

GECO[®]



**MANUAL
FOR CONTROLLER**

GH10PF

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

Program version 01

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.

TABLE OF CONTENTS

1. INTRODUCTION	3
1.1. GRAPHIC SYMBOLS.....	3
1.2. KEYBOARD AND FUNCTION BUTTON	3
1.3. DEVICE OPERATION INDICATORS	3
2. GENERAL FEATURES.....	4
3. TECHNICAL DATA.....	4
4. ELECTRICAL SYSTEM AND CONNECTION RULES.....	5
5. QUICK START	5
6. OPERATION OF THE GH10PF	6
6.1. SYSTEM CONFIGURATION, F41=0 OR F41=1	6
6.2. SYSTEM CONFIGURATION, F41=2.....	7
6.3. AUTOMATIC OPERATION MODE	7
6.4. MANUAL OPERATION MODE	9
6.5. VIEWING FLAME TEMPERATURES	10
6.6. ALARMS	10
6.7. POWER FAILURE	11
6.8. BOILER BURNOUT DETECTION.....	11
6.9. MAXIMUM FEEDER TEMPERATURE DETECTION.....	11
7. USER SETTINGS.....	12
7.1. BOILER PRESET TEMPERATURE (U0).....	12
7.2. FEEDER WORKING TIME (U1).....	12
7.3. FEEDER STOP TIME (U2)	12
7.4. MAINTAIN TIME (U3).....	13
7.5. FAN SPEED (U4).....	13
7.6. THE NUMBER OF GRATE ROTATION IN HEATING MODE (U5).....	13
7.7. GRATE STOP TIME IN HEATING MODE (U6).....	13
7.8. THE NUMBER OF GRATE ROTATION IN SUSTAIN MODE (U7).....	13
7.9. GRATE STOP TIME IN SUSTAIN MODE (U8)	13
8. TEMPERATURE LIMITER (STB).....	14
9. ROOM THERMOSTAT	14
10. CONNECTING DEVICES TO THE GH10PF CONTROLLER	15
11. INFORMATION ON LABELLING AND COLLECTION OF WORN OUT ELECTRICAL AND ELECTRONIC EQUIPMENT	15

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!

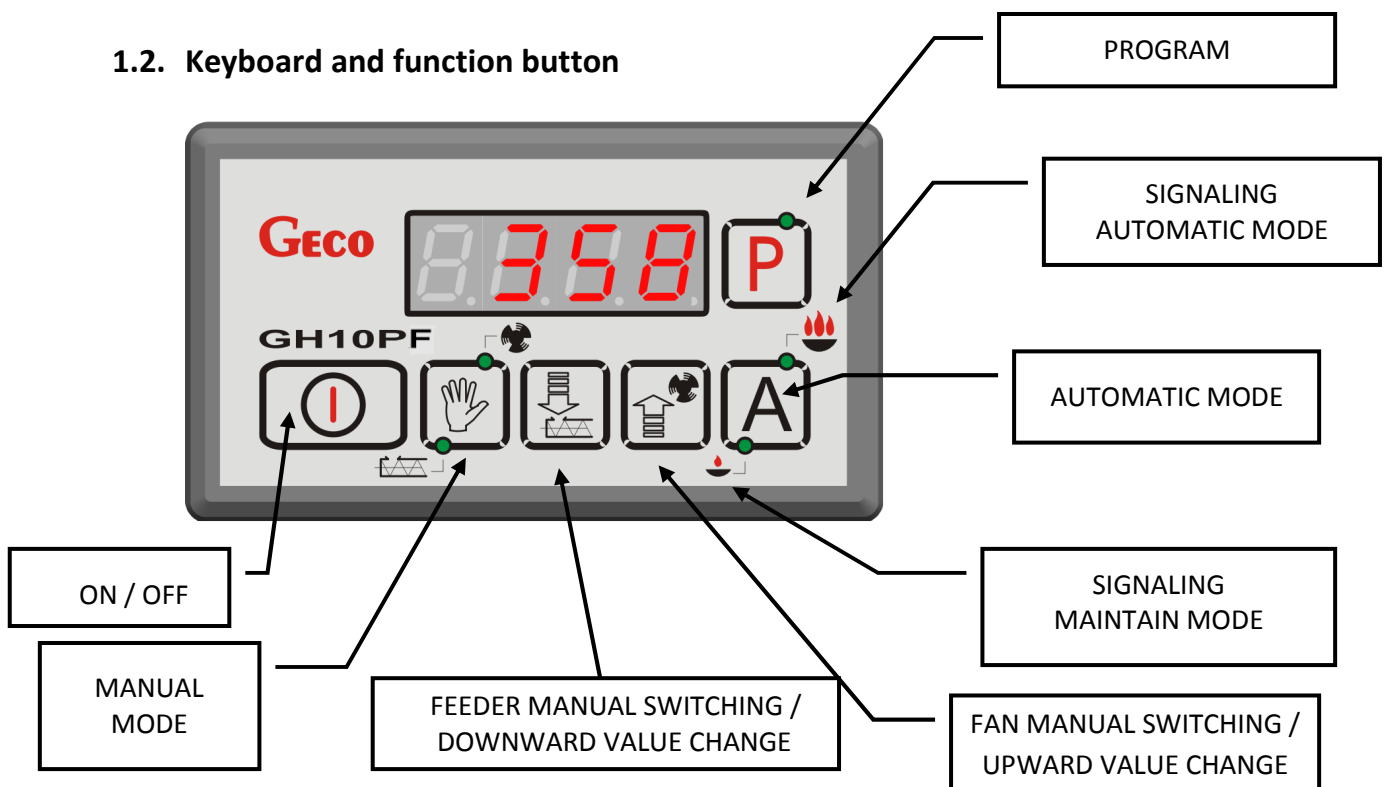
This symbol indicates information of particular importance.



