

Solar pump stations

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278-279 series

INSTALLATION AND COMMISSIONING MANUAL



Function

Solar pump stations are used on the primary circuit of solar thermal water heating systems to control the temperature of the hot water storage. The pump inside the unit is activated by the signal from a differential temperature controller. The unit contains the functional and safety devices for optimum circuit control. They are available with both supply and return connection or with return connection only.

The iSolar™ PLUS temperature differential controller, code 257260A (optional), is suitable for management and control of 10 pre-configured solar thermal system arrangements installed in an optional insulation jacket (code 278011) that mounts to the top of the pump station for a nice clean assembly and simplified wiring.

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IMPORTANT

The following instructions must be read and understood before installing, commissioning and servicing the circulation unit.



The safety symbol is used in this manual to draw attention to safety instructions. The meaning of this symbol is as follows:

CAUTION! YOUR SAFETY IS INVOLVED. FAILURE IN FOLLOWING THESE INSTRUCTIONS MAY RESULT IN INJURY.

- The solar pump station must be installed by a qualified technician in compliance with relevant national and/or local regulations.
- Install, commission and service the solar pump station correctly in accordance with the instructions given in this manual to avoid malfunction and user endangerment.
- All connection fittings must be watertight.
- When making the hydraulic connections ensure that threads are not mechanically overstressed. Over time, excessive stress may cause breakage with water leaks, property damage and/or personal injury.
- Water temperatures higher than 120°F (50°C) may cause serious scalding.
- During installation, commissioning and servicing take the necessary precautions to prevent injury to persons caused by high temperatures.



CAUTION: Risk of electric shock. Discount the electric supply before carrying out any work. Failure in following these instructions may result in injury of persons or damage to property.

Product range

Code 278751A	Single-line solar pump station with 3 speed pump, return connection and flow meter scale 2 to 8 gpm.....connection 3/4" female
Code 278751	Single-line solar pump station without pump, return connection and flow meter scale 2 to 8 gpm.....connection 3/4" female
Code 279051A	Dual-line solar pump station with 3 speed pump, supply and return connections, flow meter scale 2 to 8 gpmconnections 3/4" female
Code 279051	Dual-line solar pump station without pump, supply and return connections, flow meter scale 2 to 8 gpmconnections 3/4" female
Code 278951A	Single-line solar pump station for drainback with 3 speed pump, return connection and flow meter scale 2 to 8 gpmconnections 3/4" female

Technical specification

Materials

Shut-off valve body:	brass
Check valve:	brass
Temperature gauge:	steel/aluminum

Air Separator

Body:	brass
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Instrument holder fitting

Body:	brass
Sealing gaskets:	EPDM
O-Ring seal elements:	EPDM

Flow meter

Body:	brass
Transparent level gauge:	PS
Flow indicator:	brass
Hydraulic seals:	EPDM

Insulation

Material:	PP
Average thickness:	3/4 inch (20 mm)
Density:	2.8 lb/ft³ (45 kg/m³)
Working temperature range:	23 - 250°F (-5-120°C)
Thermal conductivity:	0.263 BTU-in/hr-ft²-°F 0.037 W/(m·K) at 50°F (10°C)
Reaction to fire (UL94):	class HBF

Performance

Suitable fluids: water, glycol solution
 Max. percentage of glycol: 50%
 Maximum working temperature:
 air separator side supply: 320°F (160°C)
 pump side return: 230°F (110°C)
 Max. working pressure: 145 psi (10 bar)
 Safety relief valve working temperature range: -20 to 320°F (-30–160°C)
 Safety relief valve setting: 90 psi (6 bar)
 Check valve min. opening pressure (Δp): 1/4 psi (2 kPa)
 Shut-off and check valves working temperature range:
 -20 to 320°F (-30–160°C)
 Flow meter working temperature range: 15 to 230°F (-10–110°C)
 Flow rate adjustment range: 2 to 8 gpm
 Flow rate indicator accuracy: $\pm 10\%$
 Pressure gauge scale: 0 to 145 psi (0–10 bar)
 Temperature gauge scale: 32 to 320°F (0–160°C)
 Connections: 3/4" female straight thread
 Hose connection: 3/4" M
 Fill/drain connections: with hose connection 9/16" OD (15 mm)

