

## Circulation units for solar thermal systems

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**278-279 series**

### INSTALLATION AND COMMISSIONING MANUAL



#### Function

Circulation units are used on the primary circuit of solar thermal systems to control the temperature in the hot water storage. The pump inside the units is activated by the signal arriving from the regulator. The units contain the functional and safety devices for optimum circuit control. They are available with flow and return connection or with return connection only.

The return connection is available in versions with or without fitting for connection to the digital regulator.

The DeltaSol® C+ digital regulator (optional) is suitable for management and control of 9 different types of solar thermal system also in a version with an insulating casing and protective panel (code 278001).

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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 circulation unit for solar thermal systems must be installed by a qualified technician in compliance with relevant national and/or local regulations.
- If the circulation unit is not installed, commissioned and serviced correctly in accordance with the instructions given in this manual, it could malfunction and endanger the user.
- Make sure that all connection fittings are watertight.
- When making the hydraulic connections ensure that threads are not mechanically overstressed. Over time, excessive stress may cause breakages with water leaks and damage to property and/or injury of persons.
- Water temperatures higher than 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. Cut off the electric supply before carrying out any work. Failure in following these instructions may result in injury of persons or damage to property.**

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### Product range

Code 2780.0	Circulation unit with return connection without digital regulator 1–13 l/min	_____	sizes 3/4" and Ø 22 mm
Code 2780.2	Circulation unit with return connection without digital regulator 8–30 l/min	_____	sizes 3/4" and Ø 22 mm
Code 278750	Circulation unit with return connection fitted for connection to DeltaSol® C+ digital regulator 1–13 l/min	_____	size 3/4
Code 278752	Circulation unit with return connection fitted for connection to DeltaSol® C+ digital regulator 8–30 l/min	_____	size 3/4
Code 2790.0	Circulation unit with flow and return connection fitted for connection to DeltaSol® C+ digital regulator 1–13 l/min	_____	sizes 3/4" and Ø 22 mm
Code 2790.2	Circulation unit with flow and return connection fitted for connection to DeltaSol® C+ digital regulator 8–30 l/min	_____	sizes 3/4" and Ø 22 mm

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### Technical specification

#### Materials

Shut-off valve	
Body:	brass EN 12165 CW617
Check valve:	brass EN 12164 CW614
Temperature gauge:	steel/aluminiu

#### Deaerator

Body:	brass EN 12165 CW617
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#### Instrument holder manifold

Body:	brass EN 12165 CW617N
Sealing gaskets:	EPD
O-Ring seal elements:	EPDM

#### Flow meter

Body:	brass EN 12165 CW617N
Transparent level gauge:	PS
Flow indicator:	brass EN 12164 CW614
Hydraulic seals:	EPD

#### Insulation

Material:	PP
Average thickness:	20 mm
Density:	45 kg/m <sup>3</sup>
Working temperature range:	-5–120°
Thermal conductivity:	0,037 W/(m·K) at 10°
Reaction to fire (UL94):	class HBF

**Performance**

Medium: water, glycol solution  
 Max. percentage of glycol: 50%  
 Maximum working temperature: deaerator side flow: 160°C  
 pump side return: 110°C  
 Max. working pressure: 10 bar  
 Safety relief valve working temperature range: -30–160°C  
 Safety relief valve setting: 6 bar (for other settings refer to 253 series using adapter code F21224)  
 Check valve min. opening pressure ( $\Delta p$ ): 2 kPa (200 mm w.g.)  
 Shut-off and check valves working temperature range: -30–160°C  
 Flow meter working temperature range: -10–110°C  
 Flow rate adjustment range: 1–13 l/min and: 8–30 l/min  
 Flow rate indicator accuracy:  $\pm 10\%$   
 Pressure gauge scale: 0–10 bar  
 Temperature gauge scale: 0–160°C  
 Connections: 3/4" F  
 Hose connection: 3/4" M  
 Fill/drain connections: with hose connection  $\varnothing$  15 mm  
 without hose connection  $\varnothing$  3/4 garden hose

