ART. S001-S002-S003-S004 SOLAR MODULE

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 S003-S004 modules are also equipped with electronic controllers which, through a sophisticated monitoring system and safety functions, ensure the total protection of the system during its operation.

S001

S002

S003

S004

PRODUCT RANGE

ART.	CODE	CIRCULATOR	EuP READY	CIRCULATOR RUN SIGNAL		CONTROL UNIT SIGNAL (if included)		SIGNAL CABLE PWM
				ON/OFF	PWM	ON-OFF	PWM	
S001	93S001AE05	Wilo S160		√				
	93S001AE05G	Grund. S160G		√				
	93S001S163	Grund.S163	√	√	√			NOT INCLUDED C64P3280153
	93S001S164	Wilo S164	√	√	√			INCLUDED
	93S001S165	Wilo S165	√	√				
S002	93S002AE05	Wilo S160		√				
	93S002AE05G	Grund. S160G		√				
	93S002S163	Grund.S163	√	√	√			NOT INCLUDED C64P3280153
	93S002S164	Wilo S164	√	√	√			INCLUDED
	93S002S165	Wilo S165	√	√				
S003	93S003AE05 S301	Wilo S160		√		√		
	93S003AE05G S301	Grund. S160G		√		√		
	93S003S163 S301	Grund.S163	√	√	√	√		NOT INCLUDED C64P3280153
	93S003S165 S301	Wilo S165	√	√		√		
	93S003AE05 S302	Wilo S160		√		√		
	93S003AE05G S302	Grund. S160G		√		√		
	93S003S163 S302	Grund.S163	√	√	√	√		NOT INCLUDED C64P3280153
	93S003S165 S302	Wilo S165	√	√		√		
	93S003S163 S302PWM	Grund.S163	√	√	√	√	√	INCLUDED
	93S003S164 S302PWM	Wilo S164	√	√	√	√	√	INCLUDED
S004	93S004AE05 S301	Wilo S160		√		√		
	93S004AE05GS301	Grund. S160G		√		√		
	93S004S163 S301	Grund.S163	√	√	√	√		NOT INCLUDED C64P3280153
	93S004S165 S301	Wilo S165	√	√		√		
	93S004AE05 S302	Wilo S160						
	93S004AE05G S302	Grund. S160G						
	93S004S163 S302	Grund.S163	√	√	√	√		NOT INCLUDED C64P3280153
	93S004S165 S302	Wilo S165	√	√		√		
	93S004S163 S302PWM	Grund.S163	√	√	√	√	√	INCLUDED
	93S004S164 S302PWM	Wilo S164	√	√	√	√	√	INCLUDED

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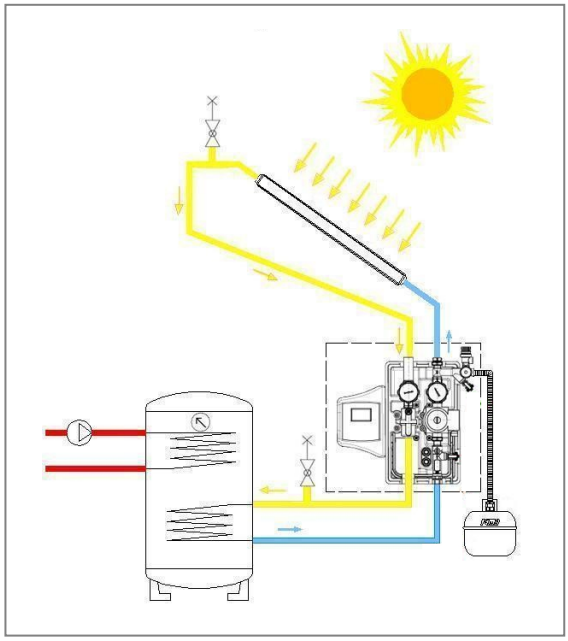
PRINCIPLE OF OPERATION

ICMA solar modules art. S001-S002-S003-S004, as already written above, 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.
In thermal solar panels the solar radiation increases the heat-transfer fluid temperature and therefore its thermal power.
In the storage tank, instead, the heat-transfer fluid carries through a heat exchanger most of its heat to the water in the tank.
The hot water in the tank will be then used for space heating or domestic use.
The solar modules manage this process and are equipped with a circulator pump having proper performances (flow and head) as well as several regulation and control devices that run the operation of the circuit.