Reference

This symbol indicates occurrence of additional information in a chapter.

1.2. Keyboard and function button



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 feeder container / grate – see the figure below:



– CH pump operation,



– heater operation,



– feeder container / grate

2. GENERAL FEATURES

The GH10PF 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 GH10PF Controller is fitted with:

- Inputs analog:
 1. for boiler output temperature measurement (PT1000),
 2. for connecting flame sensor,
 3. for temperature feeder sensor / for check position of grates (Reed Relay),
 4. 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 feeder container, the CH circulation pump and the ignition heater.



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

3. TECHNICAL DATA

Power supply	230V AC +10% -15%	
Operating temperature range	+5°C to +40°C	
Humidity	20% to 80% RH	
Fan protection	3,15A	
Sensors type	NTC 2,2kΩ, PT1000	
Sensors operating temperature range	NTC:	0°C ÷ 100°C
	PT1000:	0°C ÷ 420°C

Output	Maximum continuous load	
Feeder container/ Grate	1A	250W
CH pump	1A	250W
Fan*	1A	250W
Burner feeder*	1A	250W
Heater	3A	750W

NTC sensor resistance characteristics	
Temp. °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

PT1000 sensor resistance characteristics	
Temp. °C	Resistance Ω
0	1000,00
50	1194,00
100	1385,10
150	1573,30
200	1758,60
250	1941,00
300	2120,50
350	2297,20
400	2470,90
450	2641,80
500	2809,80
550	2974,90
600	3137,10



****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 !!!**

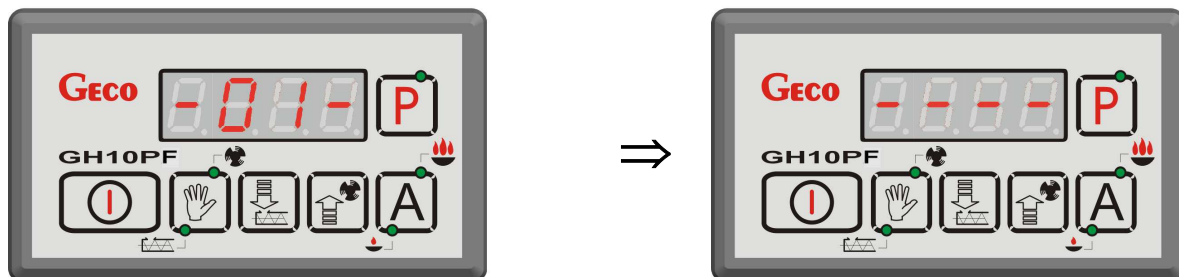


***THE CONTROLLER IS POWERED FROM 230V/50HZ MAINS
ANY REPAIRS MAY BE CARRIED OUT ONLY WITH POWER SUPPLY
CUT OFF AT THE FUSE***

