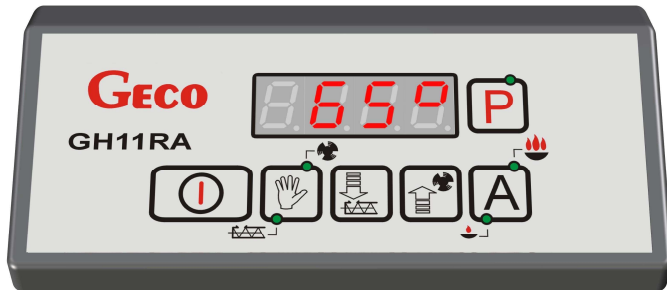**INSTRUCTION OF CONTROLLER OPERATION**

GH11RA

FOR CONTROLLING CENTRAL HEATING BOILERS WITH FEEDING SCREW

Program version: 01

USER INSTRUCTIONS

TABELE OF CONTENTS

1.   INTRODUCTION

1.1. Graphic symbols

Symbols intended to indicate and at the same time emphasise 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!

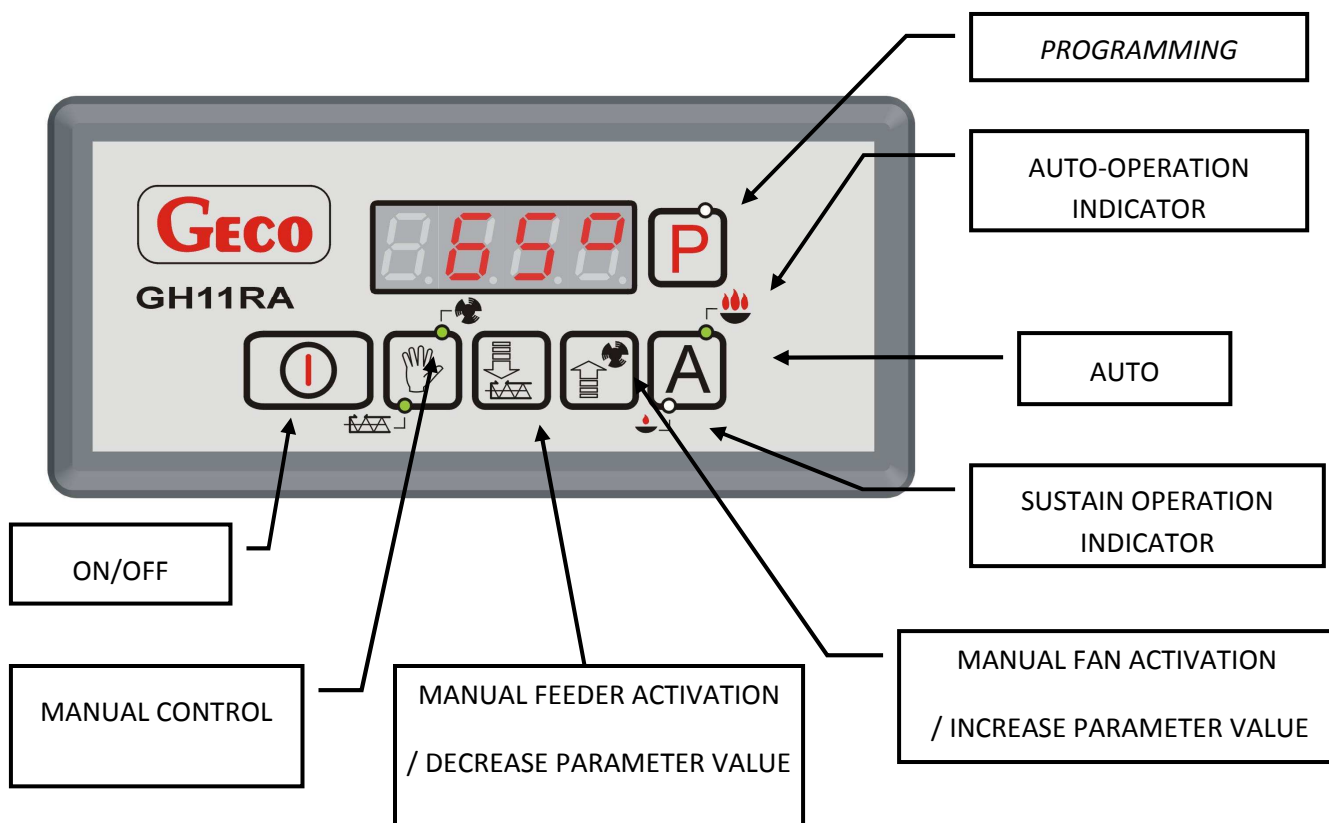This symbol indicates information of particular importance.

Reference

$\Longrightarrow$

This symbol indicates occurrence of additional information in a chapter.

1.2. Keyboard and Function Keys

PROGRAMMING

AUTO-OPERATION INDICATOR

AUTO

SUSTAIN OPERATION INDICATOR

ON/OFF

MANUAL CONTROL

MANUAL FEEDER ACTIVATION / DECREASE PARAMETER VALUE

MANUAL FAN ACTIVATION / INCREASE PARAMETER VALUE

1.   GENERAL FEATURES

The GH11RA Controller is a microprocessor-based device manufactured using the Surface Mount Technology (SMT). It is designed to control the processes of Domestic Hot Water (DHW) heating and the main Space Heating (SH) water circuit. Control parameters can be adjusted to the current operating conditions and boiler type. The Controller includes a system protecting from power outages and other different disturbances.

The GH11RA Controller is fitted with:
- inputs:
    1. boiler output water temperature measurement (NTC sensor),
    2. fuel feeder temperature measurement (NTC sensor),
    3. DHW boiler water temperature measurement (NTC sensor),
- digital input:
    4. feeder cotter pins removal sensor – reed switch,
- input (RS485) for connection of the room control panel GA01HA manufactured by GECO.

