

- ▲ Read installation and operating instructions in their entirety before installing the solar station!**
Installation, initial operation, operation and maintenance must only be carried out by qualified tradesmen!
The installation and operating instructions, as well as other valid documents must remain with the user of the system!

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Illustr. 1.1 "Regusol LH-180" DN25

1 General information

1.1 Information regarding installation and operating instructions

These installation and operating instructions serve the installer to install the solar station professionally and to put it into operation.

Other valid documents – manuals of all system components, especially the operating instructions of the solar pump and the flushing and filling station, as well as valid technical rules – must be observed.

1.2 Keeping of documents

These installation and operating instructions should be kept by the user of the system.

1.3 Copyright

The installation and operating instructions are copyrighted.

1.4 Symbol explanation

Safety guidelines are displayed by symbols. These guidelines are to be observed to avoid accidents, damage to property and malfunctions.

⚠ DANGER

Warning symbol and signal are indicating a dangerous situation with high risk, it will lead to death or serious injury if not avoided.

⚠ WARNING

Warning symbol and signal are indicating a dangerous situation with moderate risk which may lead to death or serious injury if not avoided.

⚠ CAUTION

Warning symbol and signal are indicating a dangerous situation with low risk which may lead to minor or moderate injury or damage to property if not avoided.

NOTICE

Signal word (without warning symbol) indicating a possible damage to property.

1.5 Pictograms

The following symbols and pictograms are used in these installation and operating instructions:



Warning symbol for possible injuries to persons



Warning symbol for possible injuries to persons (on a white background)



Danger from hot liquids



Danger from hot surfaces



Danger from electric voltage



Disconnect the power supply before starting work



Prohibition sign



Mandatory sign



Note, information, recommendation



Wear safety gloves



Wear helmet



Wear safety goggles



Wear safety shoes



No potable water

2 Safety notes

2.1 Correct use

Safety in operation is only guaranteed if the solar station is used correctly. The solar station is installed in the return of the solar circuit and is designed for the connection of the storage cylinder to the collector.

Any use of the solar station outside the above applications will be considered as non-compliant and misuse. Claims of any kind against the manufacturer and/or his authorised representatives due to damages caused by incorrect use cannot be accepted.

The observance of the installation and operating instructions is part of the compliance terms.

When using a solar station with electronic flow sensor, the installation of a filling and flushing device is recommended.

Suitable measures for thermal protection have to be taken in order to protect the solar station from a penetration of steam causing damage to the components (e.g. central roof heating systems with short pipes).

Provide an in-line tank, if required. For further information on thermal protection visit www.oventrop.com "Thermal solar plant – Construction, initial operation and maintenance".

2.2 Possible dangers at the installation location and during transport

The case of an external fire has not been taken into consideration when constructing the solar station.



WARNING



Heavy solar station!

Risk of injury! Suitable transport and lifting devices are to be used. Wear suitable protective clothing (e.g. safety shoes) during installation and use safety devices. External components like handwheels or pressure test points must not be misused for the absorption of external forces, e.g. as connection point for lever tools etc.



Hot or cold surfaces!

Risk of injury! Do not touch the solar station without safety gloves. It may get very hot or cold during operation.



Sharp edges!

Risk of injury! Only touch with safety gloves. Threads, bore holes and edges are sharp.



WARNING

Small components!

Risk of ingestion! Store and install the components of the solar station out of reach of children.

Allergies!

Health hazard! Do not touch the solar station and avoid any contact if allergies against the used materials are known.

2.3 Installation, initial operation, maintenance

Installation, initial operation, maintenance and repairs have to be carried out by authorised and qualified tradesmen.

(EN 5011 part 1 and VDE 1000 part 10 for work on electrical appliances).



WARNING

– Risk of injury from excess pressure!

– An exceedance of the max. permissible operating pressure may lead to an uncontrolled escape of water and to severe injuries from sudden component separation.

→ The max. permissible operating pressure must be observed when pressurizing the system.



→ Wear safety goggles during filling and leakage test.



– Once filling and flushing has been completed, all ball valves in the solar station (return ball valve and the balancing valve) and in the collector circuit (e.g. filling and flushing device) must be opened again!



– All ball valves must be in the open position during operation!

– The boiler must be switched off during maintenance or repair.

– The connection between the storage cylinder and solar station must be protected by an additional safety valve and/or a diaphragm expansion tank!



WARNING



The installation must never be flushed with liquids containing solvents as these can cause damage to plastic parts (e.g. pump impellers and seals)!