Pump model Wilo Star S-21

Body: cast iron
 Electric supply: 115 V 60 Hz
 Max. pressure: 140 psi (10 bar)
 Max. liquid temperature: 230°F (110°C)
 Min. liquid temperature: 14°F (-10°C)
 Max. current: 0.97 A
 Max. power consumption: 110 W
 Protection class: CSA enclosure 2
 Agency approval: cULus

Flow range: 0 to 18 gpm (0 to 1.1 l/s)
 Head range: 0 to 21 ft (0 to 6.4 m)

Pump model UP-100 Drainback

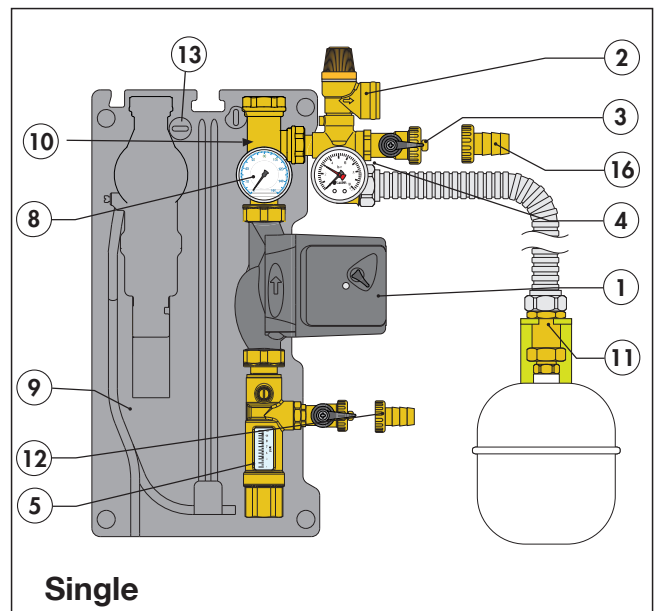
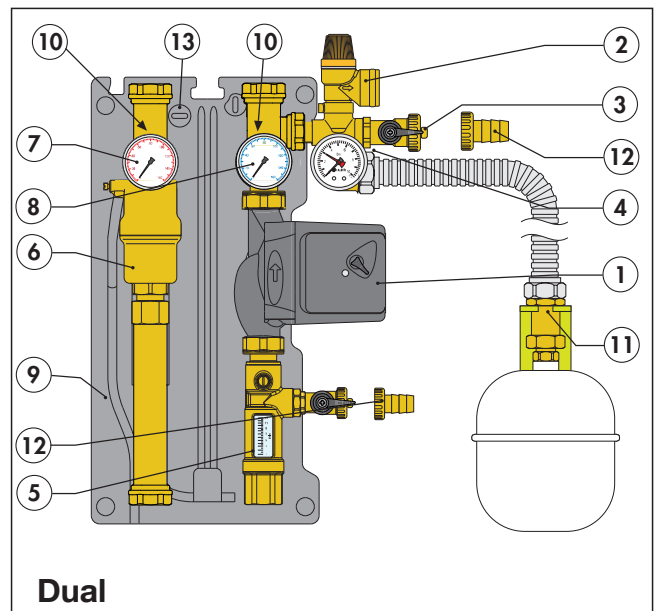
Body: cast iron GG 15/20
 Electric supply: 115 V 60 Hz
 Max. pressure: 150 psi (10 bar)
 Max. liquid temperature: 205°F (96°C)
 Min. liquid temperature: 36°F (2°C)
 Max. current: 1.1 A
 Max. power consumption: 135 W
 Agency approval: cULus