It also contains four outputs allowing direct connection of 230 V AC devices, i.e.: fan, fuel feeder, SH circulation pump, DHW pump or mixing pump, depending on the type of the controlled heating system ($\Rightarrow$ section **5**, page 3).

☞   *ALWAYS DISCONNECT THE CONTROLLER FROM POWER DURING THUNDERSTORMS*

---

2.   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
Sensor type	NTC 2.2kΩ
Sensor operating temperature range	0°C÷100°C

Output	Maximum continuous load	
DHW pump / mixing pump	1A	200W
SH pump	1A	200W
Fuel feeder	2A	400W
Fan	1A	200W

NTC sensor resistance characteristics	
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

3.   ELECTRICAL SYSTEM AND CONNECTION GUIDELINES

1.   The boiler room should be equipped with a 230V/50Hz electrical system, according to the applicable regulations.
2.   The electrical system (regardless of its type) should be terminated with a connection outlet fitted with a protective terminal. **Use of an outlet without a protective terminal causes electrical shock hazard!!!**
3.   Connect the Controller to a separately installed power line protected with a properly selected quick circuit-breaker or a residual-current device (RCD breaker). **Do not connect any other devices to this line!!!**
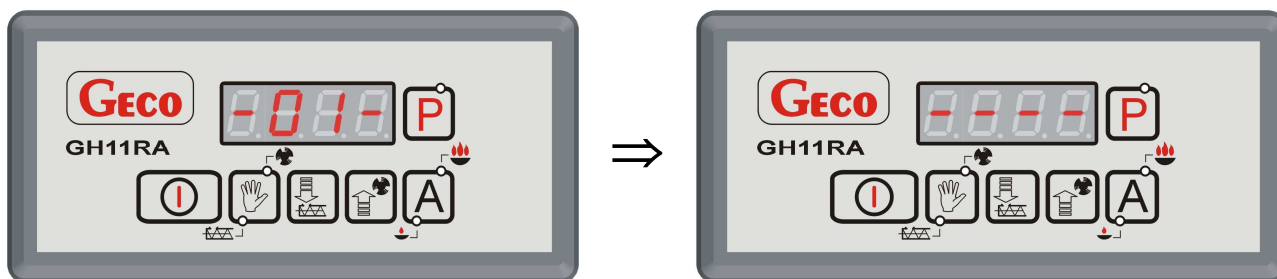

REGULATOR ZASILANY JEST Z SIECI 230V/50HZ

JAKICHKOLWIEK NAPRAW MOŻNA DOKONAĆ TYLKO PRZY

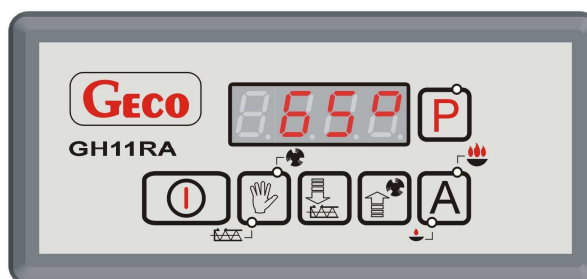*ODŁĄCZONYM ZASILANIU NA BEZPIECZNIKU*

---

4.   QUICK START

To quickly start the GH11RA Controller, perform the following actions:
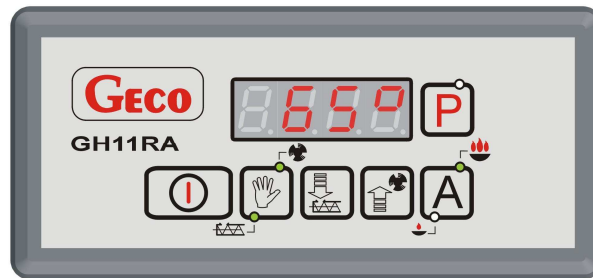
1.   Connect the device to the 230V AC power system (put the plug in the power outlet).

2.   Turn the Controller ON by pressing [⏻] . Screen appears:

3. Press [A] . Screen appears:

and the Controller starts automatic operation according to the factory settings.

Table *1* Factory settings table

User parameter	Description	Factory setting
U0	Boiler temperature setting	60^{0}C
U1	Feeder operation duration	15 s
U2	Feeder standstill duration	45 s
U3	Sustain period	15 min
U4	Fan speed	5
U5	DHW/return set temperature	40^{0}C
U6	Anti-Legionella function	Yes

5.   GH11RA OPERATION

5.1. Operated Heating System

5.1.1.   Central heating cycle + HUW cycle
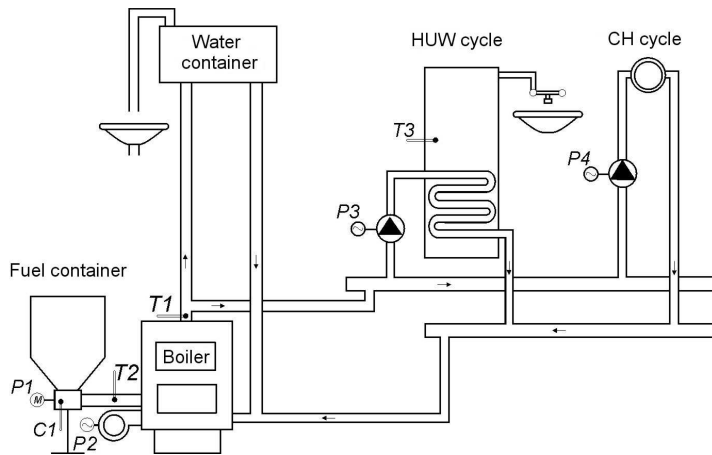
INPUTS	OUTPUTS
T1 – Boiler temp.	P1 – Fuel feeder
T2 – Feeder temp.	P2 – Fan
T3 – HUW temp.	P3 – HUW pump
C1 – Reed relay	P4 – CH pump

