

Circulation units for solar thermal systems

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278HE - 279HE 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 fitted for/not fitted for connection to the digital regulator.

The units are equipped with a high efficiency pump with PWM control.

Combinable with the DeltaSol® SLL digital regulator (code 278005) with PWM control (optional) suitable for the management and control of 9 different types of solar thermal systems also in the version with insulating casing and protective panel.

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WARNINGS

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.
- When installing, commissioning and servicing, take the necessary precautions so that these temperatures are not hazardous for persons.



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.

Product range

Code 278050HE	Circulation unit with return connection without digital regulator 1–13 l/min with pump UPM3 15-75 having internal or external PWM control	size 3/4"
Code 278052HE	Circulation unit with return connection without digital regulator 8–30 l/min with pump UPM3 15-75 having internal or external PWM control	size 3/4"
Code 278750HE	Circulation unit with return connection with pump UPM3 15-75 having internal or external PWM control fitted for connection to DeltaSol® C+ and DeltaSol® SLL digital regulator 1–13 l/min	size 3/4"
Code 278752HE	Circulation unit with return connection with pump UPM3 15-75 having internal or external PWM control fitted for connection to DeltaSol® C+ and DeltaSol® SLL digital regulator 8–30 l/min	size 3/4"
Code 279050HE	Circulation unit with flow and return connection with pump UPM3 15-75 having internal or external PWM control fitted for connection to DeltaSol® C+ and DeltaSol® SLL digital regulator 1–13 l/min	size 3/4"
Code 279052HE	Circulation unit with flow and return connection with pump UPM3 15-75 having internal or external PWM control fitted for connection to DeltaSol® C+ and DeltaSol® SLL digital regulator 8–30 l/min	size 3/4"
Code F29883	PWM connector	

Technical specifications

Materials

Shut-off valves

Body:	brass EN 12165 CW617N
Check valve:	brass EN 12164 CW614N
Temperature gauge:	steel/aluminium

Deaerator

Body:	brass EN 12165 CW617N
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Instrument holder manifold

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

Flow meter

Body:	brass EN 12165 CW617N
Transparent level gauge:	PSU
Flow indicator:	brass EN 12164 CW614N
Hydraulic seals:	EPDM

Insulation

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

Performance

Medium:	water, glycol solutions
Max. percentage of glycol:	50%
Maximum working temperature:	de-aerator 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 (Δp):	2 kPa (200 mm w.g.)
Working temperature range of shut-off and check valve:	-30–160°C
Flow meter working temperature range:	-10–110°C
Flow rate regulation range:	1–13 l/min and 8–30 l/min
Flow rate indicator accuracy:	±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 Ø 15 mm without hose connection Ø 3/4" garden hose

Pump model Solar UPM3 15-75

Body: cast iron GS 111B 0003
Electric supply: 230 V - 50 Hz
Max. pressure: 10 bar
Max. temperature: 110°C
Protection class: IPX4D

Digital regulator (code 278005)

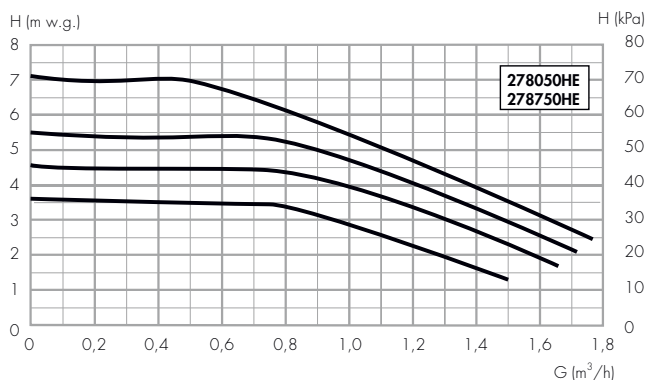
Electric supply: 100-240 V-50/60 Hz
Power consumption: < 1 W (standby)
4 inputs for temperature probes: Pt1000, Pt500 or KTY
3 relay outputs (1 potential-free low voltage relay) with contact rating:
1 (1) A 240 V~ (semiconductor relay)
1 (1) A 30 V= (potential-free relay)
total contact rating 2 A 240 V~

