

**SERVICE OPERATING MANUAL
FOR SELF-CONTAINED CONTROL
BLOCK**

G-403-P10



*VALID FOR PROGRAM VERSIONS FROM:
Version '02'*

Please study thoroughly the instruction prior to connecting and launching each of our devices. In case of any doubts, please contact us between 8.00 and 16.00 hours

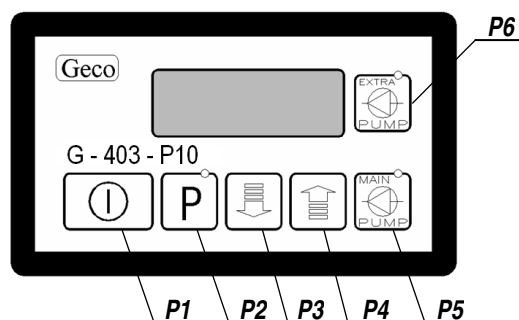
I. GENERAL CHARACTERISTICS

The **Self-contained Control Block G-403-P10** is designed for controlling the operation of pumps and stabilising the temperature in systems with the use of a solar collector. The controller was designed in microchip technology, using the automated surface assembly.

The controller does not require special maintenance; the keypad has been manufactured from a special type of foil resistant to high temperature and to most of chemical agents. Cleaning it with sharp objects is forbidden; it is enough to clean the front panel from time to time with a damp cloth.

The controller consists of:

- detachable temperature sensor 20m long - red;
- detachable temperature sensor 3m long – red;
- detachable temperature sensor 3m long - red;
- G-403-P10B keypad with a buzzer;
- G403-M023400 control module on a bus;
- clamp for mounting the keypad G18/21;
- 10-strand flat cable, 0,3m long.



II. TECHNICAL SPECIFICATIONS

- Operating voltage → 230V +10% -15%
- Temperature of environment → from +5°C to +40°C
- Humidity → from 20% to 80% RH
- Degree of protection → IP65 from the front side of control panel
- Output loads → 200W

CAUTION!!! The total current consumed by the devices may not exceed 10A!!

III. BASIC INFORMATION AND FAST START

1. In G-403-P10 controller, the sensors can be extended and shortened without the need of calibration.
2. In G-403-P10 controller, the way of connecting the sensor cables to the pipe connectors is of no importance, as is the way of inserting the plug into the 230V socket.
3. In G-403-P10 controller, the keypad and the control module do not make an inseparable set and can be replaced without the need of calibration (the change is of course permitted within the same type devices).

IV. DELIVERY AND INSTALLATION

1. In case of delivery on other than own means of transport, you should perform visual inspection of each package. **In case of any doubts, we recommend that SBR device be launched prior to installation or resale.**
2. All metal elements, through which G-403-P10 or its cables are put, should be filed or otherwise protected. It is forbidden to mount G-403-P10 allowing direct operation of water on it or causing considerable changes in temperature in relation to the temperature of the environment
3. After installing G-403-P10, we connect power cables according to the description on the wall of the control module.
4. We remove any excess cables through cutting or clipping together by means of special plastic bands. Cables must be fastened well on their entire length and may not touch the fittings of the system.
5. **The control panel and the control module in G-403-P10 are not a set and can have various serial numbers!!!**
6. **Any repairs or service operations may be performed only with power cord disconnected from power supply!!!**
7. **Any repairs on own account will result in loss of warranty and may lead to electrocution; therefore, any repairs should be performed by trained and authorised service staff.**

CAUTION!!!

On all housings, there is a label denoting:

- serial number
- description of outputs and their load capacity
- G-403-P10 type

In case of any doubts as regards operation and assembly of SBR or loss of label, you should immediately contact the manufacturer

V. PRINCIPLE OF OPERATION AND CONNECTING

After the device is switched on, the display will show four dots followed by software version, four dots, and then four dashes (----) to inform that the system is in 'standby mode'.

To start the device, just press button "P1". The temperature value in the heater will be displayed.

The factory settings in the controller are 1'- the basic software version, which can be changed in the manner described in point VI "Programming the controller type".

