

GECO[®]



**MANUAL
FOR CONTROLLER**

GH10PD

**FOR CONTROLLING CENTRAL
HEATING BOILERS FIRED WITH
PELLETS AND OATS**

Program version 01c

USER MANUAL

We request that users carefully study applicable Instructions before connecting and starting up any of our products.

Should any doubts arise, please contact our Company between 8 a.m. and 4 p.m.

Attention !!! At the bottom of each page you will find last document's update date. Please, always use the most recent version of the Instructions, which is available free of charge and will be mailed to you if ordered.

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1. INTRODUCTION

1.1. Graphic symbols

Symbols intended to indicate and at the same time emphasize the importance of text containing information that warns against dangerous situation have the following graphic forms:



Warning

This symbol is used when it is necessary in described instructions to follow the sequence of carried out operations. The unit may be damaged or destroyed in case of any error or proceeding in discord with the description.



Important!

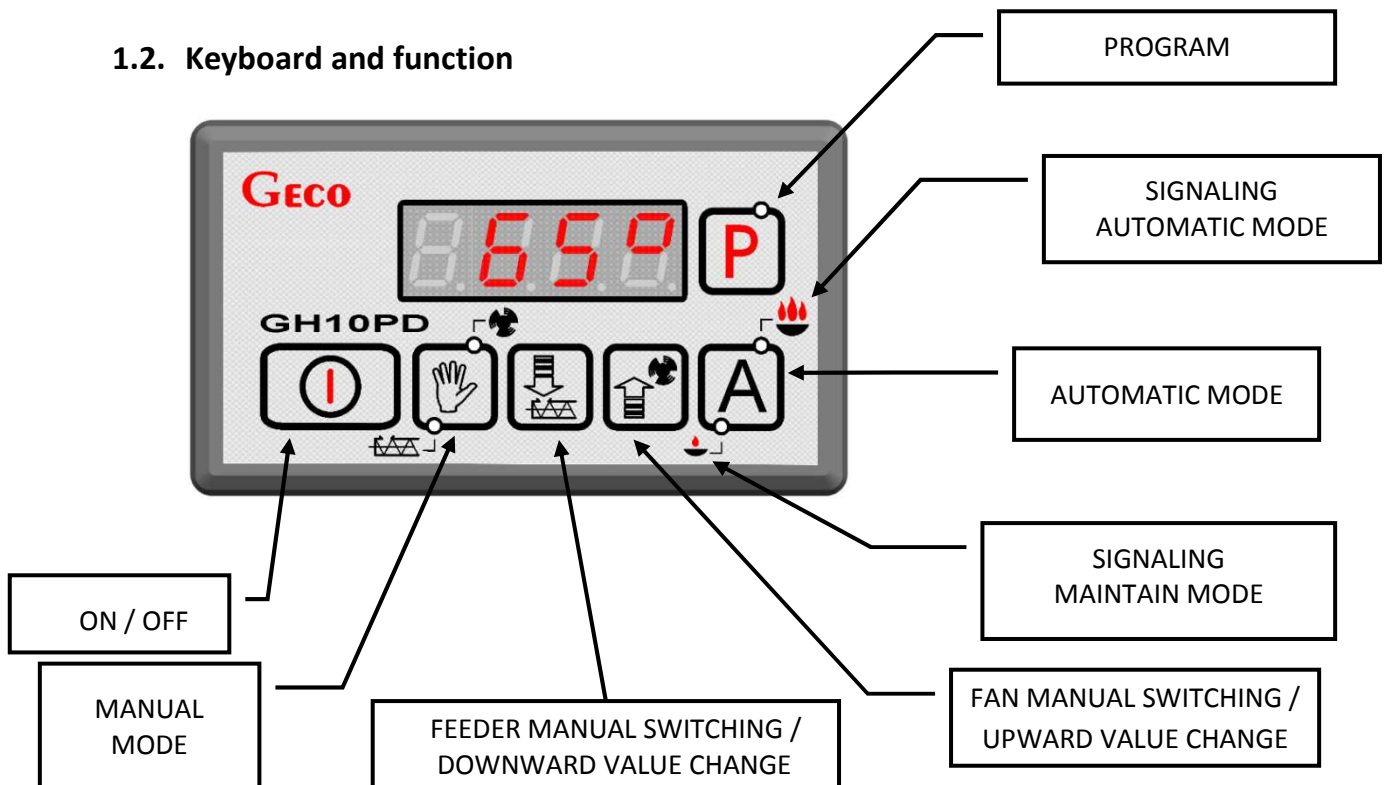
This symbol indicates information of particular importance.



