prevention regulations of the professional association
- Instructions and safety instructions mentioned in these instructions

Danger: Danger of scalding due to vapour escape!

With pressure relief valves there is a risk of scalding due to vapour escape. During installation, check the local conditions and check if a discharge line must be connected to the safety group. Observe the instructions regarding the pressure relief valve.

Danger: Personal injury and damage to property due to overpressure!

By closing the two ball valves you isolate the pressure relief valve from the heat exchanger. A rise in temperature in the storage tank will cause high pressures and could result in personal injury or damage to property!

Attention: Material damage due to mineral oils!

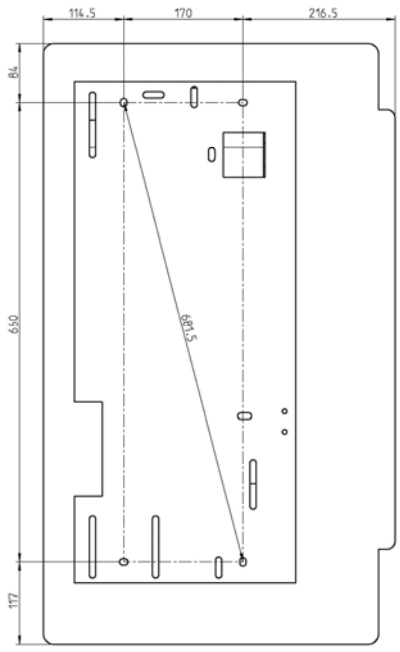
Mineral oil products cause lasting damage to seals made of EPDM, whereby the sealant properties are lost. We do not assume liability nor provide warranty for damage to property resulting from sealants damaged in this way.
It is imperative to avoid that EPDM gets in contact with substances containing 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.

Attention: Material damage due to high temperatures!

Install the valves and fittings group at a sufficient distance to the collector field, since the solar fluid may be very hot near the collector.

It may be necessary to install an intermediate tank in order to protect the expansion tank.

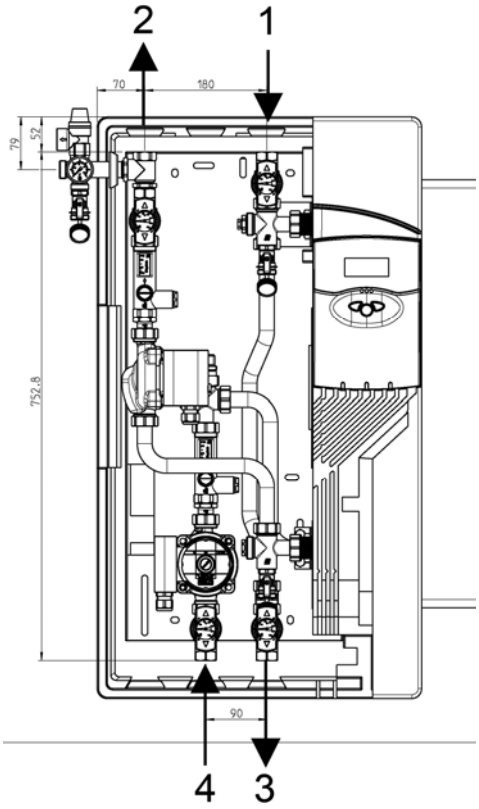
3 Assembly and installation [specialist]



The location of installation must be dry, load-carrying and frost-proof. Furthermore, the access to the closed-loop control and safety equipment must be guaranteed at all times during operation!

The discharge line of the safety equipment should be guided into heat-resistant collecting tanks with corresponding size. This allows you to avoid uncontrolled discharging into the environment and to easily refill the circuits!

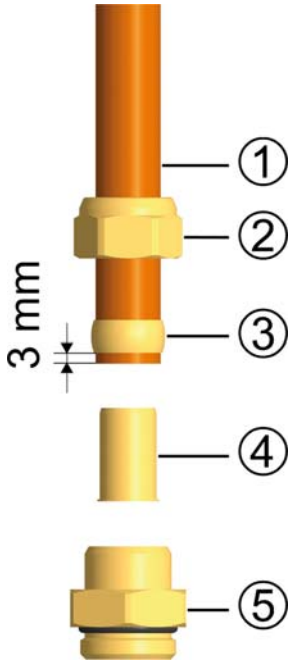
1. Copy the mounting holes to the mounting surface.
2. Drill the holes.
3. Pull off the front shell of the insulation and fasten the solar station to the wall by means of the enclosed anchors and screws.



4. Connect the transfer station to the system by pipework:
   [1] → Solar supply
   [2] → Solar return
   [3] → Supply buffer storage tank
   [4] → Return buffer storage tank

All screw connections have ¾" female threads.

For continuous venting, we recommend installing a micro-bubble separator (e.g. Art. No. 52373) into the supply of the solar circuit.



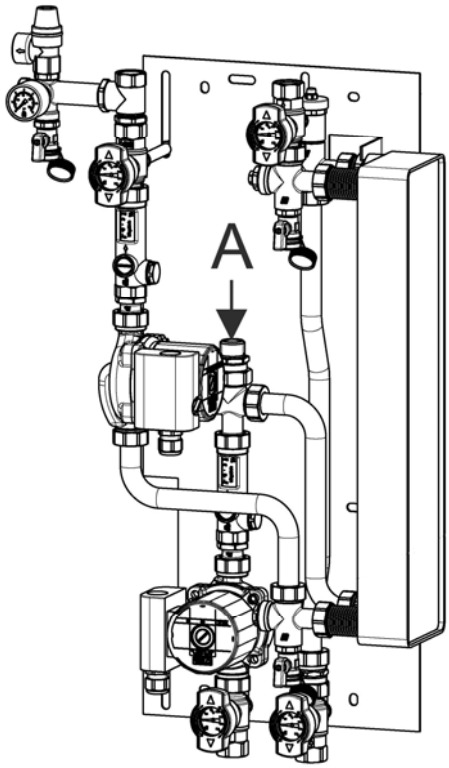
Not included in the scope of delivery!

Accessories: cutting ring fitting

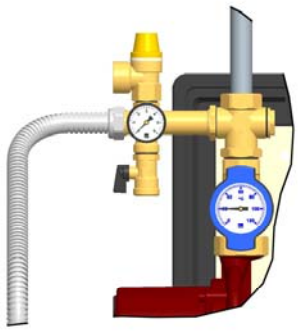
- Push the union nut ② and the cutting ring ③ onto the copper pipe ①. The pipe must protrude at least 3/8" (3 mm) from the cutting ring in order to ensure the force transmission and the sealing.
- Insert the support sleeve ④ into the copper pipe.
- Insert the copper pipe with the plugged-on individual parts (②, ③ and ④) all the way into the housing of the cutting-ring fitting ⑤.
- First screw the union nut ② manually.
- Tighten the union nut ② by rotating one full turn. Secure the housing of the cutting-ring fitting ⑤ against distortion in order to avoid damaging the sealing ring.

