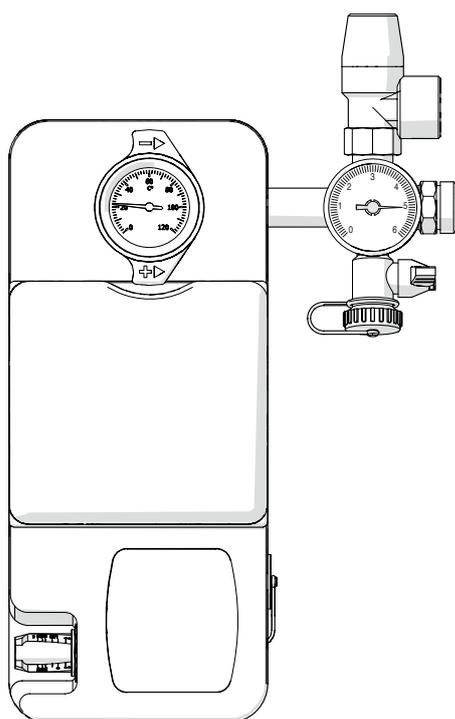


## CONNECT SOLAR R - 7.5m

Solar | Solar station



**EN** Installation Manual

## RANGE

MODEL	CODE
CONNECT SOLAR R - 7,5m	20116162

Dear heating engineer,  
We would like to congratulate you on having recommended a **Beretta** solar station unit: a modern product that's capable of ensuring a high degree of reliability, efficiency, quality and safety.

While your technical skills and knowledge will certainly be more than sufficient, this booklet contains all the information that we have deemed necessary for the device's correct and easy installation.

Thank you again, and keep up the good work,

Beretta

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## 1 GENERAL SAFETY INFORMATION

-  Check that the product is complete, undamaged and as ordered as soon as you receive it. Report any discrepancies or damage to the **Beretta** dealer who sold it.
-  This product must be installed by a legally qualified heating engineer. On completion of the installation, the installer must issue the owner with a declaration of conformity confirming that the installation has been completed to the highest standards in compliance with the instructions provided by **Beretta** in this instruction manual, and that it conforms to all applicable laws and standards.
-  This product must only be used for the purpose for which it is designed and made, as specified by **Beretta**. **Beretta** declines all responsibility, contractual or other, for damage to property or injury to persons or animals caused by improper installation, adjustment, maintenance or use.
-  The product must be serviced at least once a year. Servicing must be arranged in advance with the **Beretta** Technical Assistance Centre.
-  All servicing and repairs must be performed by a qualified heating engineer.
-  This instruction manual is an integral part of the product. It must be kept safe and must ALWAYS accompany the product, even if it is sold to another owner or transferred to another user or to another installation. If you lose this manual, order a replacement immediately. Keep the product purchase documents to be presented to the **Beretta** authorised Technical Assistance Centre to request a service call under warranty.
-  Size the solar expansion tank so as to ensure complete absorption of the expansion of the fluid contained within the system, with reference to the prevailing regulations on the matter. In particular, consider fluid characteristics, considerable fluctuation of service temperature and vapour that might be generated during solar collector stagnation stage. Proper size of expansion tank ensures setting off of all volume changes of the heat transfer fluid, avoiding excessive pressure increase. Limited pressure changes avoid reaching safety valve opening pressure and the consequent fluid drainage.



**At the end of its life, the product should be not be disposed of as solid urban waste, but rather it should be handed over to a differentiated waste collection centre.**

The following symbols are used in this manual:



**CAUTION!** = Identifies actions that require caution and adequate preparation.



**STOP!** = Identifies actions that you MUST NOT do.

## 2 PRECAUTIONS

The operation of any appliance that uses electrical power demands that a number of fundamental safety precautions be respected. In particular:

- ⊘ Never attempt to install the system without using suitable personal protection equipment and without following all applicable occupational safety standards.
- ⊘ It is forbidden to touch the device while barefoot or with wet or moist body parts.
- ⊘ It is forbidden to perform any technical or cleaning operations before having disconnected the device from its electrical power supply, by setting the system's main switch to "off".
- ⊘ It is forbidden to pull, detach, or twist the electrical cables protruding from the device, even if it is disconnected from its electrical power supply.
- ⊘ Do not expose the storage cylinder to the elements. It is not designed for use outdoors.
- ⊘ If solar plant pressure decreases, it is forbidden to top up with only water as there is a danger of freezing and overheating.
- ⊘ Do not use connections or safety devices or fittings (expansion vessels, pipes, insulation) that are not specifically designed and tested for use in solar water heating systems.
- ⊘ Do not allow children or infirm persons to operate the system unsupervised.
- ⊘ Do not dispose of packaging material into the environment, or leave it within the reach of children, since it can become a potential hazard. Dispose of packaging material in compliance with applicable legislation.

## 3 DESCRIPTION OF THE APPLIANCE

The solar station **CONNECT SOLAR R** allows transferring sun power from collectors to a storage system.

The solar station **Beretta** is enclosed in an EPP (Polypropylene foam) insulating casing and is designed to perform:

- system flushing
- system filling and emptying
- circulator removal.

The key components are:

- high-efficiency circulator running at fixed or variable speed
- non-return shut-off valve
- thermometer
- pressure gauge
- fitting for connection to a solar expansion tank
- suitable safety device, as indicated in paragraph "Safety and control devices"
- flow-meter with flow-rate regulator.

## 4 SAFETY AND CONTROL DEVICES

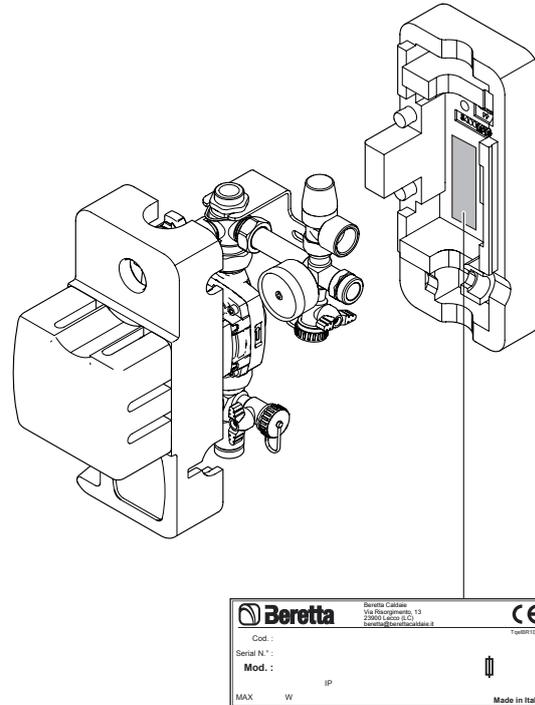
The solar station safety is ensured by a safety valve with intervention pressure of 6 bar.

