

RSS MR/MRS

EN INSTALLATION AND MAINTENANCE MANUAL

RIELLO

RANGE

MODEL	CODE
RSS MRS	20116166
RSS MR	20116167

Dear heating engineer,
 We would like to congratulate you on having recommended a **RIELLO** 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,
 Riello S.p.A.

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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 **RIELLO** 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 **RIELLO** 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 **RIELLO**. **RIELLO** 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 **RIELLO** Technical Assistance Service.

⚠ 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 **RIELLO** authorised Technical Assistance Service 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 **RSS** allows transferring sun power from collectors to a storage system.

The solar station **RIELLO** 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 with variable speed (already hard-wired)
- shut-off valves as non-return valves
- thermometers
- pressure gauge
- fitting for connection to a solar expansion tank
- suitable safety device, as indicated in paragraph "Safety and control devices".

Version MRS includes a solar regulator and temperature probes as standard (to be connected). Version MR includes a terminal strip for interface connection to an external regulator able to manage one PWM pump.

- ⚠ The integrated circulator can be managed only through PWM signal and does not need a flow control. Therefore, to choose the proper solar regulator to match version MR please refer to paragraph "Electric connections and wiring diagrams".

4 SAFETY AND CONTROL DEVICES

Solar station safety and setting are achieved thanks to:

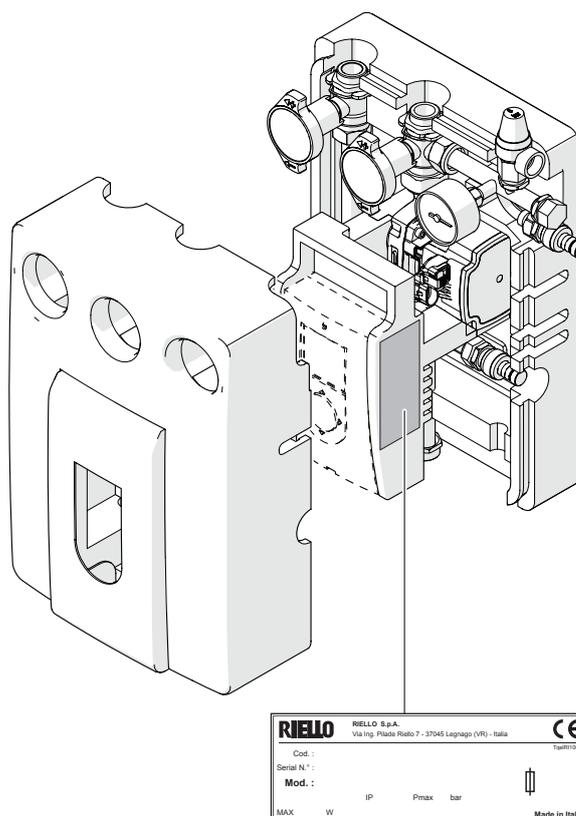
- Safety valve with trigger pressure set at 6 bar;
- Solar Regulator (if equipped) for circulator management/control. Manages 9 system diagrams that can be selected. Refer to the specific manual for further details.

5 IDENTIFICATION

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

Serial number plate

This specifies the serial number and model.

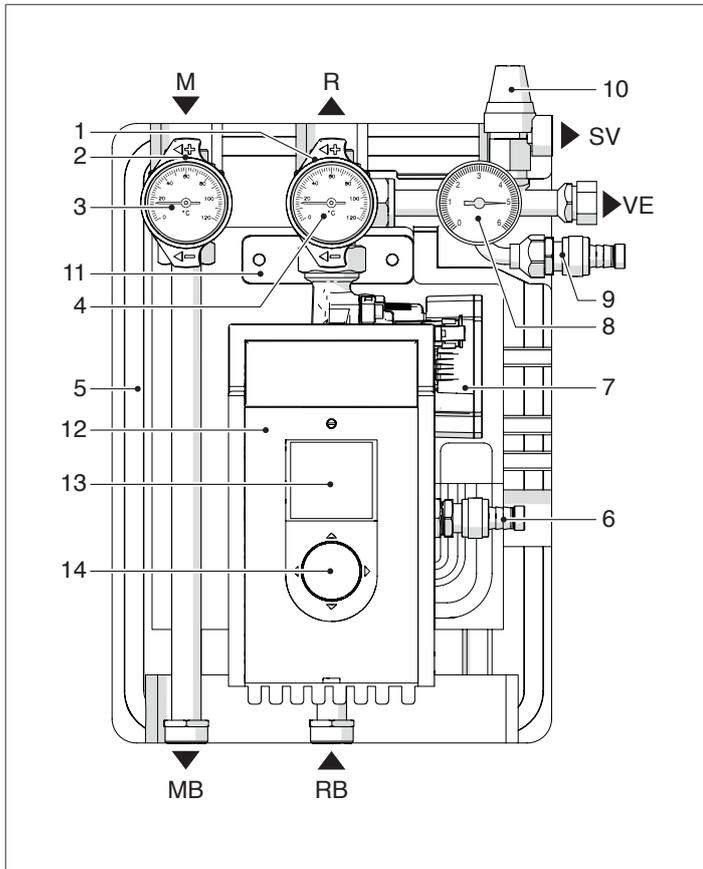


- ⚠ If these plates or any other means of clearly identifying the product are defaced, removed or lost, proper installation and servicing may be rendered difficult.