3 Transport, storage and packaging

3.1 Transport inspection

Upon receipt check delivery for any damages caused during transit and for completeness.

Any damage must be reported immediately upon receipt.

3.2 Storage

The solar station must only be stored under the following conditions:

- Do not store in open air, keep dry and free from dust.
- Do not expose to aggressive fluids or heat sources.
- Protect from direct sunlight and mechanical agitation.
- Storage temperature: -20°C up to $+60^{\circ}\text{C}$, max. relative humidity of air: 95 %

3.3 Packaging material

Packaging material is to be disposed of environmentally friendly.


4 Technical data

4.1 Performance data

Nominal size:	DN 25
Max. operating temperature t_s :	120 °C
Max. operating pressure p_s :	6 / 10 bar (PN10)
Safety valve:	6 / 10 bar
Opening pressure check valve:	20 mbar
Mechanical flow measuring and regulating device:	1-6 / 2-15 / 7-30 l/min
Distance between pipe centres:	100 mm
Connection thread:	G1 M with "Regusol" compression connection

The technical data of the solar pumps is detailed in the enclosure.

Fluid: Non-aggressive fluids (e.g. water and suitable water and glycol mixtures according to VDI 2035). Not suitable for steam, oily and aggressive fluids.

**DANGER**

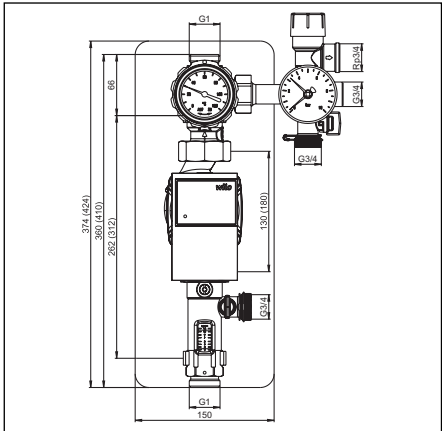
Suitable measures (e.g. safety valves) have to be taken to ensure that the maximum operating pressures and max. operating temperatures are not exceeded.

4.2 Materials

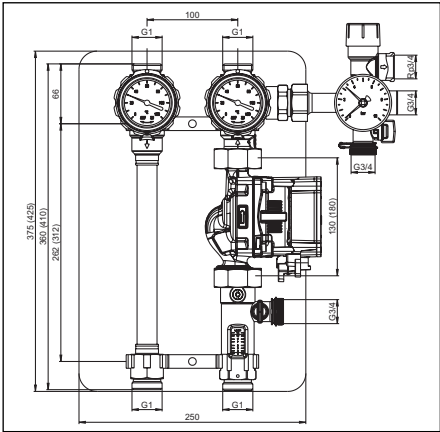
Valves and fittings	Brass
Insulation	EPP
Wall mounting device	PA6.6
Seals	EPDM
Scale tube	PSU
Handles	PA6.6
Pump body	Cast iron
Flanged pipe (optional)	Copper

4.3 Dimensions/Connection sized

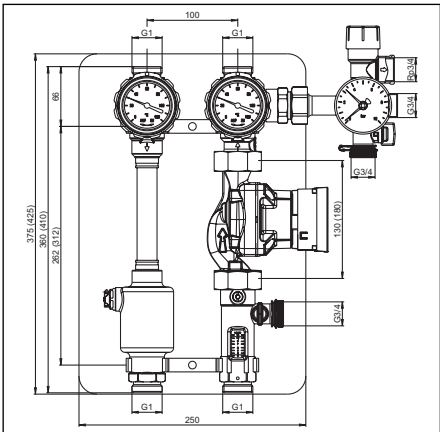
Dimensions for pump length 130 mm
(-)Dimensions for pump length 180 mm



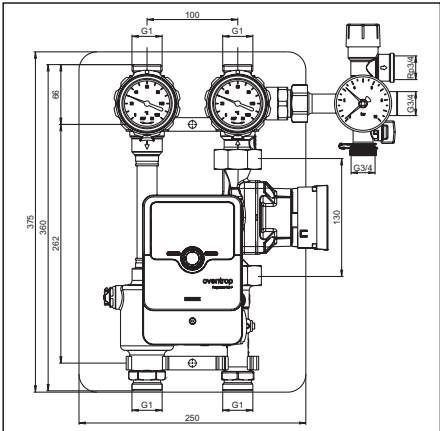
Illustr. 4.1 Pump circuit "Regusol PH-130 (180)" DN25



