

Solar module

Art. S001-S002-S004

/ Function

The solar modules are employed in the primary circuits of solar systems to manage the thermodynamic cycle of the heat-transfer fluid between the solar panels and the hot water storage tank.

The S004 modules is also equipped with electronic controllers which, through a

sophisticated monitoring system and safety functions, ensures the total protection of the system during its operation.



/ Product range

Art.	Size	Circulator	Circulator control signal		PWM signal cable	Code
			ON/OFF	PWM		
S001	3/4"	NO CIRC.	X	X	X	93S001AE05SC
S001 ●	3/4"	Wilo ST 20/6	V	X	X	93S001AE05
S001 ●	3/4"	Grundfos 15/6	V	X	X	93S001AE05G
S001	3/4"	Taco ES2 15-70	V	X	X	93S001S166
S001	3/4"	Grundfos UPM3 15-75 ELECTRONIC CIRCULATOR	V	V	NOT INCLUDED*	93S001S163
S001	3/4"	Wilo RSTG 15/7.5 ELECTRONIC CIRCULATOR	V	V	INCLUDED	93S001S164
S001	3/4"	Wilo Para ST 15/6 ELECTRONIC CIRCULATOR	V	X	X	93S001S165
S002	3/4"	NO CIRC.	X	X	X	93S002AE05SC
S002 ●	3/4"	Wilo ST 20/6	V	X	X	93S002AE05
S002 ●	3/4"	Grundfos 15/6	V	X	X	93S002AE05G
S002	3/4"	Taco ES2 15-70	V	X	X	93S002S166
S002	3/4"	Grundfos UPM3 15-75 ELECTRONIC CIRCULATOR	V	V	NOT INCLUDED*	93S002S163
S002	3/4"	Wilo RSTG 15/7.5 ELECTRONIC CIRCULATOR	V	V	INCLUDED	93S002S164
S002	3/4"	Wilo Para ST 15/6 ELECTRONIC CIRCULATOR	V	X	X	93S002S165
S004+S303	3/4"	NO CIRC.	X	X	X	93S004SCS303
S004+S303 ●	3/4"	Wilo ST 20/6	V	X	X	93S004AE05S303
S004+S303 ●	3/4"	Grundfos 15/6	V	X	X	93S004AE05GS303
S004+S303	3/4"	Grundfos UPM3 15-75 ELECTRONIC CIRCULATOR	V	V	NOT INCLUDED*	93S004S163S303
S004+S303	3/4"	Wilo RSTG 15/7.5 ELECTRONIC CIRCULATOR	V	V	INCLUDED	93S004S164S303
S004+S303	3/4"	Wilo Para ST 15/6 ELECTRONIC CIRCULATOR	V	X	X	93S004S165S303
S004+S303	3/4"	Taco ES2 15-70	V	X	X	93S004S166S303
S004+S305	3/4"	NO CIRC.	X	X	X	93S004SCS305
S004+S305	3/4"	Wilo ST 20/6	V	X	X	93S004AE05S305
S004+S305	3/4"	Grundfos 15/6	V	X	X	93S004AE05GS305
S004+S305	3/4"	Grundfos UPM3 15-75 ELECTRONIC CIRCULATOR	V	V	NOT INCLUDED*	93S004S163S305
S004+S305	3/4"	Wilo RSTG 15/7.5 ELECTRONIC CIRCULATOR	V	V	INCLUDED	93S004S164S305
S004+S305	3/4"	Wilo Para ST 15/6 ELECTRONIC CIRCULATOR	V	X	X	93S004S165S305
S004+S305	3/4"	Taco ES2 15-70	V	X	X	93S004S166S305

● Products equipped with circulators "Wilo ST 20/6" and "Grundfos 15/6" are intended for sale in non-EU countries.

*To be purchased separately in case of connection with electronic controller with PWM signal.

/ Technical specifications

PERFORMANCE

Fluids used:	Water and glycol solutions
Maximum percentage of glycol:	See specifications page 8
Maximum operating pressure:	10 bar
Calibration of safety valve:	6 bar
Temperature of the heat transfer fluid:	See specifications page 8
Safety valve temperature range:	+160°C
Minimum pressure on the intake side:	See specifications page 8
Opening check valves minimum pressure:	Δp : 2Kpa (200 mm c.a.)
Manometer scale:	0 ÷ 10 bar
Thermometers scale:	0 ÷ 160°C
Circulators:	See specifications page 8

CONNECTIONS

System connections:	G3/4" M
Safety valve connections :	G1/2" F
Connection with expansion tank:	G3/4" M
Filling/emptying connections with hose:	Ø13 mm

MATERIALS

Brass components:	Brass CW617N - EN 12165
Seals:	PTFE
Sealing elements:	EPDM Perox
Flat seals:	Cellulosic fibers with nitrile rubber
Insulation shell:	PPE
Conductivity of insulation shell $\lambda(\Delta T)$:	0.041 (W/mK)