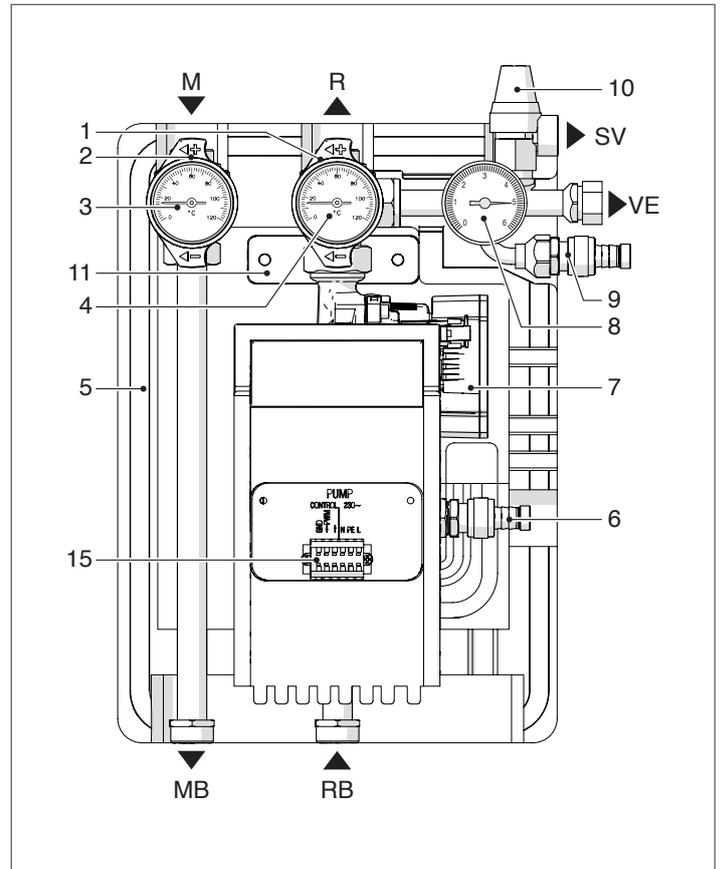
In case of loss, request a duplicate to **RIELLO** Technical Assistance Service.

6 SYSTEM LAYOUT

Version with solar regulator (MRS)



Version without solar regulator (MR)



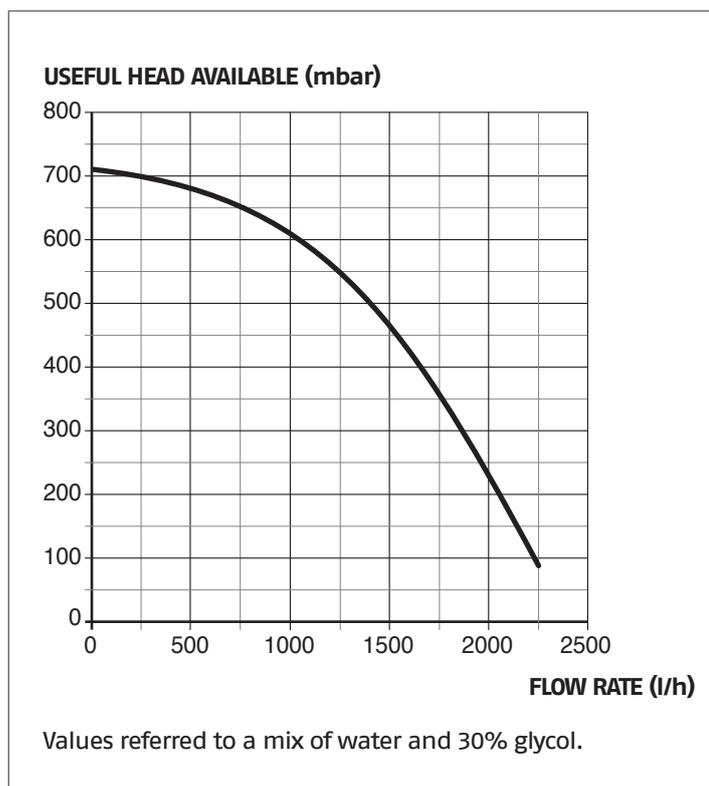
- 1** Return Valve (solar plant return) with built-in non-return valve
- 2** Delivery Valve (solar plant delivery) with built-in non-return valve
- 3** Outlet temperature gauge
- 4** Return temperature gauge
- 5** Insulation
- 6** Tap A for system filling/draining
- 7** Pump
- 8** Pressure gauge
- 9** Tap B for system filling/draining
- 10** Safety valve (6 bar)
- 11** Fixing bracket
- 12** Solar controller
- 13** Display
- 14** Multidirectional joystick
- 15** Terminal strip

- M** Solar circuit outlet. Inlet of heat transfer fluid coming from solar collector.
- R** Solar circuit return. Outlet of heat transfer fluid towards solar collector.
- MB** Storage system delivery. Outlet of heat transfer fluid towards solar storage system.
- 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	SOLAR STATION DELIVERY AND RETURN		
	WITH REGULATOR	WITHOUT REGULATOR	
Maximum working pressure	6	6	bar
Maximum operating temperature	110	110	°C
Dimensions LxHxP	313x418x185	313x418x185	mm
Net weight with insulation	5	4,7	kg
Power supply	230~50	230~50	V~Hz
Min/max electrical current draw	0,04 ÷ 0,58	0,04 ÷ 0,58	A
Min/Max power consumption	5 ÷ 63	2 ÷ 60	W