## 5 IDENTIFICATION

The solar stations by **Beretta** can be identified by:

### Serial number plate

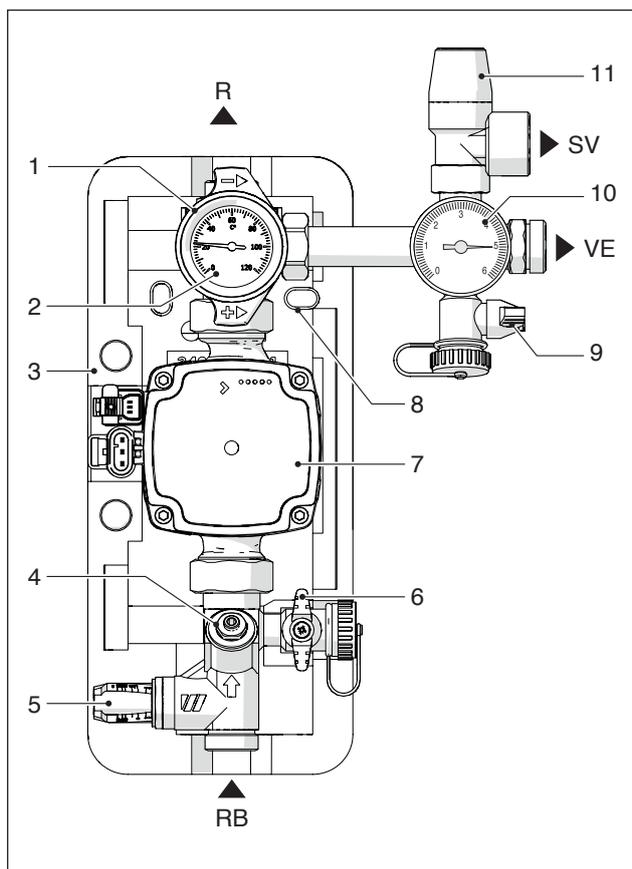
This specifies the serial number and model.



If these plates or any other means of clearly identifying the product are defaced, removed or lost, proper installation and servicing may be rendered difficult.

In case of loss, request a duplicate to **Beretta** Technical Assistance Centre.

## 6 SYSTEM LAYOUT

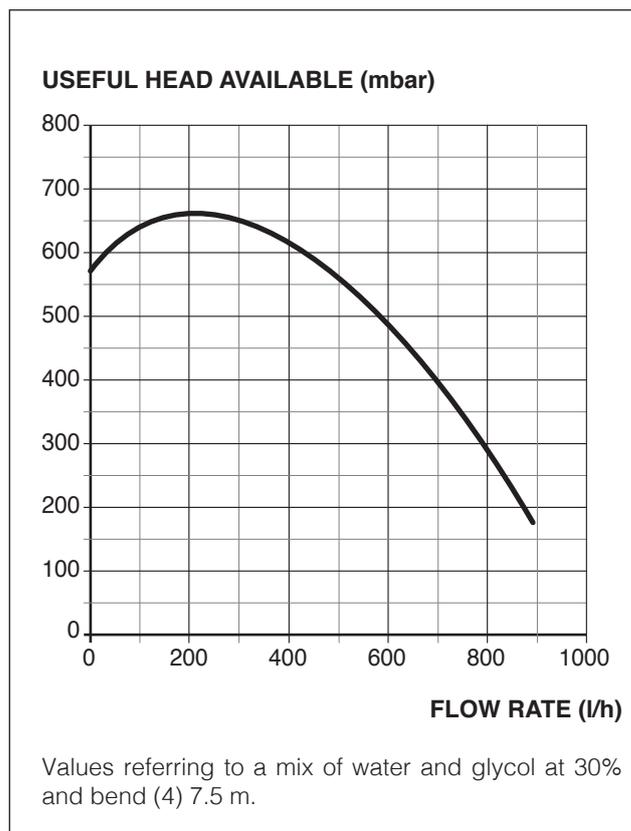


- 1** Return Valve (solar plant return) with built-in non-return valve
- 2** Return temperature gauge
- 3** Insulation
- 4** Flow regulator
- 5** Flow-meter
- 6** Tap A for system filling/draining
- 7** Pump
- 8** Fixing bracket
- 9** Tap B for system filling/draining
- 10** Pressure gauge
- 11** Safety valve (6 bar)
- R** Solar circuit return. Outlet of heat transfer fluid towards solar collector.
- RB** Storage system return. Inlet of heat transfer fluid from solar storage system.
- SV** Safety valve drain
- VE** Expansion tank fitting

## 7 TECHNICAL SPECIFICATIONS

DESCRIPTION	Return solar station	
Maximum working pressure	6	bar
Maximum operating temperature	110	°C
Dimensions LxHxP	264x362x215	mm
Net weight with insulation	3,8	kg
Power supply	230~50	V~Hz
Min/max electrical current draw	0,04 ÷ 0,48	A
Min/Max power consumption	2 ÷ 45	W

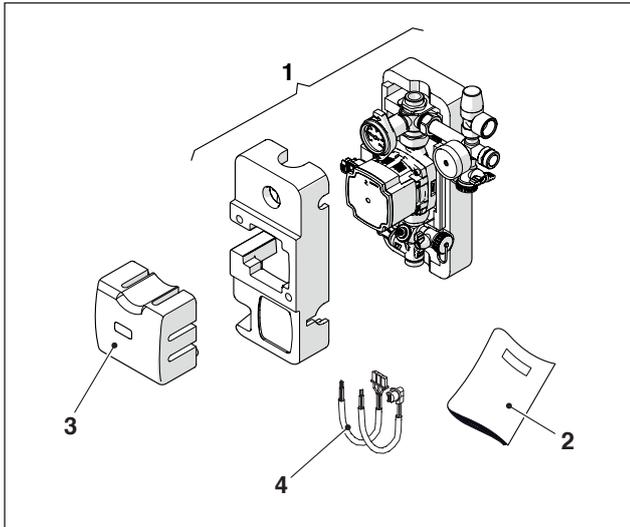
### Useful head available Return solar station



The speed of the circulator is set to a fixed factory value (ON-OFF), but can be controlled by means of the PWM signal and changes according to the temperature difference between solar collectors and storage. Pay attention to the system overall flow resistance (exchanger, solar collectors and pipes) at the maximum flow rate conditions provided.