5.1.2.   Central heating cycle + mixing pump
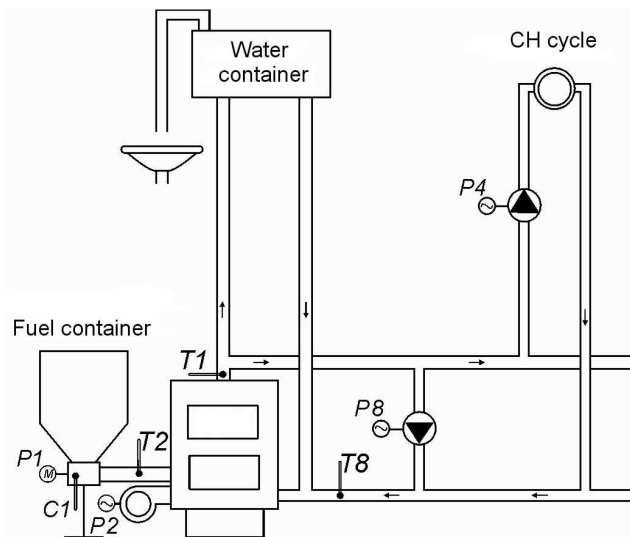
INPUTS	OUTPUTS
T1 – Boiler temp.	P1 – Fuel feeder
T2 – Feeder temp.	P2 – Fan
T8 – Return temp.	P4 – CH pump
C1 – Reed relay	P8 – mixing pump

5.2. Automatic Operation Mode

By pressing [A], you can turn on the automatic operation mode – the Controller lights the **upper**

indicator on [A] (🔥).

5.1.3. Fuel Feeder

In the AUTO mode, the fuel feeder operates according to the values set in the user settings *U1 – "Feeder operation duration"* and *U2 – "Feeder standstill duration"*. Activation and operation of the fuel

feeder is indicated by the **lower** indicator on [✋] .

5.1.4. SH Pump

In the AUTO mode, the SH pump starts 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).

Turning the SH pump on and its operation is indicated by a vertical line at the left side of the Controller main display screen.

The Controller turns off the pump when the water temperature drops to the activation temperature minus 4°C. (If the SH pump start temperature is 40°C, then the SH pump stop temperature is 36°C).

5.1.5. Fan

In the AUTO mode, the fan runs continuously until the boiler temperature reaches the value set by the user in the *U0* setting. During that period the fan runs at its maximum speed. Activation and operation

of the fan is indicated by the **upper** indicator on [✋].

5.1.6. SUSTAIN Operation Mode

The Controller gets into that mode when the boiler temperature reaches the value set by the user in the *U0* setting.

This mode of operation is indicated by lighting the **lower** indicator on [A] (🔥).

The fuel feeder and fan remain off in that mode for the period set by the user in the *U3* setting. When the period ends, the Controller turns on the feeder and fan for the period set by the manufacturer in the **F20** service setting.
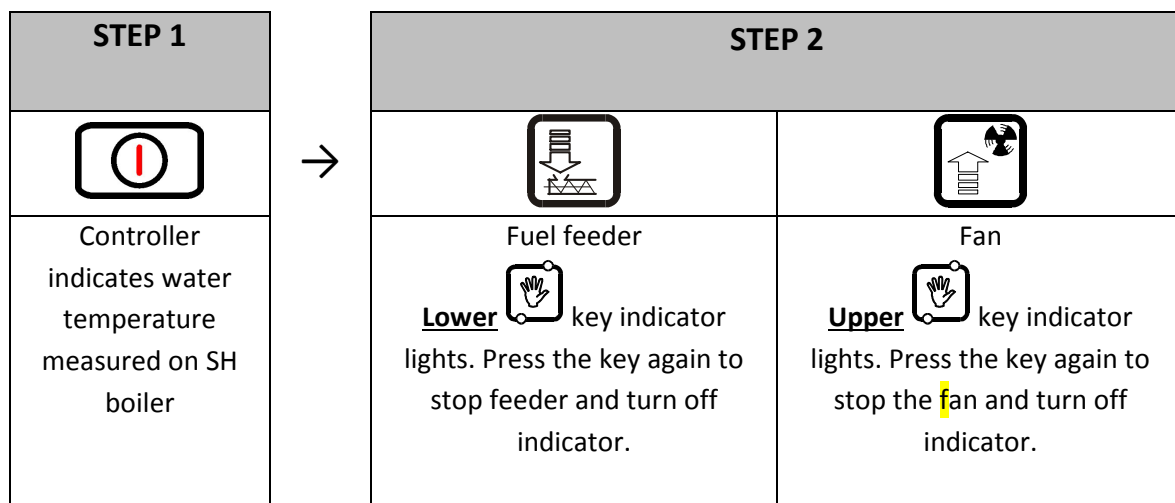
The fan will operate for the period respectively longer that the feeder for the time set in the **F18** service setting in order to fire up the added coal.

The Controller will exit the SUSTAIN mode and return to the AUTO mode if the boiler temperature drops to the value equal to the *U0* – **F05.**

The SH pump operates identically as in the AUTO mode.

5.3. Manual Operation Mode

In this mode, you can manually and independently turn on and off the fuel feeder and the fan. To do this, follow the below scheme:

STEP 1	STEP 2	
→		
Controller indicates water temperature measured on SH boiler	Fuel feeder **Lower** key indicator lights. Press the key again to stop feeder and turn off indicator.	Fan **Upper** key indicator lights. Press the key again to stop the fan and turn off indicator.

In the manual operation mode, you can also start the SH and DHW pumps. To start the SH pump, press the following keys simultaneously: + . Starting and running of the SH pump is indicated by a vertical line at the left side of the Controller main display screen.

To start the DHW pump, press the following keys simultaneously: + . Starting and running of the DHW pump is indicated by a horizontal line at the bottom of the Controller main display screen.

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

5.4. Viewing Temperatures

After pressing , the display shows water temperature at the boiler outlet. Viewing temperatures: DHW/return and feeder is available in the AUTO and SUSTAIN modes, but only if the DHW/return sensor or feeder are properly enabled.