Reference

This symbol indicates occurrence of additional information in a chapter.

1.2. Keyboard and function



1.3. Device operation indicators

The operation of particular devices is indicated by means of LED lights placed next to the keys (⇒ section 1.2 page 3) and by the first segment of the display. Individual lines on the display, when lit up, indicate the operation of: the CH pump, the heater and the grate– see the figure below:



– CH pump operation,



– heater operation,



– grate.

2. GENERAL FEATURES

The GH10PD Controller is a microprocessor-based device manufactured using the Surface Mount Technology (SMT).

It is designed to control the main Central Heating (CH) water circuit. Control parameters can be adjusted to the current operating conditions and boiler type. The Controller includes a system protecting it from power outages and various other disturbances.

The GH10PD Controller is fitted with:

- Inputs analog:
 1. for boiler output water temperature measurement (NTC sensor),
- a digital input:
 2. for check position of grates (Reed Relay),
 3. for Room thermostat

It also contains five outputs allowing direct connection of 230 V AC devices, i.e.: the fan, the burner feeder, the grate, the CH circulation pump and the ignition heater.



**IT IS ABSOLUTELY NECESSARY TO DISCONNECT THE
CONTROLLER FROM THE MAIN DURING STORMS**

3. TECHNICAL DATA

Working voltage	230V AC +10% -15%
Working temperature	from +5°C to +40°C
Humidity	from 20% to 80% RH
Fan and Feeder protection	3,15A
Sensor type	NTC 2,2kΩ
Temp. sensor operating range	0°C÷100°C

Output	Maximum continuous load	
	Current	Power
CH pump	1A	250W
Grate	1A	250W
Burner feeder*	1A	250W
Fan*	1A	250W
Heater	3A	750W

Resistance characteristics for NTC sensors	
Temperature °C	Resistance Ω
0	7174,89
10	4374,83
20	2747,10
30	1774,91
40	1172,09
50	795,08
60	547,95
70	384,62
80	275,86
90	202,37
100	149,16



****In case of connection controllers with contactor or intermediary relay. User should apply dedicated to the outputs quencher construction (for example: varistor construction).***

If this kind of protection will be omit, This can cause incorrect working or damage outputs in controller.

4. ELECTRICAL SYSTEM AND CONNECTION RULES

Boiler room should be equipped with 230V/50Hz electrical system according to applicable regulations.

Electrical system (regardless of its type) should end with a plug-in socket equipped with protective contact. **Using a socket without connected protective contact may result in electric shock !!!**

The controller needs to be connected to a separate power supply line protected with a properly selected quick fuse and differential current switch (anti-electric shock). **It is forbidden to connect any other equipment to this line !!!**

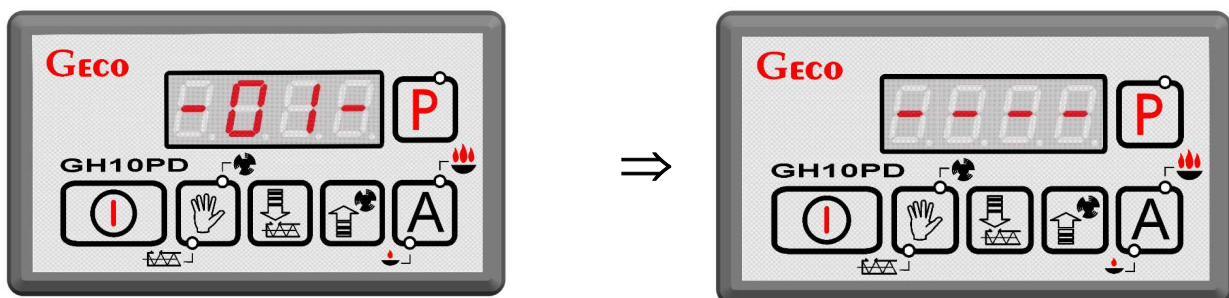


***THE CONTROLLER IS POWERED FROM 230V/50HZ MAINS
ANY REPAIRS MAY BE CARRIED OUT ONLY WITH POWER SUPPLY
CUT OFF AT THE FUSE***