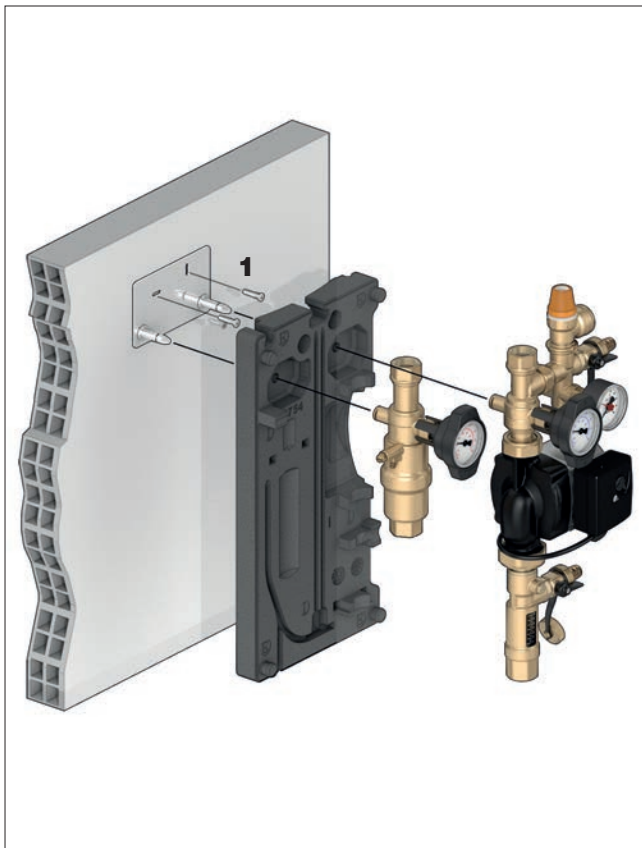
Flow range: 0 to 8.4 gpm (0 to 0.5 l/s)
 Head range: 0 to 36 ft (0 to 11.0 m)

NOTE: pump data per manufacturer technical specifications.

Characteristic components

- 1) Circulation pump
- 2) Safety relief valve
- 3) Fill/drain valve with control lever
- 4) Instrument holder fitting with pressure gauge
- 5) Flow meter
- 6) Air separator with air vent and shut-off valve with check valve
- 7) Supply temperature gauge
- 8) Return temperature gauge
- 9) Pre-formed shell insulation
- 10) Shut-off ball valve with check valve with temperature gauge holder knob
- 11) Connection kit for expansion tank (purchase separately)
- 12) Hose connection
- 13) Mounting bracket

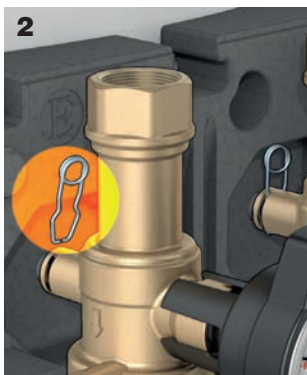




Installation

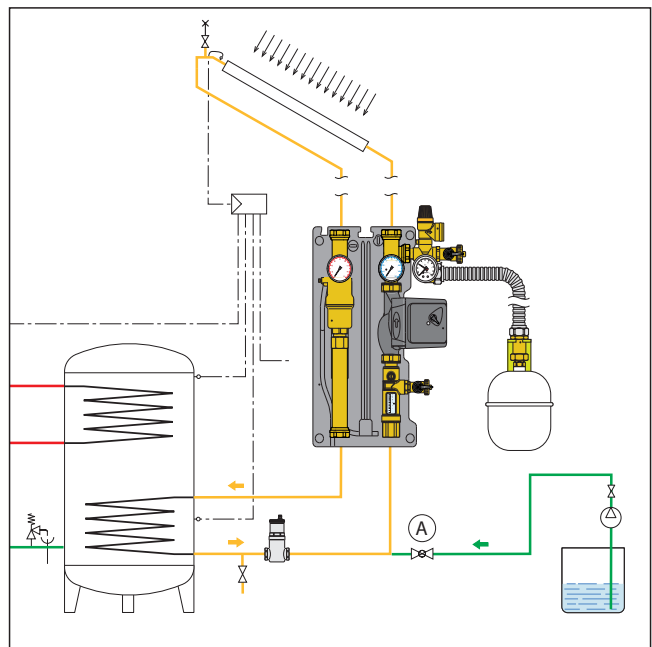
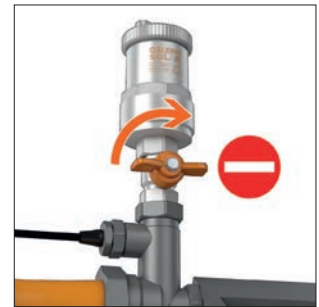
- Remove temperature gauge.
- Remove insulating shell.
- Slide clip to release bracket, then reposition.
- Install the bracket to the wall using the mounting screws supplied in the pack (1).
Insert the unit from the front, seating the pins as shown in the figure.
The components are fastened to the bracket automatically by the clip (2).
- Establish the position for installing an expansion tank (separately purchased) at a distance allowed by the length of the hose (3).
- Install the piping for the entire system and connect the solar unit. Secure the components and the pipes to the rear insulation. Tighten all the fittings.
- The unit's threaded fittings are tightened and tested in the assembly phase in the factory. However, use a pressure test to check for leaks during commissioning.
- Make the electrical connections of the system, as specified in the solar controller instruction manual.

