

**GECO**<sup>®</sup>



## ***G-406-P02***

**SELF CONTAINED CONTROL  
BLOCK**

**FOR CONTROLLING HOLZGAS  
CENTRAL HEATING TIMBER  
FIRED BOILERS AND AIR SUPPLY  
FAN**

*Software version 02*

# ***USER MANUAL***

*You are requested to carefully study this manual prior to connecting and operating of any of our equipment. If in doubt, please contact our firm between 8.00 - 16.00.*

*Note !!! The date of the last revision is provided at the bottom of each following page; you are requested for using always the most recent version of the manual which may be received free of charge by post after previous order.*



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## 1. INTRODUCTION

### 1.1. Graphing designations

The symbols to indicate and, at the same time, to highlight the meaning of the text, in which the information is provided on the warning of the potentially hazardous situation, are of the following graphic form:



#### Warning

The symbol is used where the sequence of actions performed is necessary in the design described. In case of error or procedures not in accordance with the description, the unit may either be damaged or even destroyed.



#### Important!

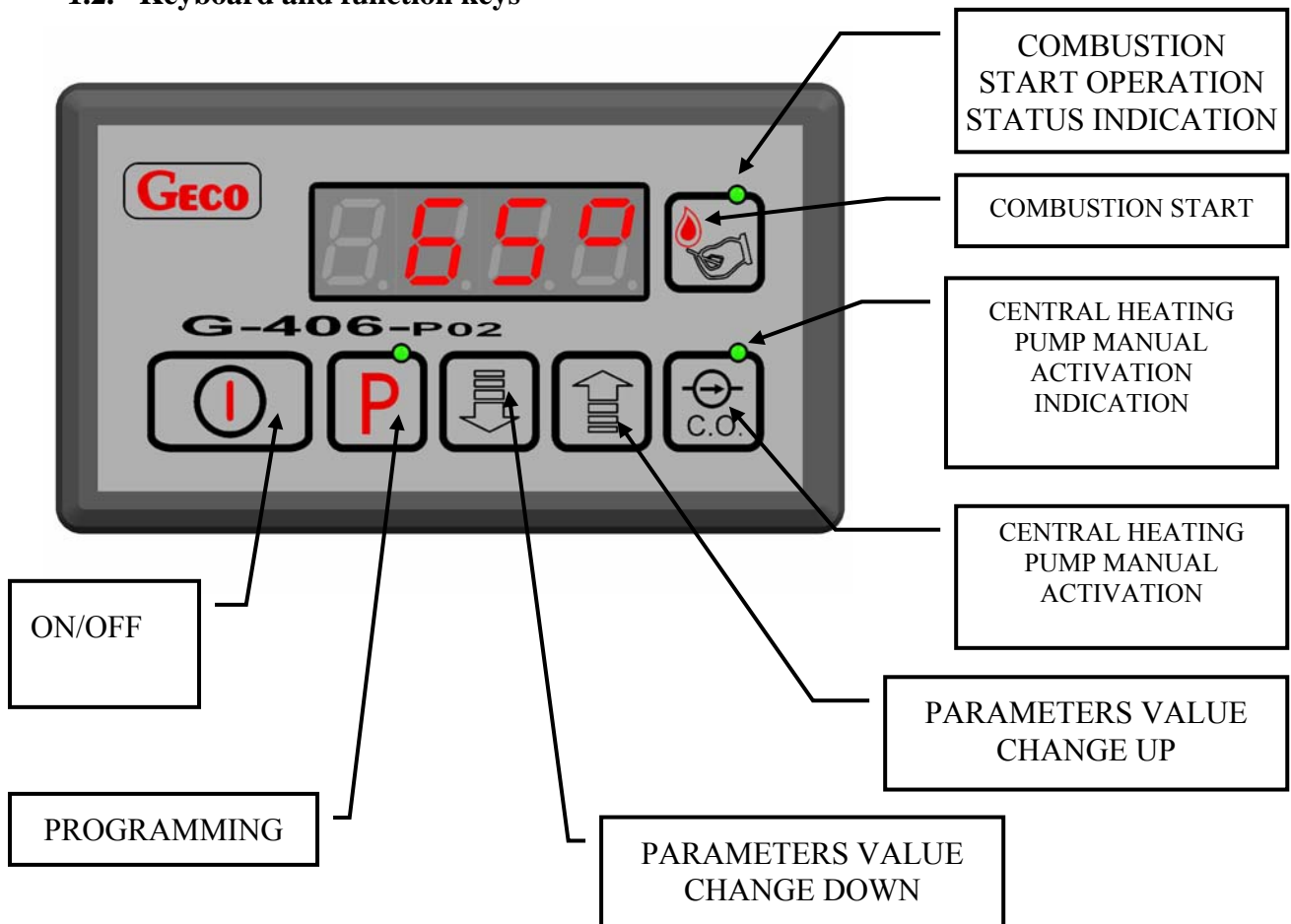
This symbol means the information of particular importance