5. QUICK START

Carry out the following operations in order to activate the GH10PF 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  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	5 min
U4	Fan speed	5
U5*	The number of grate rotation in heating mode	3
U6*	Grate stop time in heating mode	30s
U7*	The number of grate rotation in sustain mode	3
U8*	Grate stop time in sustain mode	5 min

*Only when F41=2

6. OPERATION OF THE GH10PF

6.1. System configuration, F41=0 or F41=1

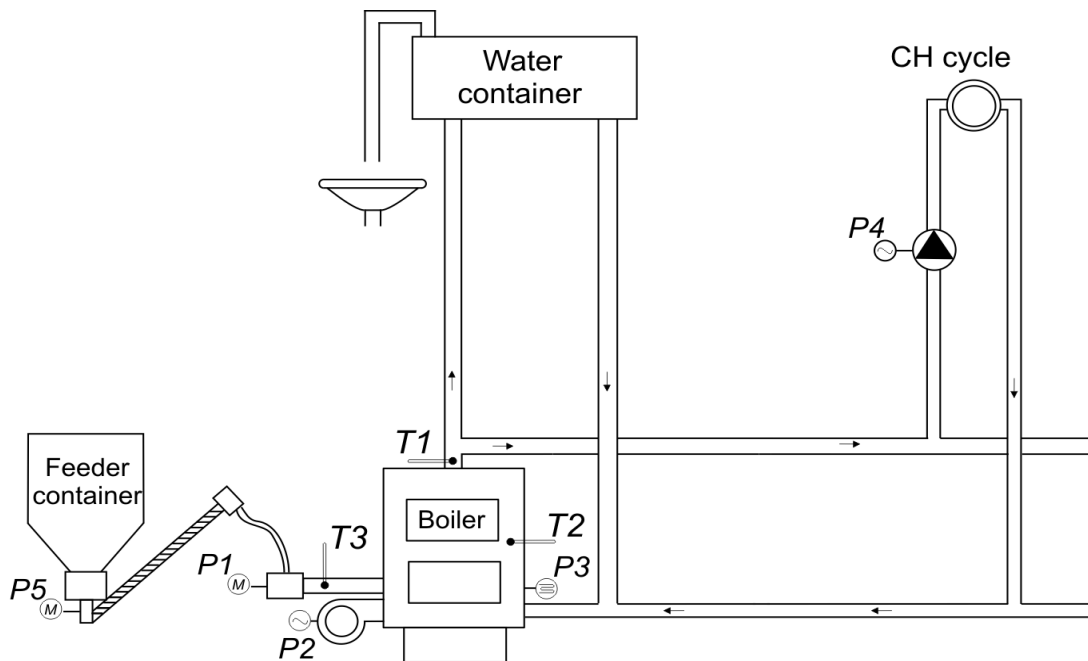
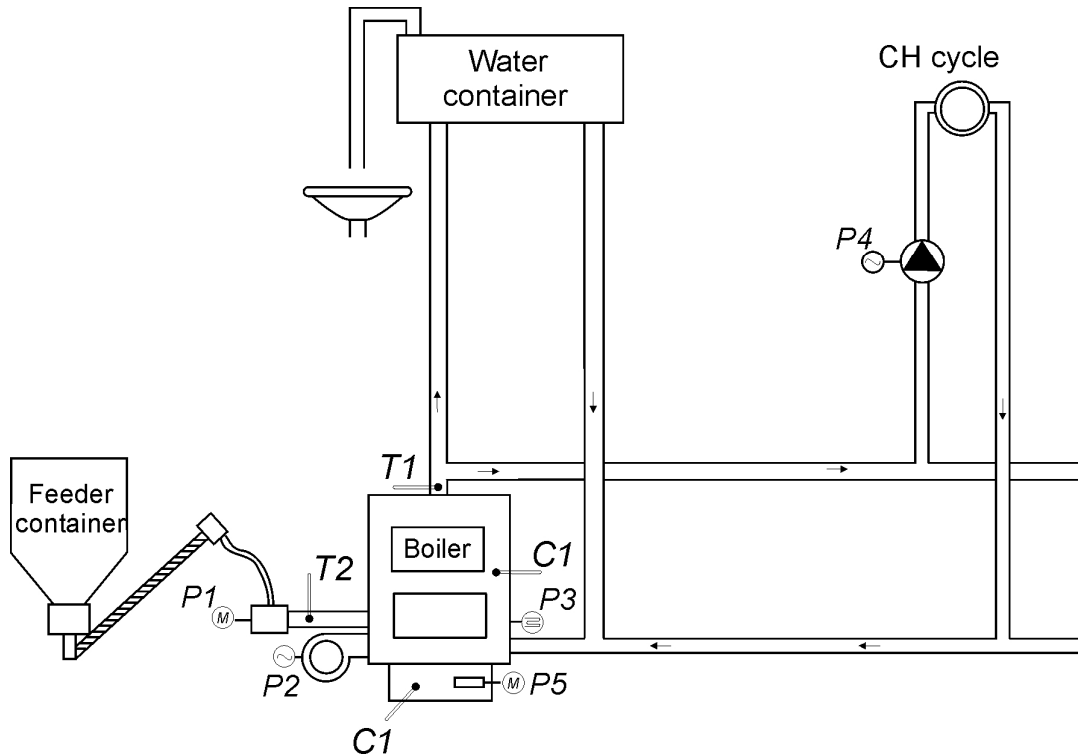