Components

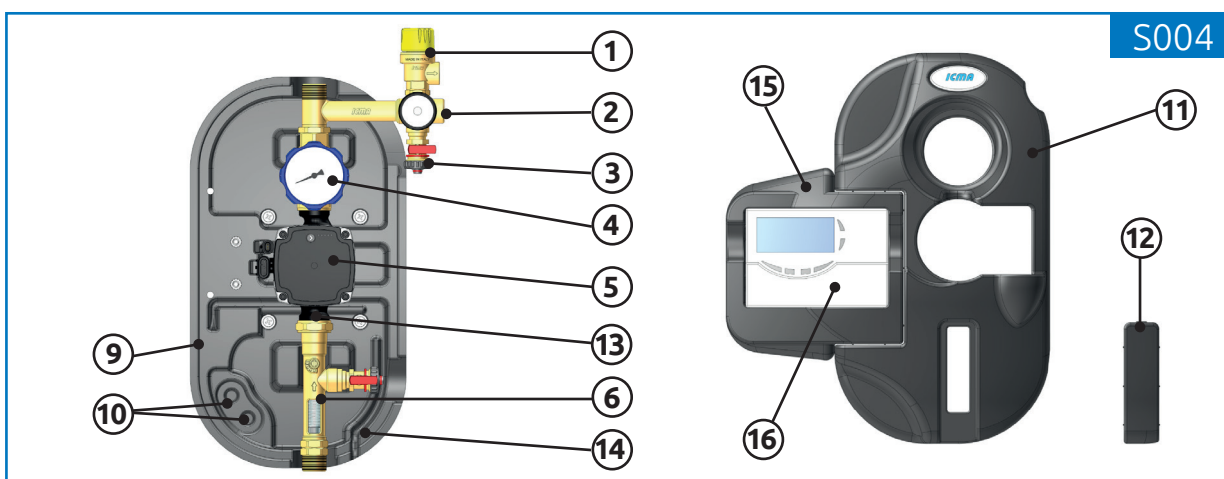
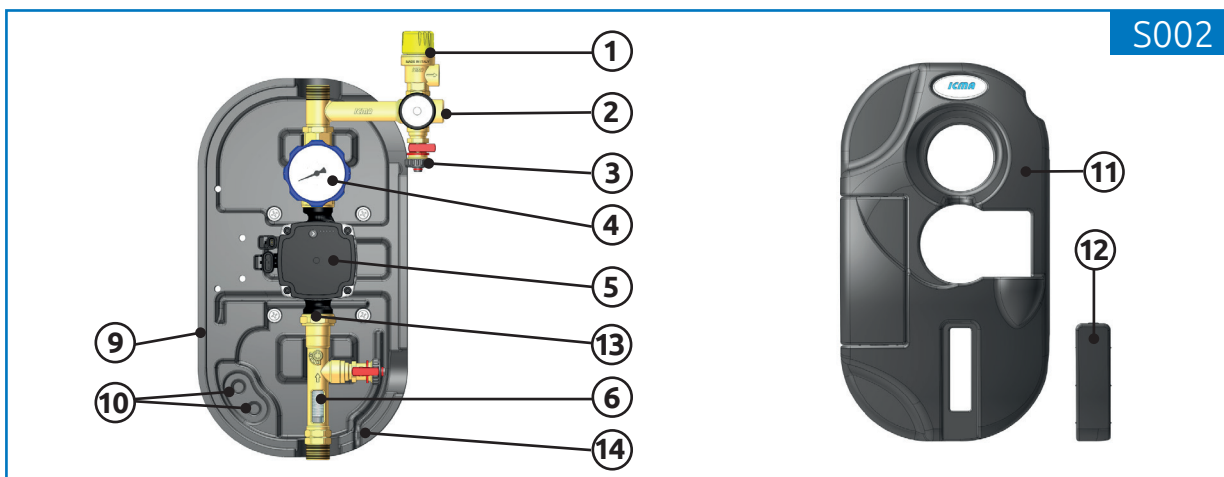
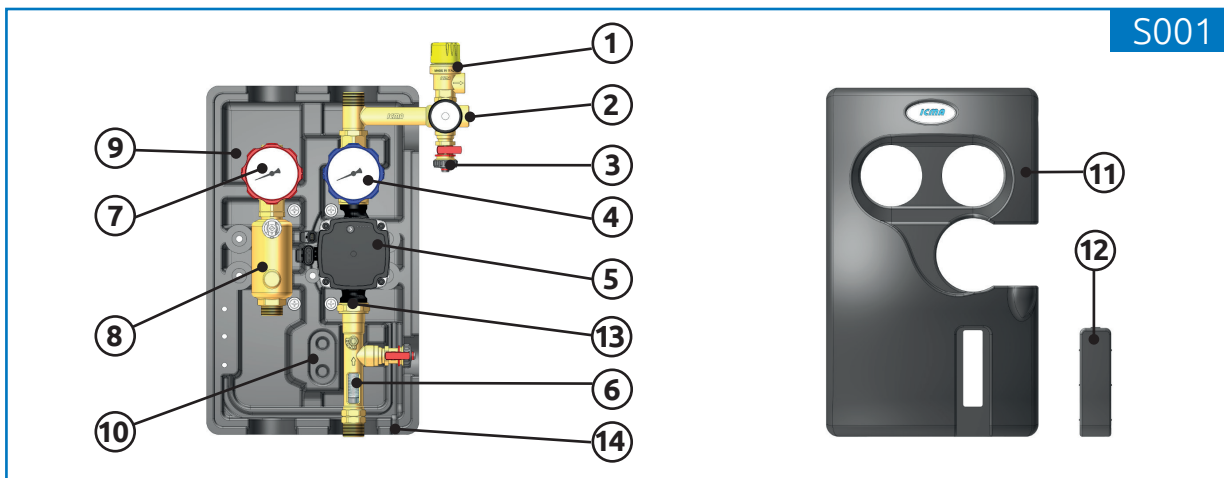
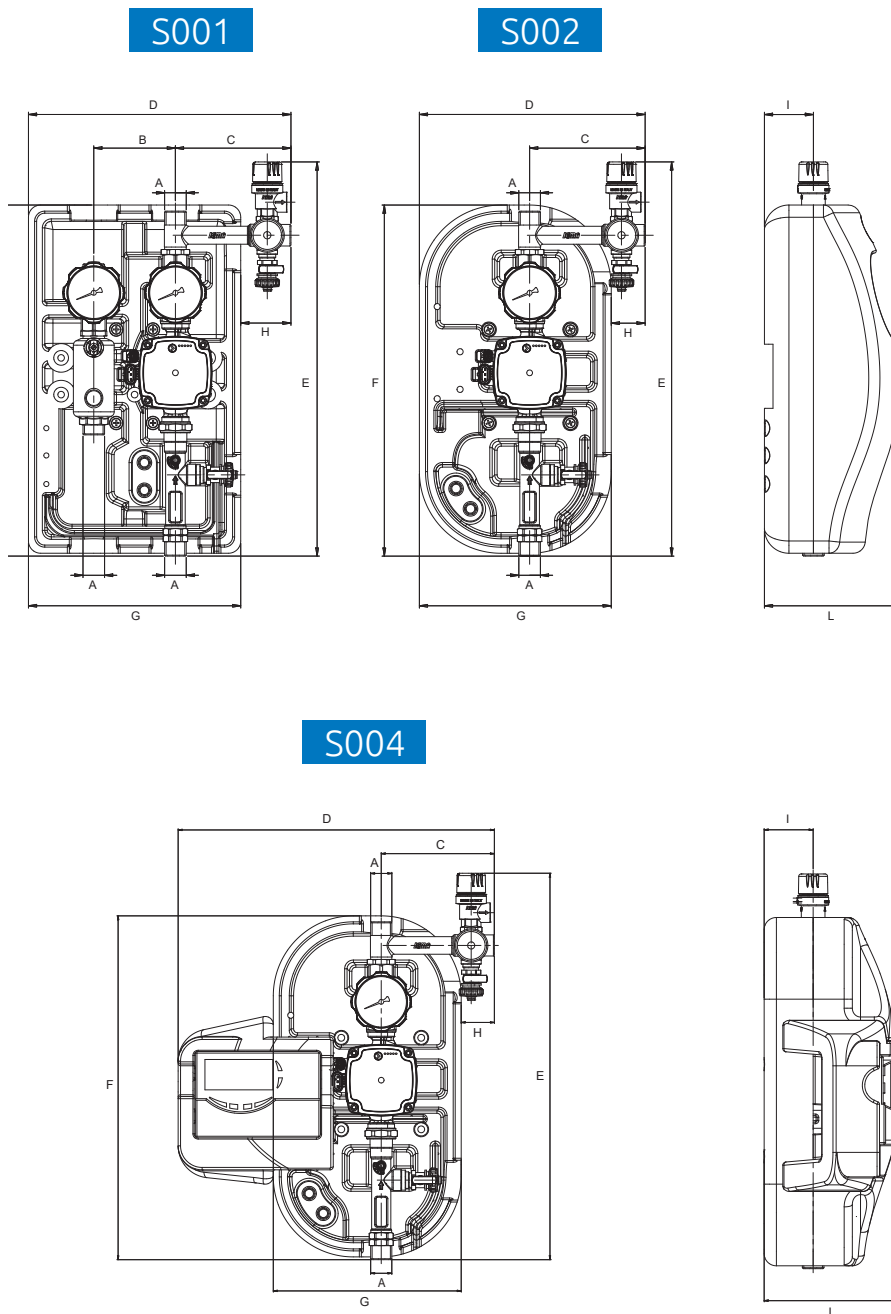


