SELF-CONTAINED CONTROL UNIT (SCCU) USER'S MANUAL

G-406-P03

TO CONTROL CENTRAL HEATING AIR BLOW THROUGH BOILERS

Program Version 03

You are politely requested for the familiarization with the manual prior to making the connection and activating any of our machines. Should you have any doubts, please do not hesitate to contact our firm from Monday to Friday between 8 a.m. and 16 p.m..

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1. INTRODUCTION

1.1. Graphical symbols

Below symbols are used to signal and underline meaning of very important information. They refer to safe usage of equipment.

Be aware!

This symbol is used when sequence of taken actions is important. In case of mistake or procedure inadequate to the description the equipment can be damaged.

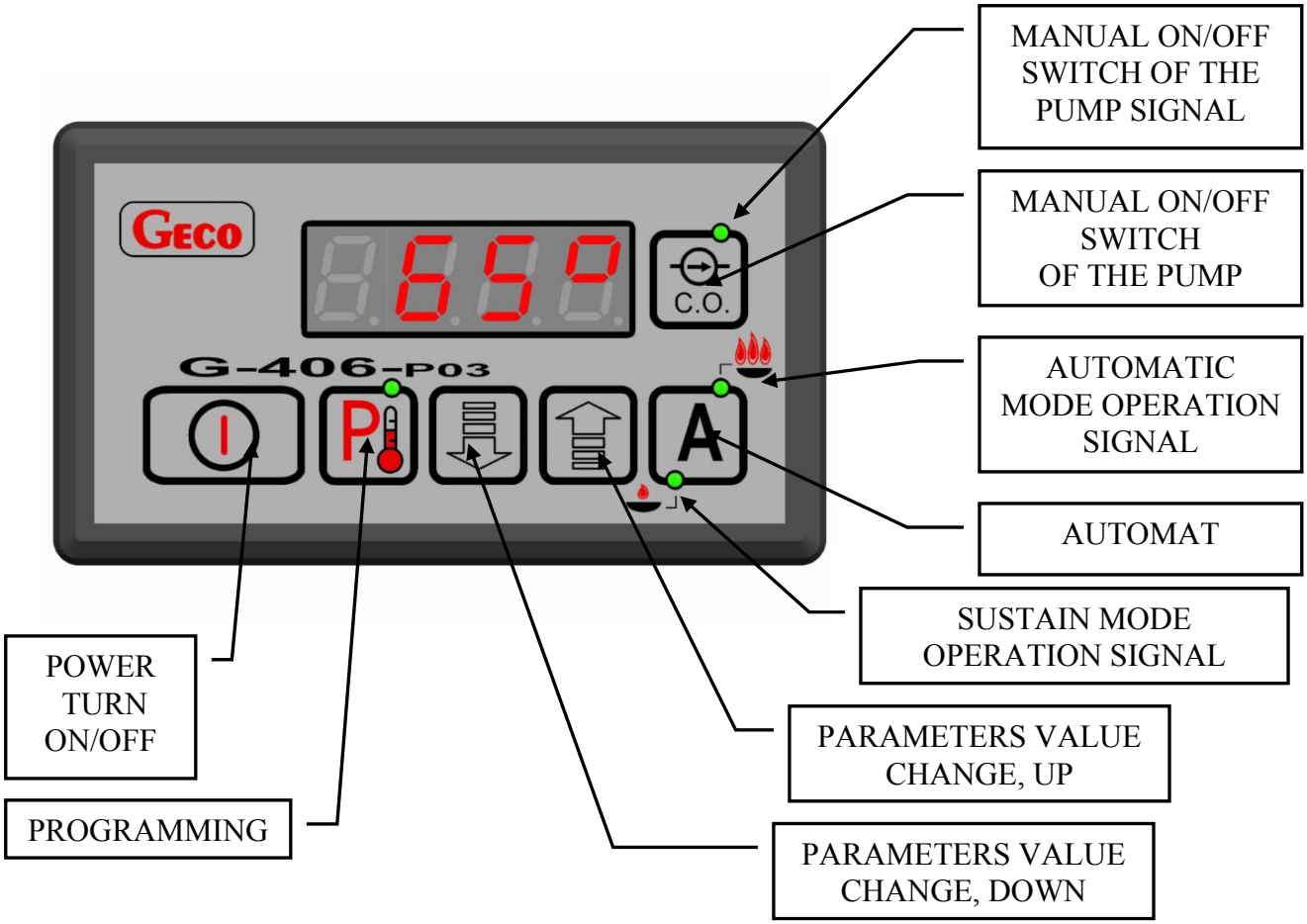
Important!