Fig. 1. Central Heating circuit



INPUT	OUTPUT
T1 – boiler sensor	P1 – feeder burner
T2 – flame sensor	P2 – fan
T3 – feeder sensor	P3 – heater
Tp – room thermostat	P4 – CH Pump
	P5 – feeder cont.

6.2. System configuration, F41=2




INPUT	OUTPUT
T1 – boiler sensor	P1 – Fedder burner
Tp – room thermostat	P2 – fan
T2 – flame sensor	P3 – heater
C1 – reed relay	P4 – CH pump
	P5 – grate

6.3. Automatic operation mode

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

6.3.1. Firing up

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 value of parameter F34 is always multiply by 10. F34x10 – time of heater in single ignition mode step.

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 **vertical** 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.

If the sensor detects fire during firing up (sensitivity drops below the value indicated in the **F38 service setting**), the firing up process is terminated and the Controller switches to automatic operation. The firing up process follows the scheme below:

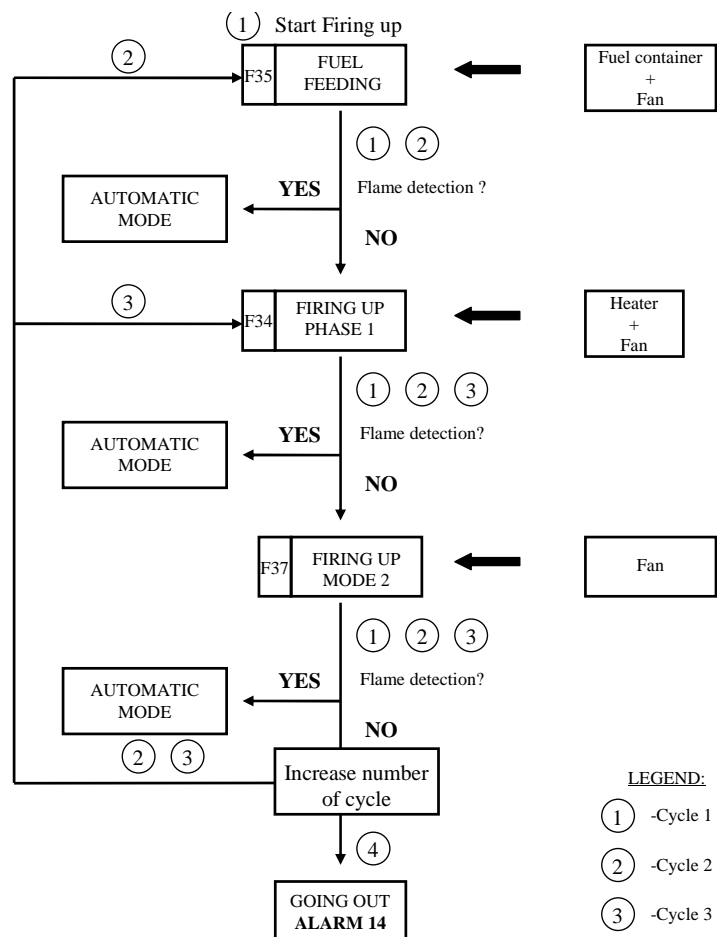


Fig. 2. Diagram showing firing up process.

Controllers come back to ignition mode automatically when sensitivity of flame will be higher than value of rate in F39 service parameter.

6.3.2. Burner feeder

When service parameter **F41=1** the burner feeder working constantly all time. When **F41** parameter has different setting 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 .

6.3.3. Grate

