

DOUBLE SOLAR STATION WITH WILO PUMP

YONOS PARA ST15/7,0 PWM2 1-6 L/MIN 2-14 L/MIN

1. Safety

The device is intended only for closed solar installation. Pump group corresponds to the current technical standards and technical safety regulations. Each device is checked for proper operation and safety.

Pump group can be installed and operated only by trained personnel. Untrained personnel can work only under the supervision of an experienced person, knowledgeable way the unit operates. Before any assembly works and installation, the installer and operator must carefully read and understand this manual.

2. Warranty conditions

The manufacturer shall not be liable for any damage or consequences resulting from failure to read and misunderstanding of the manual. Manufacturer will not be responsible for costs or damage incurred by persons using the device, in particular for damage resulting from misuse, improper or faulty connections. In addition, manufacturer is not responsible for damage resulting from any interference inconsistent with the instructions.

3. Description of the device



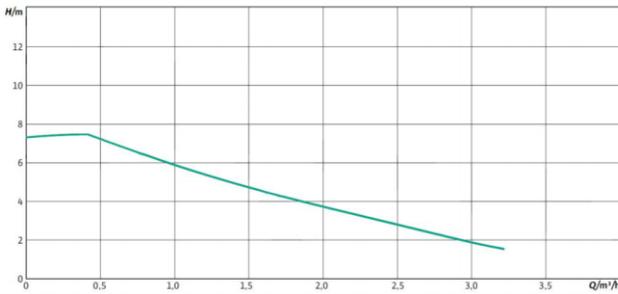
1. BALL VALVE WITH THERMOMETER (HIGH PARAMETER)
2. BALL VALVE WITH THERMOMETER (LOW PARAMETER)
3. GROUP WITH MANOMETER WITH EXPANSION TANK EXIT
4. SAFETY BAR 6 BAR
5. ELECTRONIC CIRCULATION PUMP WILO YONOS PARA ST15/7,0 PWM2
6. ROTAMETER WITH VALVES FOR FILLING AND EMPTYING SOLAR INSTALLATION
7. AIR SEPARATOR WITH MANUAL VENT
8. COUPLING ($\frac{3}{4}'' \times \frac{3}{4}''$ EXTERNAL THREAD)
9. SOLAR STATION INSULATION

4. Solar station technical data

Parametr	Value
Dimensions	440 x 280 x 150 mm
Temperature range of pump operation	0°C ÷ +110°C
Maximum pressure	6 bar
Flow pump	0-14 l/min
Measuring range	1-6 l/min 2-14 l/min
Manometer scale	0-10 bar
Thermometer scale (low parameter)	0-100°C
Thermometer scale (high parameter)	0-160°C
Connection	$\frac{3}{4}''$ M
Spacing between connections	97 mm
Pump type	Wilo Yonos Para ST15/7,0 PWM2
Supply voltage	230V, 50 Hz
Pump mounting length	130 mm
Body material	Brass
Insulation material	EPP
Tightening elements	EPDM
Medium	Mixture of non-toxic polypropylene glycol, inhibitors, and dye

5. Pump characteristics

a) characteristics Q(H)



6. Mounting of the device

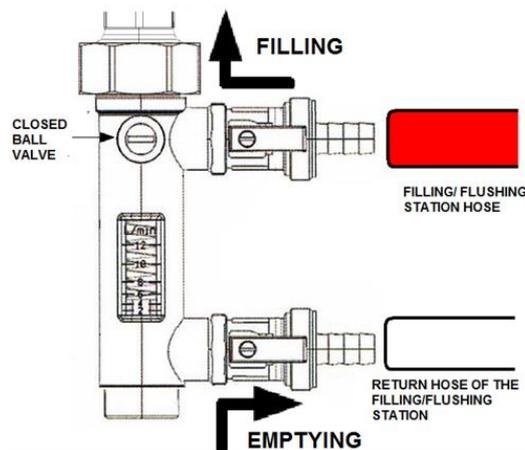
Solar station has to be installed in such place to isolate it from the surroundings. Station cannot be under the temperature which is too high, such as occur, for example, during welding or soldering. Solar station has to be mounted after such works. Before mounting of the solar station an installation has to be flushed and one has to make sure that the fluid which is introduced to the installation doesn't make any damage to the elements of the solar station.

Pump group is designed for wall mounting in an upright position.

7. Filling of the installation

In order to fill the installation:

- For filling and venting of the solar system, we can use a ready pump set with the pump flow to 12l / min and a lifting height of 7 m and a solar tank.
- At the time of filling and venting of the solar installation expansion vessel should not be connected.
- Pour solar liquid only to a clean container of solar filling/ flashing/ venting station
- Remove the air from the hose in the filling/ flushing/venting station for solar installations.
- Connect the hose to the rotameter in the pump group as shown below