Besides the automatic work, the device enables the pump engine to be switched on manually regardless of what the environmental conditions are (if there is no AL1, AL2 or AL3 on-screen message). The button „P5” for the collector pump serves this purpose or button "P6" for accessory pump (depending on the program of the controller). At normal (automatic) operation of the given pump engine, the LED on the appropriate pump button blinks. For manual operation, the LED lights continuously.

The controller also enables the detection of emergencies.

If the sensor is damaged or missing, the working devices will be switched off. An alarm code will be displayed and sound alarm will beep.

- AL1 – failure of sensor T1,
- AL2 – failure of sensor T2,
- AL3 – failure of sensor T3.

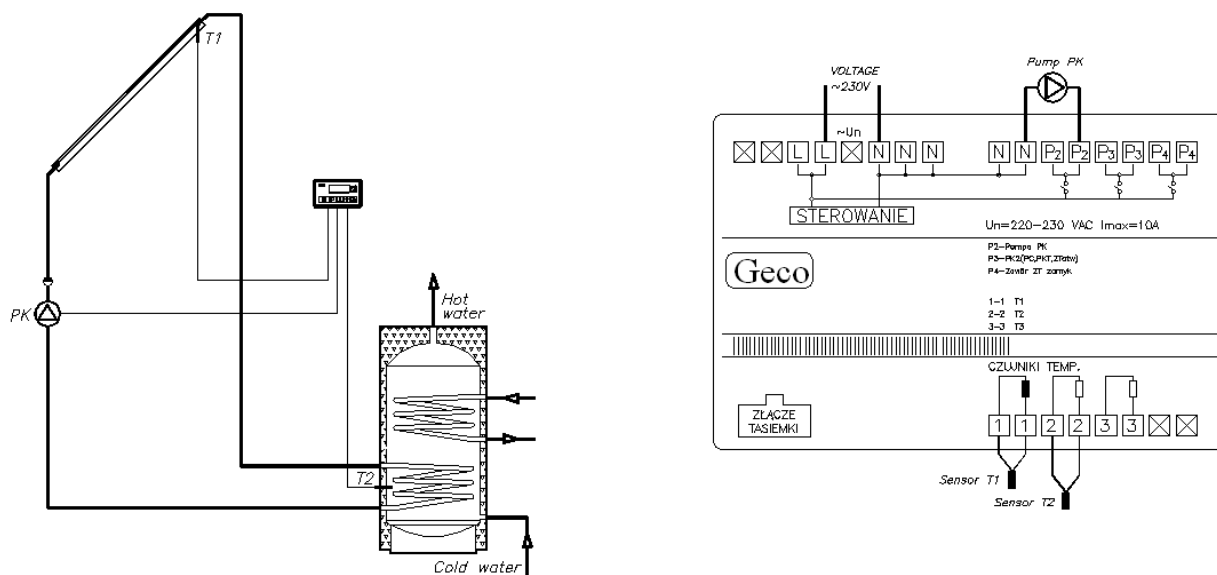
Cancelling the alarm is possible through switching off the controller, removing the cause of failure and switching the device with "P1" button again.

The controller's display will show the temperature in the heater. The controller also enables viewing the temperature in the solar collector – to do so, press button "P4".

The temperature measured by the additional sensor (place of the sensor depends on the controller's program) can be viewed through pressing button "P3".

Below we present the principle of operation and settings of the controller in the available program configurations;

1'- basic version with the collector and cwu heater (drawing 1):



