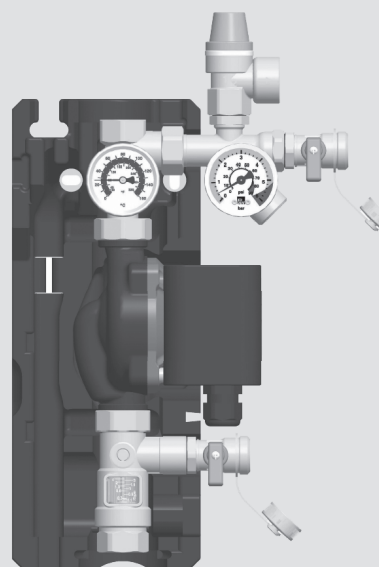


# OPERATION AND INSTALLATION

RESIDENTIAL SOLAR PUMP STATION

» SE FLOWSTAR PUMP STATION



**STIEBEL ELTRON**

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## INSTALLATION INSTRUCTIONS

### SE FLOWSTAR PUMP STATION - 221337

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**CAUTION: READ ALL INSTRUCTIONS BEFORE INSTALLING THIS PUMP STATION. ADDITIONAL ITEMS WILL BE NEEDED TO MOUNT THIS ASSEMBLY.**

#### 1 For your safety

##### 1.1 About the manual

This manual describes the function, installation, commissioning and operation of a Stiebel Eltron SE Flowstar pump station. For other components of the solar installation, such as collectors, storage tanks, expansion tanks, controllers, and any other components, please refer to the specific manuals for those parts.

##### 1.2 Designated use

The solar station is a pre-assembled fitting assembly checked for tightness and used for recirculating the solar fluid in the solar circuit. The solar station must only be used in solar thermal systems as pumping station. It must be mounted in the return line of the solar circuit, taking into consideration the technical limit values indicated in this manual. The station may only be assembled indoors. The station must be assembled and operated as described in this manual!

##### 1.3 Qualification of the installer

Installation and commissioning of this equipment should be done by qualified installers [specialist] in accordance with local, state and federal codes which may be applicable.

The following must also be observed during installation and commissioning:

- » Relevant regional and national regulations
- » Relevant accident prevention regulations
- » Instructions and safety instructions mentioned in this manual

##### 1.4 Hand-over of the system

After installation and commissioning, the installer is responsible for familiarizing the end user with the functions of the system and the basic safety measures.

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## INSTALLATION INSTRUCTIONS SE FLOWSTAR PUMP STATION - 221337

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- » After commissioning, fill in the log on the last page of this manual.
- » Hand the manual over to the end user. Instruct the end user to keep the manual in close proximity to the system.
- » Instruct the end user to have the solar station serviced and repaired by a specialist only. The controller settings must not be changed by the end user.
- » Explain to the end user the function of the system and of the safety devices. Point out to the end user that the shell must remain mounted during operation and that the check valve with temperature gauge and the ball valve in the flowmeter must be open.

### 1.5 General safety instructions

Before installing and commissioning the product, you must read and observe the following safety instructions:

#### A. Danger of scalding due to escaping vapor

If the system pressure is too high, hot solar fluid will escape from the pressure relief valves and can result in scalding. Flush and fill the system only if the collector temperatures are below 150 °F (70 °C).

Connect a discharge line to the safety assembly. Observe the instructions regarding the pressure relief valve.

#### B. Risk of burns

The valves, fittings and the pump may heat up to more than 212 °F (100 °C) during operation.

#### C. Personal injury and material damage caused by excess pressure

Closing the ball valves both in the return and supply line of the solar circuit, will disconnect the safety assembly from the heat exchanger. Heating the storage tank can result in the formation of high pressures, which may lead to material

damage and personal injury.

In operation, the ball valve with temperature gauge and the ball valve at the flowmeter must always be open.

Close the ball valve only when service is required.

### 1.6 General instructions regarding solar fluid

Propylene glycol is hazardous in the case of ingestion. It is an irritant when it comes into contact with the eyes or skin.

Always wear chemically resistant protective gloves and safety glasses with side-shields when handling propylene glycol mixtures.

### 1.7 Frost damage

Observe the instructions and specifications of the antifreeze from the manufacturer.

It often happens that solar thermal systems cannot be completely drained after flushing. Thus, there is a risk of frost damage when flushing with water. Therefore, the solar thermal system should only be flushed and filled with the solar fluid used later on.

Strictly follow the instructions of the antifreeze manufacturer for operating a solar thermal system. All components in the solar station are resistant to a percentage of propylene glycol of up to 50%.

Determine quantity according to system volume. See instructions of the collectors, storage tank and expansion tank.