Press to view the feeder temperature. Press the key again to cancel the view. The view is also cancelled after 10s from pressing of the key.

Press to get a DHW/return temperature view. Press the key again to cancel the view. The view is also cancelled after 10s from pressing of the key.

5.5. Alarm Conditions

The Controller uses 8 different alarm conditions. 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

[⏻] . This does not include the AL12 alarm condition.

Alarm conditions:

- **AL1**   → STB activated or fuse blown
- **AL2**   → Boiler water outlet temperature sensor failure
- **AL3**   → Feeder temperature sensor failure
- **AL4**   → DHW/return temperature sensor failure
- **AL9**   → No feeder rotation / reed switch failure
- **AL11**   → Maximum feeder temperature exceeded
- **AL12**   → Boiler overheating
- **AL13**   → Boiler burnout

5.6. Power Outage

After a power outage the Controller starts to reactivate according to the condition it was in before the power down. The Controller waits 1 minute to stabilise the mains power parameters, and then restores operation with the previously programmed settings.

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

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

Respective indicators (AUTO 🔥 or SUSTAIN 🔥) are blinking along with the letters.

5.7. Boiler Burnout Detection

5.1.7. 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.

5.1.8. 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 SH and DHW pumps are 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 SH and DHW pumps (if necessary) are started.

If NOT, this means that the furnace is burned out – the Controller enters the *AL13* alarm condition.

5.8. Maximum Feeder Temperature Detection

The GH11RA 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, SUSTAIN).

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°C, then fan is stopped, the fuel feeder is started for a period of 2xF16, and the display indicates the alarm condition *AL11 – "Maximum feeder temperature exceeded"*. ($\Rightarrow$ section 6.5 page 5).

The Controller remains in the alarm condition until user response.

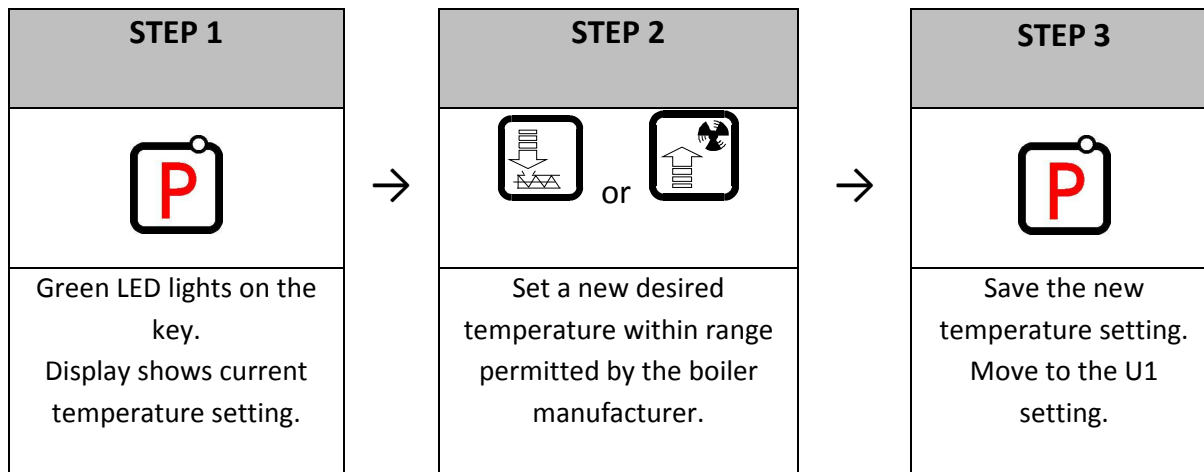☞ ***IF S14=0, THEN FEEDER SENSOR OPERATION IS OFF AND THE FUNCTION OF FEEDER MAX. TEMPERATURE INCREASE DETECTION IS NOT ACTIVE.***

6.   USER SETTINGS
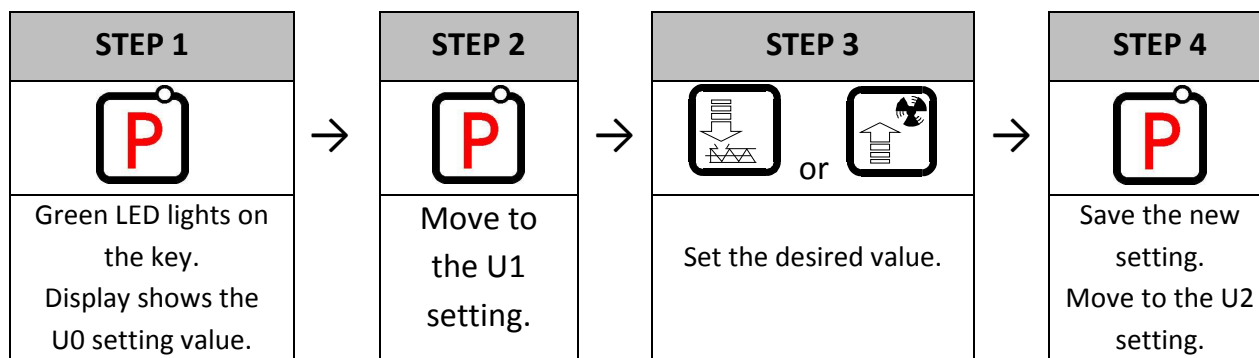
6.1. Boiler Temperature Setting (U0)

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

STEP 1		STEP 2		STEP 3
Green LED lights on the key. Display shows current temperature setting.	→	Set a new desired temperature within range permitted by the boiler manufacturer.	→	Save the new temperature setting. Move to the U1 setting.

6.2. Feeder Operation Duration (U1)

This setting informs the user about the duration of movement of the fuel feeder in the AUTO mode. Settings are within range of 2s to 250s.
You can change the setting using the following procedure:

STEP 1		STEP 2		STEP 3		STEP 4
Green LED lights on the key. Display shows the U0 setting value.	→	Move to the U1 setting.	→	Set the desired value.	→	Save the new setting. Move to the U2 setting.

