MANUAL
FOR CONTROLLER

GH10HA

For controlling Holzgas forced circulation wood central heating boiler

Program version: 01

USER MANUAL

We request that users carefully study applicable Instructions before connecting andstarting up any of our products. Should any doubts arise, please contact our Company between 8 a.m. and 4 p.m.

TABLE 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 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.
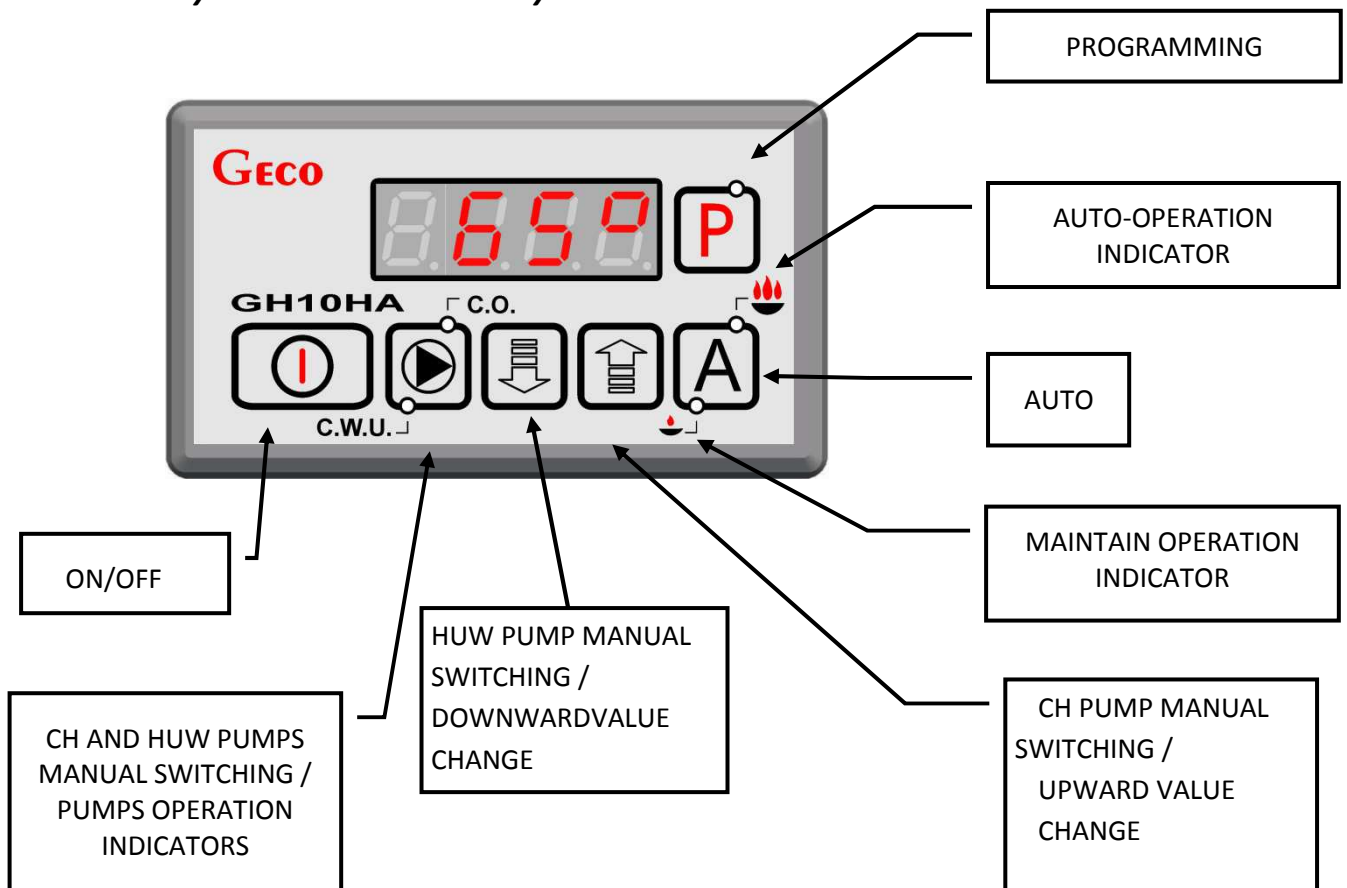
Reference
This symbol indicates occurrence of additional information in a chapter.