#### Reference

The symbol means the occurrence of additional information in the section.

### 1.2. Keyboard and function keys



## 2. OVERVIEW.

The Self contained (Independent) Control Block (SBR) hereinafter referred to as G-406-P02 is a modern, convenient and easy to use unit. It has been completed in the microprocessor technology with use of surface assembly. The controller comprises the keyboard with LED display connected by means of the band wires with the execution module in the plastic enclosure for bus. Detector cables and actuation units are connected to the execution module by means of joints, in accordance with description on the enclosure label.

The G-406-P02 controller has been equipped with the temperature detectors:  
for measuring boiler water outlet temperature,  
for measuring boiler water inlet temperature (return) or domestic hot water circulation.

The controller also holds outputs allowing the direct connection of: central heating pump, mixer pump and air supply fan, operating under the voltage of 230 volts, with power consumption as provided in the table.

The indication lamp on the module provides the information on the status of supply and fuse.

No specific maintenance is required for the G-406-P02 controller. The keyboard has been completed from the special type of film resistant to high temperature and the majority of chemicals. It, however, cannot be cleaned with sharp objects.

## 3. TECHNICAL DATA

Operating voltage	230V +10% -15%
Temperature	From +5°C to +40°C
Humidity	from 20% to 80% RH
Protection stage	IP65 on the front side of the control panel
Detector type	NTC operating range: from 20°C to +100°C

**Table 1 Output loads**

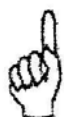
Output	Maximum constant load		
	P2 - mixer pump/domestic hot water	4A	750W
P3 - central heating pump	4A	750W	1HP
W - fan	3A	600W	1HP



**THE TOTAL CONSUMPTION OF CURRENT BY EQUIPMENT  
MAY NOT EXCEED 10A**

#### 4. WIRING SYSTEM AND RULES OF CONNECTION

1. The boiler house room should be equipped with the 230V/50Hz wiring system, in accordance with the applicable regulations.
2. Irrespective of the type of wiring system, it should be terminated with the plug-in socket equipped with the protective contact. **The application of the socket without the protective contact connected may result in electric shock!!!**
3. The controller should be connected to the separately run feeding line, protected with the relevantly selected high-speed fuse and residual current circuit breaker. **No other equipment is allowed to be connected to this line!!!**



**THE CONTROLLER IS SUPPLIED FROM 230V/50HZ NETWORK  
ANY REPAIRS ARE ALLOWED ONLY WHERE POWER SUPPLY ON  
THE FUSE IS DISCONNECTED**

#### 5. OPERATION AND ADJUSTMENT METHODS FOR G-406-P02

The controller performs the measurement of temperature within the range 0°C do 100°C. The result of measurement is displayed with time lag of 1 second. If the fault to the temperature detector is found or the value of temperature measured goes beyond the above mentioned range (if the unit is not found in the standby mode for 60 seconds for supply voltage stabilizing after power failure), the controller will report the fault to the detector, which triggers the deactivation of all activated devices, i.e. the fan and pumps and displaying on the display the AL1 where the detector of water inlet temperature (return) or domestic hot water circulation is damaged and AL2 where the detector of water outlet temperature is found faulty. The occurrence of the temperature exceeding 100°C will cause the display to display the text 00°C.