Item # 561212 for ½" copper pipe

Item # 561222 for ¾" copper pipe



5. An ASME stamped pressure relief valve must be mounted on site to protect the transfer station in case of high pressure in the secondary loop. A ¾" NPT male nipple (A) for connection is installed in the secondary loop.



6. Connect the connecting hose of the expansion tank below the pressure relief valve.
7. Assemble the expansion tank.

   Note:

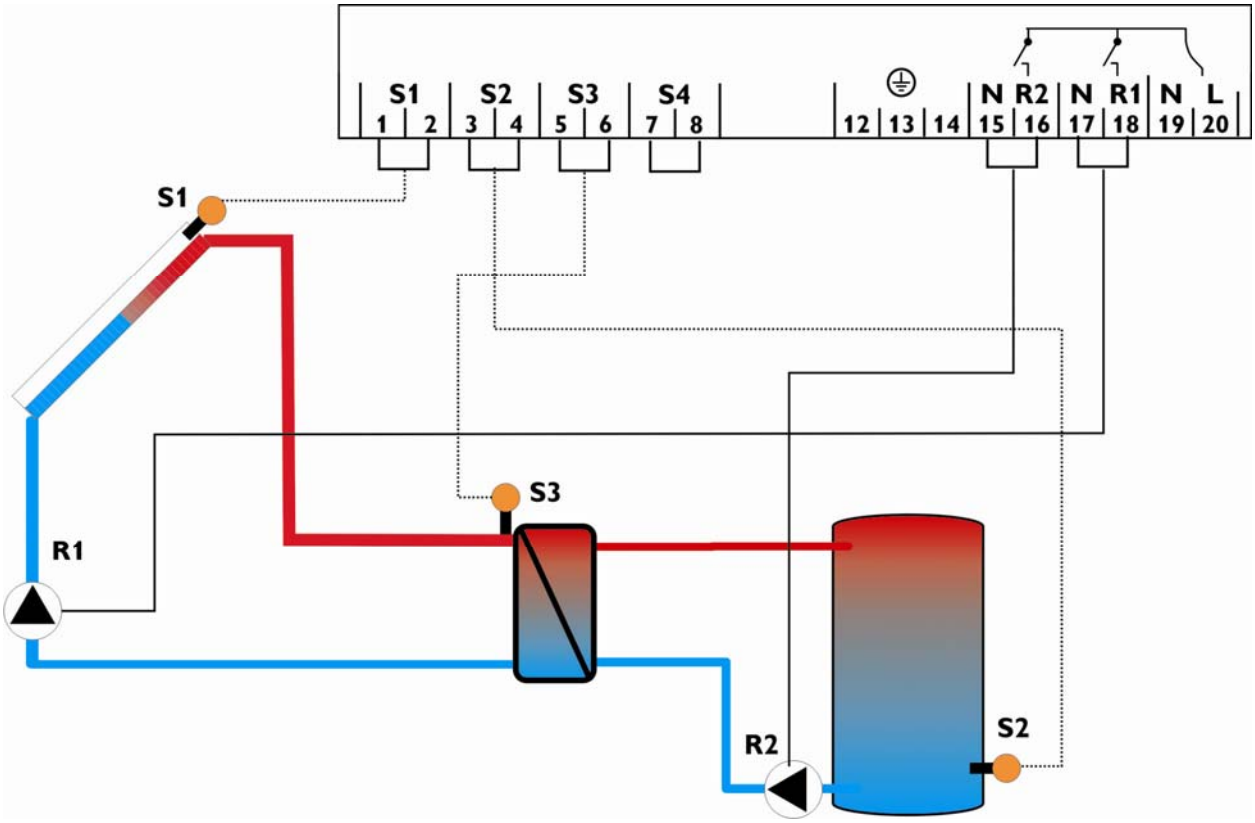
   The expansion tank must not be connected while flushing and filling in order to prevent dirt particles from being flushed in.

Set the initial pressure of the expansion tank to the system.
Observe the separate instructions regarding the expansion tank!

3.1 Controller connection

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**, plug the mains plug of the controller into a socket! This avoids an unintentional start of the motors.



Observe the separate instructions regarding the controller!

8. Connect the temperature sensors to the controller:
   - Collector sensor to S1
   - Storage tank sensor (top) to S2

   The pumps and the supply sensor are prewired.
9. Tighten all union nuts and screw connections.

The assembly of the transfer 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:

Note regarding the commissioning sequence

Flush and fill in the following sequence:

1. Flush the storage tank (to remove scale residues)
2. Fill the storage tank circuit
3. Flush and fill the solar heat exchanger
4. Flush and fill the collector field
5. Solar circuit (total)

This guarantees that no dirt particles are flushed into the heat exchanger and that eventually absorbed heat can also be dissipated.

Attention: Risk of burns and scalding!

The valves and fittings may heat to temperatures of more than 212 °F (100 °C) due to the solar fluid. Therefore, do not clean or fill the system with the collectors heated (intense sunshine).

Observe that hot solar fluid can leak from the pressure relief valves in case of too high system pressure!

Connect a heat-resistant discharge line to the outlet of the pressure relief valve and direct it into a heat-resistant container. The point of discharge must be clearly visible and terminate in a safe place so that there is no risk to persons in the vicinity of the point of discharge.

During venting the solar fluid may escape as vapour and cause scalding!

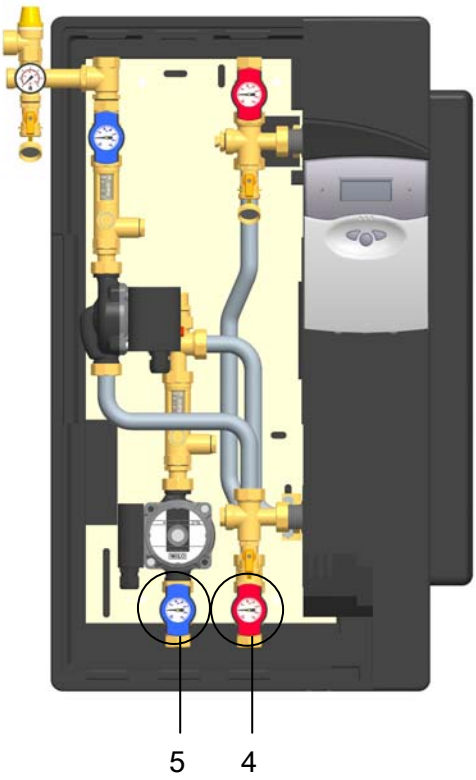
Attention: Risk of frost!

