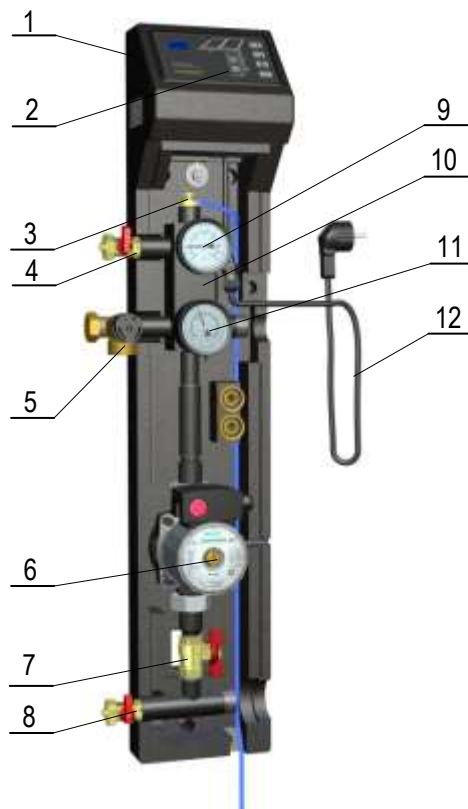


## ASSEMBLY INSTRUCTIONS FOR THE PUMP AND CONTROL UNIT ZPS 18a-01

### 1. Use and construction of the pump and control unit

The pump and control unit is designed to work with solar collectors in systems with required flow of the heat transfer fluid up to 18 l/min, depending on the surface of solar collectors installed.

The pump and control unit is a compact device, in a foamed polypropylene cover, it contains accessories necessary for correct functioning of the solar collector system. Because of the pump and controller used, the unit is an integral solution without the possibility of replacing these elements with others available on the market. The flow in the solar collector system is fully adjustable in a multi-stage manner, ensuring maximum efficiency of solar energy collection. The pump unit is adapted to support systems with a single set of solar collectors and a single boiler. The guarantee of proper operation of the pump unit is the correct placement of temperature sensors. For this purpose, it is recommended to use the appropriate connection unit for the boiler.



1	Pump and control unit cover
2	G425-P01 Controller
3	Manual vent with hose
4	Release valve – top
5	Safety valve 6bar
6	Circulation pump WILO 15 / 6 - PR
7	Ball valve
8	Release valve – bottom
9	Thermometer 0 – 120°C
10	Air separator with a check valve
11	Pressure gauge 0 – 6bar
12	Power cord

Figure 1 Pump and control unit

### Assembly of the pump and control unit.

Steps of the assembly.

- a. Attach the pump and control unit to the wall using 3 anchor screws.
- b. Connect the hydraulic connections of the pump and control unit with the solar collectors, the boiler, and the expansion tank, as shown in the schematic diagram of the system (fig. 2).
- c. Place the temperature sensors in the right places in the system and connect to the controller (fig. 3 and fig. 4)

