

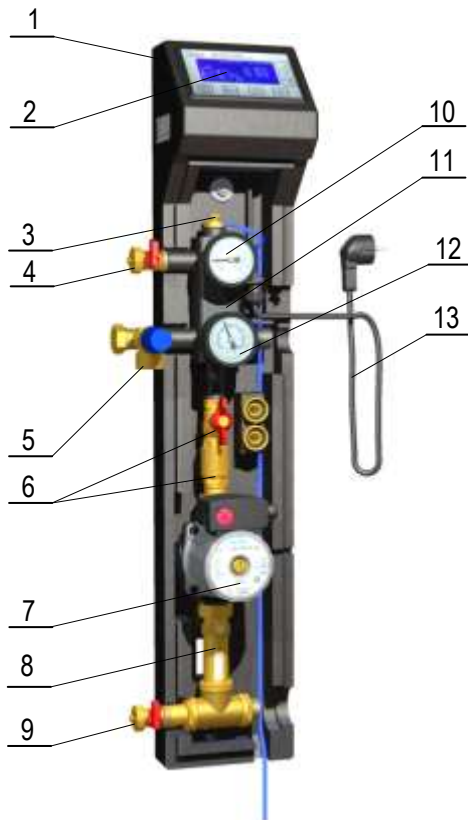
ASSEMBLY INSTRUCTIONS FOR THE PUMP AND CONTROL UNIT

1. Use and construction of the pump and control unit

Pump and control unit is used to cooperate with solar collectors in an installation with a required heat transfer fluid. Maximum flow rates of up to 6, 16, or 28 l/min can be set, depending on the type of flow controller.

The pump and control unit is compacted in a foamed polypropylene cover and it contains accessories necessary for correct functioning of the solar installation.

Construction of the pump and control unit is presented in **Figure 1** below.



1	Pump and control unit cover
2	G422 controller with an LCD screen
3	Automatic vent with a cable
4	Release valve - top
5	Safety valve 6bar
6	Ball valve with a non-return valve
7	Circulating pump WILO 15-6
8	Flow meter 1,5 - 6 or 4 - 16 or 8 - 28 l/min
9	Release valve - bottom
10	Thermometer 0 – 120°C
11	Air separator
12	Manometer 0 – 6bar
13	Power cord

Spacing of $\varnothing 10$ openings for attaching the unit

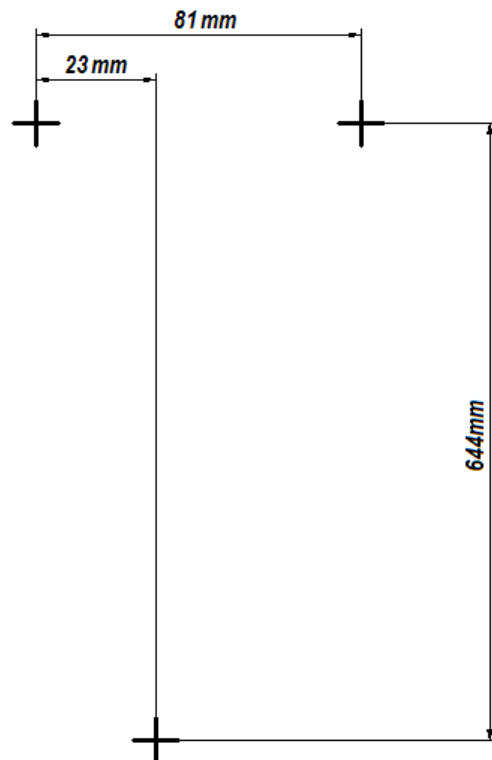


Fig. 1. Description of pump control unit components

Fig. 2. Diagram of spacing between $\varnothing 10$ openings necessary for attaching the pump control unit

2. Diagram of solar installation connections



Fig. 3. Schematic diagram of solar installation

3. Assembly of the pump and control unit.

Consecutive steps.

- Attach the pump and control unit to the wall using 3 anchor screws in spacing as presented in **Figure 2**.
- 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 installation (**Fig. 3**).
- Cold water connection should be done according to the presented schematic diagram of the installation (**Fig. 3**), or the schematic diagram of the installation in a warranty card.
- Place temperature sensors in appropriate locations in the installation and connect to the controller (according to the diagram of electric connections presented in the later part of the instruction).







Filling and starting the installation.


The installation should be filled with a proper heat transfer fluid, namely **TERMSOL EKO** or **ERGOLID EKO**, which is a water solution of propylene glycol, with a solidification temperature of -25°C with an addition of an inhibitor pack, protecting the installation from corrosion.

ATTENTION!!! TERMSOL EKO should not be diluted with water.

Filling the installation with heating medium using a manual pump.

Consecutive steps.