1.2. Keyboard and Function Keys

PROGRAMMING

AUTO-OPERATION INDICATOR

AUTO

MAINTAIN OPERATION INDICATOR

ON/OFF

CH AND HUW PUMPS MANUAL SWITCHING / PUMPS OPERATION INDICATORS

HUW PUMP MANUAL SWITCHING / DOWNWARDVALUE CHANGE

CH PUMP MANUAL SWITCHING / UPWARD VALUE CHANGE

2.   GENERAL FEATURES

The GH10HA Controller is a microprocessor-based device manufactured using the Surface Mount Technology (SMT).

It is designed to control the processes of Hot Utility Water (HUW) heating and 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 from power outages and other different disturbances.

The GH10HA Controller is fitted with:

- inputs:
    1.   Boiler output water temperature measurement (NTC sensor),

    2.   Flue gas temperature sensor in chimney (PT1000 sensor),

    3.   HUW boiler water /return water temperature measurement (NTC sensor),

    4.   Door sensor – reed relay,

It also contains four outputs allowing direct connection of 230 V AC devices, i.e.: fan, CH circulation pump, HUW pump or mixing pump, depending on the type of the controlled heating system ($\Rightarrow$ section **6**, page **7**).

	ALWAYS DISCONNECT THE CONTROLLER
	FROM POWER DURING THUNDERSTORMS

---

3.   TECHNICAL DATA

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

Sensors operating temperature range	NTC:	0°C÷100°C
	PT1000:	0°C÷400°C

Output	Maximum continuous load	
HUW pump / mix pump	1A	200W
CH pump	1A	200W
Fan*	1A	200W

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

☞ **If an auxillary or relay proxy is connected, a circuit breaker dedicated this (eg, a varistor) must be used. Failure to do so may result in controlle output malfunction or damage.*

4.   ELECTRICAL SYSTEM AND CONNECTION RULES

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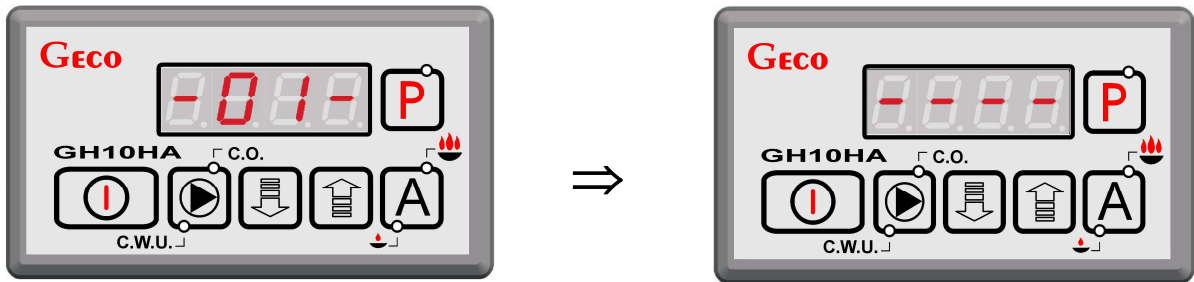
☝ *THE CONTROLLER IS POWERED FROM 230V/50HZ MAINS*
ANY REPAIRS MAY BE CARRIED OUT ONLY WITH POWER SUPPLY
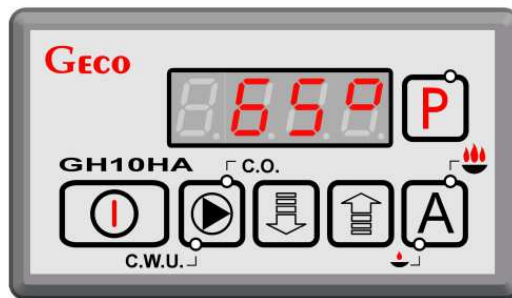
CUT OFF AT THE FUSE

5.   QUICK START

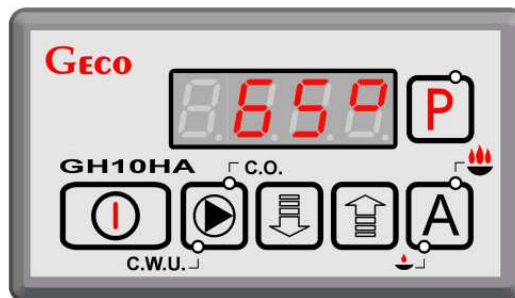To quickly start the GH10HA Controller, perform the following actions:

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.