## 8 UNPACKING THE PRODUCT

### Package content



1 Solar Station

In a plastic bag, the following material is also supplied:

- 2 Instruction manual
- 3 Circulator cover with logo (to be mounted during installation)
- 4 Wirings.



The instruction manual is an integral part of the appliance; therefore, it should be read and stored carefully.

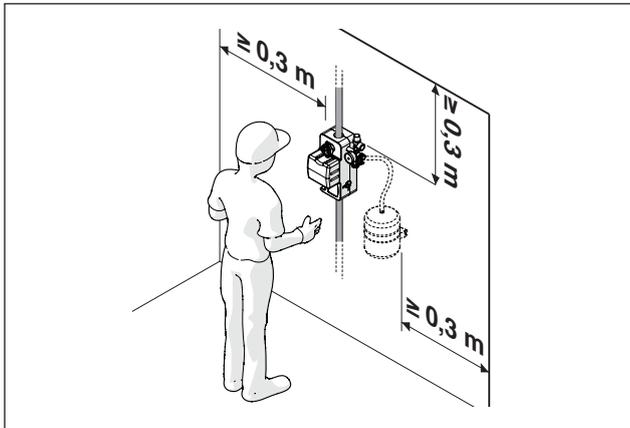
## 9 INSTALLATION PREMISES



When installing the boiler, allow sufficient space around it to access all safety and control devices and to permit easy maintenance.

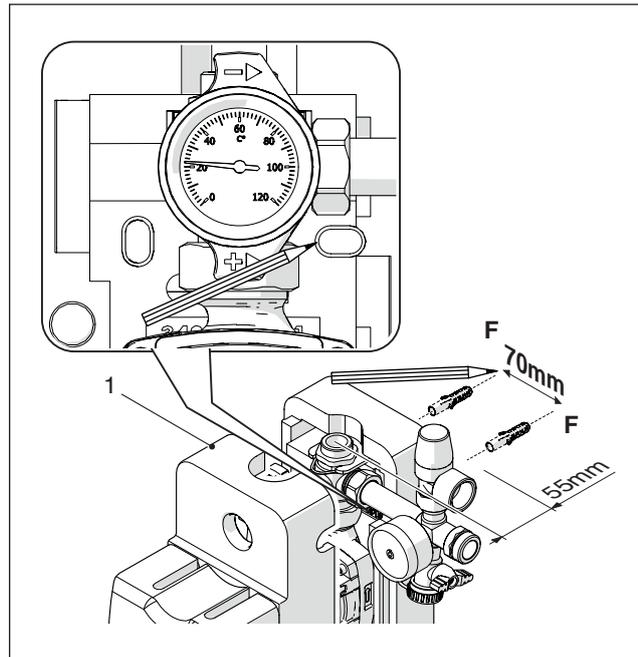
### 9.1 Recommended minimum distances

Recommended distances for assembly and maintenance are 300 mm on each side (including expansion tank). Put the solar station at a proper height to allow thermometer and pressure gauge reading.



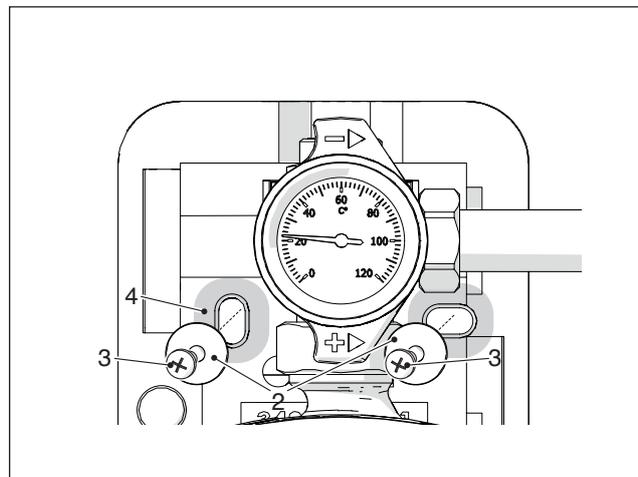
## 10 ASSEMBLY

- Remove the front insulation (1)
- Mark mounting points (F) on the wall and drill
- Insert blocks (not supplied)