This symbol refers to information of the special meaning.

Reference!

This symbol informs of additional information somewhere else in the manual.

1.2. Keyboard and function buttons



2. GENERAL CHARACTERISTICS

The self-contained controller, hereafter called G-406-P03, is a convenient, modern and easy-to-use equipment. It has been made in microprocessor based techniques, with the application of the automatic surface assembly.

Depending on the installation method, the two-part casing provides the possibility of installing the control panel operating under safe voltage practically everywhere near controlled device, without the necessity of running power supply cables far away from the equipment controlled.

The G-406-P03 controller has been equipped with:

temperature sensors

1. For measuring the temperature of water leaving the boiler;
2. For measuring the temperature of water in the utility hot water tank (option)

two digital inputs:

3. To connect the thermostat which may force the controller to change into sustaining mode with the control over water circulation pump;

The controller is equipped with three outputs allowing the direct connection of equipment operating under the voltage of 230 V, such as fan, central heating system and utility hot water circulating pumps.

If the unit is to act as the central heating system boiler controller, the G-406-P03 stabilizes the temperature of water and controls the process of fuel combustion in the boiler, preventing damping a fire. The regulation parameters may be adjusted to current conditions of operation and kinds of the boiler. The boiler has been equipped with the system of protection from the power failure or several kinds of interference.

3. TECHNICAL DATA

Operating voltage	—	230V +10% -15%
Temperature	—	+5°C - + 40°C
Relative humidity	—	From 20% to 80%
Protection degree	—	IP65 on the control panel front
Sensors type	—	NTC range from 20°C to 100°C

Table 1 ***Outputs carrying capacity***

OUTPUT	Maximal constant carrying capacity		
P1 – U.H.W. pump.	4A	750W	1HP
P1 – C.H. pump	4A	750W	1HP
W - Fan	3A	600W	1HP

THE TOTAL CURRENT CONSUMED BY THE EQUIPMENT MUST NOT EXCEED 10A!!!

4. WIRING SYSTEM AND RULES OF CONNECTION

1. The boiler house should be equipped with the 230V/50Hz wiring system, in accordance with applicable regulations.
2. Irrespective of the wiring system kind, the plug-in sockets should be equipped with the protective terminal. **The application of the socket without the protective terminal connected is a shock hazard**!
3. The controller should be connected to the separate power supply line, protected by means of the 2-4A rapid fuse and the residual current circuit breaker, with activation current 20 mA maximum. **The connection of any other equipment to this line is not allowed**

The controller is supplied with 230v/50hz power system Therefore any repairs may be performed only when the voltage is disconnected from the fuse.

5. G-406-P03 OPERATION AND ADJUSTMENT METHODS

5.1. Temperature measurement

The controller measures the temperature within the range of 0°C to 100°C. The temperature is displayed with the delay of one second. Where the malfunction occurs to the temperature sensor, or temperature value is found beyond the above-mentioned range and the equipment is not found in the mode of 60 second-waiting for power supply voltage stabilization following power failure, the controller:

1. Reports the malfunction to the sensor,
2. Deactivates of all activated equipment, i.e. fan, pump,
3. Switches to the manual operation mode,
4. The following symbols are being displayed:
   - AL1 if the outlet water temperature sensor has got broken,
   - AL2 if the malfunction has occurred to the boiler inlet water temperature sensor

The occurrence of the temperature exactly equal to 100°C will cause the display to show 00^{o}.

5.2. Power failure

Following power failure, the controller will start operations depending on its status prior to the occurrence of the power failure. The controller will wait for the period of one minute so that the electric grid can stabilize, after which the operation with the previously programmed values of parameters will be resumed

During the standby mode, the display shows the time remaining to the standby mode end, as well as the denotation of the mode in which the controller operated prior to the power failure:
- blinking "A" letter means the automatic operation mode;
- "P" letter means sustaining mode;
- "r" letter means the manual operation mode

Also the corresponding controls of automatic operation or sustaining mode will blink together with the letters. If the controller was under the manual operation mode, it will resume

operating in this status with deactivated equipment, and if the controller was under the automatic operation mode, it will also resume the automatic operation.