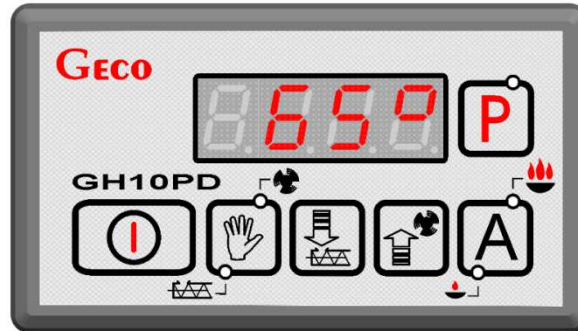
5. QUICK START


Carry out the following operations in order to activate the GH10PD controller quickly:

1. Connect the unit to the mains (plug in power supply cable).



Switch on the controller using push-button . The following screen will appear:



Press push-button . The following screen will appear:



and the controller will start automatic operation based on preset factory parameters.

Table 1. Factory settings chart.

User parameter	Description	Factory settings
U0	Boiler preset temperature*	60°C
U1	Feeder working time	15 s
U2	Feeder stop time	45 s
U3	Maintain time**	15 min
U4	Fan speed	5
U5	The number of grate rotation in heating mode and sustain mode	3

* When there is no lock on the room thermostat.

** When U3 = 0 in sustain mode the feeder and fan do not operate, and return to automatic initiates the firing up process.

6. OPERATION OF THE GH10PD

6.1. System configuration

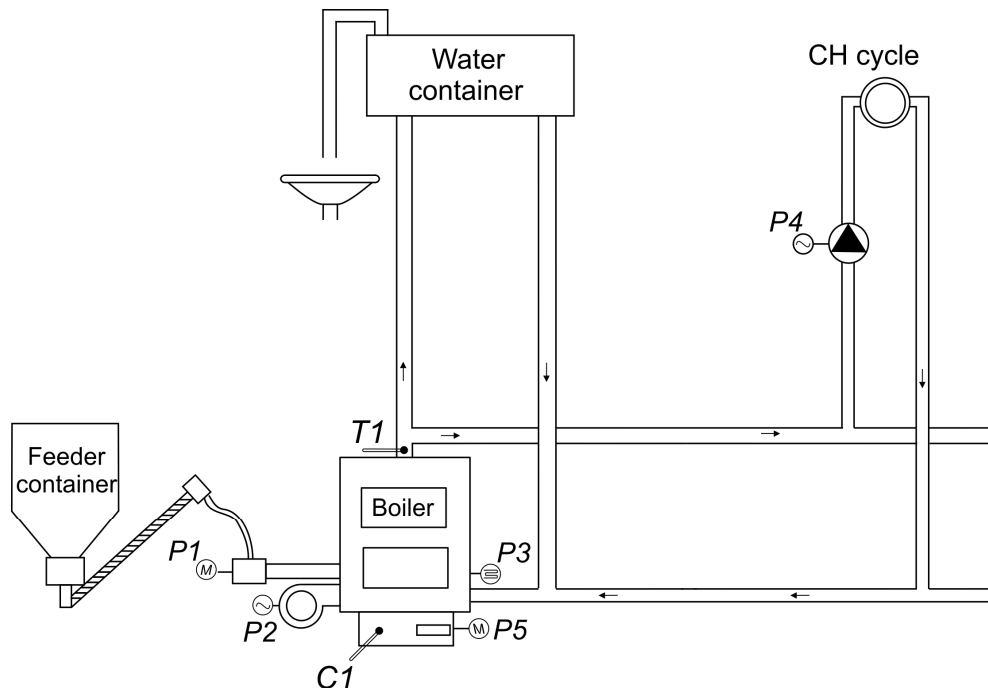





Fig. 1. Central Heating circuit

INPUT	OUTPUT
T1 – Boiler temperature	P1 – Burner feeder
Tp – Room thermostat	P2 – Fan
C1 – Reed relay gate	P3 – Heater
	P4 – CH pump
	P5 – Grate



6.2. Automatic operation mode

By pressing , you can enable the automatic operation mode – the Controller lights up the upper indicator on  ()

6.2.1. Firing up

The condition for FIRING UP mode is $U3=0$ and:

1. Exiting room panel lock and returning to automatic mode
2. Exiting sustain mode and returning the controller to automatic mode

This mode of operation is indicated by the blinking of the upper indicator on  (). Firing up consists in controlling the burner feeder, the fan and the ignition heater so as to switch to the Automatic Operation Mode (if $F34=0$, then the ignition heater cycle is skipped – Controller without ignition heater support) without the need to enable it manually.