Table 1

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Safety valve for solar energy systems 2. Instrument holder connection with manometer 3. Taps for filling, emptying and washing the system 4. Shut off valve with thermometer and built-in check valve 5. Circulator 6. Flowmeter 7. Shut off valve with thermometer and built-in check valve | <ol style="list-style-type: none"> 8. Deaerator 9. Preformed insulating base 10. Hose connection 11. Preformed insulating cover 12. Inspection compartment insert 13. Pump connector 14. Cable duct groove 15. Electronic controller frame 16. Electronic controller S303/S305 |
|---|---|

Dimensions



CODE	A	B	C	D	E	F	G	H	I	L	WEIGHT (KG)
S001	G 3/4" M	100	140	321,5	483	430	260	60	60	170	7.0
S002	G 3/4" M	/	140	276,5	483	430	235	40	60	170	5.0
S004	G 3/4" M	/	140	395,5	483	430	235	40	60	166	5.5

Table 2

Technical specifications

The solar module receive a signal from the external controller which, having at least two temperature sensors (one is positioned on the panel outlet pipe and the other is an immersion sensor in the boiler), constantly reads the temperature difference and keeps it within the established range, which normally varies between 5 and 8 °C. If the Δt between the panel and the boiler is found to be over the established set point, the controller starts up the pump on the module to provide the lacking thermal load. If, on the other hand, the Δt is narrower than the one set, the internal pump will be disabled.

For further clarification about the electronic controller functioning, consult the technical documentation about art. S303 and S305.

Filling the system

1. Open the shut off valves connected with the air vent valves (Pict.1). These valves must be located at the highest point of the system to optimize their function of air expulsion from the circuit.
2. Open both the shut off valves 4 and 8 (Table1-page 3) turning their handles to 45° (see the operating specifications of these valves on page 11 of this data sheet).
3. Fully open the flow meter 7 (Table1-page 3) carrying the reference mark of the flow meter in vertical position (see operating specifications on page 10). Check that the drain tap 3 is closed.
4. Connect an external pump to the tap 3 of the instrument holder connection 2 (Table1-page 3) with a rubber pipe. This pump will get the heat-transfer fluid, previously prepared, from an external container.
5. Open the tap 3 of the instrument holder connection 2 (Table1-page 3) and start the external pump to fill the system.
6. Fill the system until air stops coming out of the air vent valves (Pict.1).
7. Close the tap 3 and disconnect the external pump.
8. Close the shut off valves connected with the air vent valves (Pict.1).