If the controller was in the sustaining mode, the sustaining mode will be resumed, the fan will be activated for the limited period of time (manufacturer settings 25s) to light up fuel again and after that the fan will be turned off.

6. TEMPERATURE LIMITER (STB)

The controller G-406-P03 is equipped with additional, independent from the automatics mechanical protection named safe temperature limiter (STB).

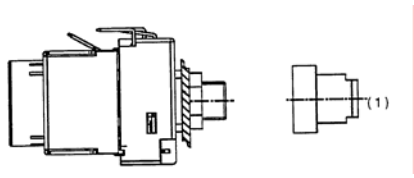
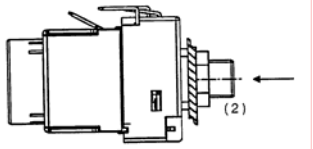
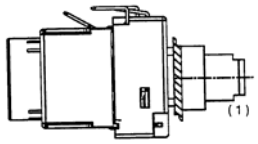
6.1. Method of operation

In case of reaching by the heated water the temperature value of 95°C the temperature limiter (STB) will turn on automatically (it starts STB function) it will turn off the fan and on the display alarm AL3 will appear.
After the temperature on the limiter decreases its value for about 20°C it will be possible to turn on again the STB function manually.

6.2. Again activation of the STB function (manually)

After the temperature limiter operation occurs and the fan stops, it is absolutely necessary to restore its operation for normal functioning of the G-406-P03 controller.

To do that one needs to follow below steps:

1. Unscrew the black protective cap. (1).	2. Press the RESET (2) button, to unblock the device	3. Screw on the black protective cap (1).
		

Punch or brake of the temperature limiter (STB) capillary tube means that the filled with water temperature limiter is leaky. That causes improper operation of the G-406-P03 controller. In case of such failure appearance it is necessary to unplug the temperature limiter from the G-406-P03 controller and plug in new and properly working device (Temperature Delimiter).

7. The G-406-P03 controller usage.

7.1. Starting the unit

Plug in the device into the power supplying line.

The unit is turned on and off using button: ⏻.

7.2. Kindle process in the boiler

1. Turn on the controller using button . On the display the outlet water temperature value will appear.
2. Clean the boiler and charge it with fuel.
3. Kindle the fuel and close the door.
4. Press the button .

The kindle process is indicated by lighting up (continuous lighting) the green indicator on this button. At the same time the fan should start and on the display prior to taking measurement of the temperature small vertical dash will light up indicating fan operation.

7.3. Manual operation

In this mode the user can manually the central heating pump. To do that follow the steps presented on the below diagram:

Step 1	→	Step 2
		C.O.
The controller shows measured temperature of the boiler outlet water.		Central Heating Pump. Manual start is indicated by continuous lighting of the indicator on the pump ON button C.O.. Again press of the button turns off the C.H. pump and switches off the diode.

Pressing the pushbutton causes the controller to abandon the automatic operation mode (heating and sustaining) and to enter the manual operation mode, involving the immediate stop of the operation of the fan and pump.

7.4. Automatic operation

When the pushbutton is pressed, the controller enters the automatic operation mode.

7.4.1. Fan

After entering this mode the procedure of "softstart" of the fan begins. Rotation will increase from minimal value to the value set by the user in the "u1" parameter, proportional to the period set by the manufacturer (manufactory setting 5 seconds)

7.4.2. C.H. pump

4. If the pump was not turned on for constant operation than after turning on the automatic mode of operation the controller will start the central heating system circulation pump, if the boiler water temperature is more or equal to the factory set value (manufactory setting

40^0C). Also the pump operation control diode (the vertical dash on the left hand side of the display) goes on

5. The controller will stop the pump if the temperature of water drops to the temperature of pump activation minus 4^0C.

C.H. pump will not be turned off in case it was before turned on for constant operation with the button 

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7.4.3. The furnace has put out

Method in which the controller notices the furnace has put out.

1. If in the automatic mode of operation the outlet water temperature will decrease for 10^0C and also, during decrease, there is no increase of this temperature for more than 4^0C, than **the pump is turned off.** The controller stores the temperature value, awaits the period set by the manufacturer (factory setting 5 min) then it checks whether the temperature has increased its value. If it does not happens, that means the furnace has put out.