6.3. Feeder Standstill Duration (U2)

This is the period of time between two consecutive coal feeds in the AUTO mode. Settings are within the range from 5s to 250s. You can modify this setting using similar procedure to the described in section 6 and section 6.2 .

6.4. Sustain Period (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 SUSTAIN mode to prevent burning out of the boiler. Settings range is from 5 min. to 250 min. You can modify this setting in a similar way to the described in sections **6** and **6.2**.

6.5. Fan Speed (U4)

This setting determines the fan rotation speed, and thus the amount of air delivered. It allows to adjust 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 minimum speed, and "10" maximum speed.
You can modify this setting in a similar way to the described in sections **6** and **6.2**.

6.6. DHW/Return Temperature Setting (U5)

This setting is available to the user **only** if the DHW heating option or return temperature stabilisation are used, and the user configured the pump with the **F00** service parameter by setting it to the values "01", "02", "03", "04" ($\Rightarrow$ section 8.2 page 8). You can modify this setting in a similar way to the described in sections **6** and **6.2**. Settings are within the range of 35°C to 65°C.

6.7. Anti-Legionella Function (U6)

To activate the ANTI-LEGIONELLA function, set the U6 setting to 1.
When the function is active, a blinking letter "L" is visible on the left part of the display, before the displayed temperature value.

You can turn off the function by modifying the U6 setting to 0, or by pressing . The anti-legionella function is also cancelled after a power down.

The ANTI-LEGIONELLA function has higher priority over other functions, therefore it is performed by the Controller in the first order (superior function).
When the function is activated, the temperature of water in the boiler is increased to 70°C and maintained for a period of 10 minutes.

> *TURNING ON OF THE ANTY-LEGIONELLA FUNCTION CAUSES RISE OF*
> *THE TEMPERATURE OF HUW WATER UP TO 70^{0}C.*
> *EXTRA CAUSION WHEN USING HUW.*
> *MAY RESULT IN BURNING !!!*

7.   OPERATING THE DHW BOILER

The GH11RA Controller allows connection of an additional pump to control the Domestic Hot Water (DHW) in the boiler.

7.1. Installation and Connections

To use the Domestic Hot Water (DHW) heating option, perform the following actions:
1.   connect the boiler according to the enclosed diagram ($\Rightarrow$ section 6.1.1 page 3).
2.   install the DHW temperature sensor in the DHW boiler

3.   connect the DHW temperature sensor to the Controller at the appropriate terminals as shown in Fig. 2
4.   configure the DHW pump for operation ($\Rightarrow$ section 8.2 page 8).

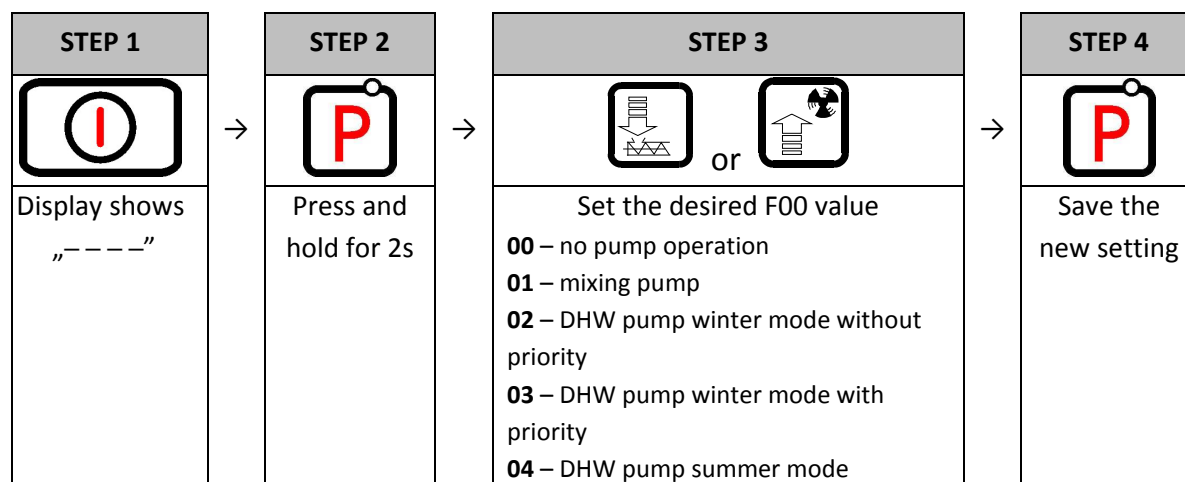### 7.2. Configuration of Additional Pump

This procedure allows you to connect an additional pump that can be used as a <u>mixing pump</u> or a <u>Domestic Hot Water (DHW) pump</u> operating with or without higher priority.

The DHW pump is started when the boiler outlet water temperature is higher than 40°C and higher than the water in the DHW boiler (to prevent cooling of the DHW boiler), and the DHW boiler temperature is lower than the temperature set in the *U5* setting ($\Rightarrow$ section **6.6** page 7).
Pump operation is indicated by a dot on the display next to the fan symbol.

If the boiler room is configured as shown in the diagram ($\Rightarrow$ section 6.1.1 page 3) then the boiler controller has no external alarm output, but allows to view the DHW boiler temperature

by pressing [icon] .

Use the following procedure to program operation of an additional pump in the Controller.

STEP 1		STEP 2		STEP 3		STEP 4
[power icon]	→	[P icon]	→	[icon] or [icon]	→	[P icon]
Display shows „– – – –"		Press and hold for 2s		Set the desired F00 value **00** – no pump operation **01** – mixing pump **02** – DHW pump winter mode without priority **03** – DHW pump winter mode with priority **04** – DHW pump summer mode		Save the new setting

7.3. DHW Priority

The GH11RA Controller allows to set operation of the DHW pump with priority. If you choose this mode of DHW pump operation, the domestic hot water heating is a higher priority function in the Controller.
To do this, set the **F00** service setting to the value of "**3**".