Illustr. 4.2 Solar station "Regusol SH-130 (180)" DN25

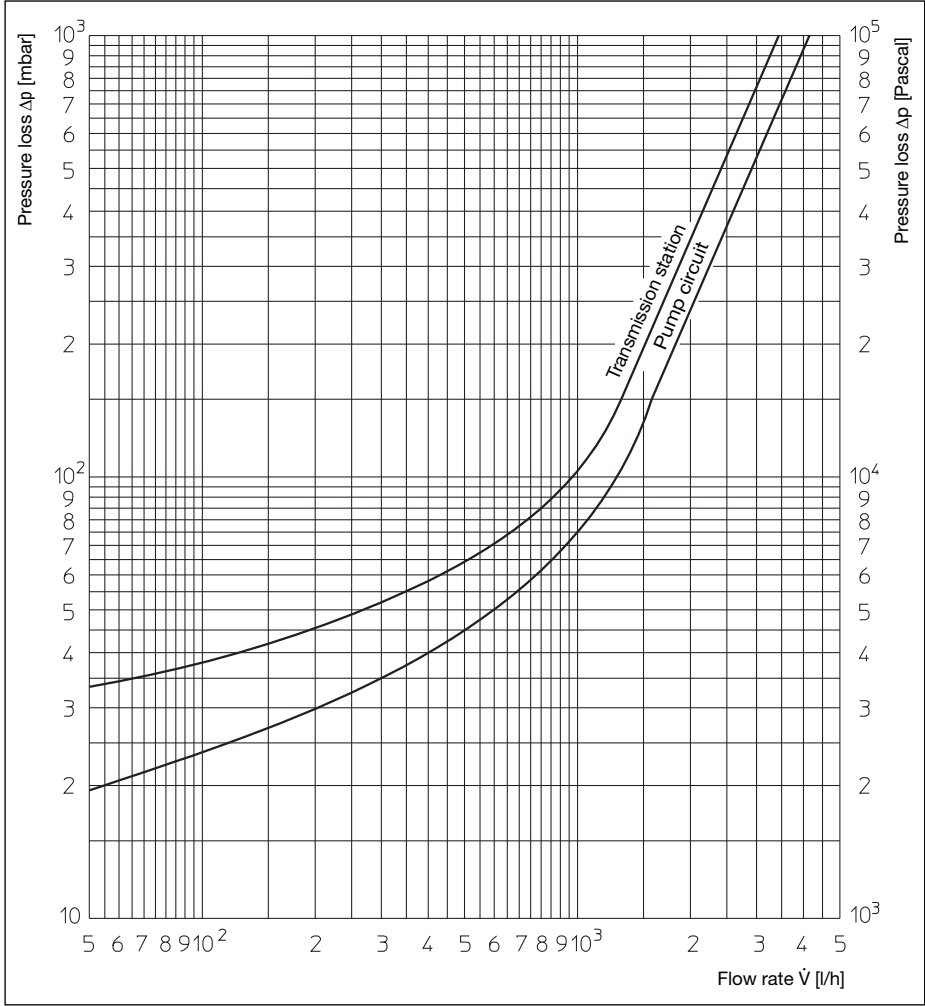


Illustr. 4.3 Solar station "Regusol LH-130 (180)" DN25



Illustr. 4.4 Solar station "Regusol ELH-130" DN25

4.4 Flow chart



5 Construction and function

5.1 Summary and functional description

Installed in the return pipe of the solar circuit, the solar station is designed for the connection of the storage cylinder and the collector.

The return line of the solar station features a ball valve with integrated check valve, to prevent gravity circulation when the pump is switched off. The safety group featuring a safety valve, a draining ball valve and a connection for an expansion tank is connected to the lateral coupling of the ball valve.

The circulation pump installed in the return line is especially suitable for use in solar circuits.

The flow measuring and regulating device/VFD sensor allows a fine setting of the volume flow. In general, the required volume flow depends on the number of collectors or the equipment of the solar plant.

The flow measuring and regulating device/VFD sensor can be shut off completely. The solar pump can be replaced after isolation of the flow measuring and regulating device/VFD sensor and the pump ball valve.

In comparison with the pump circuit, the transmission station features an integrated supply line with additional isolating ball valve with check valve.

Thermometers are included in the handles of the ball valves.

The transmission station with deaerator is equipped with a vent pot for the deaeration of the heat transfer medium.

5.2 Markings

- CE marking on the pump:

CE CE marking

- Markings on the body:

OV Oventrop

6 Installation

The pipework has to be flushed thoroughly before installation of the solar station.

NOTICE

The solar station has to be installed vertically (flow direction of the pump “upwards” to the collector)!