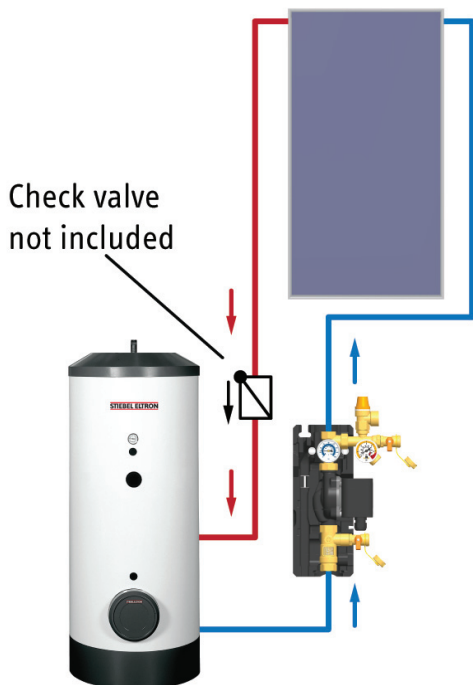
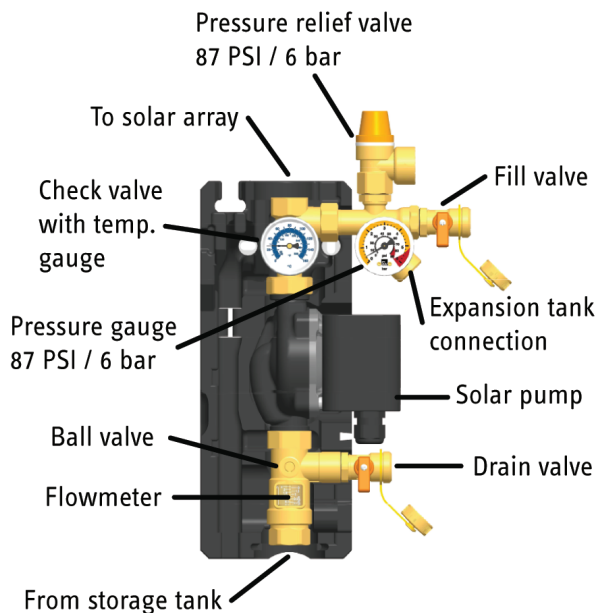
## 2 Description of the product

This solar pump station is designed to be mounted in one of two ways. Both mounting options are discussed in the manual. It can be mounted either on a wall support and held by clip springs, or on a Stiebel Eltron solar storage tank using a tank mounting kit.

### INSTALLATION INSTRUCTIONS SE FLOWSTAR PUMP STATION - 221337

The pump station contains important valves, fittings, and safety equipment to ensure the proper operation of the solar thermal system.

Below is a brief overview of the pump station components:



To prevent thermosiphoning of the system, a check valve must be installed on the supply line of the solar circuit. Stiebel Eltron provides a check valve as part of our tank mounting kits.

### 3 Assembly and installation

The solar station may only be installed indoors with a power supply of 120 V / 60 Hz. The installation site must be dry, stable and frost-free.

**NOTE:** Since the solar fluid may be very hot near the collector, the pump station must be installed at a sufficient distance from the collector field. A system pre-cooling vessel may be needed to protect the expansion tank from excessively high temperatures.

#### 3.1 Wall-mounted configuration

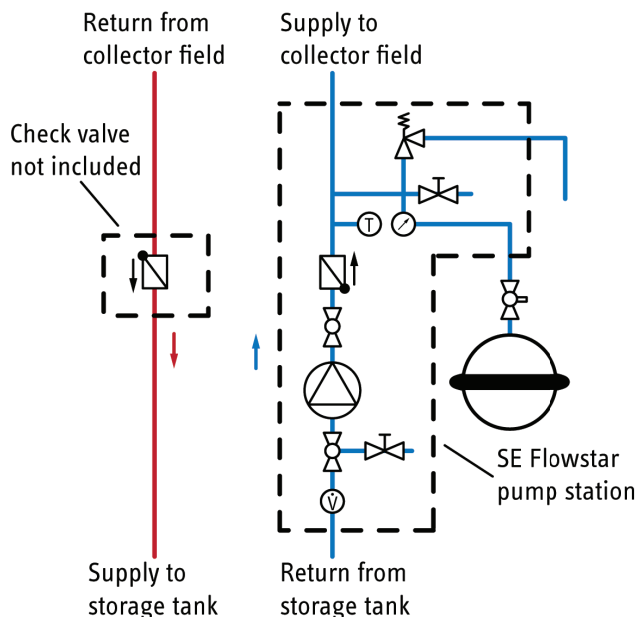
1. Remove the pump station from the packaging.
2. Pull off the front shell.
3. Copy the mounting holes next to the temperature gauges of the pump station to the mounting surface.