TECHNICAL SPECIFICATIONS

Performance

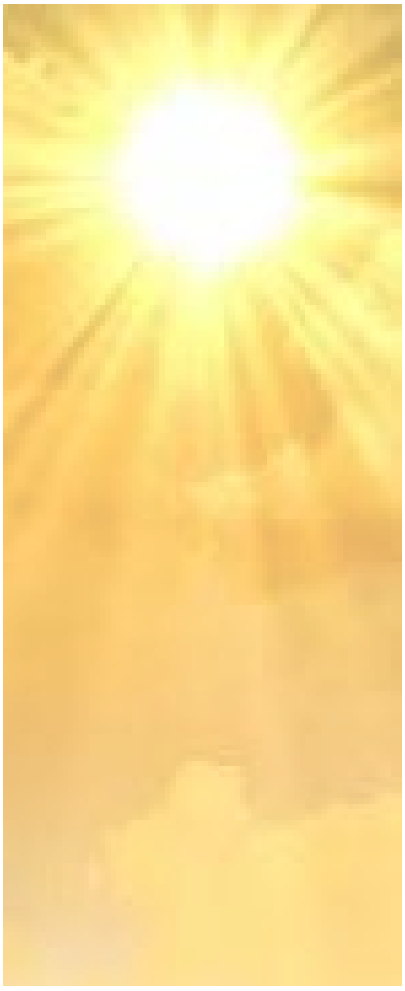
Fluids used:	Water and glycol solutions
Maximum percentage of glycol:	50%
Maximum operating pressure:	10 bar
Calibration of safety valve:	6 bar
Permitted temperature range:	-10 °C / +160°C
Max ambient temperature:	+40°C
Safety valve temperature range:	-30÷160°C
Minimum pressure on intake opening with temperatures of:	+50 °C : 0,05 bar +95 °C : 0.3 bar +110 °C : 1 bar
Opening check valves minimum pressure:	Δp: 2Kpa (200 mm c.a.)
Manometer scale:	0÷10 bar
Thermometers scale:	0÷160 °C
Circulators:	See specifications pag.7/11

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

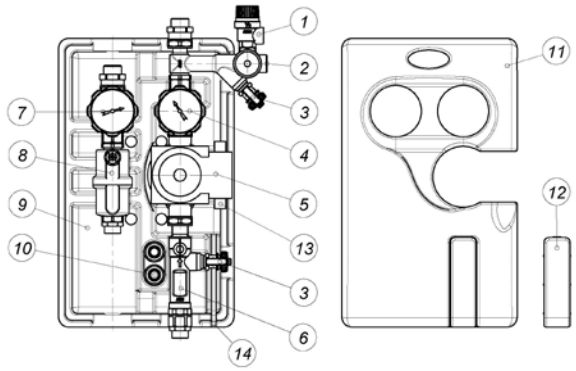
Materials

Brass components:	Brass CW617N - EN 12165
Seals:	PTFE
Sealing elements:	EPDM Perox
Flat seals:	Betaflex
Insulation shell:	PPE
Conductivity of isulation shell λ(ΔT):	0.041 (W/mK)



COMPONENTS

S001



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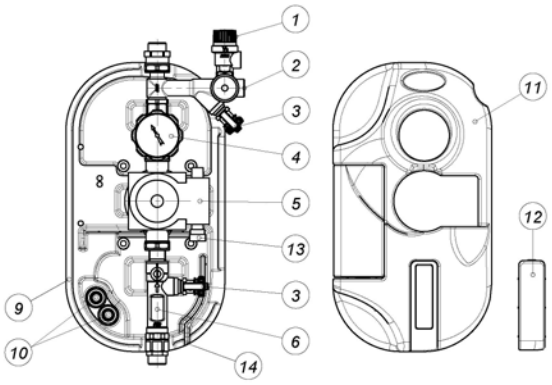
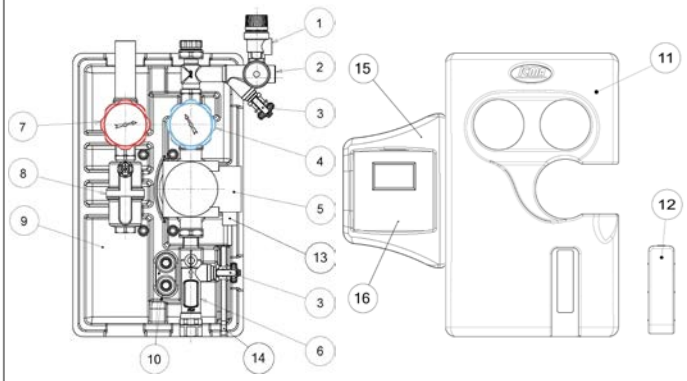
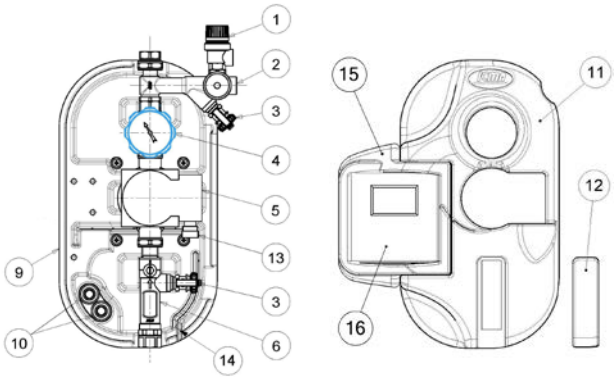