This installation position provides a good optical display of the thermometers, pressure gauge and flow measuring and regulating device.

The functions of the mechanical flow measuring and regulating device, deaerator and the safety valve are only guaranteed when vertically installed!

! Observe warning advice under paragraph 2 (safety notes)!

CAUTION

- Do not use any greasing agents or oils for the installation, as these can destroy the seals. Any dirt particles or grease or oil residues must be flushed out before the solar station is installed.
- When choosing the operating fluid, the latest technical status has to be considered (e.g. VDI 2035).
- Do not use any solvents for flushing the system, as these can cause damage to plastic parts, such as pump impellers.
- Please protect against external forces (e.g. impacts, vibrations etc.).

After installation, check all installation points for leaks.

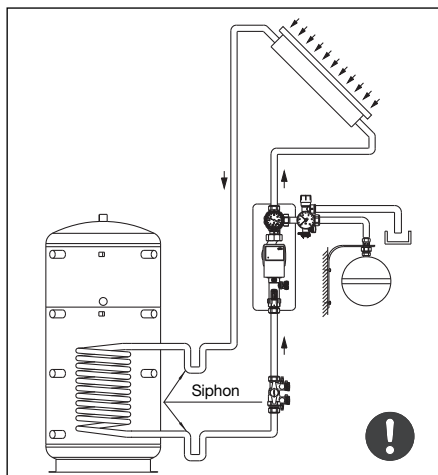
NOTICE

The difference in density between cold and hot heat transfer liquid entails a gravity circulation in the solar circuit!

In exceptional cases, check valves can be opened by strong self-circulation.

Gravity circulation is minimised by installing a siphon-like pipe loop (see illustr. 6.1) near the storage cylinder!

Alternatively, the installation of an additional electric isolation device which is activated parallel to the pump and only opens under working conditions is recommended.



Illustr. 6.1 System illustration



WARNING



Before starting work, make sure that the pipework and components have cooled down and been drained.

Before work commences, please ensure that all electrical components (controllers, pumps, etc.) are disconnected from the power supply!

The solar station always has to be installed at a lower level than the collectors so that no steam may penetrate the expansion tank if stagnation occurs.

If the expansion tank is installed at the same or a higher level than the solar station, a thermal insulation loop is required.

The installation has to be flushed with fresh water after each draining operation.

The solar station is not suitable for direct contact with swimming pool water or solvents.

6.1 Safety valve

The following points must be observed during installation of the discharge pipe:

- The discharge pipe has to be laid with a decline.
- The size of the discharge pipe has to be identical to the outlet size of the diaphragm safety valve.
- The discharge pipe should not feature more than two elbows and a length of 2 m should not be exceeded.
- The discharge pipe has to be laid so that a back pressure is avoided when the safety valve opens.
- The discharge pipe must not be laid in the open, and the discharge must be freely accessible and controllable.
- Escaping heat transfer liquid must be drained without risk.
- If the discharge pipe ends above a draining funnel, the diameter of the outlet of the draining funnel must be twice the size of the valve entry.

6.2 Use of high-efficiency pumps



Europe's leading manufacturers of heating pumps have agreed on a uniform rating of energy consumption. The energy label is comparable with that of refrigerators and other house-hold appliances. The latest high-efficiency pumps (ECM technology, synchronous motor with permanent magnetic rotor) have a class A rating. The efficiency of these pumps is twice that of classic pumps (asynchronous motors). The pump speed (pump capacity) is automatically adapted to the requirements. As a result, the energy consumption can be reduced by 80%.

NOTICE



A modification of the thermal insulation is not permissible! The pump motor must not be covered!

Important information on the replacement/connection of controllers and speed controlled high-efficiency pumps

In addition to the power supply cable (230 V), speed controlled high-efficiency pumps call for a separate cable for the transmission of the control signal. The most common control signals are 0-10 V and pulse-width modulated signals (PWM) of proportional and inverted type.

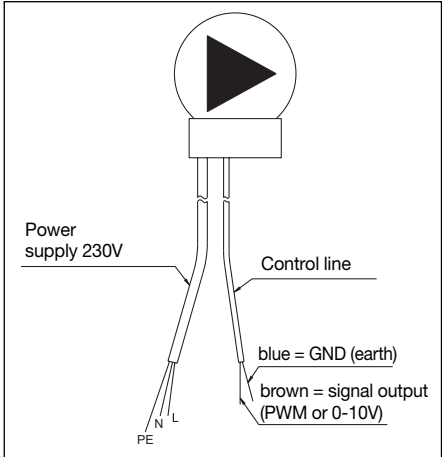
The type of signal is specified in the operating instructions of the corresponding pump! If the control signals of the controller and the pump are not coordinated, an operation is not possible.