The Grate is active when service parameter **F41=2**. In heating mode the burner feeder operates according to the values set in the user settings *U5 – “The number of grate rotation in heating mode”* and *U6 – “Grate stop time in heating mode”*. In the maintain mode the burner feeder operates according to the values set in the user settings *U7 – “The number of grate rotation in sustain mode”* and *U8 – “Grate stop time in sustain mode”*.

The grate activation and operation are indicated by means of a **horizontally** line on the down 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 firing up process is finish. The Grate start its work from the *U6* parameter - Grate stop time in heating mode.


6.3.4. 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 right 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).



6.3.5. 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 .


6.3.6. Container feeder

This feeder is activated by entering the setting **F41=1**, then the container feeder operates on a cyclical basis according to the values of the user settings **U1** – “Feeder working time” and **U2** – “Feeder stop time” in the AUTO mode. In the MAINTAIN mode the container feeder operates according to the value of the **F20** setting. The container feeder activation and operation are indicated by means of a **horizontal** line on the down side of the display, in the **lower** sign segment, on the Controller main display screen (⇒ section 1.3 page 4).

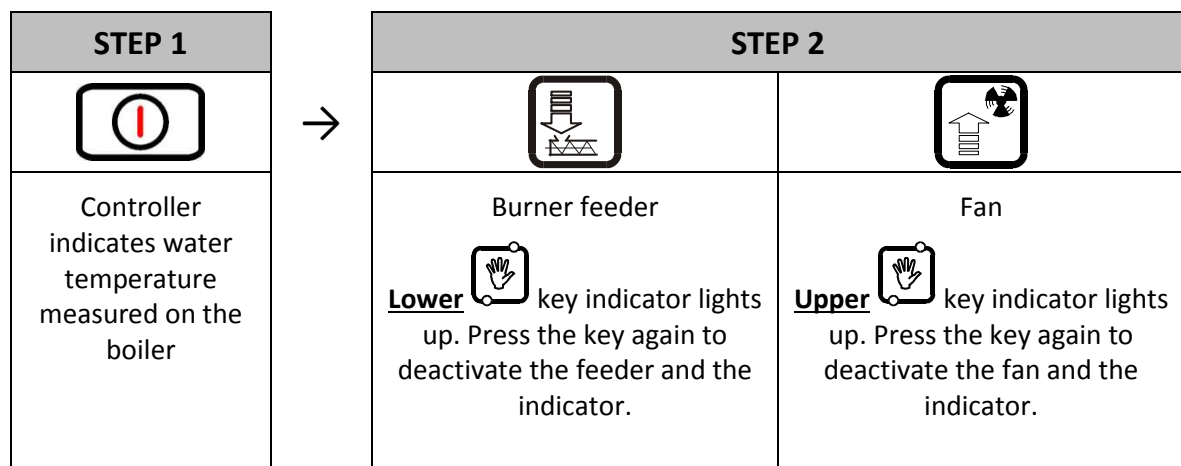
6.3.7. Maintain operation mode



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  (). The fuel feeder and the fan remain inactive in this mode for the period set by the user in the **U3** setting. 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 return 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.