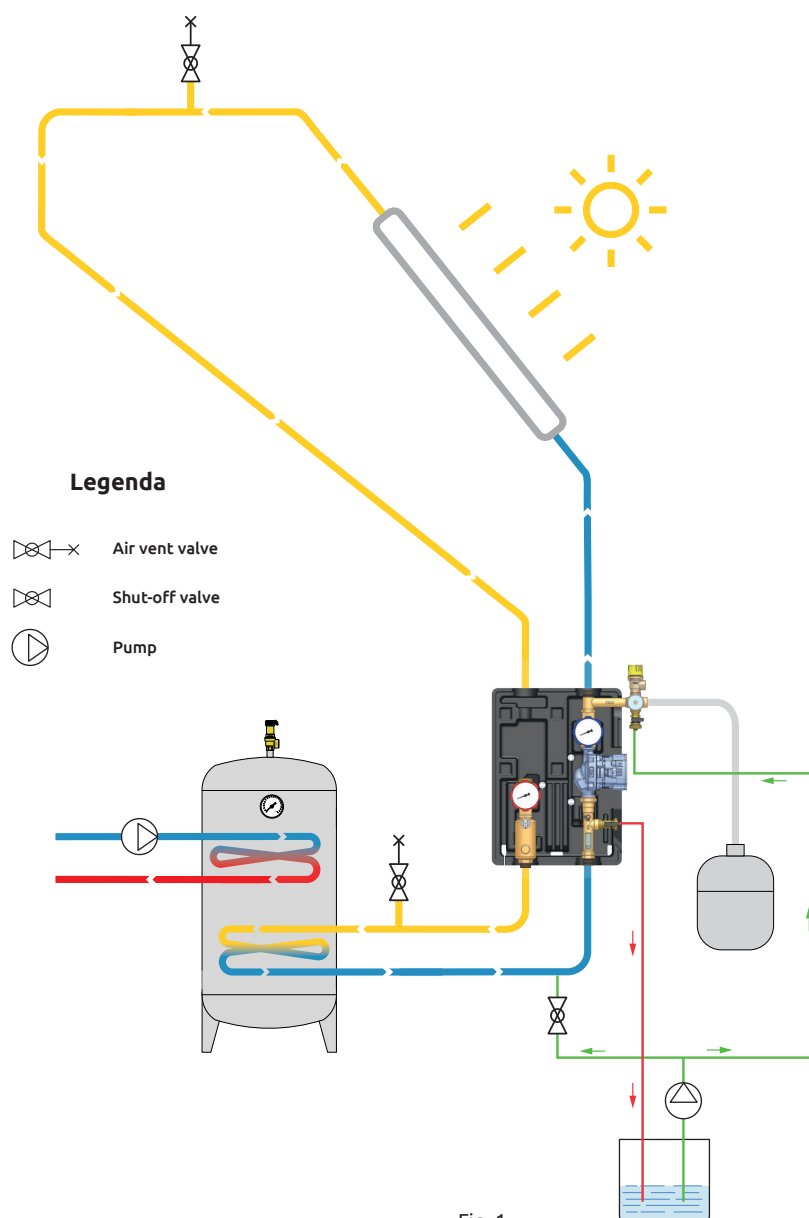


Fig. 1

/ Washing the system

1. Open both the shut off valves 4 and 8 (Table1-page 3) turning their handles to 45° (see the operating specifications of these valves on page 11 of this data sheet).
2. Close the flow meter 7 (Table1-page 3), carrying the reference mark of the flowmeter in horizontal position (see operating specifications on page 10).
3. Connect the drain cock 3 of the flow meter 7 (Table1-page 3) to a point of discharge using a rubber pipe.
4. Connect an external pump to the tap 3 of the instrument holder connection 2 (Table1-page 3) with a rubber pipe. This pump will get the washing liquid (or the new heat-transfer fluid) from an external container.
5. Start the external pump and open both taps 3, the washing fluid will enter into the system while the one inside will be discharged through the lower tap 3 of the flow meter 6 (Table1-page 3).
6. Open slightly and for a **⚠ short time ⚠** the flow meter 7 (Table1-page 3) to let the washing fluid running also through the system pump.
7. For a proper washing let the pump running for a **⚠ few minutes ⚠**, then close the taps, switch off the pump and disconnect the rubber pipes.

⚠ WARNING: It is necessary to comply with the warnings and instructions provided by the supplier of washing liquid.

/ Start-up

1. Connect an external pump to the tap 3 of the instrument holder connection 2 (Table1-page 3) The pump is used to increase the pressure in the system.
2. Operate the pump, open the tap 3 and increase the system pressure to the maximum operating value of the solar thermal system. Read the pressure value on the manometer 2 (Table1-page 3), then close the tap 3 and stop the pump.
3. Open the shut off valves 4 and 8 (Table1-page 3) by turning them counter-clockwise until they stop.
4. Fully open the flowmeter 7 (Table1-page 3) carrying the reference mark of the flowmeter in vertical position (see operating specifications on page 10). Check that the drain cock 3 is closed.
5. Start the circulator 5 (Table1-page 3).
6. Let the system running for a while, check the hydraulic seals of the system.
7. Open both the shut off valves 4 (Pict.1) and let drain any remaining air in the system, then close the valves.
8. Stop the circulator 5 (Table1-page 3)
9. Restore the pressure to the desired operating value as described above in step 2.
10. The system flow can be regulated by using the flowmeter 7 (Table1-page 3), and reading the flow value on the scale "flow indicator" (see operating specifications on page 10). During this operation, the circulator 5 has to run at its maximum power. To choose the flow rate suitable to the system follow the instructions of the solar panels manufacturer.
11. After a few hours of operation, remove air from the solar system once again with the air vent valves A (Pict.1) and the deaerator 9 (Table1-page 3). After all air has been removed, check once again the pressure in the system with the manometer 2 (Table1-page 3) and, if necessary, restore the desired operating value as described above in step

/ Emptyng the system

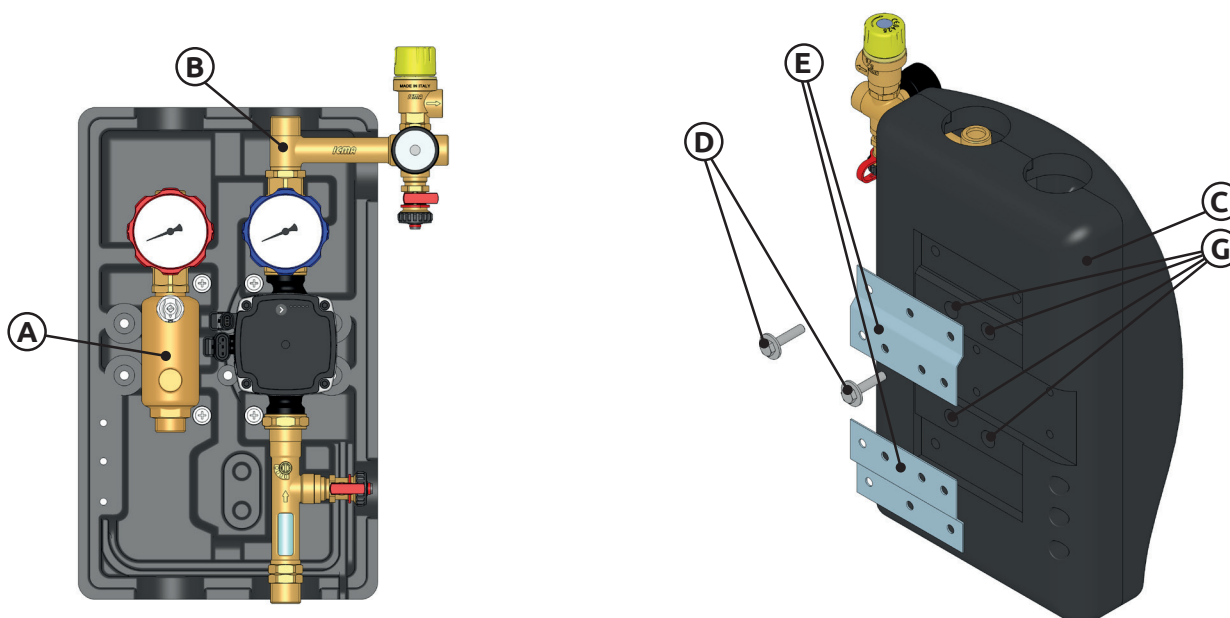
1. The system must be emptied if it has been filled with water only and will be exposed to a risk of freezing..
2. Open the shut off valves connected with the air vent valves (Pict.1).
3. Open both the shut off valves 4 and 8 (Table1-page 3) turning their handles to 45° (see the operating specifications of these valves on page 11 of this data sheet).
4. Open the drain cock of the flowmeter 7 (Table1-page 3) or the tap located at the lowest point in the system.