Fan operation:

1. On combustion start, the fan is operated with the rpm set to the service parameter "c6".
2. Having left the combustion start mode, the controller changes for automatic operation. The fan operates smoothly beginning from its minimum rpm (service parameter c4) up to its maximum rpm determined by the user in the parameter u1.  
Close to the temperature set, the fan begins to slow down gradually.
3. Having exceeded the temperature set, the controller changes for only blows keeping up combustion. The blows are interlocked where the outlet water temperature exceeds the set temperature by 10°C (for reasons of safety!!!)

#### 6. TEMPERATURE LIMITER (STB)

The G-406-P02 controller has been equipped with additional mechanical protection, independent of automatics, called the safety temperature limiter (STB).

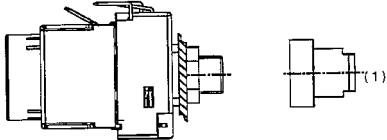
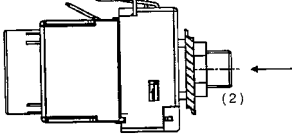
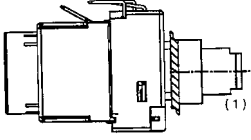
##### 6.1. Operation method:

Where the heating water has obtained the temperature of 95°C, the temperature limiter will be triggered automatically (the STB function will be activated), the fan disconnected and the **AL 5** alarm displayed on the display.

When the temperature at the limiter drops down by some 20°C, the STB function may be manually reactivated.

## 6.2. STB function manual reactivation

When the STB temperature limiter has been triggered and fan deactivated, its operation must unconditionally be restored in order to ensure the proper functioning of the G-406-P02 controller. In order for the unit to be reactivated, proceed as follows:

1. Unscrew the black protective nut (1).	2. Press RESET pushbutton (2) to unblock.	3. Apply and secure protective nut (1).
		


**Damage or breaking to the capillary tube means the leaks of the temperature limiter filled with liquid, which leads to the G-406-P02 misperformance.**





**Should such fault be found, the temperature limiter should be disconnected from the G-406-P02 controller, dismantled and replaced with the brand new one.**


## 7. G-406-P02 HANDLING

### 7.1. Unit statuses:

Deactivation status – in this state, four horizontal dashes are displayed on the display, showing the state under energizing. In this state, the central heating pump may be activated or deactivated through pressing the pushbutton .

Preview status – obtainable through activating the controller with the pushbutton . In this state, the controller measures also temperatures and the central heating pump may be activated or deactivated through pressing the pushbutton .

In the previous state, the controller does not control the operation of fan, central heating pump and mixer pump, i.e. it does not perform any adjustments. This is the state dedicated for previewing temperatures and tests performing.


Operation status – the unit transforms into this state following pressing the combustion start pushbutton . The controller begins controlling and adjustments. The display of small circle prior to temperature measurement, informing of the stop or operation of the fan, is characteristic for this state. The fan stop is signalled through the permanent illumination of the circle, while fan operation - with circle flickering.

## 7.2. Unit activation

1. Connect the unit to the feeding network (insert the plug to the socket).

Four horizontal dashes will be displayed on the display. All functions (in particular, equipment controlling the operation of the boiler, i.e. pump, fan and feeder, connected to the controller) are deactivated. In this state, the unit will disregard pressing any pushbutton

except for .



2. Turn on the controller with the pushbutton .

Having pressed the above pushbutton, the unit transforms into the state of manual control of central heating boiler and reads the settings of boiler operation parameters most recently programmed by the user ( $\Rightarrow$  p.8).