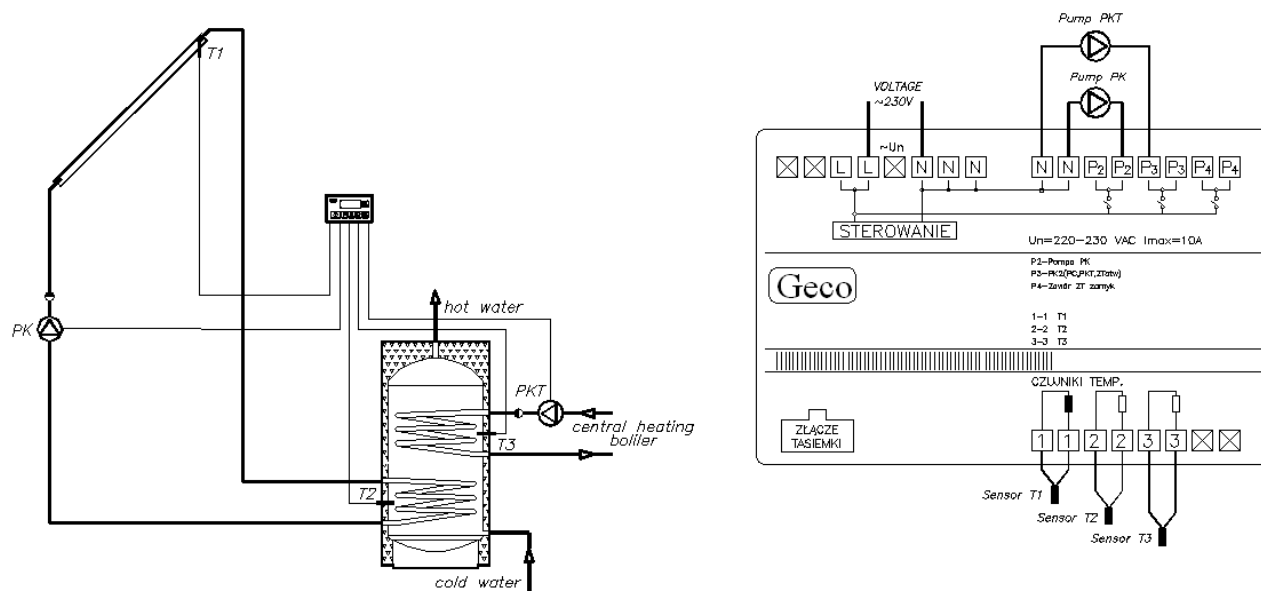
The controller decides whether to switch on the PK pump engine based on the information received from temperature sensors located in the solar energy collector T1 and the heater T2. When difference between the solar energy collector temperature and the isothermal tank temperature is positive and higher than the value declared by the user in parameter 'u0' ((see « Programming user parameters”)) and the maximum water temperature in the heater 'u1' has not been exceeded, the collector pump PK is switched on and water in the tank is heated from the solar collector energy.

User parameters

'u0' - (between 2 and 15°C) – temperature difference (T1-T2) that controls the collector pump PK

'u1' - (between 10 and 90°C) – maximum water temperature in the heater (T2); when exceeded the collector pump PK is switched off
The principle of starting the PK collector pump is the same for all the programming versions of the controller.

2'- version with the collector, cwu heater and support for heater pump for water from central heating boiler. (drawing 2):



The conditions for starting PK pump are identical as in the program version '1'. PKT boiler pump will be switched on, if the temperature of sensor T3 is lower than the temperature set by the user in 'u2' parameter.