The fan operates continuously providing the output indicated in the **F36** service setting and the Controller additionally indicates whether it activates the feeder, the fan or the heater.

The heater activation and operation are indicated by means of a **horizontal** line on the left side of the display, in the **lower** sign segment, on the Controller main display screen (⇒ section 1.3 page 4). During the firing up operation the grate is all time off.

The firing up process follows the scheme below:

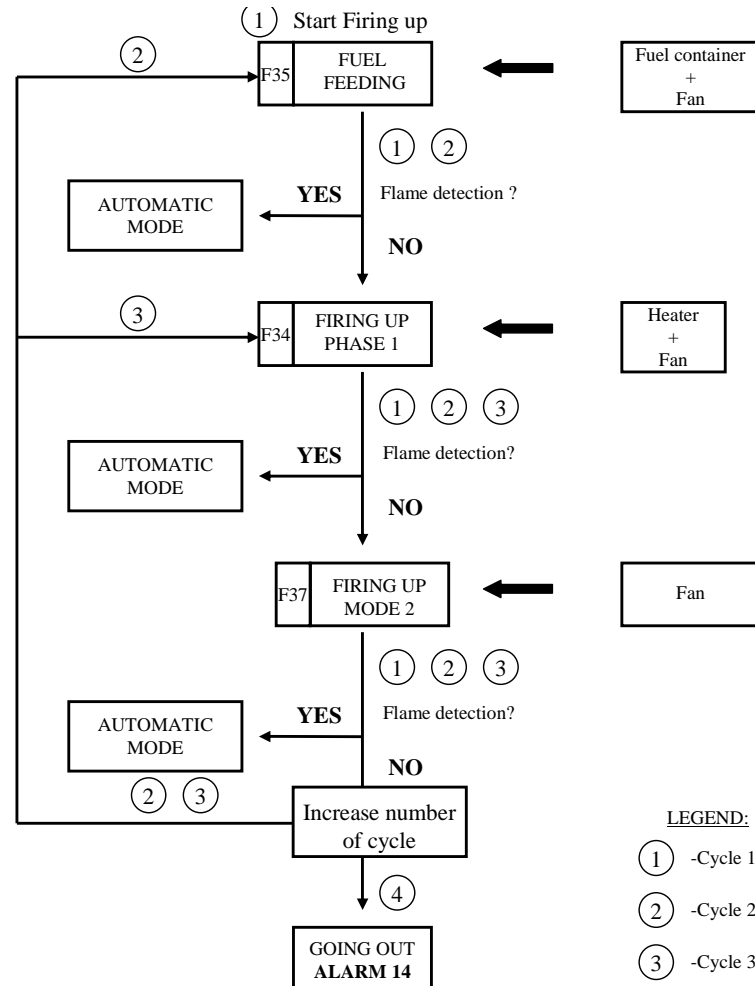



Fig. 2. Diagram showing firing up process.

6.2.2. Burner feeder

The burner feeder operates according to the values set in the user settings *U1* – “Feeder work time” and *U2* – “Feeder stop time”. Activation and operation of the burner feeder is indicated by the **lower**

indicator on .

6.2.3. Grate

The burner feeder operates according to the values set in the user settings *U5* – “The number of grate rotation in heating mode and in sustain mode”.

a) In sustain mode when $U3 > 0$:

In SUSTAIN mode, the fuel feeder operates according to the value set by the user in parameter *U5*. The grate activation and operation are indicated by means of a **horizontally** line on the left side of the display, in the **lower** sign segment, on the Controller main display screen (⇒ section 1.3 page 4).

In the firing up mode of operation the grate is off. It starts working when the firing up process is finished. The Grate starts its work from the U5 parameter - "The number of grate rotation in heating mode and in sustain mode".

The Grate starts its work only when the burner feeder stops, and working according to the values set in the user settings U5 – "The number of grate rotation in heating mode and in sustain mode".

b) In sustain mode when U3=0:

The fuel grate does not operate in sustain mode

6.2.4. CH pump


In the AUTO mode, the CH pump is activated when the temperature of the boiler water is higher or equal to the value set in the **F06** service setting (factory setting is 40°C).