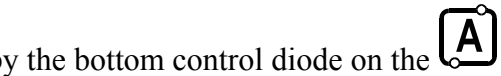
2. If the water temperature during automatic operation mode remains below 40^0C for time set by the manufacturer (manufacturer setting 60 min) that also means the furnace has put out.

3. If the controller entered into automatic mode of operation during room thermostat interlock there is no checking whether the furnace has put out.

If the temperature reaches value set by the user the controller will enter the sustaining mode.

7.5. Sustaining mode operation

The controller enters this mode if the outlet water temperature reaches the value set by the user in the "U0" parameter.

This phase is signaled by the bottom control diode on the 

button.

7.5.1. Fan

In this mode of operation the fan will be turned on only for periodical blows through due to the cycle:

Blow through period (factory setting 5 seconds),
Brake time between blow through (factory setting 5 seconds),

7.5.2. C.H. pump

In sustaining mode the C.H. Pump operates in the same manner as in the automatic operation mode. That means:

1. If the pump was not turned on for constant operation than after turning on the automatic mode of operation the controller will start the central heating system circulation pump, if the boiler water temperature is more or equal to the factory set value (setting $40\ ^o$C). Also

the pump operation control diode (the vertical dash on the left hand side of the display) goes on

2. The controller will stop the pump if the temperature of water drops to the temperature of pump activation minus 4 °C.

C.H. Pump will not be turned off in case it was before turned on for constant operation with the button C.O..

7.6. Alarm modes

Four alarm modes are recognized by the controller. Except for AL3, the number of alarm will be shown, as well as the acoustic alarm output will be activated for the period of two seconds. Then this output will be deactivated for the period of six seconds, to be activated again, etc.. Except for the AL3, the abandonment of the alarm modes is possible only when the ⏻ pushbutton is pressed..

The alarm will be turned off for good after the time set in the C5 service parameter is finished. If this parameter is set to zero "0" the alarm (except AL3 alarm) will be active until it is turned off with the ⏻ button.

Kinds of alarms:

- AL1 → Damage to the boiler outlet water temperature sensor;
- AL2 → Damage to the boiler inlet water temperature sensor;
- AL3 → The outlet water has reached the temperature exceeding 95°C
- AL4 → The furnace has put out;

Where the AL3 alarm has occurred, the temperature measured and the alarm message (AL3 text) is displayed alternately. In the manual operation mode, the central heating system circulation pump will be activated. This alarm will automatically go off when the temperature in the boiler drops below 95°C

8. MIXING PUMP HANDLING

The controller has been expanded with the option of the realization of the boiler minimal temperature through the operation of the mixing pump connected to the alarm output (see figure 2).

To configure the controller for operation with mixing pump it is necessary to contact with the C.H. boiler manufacturer. It is connected with necessity to enter proper changes in the service operation mode, available only for the boiler manufacturer.

9. USER PARAMETERS CONFIGURATION

When the P pushbutton is pressed, the controller will enter the programming mode which will be signaled by the activation of the control diode on the P pushbutton.

The programming does not affect the current operation of the controller. While in the

programming mode, the controller cannot change between the manual and automatic operation modes (the controller does not response to pressing the A pushbutton) It is also impossible to control the pump with the C.O. pushbutton.

9.1. The preset temperature of the outlet water of the boiler (u0)

The following procedure allows to change the preset {T^{zad}} temperature of the outlet water of the boiler:

Step 1	→	Step 2	→	Step 3
P		↓ or ↑		P
The illumination of the diode on the pushbutton signals commencing the temperature setting. The display shows the temperature set to date.		Set the desired temperature		The new value of temperature is stored Enter the programming mode of the subsequent u1 parameter.

If, in the case of setting the new temperature, any of the ↓, ↑, P, is not pressed for the period of 20 seconds, the new temperature will not be stored and the controller will abandon the programming mode.

9.2. Run of the fan operation (u1)

This parameter sets the rotation velocity of the fan, that responds to the amount of air supplied. It allows setting of the fan rotation due to the fuel used. The value of this parameter can be changed in the range from 1 to 10, where 1 responds to minimal fan rotation, and 10 responds to maximal fan rotation.

Step 1	→	Step 2	→	Step 3	→	Step 4
P		P		↓ or ↑		P
The green diode on the pushbutton starts to illuminate. The display shows "u0" parameter value.		Enters the u1 parameter 1		Set the desired value from 1 to 10		The new value of the parameter is stored .