6.4. 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/ feeder container, 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).

6.5. 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.

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

6.6.

6.7. Alarms

The Controller uses 8 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 outlet temperature sensor failure
- **AL3** → Feeder temperature sensor failure
- **AL9** → No grate rotation / reed relay failure (the time exceed value in F19)
- **AL11** → Maximum feeder temperature exceeded
- **AL12** → Boiler overheating
- **AL13** → Boiler burnout
- **AL14** → Burnout when firing up

6.8. 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.

6.9. Boiler burnout detection

6.9.1. 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.

6.10. Maximum Feeder Temperature Detection

The GH10PF Controller is equipped with an additional option of protecting from temperature rise in the fuel feeder above the permissible value to prevent backfires into the fuel feeder.

The detection is active only in the automatic boiler operation mode (AUTO, MAINTAIN).

When the measured temperature exceeds the value set in the **F14** service setting, the fuel feeder activates for the period of time set in the **F16** service setting to eject the ignited fuel from the feeder. During the **F16** period the fan remains stopped.

When the time set in **F15** service setting elapses, the Controller restores the maximum feeder temperature detection process.

When the feeder $T > 90^{\circ}\text{C}$, then fan is stopped, the fuel feeder is started for a period of $2 \times \text{F16}$, and the display indicates the alarm condition *AL11* – "Maximum feeder temperature exceeded". (⇒ section 6.5 page 5).

The Controller remains in the alarm condition until user response.

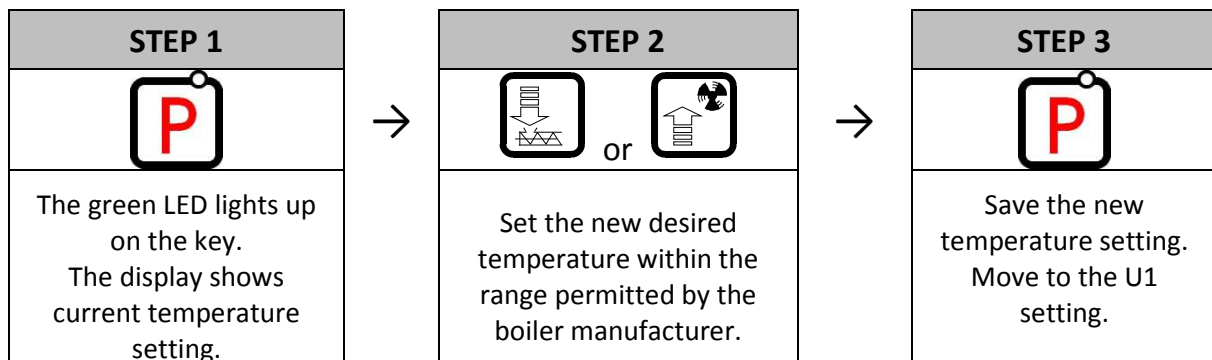


IF S14=0, THEN FEEDER SENSOR OPERATION IS OFF AND THE FUNCTION OF FEEDER MAX. TEMPERATURE INCREASE DETECTION IS NOT ACTIVE.