7.4. Summer Mode

The GH11RA Controller is equipped with a SUMMER MODE option that allows you to turn off the SH pump for the summer season, and the boiler operates only to supply the DHW water. To do this, set the **F00** service setting to the value of "**4**".

8. ROOM PANEL

The GH13RA controller has been fitted for full communication with the GA01HA room panel manufactured by GECO, which allows to control boiler operation comfortably from user's apartment.
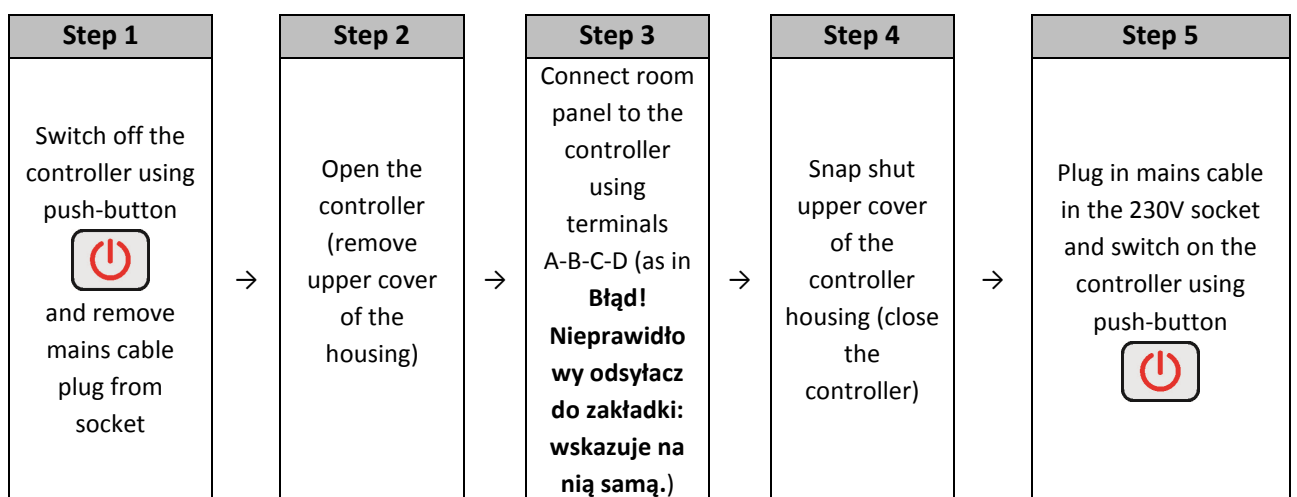
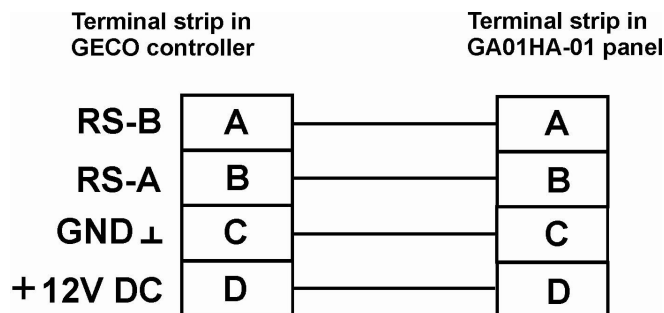The GA01HA room panel connected to the GH13RA controller allows:

- to change boiler preset temperature
- to change HUW preset temperature
- information on all alarms to be displayed in room panel
- to view boiler operation state
- to view operation states of other units (fan, fuel feeder, central heating pump, HUW pump)
- to view all measured temperature values

If the GA01HA room panel is correctly connected to the GH13RA controller, it will be automatically detected by the controller. Then, user is not required to carry out any additional operations or make any settings.
In this case, the controller will work according to the room panel settings.

Proceed as follows to connect the GA01HA room panel to the GH13RA controller:

Step 1		Step 2		Step 3		Step 4		Step 5
Switch off the controller using push-button ⏻ and remove mains cable plug from socket	→	Open the controller (remove upper cover of the housing)	→	Connect room panel to the controller using terminals A-B-C-D (as in **Błąd! Nieprawidłowy odsyłacz do zakładki: wskazuje na nią samą.**)	→	Snap shut upper cover of the controller housing (close the controller)	→	Plug in mains cable in the 230V socket and switch on the controller using push-button ⏻

```
   Terminal strip in              Terminal strip in
   GECO controller                GA01HA-01 panel

RS-B │  A  │──────────────────│  A  │
RS-A │  B  │──────────────────│  B  │
GND⊥ │  C  │──────────────────│  C  │
+12V DC│ D  │──────────────────│  D  │
```

9.   TEMPERATURE LIMITER (STB)

The GH13RA controller is provided with an extra mechanical protection, independent of automatic systems. It is called safety temperature limiter (STB).

9.1. Operation principle

In case heating water reaches the temperature of **95^{0}C**, temperature limiter will start working automatically (it will activate the STB function), and interrupt fuel supply and air delivery to combustion chamber (it will switch off the fan).

When temperature in the limiter drops by approximately **20^{0}C**, it will be possible to restart the STB function, but only manually.

9.2. STB function restart (manual)

In order to restart the device press push-button "*RESET*" installed on the left side of the controller housing.
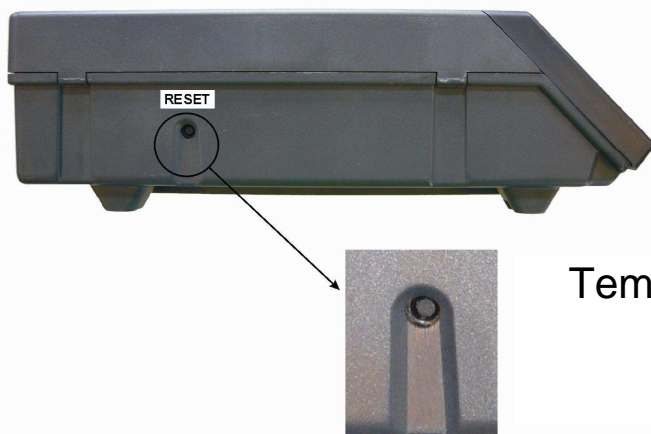
Temperature limiter (STB)

The controller does not return by itself to automatic operation due to safety reasons.