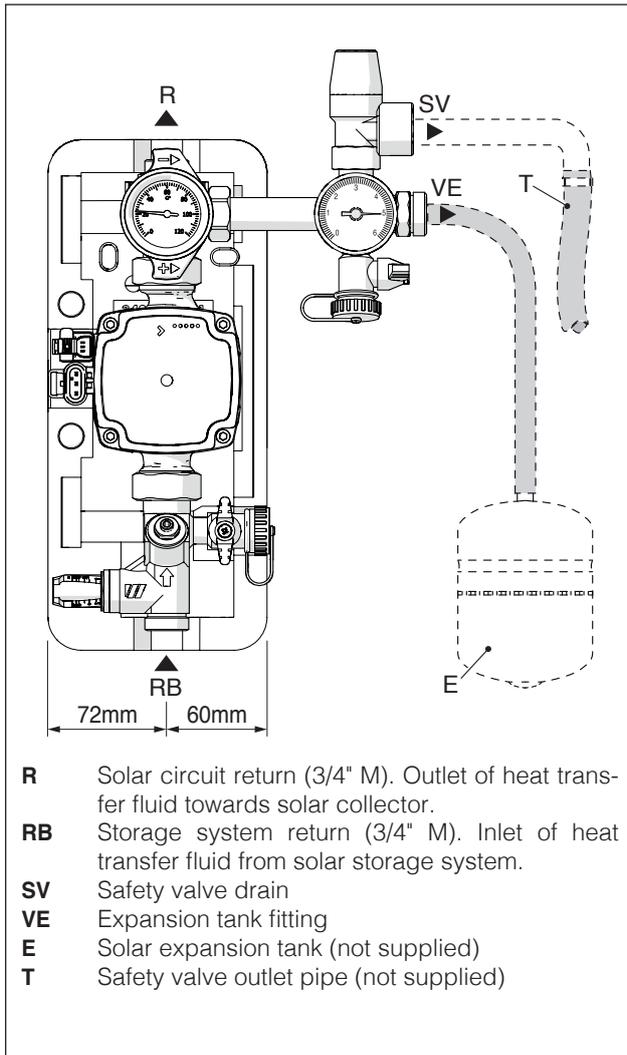


Use suitable wall-mounting bolts and blocks.

- Set solar station at the centre
- Fasten the solar station with the fixing bracket (4), the screws (2) and the washers (3) not supplied.



## 11 WATER CONNECTIONS



- Connect the return fitting (R) in the upper part of the solar station to the solar plant
- Connect the return fitting (RB) in the lower part of the solar station to the accumulation system
- Connect the safety valve drain to a pipe (T) to avoid burns from expelled fluid and to permit the heat transfer fluid to be recovered
- Connect expansion tank (E), suitable for solar plant applications, to 1/2" fitting (VE).

⚠ Fasten expansion tank as explained in the instruction sheet supplied with the accessory.

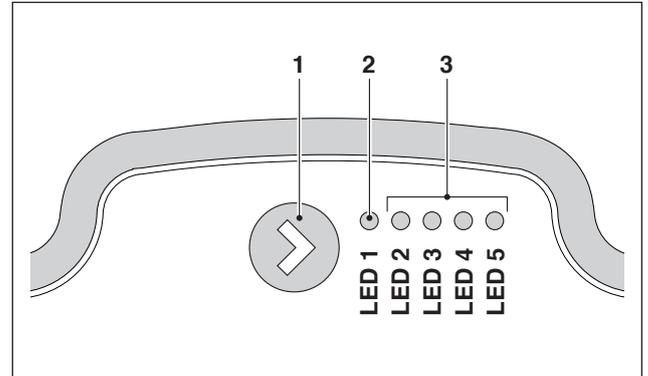
⚠ For hydraulic connections, use silicone seals having a hardness of at least 80SH. If no seals can be used, seal fittings with high-temperature sealant (>180°C) suitable for solar applications.

## 12 PUMP CONTROLLER

The circulator leaves the factory configured for management with "direct speed control function" and with a maximum discharge head of 7.5m (bend 4).

### USER INTERFACE

The user interface consists of a push-button (1), a red/green LED (2) and four yellow LEDs (3).



When necessary, the user interface provides access to:

- **Functioning (performance display) mode.** Pump performance is displayed during functioning as a % of current draw with respect to rated load. Alarm conditions can be seen from the colour of LED.
- **Setting Mode:** Press button (1) to enter setting mode and select the type of pump curve.

### FUNCTIONING MODE

#### Performance display

When the pump is running, LED no.1 is green. The four yellow LEDs indicate the pump's instantaneous electrical power consumption as shown in the table.

Nr. displayed	Meaning	% power
LED 1 flashing green	Stand-by	0
LED 1 green and LED 2 yellow, both lit	Low load	0-25
LED 1 green and LEDs 2, 3 yellow, all lit	Low-medium load	25-50
LED 1 green, LEDs 2, 3, 4 yellow, all lit	Medium-high load	50-75
LED 1 green, LEDs 2, 3, 4, 5 yellow, all lit	High load	75-100

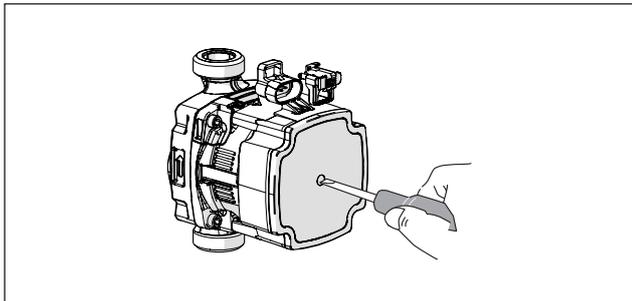
### Alarm display

If the pump detects one or more alarm conditions, LED 1 changes from green to red. When an alarm is active, the LEDs indicate the type of alarm as shown in the following table. If more than one alarm is active at the same time, the LEDs only show the alarm condition with the highest priority. Alarm priority follows the order of the table.

When no alarm is active, the user interface automatically displays pump performance.

Nr. displayed	Meaning	Function	Action
LED 1 red and LED 5 yellow, both lit	The pump rotor is blocked	The pump automatically attempts to start every 1.5 seconds	Wait or check that the pump rotor is free to rotate
LED 1 red and LED 4 yellow, both lit	Supply voltage too low	Indication only. The pump continues to function	Check the voltage of the power supply
LED 1 red and LED 3 yellow, both lit	Electronic controller error	The pump has stopped because supply voltage is too low or because an error has occurred in the internal electronic controller	Check the voltage of the power supply or replace the pump

- Make sure that all the pumps in the system are free and rotate in the right direction;



### SETTING MODE

#### Setting display

To switch from performance display to setting display, press button (1). The LED indicate the current setting. For the interpretation of the LED, refer to the following tables.

Setting display mode shows the type of pump control or the currently selected pump curve. Settings cannot be changed in performance display mode. After 2 seconds, the display returns to performance display mode.

LED no.1: if red it reveals an alarm or an external control; if green it indicates the circulator performance or internal control possibility.

LEDs no. 2 and 3 indicate different control mode possibility and LEDs no.4 and 5 indicate the curve type setting (1,2,3 or 4). These LEDs are yellow.