It often happens that the solar system cannot be completely drained after flushing. Thus, there is a 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 max. 50 % propylene glycol as solar fluid.

4.1 Flushing and filling the storage tank circuit

The storage tank circuit is filled by means of the valves and fittings of the heating system. To avoid that dirt particles reach into the heat exchanger, shut the ball valves of the station and wash out the present dirt particles/scale residues before commissioning the tank. Make sure to only use purified heating water.

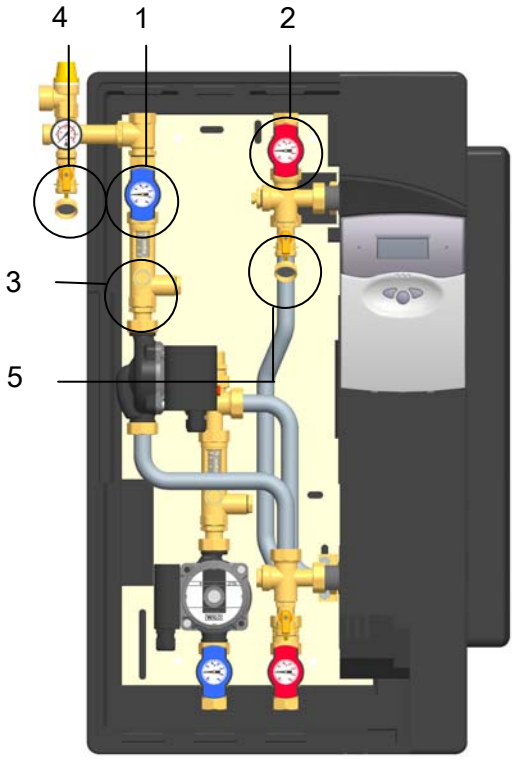


1. Open the discharge valve at the automatic deaerator [1].
2. Open the ball valve in the storage tank return line [5] (90°, see page 16).
3. Shut down the check valve of the storage tank supply [4].
   To do so, position the ball valves at 45° (see page 16).
4. Fill heating water into the storage tank circuit by means of the fill and drain valve.
5. Set the required operating pressure after filling the storage tank circuit.

4.2 Flushing and filling the solar circuit

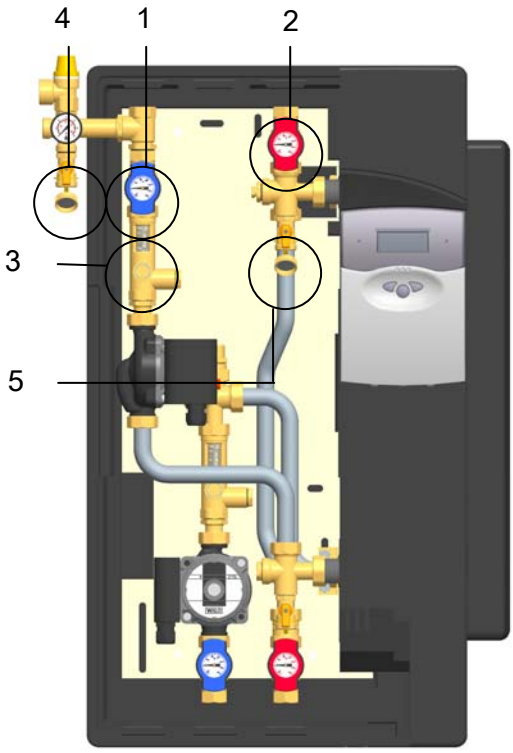
The fill and drain valves required to flush and fill are integrated in the transfer station. Make sure not to wash dirt particles that may be present in the solar system into the heat exchanger and the expansion tank. Therefore, only use flush and fill stations with fine filters.

Flushing the heat exchanger



1. Disconnect the expansion tank from the solar system. This avoids the access of dirt particles present in the pipes to the expansion tank.
2. Open the ball valve in the return [1] (45°, see page 16).
3. Rotate the flow restrictor [3] of the FlowCheck such that the groove is vertical. This allows the FlowCheck to be flushed against the flow direction.
4. Close the ball valve [2] in the supply (90°, see page 16).
5. Connect the flush and fill station:
   - pressure hose to the fill valve [4]
   - flush hose to the drain valve [5]
6. Open the fill and drain valves [4|5] and put the flush and fill station into operation.
7. Flush the heat exchanger until the solar liquid exits without bubbles.
8. Switch off the fill station and close the fill and drain valves [4|5].

Flushing the collector field



The fill station remains connected as in *Flushing the heat exchanger*:

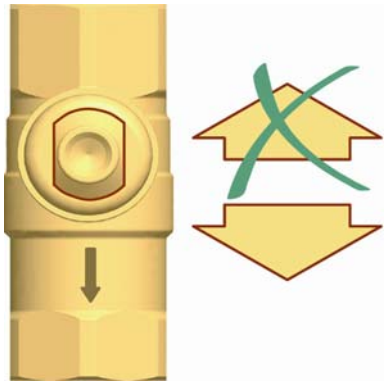
- pressure hose to the fill valve [4]
- flush hose to the drain valve [5]

1. Close the ball valve in the return [1] (90°, see page 16) to allow the solar fluid to be pumped into the collector field.
2. Open the ball valve in the supply [2] (0°, see page 16) to allow the solar fluid to flow from the collector field into the fill station.
3. Put the flush and fill station into operation and flush the collector field until the solar fluid exits without bubbles.

Flushing and venting the total solar circuit

4. Open the ball valve in the return [1] (0°, see page 16).
5. Close the drain valve [5] with the filling pump running and increase the system pressure to 72.5 psi (5 bars). The system pressure can be read on the pressure gauge.
6. Close the fill valve [4] and switch off the pump of the flush and fill station.
7. Check at the pressure gauge to see whether the system pressure reduces and eliminate leaks where necessary.