**Pump model Solar 15-65 (15-80 for 8–30 l/min flow meters)**

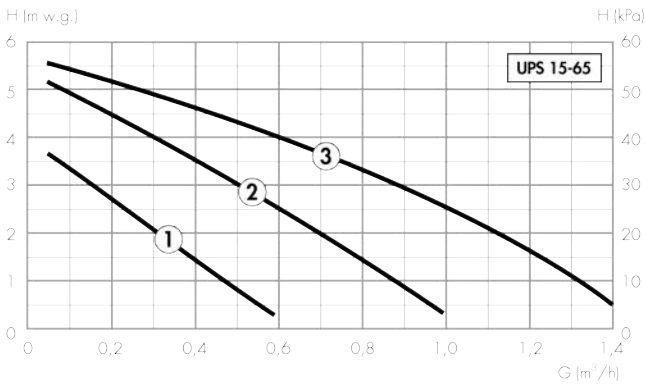
Body: cast iron GG 15/20  
 Electric supply: 230 V - 50 Hz  
 Max. pressure: 10 bar  
 Max. temperature: 110°C  
 Protection class: IP 42

**Digital regulator (code 278001)**

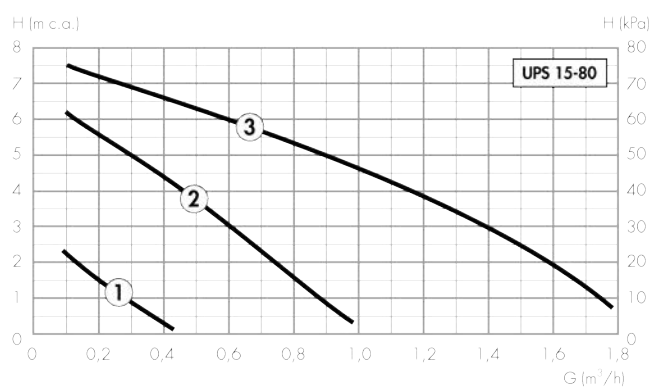
Electric supply: 230 V - 50 Hz  
 Nominal power consumption: 1,5 VA (12 V (ac))  
 4 Pt1000 probe input  
 2 semiconductor relay outputs with contact rating: 1 A  
 2 temperature probes with working range: -50–200°C  
 Probe cable working temperature range: -50–70°C  
 1 temperature probe with working range: -50–200°C  
 Probe cable working temperature range: -50–180°C  
 Ambient temperature range: 0–40°C  
 Protection class: IP 20  
 Dimensions: 172 x 111 x 49 mm

**Head available at the circulation unit connections**

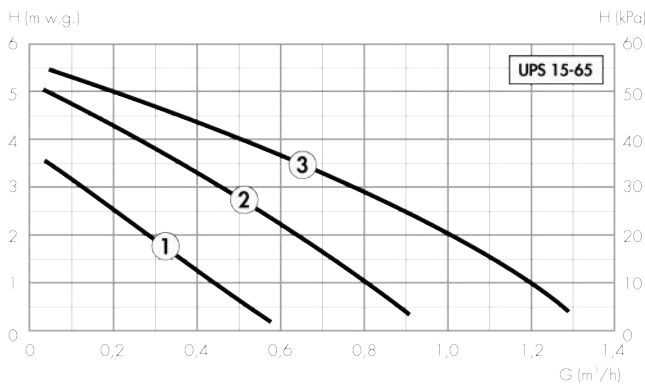
278 series Flow rate adjustment range 1–13 l/min



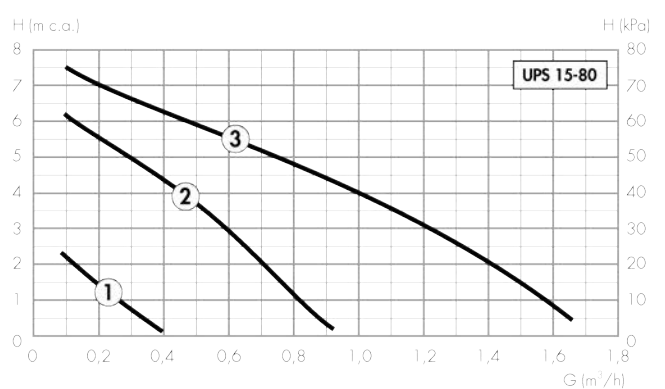
278 series Flow rate adjustment range 8–30 l/min