- Connect the pump's supply hose to the release valve (9).
- Open the venting valve by the solar collector battery's heat transfer fluid outlet.
- Fill the manual pump with the heat transfer fluid and pump it into the installation until the heating medium overflows through the venting valve by the collectors. Close the valve and continue pumping the heat transfer fluid into the installation, until the required pressure in the installation is achieved $p = 2.5 \text{ bar}$, indicated by a manometer (12).
- Connect the controller's plug to 230V power supply and turn on the circulation pump in a manual mode. In order to do so follow the steps below:
 - Turn on the controller by pressing 
 - Enter the MENU by pressing 
 - Using directional buttons  or  select the **Manual Control** option and confirm by pressing 
 - Turn on the pump P manually, by switching the option „Off” to „On”, using  button
- The remaining air should be automatically removed by the automatic vent (3).
- In case of a drop or lack of flow (the flow meter float drops), unscrew the circulation pump's central screw (11) and release air blocking the pump. Repeat this process until air is evacuated completely from the installation.

- g. In case of a pressure drop below 1.5 bar, indicated on the manometer (12), refill the fluid to the pressure of $p = 2.5$ bar.
- h. Disconnect the manual pump's supply hose from the valve (9).
- i. Next, using a screwdriver, use the flow meter screw (8) to adjust the flow rate of the heat transfer fluid to the value of: 1.5l/min for each solar collector (the actual flow rate is indicated by the bottom of the float).
- j. Switch the controller to automatic mode by pressing .

Filling the installation with heating medium using a turbine-driven pump.

Consecutive steps.

- a. Pump hoses: connect the supply hose to the top release valve (4), the overflow hose to the bottom release valve (9). Fill the pump's tank with the heat transfer fluid, open the bottom release valve (9) and turn on the pump.
- b. Close the ball valve (6) causing the fluid to flow through the collectors. During filling and venting the system, open and close the ball valve several times (6).
- c. Do not turn off the pump until all air is completely evacuated from the installation – meaning to the moment, when air bubbles stop flowing out from the overflow hose.
- d. Open the ball valve (6) and close the release valve (4). Keep pumping the heat transfer fluid until the overpressure of $p=2.5$ bar is reached, indicated by the manometer (12).
- e. Close the release valve (4) and keep pumping heat transfer fluid until the overpressure of $p=2.5$ bar is reached, indicated by the manometer (12).
- f. Next, perform steps d, e, f, g, i, and j described in the manual pump filling instructions
- g. Disconnect pump hoses from the valves (4 and 9).

4. G422-P03 electronic controller

The controller is an independent control block designed to control circulation pumps and other devices, which may be a part of solar collector installations. G422-P03 controller has 4 temperature sensors, which depending on the selection of one of various installation programmes (schemes), should be placed in appropriate temperature measurement locations indicated in the diagram of the respective installation scheme (see: G422-P03 independent control block operation manual).

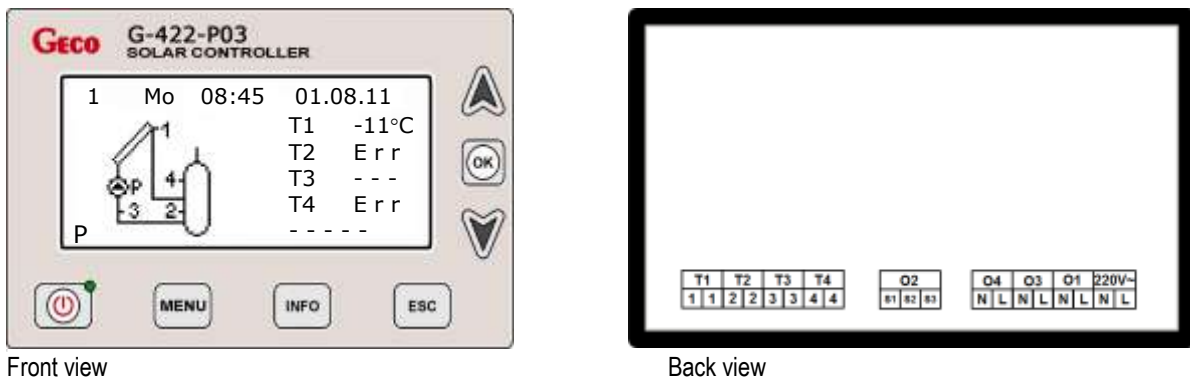


Fig. 4. Description of measurement outputs and relay inputs for system no.1.