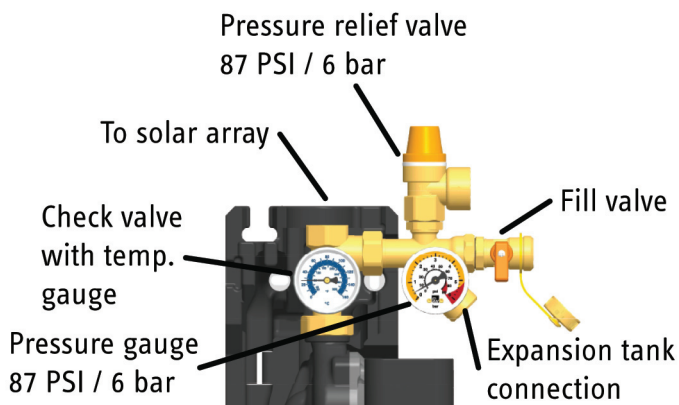
4. Drill the holes and fasten the pump station to the wall using the enclosed screws and, if required, the enclosed wall anchors.

### INSTALLATION INSTRUCTIONS SE FLOWSTAR PUMP STATION - 221337

5. Connect the pump station to the system by means of the top and bottom connections. The bottom connection should be piped to the heat exchanger outlet of the storage tank. The top connection should be piped to return to the collector field. It is recommended to ensure the seal of all threaded connections by using teflon tape and pipe dope.
6. To prevent thermosiphoning, install a check valve in the supply line of the solar circuit.



7. Connect the discharge line to the pressure relief valve connection. Pipe this discharge line to a heat-resistant container.

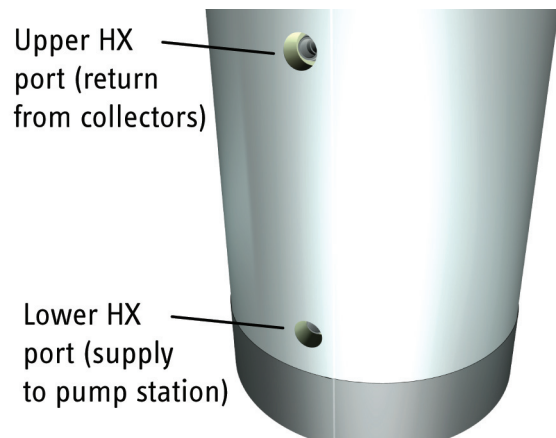


8. Connect the expansion tank at the connection below the pressure gauge. Stiebel Eltron provides kits for quick connection of the expansion tank, but it is sold separately.
9. Adapt the initial pressure of the expansion tank to the system and connect the expansion tank. For more information regarding the installation of the expansion tank, please see the installation manual for that expansion tank.
10. Check all threaded connections and retighten them.

#### 3.2 Tank-mounted configuration

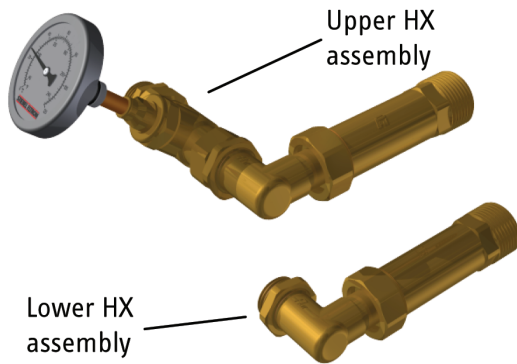
This section describes how to mount an SE Flowstar pump station onto an SBB tank using a low tank mounting kit. These components are sold separately.

1. Remove the pump station from the packaging.
2. Pull off the front shell.
3. Observe the lower connector of the pump station. Remove the  $\frac{3}{4}$ " NPT adapter, revealing a  $\frac{3}{4}$ " BSP threaded connection.
4. Inspect the threads of the tank to make sure they are clean and free of debris.