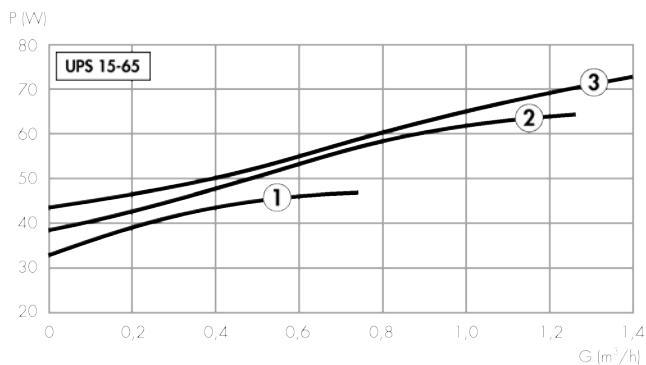
279 series Flow rate adjustment range 1–13 l/min



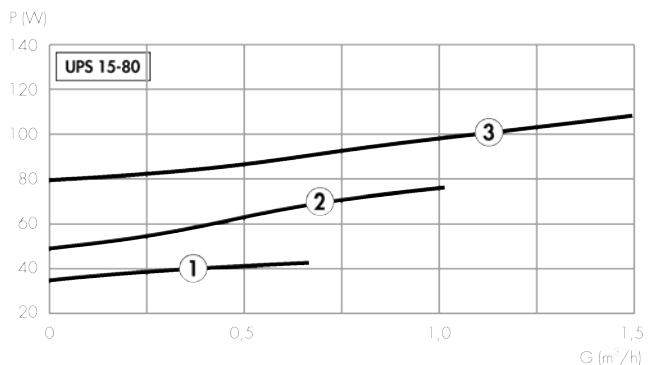
279 series Flow rate adjustment range 8–30 l/min



**Power consumption**

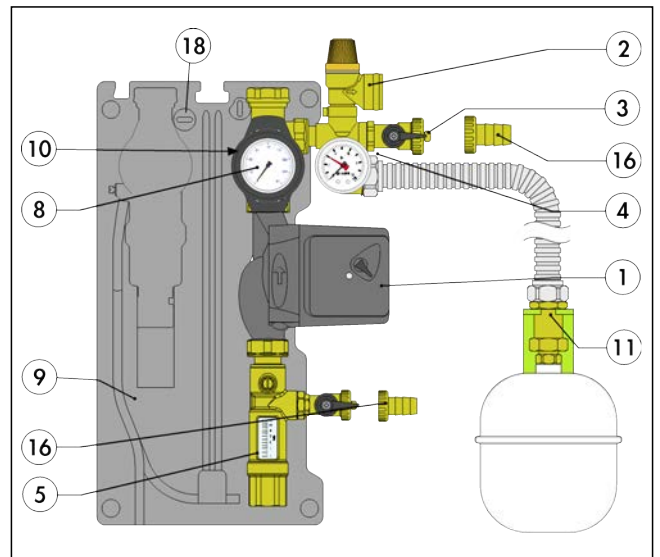
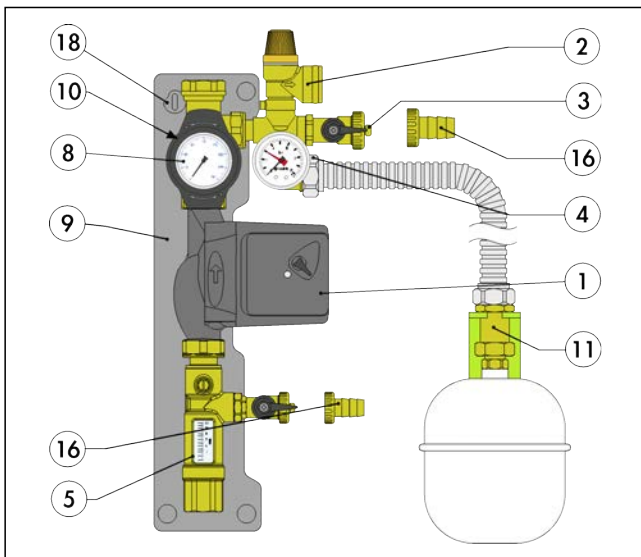
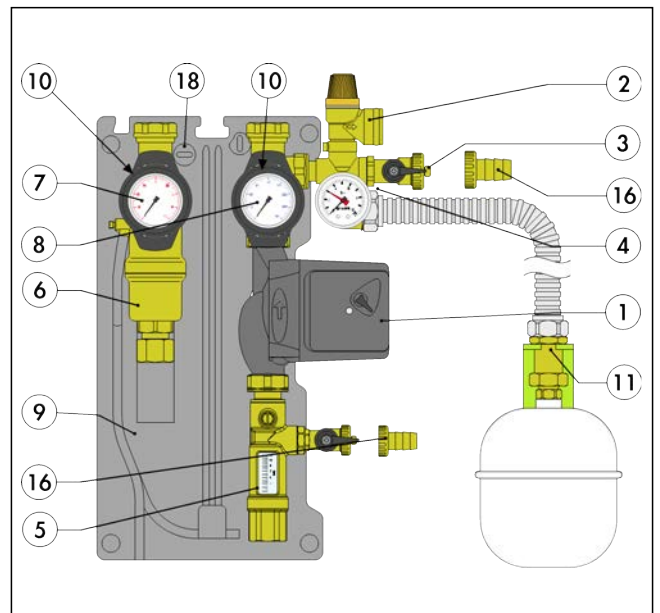