NOTICE

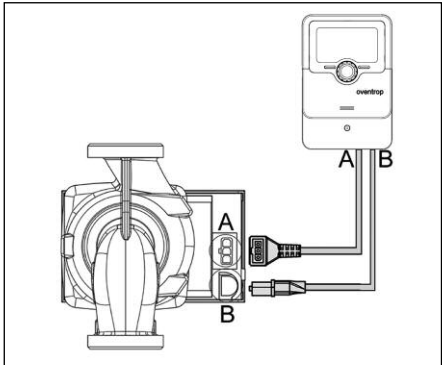
To avoid malfunctions and severe damage to installations with speed controlled high-efficiency pumps, the following must be observed:

- The pump must only be replaced with a pump with identical control signal!
- The controller must only be replaced with a controller with identical control signal!
- When combining a pump and a controller with different control signals, operating safety is no longer guaranteed. Wrong control signals may cause damage to the installation and endanger health!
- The following functional test has to be carried out when putting the controller or pump into operation and when replacing them:
 1. Switch pump to "ON" in the manual menu (relay test) –the pump is in operation now.
 2. Now switch the pump to "OFF" in the manual menu – the pump is no longer in operation.
- Work on electrical installations must only be carried out by a qualified electrician.
- Always disconnect the power supply before starting work on electrical components.
- If not stated otherwise, all work and settings must only be carried out by a trained tradesman.
- Under working conditions, high-efficiency pumps are almost silent. Malfunctions caused by airlocks could be confounded with a pump defect. This has to be taken into account when carrying out the functional test!

The installation and operating instructions that come with the pump, controller and station have to be read in their entirety before installation and initial operation. The instructions have to remain with the user of the system. Claims of any kind due to damages caused by the nonobservance of the instructions or incorrect use cannot be accepted.



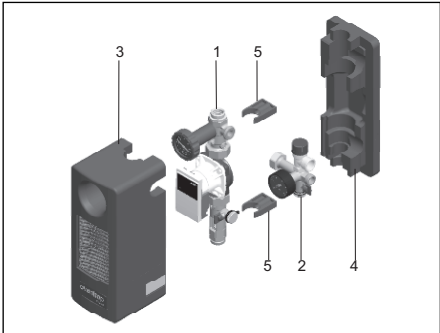
Illustr. 6.2 General information regarding assignment



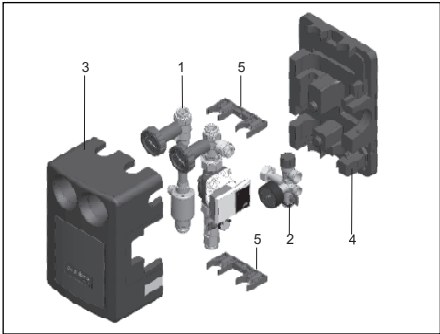
Illustr. 6.3 Connecting cable high-efficiency pump (example for Wilo pumps)

6.3 Installation

1. Pull off the front insulation (3) and remove the solar station / pump circuit (1) from the rear insulation (4).

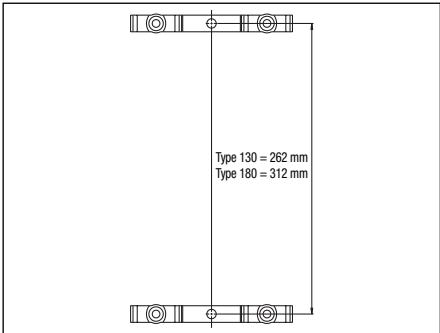


Illustr. 6.4 Pump circuit



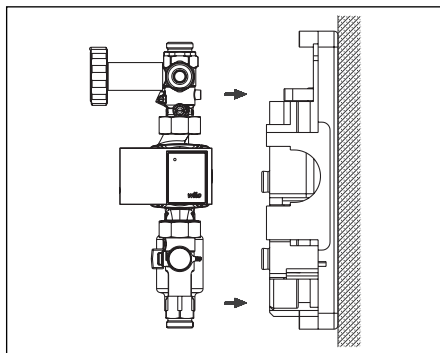
Illustr. 6.5 Transmission station

2. For wall attachment, drill two 8 mm holes at a distance of 262 mm ("Regusol-130") or 312 mm ("Regusol-180") and insert the enclosed dowels into the bores. Use rear insulation (4) as drilling jig.