The CH pump activation and operation are indicated by means of a **vertical** line on the left side of the display, in the **upper** sign segment, on the Controller main display screen (⇒ section 1.3 page 4).

The Controller deactivates the pump when the water temperature drops to the activation temperature - 4°C. (If the CH pump activation temperature is 40°C, then the CH pump deactivation temperature is 36°C).


6.2.5. Fan

In the AUTO mode, the fan operates continuously until the boiler temperature reaches the value set by the user in the U0 setting. During that period the fan operates at the speed set in the U4 setting. Fan

activation and operation are indicated by the **upper** indicator on .

6.2.6. Maintain operation mode

The Controller switches into this mode when the boiler temperature reaches the value set by the user in the U0 setting.

This mode of boiler operation is indicated by the **lower** indicator on .

If U3>0

The fuel feeder and the fan remain inactive in this mode for the period set by the user in the U3 settings. When the period ends, the Controller activates the feeder and fan for the period set by the manufacturer in the **F20** service setting.

The fan operates for a period appropriately longer than the feeder for the time set in the **F18** service setting in order to fire up the added fuel.


The Controller exits the MAINTAIN mode and returns to the AUTO mode if the boiler temperature drops to the value equal to: U0 - **F05**.

The CH pump operates in the same manner as in the AUTO mode.

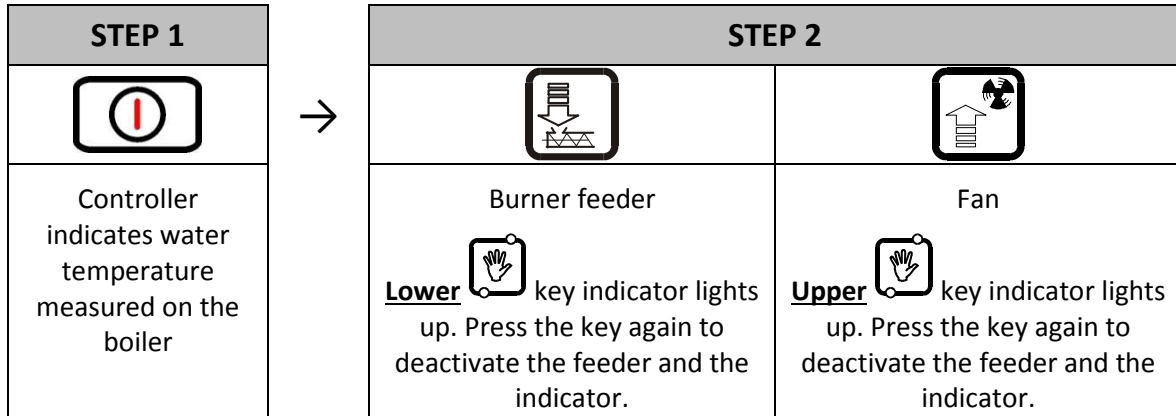
If U3=0





The fan, feeder and heater remain off until SUSTAIN mode is exited and automatic mode is initiated.

6.3. Manual operation mode


Pressing  causes the Controller to switch from automatic to manual mode, and immediately deactivates the fan, the feeder and the pump.


In this mode, you can manually and independently activate and deactivate the fuel feeder, grate, pump CH and the fan. To do this, follow the scheme below:




To activate or inactivate the CH pump, press the following keys simultaneously:  + . The CH pump activation and operation are indicated by means of a **vertical** line on the left side of the display, in the **upper** sign segment, on the Controller main display screen (⇒ section 1.3 page 4). The grate is inactivate after inputs reed relay change from open to close. To activate or inactivate the grate, press the following keys simultaneously:  + . The grate activation and operation are indicated by means of a **horizontal** line on the left side of the display, in the **lower** sign segment, on the Controller main display screen (⇒ section 1.3 page 4).

6.4. Viewing flame temperatures

After pressing , the display shows water temperature at the boiler outlet. Flame sensor measurement is available in the AUTO and MAINTAIN modes, but only if the flame sensor are properly

enabled. Press  to view the flame sensor measurement. Press the key again to exit the view. You can also wait for automatic exit 10s from pressing the key.