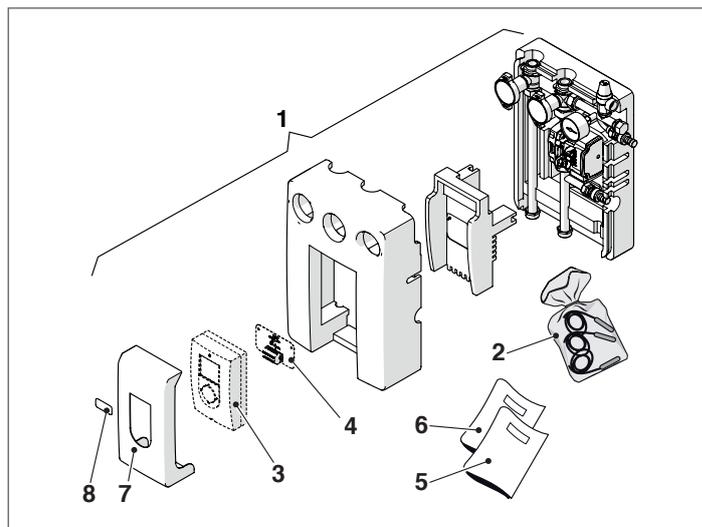
Useful head available Solar station for delivery and return



The circulator speed is controlled through PWM signal and varies according to the thermal gradient 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
- 2 Bag containing 3 probes 1.5 m long (only for version MRS)
- 3 Solar controller (only for version MRS)
- 4 Terminal strip (only for version MR)

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

- 5 Instruction manual
- 6 Instruction manual for solar regulator (only for version MRS)
- 7 Solar regulator casing
- 8 Logo.

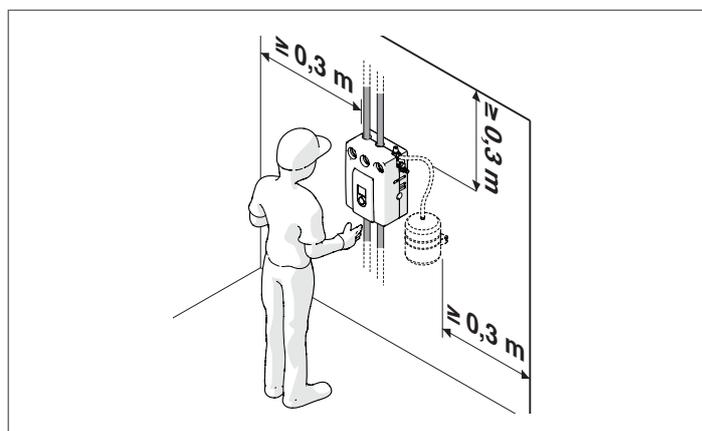
! The instruction manual is an integral part of the appliance; therefore, it should be read and stored carefully.

9 INSTALLATION PREMISES

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

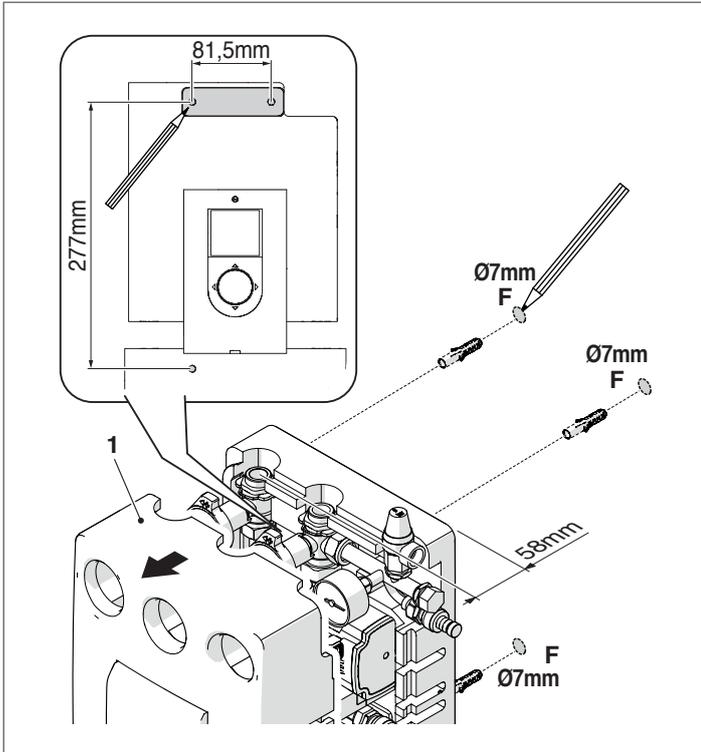
9.1 Recommended minimum distances

Recommended distances for assembly and maintenance are 300 mm on each side (including expansion tank).
Position solar station at a height so that the display and/or thermometers are easy to read.