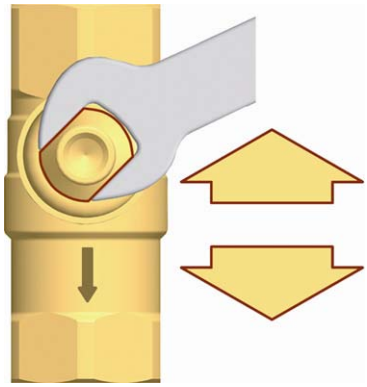
0°



Check valve is operating,

flow only in flow direction.

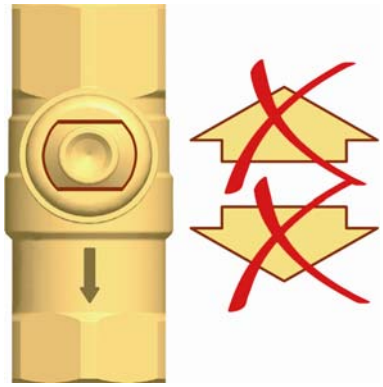
45°



Check valve is not operating,

flow in both directions.

90°



Ball valve closed,

no flow.

8. Reduce the pressure on the drain valve [5] to the operating pressure. Do not exceed 72.5 psi (5 bars).
9. 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 (see instructions regarding the expansion tank).
10. Close the fill and drain valves [4|5].
11. Put the check valves into operating position by turning the ball valves [1|2] to position 0°.
12. Connect the controller to the mains. Set the solar circuit pump (P1 on relay 1) in the manual mode to ‘On’ by means of the controller manual.
13. Let the solar circuit pump run at maximum rotation speed for at least 15 minutes.
14. If necessary, increase the system pressure to the operating pressure.
15. Remove the hoses of the flush and fill station and screw the sealing caps on the fill and drain valves.

4.3 Setting the flow rates

Observe the specifications of the manufacturer of the collectors for the correct adjustment of the flow rate!

1. Switch on the pumps at the controller in manual mode.
   [Main menu \ Manual operation \ All relays: ON]
2. Set the speed level (I to III) of the **solar centrifugal pump** to reach the required flow rate. The current flow rate can be read at the FlowCheck.

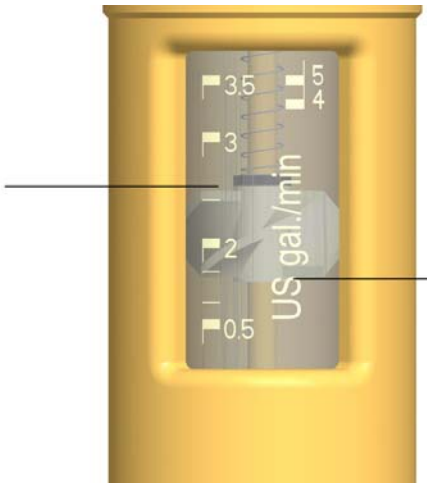
Note:

The system must be clean and free of air and contaminants to ensure the perfect functioning of the measuring device.

Left scale:
0.5-3.5 USgpm

Reading edge = **Top edge** of the turbine

Example: approx. 2.5 USgpm



Right scale:
4-5 USgpm

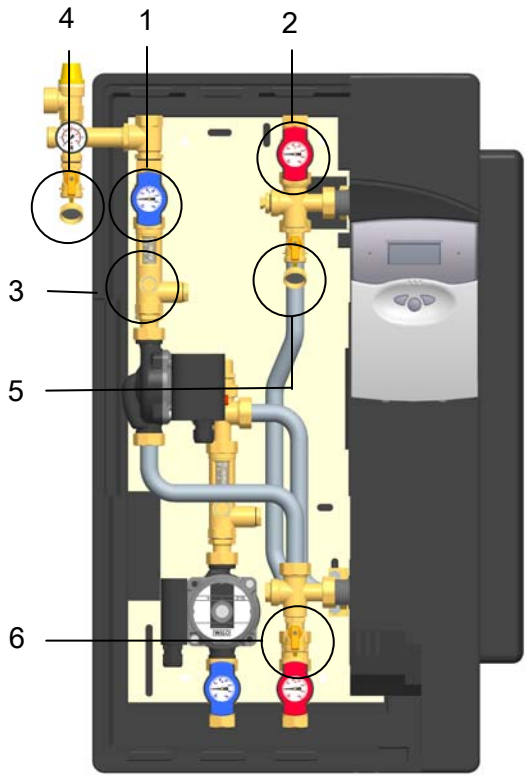
Reading edge = **Bottom edge** of the turbine.

3. Set the speed level of the **storage tank centrifugal pump** to reach the same flow rate as in the solar circuit.
4. Switch the relays at the controller to Automatic mode.
   [Main menu \ Manual operation \ All relays: AUTO]
5. Mount the front shell of the insulation on the solar station.

Attention: Controller presetting

Confirming a different system in the controller and **saving** it will reset the controller to the factory setting of the system.

4.4 Draining the solar circuit



1. Open the check valve in the supply ball valve [1] by turning it to position 45°.

2. Connect a heat-resistant hose to the drain valve [6].
   Make sure that the solar fluid is collected in a heat-resistant container.

Danger: Danger of scalding due to hot solar fluid!

The escaping medium may be very hot. Place the collecting container so that people standing nearby are not endangered when the solar system is being emptied.

3. Open the drain valve [6] of the solar station.
4. Open a vent valve that may be present at the highest point of the solar system.
5. Dispose of the solar fluid observing the local prescriptions.

5 Controller configuration [specialist]

The controller of the transfer station is already preset.

Attention: Controller presetting

Confirming a different system in the controller and **saving** it will reset the controller to the factory setting of the system.

The transfer station may no longer operate perfectly without additional settings! Therefore, system settings may be carried out by qualified personnel only!
The following information does not replace the controller manual; it contains the special operating parameters of the transfer station.