2 PWM outputs for high efficiency pumps speed control

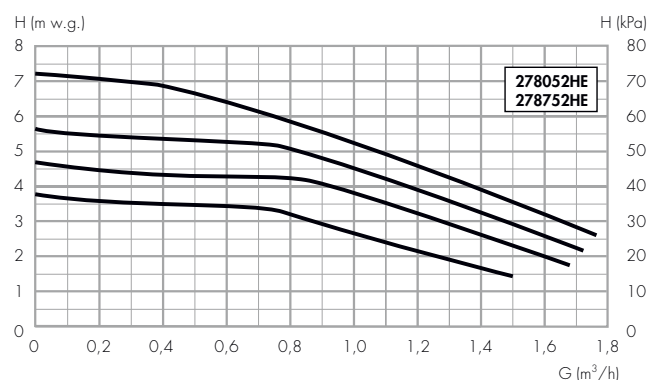
1 pulse input: V 40
Automatic operation control according to VDI 2169
10 selectable basic systems
PWM frequency: 1000 Hz
PWM voltage: 10,5 V
2 temperature probes with working range: -50–200°C
Probe cable working temperature range: -50–70°C
1 temperature probe with working range: -50–200°C
Probe cable working temperature range: -50–180°C
Ambient temperature range: 0–40°C
Protection class: IP 20
Protection class: I
Dimensions: 110 x 166 x 47 mm

Head available at the circulation unit connections

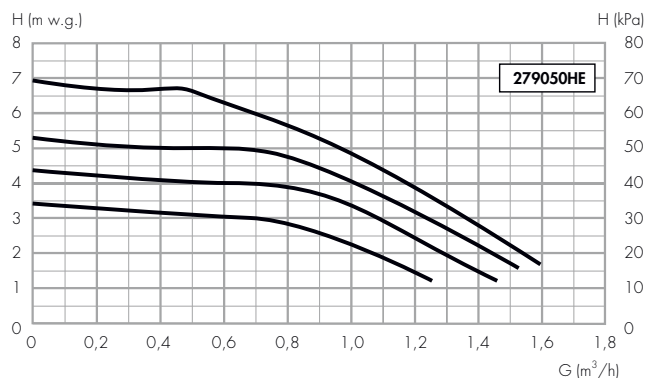
278HE series Flow rate adjustment range 1–13 l/min



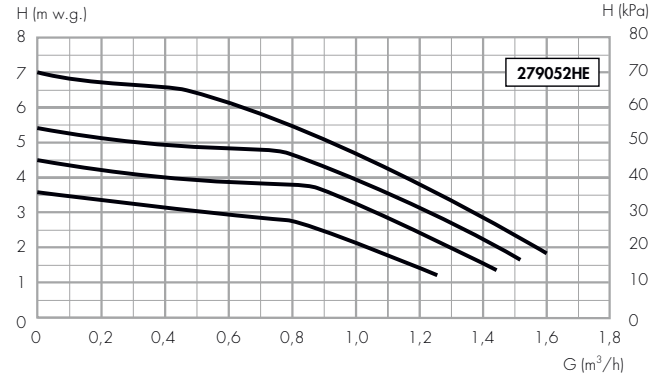
278HE series Flow rate adjustment range 8–30 l/min



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

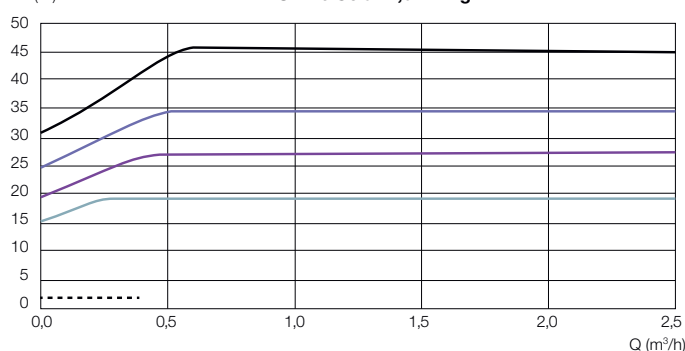


279HE series Flow rate adjustment range 8–30 l/min



P1 (W)

UPM3 Solar 7,5 m w.g.