Press push-button ⏻ twice to resume the controller operation:

      - first pressing of push-button ⏻ will cancel the alarm and switch off the controller

      - second pressing of push-button ⏻ will restart the controller

      - press push-button A - the controller will 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 GH13RA CONTROLLER.***
> ***IN CASE IF THE ABOVE-MENTIONED DEFECT IS FOUND, IT WILL BE NECESSARY TO DISCONNECT TEMPERATURE LIMITER FROM THE GH13RA CONTROLLER, REMOVE IT AND REPLACE WITH A NEW DEVICE.***

10. PROCEDURE IN THE CASE OF CONTROLLER DAMAGE

In a case if have been noticed any irregularities in functioning of controller, user should contact with the supplier / producer or GECO company. Professional technical assistance will be given to him. If service assistance is indispensable (repair of the controller), damaged controller should be dismounted from the boiler and sent as a set (together with casing) on indicated address.
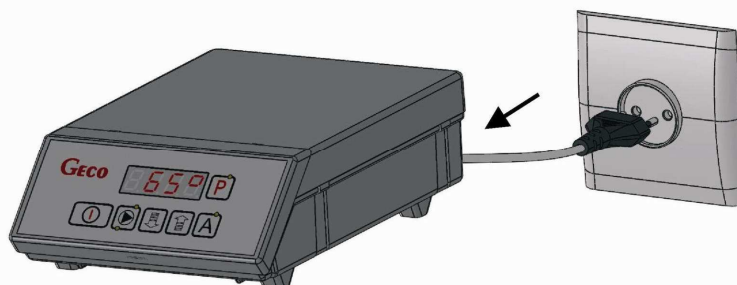
> ☝ ***SENDING A NOT COMPLETE CONTROLLER TO THE SERVICE CAUSES AN AUTOMATIC LOSS OF THE GUARANTEE***
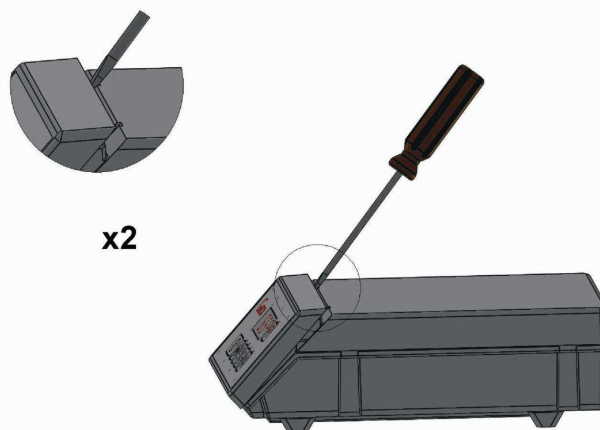
PREPARING THE CONTROLLER TO DELIVERY TO THE SERVICE
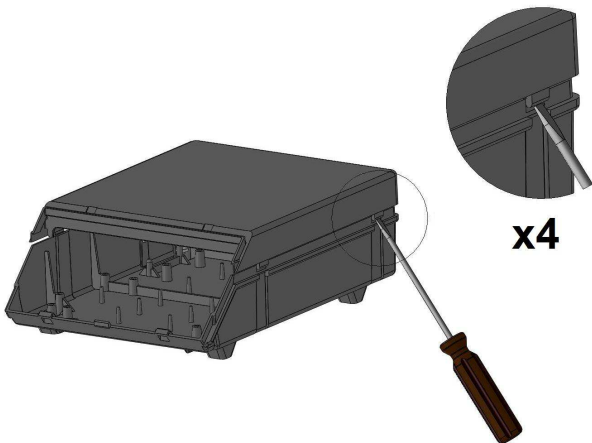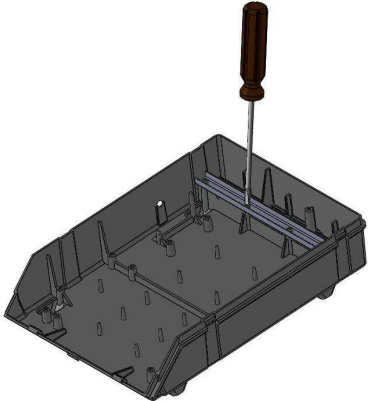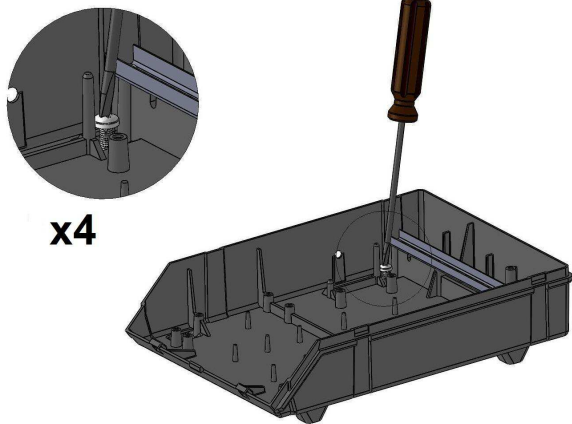
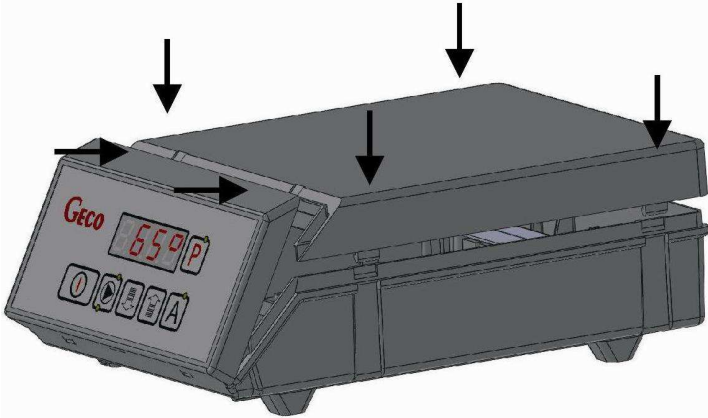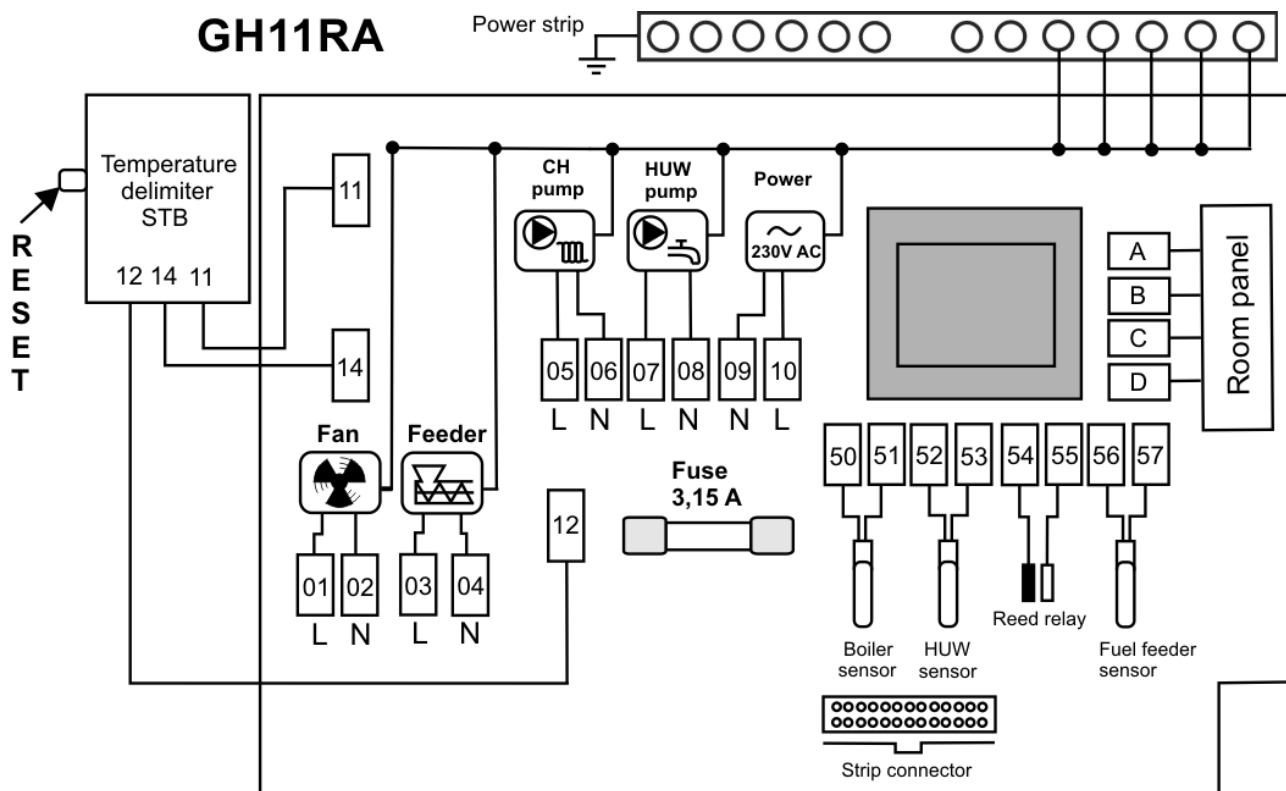|	
STEP 1 Disconnect a controller from power supply (remove plug from power point)	
STEP 2 Remove a front panel by using of flat screwdriver	