/ Installazion and wall mounting

The fixing of the delivery part (A) and return part (B) to the insulation shell (C) is made in the factory by two screws and two M8x32 mm. with relative washers (D). The dowels (E) for the wall fixing are optional.

To install the solar module please proceed as follows:

1. Lay the pipes inside the solar system, leaving enough space for the solar module considering the size reported in Table 2 (page 4)
2. Define the positioning of the module on the wall and mark the position of the 4 holes for the fixing (G).
3. Drill the wall and insert the dowels (dowels are not included).
4. Fix the solar module to the wall and connect it to the system pipes.
5. Check that all unions are properly tight.
6. Proceed with the electrical wiring.



/ Circulators range

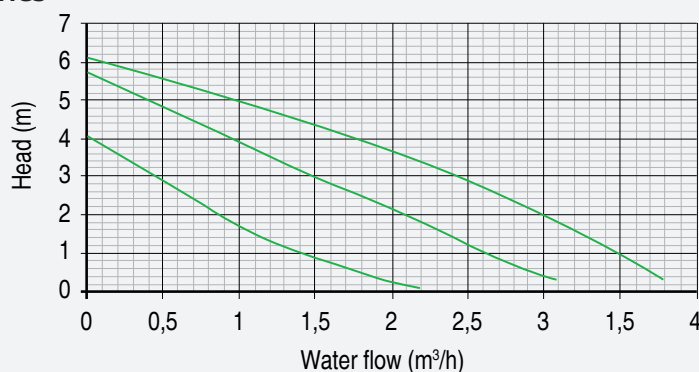
Art. S160 - Synchronous circulation pump with 3 speeds



Technical specifications

Brand:	Wilco
Model:	Solar ST20/6
Centre to centre distance:	130 mm.
Connections:	G1" M
Electrical power supply:	230 V - 50/60 Hz
Operating temperature:	2 ÷ 110°C
Max temperature:	140°C for short periods
Max operating pressure:	10 bar
Protection level:	IP44
Energy class (EEI):	C
Maximum percentage of glycol:	50%
Minimum pressure on the intake side:	0,049 bar

HYDRAULIC CHARACTERISTICS



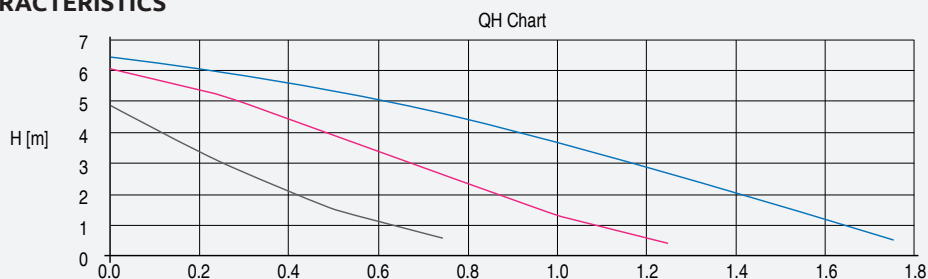
Art. S160G - Synchronous circulation pump with 3 speeds



Technical specifications

Brand:	Grundfos
Model:	Solar 15/65
Centre to centre distance:	130 mm.
Connections:	G1" M
Electrical power supply:	230 V - 50/60 Hz
Operating temperature:	2 ÷ 110°C
Max temperature:	140°C for short periods
Max operating pressure:	10 bar
Protection level:	IP44
Energy class (EEI):	C
Maximum percentage of glycol:	50%
Minimum pressure on the intake side:	
• T=85°C	0,049 bar
• T=90°C	0,270 bar
• T=110°C	1,080 bar

HYDRAULIC CHARACTERISTICS



Solar module

Art. S001-S002-S004

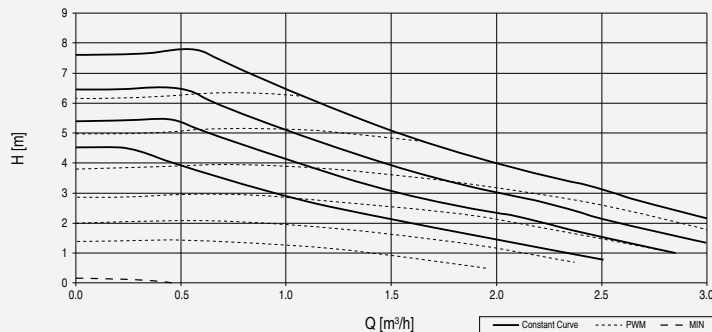
S163 - Circulator with 4 constant curves, 4 PWM curves profile C