6.5. Alarms

The Controller uses 5 different alarms. In each alarm condition, the Controller displays the alarm number and activates the alarm sound output. In case of several alarm conditions occurring simultaneously, their numbers are displayed in sequence. You can exit an alarm condition only by pressing , except the AL12 alarm. Alarms:

- **AL1** → STB activated or fuse blown
- **AL2** → Boiler water outlet temperature sensor failure
- **AL9** → No grate rotation / reed relay failure
- **AL12** → Boiler overheating
- **AL13** → Boiler burnout

6.6. Power failure

After power failure the Controller resumes operation according to the condition it was in before the power failure. The Controller waits 1 minute for the mains power parameters to stabilise, and then resumes operation with the previously entered settings.

During the waiting period, the display shows time in seconds remaining until the end of the period, together with indication of its condition before the power outage:

- blinking "A" for AUTO mode,
- blinking "P" for MAINTAIN mode,
- blinking "r" for MANUAL mode.

Respective indicators (AUTO  or MAINTAIN ) are blinking together with the letters.

6.7. Boiler burnout detection

6.7.1. No fuel

If during automatic operation the boiler outlet water temperature remains below the **F08** setting for a period of time set in the **F09** setting, then the Controller considers the boiler as "burned out" and enters the **AL13** alarm condition.

6.7.2. Sudden Drop of Outlet Water Temperature

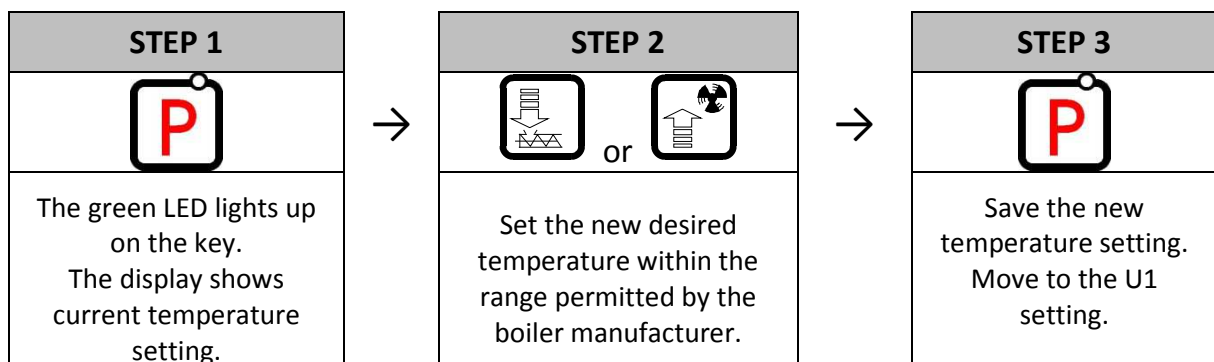
If during automatic operation the boiler outlet water temperature drops by 10°C, and during that dropping period the temperature does not rise by 4°C, then the CH pump is switched off, and the Controller goes into the burnout detection mode.




The Controller waits for the period of time set in the **F10** setting, during which it checks whether a rise of 4°C occurs. If YES, then the burnout detection condition is stopped, and the CH pump (if necessary) is started. If NOT, this means that the furnace is burned out – the Controller enters the **AL13** alarm condition.

7. USER SETTINGS

7.1. Boiler preset temperature (U0)

You can change the boiler temperature setting applying the following procedure:

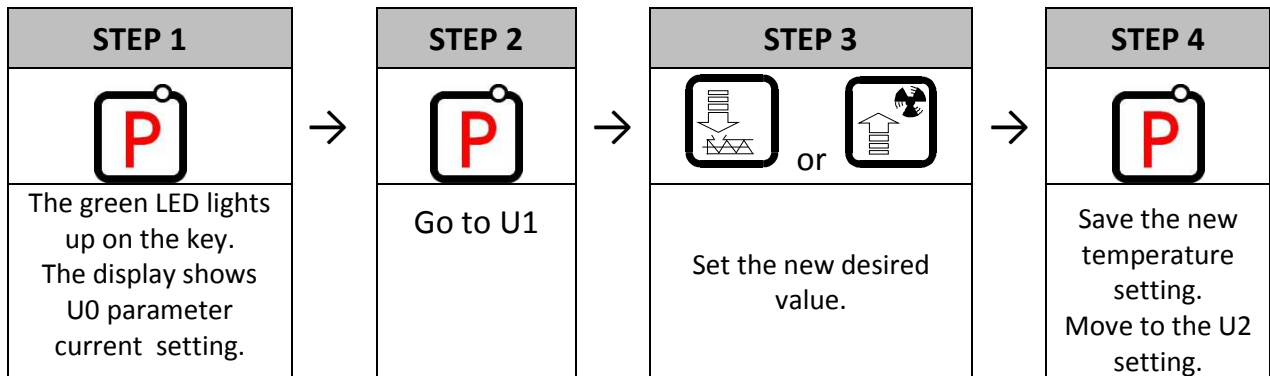


If during setting the new temperature none of the following keys , ,  is pressed for 15 s, the new temperature will not be saved and the Controller will exit the programming mode.