- Close the valve on the rotameter - so that the indentation on the ball valve rotameter is in a horizontal position (see figure)
- Connect the return hose (drain) to the rotameter in the pump group as shown in Figure
- Turn on the pump and open the shut-off valve on the flow and return of the rotameter. Rotameter control valves are still closed. Watch glycol level in the tank of a filling station, adding if necessary.
- Pumping of the solar fluid should last for at least 30 minutes, until in the transparent hose connected to the back of a filling station does not show any air bubbles flowing and the glycol is clear.
- During this time, you can check the tightness of the system, connect the electric pump in the pump group with solar sensors.
- Ensuring that returning to the container solar fluid is clear, you should proceed to so called 'pressure peaks'. This involves closing of the return valve with the pump running at a filling station. We observe the pressure gauge(manometer) of the pump as the pressure increases. The slow increase in pressure tells us that the air has remained in the solar system. Rapid opening the valve on the return to the filling station will lower the pressure. Repeat until the pressure increase after the closing return valve rapidly reaches the maximum pressure (4 - 5.5 bar).
- After the removal of air from the solar system, close the valve on the return, bring the pressure of glycol in the solar system to the level of 4-5.5 bar, turn off the pump and close the valve in the supply of solar installation. Gently open the valve on the

return and empty installation to the operating pressure of the solar system. According to the formula:

$h \leq 5 \text{ m}$	$P_{\text{solar instalation}} = 1,5 \text{ bar}$
$5 < h < 10 \text{ m}$	$P_{\text{solar instalation}} = 2 \text{ bar}$
$10 < h < 15$	$P_{\text{solar instalation}} = 2,5 \text{ bar}$
h – Static height of the instalation	

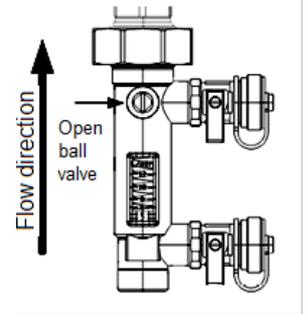
The minimum pressure in the solar system is 1.5 bar.

- Unscrew the hoses filling station, turn to the vertical rotameter control valve, seal shut-off valves on the rotameter, see the figure below. Pump group is prepared for controlling of the flow
- In the disconnected expansion vessel to refill the pressure of the gas cushion to be equal to the formula:

$$P_{\text{gas cushion}} = (1,5 + 0,1 * h)$$

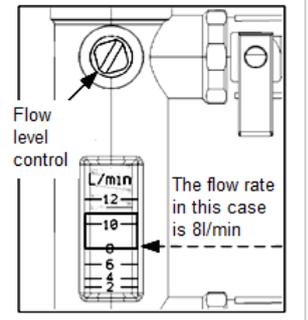
h – Static height of the instalation

- reconnect the expansion tank

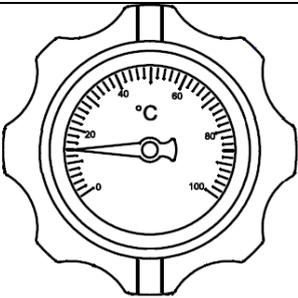
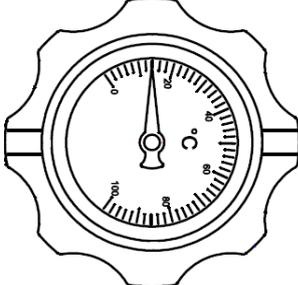


Flow control:

- switch on the speed selector of the pump and set to 1st gear, flow meter control valve is completely open, at the solar controller set the manual control of the solar pump without the regulation onf the rotation speed (100% the speed of rotation of the solar pump)
 - Using a screwdriver or wrench turn the adjusting screw until the rotameter sets required flow.
 - If you cannot achieve the required flow rate, the pump gear should be increased.
- An indicator of the flow on the rotameter
The lower edge of the float indicates the flow as shown

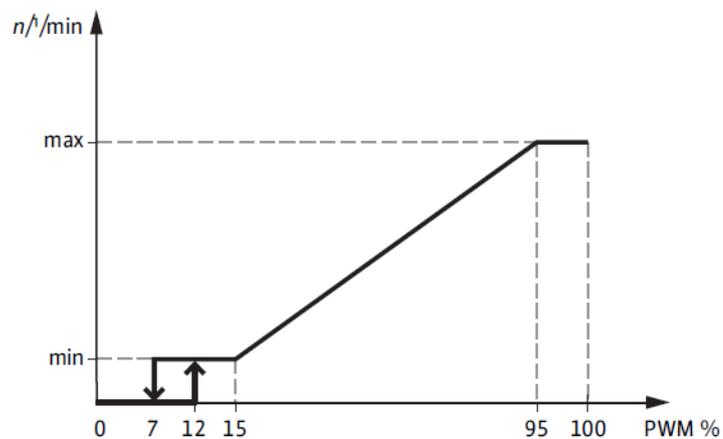


8. Ball valve handling

Position the thermometer in ball valve		
	Angle 0°	Normal operation – ball valve open
	Angle 90°	maintenance – ball valve closed

9. Pump control using a PWM signal.

Pump control is carried out by providing setpoint signal from external controller. The controller give PWM signal as a control variable to WILO Yonos Para. Generator of PWM signal gives pulse train to pump (the duty cycle) in accordance with DIN IEC 60469-1. The value of the variable is defined as the ratio of the pulse duration to the period. The size of the variable is defined as the dimensionless ratio of pulse duty 0...1 or percentage of 0-100%.



OPERATION OF THE PUMP WITH PWM SIGNAL:

- <7 - The pump stops
- 7-15 - The pump working with minimal speed (work)
- 12-15 - The pump working with minimal speed (start-up)
- 15-95 - Speed pump increase linearly from min to max
- > 95 - The pump running with maximum speed