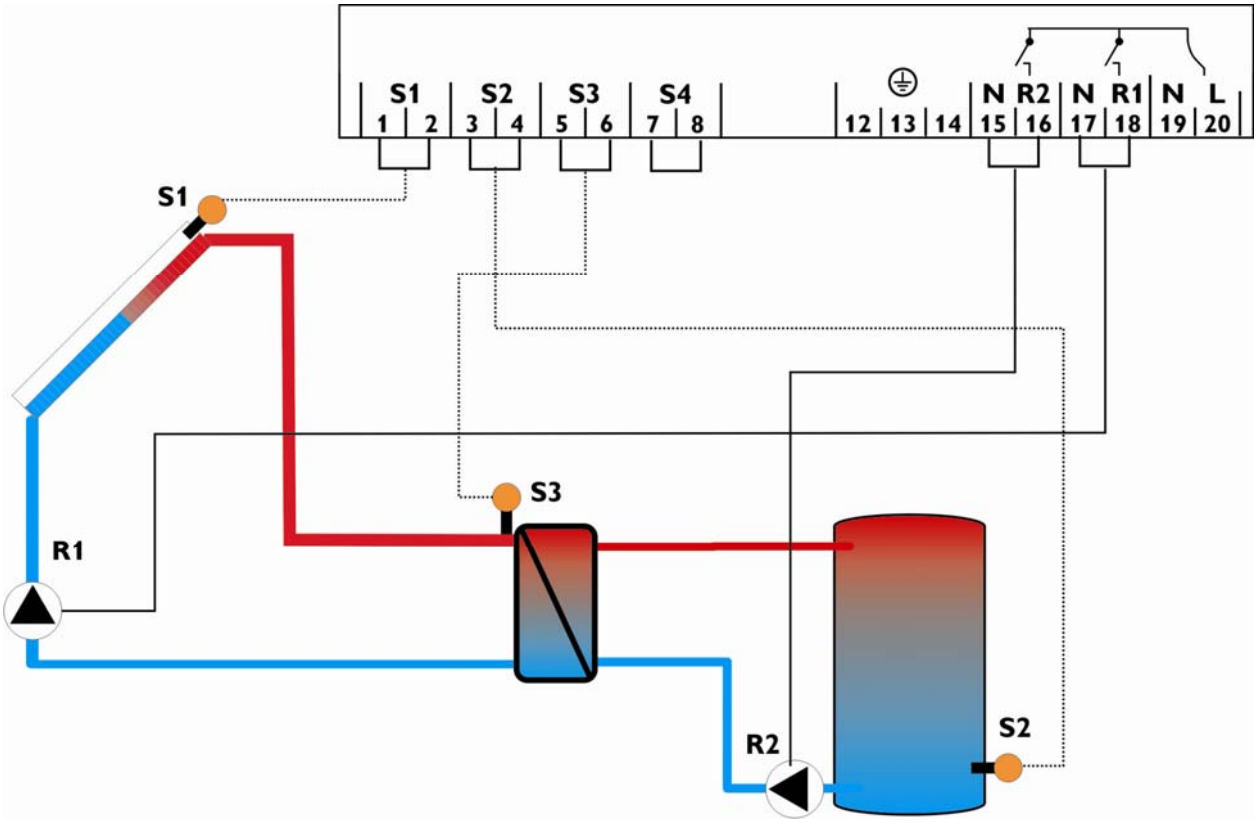
5.1 Setting the controller language

Key 1:	Scroll forwards Increase settings
Key 2:	Scroll backwards Decrease settings
Key 3:	Confirm

How to set the language of the controller is described below:

1. In the main menu, select the "Specialist" menu item.
2. In the "Specialist" menu item, select the "Language" sub-item.
3. Select the desired language and save it.
4. Go back to the main menu.
5. In the main menu, select the "User code" menu item.
6. Confirm the code "0000". This will suppress the "Specialist" menu item. If you want to go back to the "Specialist" menu item, you must enter the code "0262" in the "User code" menu item and confirm it.

After you have set the language of the controller, you can check the system settings or set up a different system.



5.2 System description

The controller compares the temperature at the collector sensor S1 with the storage tank temperature at the sensor S2. If the measured temperature difference is larger than the preset switch-on temperature difference, the pump (P1) will be switched on. At the same time the temperature difference between S3 and S2 is determined and compared with the switch-on temperature for the secondary pump, which can be separately preset. If this temperature difference exceeds the set value, the pump (P2) is switched on and the boiler is heated up until the switch-off temperature difference or the maximum storage tank temperature is reached. (S3-heat source)

Relay assignment

Relay output	Note
R1	Solar pump (P1), primary
R2	Secondary pump (P2),

Sensor assignment

Sensor input	Description	Indication channel
S1	Temperature collector 1	COL1
S2	Temperature store below	TSTL
S3	Solar flow primary	COL2
S4		

The following settings must be changed at the controller:

Channel	Description	Factory setting	Change to	Note
COL1	Temperature collector 1	-------		Collector
COL2	Temperature collector 2	-------		Flow primary circuit
TSTL	Temperature store below	-------		Store below
n1 %	Pump speed relay 1	-------		
n2 %	Pump speed relay 2	-------		
h P1	Operating hours relay 1	-------		
h P2	Operating hours relay 2	-------		

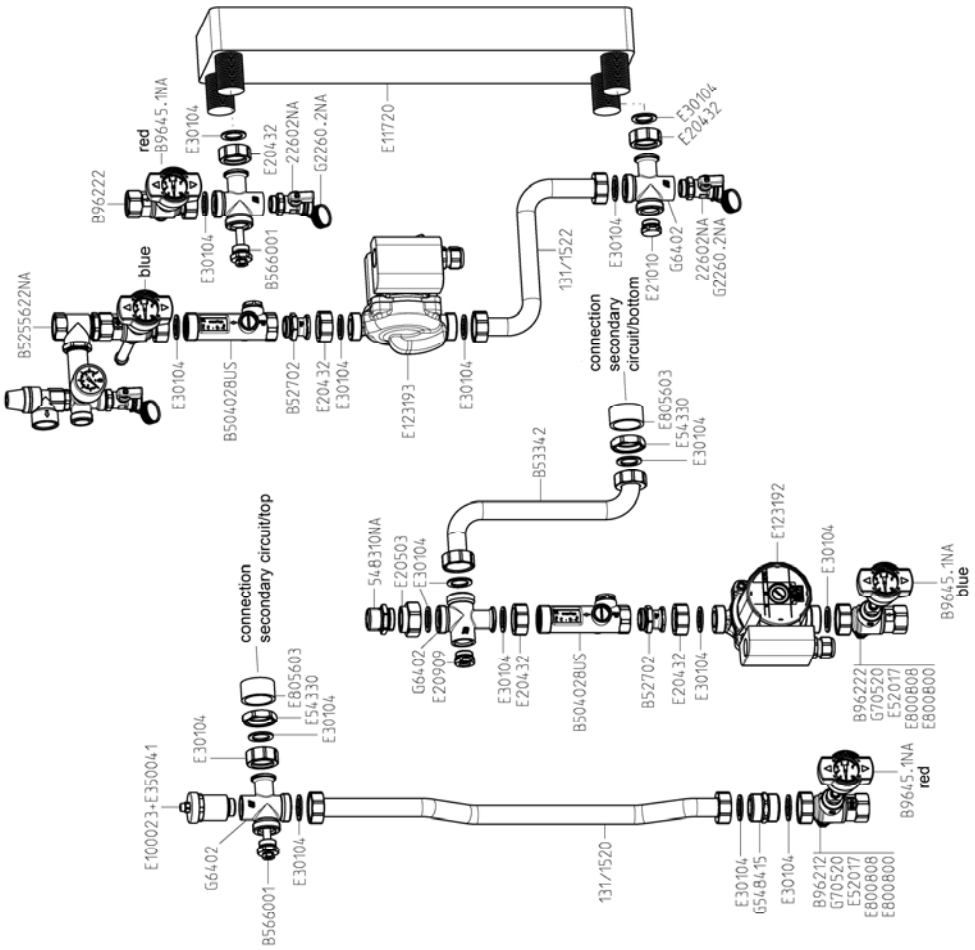
Arr	System selection	1	**7**	System7, 2-collector solar system with one storage tank, here: one collector and an external heat exchanger
DT1O	Switch-on temperature difference	6.0 K	**for example 10**	Set the desired switch-on temperature difference
DT1F	Switch-off temperature difference	4.0 K	**for example 5**	Set the desired switch-off temperature difference
DT1S	Nominal temperature difference	10.0 K		Set the desired nominal temperature difference
RIS	Increase	2 K		When the desired nominal temperature difference DTS is reached and when there is an increase of the difference RIS the speed is increased by 10%
DT2O	Switch-on temperature difference	6.0 K	**for example 10**	Set the desired switch-on temperature difference
DT2F	Switch-off temperature difference	4.0 K	**for example 5**	Set the desired switch-off temperature difference