7.2. Feeder working time (U1)

This setting informs the user about the time for which the fuel feeder will be activated in the AUTO mode. Settings are within range of 2s to 250s.

You can change the setting using the following procedure:



7.3. Feeder stop time (U2)

This is the period of time between two consecutive fuel feeds in the AUTO mode. Settings are within the range from 5s to 250s.

You can modify this setting applying a procedure similar to the one described in section 7.2.

7.4. Maintain time (U3)

This is the period of time after which the Controller activates the feeder and fan for the period set by the manufacturer for the MAINTAIN mode to prevent burning out of the boiler. Settings range is from 1 min. to 250 min. When U3=0 in SUSTAIN mode, the fan, feeder and heater do not turn on, and each return to AUTOMATIC mode starts FIRING UP mode. You can modify this setting in a manner similar to the one described in section 7.2.

7.5. Fan speed (U4)

This setting determines the fan rotation speed, and thus the amount of air delivered. It allows adjusting the fan speed according to the type and quality of the fuel used.

This setting can be set within the range of 1÷10, where “1” denotes the minimum speed, and “10” the maximum speed. You can modify this setting in a manner similar to the one described in section 7.2.

7.6. The number of grate rotation in heating mode and sustain mode (U5)

This setting determines the number of grate rotation in heating mode and sustain mode, thus the amount of ash throw out. It allows adjusting the number of grate rotation according to the type and quality of the fuel used. This setting can be set within the range of 1÷10. You can modify this setting in a manner similar to the one described in section 7.2.

8. TEMPERATURE LIMITER (STB)

The GH10PD Controller can be equipped with an additional independent temperature limiter STB via terminals 15 and 16.





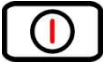

WHEN THE TEMPERATURE LIMITER IS NOT USED, TERMINALS 15 AND 16 SHOULD BE SHORTED.

If due to boiler temperature rise the temperature limiter is activated and opens its terminals, it will disable feeder and fan power supply in order to stop fuel and air delivery do the boiler. After approximately 5s from limiter activation the Controller indicates the AL1 alarm.

Return to normal boiler operation is possible when the boiler temperature drops to a level enabling limiter reset (temperature level depends on the limiter model used).

For safety reasons the Controller does not resume automatic operation on its own.

For the Controller to resume operation you have to, after resetting the limiter, press  twice:

- pressing  for the first time cancels the alarm and disables the Controller,
- pressing  for the second time reactivates the Controller,
- pressing  causes the Controller to switch to automatic operation mode.

CAPILLARY TUBE PUNCTURE OR BREAKAGE INDICATES THAT TEMPERATURE LIMITER FILLED WITH LIQUID LEAKS, WHICH RESULTS IN ABNORMAL OPERATION OF THE GH10PD CONTROLLER. IN CASE IF THE ABOVE-MENTIONED DEFECT IS FOUND, IT WILL BE NECESSARY TO DISCONNECT TEMPERATURE LIMITER FROM THE GH10PD CONTROLLER, REMOVE IT AND REPLACE WITH A NEW DEVICE.



9. ROOM THERMOSTAT

The GH10PD controller can cooperate with external room thermostat (Fig.1), which can put coal boiler in blockade position when temperature is reached in room.