**Power consumption**



### Characteristic components

- 1) Grundfos Solar 15-65 or 15-80 circulation pump
- 2) Safety relief valve with adjustable outlet type 253 series
- 3) Fill/drain cock with control level
- 4) Instrument holder fitting with pressure gauge
- 5) Flow mete
- 6) Deaerator with air vent and shut-off valve with check valve
- 7) Flow 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 vessel (optional)
- 12) Display with synoptic panel and temperature readings
- 13) Adjustment button
- 14) Temperature probe
- 15) Stainless steel probe pocket code 257004 (optional)
- 16) Hose connection
- 17) Insulating casing with protective panel and regulator code 27800
- 18) Mounting bracket



### DeltaSol® C+ digital regulator

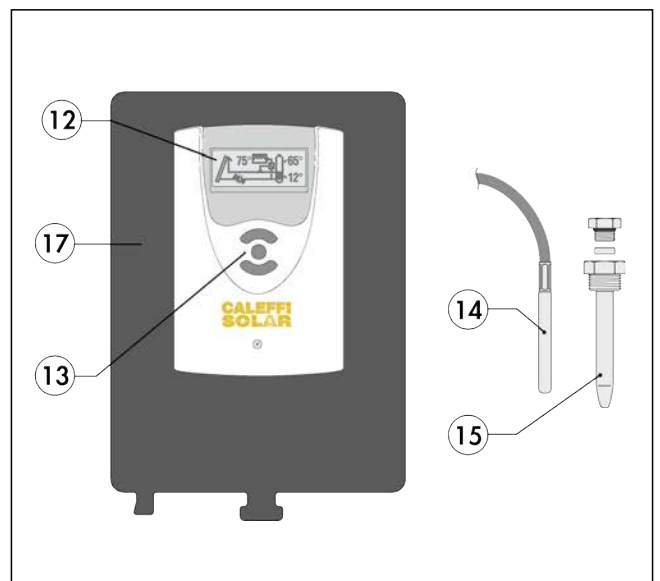
Electric supply: 230 V (ac).  
Complete with pre-formed shell **insulation**, compatible for connection to series 278 and 279 circulation units.

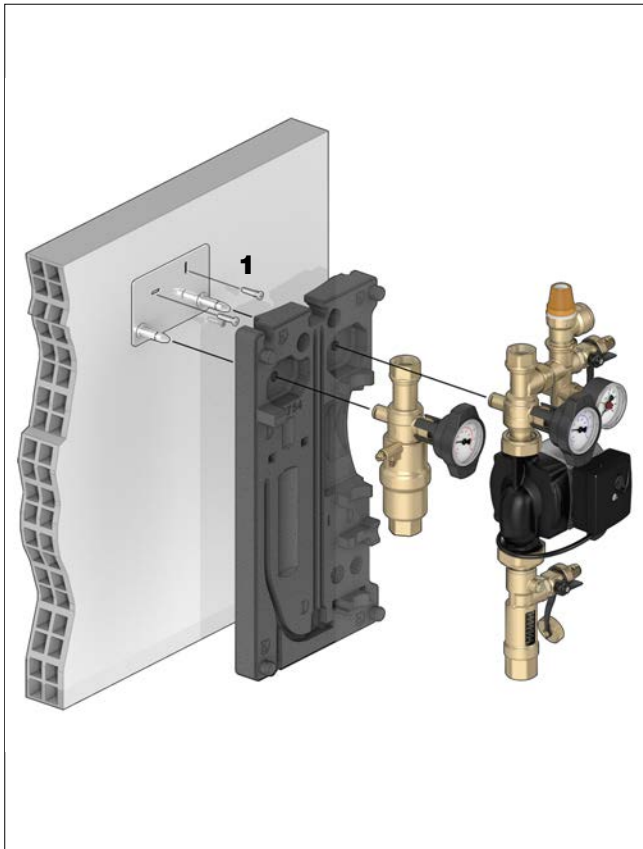
Complete with 3 Pt1000 probes; optional fourth probe.