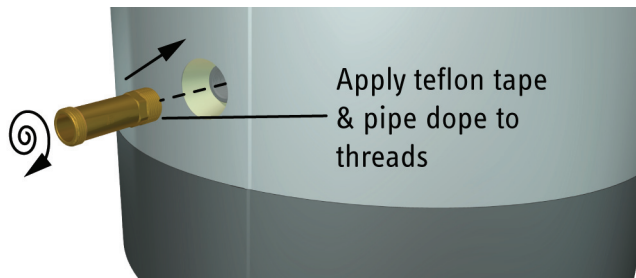


### INSTALLATION INSTRUCTIONS SE FLOWSTAR PUMP STATION - 221337

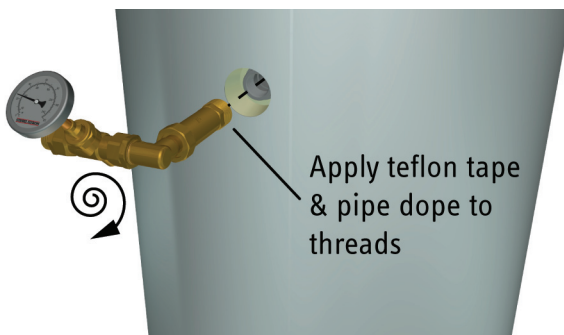
5. Remove the components from the tank mounting kit.



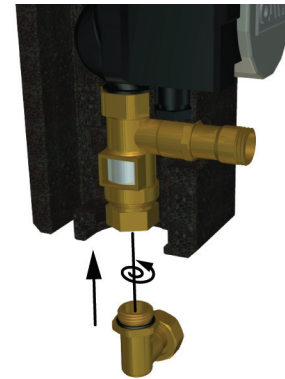
6. Apply teflon tape & pipe dope to the 1" BSP threads on the lower HX assembly. Screw the assembly into the HX port and tighten it.



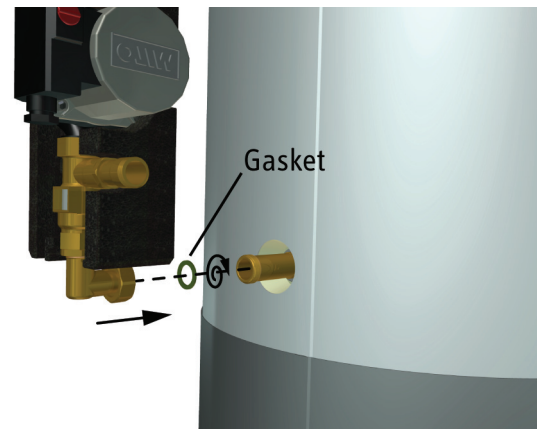
7. Apply teflon tape & pipe dope to the 1" BSP threads on the upper HX assembly. Screw the assembly into the HX port and tighten it.



8. Attach the elbow piece of the lower HX assembly to the pump station. Save the gasket for the next step.



9. Attach the pump station to the lower HX connection. Ensure that the gasket is placed between the connecting pieces.



10. Connect the discharge line to the pressure relief valve connection. Pipe this discharge line to a heat-resistant container.

11. Connect the expansion tank at the connection below the pressure gauge. Stiebel Eltron provides kits for quick connection of the expansion tank, but it is sold separately.

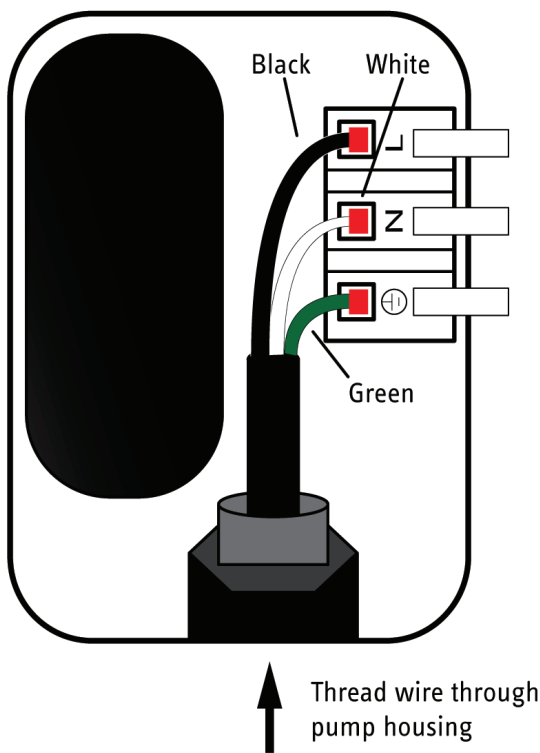
12. Adapt the initial pressure of the expansion tank to the system and connect the expansion tank. For more information regarding the installation of the expansion tank, please see the installation manual for that expansion tank.

13. Check all threaded connections and retighten them.

## INSTALLATION INSTRUCTIONS SE FLOWSTAR PUMP STATION - 221337

### 3.3 Wiring the pump

1. Remove the screw from the pump housing. Connect an 18 gauge wire to the pump wiring block by threading it through the waterproof nut at the bottom of the pump housing. Be sure to connect the colored wires in the correct manner.