Technical specifications

Brand:	Grundfos
Model:	UPM3 SOLAR 15-75 130
Centre to centre distance:	130 mm.
Connections:	G1" M
Electrical power supply:	230 V - 50Hz
Working temperature (cast iron body):	2 ÷ 110°C
Working temperature (PPS body):	2 ÷ 95°C
Max temperatura (cast iron body):	130°C for short periods
Max operating pressure:	10 bar
Protection level:	IPX4D
Energy class (EEI):	≤0.20
PWM signal cable code:	C64P3280153 (NOT INCLUDED)
Maximum percentage of glycol:	50%
Minimum pressure on the intake side:	0,050 bar
• T=75°C/95°C/110°C	

HYDRAULIC CHARACTERISTICS



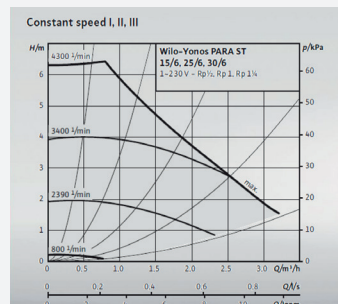
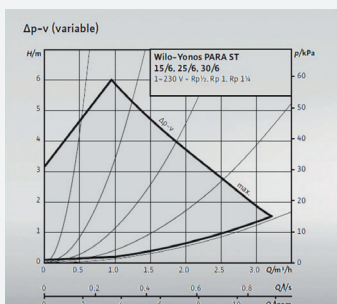
Art. S165 - Circulator with 3 constant curves, ΔP variable



Technical specifications

Brand:	Wilo
Model:	Para 15-6
Centre to centre distance:	130 mm.
Connections:	G1" M
Electrical power supply:	230 V - 50/60 Hz
Operating temperature:	
• Ambient temperature = 58°C	2 ÷ 100°C
• Ambient temperature = 62°C	2 ÷ 90°C
• Ambient temperature = 66°C	2 ÷ 80°C
• Ambient temperature = 71°C	2 ÷ 70°C
Max operating pressure:	10 bar
Protection level:	IPX4D
Energy class (EEI):	≤0.20
Maximum percentage of glycol:	50%
Minimum pressure on the intake side:	
• T=85°C	0,049 bar
• T=90°C	0,270 bar

HYDRAULIC CHARACTERISTICS



Solar module

Art. S001-S002-S004

Art. S164 - Circulator with 3 constant curves, ΔP variable, 2 PWM curves

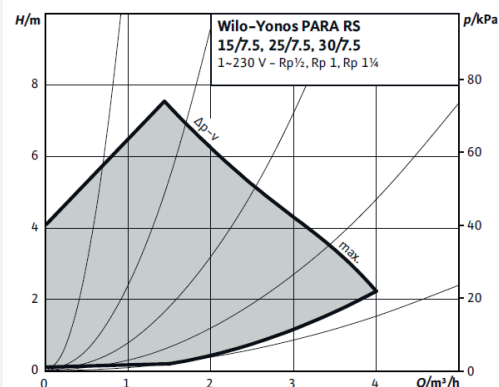


Technical specifications

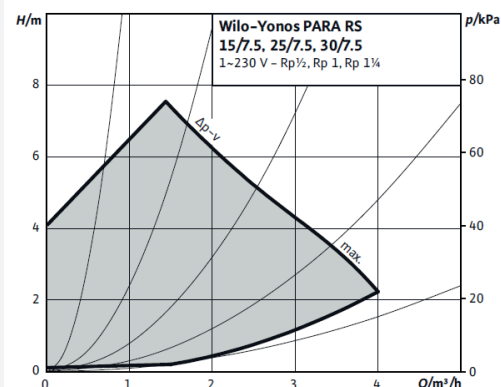
Brand:	Wilo
Model:	Yonos PARA RSTG 15/7.5 RK
Centre to centre distance:	130 mm.
Connections:	G1" M
Electrical power supply:	230 V - 50/60 Hz
Operating temperature:	
• Ambient temperature = 52°C	2 ÷ 110°C
• Ambient temperature = 57°C	2 ÷ 95°C
• Ambient temperature = 60°C	2 ÷ 90°C
• Ambient temperature = 67°C	2 ÷ 70°C
Max temperature:	130°C for short periods
Max operating pressure:	10 bar
Protection level:	IPX4D
Energy class (EEL):	≤0.21
Maximum percentage of glycol:	20%
Minimum pressure on the intake side:	
• T=50°C	0,049 bar
• T=95°C	0,441 bar
• T=110°C	1,079 bar

HYDRAULIC CHARACTERISTICS

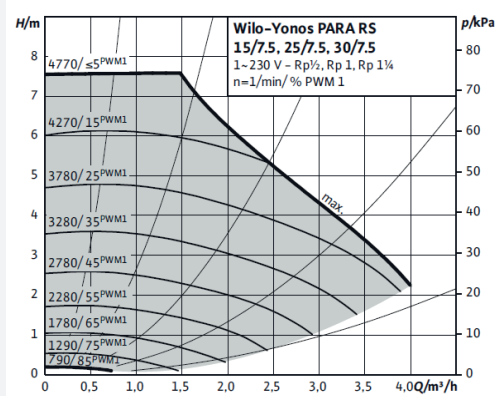
Δp-v (variable)



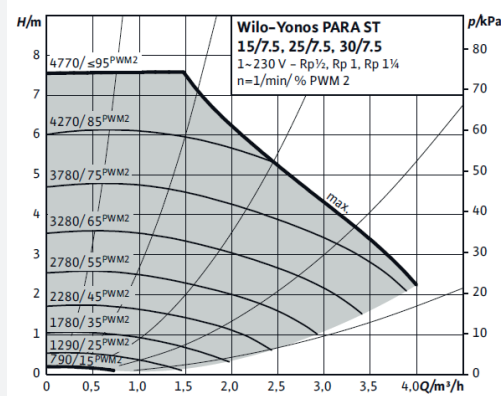
Δp-v (variable)