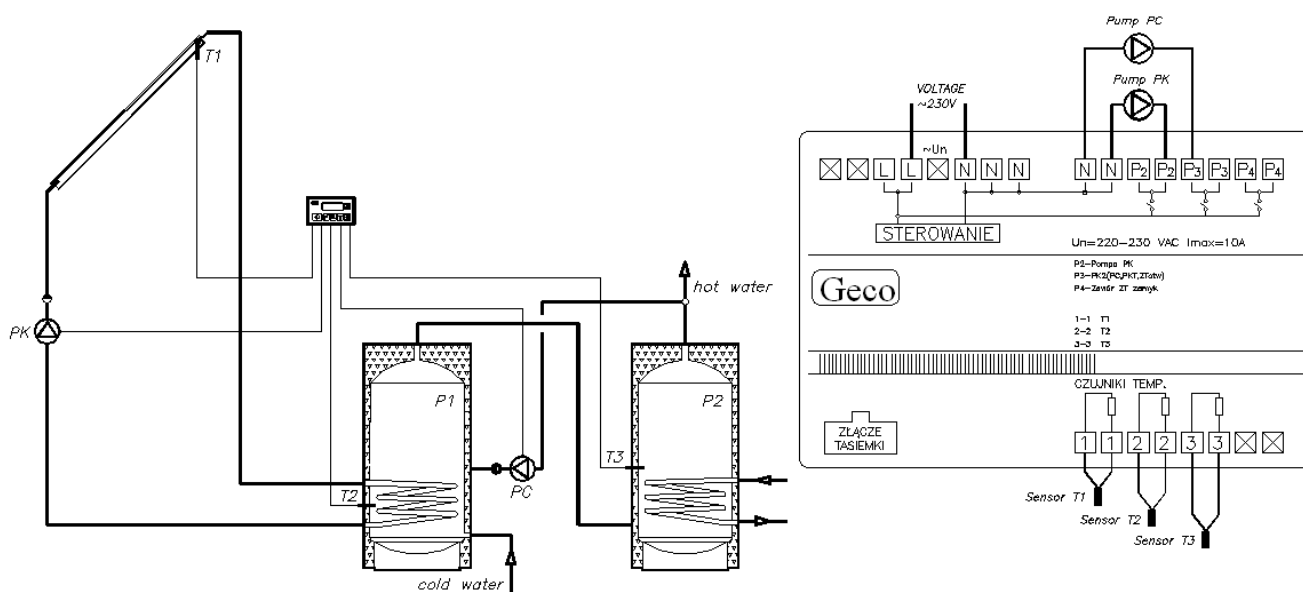
User parameters

'u0' - (between 2 and 15(C) – temperature difference (T1-T2) that controls the collector pump PK

'u1' - (between 10 and 90°C) – maximum water temperature in the isothermal tank (T2); when exceeded, the collector pump PK is switched off

'u2' - (between 10 and 90°C) – the temperature (T3); when below this temperature, the boiler pump PKT is switched on

3'- version with the collector, cwu heater and support for circulation pump for the heater operating with the boiler (drawing 3):



The conditions for starting PK pump are identical as in the program version '1'. When the sensor T3 temperature is lower than the temperature set by the user in parameter "u2" and the temperature difference between the isothermal tank (T2) and CWU tank (T3) is positive and greater than the value set by the user in the parameter 'u3', the pump between heaters P1 and P2 is switched on.

User parameters

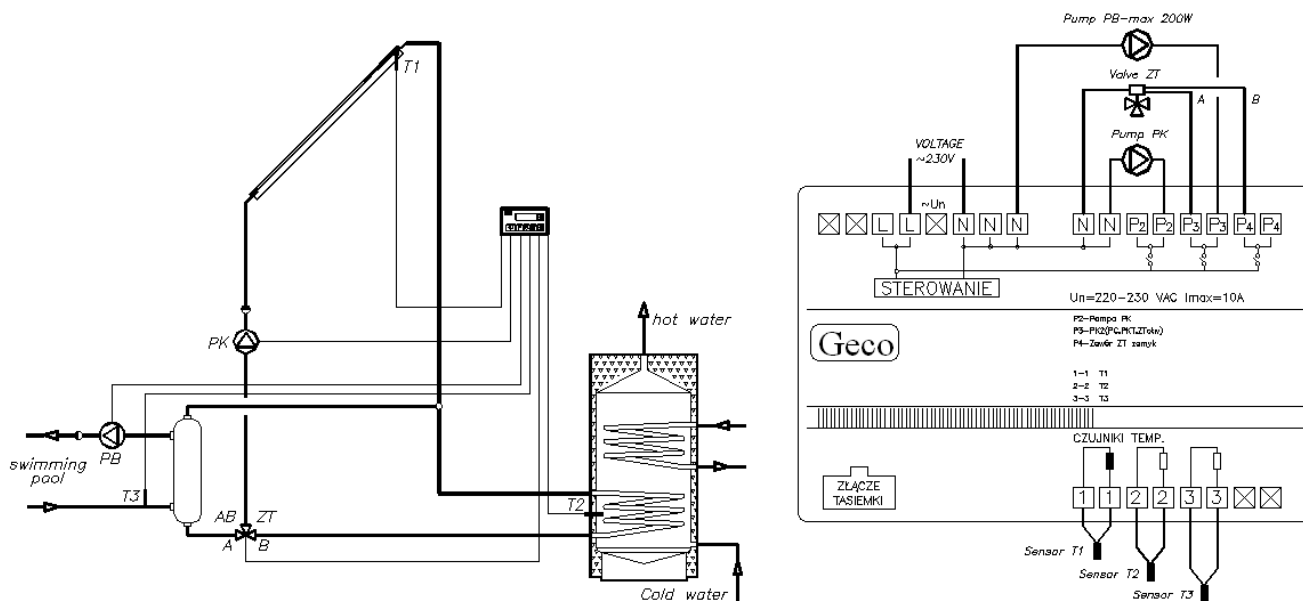
'u0' - (between 2 and 15°C) – temperature difference (T1-T2) that controls the collector pump PK

'u1' - (between 10 and 90°C) – maximum temperature in the isothermal tank (T2); when exceeded, the collector pump is switched off

'u2' - (between 10 and 90°C) – temperature of CWU tank (T3); when exceeded the pump PC is switched off.