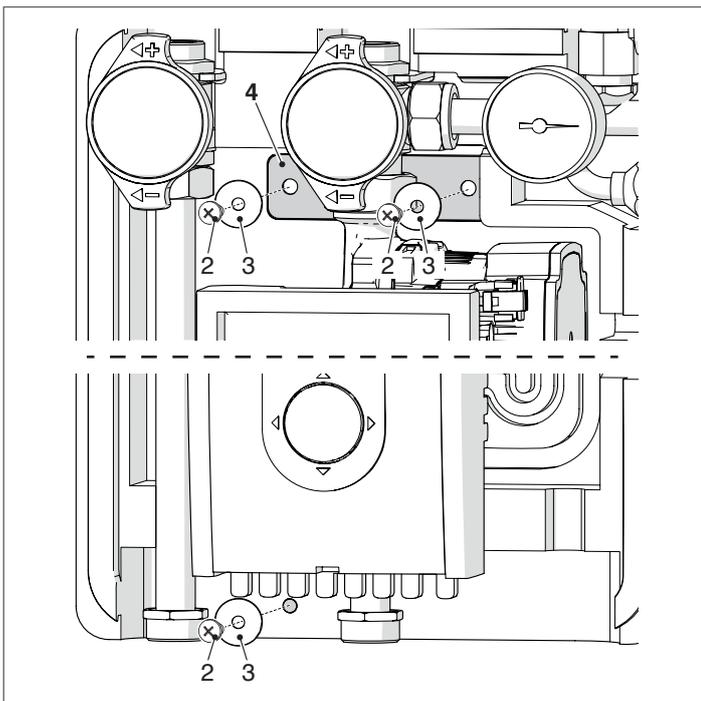
10 ASSEMBLY

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



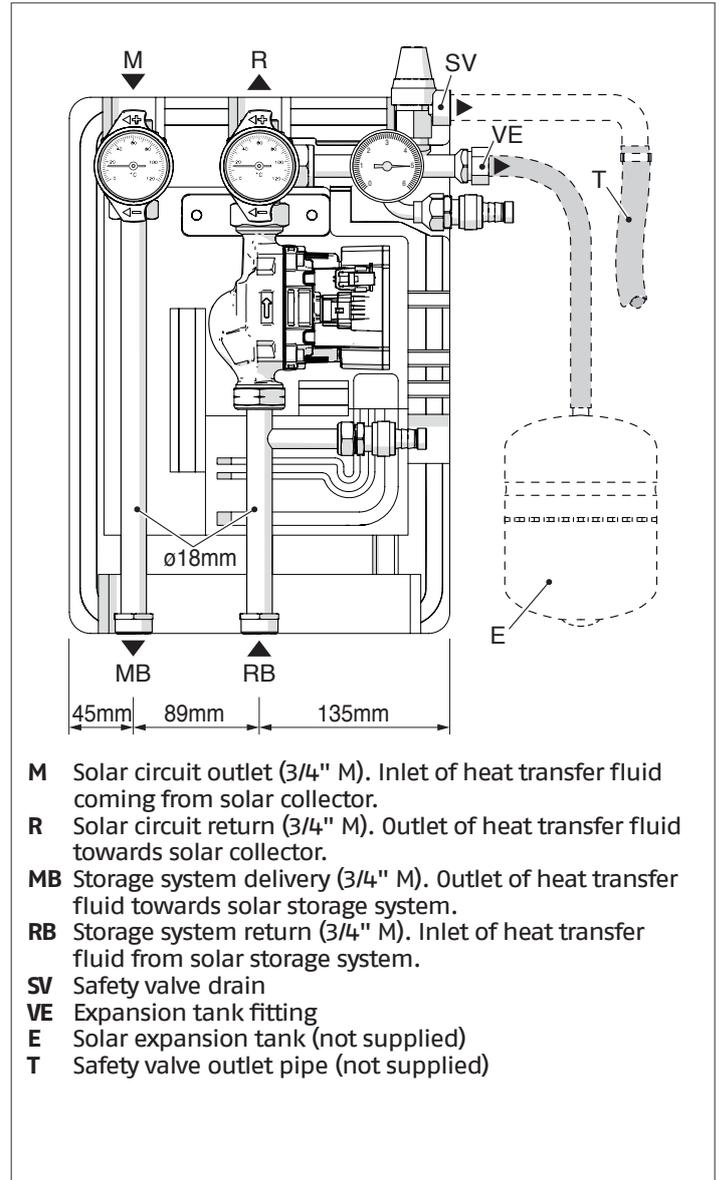
⚠ Use suitable wall-mounting bolts and blocks.

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



The display features a protective film that must be removed after equipment commissioning.

11 WATER CONNECTIONS



- M** Solar circuit outlet (3/4" M). Inlet of heat transfer fluid coming from solar collector.
- R** Solar circuit return (3/4" M). Outlet of heat transfer fluid towards solar collector.
- MB** Storage system delivery (3/4" M). Outlet of heat transfer fluid towards solar storage system.
- RB** Storage system return (3/4" M). Inlet of heat transfer fluid from solar storage system.
- SV** Safety valve drain
- VE** Expansion tank fitting
- E** Solar expansion tank (not supplied)
- T** Safety valve outlet pipe (not supplied)

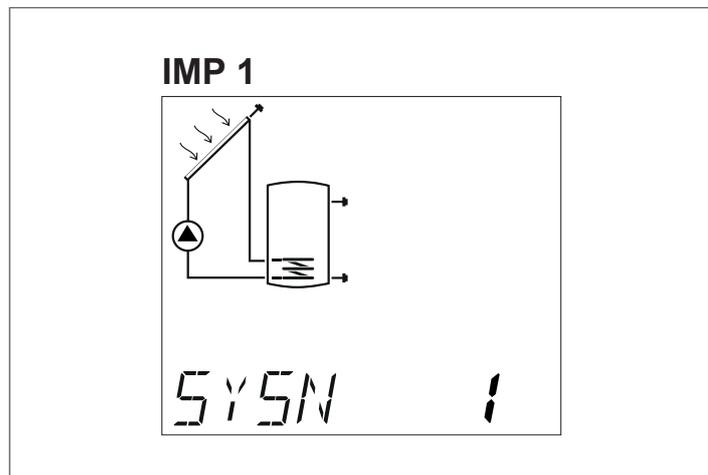
- Connect delivery fittings (M) and return fittings (R), found at the top of the solar station, to the solar plant
- Connect delivery fittings (MB) and return fittings (RB), found at the bottom of the solar station, to the storage system
- Connect the safety valve drain to a pipe (T) to avoid burns from 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 TYPICAL WATER SYSTEM SCHEMATICS

The diagram below shows the solar regulator default setting (on version MRS).



Please refer to the instruction manual supplied with the solar regulator for any system setup and further details.