External control via PWM 1



External control via PWM



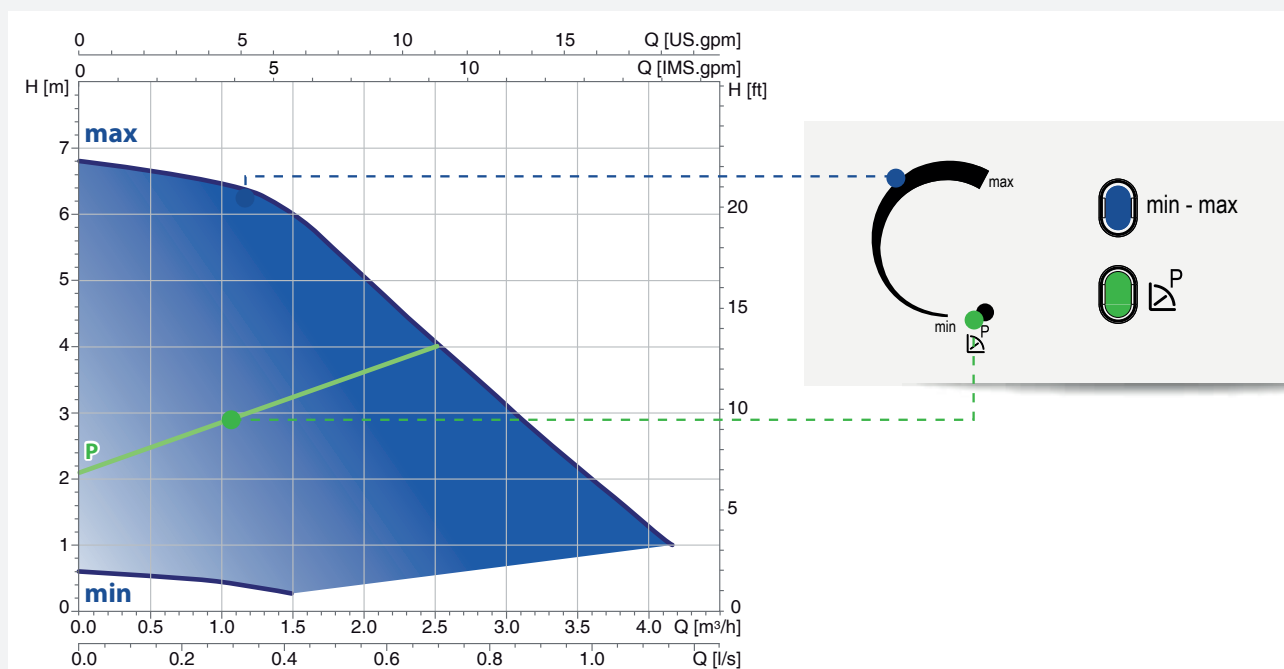
Art. S166 - Circulator with 1 proportional-pressure curve - min-max mode – Fixed speed



Technical specifications

Brand:	Taco
Model:	ES2 solar 15-70
Centre to centre distance	130 mm.
Connections:	G1" M
Electrical power supply:	230 V - 50/60 Hz
Operating temperature:	
• Ambient temperature = 30°C	30 ÷ 110°C
• Ambient temperature = 35°C	35 ÷ 90°C
• Ambient temperature = 40°C	40 ÷ 70°C
Max operating pressure:	10 bar
Protection level:	IP44
Energy class (EEI):	≤0.21
Maximum percentage of glycol:	50%
Minimum pressure on the intake side:	
• T=85°C	0,049 bar
• T=90°C	0,270 bar
• T=110°C	1,080 bar

HYDRAULIC CHARACTERISTICS



/ Flow meter

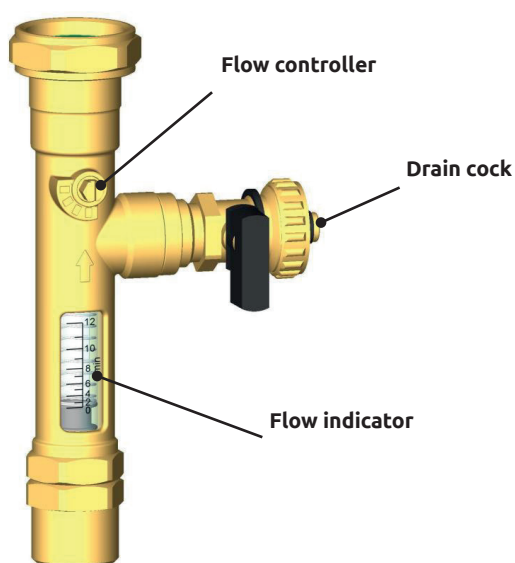
The flowmeter 7 (Table1-page 3) is an instrument to measure the flow of the heat-transfer fluid circulating in the system.

It is possible to read in real time the value of the flow in the circuit with the flow indicator (Pict.3), This device is equipped with a glass having a graduated rate of flow scale, with a calibration spring and with a movable indicator that varies its position according to the flow inside the glass. The flow rate reading are explained the paragraph below.

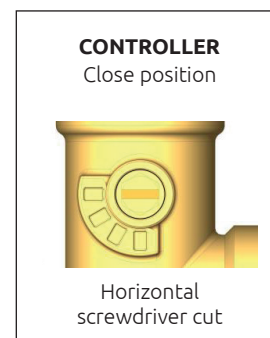
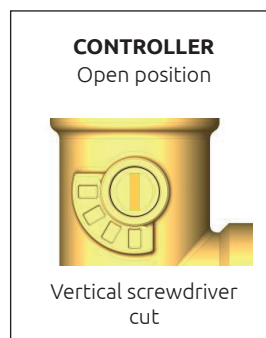
The flow meter is also equipped with a manual flow regulator, adjustable with a screwdriver.

For proper operation, the flow meter must be installed in a vertical position.