'u3' - (between 2 and 15°C) – temperature difference (T2-T3) that controls PC pump to CWU tank

4' - version with the collector, cwu heater and support for heater of swimming pool with the use of valve ZT (drawing 4a):



The proposed circuit operates providing for the priority of hot water, according to the principles of '1' program version, with calibrating the valve ZT to output B. The three-way valve will be opened to output A (heating the swimming pool water) and the PK pump will be activated, if:

- the maximum temperature in the heater set by the user in parameter 'u1' and the temperature difference between the collector (T1) and the swimming pool (T3) is positive and greater than the value set by the user in the parameter 'u3'.

- the temperature difference between the solar collector (T1) and the heater is lower than the temperature set by the user in parameter 'u0' and the temperature difference between the collector (T1) and the swimming pool (T3) is positive and greater than the value set by the user in the parameter 'u3' and the temperature (T3) is lower than the temperature set by the user in parameter 'u2'.

During heating up the water in the swimming pool, every hour there will be a break in the operation of pump PK, in order to test the temperatures as regards heating the water in the heater (switching the valve ZT).

User parameters

'u0' - (between 2 and 15°C) – temperature difference (T1-T2) that controls the collector pump PK

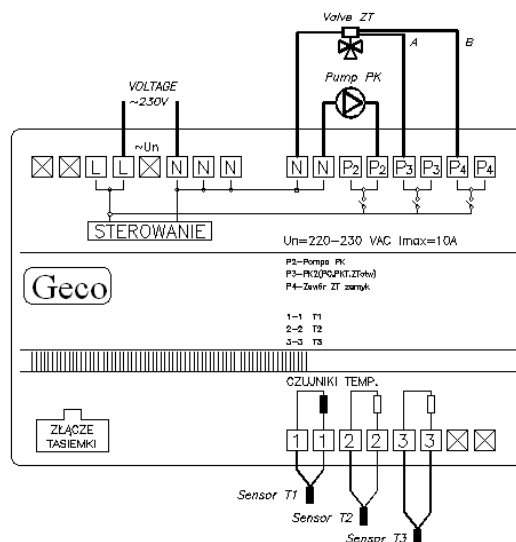
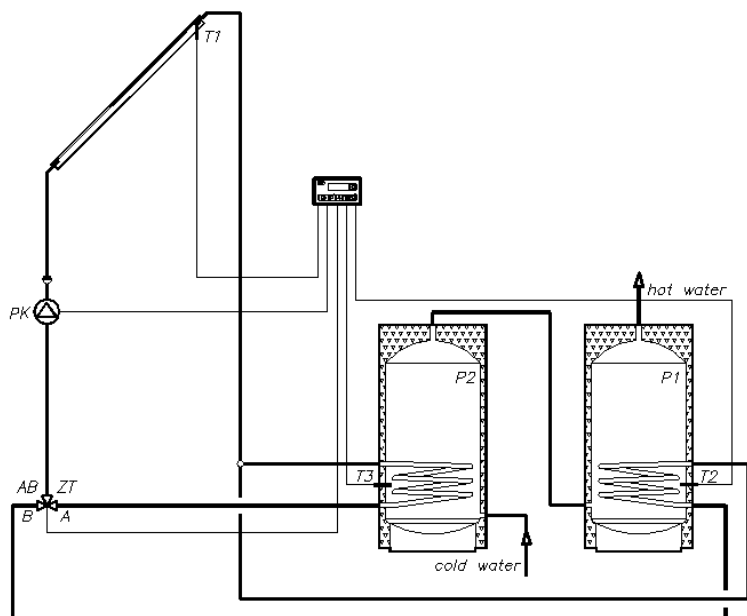
'u1' - (between 10 and 90°C) – maximum temperature in the heater (T2); when exceeded the collector pump PK is switched off or the three-way valve ZT is redirected to output A.