S003



S004

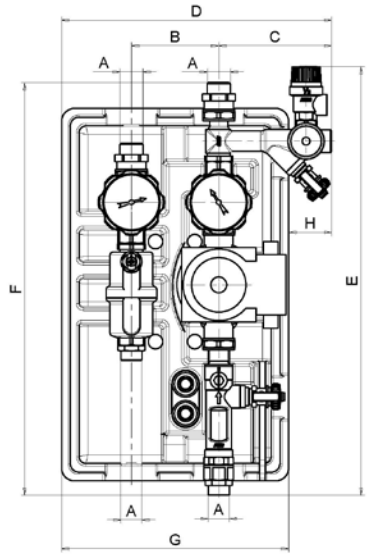


Tab. 1

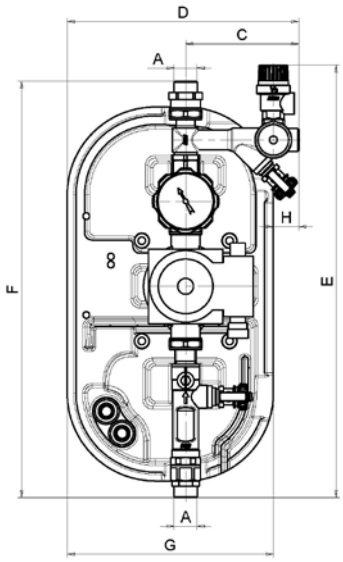
1. Safety valve for solar energy systems
2. Instrument holder connection with manometer
3. Taps for filling, emptying and washing the system
4. Shut off valve with thermometer and built-in check valve
5. Circulator
6. Flowmeter
7. Shut off valve with thermometer and built-in check valve
8. Deaerator
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 S301/S302/S302PWM

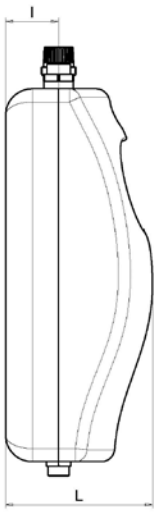
DIMENSIONS

S001

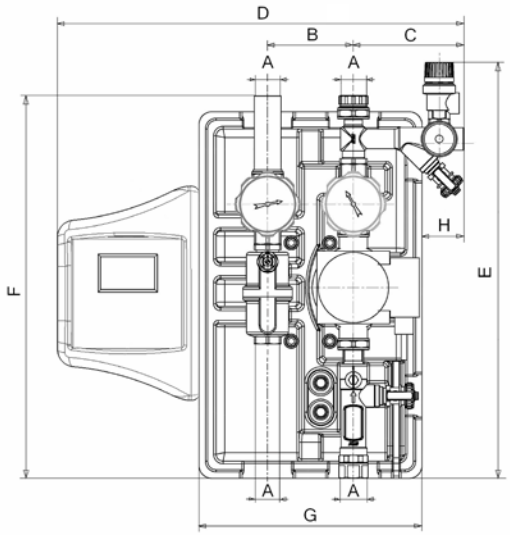


S002

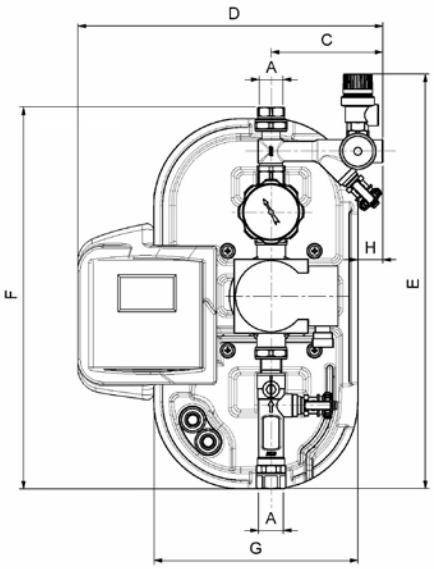


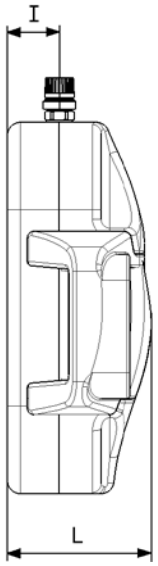


S003



S004





CODE	A	B	C	D	E	F	G	H	I	L	WEIGHT (KG)
S001	G ¾" M	100	140	325	480	420	260	60	60	170	7.0
S002	G ¾" M	/	140	275	480	420	235	40	60	170	5.0
S003	G ¾" M	100	140	480	480	420	260	60	60	170	7.5
S004	G ¾" M	/	140	360	480	420	235	40	60	170	5.5

Tab. 2

TECHNICAL SPECIFICATIONS

The solar modules 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. S301, S302 and S302PWM.

FILLING THE SYSTEM

1. Open the shut off valves connected with the air vent valves A (Fig.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 (Tab.1) and 7 (when present) 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 6 (Tab. 1) 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 (Tab.1) 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 (Tab.1) and start the external pump to fill the system.
6. Fill the system until air stops coming out of the air vent valves A (Fig.1).
7. Close the tap 3 and disconnect the external pump.
8. Close the shut off valves connected with the air vent valves A (Fig.1).