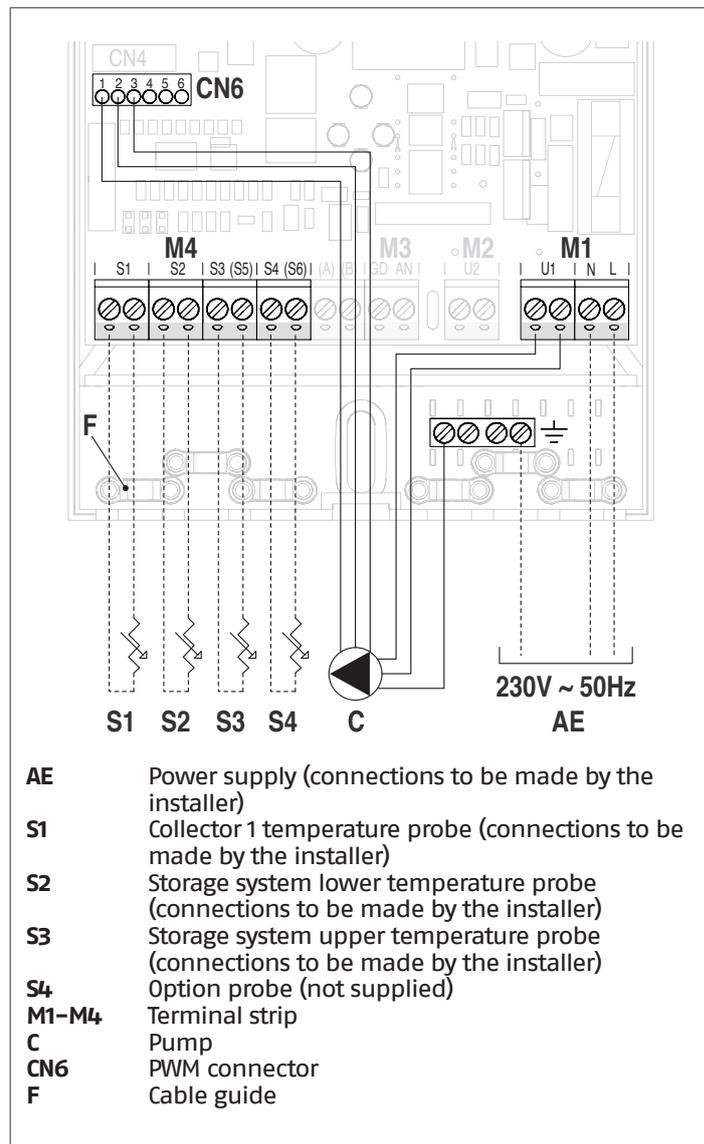
13 ELECTRIC CONNECTIONS AND WIRING DIAGRAMS

- ⚠** 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 mm²)
 - refer to the wiring diagrams in this manual for all electric operations
 - 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.

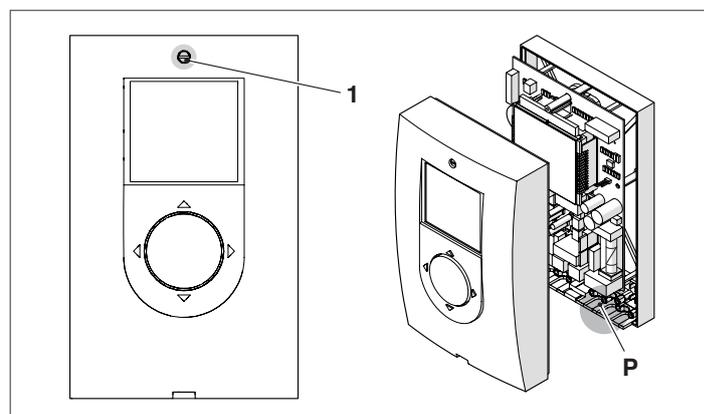
The manufacturer is not responsible for any damage caused by failure to earth connect the device and failure to comply with what is indicated in the wiring diagrams. Refer to the manual supplied with the solar controller for details of all electrical connections, programming, etc..

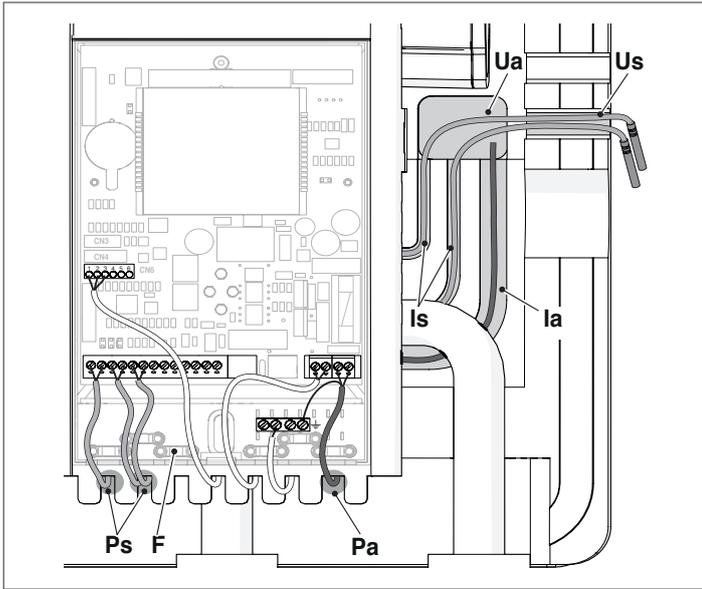
Version with solar regulator (MRS)



Please refer to solar regulator manual for further details on electrical connections.

In the version with solar regulator, the control unit is supplied hard-wired with the exception of power supply and probes. To make electrical connections, undo screw (1) on cover and remove cover from solar regulator.





Sensor connections

- Route probe cables through the cable guides (F), the fairleads (Ps), the passages on the insulation (Is), the solar station outlets (Us/Ua) and connect them to terminal board M4 of solar regulator (terminals S1-S2-S3-S4) making reference to the instructions provided in the specific regulator manual.