The inception factory settings are as follows:


[u0]	boiler water outlet temperature	$\rightarrow 60^{\circ}\text{C}$
[u1]	fan operation run	$\rightarrow 5$ (100%)

## 7.3. Boiler combustion start

1. Turn on the controller by pressing pushbutton . The display will show only the boiler water outlet temperature.
2. Clean and load the boiler with the fuel.
3. Set fire to the fuel and close the door. Press the combustion start pushbutton .

The combustion start process is signalled by the illumination of the green diode on this pushbutton. Concurrently, the fan should start and the circle signalling that the fan operates should flicker prior to temperature measurement.


During combustion start, the fan operates in the relevant operation run within the range 1÷5 set by the boiler manufacturer (factory setting is 5)

The fan may be stopped through pressing the pushbutton  again.  
The mixer and circulation pumps are deactivated.

The combustion start process will be automatically completed when the temperature has obtained  $55^{\circ}\text{C}$ , the green diode stops flickering and becomes permanently illuminated - the controller will transform into the automatic operation mode.




#### 7.4. Manual and automatic control of central heating pump

The issuance of the command for central heating from activation (manually) takes place through pressing the pushbutton .

The activation of the central heating pump is signalled with the illumination of the dot at the right hand, bottom corner of the display. The instructions given to the central heating pump by the controller have the priority over the instructions issued manually.

1. The pump may be activated and deactivated manually up to the temperature (factory setting 60°C).
  - The manual activation is indicated with the permanent illumination of the diode on the pushbutton of pump activation.
  - If the pump has not been activated manually, the diode on the pushbutton is off.
2. If the boiler outlet water temperature exceeds 60°C, the central heating pump will be activated automatically. This condition has the priority over the remaining ones - the diode on the pump pushbutton flickers and the pump cannot be deactivated manually. Following temperature drop below 56°C, the pump will stop its operation if it had not been activated before in the manual operation mode (⇒ item 1).
3. If the temperature difference between the outlet and inlet water exceeds 10°C, the central heating pump will be activated and deactivated every 8 seconds (does not apply to configuration without mixer pump).

The central heating pump operation is, to some extent, independent from the remainder of the unit and may therefore be activated or deactivated regardless of whether the controller is activated by means of  pushbutton or not.

#### 7.5. The operation of the mixer pump

The controller has been developed with the option of stabilizing the minimum boiler temperature exceeding 55°C through the operation of the mixer pump connected to the additional outlet (⇒ fig.2)



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**In order to configure the controller to operate with the mixer pump, contact the boiler manufacturer.**


**This is related to the necessity of performing relevant changes in the service mode.**

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## 7.6. Alarm states

The controller recognizes four alarm states. The alarm number and acoustic alarm output for the period of two seconds will be displayed and activated, respectively. Subsequently, this output will be deactivated for the period of two seconds then reactivated and so on.

- AL1 → Damage to the detector of inlet water temperature or domestic hot water
- AL2 → Damage to the detector of outlet water temperature
- AL4 → Fire damping
- AL5 → The outlet water temperature has exceeded 95°C.

The alarms are reset through pressing the pushbutton  and reactivation. If the message appears again after the controller has been connected to the power supply network, the controller and detectors should be checked.


If the controller displays the alarm states and the power failure takes place, the controller, after power is restored, remains deactivated !!!

## 7.7. Power failure


After the power failure, the controller will start operations depending on the state it had been in prior to the power failure, i.e.:

- if it had been deactivated, it will remain deactivated
- if it had been in the state of preview, it will return to this state,
- if it had been in the status of combustion start process, the combustion start will reappear after the power is restored,
- if the controller had been in the automatic operation state, it will return to the automatic state with the parameters programmed.
- If it had been in the alarm mode, it will return to the preview state, not saving the most recent alarm.

## 7.8. Return water temperature preview

The temperature of inlet water may be seen following pressing the pushbutton . The preview takes place five seconds and the display flickers over this time. Following preview completion, the display stops to flicker and automatically returns to showing the temperature of outlet water. If the additional pump handling is deactivated/disabled, the preview function is not present.