'u2' - (between 10 and 90°C) – the temperature (T3); when below this temperature, the collector pump PK is switched on

'u3' - (between 2 and 15°C) – temperature difference (T1-T3) that controls the collector pump PK

'u4' - (between 2 and 10 min) – duration of break in the operation of collector pump PK for testing the temperatures as regards the repeated heating of water in the heater (when 'u4'=0 no test)

4'- version with the collector, cwu heater and support for the second heater with the use of valve ZT (drawing 4b):



The proposed circuit operates providing for the priority of heating the water in P1 heater, according to the principles of 1' program version, with calibrating the valve ZT to output B. The three-way valve will be opened to output A (heating the water in heater P2) and the PK pump will be activated, if:

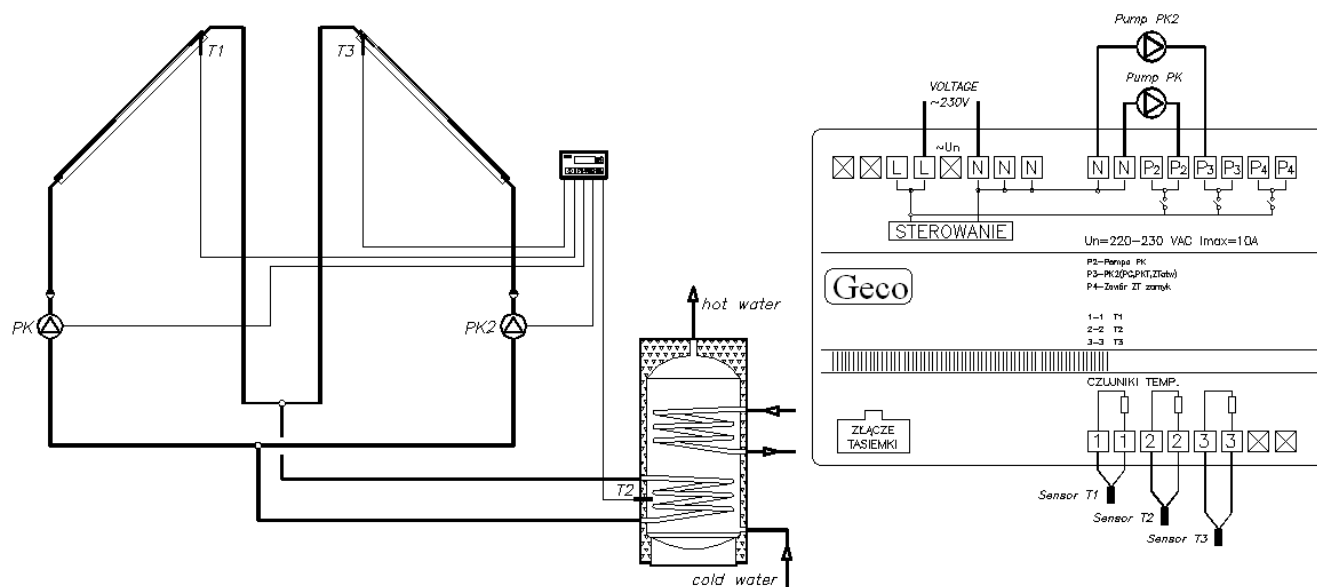
- the maximum temperature in the heater P1 set by the user in parameter 'u1' and the temperature difference between the collector (T1) and the heater P2 (T3) is positive and greater than the value set by the user in the parameter 'u3'.
- the temperature difference between the solar collector (T1) and the heater P1 is lower than the temperature set by the user in parameter 'u0' and the temperature difference between the collector (T1) and the heater P2 (T3) is positive and greater than the value set by the user in the parameter 'u3' and the temperature (T3) is lower than the temperature set by the user in parameter 'u2'.

During heating up the water in heater P2, every hour there will be a break in the operation of pump PK, in order to test the temperatures as regards heating the water in the heater P1 (switching the valve ZT).