**Functions:**  
differential temperature regulator with supplementary and optional functions.

**Inputs:**  
for 4 Pt1000 temperature probes.

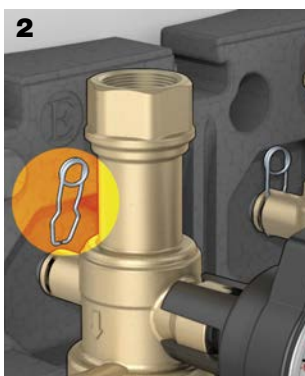
**Outputs:**  
2 semiconductor relays.





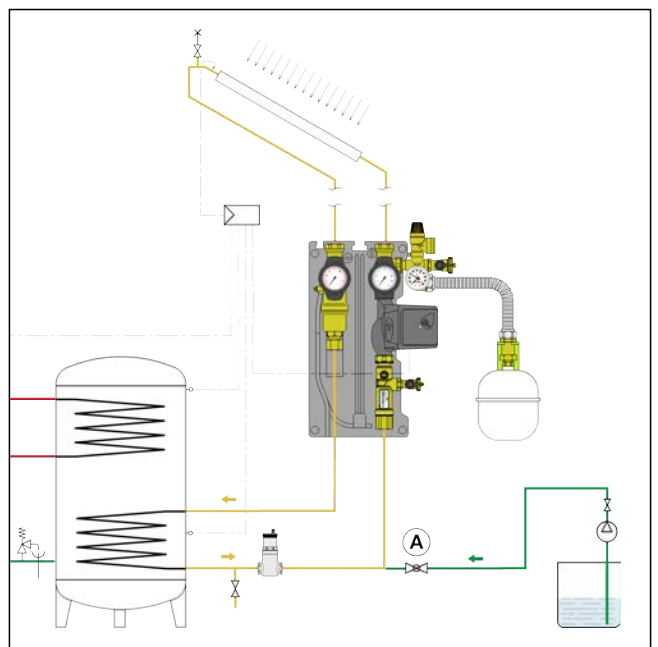
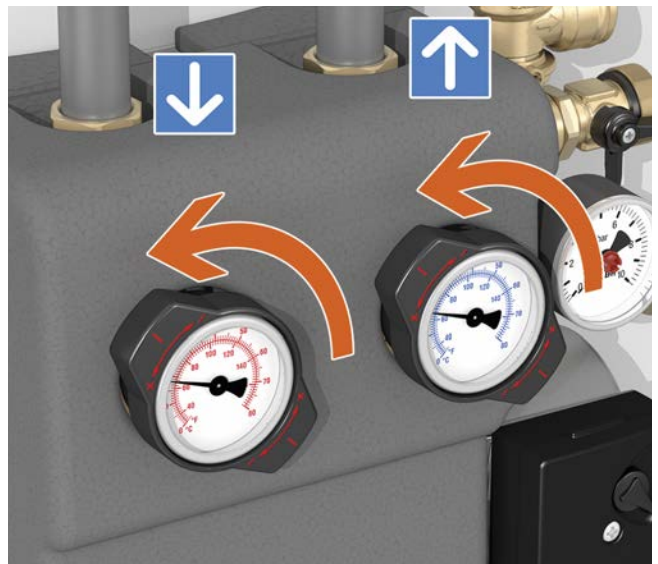
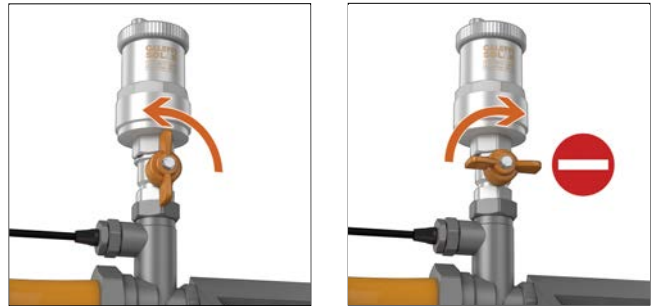
## Installatio