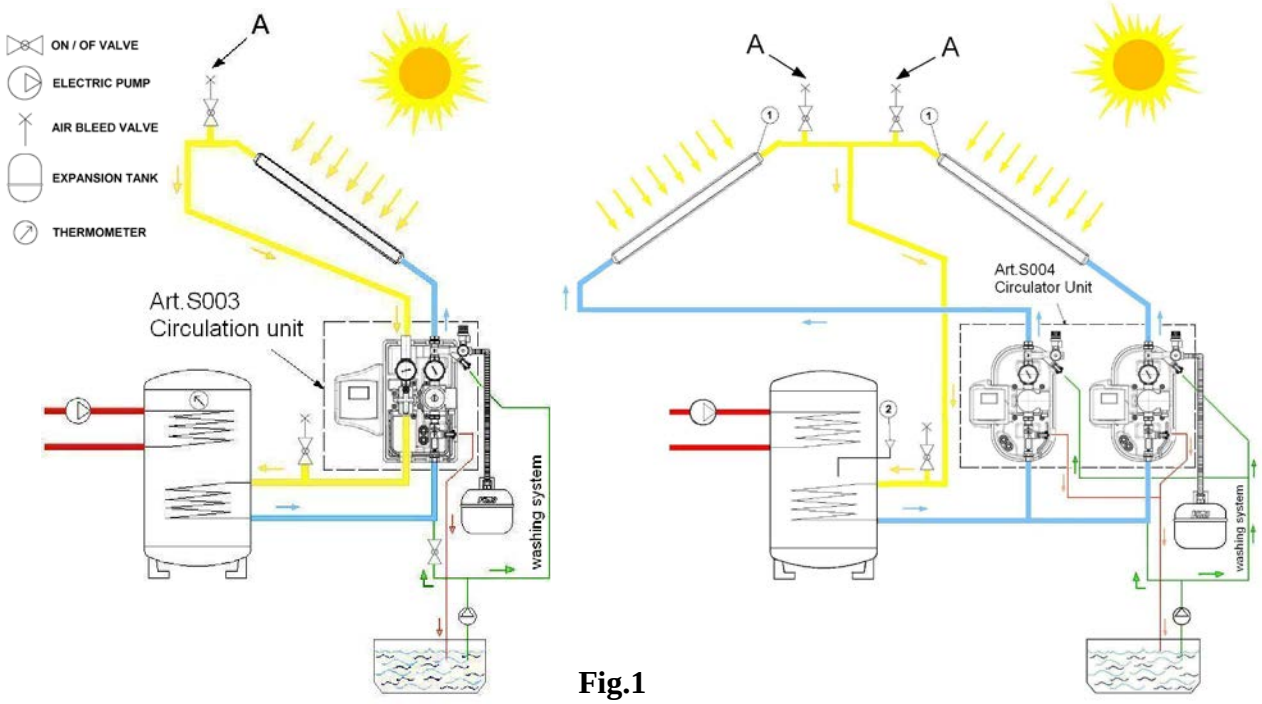


Fig.1

WASHING THE SYSTEM

1. Open both the shut off valves 4 (Tab.1) and 7 (when present) turning their handles to 45° (see the operating specifications of these valves on page 11 of this data sheet).
2. Close the flow meter 6 (Tab. 1) 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 6 (Tab. 1) to a point of discharge using a rubber pipe.
4. Connect an external pump to the tap 3 of the instrument holder connection 2 (Tab.1) 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 (Tab. 1).
6. Open slightly and for a short time the flow meter 6 (Tab. 1) 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.

START-UP

1. Connect an external pump to the tap 3 of the instrument holder connection 2 (Tab.1). The pump is used to increase the pressure in the system.
2. Start the pump, open the tap 3 and increase the pressure in the system up to the maximum value. Read the pressure value on the manometer 2 (Tab. 1), then close the tap 3 and stop the pump.
3. Open the shut off valves 4 (Tab.1) and 7 (when present) by turning them counter-clockwise until they stop.
4. Fully open the flowmeter 6 (Tab. 1) 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 (Tab.1).
6. Let the system running for a while, check the hydraulic seals of the system.
7. Open both the shut off valves 4 (Fig.1) and let drain any remaining air in the system, then close the valves.
8. Stop the circulator 5 (Tab.1)
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 6 (Tab. 1) 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 (Fig.1) and the deaerator 8 (Tab. 1) when present. After all air has been removed, check once again the pressure in the system with the manometer 2 (Tab.1) and, if necessary, restore the desired operating value as described above in step 2.

EMPTYING THE SYSTEM

The system must be emptied if it has been filled with water only and will be exposed to a risk of freezing.

1. Open the shut off valves connected with the air vent valves A (Fig.1).
2. Open both the shut off valves 4 (Tab.1) and 7 (when present) turning their handles to 45° (see the operating specifications of these valves on page 11 of this data sheet)
3. Open the drain cock of the flowmeter 6 (Tab. 1) or the tap located at the lowest point in the system.

INSTALLATION 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 M8x35mm and two washers (D).
The supporting plate (E) and the dowels for the wall fixing (F) 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 as shown in Table N. 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.