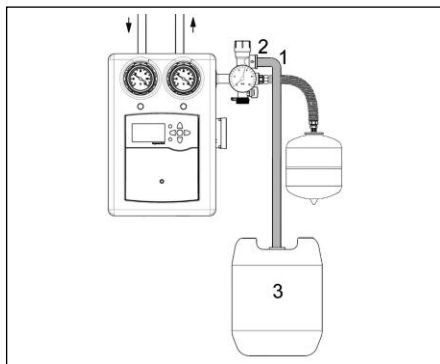
Illustr. 6.6 Fixing of the wall brackets

3. Fix the wall brackets (5) with the rear insulation (4) and engage the solar station (1) into the brackets (5).



Illustr. 6.7 Engage station

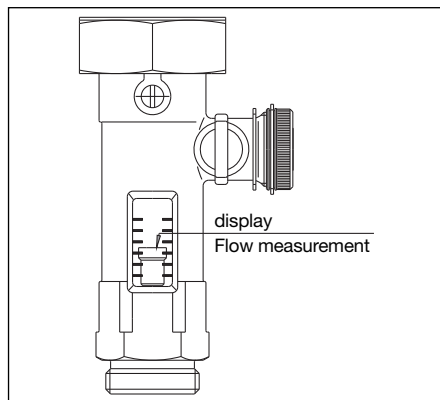
4. Mount the front insulation (3) and insulate the supply and return pipes up to the thermal insulation.
5. When connecting the solar station to a flexible pipework (e.g. corrugated metal hoses), we recommend to use not only the wall bracket supplied with the station but also the locking shackle (OV item no. 1369090).
6. Connect pipework of the solar circuit to the upper and lower connection by use of compression fittings. When using soft and thin walled pipes, reinforcing sleeves are to be used for the additional stabilisation of the pipe. The ends of the pipe have to be cut at right angles and have to be free of burrs. Introduce pipe until stop and firmly tighten the compression fittings by using a spanner. Hold firmly while tightening.
7. Screw safety group (2) onto the return ball valve. Mount discharge pipe of the safety valve to the collecting basin (3) and the connection pipe of the safety group towards the expansion tank (1) (Installation discharge pipe see also point 6.1 – Safety valve).



Illustr. 6.8 Safety group connection

8. Lead cables of the pump downwards and connect to the control unit according to the installation instructions of the manufacturer of the solar plant. For pumps with connecting plugs see illustr. 6.3.
9. Flush solar plant thoroughly, then fill it up with solar liquid and carry out leakage test. Adapt volume flow to the number of collectors or the collector surface via the phases of the circulation pump. If required, the fine adjustment is carried out by using the ball valve of the flow measuring and regulating device.

Flow measurement:



Illustr. 6.9 Flow measurement

6.4 Filling and flushing



WARNING

The use of high pressure pumps can cause damage to the solar plant!

When using the flushing station, the corresponding operating instructions must always be observed!



CAUTION

The solar plant must always be flushed in the flow direction of the circulation pump!

The expansion tank must always be removed before filling the solar plant.



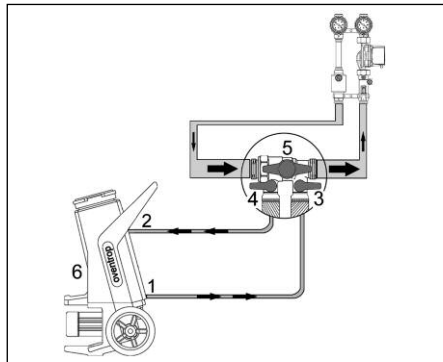
WARNING

The installation must never be flushed with liquids containing solvents as these can cause damage to plastic parts (e.g. pump impellers and seals)!

Filling and flushing of the solar plant can be carried out with the help of a separate filling and flushing device or the safety group and flow measuring and regulating device of the solar station.

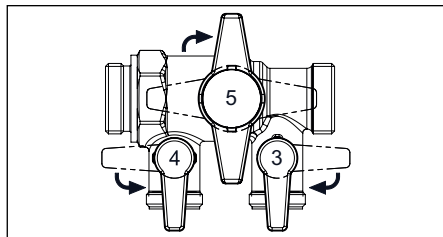
The different procedures are described in the following:

Filling and flushing via the filling and flushing device



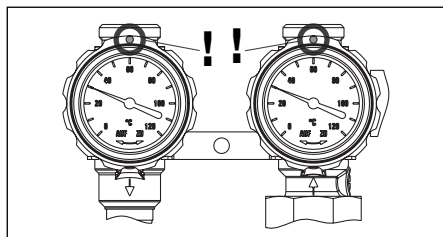
Illustr. 6.10 Filling via the filling and flushing device

1. Connect the filling and flushing device to the solar station on the one side and to the flushing and filling station on the other side (illustr. 6.10). The flow direction of the circulation pump must be strictly observed!
2. Close the straight ball valve (5) in the centre of the filling and flushing device (illustr. 6.11).
3. Open the filling (3) and draining cock (4) of the filling and flushing device (illustr. 6.11).