2. Close the pump housing, and reattach the front cover of the pump station.

3. Connect the pump wire to the solar controller. The solar controller should be installed and at this point, as it will be necessary to manually run the pump later in the installation process.

## 4 Commissioning

Before commissioning the pump station, read and observe the following safety instructions:

### A. Risk of burns and scalding.

The valves and fittings may heat up to more than 212° (100°C). During flushing, filling and venting, the solar fluid can escape as vapor and result in scalding. Flush and fill the system only if the collector temperatures are below 150°F (70°C).

### B. Propylene glycol safety.

Propylene glycol is hazardous in the case of ingestion. It is an irritant when it comes into contact with the eyes or skin.

Always wear chemically resistant protective gloves and safety glasses with side-shields when handling propylene glycol mixtures.

Observe the instructions and specifications of the antifreeze from the manufacturer.

### C. Risk of frost.

It often happens that solar thermal systems cannot be completely drained after flushing. There is a risk of frost damage when flushing with water.

Therefore, the solar thermal system should only be flushed with water, immediately followed by the solar fluid to fill the system.

Use a water and propylene glycol mixture with max. 50% propylene glycol as a solar fluid, in order to avoid damaging gaskets and seals.

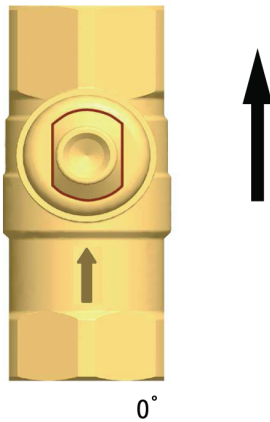
### 4.1 Flushing and filling the solar circuit.

The fill and drain connections required for flushing and filling are integrated into the solar station. In order to flush any dirt particles that may still be present out of the system, use only flush and fill stations equipped with suitable micro filters.

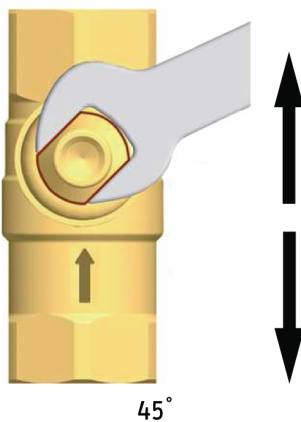
### INSTALLATION INSTRUCTIONS SE FLOWSTAR PUMP STATION - 221337

#### Ball valve with integrated check valve

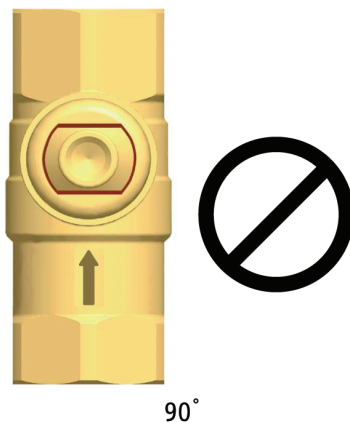
One directional flow  
(Normal operation)



Two directional flow  
(Check valve inactive)

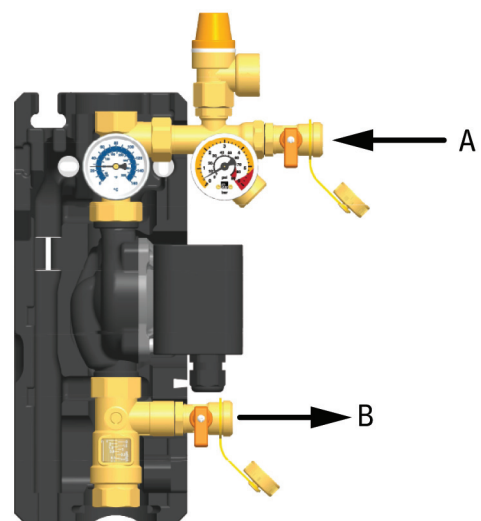


No flow  
(Ball valve closed)



#### 4.2 Preparation for flushing

1. Conduct an air pressure test of the system before flushing and filling. This will ensure that all gaskets, soldering joints, or threaded connections are properly sealed. The pressure, and length of this test is at the discretion of the installer, but it is highly recommended by Stiebel Eltron that this step is completed.
2. Disconnect the expansion tank from the solar thermal system. This is typically done via a ball valve piped between the expansion tank and the pump station.
3. Ensure the check valve in the pump station is in its 0° position.
4. Connect a hose from a domestic water connection to connection A, as shown in the image below.
5. Connect the flushing hose to connection B, as shown below.
6. Ensure that the flushing hose is positioned to empty into a drain or sink.