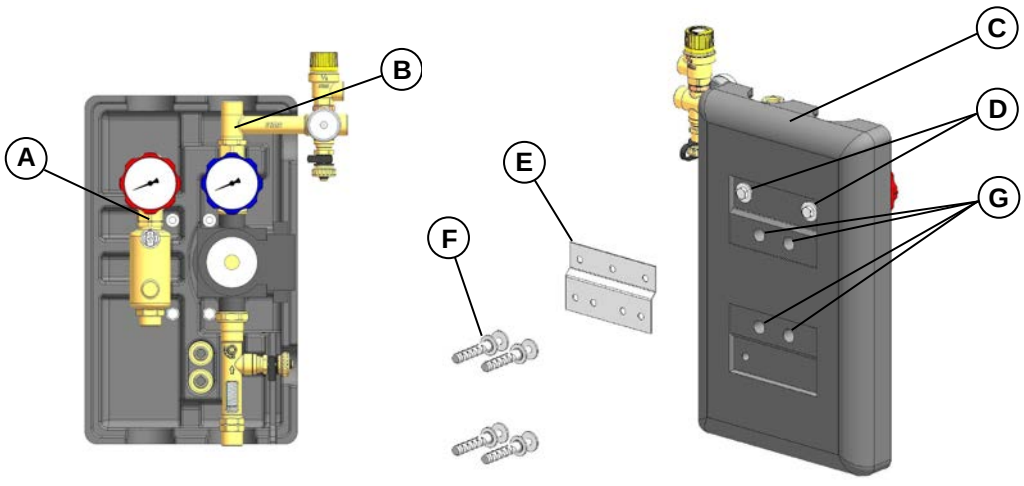


Fig. 2

CIRCULATORS RANGE

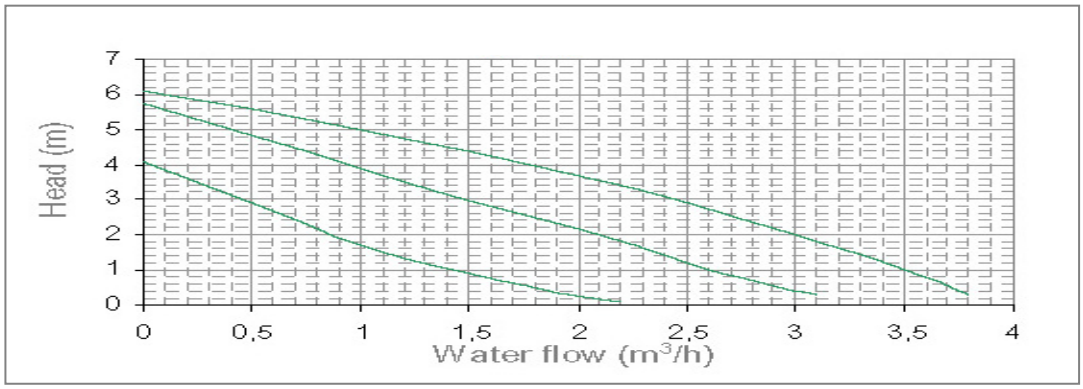
ARTICLE: S160

Synchronous circulation pump with 3 speeds

Technical specifications

Brand:	Wilo
Model:	Solar ST20/6
Centre to centre distance:	130 mm
Connections:	G1" M
Electrical power supply:	230V – 50/60Hz
Operating temperature:	2÷110°C.
Max temperature:	140°C per brevi periodi
Max operating pressure:	10 bar
Protection level:	IP44
Energy class (EEI):	C

Hydraulic characteristics



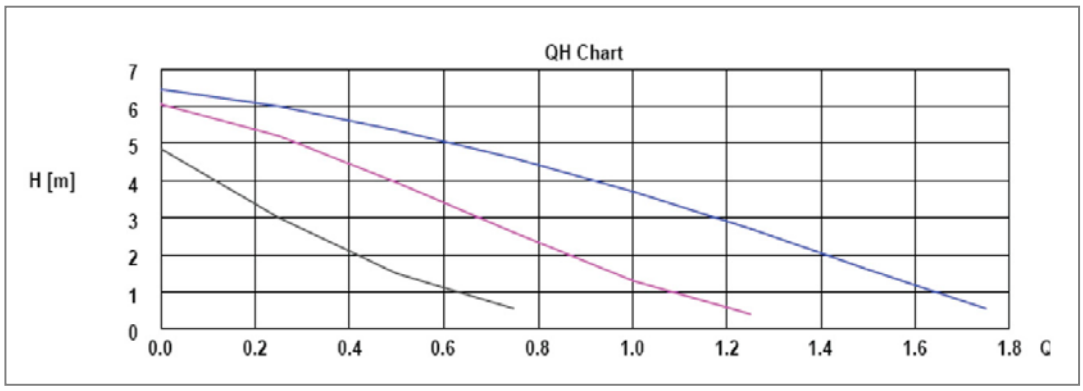
ARTICLE: S160G

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:	230V – 50/60Hz
Operating temperature:	2÷110°C.
Max temperature:	140°C per brevi periodi
Max operating pressure:	10 bar
Protection level:	IP44
Energy class (EEI):	C

Hydraulic characteristics



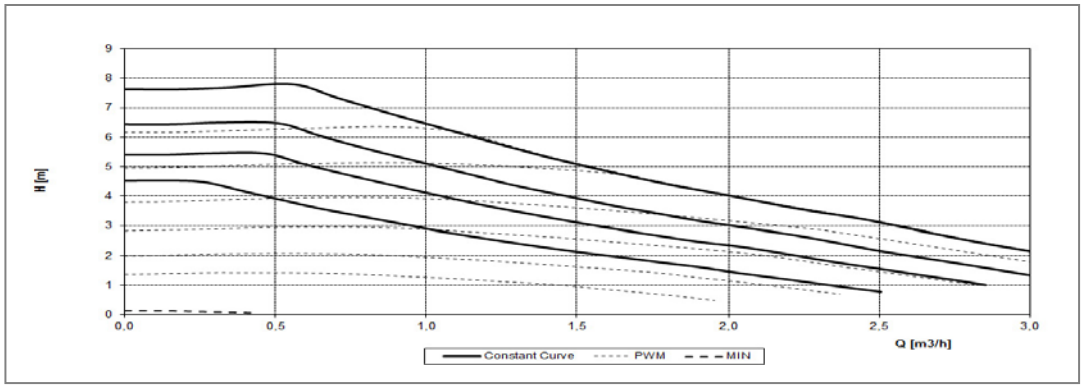
ARTICLE: S163

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:	230V – 50Hz
Operating temperature:	2÷110°C.
Max temperature:	130°C per brevi periodi
Max operating pressure:	10 bar
Protection level:	IPX4D
Energy class (EEI):	≤0.20
PWM signal cable code:	C64P3280153 (NOT INCLUDED)