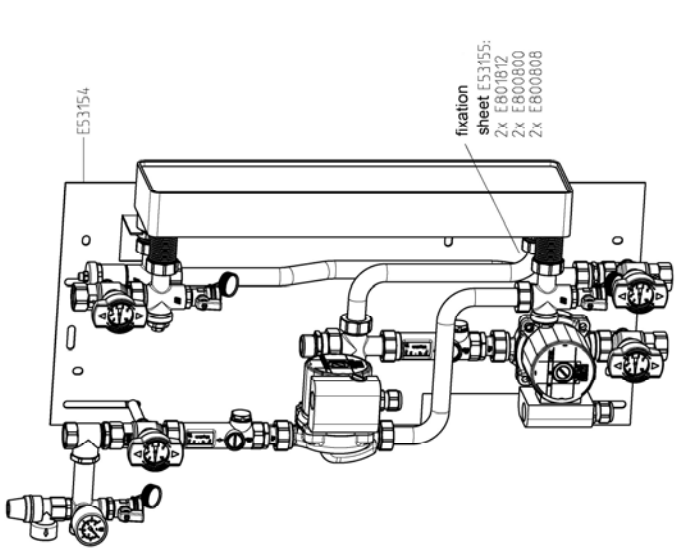
DT2S	Nominal temperature difference	10.0 K		Set the desired nominal temperature difference
S MX	Maximum temperature store	60 °C	for example 85	Set the desired maximum store temperature

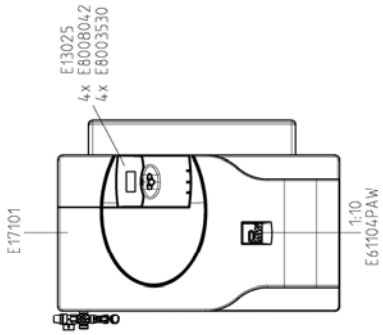
EM1	Emergency temperature collector 1	140 °C		If you do not want the collector emergency stop to be active, set this value to 200 °C
EM2	Emergency temperature collector 2	140 °C		If you do not want the collector emergency stop to be active, set this value to 200 °C
OCX1	Option collector cooling collector 1	OFF		
OCN1	Option minimum limitation collector 1	OFF		
OCF1	Option antifreeze collector 1	OFF		
CMN1	Collector minimum temperature 1	10		
OCX2	Option coollector cooling collector 2	OFF		
OCN2	Option minimum limitation collector 2	OFF		
OCF2	Option antifreeze collector 2	OFF		
CMN2	Collector mimimum temperature 2	10		
OREC	Option recooling	OFF		
OTC	Option tube collector	OFF		
n1MN	Minimum pump speed relay 1	30		
n2MN	Minimum pump speed relay 2	30		
HND1	Manual operation relay 1	Auto		
HND2	Manual operation relay 2	Auto		
LANG	language	dE		dE = German En = English It = Italian
PROG	program number	xx.xx		
VERS	Version number	x.xx		