#### 4.3 Flushing the system

1. Open the fill and drain valves.



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2. Open the domestic water connection to allow water to begin flushing through the system.
3. Leave the water running through the system and into the drain for a full 5 minutes after the flushing hose has begun purging water.
4. Close the fill and drain valves, as well as the domestic water connection.
5. Use the solar controller to manually circulate the fluid. The process for doing this will depend on the controller you are using. Circulate the fluid for 30 minutes.

#### 4.4 Filling the system

1. Stop the manual operation of the pump and turn the pump to off on the controller.
2. Open the check valve in the pump station to its 45° position.
3. Close the ball valve in the flow meter.
4. Connect the charging pump hose to connection A, as shown above.
5. Make sure the flushing hose is still connected to the drain connection B.
6. Insert the filling hose (on the back end of the charging pump) into the solar fluid.
7. Start the charging pump.
8. Open the fill valve.
9. Open the drain valve.
10. Observe the discharge of the flushing hose and make note of the color change of the fluid to the propylene glycol mixture.
11. Close the drain valve.

12. Insert the flushing hose into the same bucket of propylene glycol mixture as the charging hose.
13. Open the ball valve that is isolating the expansion tank.
14. Open the drain valve to continue the circulation of solar fluid through the system. This configuration will allow any air in the system to be discharged via the bucket. Circulate the fluid in this manner for 15 minutes.
15. Close the drain valve again. The system will now begin building pressure. Observe the pressure on the pump station gauge until it reaches the intended cold system pressure.
16. Close the fill valve and turn off the charging pump.
17. Open the ball valve in the flow meter.
18. Set the check valve to the 0° operating position.
19. Manually run the pump via the pump station to ensure that the system is working properly.
20. Air may have accumulated at the solar collectors. It is important to bleed off any air from them to ensure that they are performing uniformly.

#### 4.5 Setting the solar system

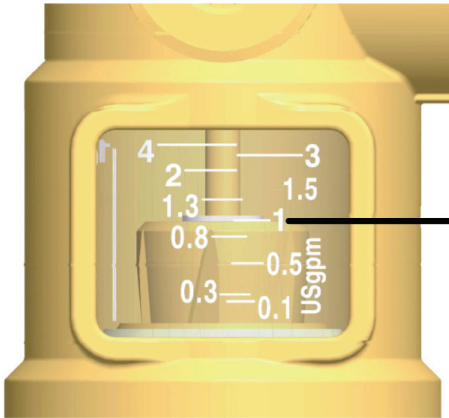
Observe the specifications of the manufacturer of the collectors for the correct adjustment of the flow rate. For Stiebel Eltron SOL 27 Premium collectors, the recommended flow rate is 0.75 gpm/collector.

| Part:                    | # of Collectors in Array: |     |      |     |
|--------------------------|---------------------------|-----|------|-----|
|                          | 1                         | 2   | 3    | 4   |
|                          | Flow Rate (gpm):          |     |      |     |
| SOL 27 Premium collector | 0.75                      | 1.5 | 2.25 | 3.0 |

1. Set the desired max. flow rate via the rotation speed of the solar pump. The controller will set the speed accordingly.

## INSTALLATION INSTRUCTIONS SE FLOWSTAR PUMP STATION - 221337

2. Observe the flow via the flowmeter.



Measure flow  
at top of  
floating body

2. Re-mount the front shell on the solar station.
3. Set the controller to automatic mode.

### 5 Cleaning

Clean the pump station only from the outside with a damp cloth. Never use scouring or sand-containing cleaning agents.

### 6 Maintenance and decommissioning

Before maintaining and decommissioning the system, read and observe the following safety instructions.

#### A. Risk of electric shock

Disconnect all electrical devices in the solar circuit from the power supply before carrying out maintenance work or decommissioning.

Ensure that the electrical devices cannot be switched on again.

#### B. Risk of burns and scalding.

The valves and fittings may heat up to more than 212° (100°C).

Before decommissioning, wait until the solar fluid has cooled down below 122°F (50°C).

#### 6.1 Draining the solar installation

Complete draining allows components in the pump station to be replaced.

1. Disconnect the controller from the power supply and secure it against being switched on again.

2. Open the check valve to the 45° position.

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

4. Open the drain valve.

5. To accelerate the draining of the solar circuit, open the bleeding device at the collectors.

6. If discarding the solar fluid, dispose of it observing any local regulations.

#### 6.2 Replacing the pump

1. After performing the draining process as in 6.1, disconnect the pipe joint between the pump station and the storage tank.