## 7.9. Boiler sweep function

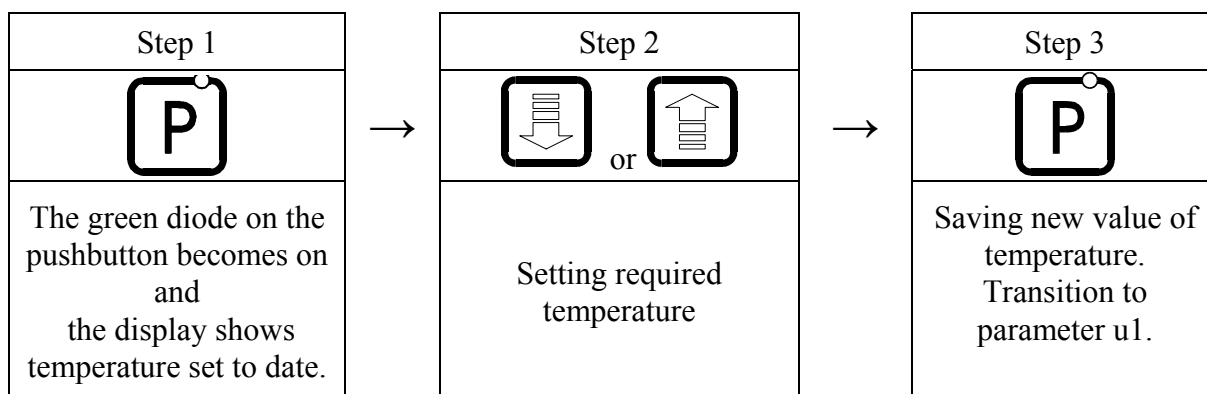
This function may be activated after pressing the pushbutton . It is indicated through the illumination of the upper, horizontal dot on the fourth segment of the display. The circle flickering indicates the operation of the fan; it operates at the maximum rpm for the specific run set by the user "u1". The central heating circulation pump is deactivated while the mixer pump is activated.




When the boiler has obtained the maximum temperature, the switching process ends and the preview mode reappears.

## 8. USER PARAMETERS CONFIGURATION

### 8.1. Predefined temperature of outlet water from the boiler (u0)

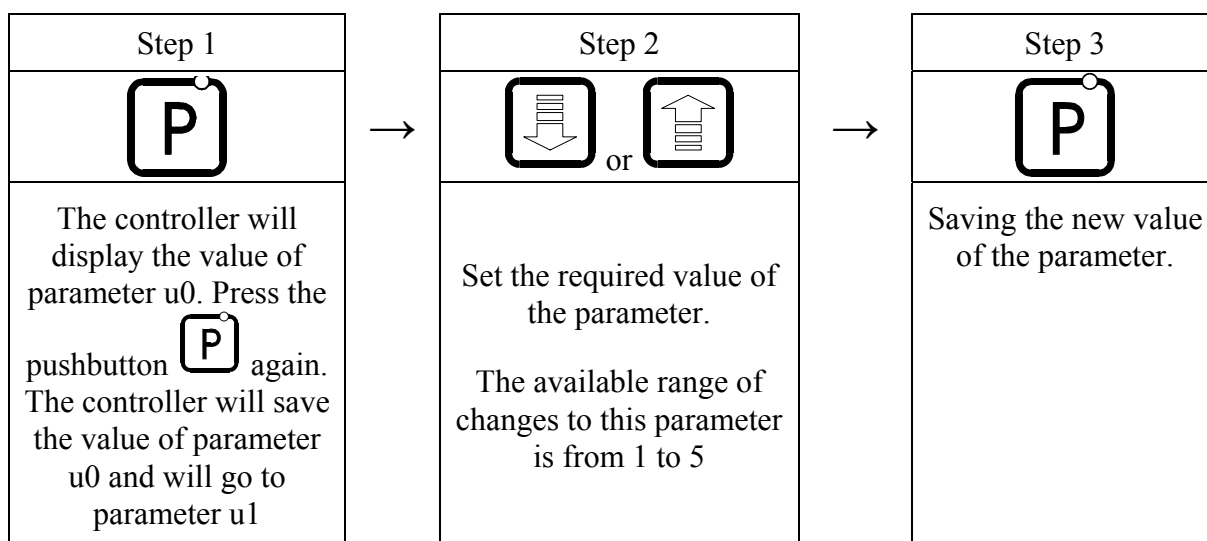
The change to the predefined temperature value  $\{T^{zad}\}$  is obtained as follows:



If, during setting the new temperature, none of the pushbuttons   is pressed within 15 seconds, the new temperature will not be saved and the controller will exit the programming mode. 

### 8.2. Fan operation run (u1)

This parameter determines the fan rpm, i.e. the rate of air supplied. It allows the selection of the fan rpm depending on the fuel humidity. The value of this parameter may change within the range 1 ÷ 5, where “1” means the minimum rpm, and “5” maximum rpm.



## 9. DOMESTIC HOT WATER CYLINDER HANDLING

The G-406-P02 controller allows the connection of the additional pump (⇒ Table 1) controlling the heating of the domestic hot water in the cylinder.

### 9.1. The assembly and connection

If you wish to take advantage of the domestic hot water heating function, perform the following actions:

1. Connect the boiler according to the diagram provided in the figure 1.
2. Place the domestic hot water temperature detector inside the cylinder.



**The assembly of the domestic hot water detector in the measuring chambers manufactured by “GECO” Sp. z o.o. is recommended. The location of temperature detectors in the chambers with oil or other liquid is definitely prohibited !!!**

4. Connect the **domestic hot water temperature detector** to the controller for terminals as shown in the figure 2.
5. Set the relevant parameters in the G-406-P02 controller (⇒ item 9.2).

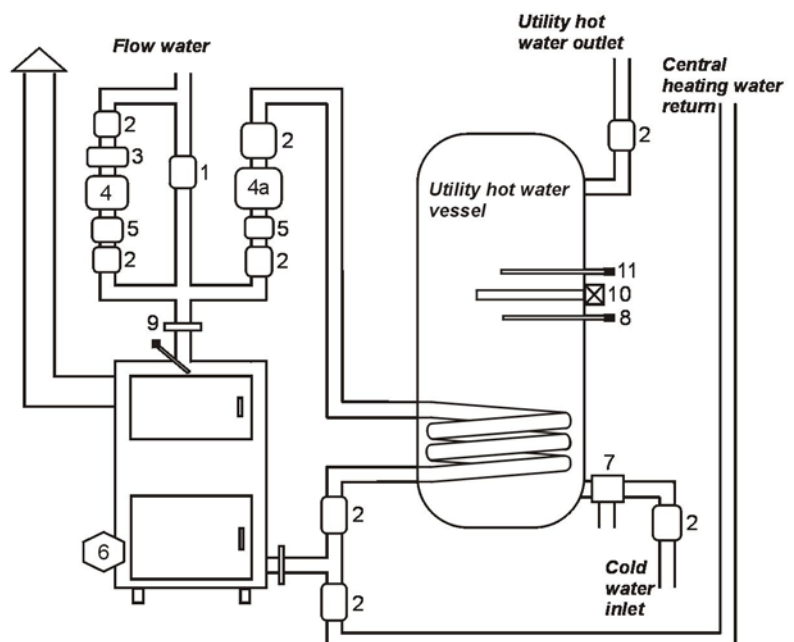


**The domestic hot water temperature detector is an additional detector that an option, not supplied together with the G-406-P02 controller.**

**The above mentioned detector may be purchased against additional payment from the manufacturer, i.e. “GECO” Sp. z o.o.**

Legend:

1. Residual valve
2. Ball Cut-off valve
3. Check valve
4. Circulating pump
- 4a. Utility hot water vessel supplying pump
5. Reticular filter
6. Boiler fan
7. Vessel safety valve
8. Utility hot water temperature sensor of the controller
9. Boiler hot water temperature sensor of the controller
10. Vessel electric heater
11. Vessel electric heater temperature sensor



9.2. Parameters configuration

In order to configure the controller for operation with the additional domestic hot water pump, the manufacturer of the boiler must unconditionally be contacted. This is related to the introduction of relevant changes in the service mode, available exclusively to the boiler manufacturer.