Hydraulic characteristics



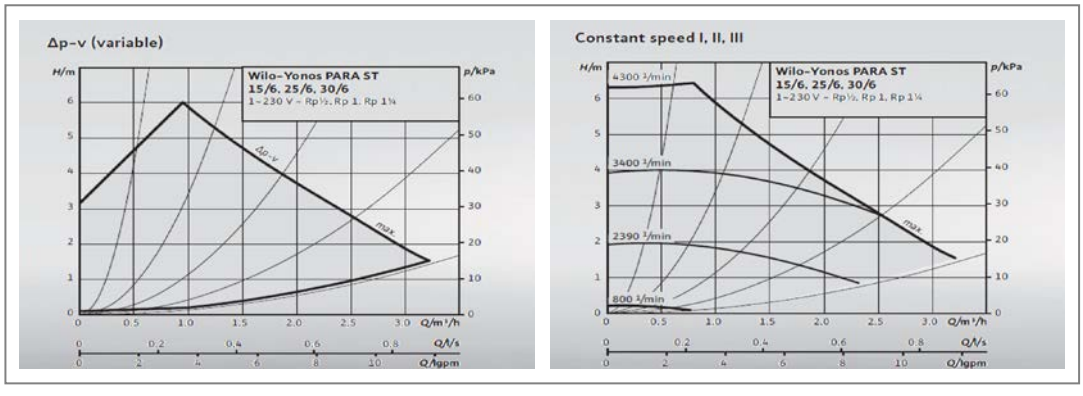
ARTICLE: S165

Circulator with 3 constant curves, ΔP variable

Technical specifications

Brand:	Wilo
Model:	Yonos PARA ST 15/6 RKC
Centre to centre distance:	130 mm
Connections:	G1" M
Electrical power supply:	230V – 50/60Hz
Operating temperature:	2÷110°C.
Max temperature:	130°C per brevi periodi
Max operating pressure:	10 bar
Protection level:	IPX4D
Energy class (EEI):	≤0.21