2. Dismount the flowmeter connection to the pump.

3. Dismount the pump connection from the upper assembly.

4. Install the new pump, making sure to include new gaskets.

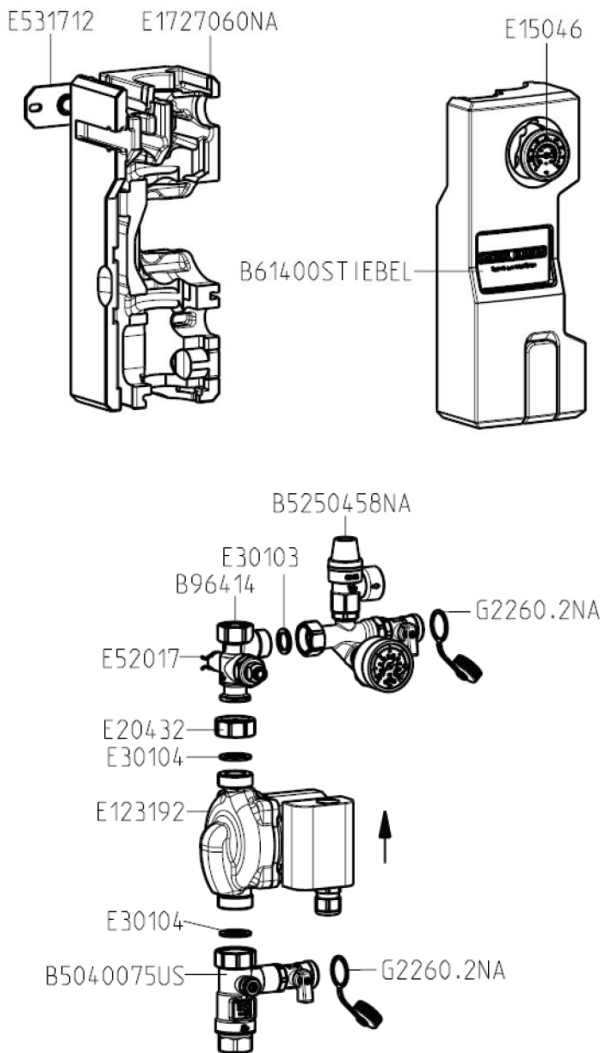
5. Mount the flowmeter.

6. Connect the pump station to its original connections. Repeat the commissioning process as described in section 4.

### 7 Spare parts

### INSTALLATION INSTRUCTIONS SE FLOWSTAR PUMP STATION - 221337

Below is a diagram of the spare parts that can be ordered from Stiebel Eltron. If you need to order a replacement part, please contact Stiebel Eltron and use the part numbers below as a reference.