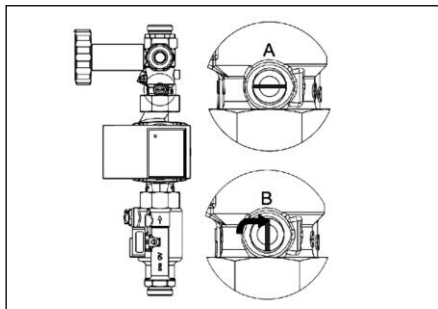
Illustr. 6.11 Filling and flushing device

4. Check position of the ball valves of the solar station. They have to be positioned as shown in illustr. 6.12 (angular position of the thermometer handles in the supply and return: 0°).



Illustr. 6.12 Position of ball valves

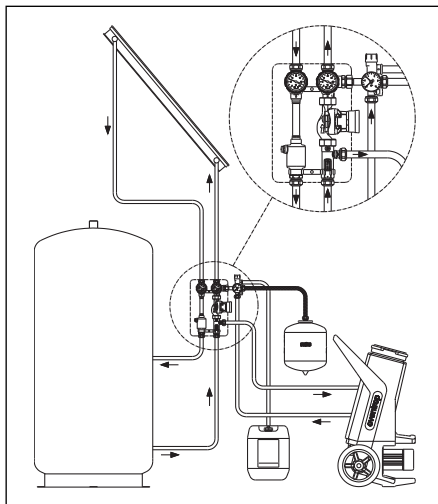
5. Open the check valve of the solar station (in the return of the solar station above the pump) by turning the adjustment screw into vertical position (position B in illustr. 6.13). The check valve is inactive now.



Illustr. 6.13 Check valve (return ball valve)

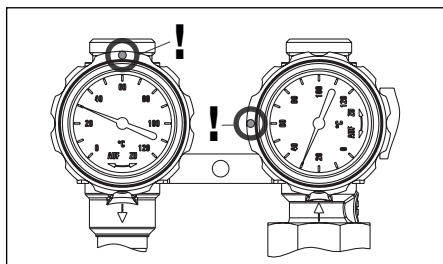
6. Switch on the flushing and filling station and let it run for at least 15 minutes.
7. Close the filling (3) and draining cock (4) and open the straight ball valve (5) of the filling and flushing device.
8. Switch off the flushing and filling station.

Filling via the safety group and flow measuring and regulating device



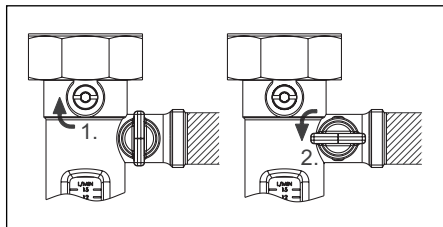
Illustr. 6.14 Filling via the safety group and flow measuring and regulating device

1. Connect the flushing and filling station to the solar plant (illustr. 6.14). The flow direction of the circulation pump must be strictly observed!
2. Position the ball valves of the solar station as shown in illustr. 6.15 (angular position of the thermometer handles in the supply: 0°, return: 90°)



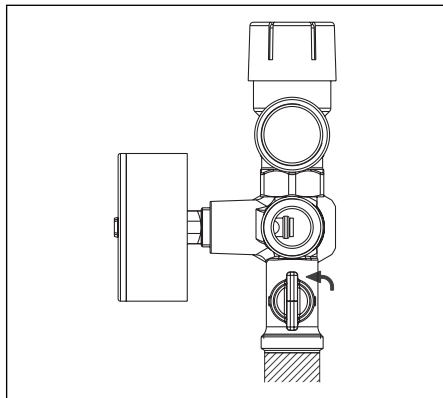
Illustr. 6.15 Ball valve position filling

3. Close the upper ball valve of the flow measuring device by turning the adjustment screw into horizontal position. Open the lateral ball valve of the same component with a 90° turn to the left (illustr. 6.16).