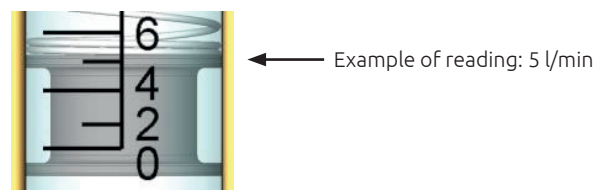
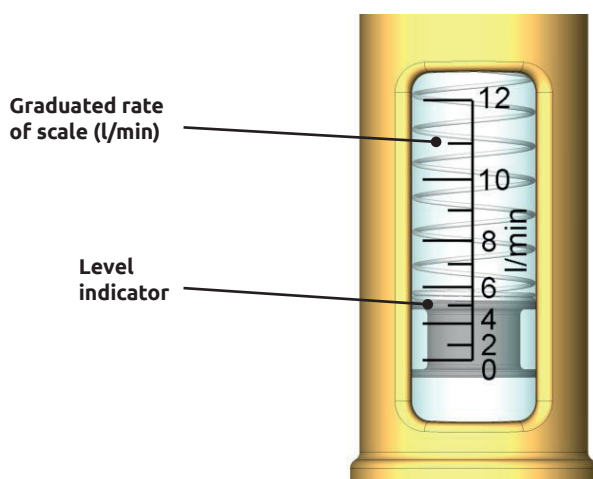
The scale range is 0-12 l/min.



Pict. 3



/ Flow rate reading



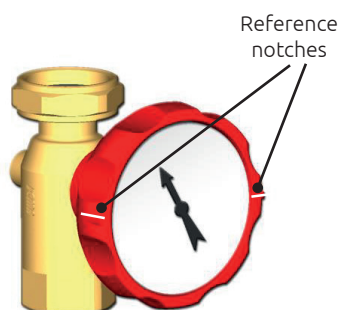
Pict. 4

/ Shut/off valve and check valve

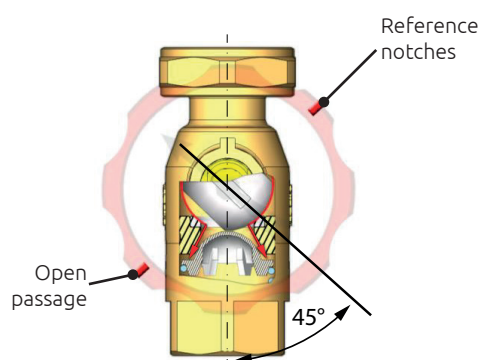
The group is equipped with shut-off valves with thermometer and built-in check valve 4 and 8 (Table1-page 3). The valves intercept the delivery and return flow to let fill, wash and discharge the system. They also enable a quick and easy replacement of the pump without emptying the system.

The shut-off valves are also equipped with check valves which ensure the proper flow of the heat-transfer fluid inside the solar circuit preventing undesired refluxing when the pump is not working

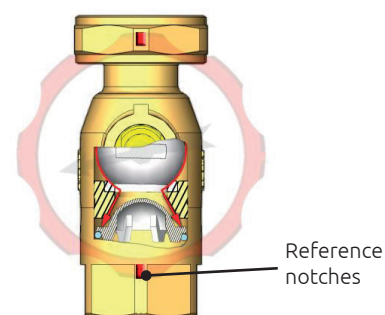
1. To fully close the shut-off valves turn the regulating handles clockwise until they stop (Pict.5).
2. To allow the fluid to pass through the valves in both directions and open the check valve, turn the regulating handles to 45° (Pict.6).
3. During the normal operating cycle instead, the valves must be in the position shown in Pict.7 by turning the regulating handles counter-clockwise until they stop.



Pict. 5

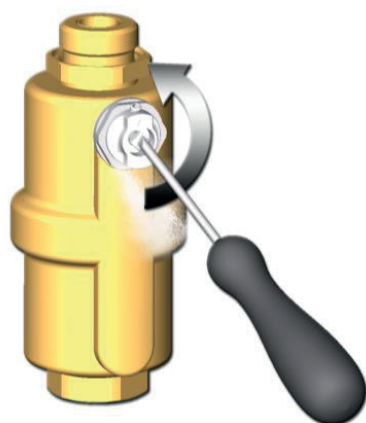


Pict. 6



Pict. 7

/ Deaerator



The solar modules S001, S002, and S004 is equipped with a deaerator 9 (Table1-page 3).

During the normal functioning of the solar circuit, the air present in the heat-transfer fluid is separated and collected in the upper part of the deaerator.

During the start-up, the air collected in the deaerator has to be periodically discharged by the manual air vent located in the upper part of the deaerator by turning its spindle counter-clockwise with a screwdriver. After discharging all the air in the deaerator, close the vent by turning its spindle clockwise until it stops.

Once the star-up is completed, for a first period, this operation must be repeated every month.

Then it will be sufficient to repeat this operation every 6 months to maintain the solar system efficient.

RISK OF BURNS!

When bleeding the system, depending on the pressure and temperature of the heat-transfer fluid in the system, opening the air vent may cause a high-speed jet of high-temperature liquid or water vapour, dangerous for the operator. To prevent any accidents, please follow these instructions:

- Wear appropriate protective equipment to protect hands and face.
- Carefully turn the air vent
- Keep your face away from the deaerator to avoid accidental burns.
- Protect all components and electrical connections from water.

/ Safety

Read assembly and operating instructions carefully before starting up the system in order to prevent accidents and damage to the system caused by improper use. Remember that your rights under the warranty will be forfeited if you make any changes to the system or tamper with it during assembly and construction without authorisation. In addition, you must follow the requirements of the regulations listed below:

/ Operating conditions

The limits on operating values specified must not be exceeded under any circumstances. Safe operation is guaranteed if you comply with the general conditions and limits on operating valves described in this information sheet.

/ Safety standards for assembly and inspection

Assembly and inspection operations must always be performed by qualified, authorised personnel familiar with the instructions contained herein. Make sure the system is shut down before performing any work on it.

/ Electrical connections

Electrical connections must be made by qualified personnel. Connecting cables must be positioned in the cavity provided for the purpose in the insulating shell so as to avoid contact with the body of the pump motor and with pipes.

Check that the power supply voltage is as specified on the plate before turning on the pump. All connections must be made as required by law.

/ Maintenance

Maintenance work must always be performed by qualified, authorised personnel familiar with the instructions contained herein. Make sure the system is shut down before performing any work on it. When replacing the pump, turn the on/off valve, return connection4 (Table1-page 3) and flow control valve 7 (Table1-page 3) to the off position.



WARNING! Depending on operating conditions in the pump and the system, the surface temperature could be very high. Touching the pump directly comports a risk of burning!