10. UTILITY HOT WATER TANK HANDLING

The G-406-P03 controller allows the connection of the additional pump controlling heating the hot water in the tank.

10.1. Assembly and connection

If the heating of the utility hot water is required, the following procedure should be adhered to, notably:

1. Connect the boiler in accordance with the diagram shown in figure 1.
2. Place the utility hot water temperature sensor inside the tank

The assembly of the utility hot water temperature sensor in the measuring wells manufactured by P.P.U.H. GECO Sp. z o.o. is recommended. Placing the temperature sensors in wells with oil or other liquid is strongly forbidden.

3. Connect the **utility hot water temperature sensor** to the controller terminals as shown in figure 2.
4. Set the G-406-P03 controller appropriate parameters (see item ⇒ p.10.2).

Legend:

1. Residuall valve
2. Ball Cut-off valve
3. Check valve
4. Circulating pump
4a. Utility hot water tank supplying pump
5. Reticular filter
6. Boiler fan
7. Tank safety valve
8. Utility hot water temperature sensor of the G-406-P03 controller
9. Boiler hot water temperature sensor of the G-406-P03 controller
10. Tank electric heater
11. The temperature sensor of the tank electric heater

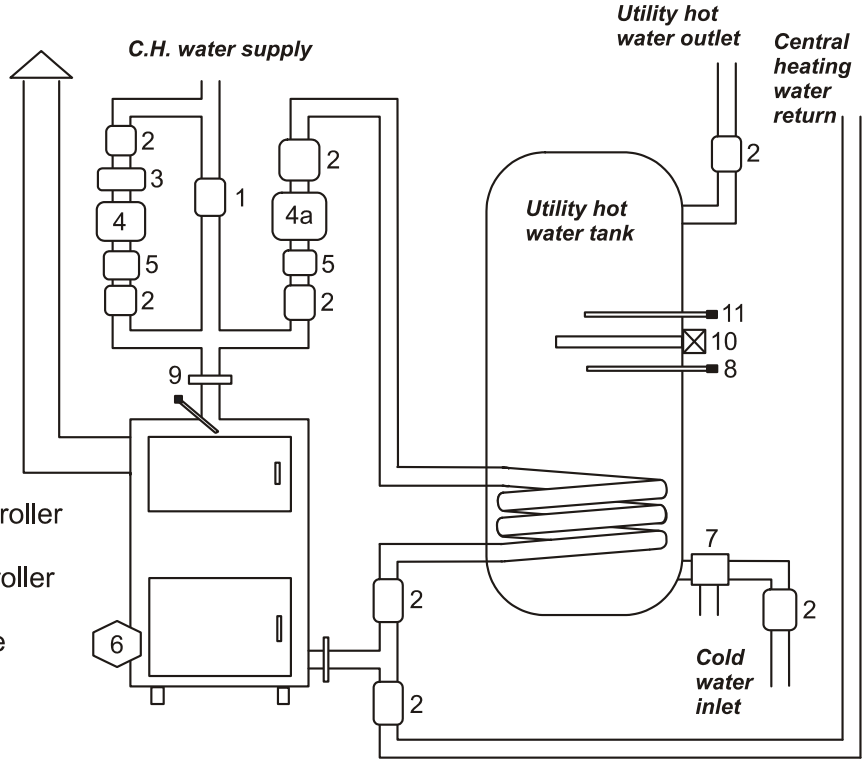


Figure 1. Central heating system block diagram (one circulating pump and one utility hot water tank replenishing pump).

Utility hot water temperature sensor is the additional sensor (option), not supplied together with the G-406-P03. The sensor in question may also be purchased against the additional payment from the manufacturer, i.e. P.P.U.H.„GECO" Sp. z o.o.

10.2. Configuration of the parameters

To set up the controller for operation with the auxiliary UHW pump, it is necessary to contact with the boiler manufacturer.

It is connected with necessity to enter correct values of parameters available only for the boiler manufacturer.

To ensure proper operation of the UHW pump and the room thermostat set the boiler preset temperature (parameter U_0) to be minimum 3^0C higher than UHW tank temperature.

When the tank temp. is greater than or equal to the current temperature of the boiler, the UHW pump will not operate in order not to cool down the tank, while the boiler preset temperature can now be reached (it will be lower than the temp. in the tank). In this case the controller will not go into interlock status caused by operation of the room thermostat and UHW pump will remain shut down.