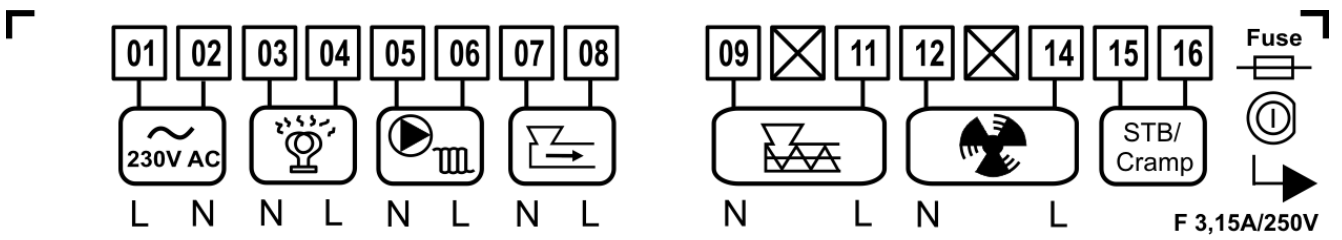
During blockade position C.H. pump stay off after 4 minutes, for the moment when temperature in room is reached (short circuit contact). The boiler start working in maintain operation mode.

The controller GH10TA passing from automatic operation to maintain operation mode just from time to time, when the boiler temperature is higher than minimum temperature adjust in **F03** service parameter. When room thermostat put controller in blockade position, the boiler is in maintain operation mode and boiler temperature fall down less than **F03** service parameter than the controller come back to automatic operation mode until both conditions will be accomplish.

The controller supports the room panel of our manufacture. The controller responses to the panel orders if the controller is under the automatic operation mode. Where the malfunction occurs to the connection with the panel, the controller will resume the operation with the user programmed settings. The illuminated dot on the segment on the left-hand side of the display shows that the communication link is operable.

10. CONNECTING DEVICES TO THE GH10PD CONTROLLER

OUTPUTS				INPUTS			
14	L	—	Fan (P2)	50, 51	—	Boiler temperature (T1)	
12	N	—	Fan (P2)	52, 53	—	Room thermostat (Tp)	
11	L	—	Burner feeder (P1)	56, 57	—	Grate reed relay (C1)	
09	N	—	Burner feeder (P1)				
06	L	—	CH pump (P4)				
05	N	—	CH pump (P4)				
08	L	—	Grate (P5)				
07	N	—	Grate (P5)				
04	L	—	Heater (P3)				
03	N	—	Heater (P3)				
02	N	—	Power AC 230V				
01	L	—	Power AC 230V				



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- 01-02 - Power
- 03-04 - Heater
- 05-06 - C.H. Pump
- 07-08 - Grate
- 09-11 - Burner Feeder
- 12-14 - Fan
- 15-16 - STB
- 50-51 - Boiler temperature
- 52-53 - Room thermostate
- 56-57 - Grate Reed Relay

Un = 220-230 VAC
 I_{max} = 10A

Made in Poland

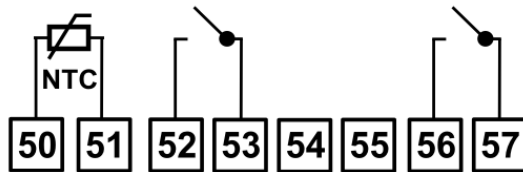
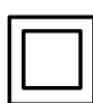
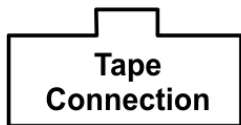
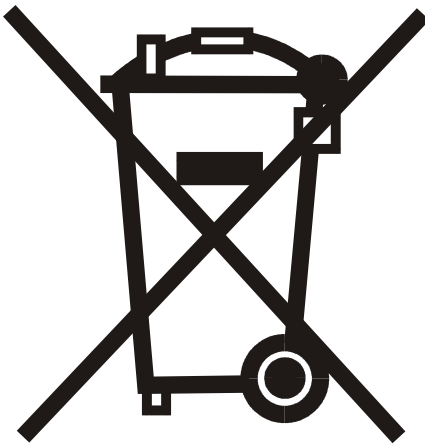


Fig. 3 Diagram of connections between equipment, sensors and the GH10PD controller.



ANY ADDITIONAL EQUIPMENT MAY BE CONNECTED TO THE GH10PD CONTROLLER ONLY BY PERSON LICENSED TO PERFORM ELECTRICAL INSTALLATION WORKS.

11. INFORMATION ON LABELLING AND COLLECTION OF WORN OUT ELECTRICAL AND ELECTRONIC EQUIPMENT



CAUTION!

This symbol placed on the product or its packaging indicates the need for selective collection of worn out electrical and electronic equipment. It means that this product should not be disposed of with other household wastes. Proper disposal of aged and worn out electrical and electronic equipment will help to avoid potentially adverse effects for environment and human health.

It is the user's responsibility to collect worn out equipment separately, and to return it to an authorized disposal company.



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