Hydraulic characteristics



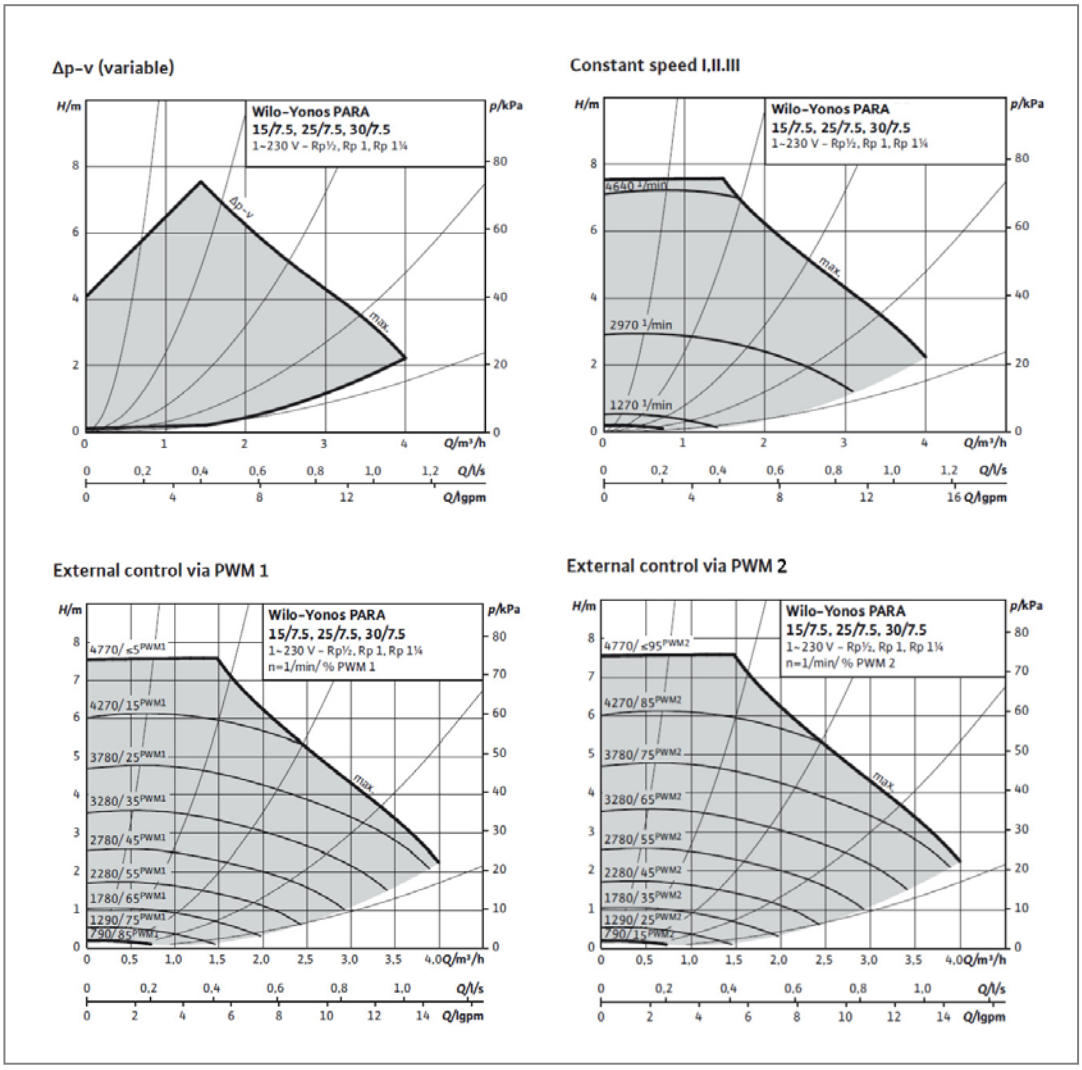
ARTICLE: S164

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:	230V – 50/60Hz
Operating temperature:	2÷110°C.
Max temperature:	130°C per brevi periodi
Max operating pressure:	10 bar
Protection level:	IPX4D
Energy class (EEI):	≤0.21

Hydraulic characteristics



FLOW METER

The flowmeter (6 in Tab.1) 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 (Fig.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.