— 7,5 m w.g.
— 6,5 m w.g.
— 5,5 m w.g.
— 4,5 m w.g.
..... MIN

Settings	Max. P _{1 nom}
Curve 1	19 W
Curve 2	28 W
Curve 3	35 W
Curve 4	45 W

EEI ≤ 0,20 Part 3
P_{L,avg} ≤ 20 W

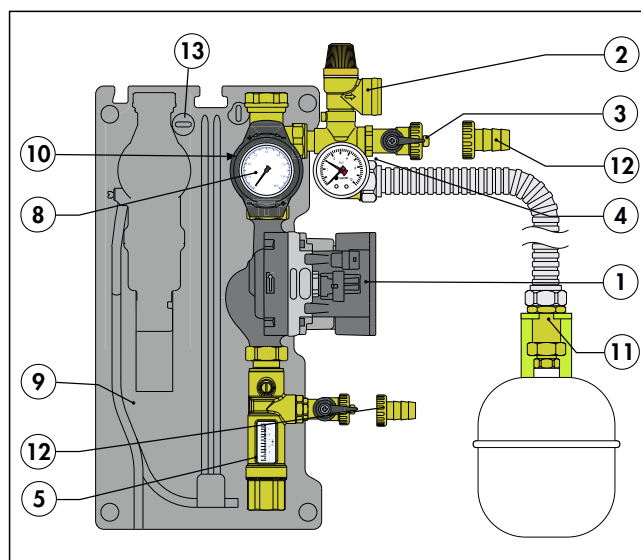
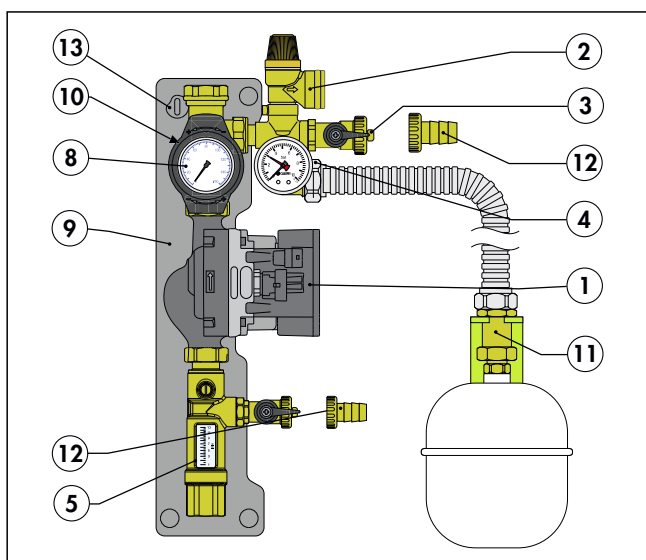
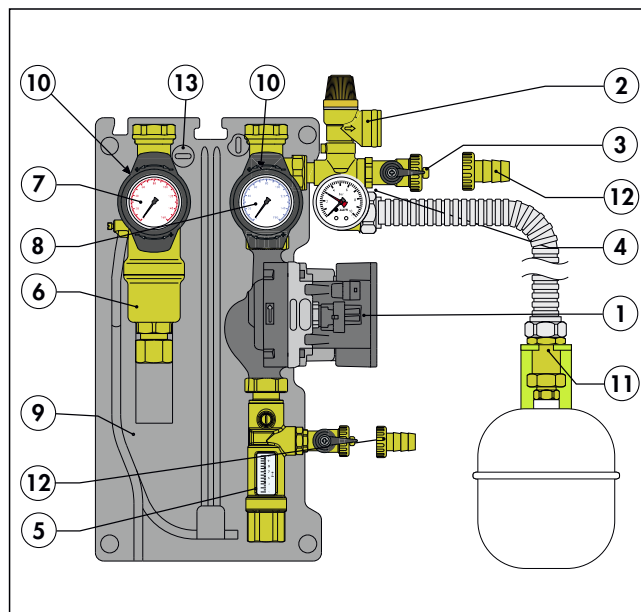
Electrical data, 1 x 230 V, 50 Hz			Settings			
Speed	P1 (W)	I 1/1 (A)	PWM A	PWM C	PP	CC
Min.	2	0,04	-	4	-	4
Max.	45	0,48				