- Remove temperature gauge holder knob.
- Remove insulating shell.
- Slide clip to release bracket, then reposition.
- Fix the bracket to the wall using the fixing screws supplied in the pack (1).  
Insert the unit from the front, fitting the pins in their seats as shown in the figure.  
The components are fastened to the bracket automatically by the clip (2).
- Establish the position for installing the expansion vessel at a distance allowed by the length of the hose, using the bracket provided.  
The bracket allows the use of expansion vessels with a maximum capacity of 24 l, see the instructions concerning the accessories (3).
- Lay the pipes of the whole system and connect the solar unit. Secure the components and the pipes to the rear insulation. Fully tighten all the fittings.
- The unit's threaded fittings are tightened and tested in the assembly phase in the factory. However, during commissioning the water-tightness of the fittings must be checked by means of a pressure test.
- Make the electrical connections of the system, as specified in the regulator instruction manual.  
Apply the front part of the insulation.



## Filling the syste

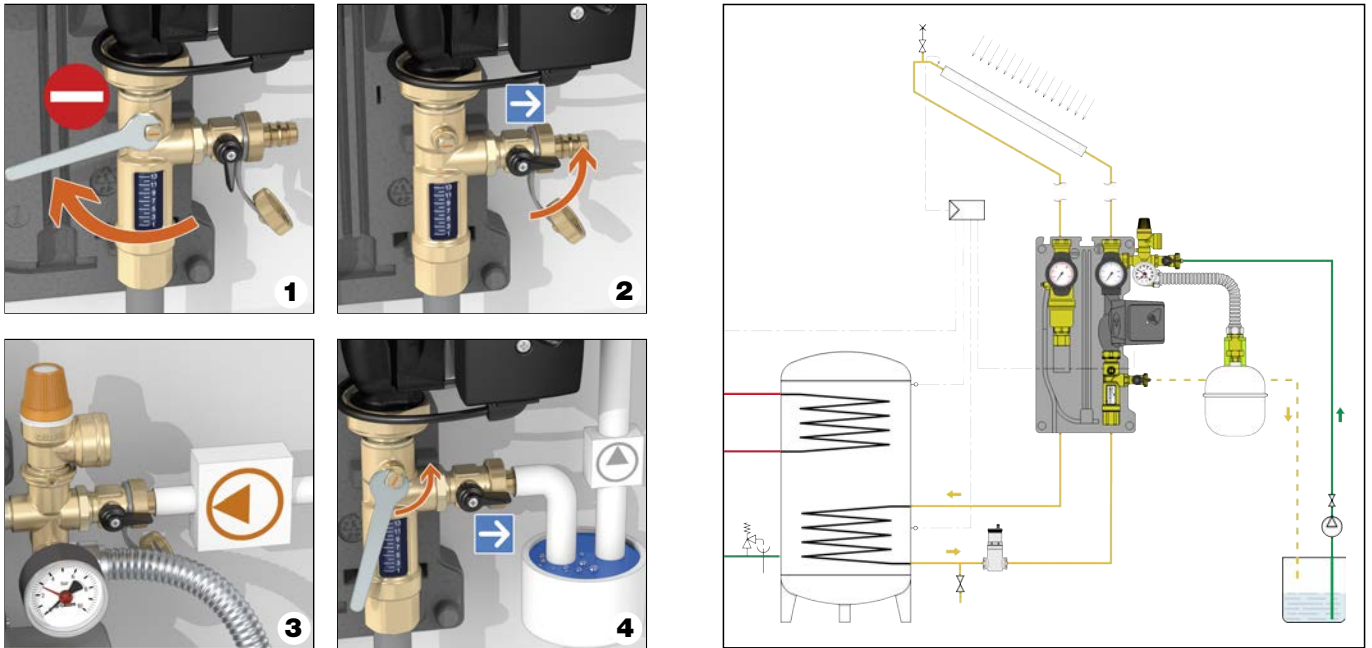
- Open the shut-off valve coupled with the automatic air vent, installed at the highest point of the solar thermal system.
- Open the shut-off and check valves, turning the control stems through 45° (do not remove the temperature gauges).
- Fill by means of a pump, using the cock (A) located at the lowest point of the system, until air no longer comes out of the air vents. If the solar thermal system requires the use of water premixed with anti-freeze, any top-ups must be carried out using a mixture with the same proportions.
- Close the air vent shut-off valve.
- Close the cock (A).