### PWM mode

	LED 1	LED 2	LED 3	LED 4	LED 5
Curve 1 (4.5m)	Red	-	Yellow	-	-
Curve 2 (5.5m)	Red	-	Yellow	Yellow	-
Curve 3 (6.5m)	Red	-	Yellow	Yellow	Yellow
Bend 4 (7.5m)	Red	-	Yellow	-	Yellow

### Direct speed control function (ON-OFF).

	LED 1	LED 2	LED 3	LED 4	LED 5
Curve 1 (4.5m)	Green	Yellow	Yellow	-	-
Curve 2 (5.5m)	Green	Yellow	Yellow	Yellow	-
Curve 3 (6.5m)	Green	Yellow	Yellow	Yellow	Yellow
Curve 4 (7.5m) (*)	Green	Yellow	Yellow	-	Yellow

(\*) Factory setting

### Button lock/unlock function

The button lock function serves to prevent improper use or accidental changes to pump settings.

When the button lock is active, pressing the button has no effect. This prevents users from accidentally accessing setting mode while allowing them to use setting display mode. If the button (1) is pressed for more than 10 seconds, it can be switched to enable / disable the lockout function. In doing so, all the LEDs, with the exception of the red LED, are flashing for one second to indicate that the lockout function has been switched.

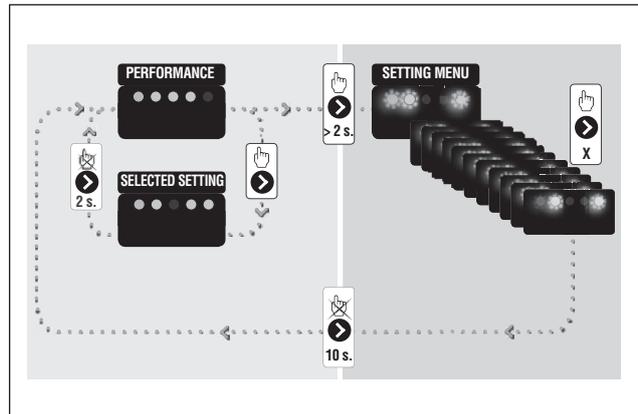
### Setting mode

To modify settings, press the button (1) for 2 to 10 seconds. The user can select new settings provided that the button lock function is disabled.

Available settings are displayed in a pre-defined sequence that is repeated every time the button is briefly pressed and released.

If the button is not pressed for over 10 seconds, the pump exits setting mode and returns to performance display mode.

See the table above for the meanings of the LED sequences.



## 13 ELECTRICAL CONNECTIONS



The following is mandatory:

- have an omnipolar magneto-thermal circuit breaker and a disconnecting switch compliant with the prevailing standards of the installation country
- respect the polarity of the L1 (Phase) - N (Neutral) connections
- use cables with insulation and cross section conforming to applicable standards (minimum cross section 1.5 mm<sup>2</sup>)
- make sure the appliance is connected to an efficient ground (earth).



It is strictly forbidden to use pipes of any kind to ground the appliance.

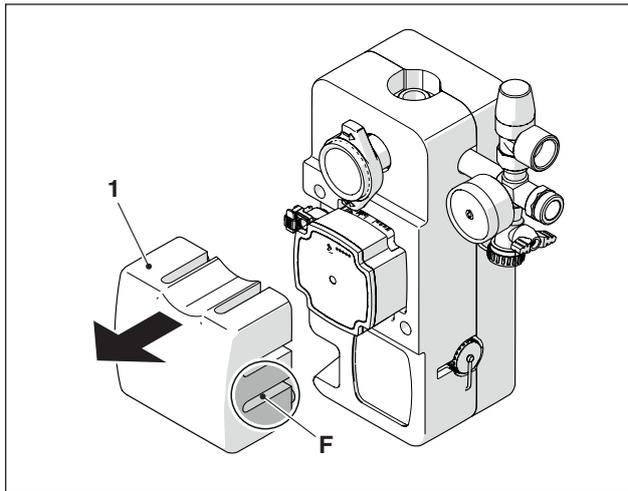
**The manufacturer is not responsible for any damages due to the missing device grounding.**

**Refer to the manual supplied with the solar controller for details of all electrical connections, programming, etc..**

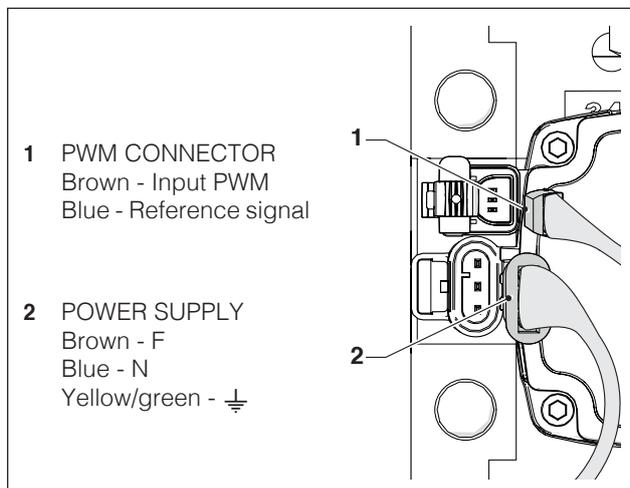
The power supply and PWM signal connections must be arranged by the technician.

To carry out the electric connections:

- remove the frontal insulation (1).
- the cables must be inserted through the proper passages (F).



- connect the connectors as shown in the figure.



To control the circulator in on/off mode, the PWM cable is not required.

To control the circulator in modulating mode by using a solar regulator, verify the compatibility between the chosen regulator and the PWM signal (see following paragraph "CONTROL SIGNALS").

### CONTROL SIGNALS

The circulator can be controlled with a low voltage PWM digital signal (pulse width modulation). The speed changes according to the input signal, as indicated in paragraph "PWM input signal".

Here below are the main characteristics required of the PWM signal output by the associated regulator.