10. METHOD OF CONNECTING EQUIPMENT TO G-406-P02 CONTROLLER:

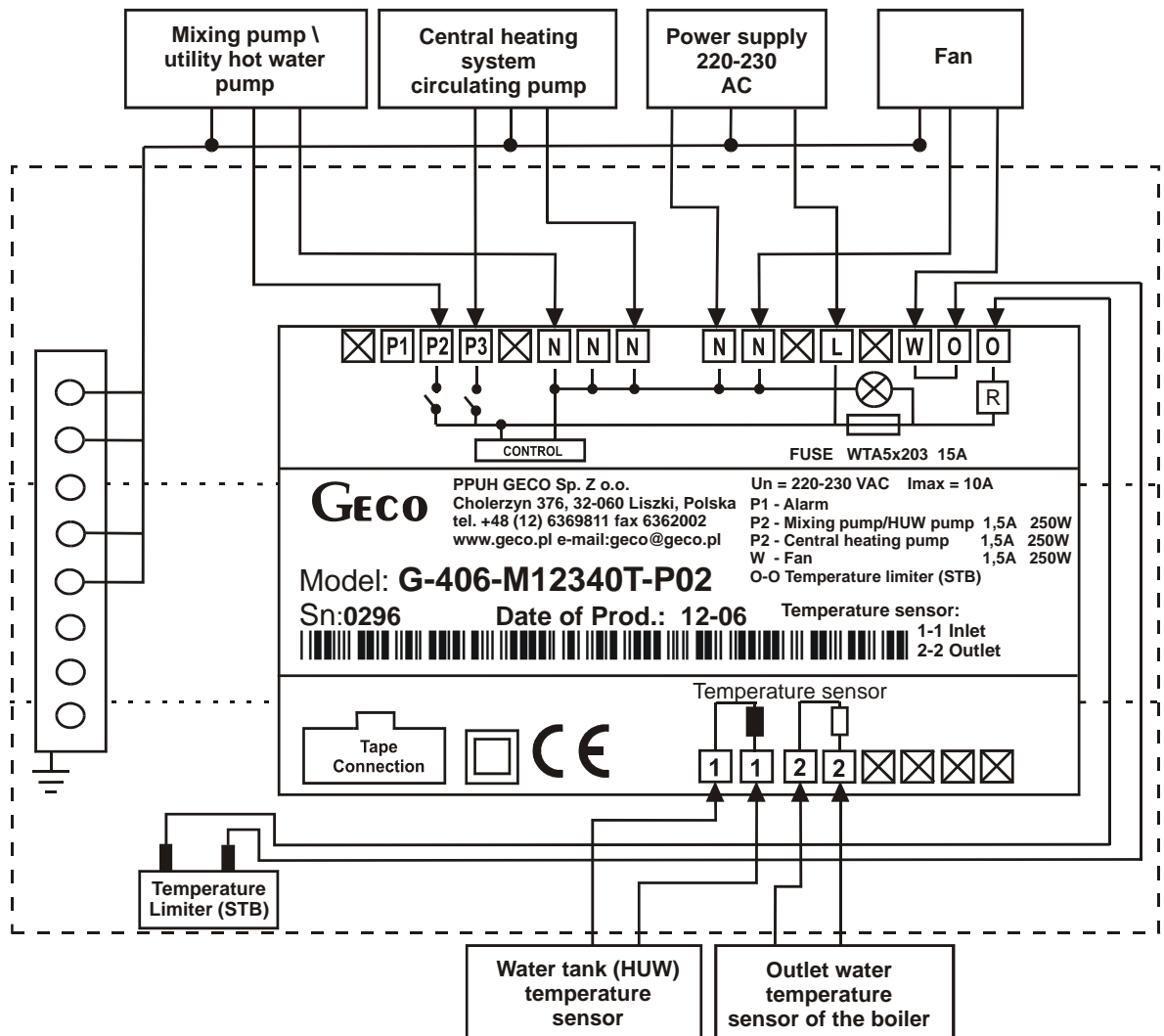
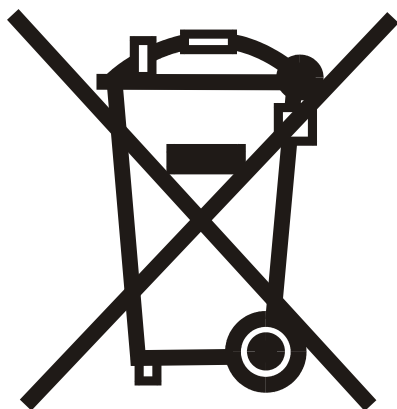