Apply the front part of the insulation.



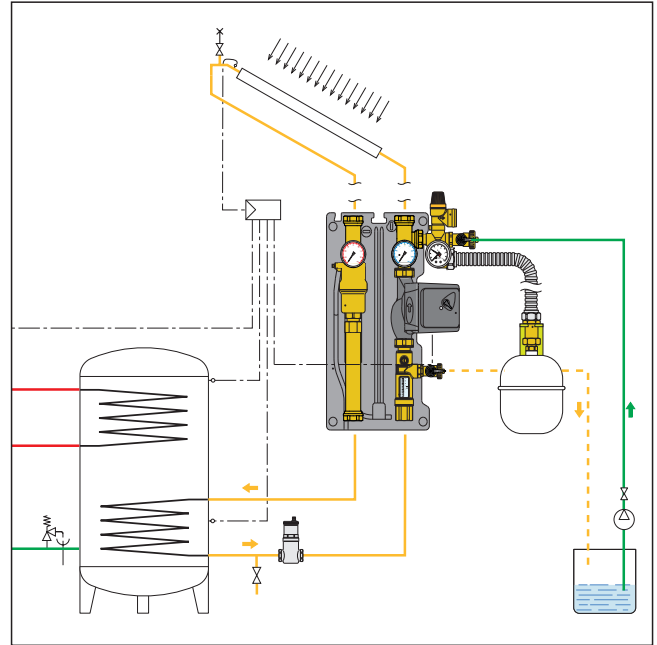
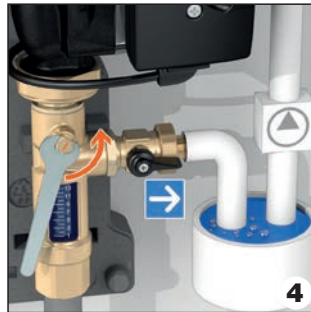
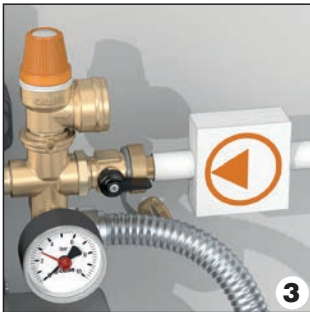
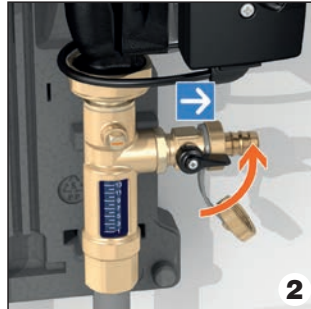
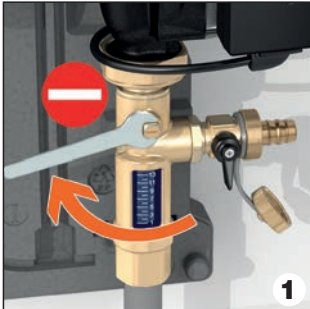
Filling the system

- Open the shut-off valve coupled with the automatic air vent, installed at the highest point of the solar thermal system.
- Open the shut-off and check valves, located where the temperature gauge(s) insert.
- Fill with a pump, using the valve (A) located at the lowest point of the system, until air no longer comes out of the air vents. If the solar thermal system requires the use of glycol-water solution top-off the system using the same glycol-water mixture.
- Close the air vent shut-off valve.
- Close valve (A).