Note:

The pumps can operate in accordance with a constant speed internal control or a PWM external control, by means of a specific regulator that adapts performance to system requirements. For more information refer to the pump installation instruction sheet supplied in the package and the technical manual available at www.caleffi.it.

Characteristic components

- 1) Grundfos UPM3 Solar 15-75 circulator
- 2) Safety valve with adjustable drain 253 series
- 3) Fill/drain cock with control lever
- 4) Instrument holder fitting with pressure gauge
- 5) Flow meter
- 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) Fill/drain hose connection
- 13) Mounting bracket
- 14) Display with synoptic diagram and temperature readings
- 15) Regulating keys
- 16) Temperature probe
- 17) Stainless steel probe pocket code 257004 (optional)
- 18) Insulating casing with protective panel and regulator code 278005



DeltaSol® SLL digital regulator code 278005

The DeltaSol® SLL digital regulator code 278005 can be combined with 278...HE and 279...HE units using the Solar UPM3 15-75 high efficiency pump with PWM control enabled.

Functions

Differential temperature regulator with supplementary and optional functions.

Inputs:

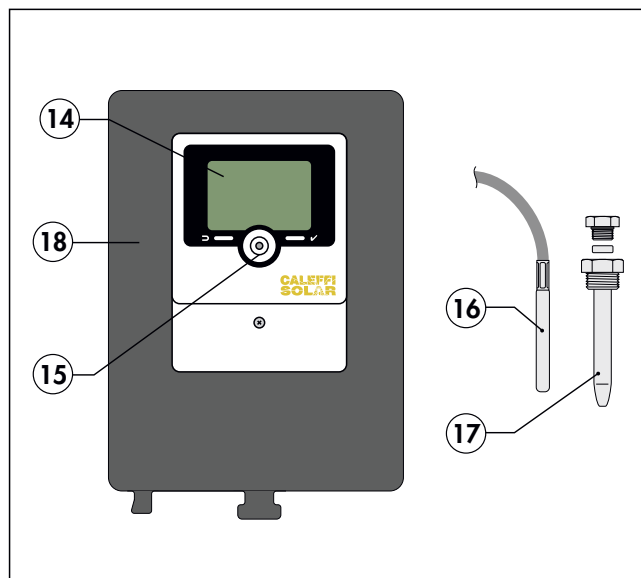
For 4 Pt1000 temperature probes.

Outputs:

3 semiconductor relays (code 278005)

Accessories for PWM control:

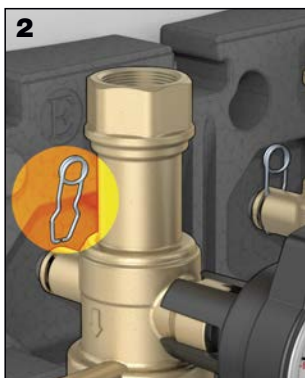
F29883 PWM connector, electric supply cable length 1 m, for UPM3 Solar 15-75 circulator