Fig. 1 Diagram of connecting the equipment and detectors to the G-406-P02 controller.

## 11. INFORMATION ON THE MARKING AND COLLECTION OF WORN ELECTRIC AND ELECTRONIC EQUIPMENT



### ATTENTION!

The symbol placed on the product or its packaging shows the selective collection of the worn electric and electronic equipment. This means that this product should not be disposed of together with other household waste. The proper disposal of old and worn electric and electronic equipment will help to avoid the potentially adverse results for the environment and human health.

The selective collection of the worn equipment is the area of the responsibility of the user, who should give this equipment back to the collector of the worn equipment.

## 12. TROUBLESHOOTING GUIDE

Fault symptoms	Items to check
1. The display fails to illuminate in spite of connecting the controller to the network	Check: <ul style="list-style-type: none"> <li>• the presence of voltage 230V on the L and N supply terminals</li> <li>• correctness of connecting the execution module with the control panel</li> <li>• remove and reinsert band wire sockets</li> <li>• connect another band wire</li> </ul>
2. The fan fails to turn on in spite of indication of its activation - green diode	Check: <ul style="list-style-type: none"> <li>• the presence of voltage 230V on the terminals according to the description on the upper wall of the execution module</li> <li>• fan efficiency</li> <li>• correctness of connecting the execution module with the control panel</li> <li>• connect another band wire</li> </ul>
3. The pump fails to turn on in spite of indication of its activation - red, vertical dash	Check: <ul style="list-style-type: none"> <li>• the presence of voltage 230V on the terminals according to the description on the upper wall of the execution module</li> <li>• pump efficiency</li> <li>• correctness of connecting the execution module with the control panel</li> <li>• connect another band wire</li> </ul>
4. Erroneous temperature indication	Check: <ul style="list-style-type: none"> <li>• connection of the detector to the joint</li> <li>• correctness of detector mounting</li> <li>• state of detector cable; the cable <b>may not have any damage</b></li> <li>• carefully the appearance of the exterior surface of the detector scale, i.e. if it has not been damaged mechanically</li> <li>• connect another band wire</li> </ul>
5. "Abnormal" or "strange" conduct of controller	Check: <ul style="list-style-type: none"> <li>• the presence of voltage 230V on the L and N supply terminals</li> <li>• the condition of feeding joints</li> <li>• the condition of wiring system and the number of equipment connected to one phase</li> <li>• if the control panel, execution module or band wire plugs have been subjected to the operation of water or other liquid</li> <li>• if the control panel, execution module or band wire plugs are exposed to the operation of moist or violent temperature fluctuations</li> <li>• correctness of connecting the execution module with the control panel</li> <li>• connect another band wire</li> </ul>
6. Display's flickering, the absence of activation capability	Check: <ul style="list-style-type: none"> <li>• the value of supply voltage</li> <li>• the condition of feeding joints</li> <li>• securing the feeding joints</li> <li>• correctness of connecting the execution module with the control panel</li> <li>• connect another band wire</li> </ul>



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