## Diagrams of pump and control unit connections in the solar system

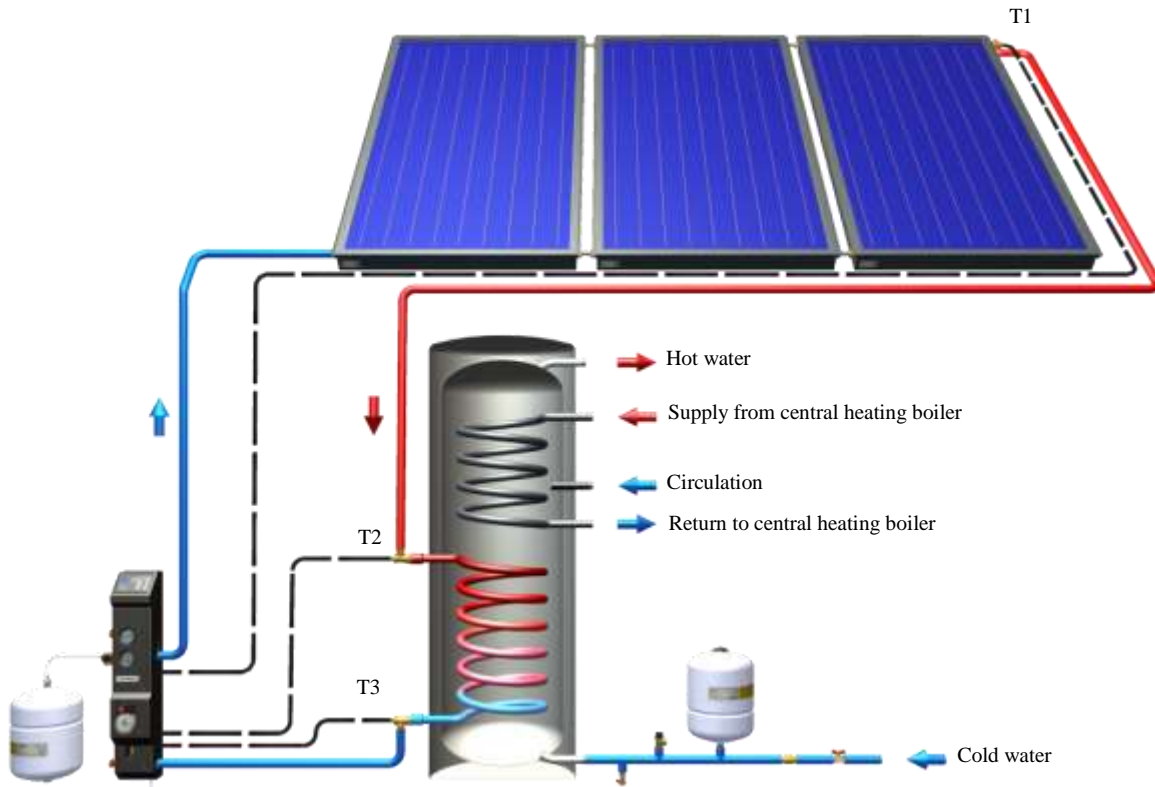


Fig. 2


### Filling and starting the system.

The system should be filled with a heat transfer fluid, which is a water solution of propylene glycol, with a crystallization temperature of  $-25^{\circ}\text{C}$  with an addition of an inhibitor pack, protecting the system from corrosion.

**Attention!!! The fluid with the freezing temperature stated should not be diluted with water.**

### Fill the system with heat transfer fluid using a turbine-driven pump.

Steps of the filling and starting procedure:

- Pump hoses: connect the supply hose to the top release valve (4), the overflow hose to the bottom release valve (8). Fill the pump's tank with the heat transfer fluid, open the bottom release valve (8) and start the turbine-driven pump.
- During the entire time of filling and starting the system, leave the manual vent valve slightly open (3) and also check the venting of the pump (pump unit branch between the lower tee and the check valve in the bottom of the separator) by unscrewing the central screw (6).
- Leave the turbine-driven pump working until completely ventilating the system.
- Close the drain valve (8) and increase the system pressure to about **2.5 bar** indicated by the pressure gauge (11).
- Plug the controller into 230V AC mains and turn on the circulation pump in manual mode; leave the circulation pump in manual mode for a period from few to several minutes.
- If the system operates quietly without noise caused by air bubbles circulating with the fluid, close the manual vent valve (3) and possibly increase pressure in the system in accordance with paragraph d.
- Disconnect pump hoses from the valves (4 and 8).
- Switch the controller to automatic mode by pressing  again.

## G425-P01 electronic controller

G-425-P01 controller is a device designed and produced to be used with solar collector systems. This product has been created on the basis of a faultless modern microchip technology. The controller has a modern look and is very easy to use, thanks to its user panel which features a simple keyboard and an LCD screen. This controller works with a dedicated pump WILO RS15/ 6 - 3 - PR providing change of flow in the full range of the pump's operation. The controller cannot be used to work with commonly used pumps for solar systems with a manual change of rotational speed. The only user-adjustable parameter is maximum temperature of water heated by solar panels.

### Electrical system and rules for connecting.

- Electrical system (regardless of its type) must be ended with a plug socket equipped with a safety contact. The use of a socket without the protective conductor terminal is a risk of electric shock!!!
- The crimp connectors used are approved for continuous load of 16A!!! They feature a fine thread and special plates to prevent crossing of wires, and therefore only a slight tightening of the cable creates a maximally good contact and the use of greater force may lead to breaking the thread.
- After connecting the device to power, dangerous 230VAC voltage can occur on the cables and connectors, regardless of whether the controller is switched on or off, therefore **ANY WIRING REPAIRS AND CHANGES can be made only with a completely disconnected power supply!!!**

### System diagram and connection of the controller.

The G-425-P01 controller is equipped with 3 inputs allowing connecting 3 temperature sensors NTC10k-type (T1, T2, T3) and 4 outputs for connecting one 3-speed collector pump (P).

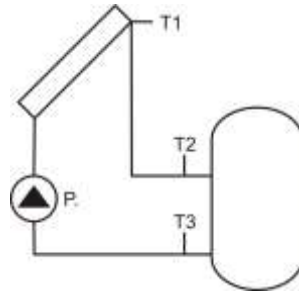


Fig. 3 Schematic diagram of the system.