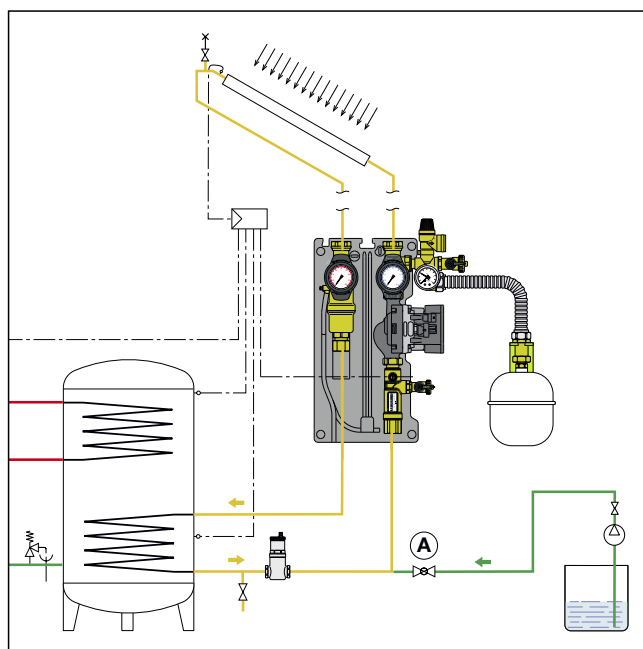
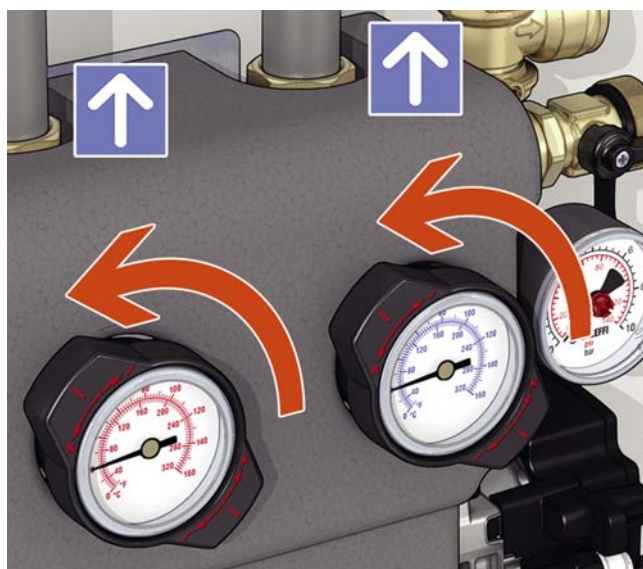
Installation

- Remove the temperature gauge holder knob.
- Remove the front insulating shell.
- Offer up the unit to the wall to mark the drilling positions (1).
- Position the unit and secure it with the screws.
- If you need to remove the valve units from the bracket, slide clip to release bracket (2).
- Establish the position for installing the expansion vessel at a distance allowed by the length of the hose, using the bracket provided (3).
The bracket allows the use of expansion vessels with a maximum capacity of 24 l, see the instructions concerning the accessories (connection kit).
- 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, the water-tightness of the fittings must be checked at the time of commissioning 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.