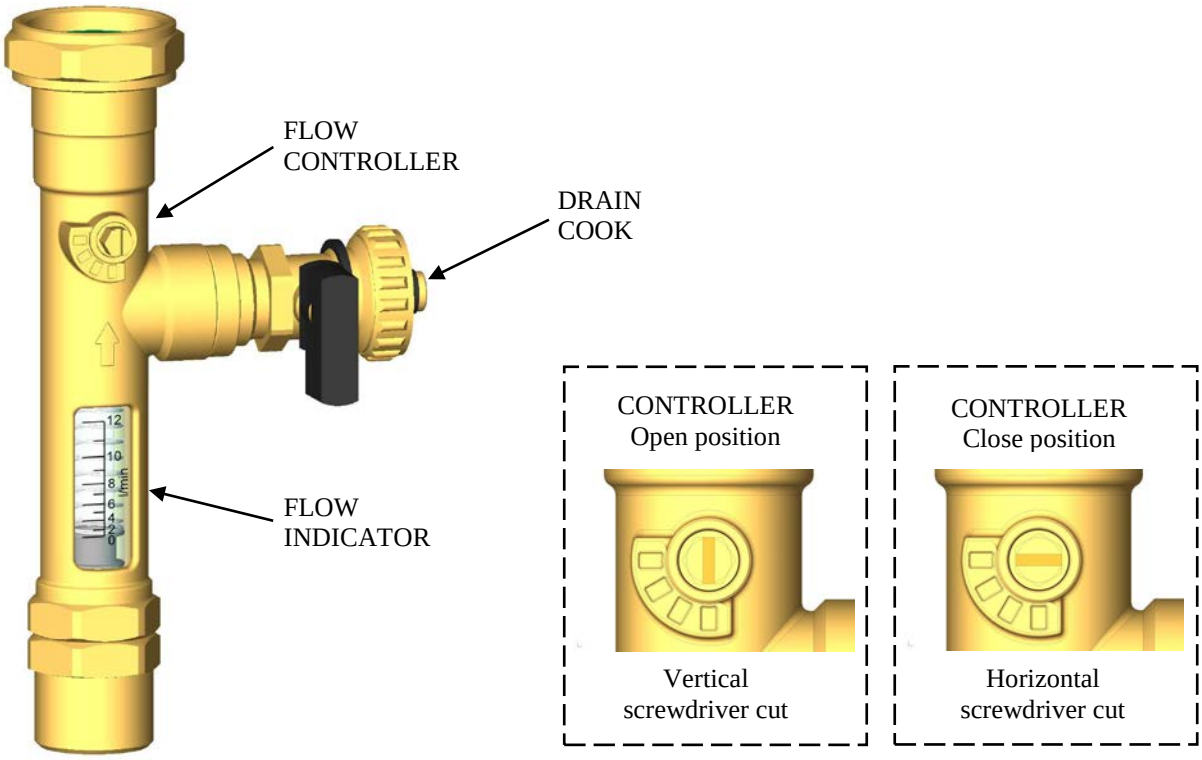


Fig.3

FLOW RATE READING

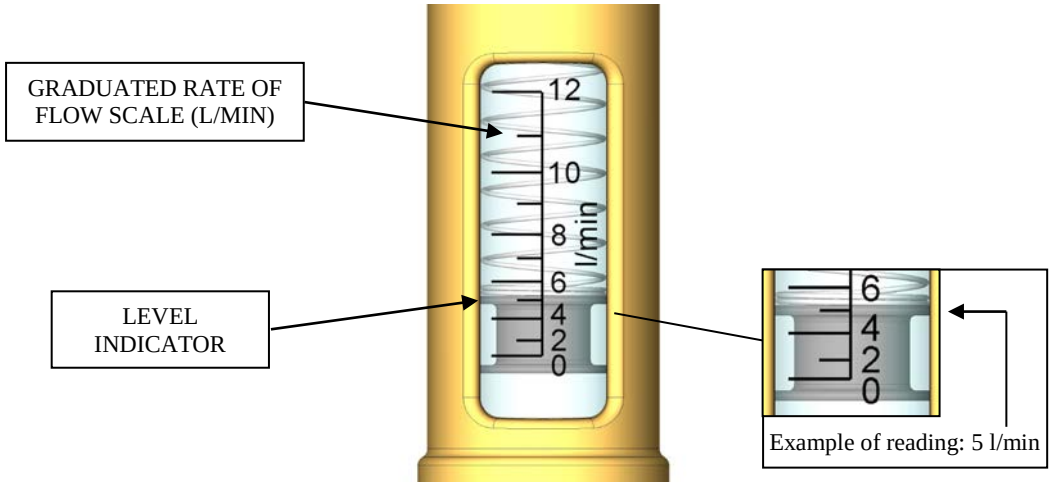


Fig.4

SHUT/OFF VALVE AND CHECK VALVE

The group is equipped with shut-off valves with thermometer and built-in check valve 4 e 7 (Tab.1). 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 regulatig handles **clockwise** until they stop (Fig.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° (Fig.6).
3) During the **normal operating cycle** instead, the valves must be in the position shown in Fig.7 by turning the regulating handles **counter-clockwise** until they stop.

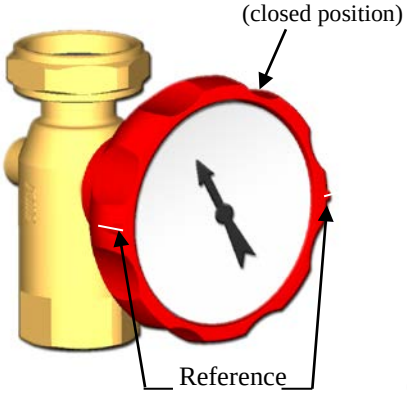


Fig.5

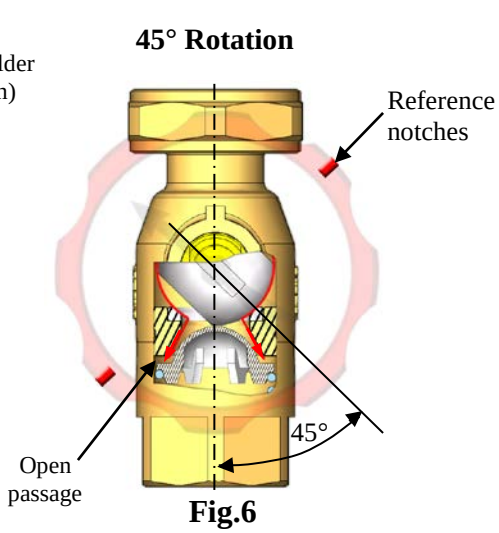


Fig.6

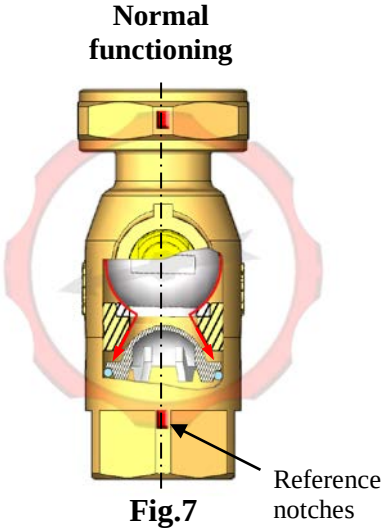


Fig.7

DEAERATOR

(Present only in the solar modules art. S001 and S003)

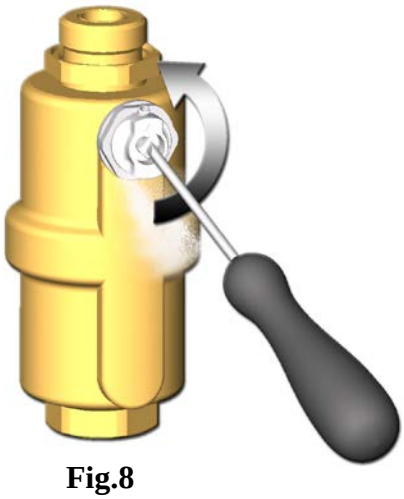


Fig.8

The solar modules art. S001 and S003 are equipped with a deaerator 8 (Tab. 1). 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 the first few months this operation must be repeated every week or every month.
When the system is working, instead, it is necessary to repeat such operation just every 6 months to mantain 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:
- Carefully turn the air vent protecting your hands with suitable gloves.
- Keep your face away from the deaerator.
- Protect all components and electrical connections from water.

SAFETY

Safety warnings

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:

DIN 4751
Water heating systems

DIN 4757
Solar heating systems

DIN 18380
Heating systems and hot water heating systems

DIN 18382
Electrical systems and pipes in buildings

DIN 12975
Thermal solar systems and components

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 14 (Tab.1) 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 connection 4 (Tab.1) and flow control valve 6 (Tab.1) 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!