User parameters

- 'u0' - (between 2 and 15(C) – temperature difference (T1-T2) that controls the collector pump PK
- 'u1' - (between 10 and 90°C) – maximum temperature in the heater P1 (T2); when exceeded the collector pump PK is switched off or the three-way valve ZT is redirected to output A
- 'u2' - (between 10 and 90°C) – the temperature (T3) in heater P2; when below this temperature, the collector pump PK is switched on
- 'u3' - (between 2 and 15(C) – temperature difference (T1-T3) that controls the collector pump PK
- 'u4' - (between 0 and 10 min) – duration of break in the operation of main collector pump PK for testing the temperatures as regards the repeated heating of water in the heater P1 (when 'u4'=0 no test)

'5'- version with two batteries of collectors and the cwu heater (drawing 5):

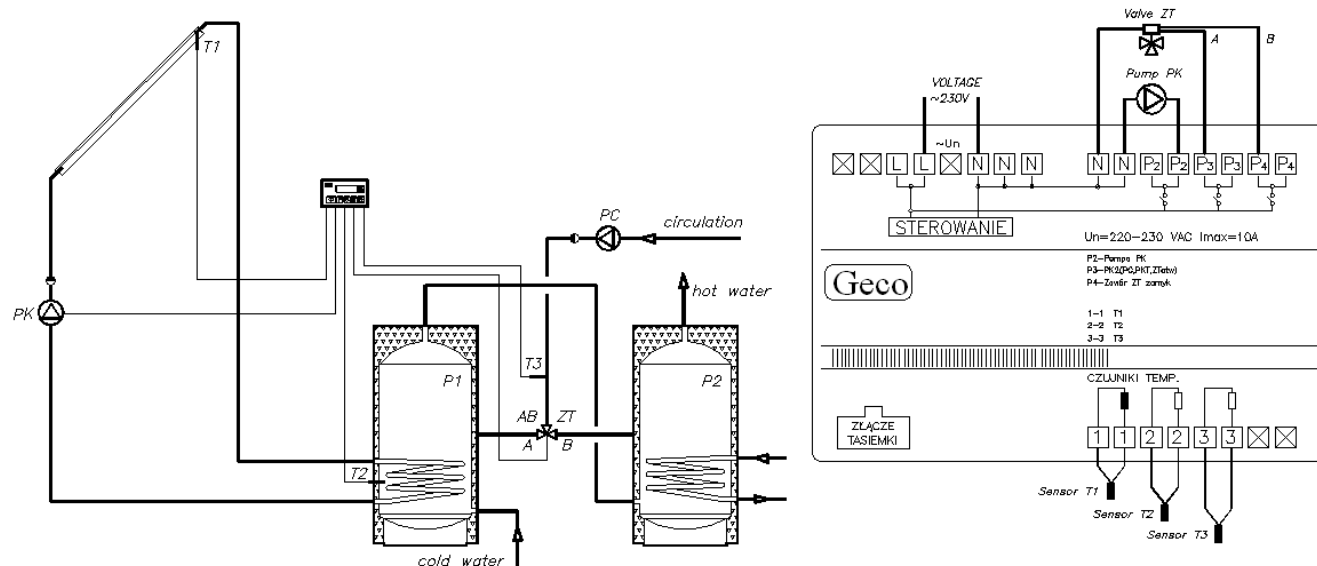


The conditions for starting PK pump are identical as in the program version '1'. The collector pump PK2 will be switched on, if the temperature difference between the second solar collector (T3) and the heater (T2) is positive and greater than the value set by the user in the parameter 'u0' and the maximum temperature of the heater set by the user in the parameter 'u1' is not exceeded.

User parameters

- 'u0' - (between 2 and 15 °C) – temperature difference (T1-T2 and T3-T2) that control the operation of collector pumps PK and PK2
- 'u1' - (between 10 and 90(C) – maximum temperature in the isothermal tank (T2); when exceeded, the collector pumps PK and PK2 are switched off

'6'- version with the collector, cwu heater and controlled return from circulation through valve ZT (drawing 6):



The conditions for starting PK pump are identical as in the program version '1'. The three-way valve will be opened to output A, when the difference of temperatures between the heater (T2) the return of circulation (T3) is positive and greater than the value set by the user in the parameter 'u3' and the temperature (T3) is lower than the temperature set by the user in parameter 'u2'.