Upon connection, or should it be necessary to increase probe cable length, refer to these remarks:

- Absolutely avoid laying probe cable together with mains power cables and/or AC cables
- Absolutely avoid routing cables close to strong magnetic fields
- Avoid any cable jointing as much as possible; solder and duly insulate any indispensable jointing
- Use twisted and shielded wires
- Use cables having a cross-section of over 0.5 mm²

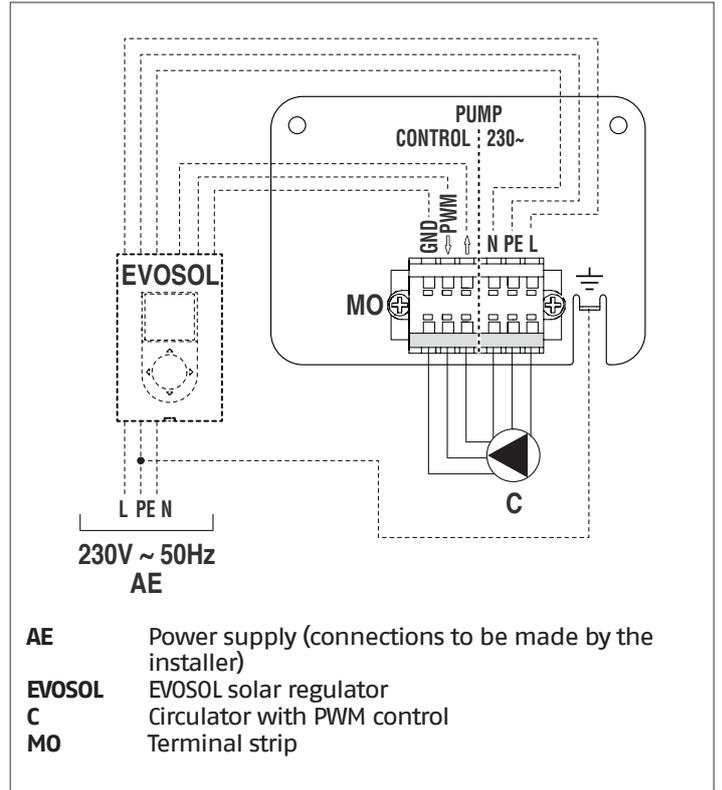
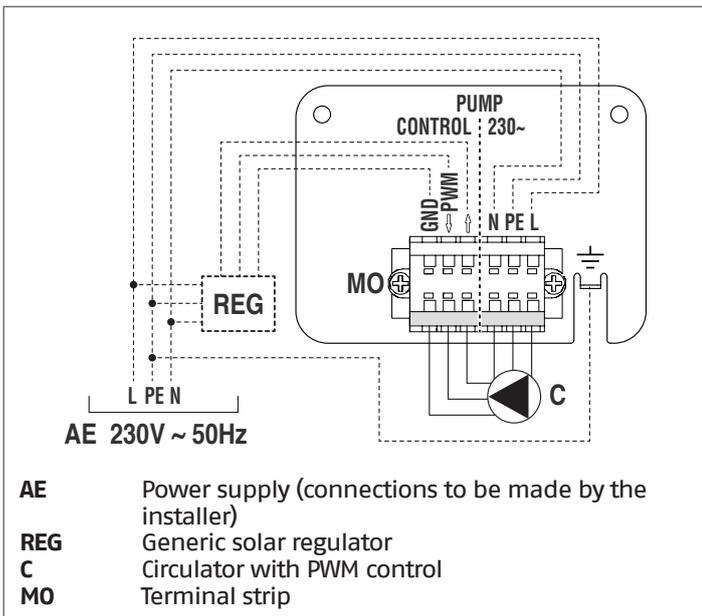
Solar controller power connections

- Route the supply cable through the cable guides (F), the fairleads (Pa), the passages on the insulation (Ia), the solar station outlets (Ua) and connect it to terminal board M1 of solar regulator (terminals L-N-GND) making reference to the instructions provided in the specific regulator manual.

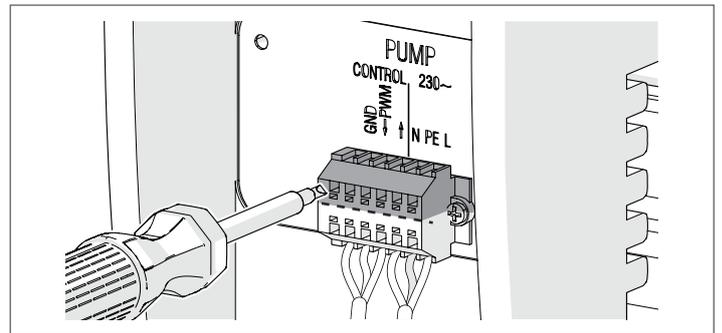
Once electrical connections are completed, fasten cables using the guides supplied, close regulator cover and solar station protection housing.

Version without solar regulator (MR)

The circulator supplied with version MR needs a PWM signal control with the characteristics below.



In the version without solar regulator, connections for circulator PWM signal and power supply (solar regulator side) shall be made by Installer.



Circulator operation depends on the presence of a solar regulator allowing for PWM control. Check compatibility of the chosen regulator with the PWM signal characteristics (refer to paragraph "Control Signals" below).

CONTROL SIGNALS

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

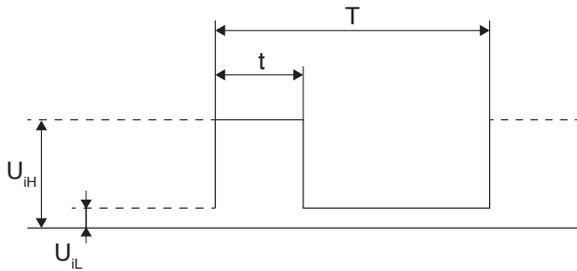
Here below are the main characteristics required of the PWM signal output by the associated solar regulator.