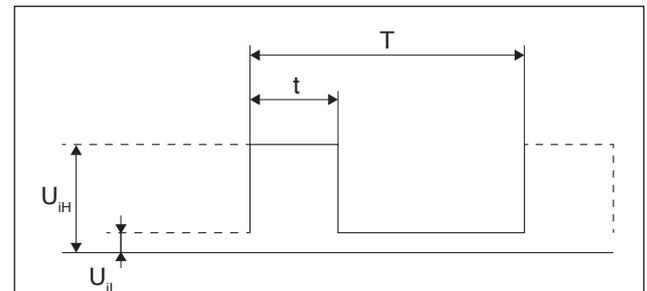


Check the characteristics of your regulator PWM signal to ensure they comply with the features below. Different signals could irreversibly damage the circulator on-board electronics.

### PWM low-voltage digital signal

The PWM square wave signal was designed for a frequency interval between 100 and 4000 Hz. The PWM signal is used to set circulator speed.

*Example of Duty cycle*

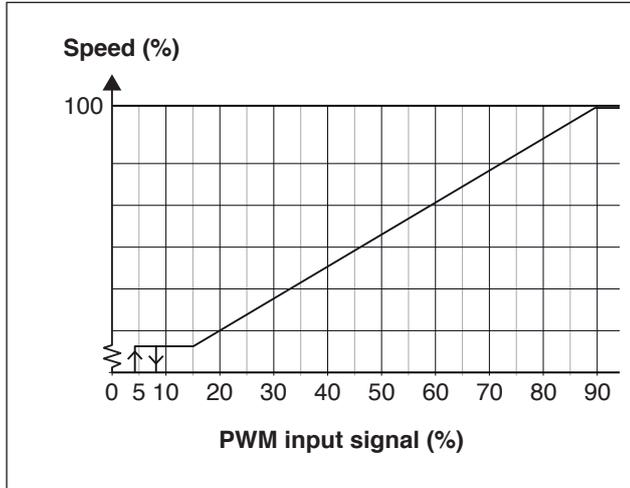


<b>T</b>	Period
<b>d</b>	Duty cycle (t/T)
<b>U<sub>iH</sub></b>	High voltage level of input signal
<b>U<sub>iL</sub></b>	Low voltage level of input signal
<b>i<sub>iH</sub></b>	Input signal current

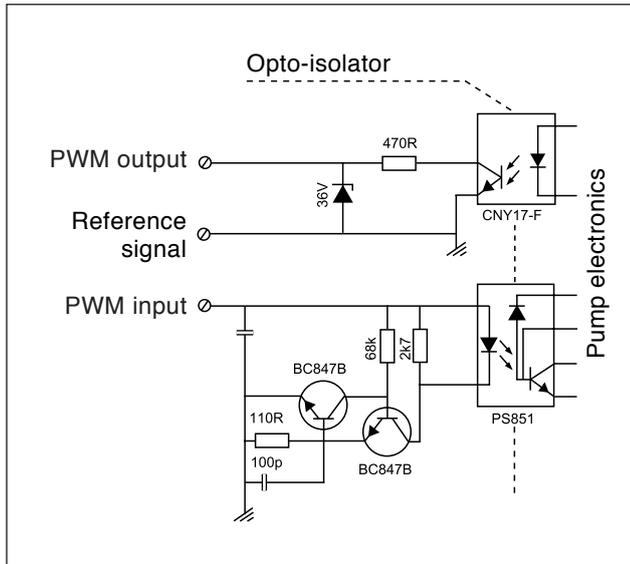
Example	Evaluation
T = 2 ms (500 Hz)	U <sub>iH</sub> = 4-24 V
t = 0,6 ms	U <sub>iL</sub> ≤ 1 V
d % = 100 x 0.6 / 2 = 30 %	i <sub>iH</sub> ≤ 10 mA (depending on U <sub>iH</sub> )

### PWM input signal

With a low input value (<5 % PWM), the pump cannot start. The pump stops when input signal is 5 to 8% of PWM signal or when PWM signal is not present, for safety reasons. If the pump receives no input, due for instance to failure of the signal cable, it will stop in order to avoid solar system overheating.



### Electronic circuit



### Technical specifications

Maximum power	Symbol	Value
PWM input frequency	f	100-4000 Hz
Consumption in stand-by		< 1 W
High voltage level of input signal	U <sub>iH</sub>	4-24 V
Low voltage level of input signal	U <sub>iL</sub>	< 1 V
Input signal current	I <sub>iH</sub>	< 10 mA
Input Duty cycle	PWM	0-100%

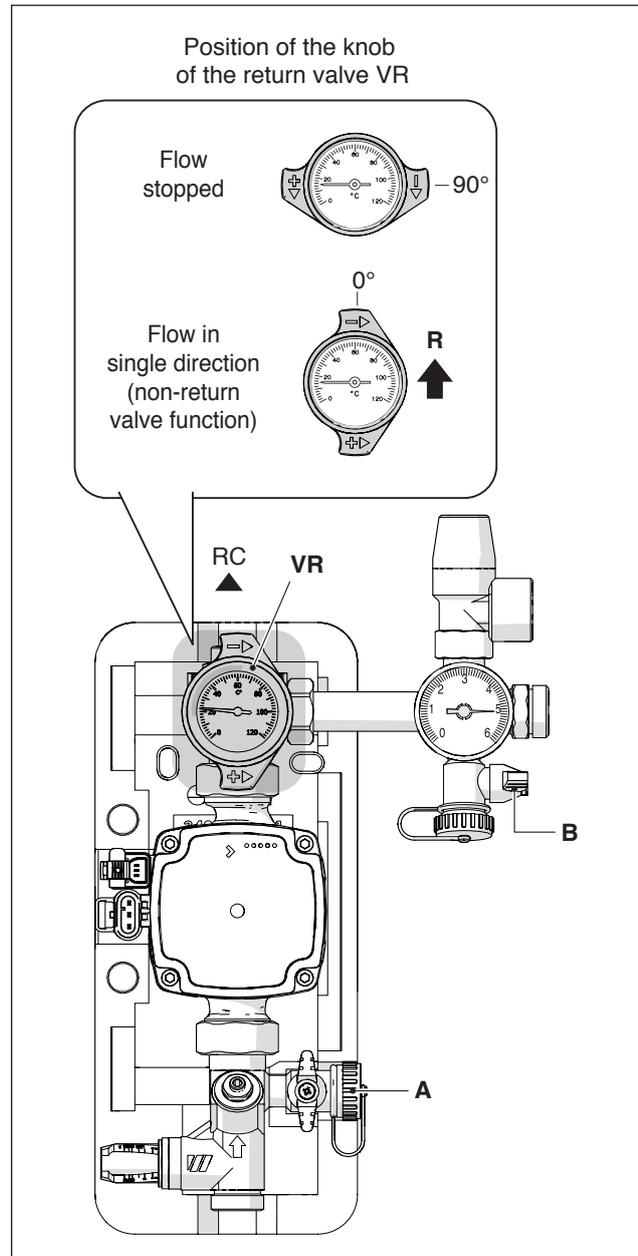
## 14 SYSTEM FLUSHING

Before filling the system with mixture of water and glycol, it is necessary to flush the pipes of the solar system to eliminate all residues of fluid or scale.