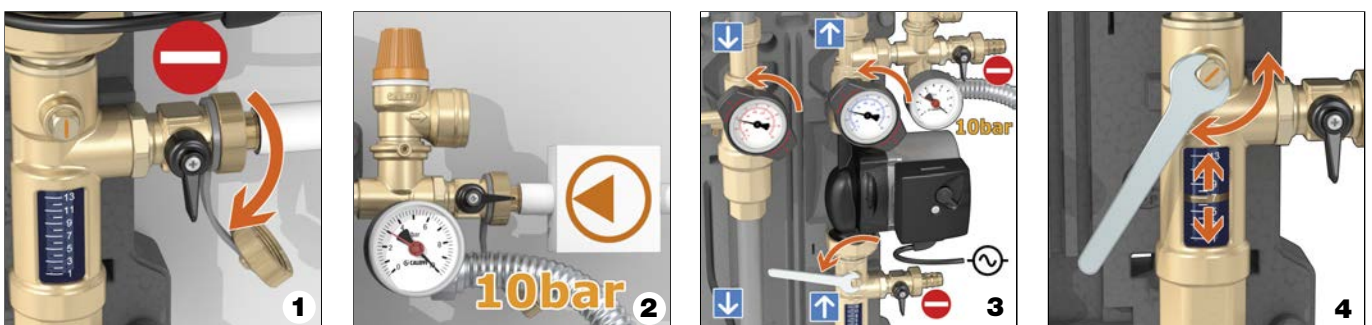
## Flushing the system

- Close the flow meter adjustment ball valve (1). Now open the fill/drain cock (2).
- By means of an external (separate) pump applied on the safety unit fill/drain cock (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 cock (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 cock (1) and increase pressure in the system to the maximum design pressure using the external filling pump applied to the safety unit fill/drain cock.
  - When this pressure is reached (2), close the safety unit fill/drain cock using the control lever.
  - Open the valves of the unit (3) and switch on the solar circulation unit pump (do not remove the temperature gauges).
  - Allow the water to circulate for a while and then check water-tightness.
  - Re-open the air vent installed at the highest point of the solar thermal system and repeat the deaeration 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). To regulate/limit the flow rate it is recommended to follow the indications of the solar panel manufacturer.
  - After the first few operating hours, the solar thermal system must be deaerated again, both in the highest point and on the air separator (on versions where fitted).
- Once deaeration is terminated, check system pressure and if necessary restore to the desired working pressure.



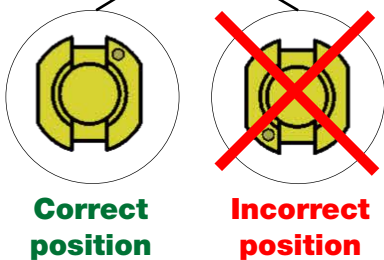
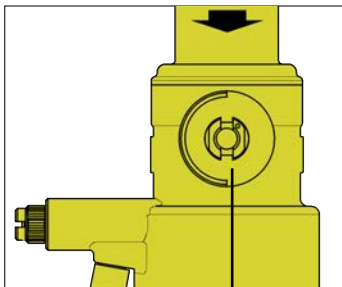
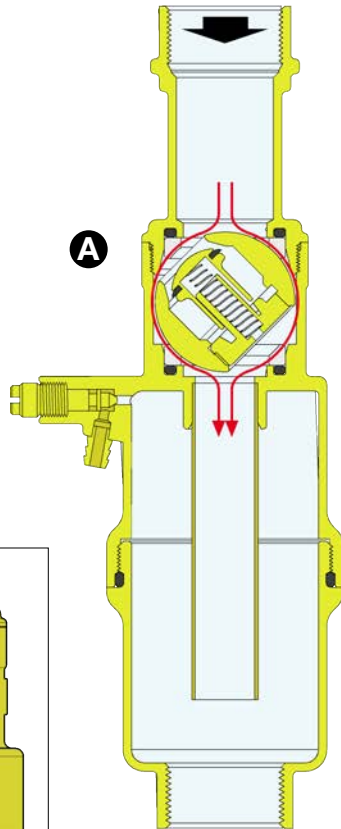
## Draining the system

- The draining operation 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, turning the control knobs through 45°. Open the air vents at the highest point.
- Open the drain cock 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. The check valve is opened by the ball, see figure (A).
2. In normal system operation, the ball valves must be fully open.