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



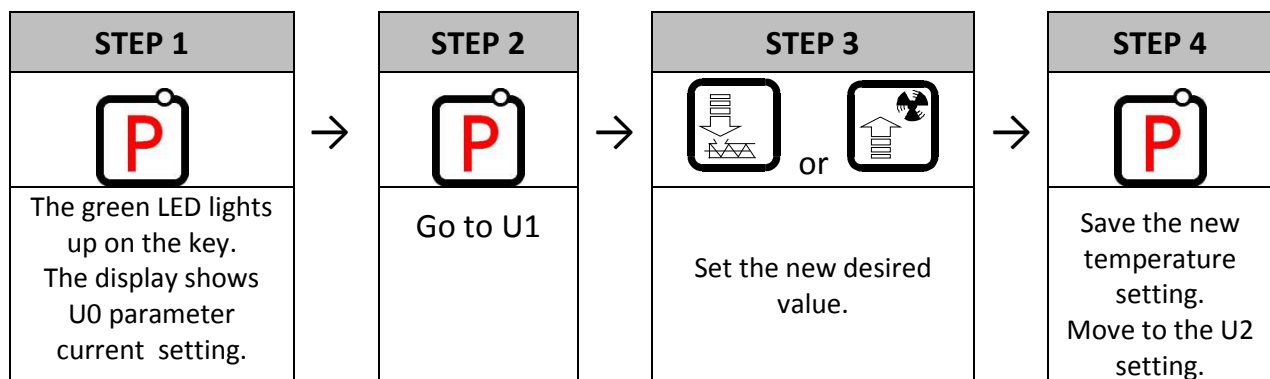
none of the following keys  ,  , 

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.

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 (U5)

This setting determines the number of grate rotation in heating mode, and 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.

7.7. Grate stop time in heating mode (U6)

This is the period of time between two consecutive moving grate in the heating 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.

7.8. The number of grate rotation in sustain mode (U7)

This setting determines the number of grate rotation in sustain mode, and 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.

7.9. Grate stop time in sustain mode (U8)

This is the period of time between two consecutive moving grate in the sustain mode. Settings are within the range from 5min to 250s.

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

8. TEMPERATURE LIMITER (STB)

The GH10PF 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 GH10PF CONTROLLER. IN CASE IF THE ABOVE-MENTIONED DEFECT IS FOUND, IT WILL BE NECESSARY TO DISCONNECT TEMPERATURE LIMITER FROM THE GH10PF CONTROLLER, REMOVE IT AND REPLACE WITH A NEW DEVICE.



9. ROOM THERMOSTAT

The GH10PF 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 GH10PF 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.

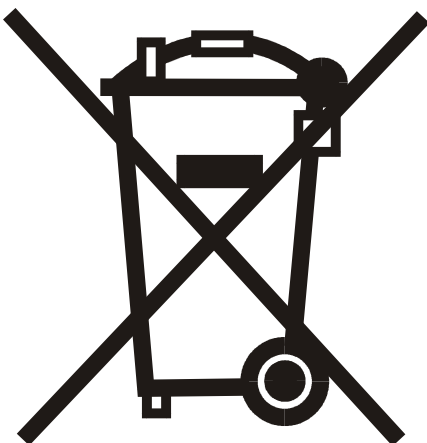
10. CONNECTING DEVICES TO THE GH10PF CONTROLLER

OUTPUTS				INPUTS		
14	L	—	Fan (P2)	50, 51	—	Flame sensor (T2)
12	N	—	Fan (P2)	52, 53	—	Grate reed relay / Feeder temperature (C1)
11	L	—	Burner feeder (P1)	54, 55	—	Boiler temperature (T1)
09	N	—	Burner feeder (P1)	56, 57	—	Room thermostat (tp)
06	L	—	CH pump (P4)			
05	N	—	CH pump (P4)			
08	L	—	Grate / Feeder container (P5)			
07	N	—	Grate / Feeder container (P5)			
04	L	—	Heater (P3)			
03	N	—	Heater (P3)			
02	N	—	Power AC 230V			
01	L	—	Power AC 230V			



ANY ADDITIONAL EQUIPMENT MAY BE CONNECTED TO THE GH10PF 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.



Geco[®]

P.P.U.H. „Geco” Sp. z o.o. [Ltd.]
Cholerzyn 376, 32-060 Liszki
Poland

ph.+48 12/636-98-11, 636-12-90

fax. +48 12/636-20-02

<http://www.geco.pl>

e-mail: geco@geco.pl