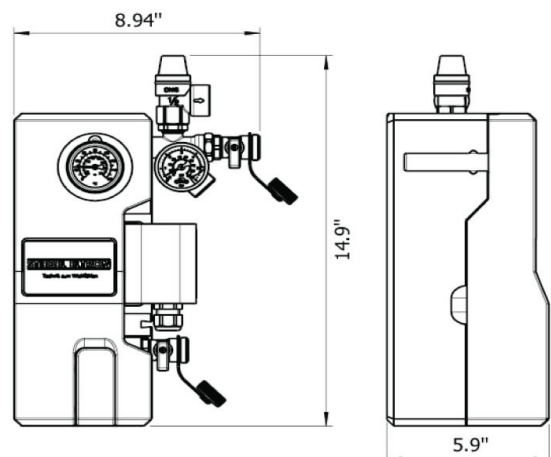


### 8 Technical data and pressure drop curve

#### Technical data

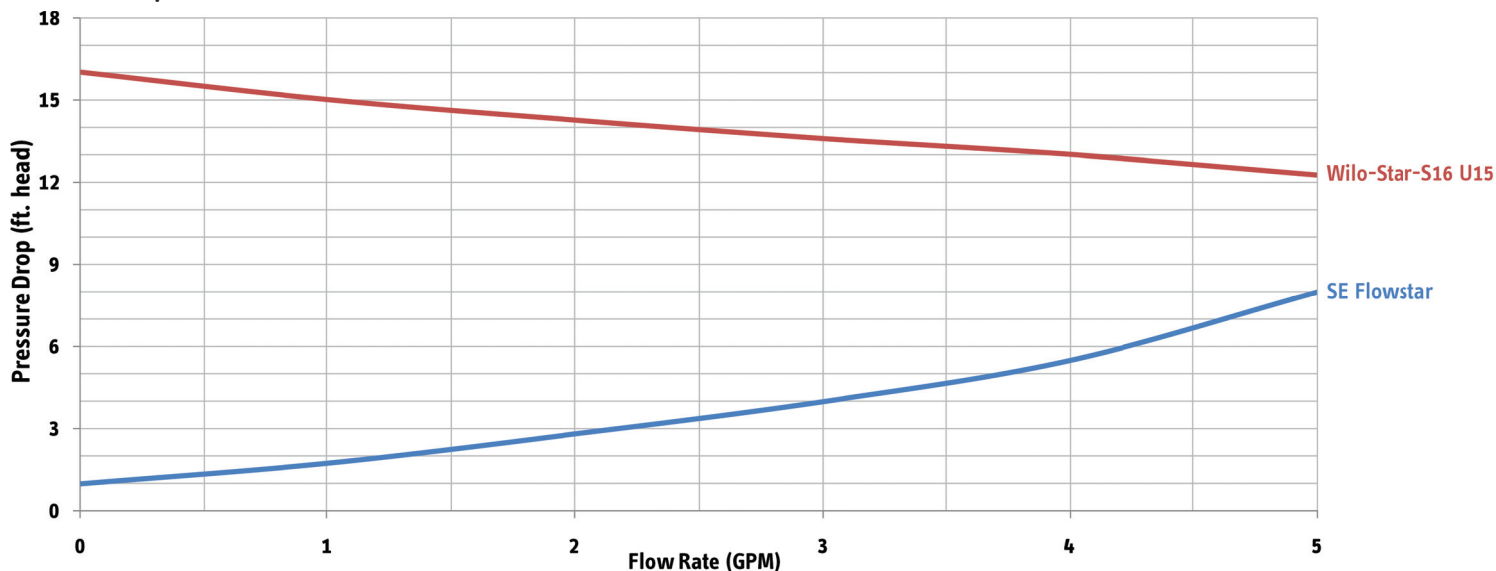
| SE Flowstar Pump Station          |                                  |
|-----------------------------------|----------------------------------|
| <b>Dimensions</b>                 |                                  |
| Height                            | 14.9 in. / 379 mm                |
| Width                             | 8.94 in. / 227 mm                |
| Depth                             | 5.9 in. / 150 mm                 |
| Upper & lower connections         | 3/4" Male NPT or 3/4" Female BSP |
| Exp. tank connection              | 3/4" Male BSP                    |
| PRV connection                    | 3/4" Female BSP                  |
| <b>Temperature &amp; Pressure</b> |                                  |
| Max. pressure                     | 145 PSI / 10 bar                 |
| Max. temp.                        | 248°F / 120°C                    |
| Max. short term temp.             | 320°F / 160°C for < 15 min.      |
| Max. propylene glycol %           | 50%                              |
| <b>Equipment</b>                  |                                  |
| Pressure relief valve             | 87 psi / 6 bar                   |
| Pressure gauge                    | 0-87 psi / 0-6 bar               |
| Check valve                       | 7.9 in. head / 200 mmWC          |
| Flowmeter                         | 0.1-4 gpm                        |
| <b>Material</b>                   |                                  |
| Valves & fittings                 | Brass                            |
| Gaskets                           | EPDM                             |
| Check valves                      | Brass                            |
| Insulation                        | EPP, $\lambda=0.043$ W/(m·K)     |

#### Dimensions



### INSTALLATION INSTRUCTIONS SE FLOWSTAR PUMP STATION - 221337

Pressure drop curve



For any service or warranty related issue, contact Stiebel Eltron at:

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Due to our continuous process of engineering and technological advancement, specifications may change without notice.

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**COMMISSIONING LOG  
SE FLOWSTAR PUMP STATION**

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The installer should fill out this sheet at the end of the installation, and leave it at the installation site.

**Site:**

System operator: \_\_\_\_\_

Installation site: \_\_\_\_\_

**Collectors:**

Collectors (number / type): \_\_\_\_\_

Collector surface area: \_\_\_\_\_

**System specifications:**

System height: \_\_\_\_\_

Pipe run length: \_\_\_\_\_

Ventilation: \_\_\_\_\_

Solar fluid (type / concentration): \_\_\_\_\_

Max. flow rate: \_\_\_\_\_

Pump station: \_\_\_\_\_

Pump setting (low/med/high): \_\_\_\_\_

System pressure (cold): \_\_\_\_\_

System pressure (hot): \_\_\_\_\_

Expansion tank: \_\_\_\_\_

**Checklist:****Mark for condition (checked, closed, open, etc.)**

Pressure relief valve: \_\_\_\_\_

Check valves: \_\_\_\_\_

Ball valves: \_\_\_\_\_

**Serial numbers:**

Pump station: \_\_\_\_\_

Controller: \_\_\_\_\_

Software version: \_\_\_\_\_

**Installation company:** \_\_\_\_\_**Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_