6 Spare parts [specialist]

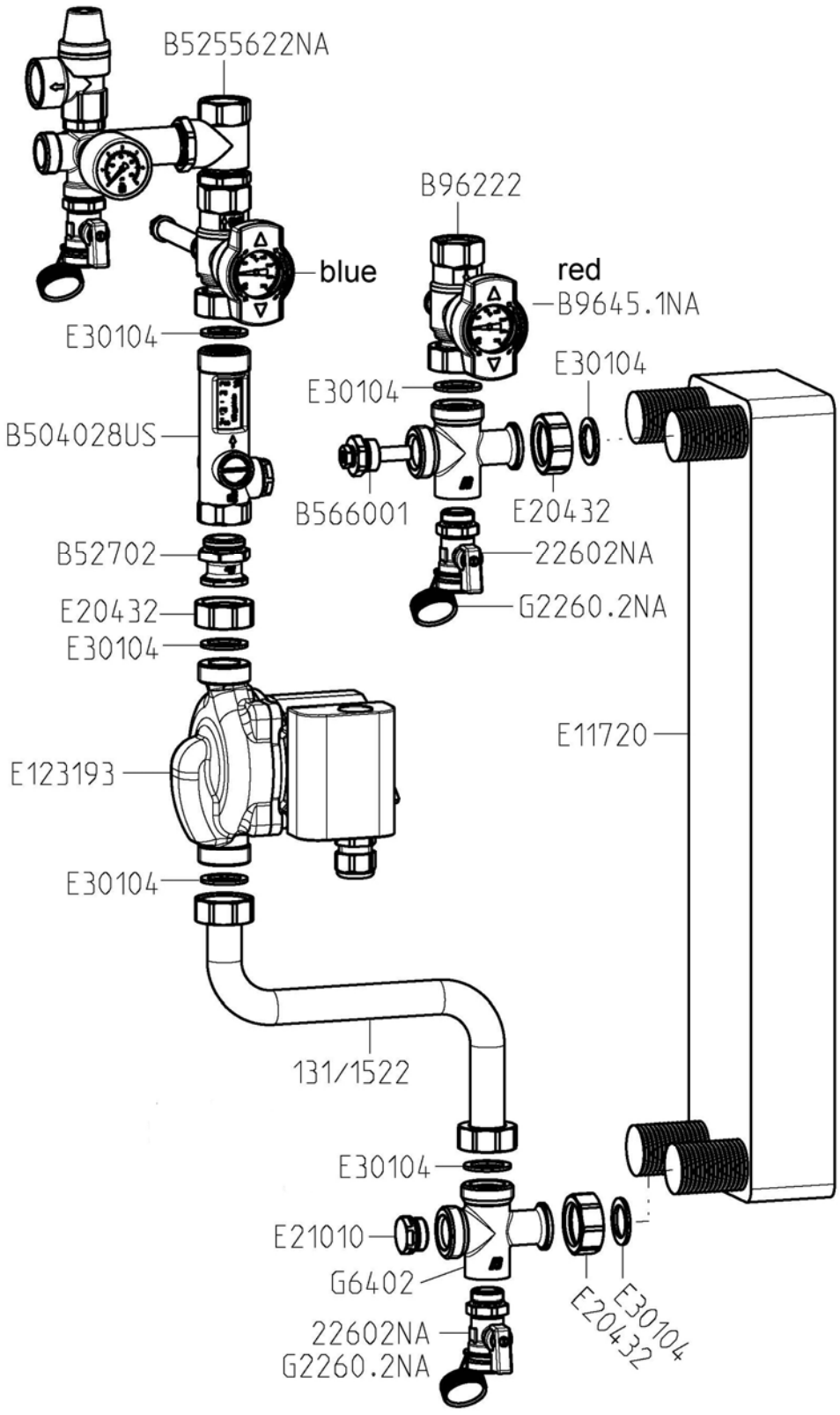
In case of a complaint, please indicate the serial number of the station, the pumps, the controller and the sensors.