Flushing the system

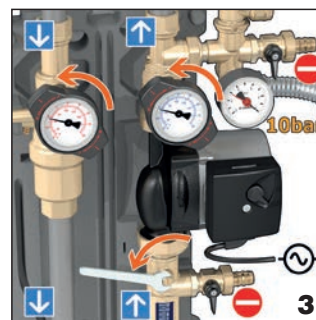
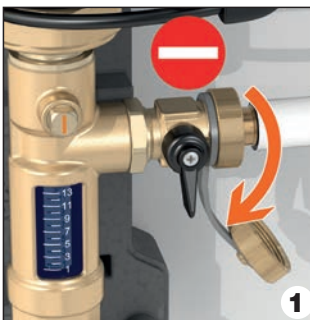
- Close the flow meter adjustment ball valve (1). and open the fill/drain valve (2).
- Connect an external (separate) pump to the safety relieve valve fill/drain valve (3), allow the medium to flow through the solar panels and the heat exchange circuit until it flows out of the flow meter fill/drain valve (4).
- Briefly open the flow meter ball valve (4) to expel all air from the system.
- Leave the external pump running on the system for a few minutes to ensure correct flushing.



Commissioning

- Close the flow meter fill/drain valve (1) and increase pressure in the system to the maximum design pressure, 145 psi (10 bar), using the external filling pump connected to the safety unit fill/drain cock. When this pressure is reached (2), close the safety unit fill/drain valve using the control lever.
- Open the valves under the temperature gauges (3) and switch on the solar circulation unit pump.
- Allow the water to circulate for a while and then check for leaks.
- Re-open the air vent installed at the highest point of the solar thermal system and repeat the air purging procedure, briefly activating the circulation pump.
- Restore the desired working pressure with the filling pump.
- The flow rate of the system can be varied using the flow meter (4). This modulation is performed by the ball valve with which it is equipped (see respective characteristics). Follow the solar panel manufacturer's flow rate recommendations when setting the flow rate.
- After the first few operating hours, the solar thermal system must be purged of excess air again, both in the highest point and on the air separator (if equipped).

Once the air is purged, check system pressure and if necessary restore to the desired working pressure.



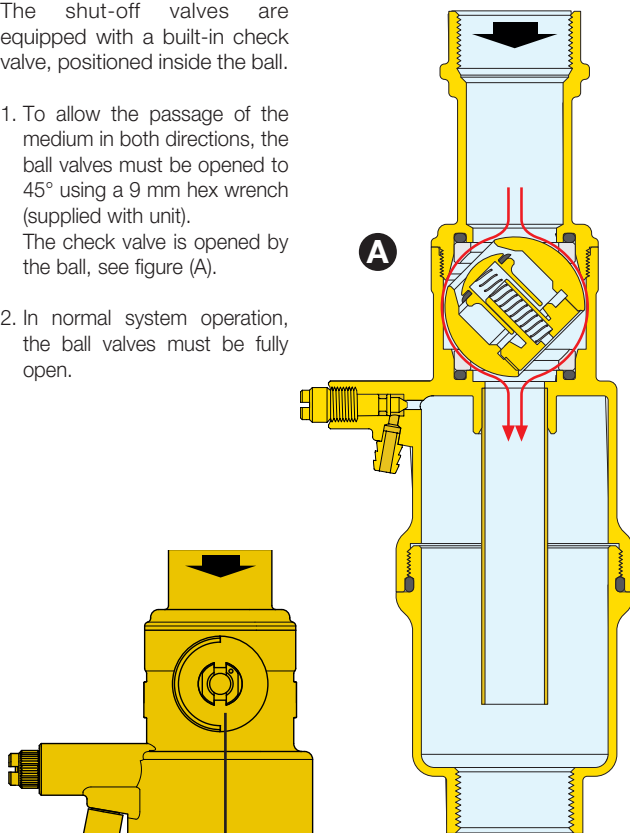
Draining the system

- Draining is necessary if the system has been filled with water only and there is a risk of frost.
- Open the shut-off and check valves (under the temperature gauges), turning them 45°. Open the air vents at the highest point.
- Open the drain valve at the lowest point of the system.