11. THE ROOM THERMOSTAT

The G-406-P03 controller is prepared to operate with the room thermostat of any company (recommended EUROSTER 2005)

11.1. External thermostat

It is possible to connect external thermostat into the G-406-P03 controller (⇒ fig. 2). In case of its operation, it will join the output contacts and turn the boiler into the interlock mode.

If the Utility Hot Water pump function is turned on then the controller will enter into the forced sustain mode after the water temperature in the utility hot water tank is reached and the UHW pump turned of. (UHW PRIORITY)

This will cause the following changes to the operation of the unit, notably:

- in the sustaining mode, the controller will cause the central heating system pump to be deactivated while the display will show "blo";
- in the automatic operation mode, the controller will enter the sustaining mode, display the "blo" text and deactivate the central heating system pump after four minutes;
- if the boiler outlet water temperature is lower than the user set temperature plus 10°C the controller will go into flame support using air blow through. (if the boiler outlet water temperature is higher than the user set temperature for more than 10°C there will be no air blow through actions.)

- the thermostat interlock will not cause the controller to abandon the controller programming mode in the automatic or sustaining mode operation;
- during the interlock, the controller will activate the central heating system pump operate for the period of 30 seconds, at the time intervals preset by the manufacturer (factory settings 1 minute)
- in any other cases, the interlock is ignored.