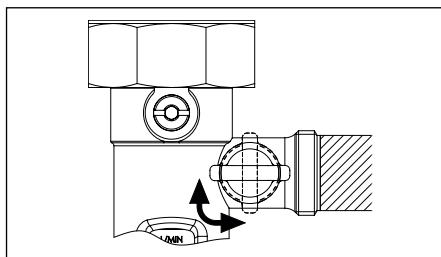
Illustr. 6.16 Check valve and draining ball valve

4. Open the ball valve of the safety group with a 90° turn to the left (vertical position, illustr. 6.17).



Illustr. 6.17 Draining ball valve safety group

5. Switch on the flushing and filling station and let it run for at least 15 minutes.
6. Bleed the solar plant manually by closing the lateral draining ball valve of the flow measuring and regulating device during the flushing operation for about 20 seconds and by opening it again all of a sudden (illustr. 6.18). Repeat this procedure at regular intervals.

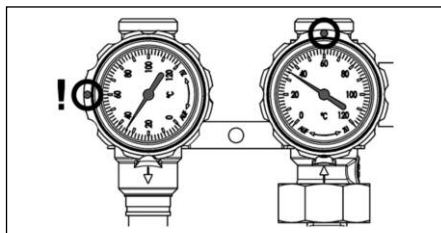


Illustr. 6.18 Bleeding via the flow measuring and regulating device

7. Switch off the flushing and filling station.

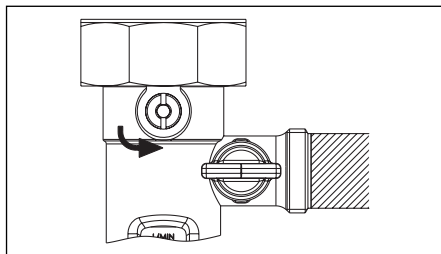
Bleeding the pump

1. Position the ball valves of the solar station as shown in illustr. 6.19 (angular position of the thermometer handle in the supply: 90°, return: 0°).



Illustr. 6.19 Ball valve position pump bleeding

2. Switch on the flushing and filling station.
3. Open the upper ball valve of the flow measuring and regulating device by turning the adjustment screw into vertical position (illustr. 6.20).



Illustr. 6.20 Position adjustment screw

4. Close the draining ball valve of the flow measuring and regulating device and the ball valve of the safety group after about 1 minute.
5. Switch off the flushing and filling station.
6. Set the check valves to operating position.

6.5 Setting of the system pressure

Once flushing is complete, the diaphragm expansion tank has to be connected to the connection set respectively the safety group. The required inlet pressure of the diaphragm expansion tank has to be determined first and the tank has to be filled with nitrogen accordingly.

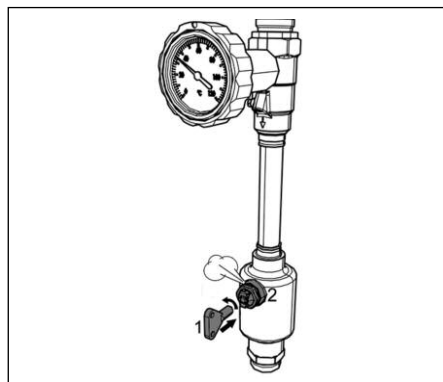


The required inlet pressure of the diaphragm expansion tank as well as the system pressure depends on the spatial and performance-related parameters of the solar plant. The technical service of the company Oventrop will support you in the design of an energy efficient solar plant and the determination of all required operating pressures.

7 Operation

7.1 Bleeding the system

Before initial operation, the system must be filled and bled with due consideration of the permissible operating pressures.



Illustr. 7.1 Bleeding at the vent pot ("Regusol LH")

7.2 Correction factors for mixtures of water and glycol

The correction factors of the manufacturers of the antifreeze liquids have to be considered when setting the volume flow.

8 Accessories

Compression fittings: For the connection of the solar station to the pipework.

Locking shackle: For the connection of the solar station to a flexible pipework (e.g. corrugated metal hoses); in addition to the wall bracket included in the delivery.

"Regusol" filling pump: For manual filling of the solar plant with small quantities of heat transfer medium from an external storage basin.

"Regusol" flushing and filling station: For flushing, filling and bleeding of solar thermal plants.

The complete range of accessories can be found in the catalogue.

9 Maintenance

The station is maintenance-free.

Tightness and function of the station and its connection points have to be checked regularly during maintenance. The station must be easily accessible.

10 General conditions of sales and delivery

The general terms and conditions of sale and delivery valid at the time of supply are applicable.