User parameters

- 'u0' - (between 2 and 15(C) – temperature difference (T1-T2) that controls the collector pump PK
- 'u1' - (between 10 and 90°C) – maximum water temperature (T2) in the heater P1; when exceeded the collector pump is switched off

'u2' - (between 10 and 90°C) – temperature of the return of circulation (T3); when exceeded the three-way valve ZT is redirected to output B.

'u3' - (between 2 and 15°C) – temperature difference (T2-T3) that controls the operation of valve ZT to heater P1

VI. PROGRAMMING THE CONTROLLER TYPE

In order to program the type of controller, you have to enter standby mode (two horizontal dashes at the display ('---')) and press one after another the buttons "**P5**", "**P3**", "**P1**" and hold the buttons pressed together for about 3 seconds, till message '**c0**' is displayed.

It will appear in the display for about a second, and then its value will be displayed. The LED in button "**P2**" lights, too.

'c0' parameter means the selection of the controller program (1-6):

- 1' - basic version with the collector and cwu heater (drawing 1),
- 2' - version with the collector, cwu heater and support for heater pump for water from central heating boiler. (drawing 2),
- 3' - version with the collector, cwu heater and support for circulation pump for the heater operating with the boiler (drawing 3),
- 4' - version with the collector and support for heater of swimming pool the second heater through valve ZT (drawing 4a or 4b),)
- 5' - version with two batteries of collectors and the cwu heater (drawing 5),
- 6' - version with the collector, cwu heater and controlled return from circulation through valve ZT (drawing 6),

We can change its value with buttons "**P3**" and "**P4**". To scroll the readings, press and hold one of the buttons. After setting the desired values, we save the change with button "**P2**" or cancel the change with button "**P1**". Through pressing button "**P2**", we update this parameter and exit the programming mode, causing the controller to restart for readout of new settings from the memory.

VII. PROGRAMMING USER PARAMETERS

User parameters can be programmed with button „**P2**” when the controller is switched on, that is it stabilises the temperatures through the appropriate work of pumps. When pressed, the LED on button "**P5**" lights up to indicate the programming mode is active.

The parameter name and number and its current value will be displayed for 1 second. We can change its value with buttons "**P3**" and "**P4**".

To scroll the readings, press and keep buttons "**P3**" or "**P4**". To accept the set value, press button "**P2**". The parameter value will be saved and then the next parameter will be displayed.

VII. TROUBLESHOOTING

Symptoms of failure	Check:
The display does not light up when the controller is connected to the power mains	<ul style="list-style-type: none"> the voltage 230V on power clamps L and N the correctness of connecting the control module to the control panel if still not working properly, connect a different strip
The collector pump PK does not switch on despite the indicator – green LED – lights up	<ul style="list-style-type: none"> the voltage 230V on power clamps, according to the description on the upper wall of the control module whether the pump works properly the correctness of connecting the control module to the control panel if still not working properly, connect a different strip
The additional pump does not switch on despite the indicator – green LED – lights up	<ul style="list-style-type: none"> the voltage 230V on power clamps, according to the description on the upper wall of the control module whether the pump works properly the correctness of connecting the control module to the control panel if still not working properly, connect a different strip
Incorrect readings of temperature	<ul style="list-style-type: none"> the connection of the sensor to the pipe connector the correctness of mounting of the sensor sensor cables: the cable must not be damaged anywhere the appearance of external surface of sensor's shell, that is whether it shows any mechanical damage if still not working properly, connect a different strip
Abnormal or "strange" operation of the controller	<ul style="list-style-type: none"> the voltage 230V on power clamps L and N power connectors state of the electrical installation and the number of devices connected to one phase whether the control panel, control module or strip plugs were not subject to action of water or other liquid whether the control panel, control module or strip plugs are not subject to humidity or substantial changes in temperature the correctness of connecting the control module to the control panel if still not working properly, connect a different strip
The display blinks, it cannot be switched on	<ul style="list-style-type: none"> power mains voltage power connectors tighten the power connectors the correctness of connecting the control module to the control panel if still not working properly, connect a different strip

Manufactured by



P.P.U.H. „Geco” Spółka z o. o.
 30-134 Kraków ul. Zarzecze 112 A
 tel. (012) 6369811, 6361290
 fax. (012) 6362002