Input / Output	Description
220V~	Connection to a 230V~/50Hz power line
O1	Collector pump input – Maximum current capacity: 3,15A
O2	Relay output – potential free output
O3	Circulation pump input - Maximum current capacity: 8A
T1	Solar collector temperature sensor
T2	Heater temperature sensor – bottom coil
T3	Air separator temperature sensor (heat transfer return)
T4	Heater temperature sensor – top coil

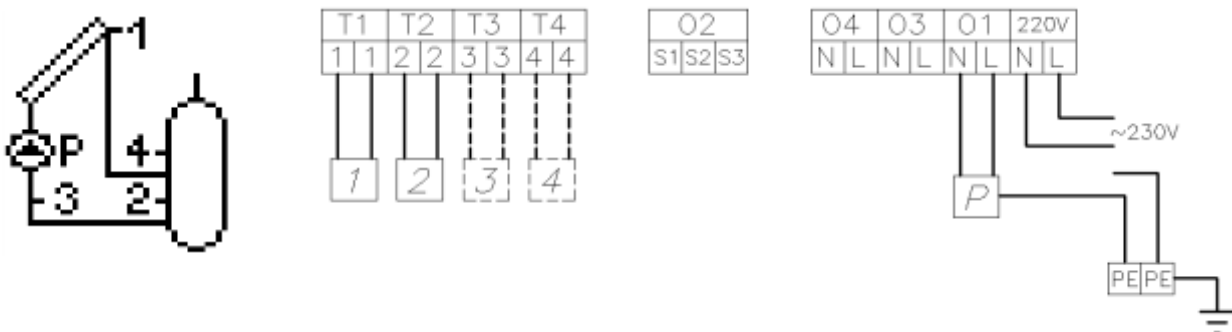


Fig. 5. Schematic and electric diagram of installation no. 1





ATTENTION!!! On the electric diagram dashed lines denote sensors which may be connected, but are not necessary for proper functioning of the controller (for scheme no. 1 these are sensors T3 and T4).

Description of G422-P03 controller


Controller is equipped with an LCD screen and 7 buttons.

After connecting electric connections correctly, turn on the controller by pressing .

In normal operation, the controller's screen displays:

- Current installation scheme number and diagram,
- Current date and time,
- Current temperatures in respective measurement locations (a lack of the sensor is indicated by displaying - - -, and damage of the sensor by displaying **Err** messages)
- During pump's operation (pump symbol flashing) instantaneous power output of solar collectors is displayed. Pressing  selects controller's menu.
- Using directional buttons  and  select the desired option and confirm by pressing .

The selected options of the controller include, for example:

Scheme selection – allows for selecting one of various installation schemes. After selecting the desired scheme, confirm by pressing .

Parameters – option of setting operating parameters

Control parameters – a set of options, which enable configuration of operating parameters for the selected scheme,

Heat transfer fluid – solidification temperature of the heat transfer fluid (this parameter is necessary for calculating collectors' instantaneous power output),

Flow rate – flow rate of the heat transfer fluid used in the solar installation.

Description of control parameters for the first programme.

Parameter	Description	Range
Solar collector type	This parameter allows for choosing a type of solar collector (flat or tube). When selecting tube in the period from 8AM to 5PM (at full hour), solar pump turns on for a minute. Since the temperature sensor is located on the bottom of the collector, especially in case of low temperature of the outside air, the temperature measured by the sensor may be different than that inside the collector. If sensor T1 reaches the temperature required to start the operation, the pump will start working.	Flat / Tube
Temp. T1&T2 difference – pump ON	It defines operating conditions of the collector pump. If the temperature in solar collectors measured by sensor T1 is greater than the sum of $\Delta T1$ and temperature of the water in the water heater T2 ($T1 > \Delta T1 + T2$), the pump will switch on. Additionally, to ensure stable operation of the system, hysteresis protection was applied, that is, 1°C for switch-on and 2°C for switch-off.	5 – 15 °C
Max.Temp. T2 OFF collectors' pump	It relates to temperature sensor T2 , located on the bottom of water heater. It defines the maximum temperature permitted in the water heater, measured by the sensor T2 (above that temperature the solar installation will stop working).	10 – 85 °C
Regulation of collectors' pump	Regulation of the operation speed of the solar collector pump. When ON, the pump speed is adjusted smoothly by the controller to ensure proper flow rate of the heat transfer fluid at any time. When OFF the controller switches the pump on and off alternatively. Switching the pump regulation ON may cause noise level of the solar collector pump to increase, which is a typical phenomenon.	Yes / No
Overheat protection of collectors ON	It enables switching on solar collector pump P to prevent overheating of the installation. When the temperature on the collectors (measured by sensor T1) reaches 110°C the controller turns the pump on to evacuate excess heat. Once the temperature drops to 100°C or it reaches the preset value for MaxTempT2 in the water heater, measured by sensor T2 , the pumps is turned off. This parameter is active despite exceeding the maximum water temperature set as T2max .	Yes / No
MaxTemp. T2 overheat protection OFF	It defines the maximum temperature in the water heater at which the overheat protection function is active.	60 – 85 °C
Freezing protection of collectors ON	It applies to countries where heat transfer fluid in the collector circuit is water and defines when the function should be active to prevent the installation from freezing. When ON, solar pump P turns on if water in the water heater, measured by sensor T2 is greater than 7°C and temperature on the collectors drops below 0°C. In case of further temperature drop in the water heater up to 4°C or the increase of the temperature on the collectors above 0°C, the pump will turn off. The function is active only when value of the heat transfer fluid parameter is set to 0°C.	Yes / No