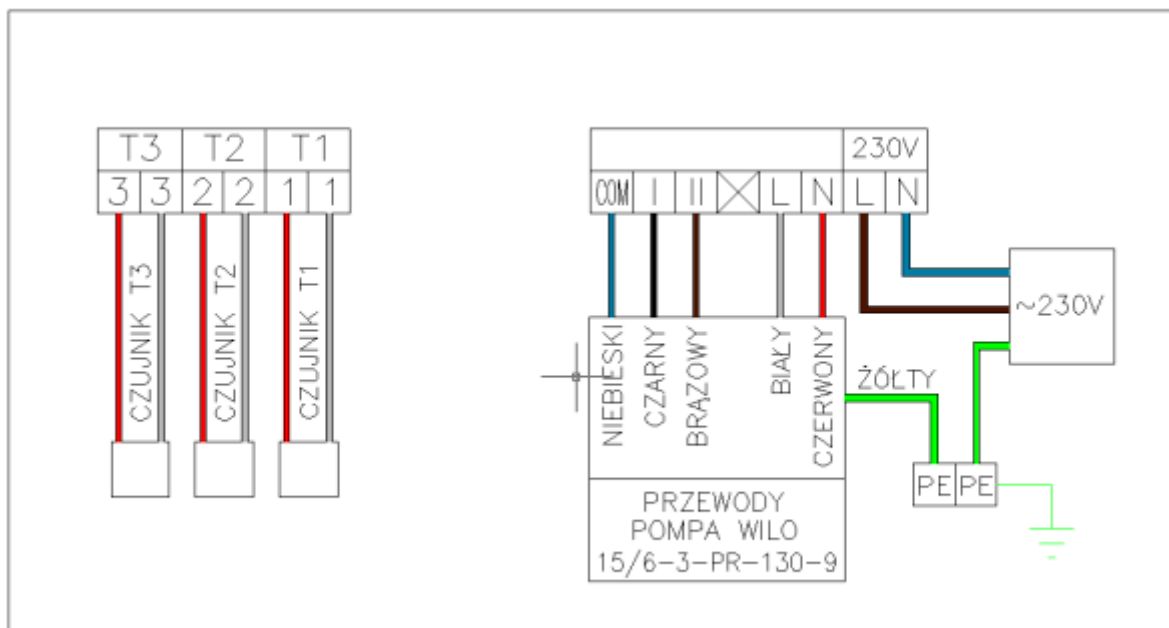


Fig. 4 Electrical connection of the controller.

### Using the controller.

#### Switching the controller on and calibration of the touch keyboard.


When connected to a power source, the controller calibrates the touch keyboard for about 6 seconds. **During the calibration, do not place your hands close to the sensors, which would cause incorrect calibration and, consequently, keyboard malfunction.** After the keyboard calibration process, the controller goes into standby mode (if it was in standby mode before switching it off), or into operation mode (if it was in operation mode before switching it off).

If the keyboard is not working properly, rerun the calibration process. To do this, disconnect and then reconnect the controller to a power source and wait for the touch keyboard to recalibrate, remembering not to place your hands near the sensors.

#### Standby.


In this mode, the LED display shows the symbol "- -".

In standby mode, all outputs are disabled and the alarm sound is inactive.

Pressing  will cause the controller to exit from standby mode and go to automatic mode.

### **Automatic mode.**

In automatic mode, the collector pump control algorithm is implemented, based on information read from the temperature sensors T1, T2 and T3.

During the active automatic mode, the display shows the temperature of one of three temperature sensors (T1, T2 or T3) or the collector pump speed level, but if the temperature displayed is less than  $-9^{\circ}\text{C}$ , a "Lo" message is displayed, and the temperature displayed is greater than  $99^{\circ}\text{C}$ , an "UP" message is displayed. Switching between successive points is done using the  button in the sequence:

temperature T2 → temperature T3 → collector pump speed level → temperature T1 → temperature T2  
...


Information about which point is currently displayed is shown by continuous light of one of the four green LEDs, located on the diagram by the symbols of the individual points. If no buttons are pressed for 60 seconds, the controller will revert to displaying temperature T2. For a few seconds after power up, instead of the temperature, symbol of 'un' (uncertain value) will be shown on the display until the controller has completed the first measurement loop. During this time, the collector pump is turned off.


Pump operation is signalled by a green LED located by the pump symbol according to the diagram: the LED is not lit - the pump is not operating, the LED blinks - the pump is working, but if the pump is working, and the collector pump speed level is displayed, the LED is lit with continuous light. In addition, the collector pump status is displayed by a dot in the lower right corner of the display: if dot is not lit up - the pump is not working, if the dot is lit up - the pump is working.


When displaying information about the collector pump speed level, the left display shows the current gear of the pump, from 0 to 3, where 0 means the pump is stopped, 1 means the slowest gear and 3 the fastest gear of the pump. The right display indicates the collector pump phase speed level, from 0 to 5, where 0 means the pump is stopped, 1 means minimum phase speed level of the pump, and 5 means maximum phase speed level of the pump.