⚠ Check the characteristics of your solar 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

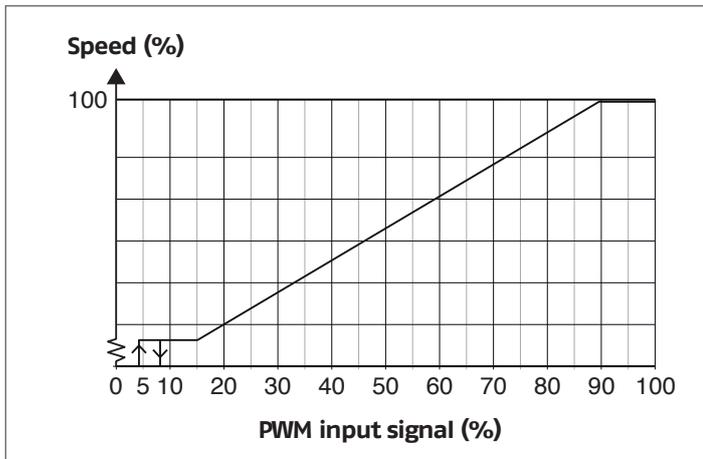


- T** Period
- d** Duty cycle (t/T)
- U_{iH}** High voltage level of input signal
- U_{iL}** Low voltage level of input signal
- i_{iH}** Input signal current

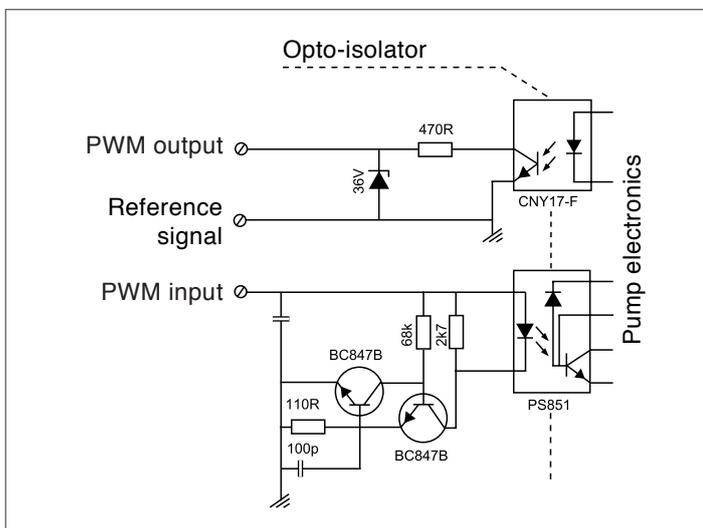
Example	Evaluation
T = 2 ms (500 Hz)	U _{iH} = 4-24 V
t = 0,6 ms	U _{iL} ≤ 1 V
d % = 100 x 0.6 / 2 = 30 %	i _{iH} ≤ 10 mA (depending on U _{iH})

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 _{iH}	4-24 V
Low voltage level of input signal	U _{iL}	< 1 V
Input signal current	i _{iH}	< 10 mA
Input Duty cycle	PWM	0-100%

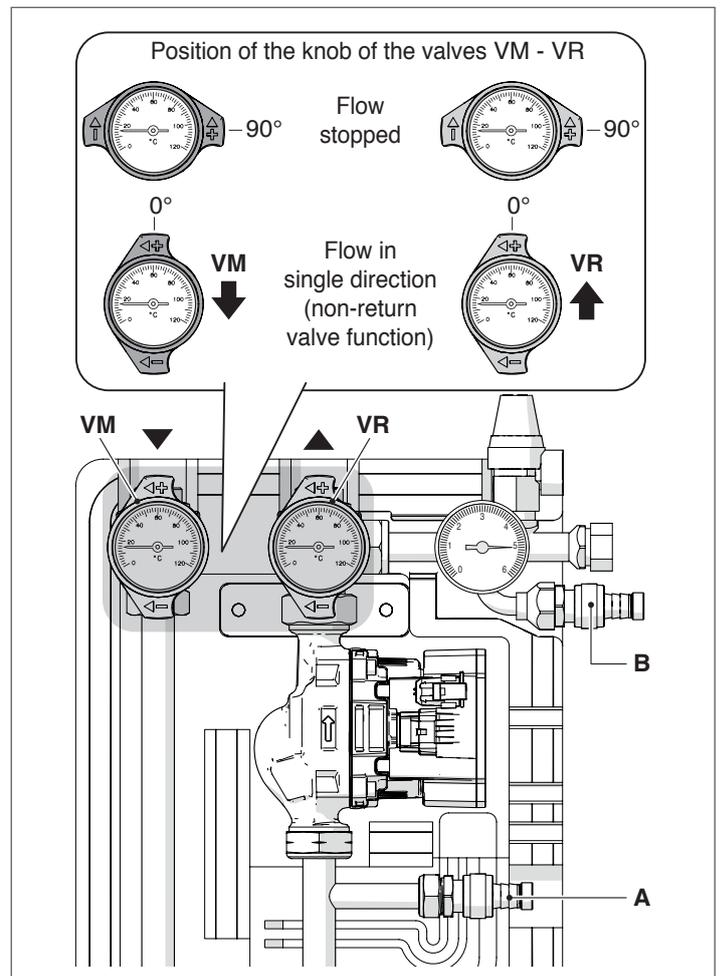
14 SYSTEM FLUSHING

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.