Shut-off and check valves

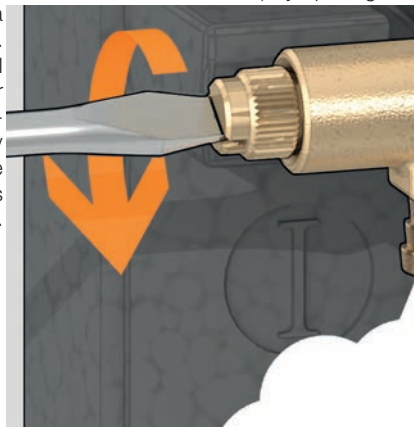
The shut-off valves are equipped with a built-in check valve, positioned inside the ball.

1. To allow the passage of the medium in both directions, the ball valves must be opened to 45° using a 9 mm hex wrench (supplied with unit). The check valve is opened by the ball, see figure (A).
2. In normal system operation, the ball valves must be fully open.



Air separator

The solar pump stations with supply and return connections (279 series) are equipped with an air separator on the supply line. The gases separated from the heat transfer medium collect at the top of the air separator. The collected gases must be evacuated from time to time (every day after putting into operation and afterwards, depending on the quantity of air, once a week or once a month) by opening the manual air vent with a suitably sized screwdriver. To maintain optimal efficiency of the solar thermal system, afterwards, it is necessary to discharge air from the system every six months using the air separator.

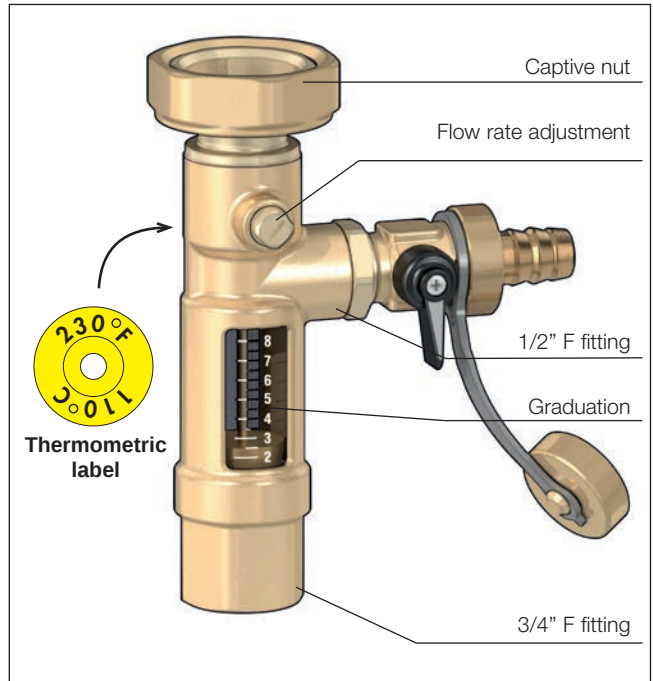


Flow meter

The flow meter is a flow rate measuring device, float equipped, with an adjustment ball valve.

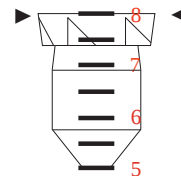
The meter has a range of 2 to 8 gpm.

The flow meter must always be installed in a vertical position.

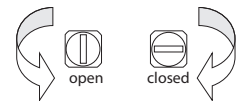


A thermometric label on the back of the flow meter signals if the maximum permitted temperature (230°F/110°C) has been exceeded: white = temperature not exceeded; dark = maximum temperature exceeded. Warranty will be void if this label is removed.

The reading is taken from the top edge of the float



Important! Use only a 9mm hex wrench (supplied with unit) to adjust the flow meter.



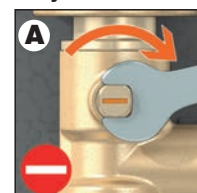
Correction for different density liquids

Changes in flow rate readings remain within the indicated accuracy ($\pm 10\%$) for glycol percentages of up to 50%.

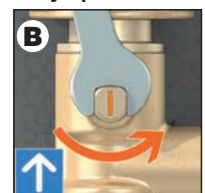
Complete closing and opening of the valve

The valve can be fully closed or fully open. A slot on the valve adjusting stem indicates the status of the valve.

Fully closed



Fully open



Application diagrams