Proceed as follows.

- Verify the flow-meter (C) is completely open
- Turn handle on valve (VR) clockwise
- Open taps (A) and (B) on the return tube
- Flush water in through the cock (B) and wait for it to come out of the cock (A)
- Allow water to come out for at least 30 seconds
- Turn handle on valve (VR) counter clockwise
- Close taps (A) and (B).

**!** During system flushing, pay attention to water coming out of the taps as vapour could be released with risk of burns or scalds. Use suitable personal protective equipment.



**⚠** If copper piping has been used and joints have been hot brazed, flush out the system to remove any brazing residues. Seal test the system after you have flushed it out.

**⚠** The solar circuit must be immediately filled with a mixture of water and glycol, that avoids freezing and corrosion.

## 15 SYSTEM FILLING COCK

Before filling the system:

- Cut power off to the solar station and to the connected integration system, by setting the system's main switch and the device's main switch to OFF

**⚠** Always use a mixture of water and glycol suitable for solar applications. Choose the mixture according to the minimum temperature that can be reached at the installation site and to the maximum service temperature of solar collectors. For further information, please refer to the glycol safety data sheet.

When using glycol not pre-mixed:

- Do NOT part fill the circuit with pure glycol then add water later.
- Ensure that filling water characteristics comply with prevailing regulations; if that is not so, filling water must be treated. Use portable treatment systems, for instance. In particular, when chlorine content is very high (> 50ppm) you must use distilled water for the mixture.

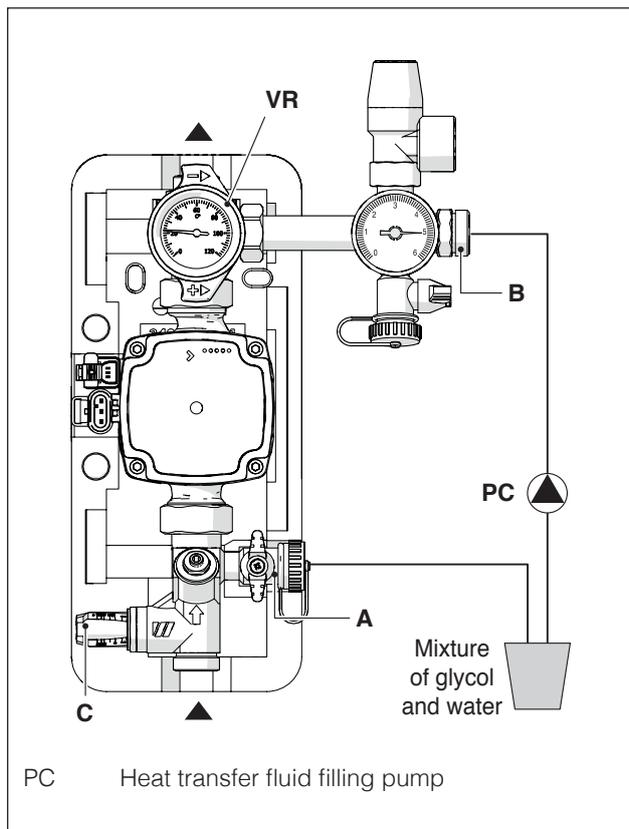
To fill the system, proceed as follows:

- Verify the flow-meter (C) is completely open
- Connect the filling pump (PC) as shown
- Turn handle on valve (VR) clockwise
  - Open taps (A) and (B) on the return tube
- Open manual degassing points and any bleeder valve, located at the highest points of the system, and keep them open throughout the filling procedure.
- Pump the heat transfer fluid around the circuit with an external filling pump until all air bubbles have been eliminated. Close the manual bleed valve and any vent valves opened previously.
- Turn handle on valve (VR) counter clockwise
- Temporarily raise the pressure in the system to 4 bar.
- Start up the system for about 20 minutes.
- Repeat air bleeding operation until system is completely free of air bubbles.
- set the system pressure.
- Close taps (A) and (B).

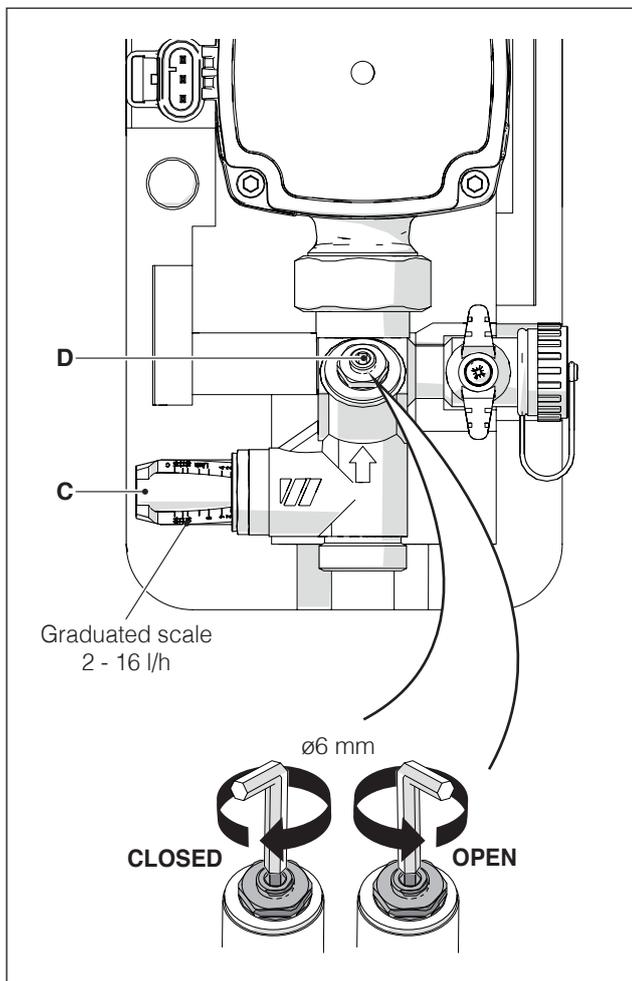
**⚠** The set pressure must ensure that the one measured at the solar collectors is positive with respect to the ambient one (avoid depression in the solar field) and must be set considering both the safety valve opening pressure (6) and the solar expansion reservoir pre-charge pressure. To set the system pressure correctly, refer to the design manual.