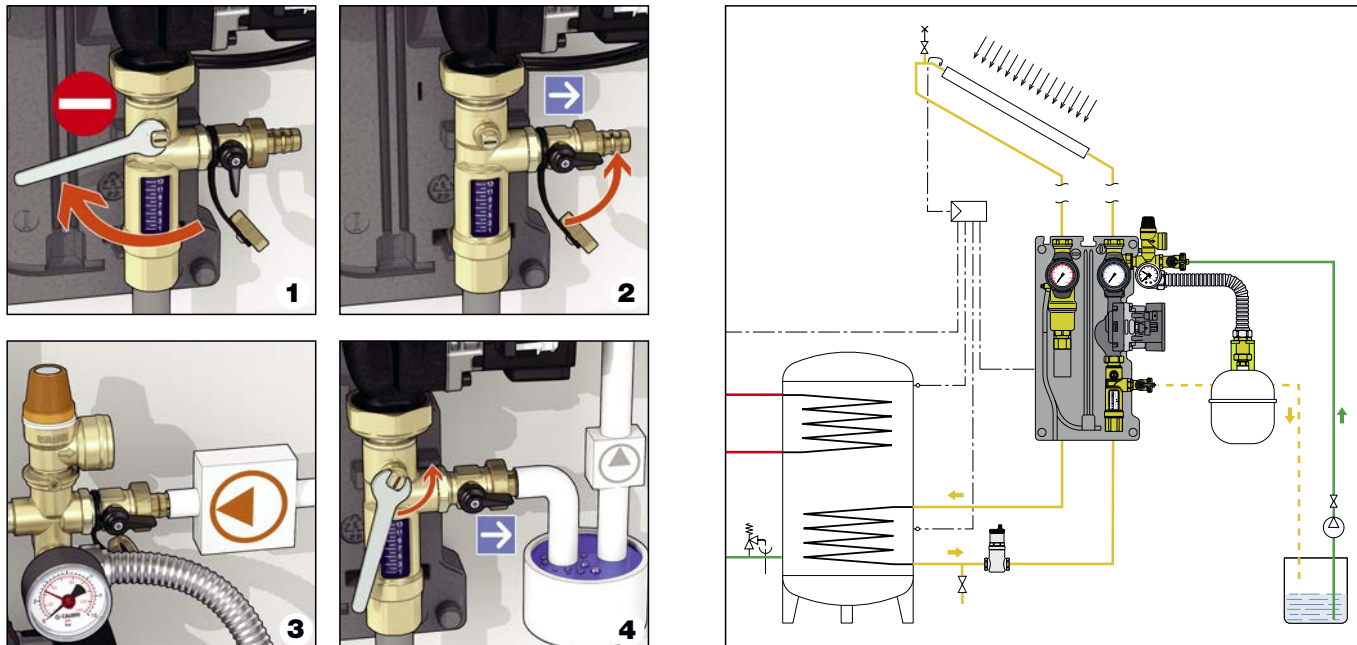
Filling the system

- 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, 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).



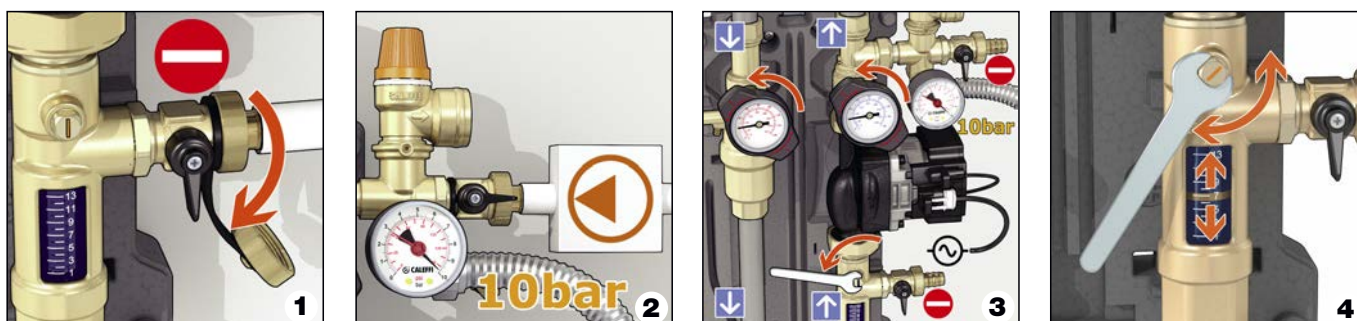
Flushing the system

- 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 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.