12. METHOD OF CONNECTING THE EQUIPMENT TO THE G-406-P03 CONTROLLER

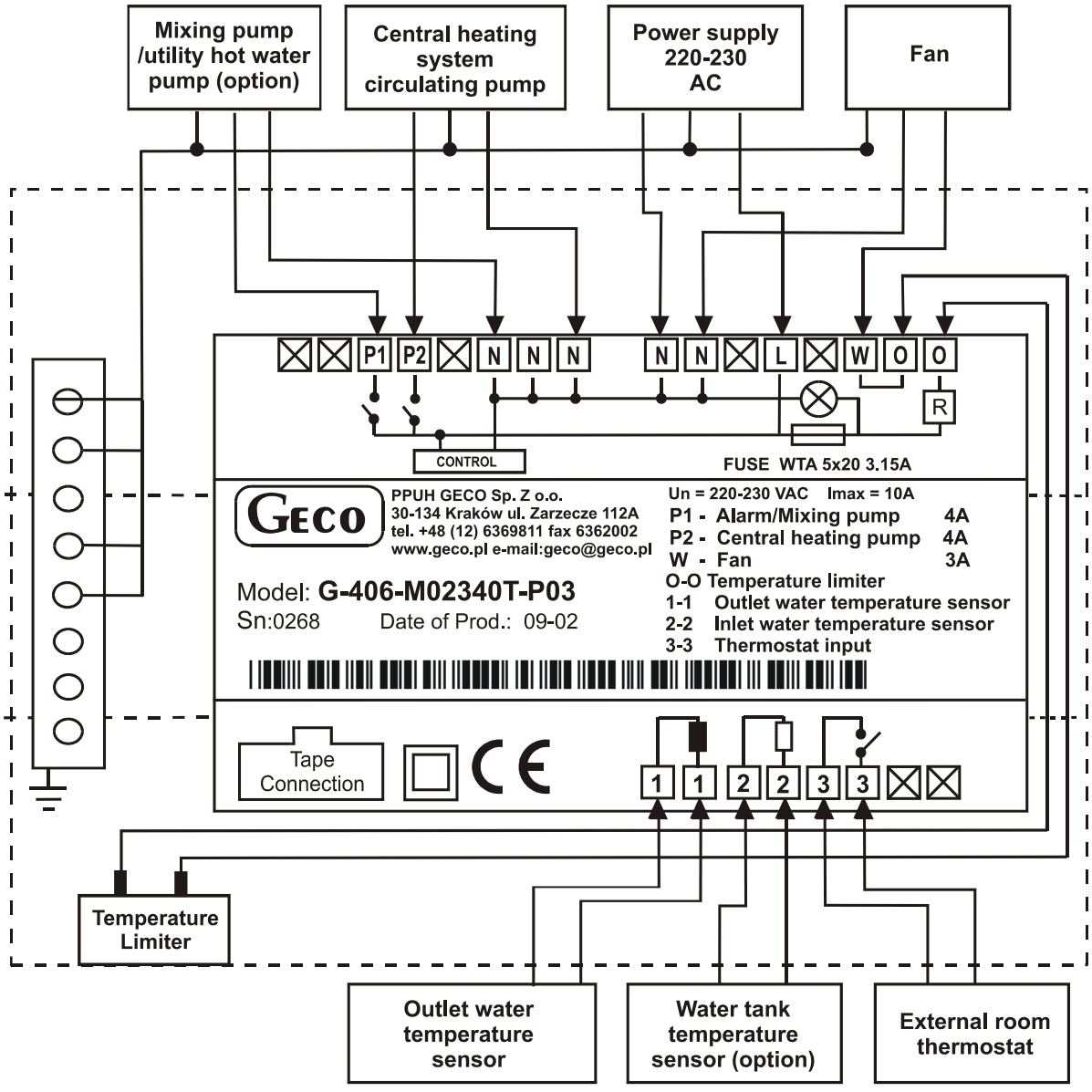


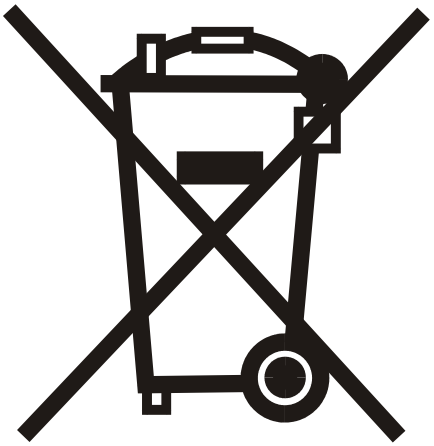
Figure 2. Diagram of equipment connection to the G-403-P02 controller

The additional equipment to the G-406-P03 controller may be connected only by the person holding the certificate for performing electrical assembly works.

13. TROUBLESHOOTING GUIDE

Symptoms:	**Check:**
1. The display remains dim, but the controller is connected to the mains.	• whether the 230 V voltage is present on the terminals L and N • the correctness of the connection of the actuating module with the control panel • remove and apply again the data transfer tape sockets • connect another data transfer tape
2. Despite turning on the power the fan won't work – the display is on and is showing the temperature. The circle is blinking before the temperature	• correct connection of the fan wires to the connection block on PCB. • if mechanical temperature limiter of outlet water temperature indication has tripped. • outlet water temperature indication, if sensor or electronics is damaged and the indications are incorrect this may be the cause of fan not working. • correct connection of the cables to the fan and if fan starting capacitor (if any) has not been damaged. • if fan impeller is not seized and rotates freely
3. The pump does not start in spite of the fact that its activation it signaled by the red diode.	• whether the 230V voltage is present on the terminals in accordance with the description provided on the upper wall of the actuating module • pump operability • the correctness of the connection of the actuating module with the control panel • connect another data transfer tape
4. Erroneous temperature indications	• the connection of the sensors to the connector • the correctness of the sensor fastening • sensor cable condition; **no** damages to the cable are allowed • carefully the appearance of the external surface of the sensor shell, i.e. check for mechanical injuries • connect another data transfer tape
5. Controller "abnormal" or "strange" operation	• whether the 230 V voltage is present on the terminals L and N • the condition of feeding connectors • the condition of wiring system and the number of equipment connected to one phase • whether the control panel, actuating module or tapes plugs have not been exposed to water or other liquid • whether the control panel, actuating module or tapes plugs are not exposed to moisture or sudden temperature fluctuations • the correctness of the connection of the actuating module with the control panel • connect another data transfer tape
6. Display is blinking, and cannot be turned on	• the value of the power supply voltage • condition of the feeding connectors • the condition of feeding connectors screwing in • the correctness of the connection of the actuating module with the control panel • connect another data transfer tape.

14. THE INFORMATION REGARDING COLLECTION AND RECOGNITION OF USED ELECTRONIC AND ELECTRIC EQUIPMENT



NOTICE!

This symbol presented on the product or its package points out the selective collection of used electronic and electric equipment. That means the product should not be thrown away together with other home wastes.

The correct elimination of old, unused electronic and electric devices helps preventing damages to people and environment.

The user of the equipment is obliged to selectively collect used equipment, and to return it to the special unit responsible for used equipment collection.

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