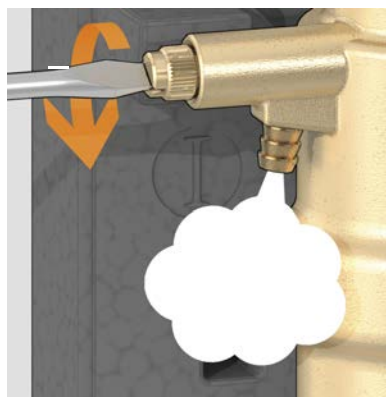


### Air separator device

The solar circulation units with flow and return connection are equipped with an air separator on the flow line. The gases separated from the thermal carrier medium collect at the top of the deaerator.

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 deaerator.

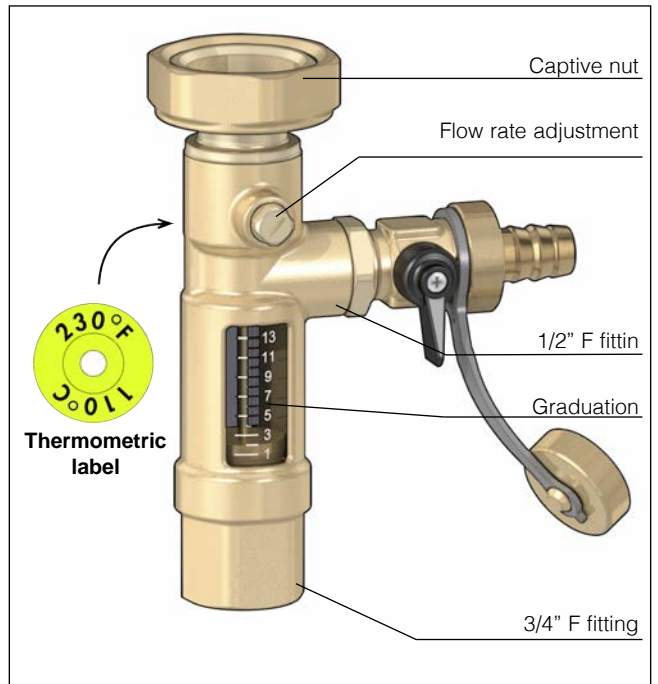


### Flow meter

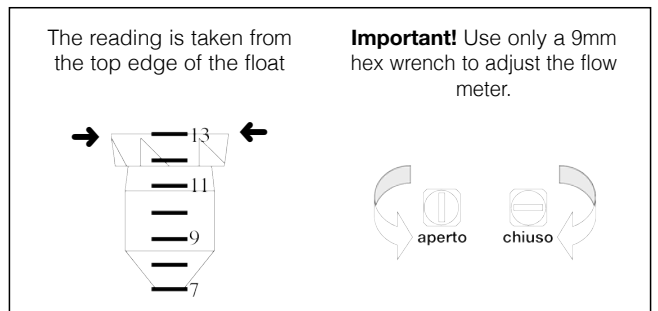
The flow rate meter is a flow rate measuring device with float equipped with an adjustment ball valve.

The meter has a range of 1–13 l/min or 8–30 l/min

**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 (110°C) has been exceeded: white = temperature not exceeded; dark = maximum temperature exceeded. The appliance warranty will no longer apply if this label is removed.

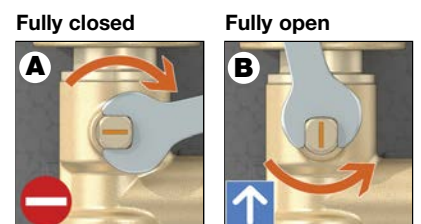


### Correction for different density liquids

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 obturator stem indicates the status of the valve.



**Application diagrams**