In case of sensor failure, and the user selects to display readings from this sensor, the display instead of the temperature value displays the symbol "Er", and the LED on the diagram assigned to this sensor is lit with a continuous light. If another point is currently displayed, the LED on the diagram assigned to the damaged sensor flashes.




Additionally, if there is damage to at least one of temperature sensors, acoustic signal is active until the failure is removed or the signal is muted by the user, by pressing any key.

Pressing the button  causes switching to the menu for viewing and setting of the maximum temperature.


Pressing the button  will enter the manual mode.

By pressing the button  the controller will switch to standby.


### **Viewing and setting the maximum temperature.**

Switching to the menu for viewing and setting the maximum temperature is achieved by pressing  when automatic mode is active. After entering this mode the current value of the maximum temperature is displayed (flashing). Repeatedly pressing the  will increase the temperature by  $1^{\circ}\text{C}$ , and after crossing  $85^{\circ}\text{C}$  it will be substituted by the value of  $40^{\circ}\text{C}$ . Hold the  button longer will activate the auto repetition function. The controller automatically returns to the automatic mode, and the new value of the maximum temperature will be saved, if no buttons are pushed for 5 seconds.

### **Manual mode.**

Switching to the manual operation mode is achieved by pressing  when the automatic mode is active.

After entering this mode, the pump is running at the maximum speed level (3, 5), the LED by the pump symbol in the diagram flashes in a cycle of 3 short flashes and a pause, and a short sound signal is generated for about 10 seconds.


Similarly as during the active automatic mode, the display shows the temperature of one of three temperature sensors (T1, T2 or T3), but if the temperature displayed is less than  $-9^{\circ}\text{C}$ , a "Lo" message is displayed, and the temperature displayed is greater than  $99^{\circ}\text{C}$ , an "UP" message is displayed. Switching between successive points is done using the  button in the sequence:


temperature T2 → temperature T3 → temperature T1 → temperature T2 ...

Information about which point is currently displayed is shown by continuous light of one of the three green LEDs, located on the diagram by the symbols of the individual points. If no buttons are pressed for 60 seconds,

the controller will revert to displaying temperature T2. For a few seconds after power up, instead of the temperature, symbol of 'un' (uncertain value) will be shown on the display until the controller has completed the first measurement loop.

Information about the failure of one of the sensors is displayed the same way as in automatic mode.

The controller will return to automatic mode automatically after 10 minutes after activating the manual mode, or after pressing .

By pressing the button  the controller will switch to standby.

### **Protection**

To protect the system from high temperature, circulation of steam bubbles and cavitation, if the temperature  $T_1 \geq 120^\circ\text{C}$ , protection will be activated, the pump will be switched off and temperature T1 on the LED display will flash. Protection will be disabled if  $T_1 \leq 118^\circ\text{C}$ .

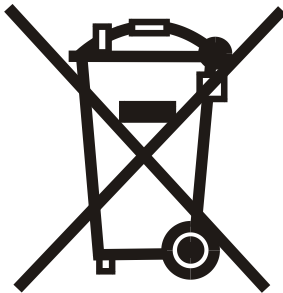
With the introduction of sets in which the collectors have an absorber made entirely of aluminium, an additional protection was introduced. If temperature  $T_3 \geq 70^\circ\text{C}$ , the pump will be switched off, and temperature T3 on the LED display will flash. Protection will be disabled if  $T_3 \leq 68^\circ\text{C}$ .

### **Alarm.**

If the temperature parameters indicate a no-flow status (e.g. aerated system, pump failure), the controller activates the alarm - "FL" will be shown on the display and a sound alarm will activate. The alarm will be active until confirmation by the user by pressing any key, or until the state that caused the alarm is changed.

### **Information regarding labelling and disposal of worn out electric and electronic equipment.**

ATTENTION!



The symbol found on the product or its packaging indicates selective disposal of worn out electric and electronic equipment. What this means is that this product should not be thrown away with other household waste. Proper disposal of old and worn out electric and electronic equipment will help avoid potentially unfavourable effects on the environment and human health.

The responsibility of selective disposal of worn out equipment lies with the user, who should return it to a proper facility collecting worn out equipment.

### **NOTES**

- This equipment is not intended for use by persons (including children) with reduced physical, sensory or mental ability, or persons who have no experience or knowledge of the equipment, unless it is done under supervision or in accordance with the operating manual for the equipment by a person responsible for their safety. Make sure that children do not play with the equipment
- If the non-detachable cord is damaged, it should be replaced by the manufacturer or a specialised repair facility or by a qualified person in order to avoid risks