STEP 3 Remove a top part of casing (lever snap fasteners) by using of flat screwdriver	 **x4**
STEP 4 Remove connectors (with connected wires) from plugs, unscrew ground wires from PE strip, oosen strip which is tightening wires and take all wires out of the controller	
STEP 5 Dismount a controller from boiler by unscrewing four screws in the bottom part of the casing of the controller	 **x4**
STEP 6 Install top part of the casing and front panel	

10. CONNECTING DEVICES TO THE GH11RA CONTROLLER

WYJŚCIA			
01	L	—	Wentylator (P2)
02	N	—	Wentylator (P2)
03	L	—	Podajnik paliwa (P1)
04	N	—	Podajnik paliwa (P1)
05	L	—	Pompa CO (P4)
06	N	—	Pompa CO (P4)
07	L	—	Pompa CWU (P3) / pompa miesz. (P8)
08	N	—	Pompa CWU (P3) / pompa miesz. (P8)
09	N	—	Zasilanie 230V
10	L	—	Zasilanie 230V

WEJŚCIA			
50, 51	—	Temperatura kotła (T1)	
52, 53	—	Temperatura CWU (T3) / powrotu (T8)	
54, 55	—	Kontaktron (C1)	
56, 57	—	Temperatura podajnika (T2)	
A	—	RS-B	
B	—	RS-A	Panel Pokojowy
C	—	GND (⊥)	GA01HA
D	—	+12V AC	

Rys. 1 Schemat podłączenia urządzeń i czujników do regulatora GH11RA

ANY ADDITIONAL EQUIPMENT MAY BE CONNECTED TO THE GH13RA CONTROLLER ONLY BY PERSON LICENSED TO PERFORM ELECTRICAL INSTALLATION WORKS.

P.P.U.H. „Geco" Sp. z o.o.

Cholerzyn 376, 32-060 Liszki

tel. 012/636-98-11, 636-12-90

fax. 012/636-20-02

http://www.geco.pl

e-mail: geco@geco.pl