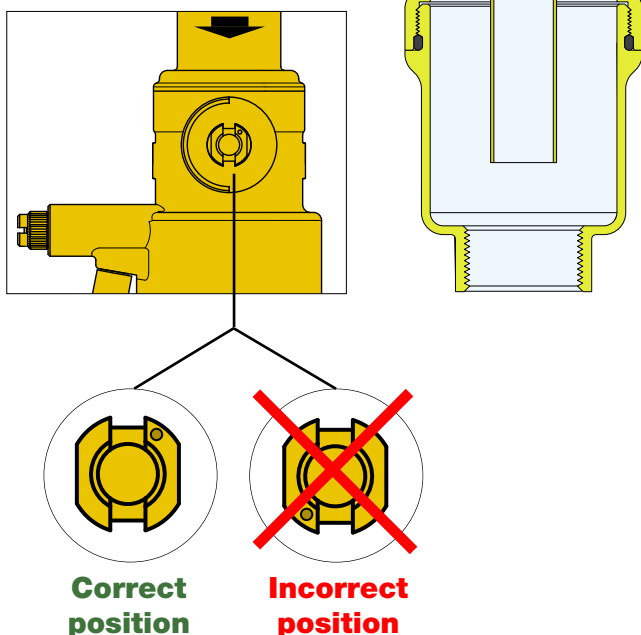
Draining the system

- 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.

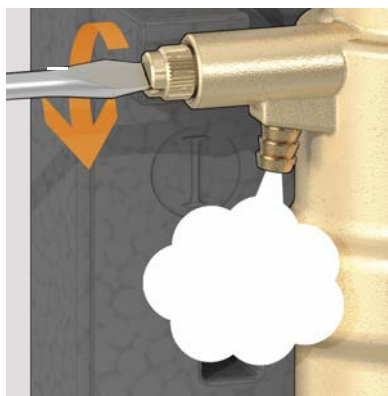


Air separating device

The solar circulation units with flow and return connection are equipped with an air vent 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.

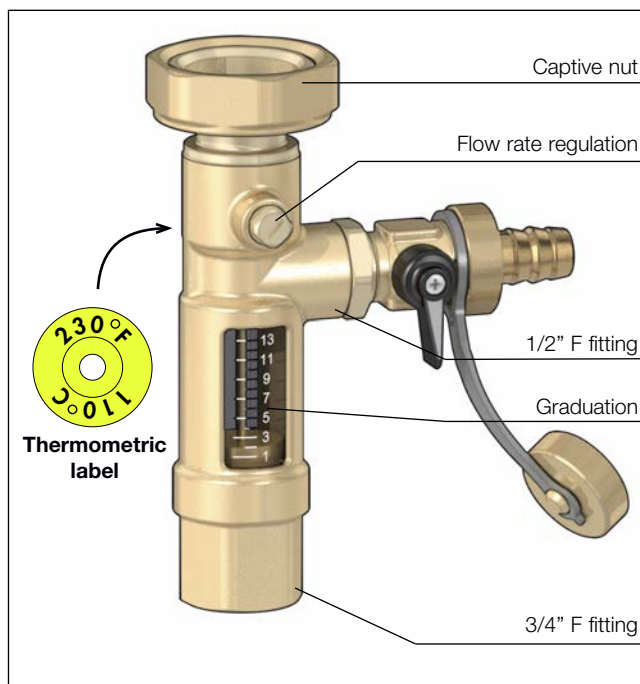


Flow meter

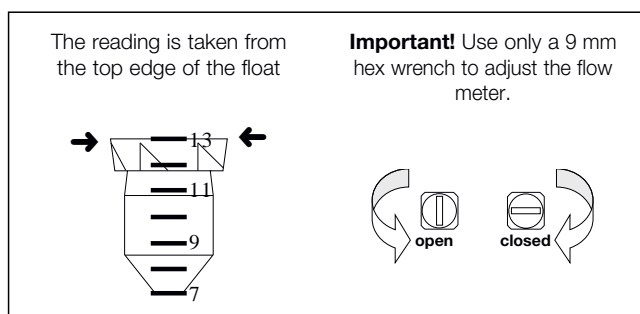
The flow meter is a flow rate measuring device with float equipped with an adjustment ball valve.

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

The flow meter must be fitted in a vertical position only.



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.

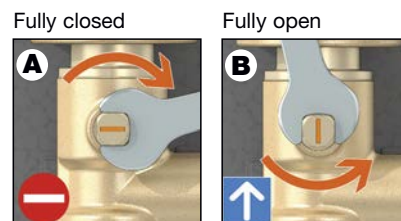


Correction for liquids with different densities

The variation in the flow rate reading remains within the range of 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