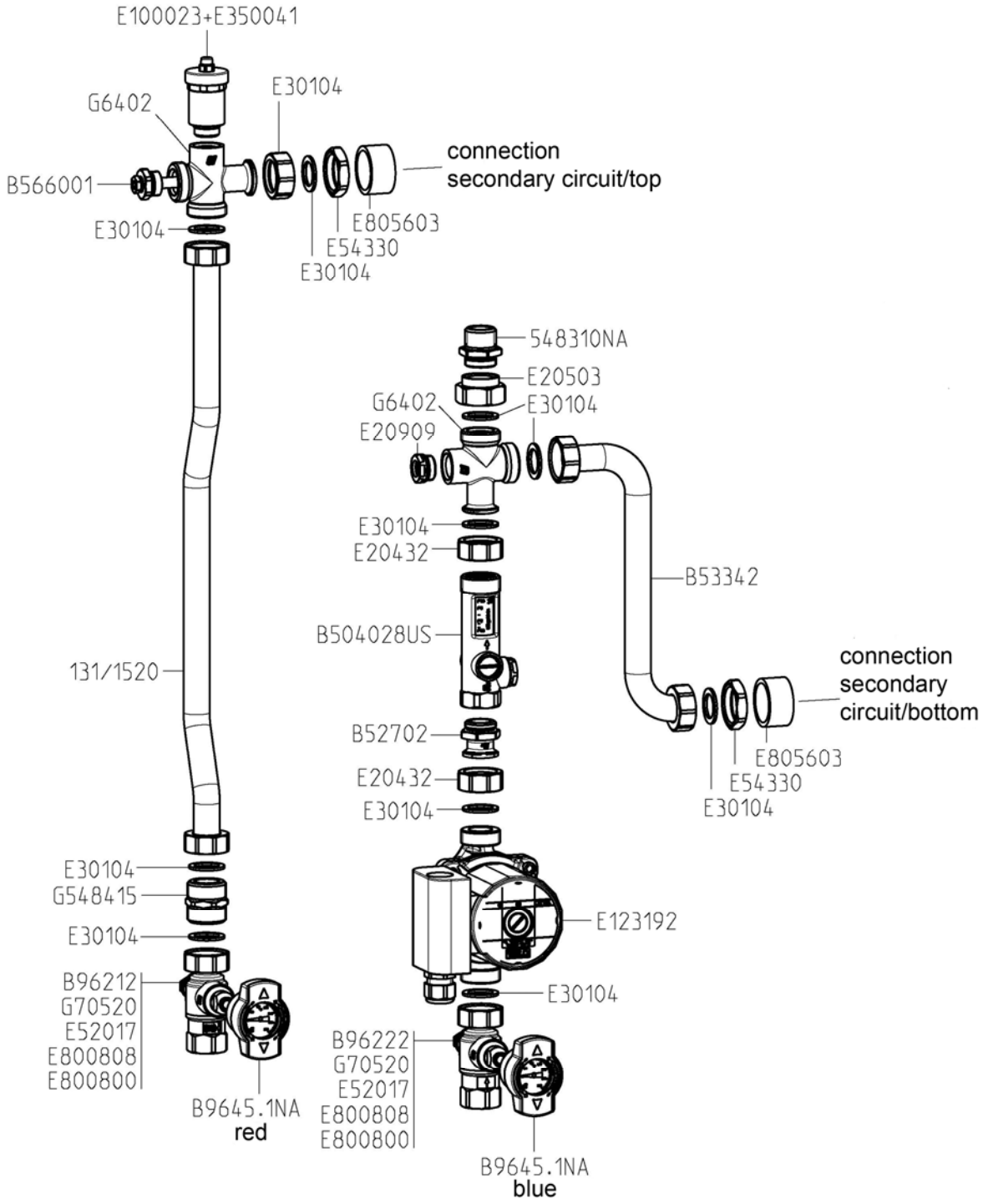




6.1 Primary/solar loop



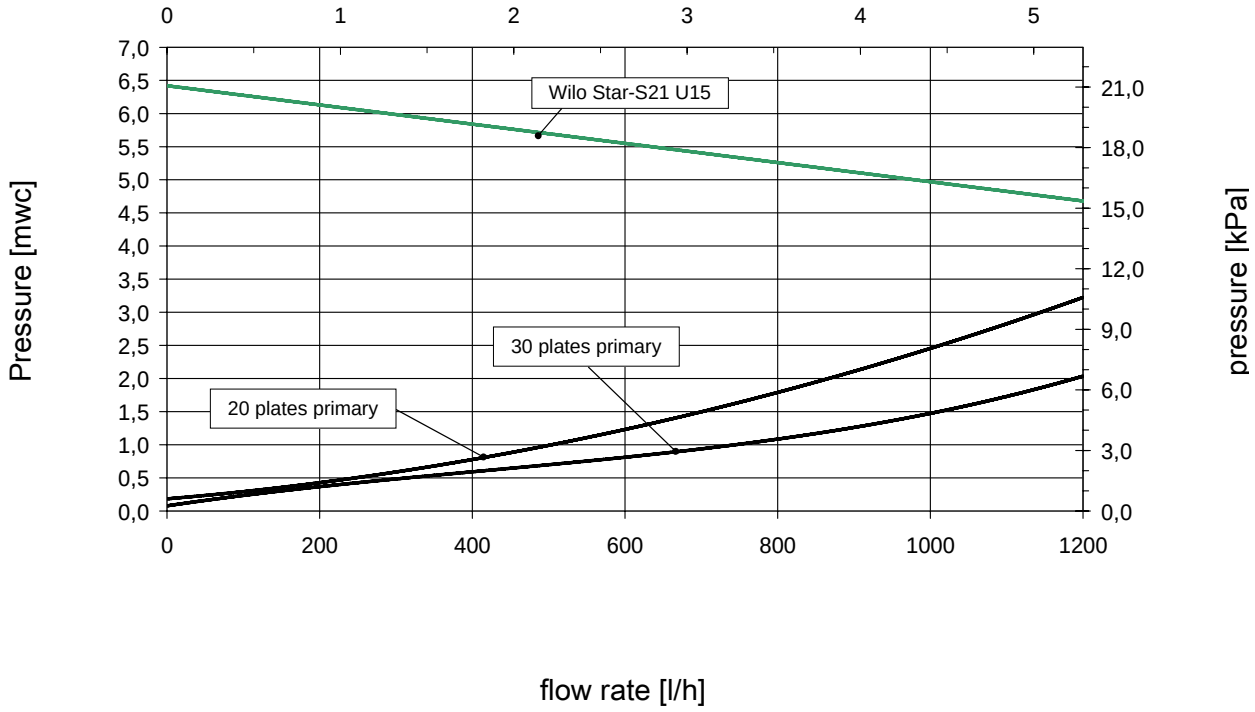
6.2 Secondary/storage tank loop



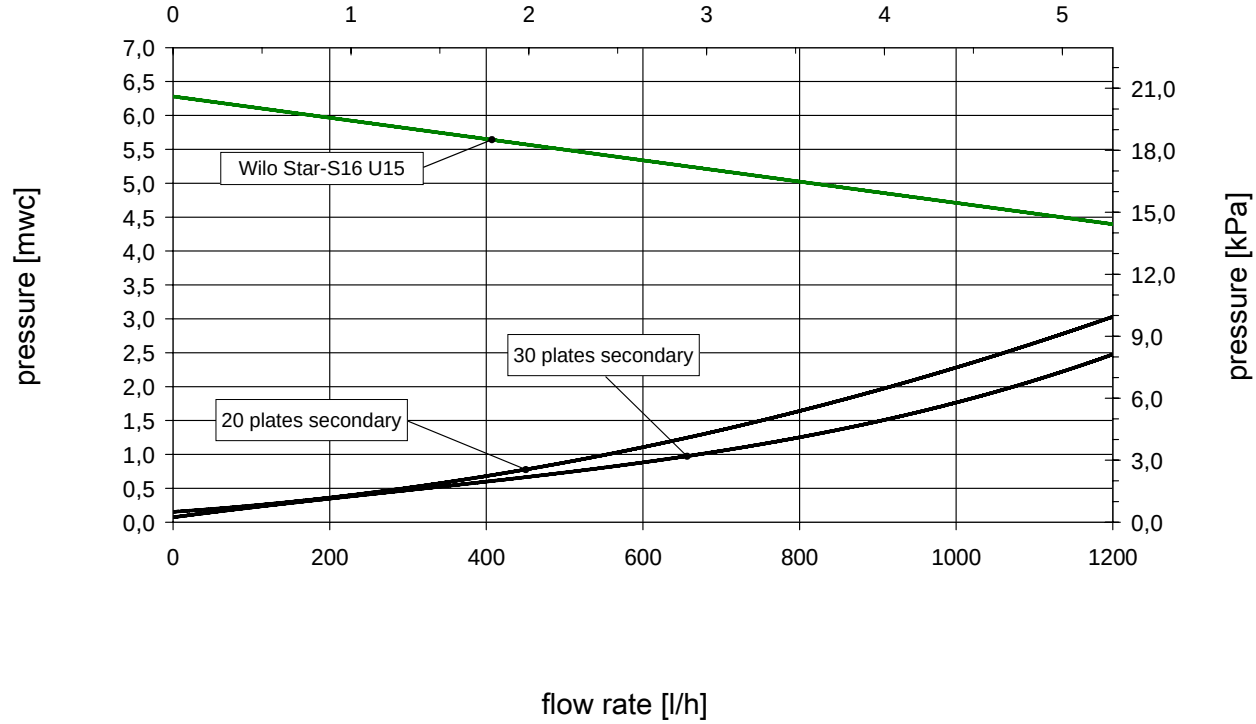
7 Technical data

Dimensions:	Height (with insulation):	34 21/32"	880 mm
	Width (with insulation):	22 1/32"	560 mm
	Pipe connections:	¾" female thread	
	Connection for the expansion tank:	¾" male thread, flat sealing	
	Pressure relief valve outlet:	¾" female thread	
Operating data:	Max. admissible pressure:	145 psi	10 bars
	Max. operating temperature:	266 °F	130 °C
	Max. propylene glycol content:	50 %	
Equipment:	Pressure relief valve, solar:	87 psi	6 bars
	Pressure gauge:	0 - 87 psi	0 - 6 bars
	Opening pressure check valves:	Primary: 4 kPa Secondary: 2 kPA	
	Dial temperature gauge:	32 - 320 °F	
	FlowChecks:	0.5-5 USgpm	
Material:	Valves and fittings:	Housing: brass	
	Plate heat exchanger:	Plates: stainless steel 1.4400/ Solder: copper (99.99 %)	
	Pipes:	Stainless steel 1.4400	
	Gaskets:	Klingersil/EPDM	
	Insulation:	EPP	

Characteristics Solex HF I (60918x2)



Characteristics Solex HF I (60918x2)



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