**⊖** Do not fill the system in bright, sunny conditions or if the collectors are hot.

**⚠** Use a manual bleed valve, which should be installed at the highest point in the system, to ensure that all air bubbles have been eliminated from the circuit.



 When operating with the PWM speed control of the circulator, the regulator (D) and the flow meter (C) must always be open. When operating with direct speed control (ON-OFF) to decrease the flow rate the desired bend must be set, passing to a bend lower than the factory setting (see the paragraph "Setting mode" for more information). In addition, for a finer adjustment of the flow, you can operate the regulator (D) as shown in the figure.



## 16 DEVICE CLEANING AND MAINTENANCE

 Service the system at least once a year and carry out the inspections specified in the relevant manual.

The following operations must be exclusively performed by Technical Assistance Centre.

### 16.1 Checking the seals

After commissioning, check hydraulic fitting sealing. Make sure there is no leakage close to electric components to avoid short-circuits.

### 16.2 External cleaning

If dust accumulates on the insulation, clean it with a dry cloth.

 Do not use abrasive products, petrol or triethylene.

## 17 INTERVENTIONS ON THE HYDRAULIC SYSTEM

### 17.1 Draining the system

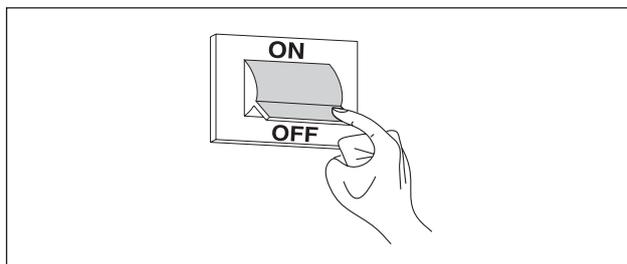
- Connect a rubber hose to taps (A) and (B)
- Connect the opposite end to a vessel
- Open system drain taps and allow full drainage
- Close system drain taps and remove the rubber hose
- The exhausted heat transfer fluid must be disposed of according to the prevailing regulations, pursuant to the instructions provided in the safety data sheet supplied with the glycol.

### 17.2 Disassembling the circulator

 Remove the circulator when system has cooled down.

Before removing circulator (C):

- Cut power off to the solar station and to the connected integration system, by setting the system's main switch and the device's main switch to OFF



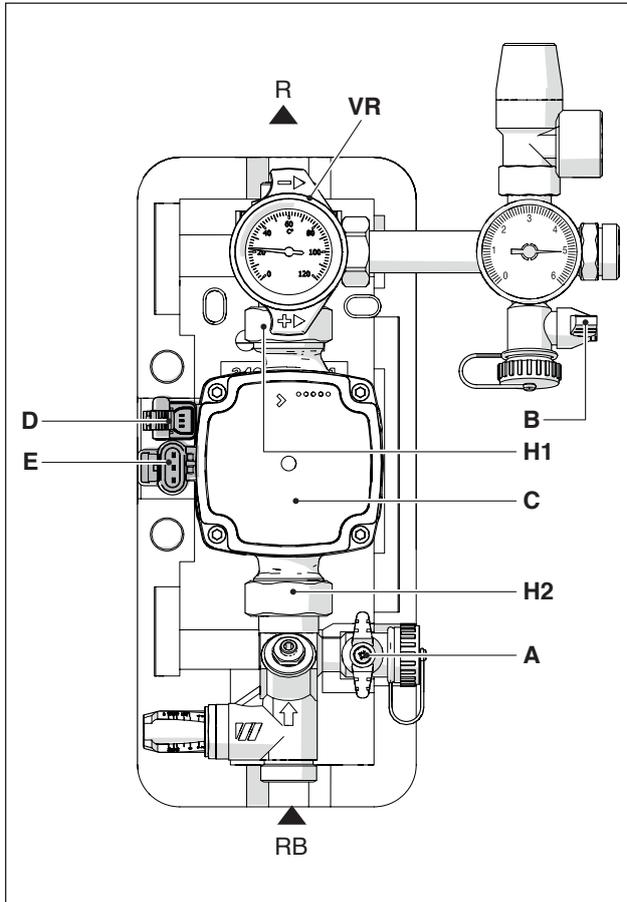
- Disconnect circulator power by removing connectors (D) and (E)
- Move away any wiring and electric devices below to protect them against any leakage of heat transfer fluid
- Close the valve (VR) by turning the handle 90° clockwise
- Open taps (A) and (B) and drain the solar circuit
- Loosen ring nuts (H1) and (H2) and remove circulator (C).

## 18 RECYCLING AND DISPOSAL

The device is primarily composed of:

Material	Component
metal materials	tubes, circulator
EPP (polypropylene foam)	insulation
electrical and electronic components	cable and wiring, circulator

At the end of the device's useful life, these components must be separated and disposed of according to current regulations in the country of installation.



Reverse the above steps to fit the new pump.  
Fill the solar circuit as described in paragraph "System filling cock".







Via Risorgimento, 23 A  
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[www.berettaboilers.com](http://www.berettaboilers.com)

The manufacturer strives to continuously improve all products. Appearance, dimensions, technical specifications, standard equipment and accessories are therefore liable to modification without notice.