- 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

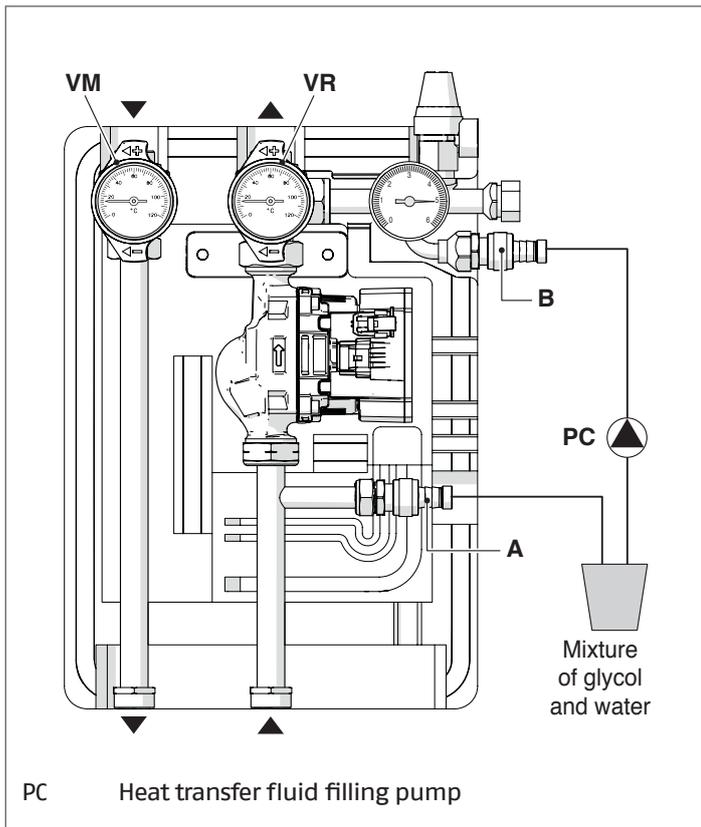
Before filling the system:

- 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:

- 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 tap 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.

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 Service.

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

Use a dry rag to clean the insulation and the solar regulator display (if present) to remove any dust.

⊘ Do not use abrasive products, petrol or triethylene.

17 INTERVENTIONS ON THE HYDRAULIC SYSTEM

17.1 Draining the system

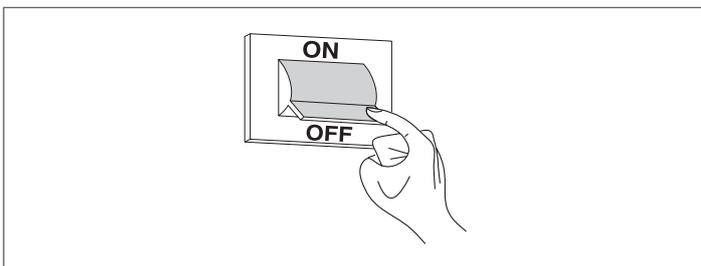
- Connect a rubber hose to taps (A) and (B)
- Connect the opposite end to a vessel
- Open system drain taps and allow full drainage
- Close system drain taps and remove the rubber hose
- The exhausted heat transfer fluid must be disposed of according to the prevailing regulations, pursuant to the instructions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

17.2 Disassembling the circulator

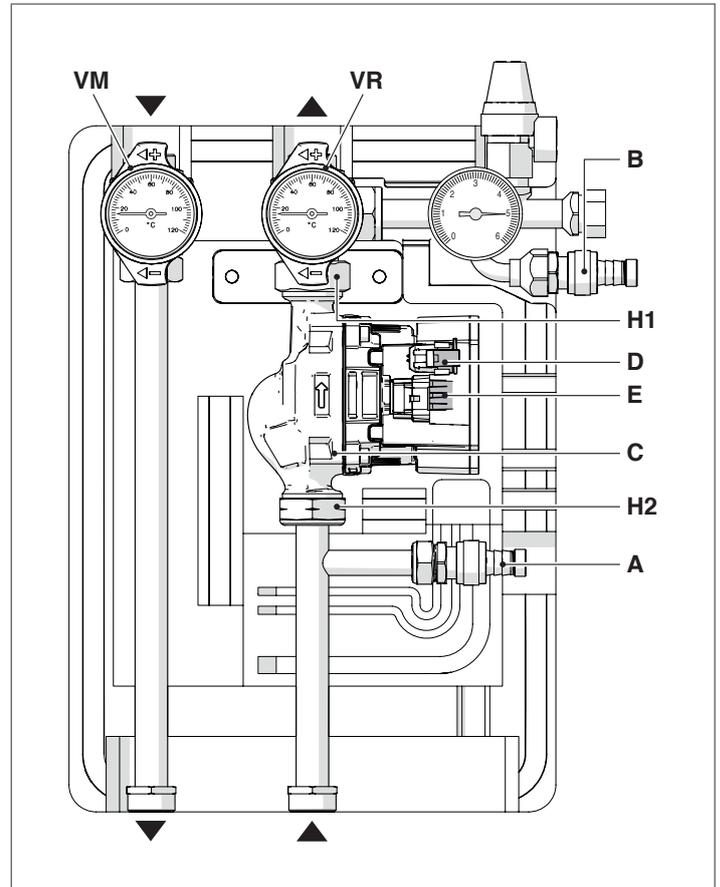
⚠ Remove the circulator when system has cooled down.

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 valves (VR) and (VM) by turning handle clockwise by 90°
- Open taps (A) and (B) and drain the solar circuit
- Loosen ring nuts (H1) and (H2) and remove circulator (C).



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

18 RECYCLING AND DISPOSAL

The device is primarily composed of:

Material	Component
metal materials	tubes, circulator
ABS (acrylonitrile-butadiene-styrene)	solar regulator housing
EPP (polypropylene foam)	insulation
electrical and electronic components	cables and wiring, solar regulator, 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.

RIELLO

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