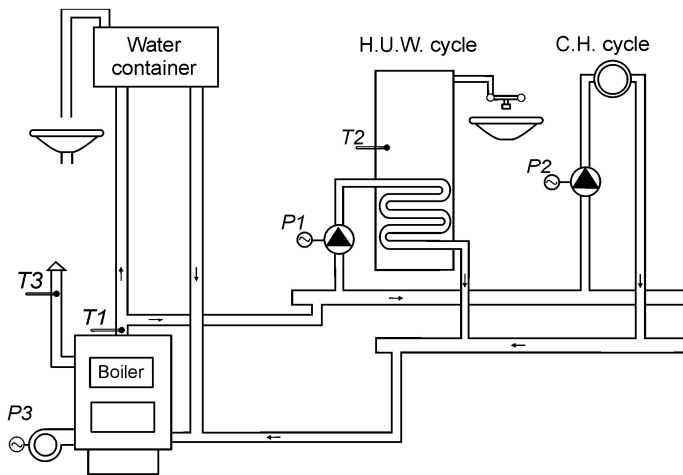**Table 1** Factory settings chart

User parameter	Description	Factory setting
U0	Boiler preset temperature	60^0C
U1	Fan speed	5
U2	HUW/return set temperature	40^0C
U3	Anti-Legionella function	Yes

6. THE GH10HA OPERATION

6.1. Operated Heating System

6.1.1. Central Heating cycle + HUW cycle

INPUTS	OUTPUTS
T1 – Boiler temp.	P1 – HUW pump
T2 – HUW temp.	P2 – CH pump
T3 – Flue gas temp.	P3 – Fan

6.1.2. Central Heating cycle + mixing pump
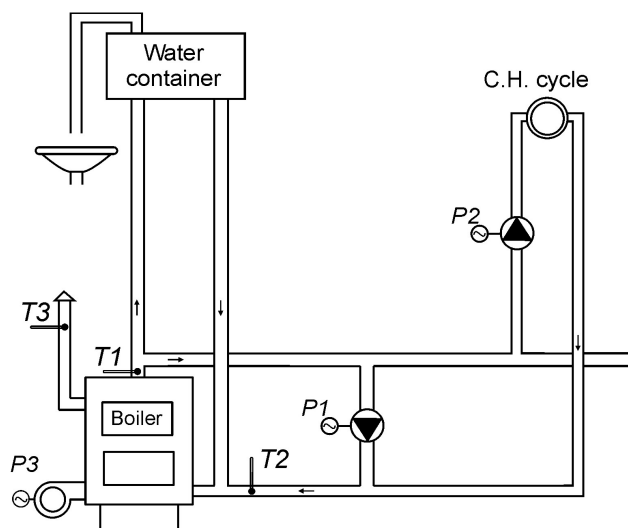
INPUTS	OUTPUTS
T1 – Boiler temp.	P1 – Mixing pump
T2 – Return temp.	P2 – CH pump
T3 – Flue gas temp.	P3 – Fan

6.2. Automatic operation mode.

The controller may work in one of two available automatic operation modes – the AUTOMAT mode or the MAINTAIN mode.

When outlet water temperature is lower than preset one, the controller works in the AUTOMAT mode. If outlet water temperature is higher or equal to preset temperature, the controller works in the MAINTAIN mode.

6.2.1. Firing up

After pressing push-button [A] the controller switches to the automatic operation mode, which is indicated by lighting the **upper** indicator on [▶] 🔥.

FIRING UP is the first stage of automatic operation, and it is indicated by blinking lighting the **upper** indicator on [▶] 🔥. It's possible just in AUTOMAT mode.

FIRING UP process will be completed as soon as the temperature of outlet water from the boiler reaches the value of F*6*-4°C, or when flue gas temperature reaches *F43* (if *F11* = 0, the condition concerning *F43* is omitted). Firing up will also end when the unit switches to the MAINTAIN mode before occurrence of any of the conditions for firing up termination after outlet water has reached preset temperature value.

When firing up stage exceeds time preset in service parameter *F45*, firing up process will be stopped and ALARM 14 will be activated.

6.2.2. Fan

In MANUAL mode when door sensor function is active (*'F46'* = 1) and door sensor detect door open position, than fan is on maximum rotation. In the other situation (door close position) fan is off.

During FIRING UP stage the fan will start from minimal speed (gear 1) and accelerate according to setting *F31* until it reaches speed set in parameter *F36*, and in case if *F36* = 0 or *F36* > *U1*, up to the value preset in *U1*.

In the AUTOMAT mode, after firing up completion, when *F36* < *U1*, the fan will be increasing its speed by one gear every 5s until it reaches speed set in parameter *U1*.

If the boiler output water temperature value is lower/equate than *'Tz'*-*'F44'* value, than fan is working with speed sett in *'U1'* parameter.

If the boiler output water temperature value is in range (*'Tz'*-*'F44'*; *'Tz'*) value, than fan is working with speed adjust by controller alghoritm.

During the Alert mode fan is off.

👆 **WHEN S11≠0 (CHIMNEY SENSOR OPERATION ON),**
FAN SPEED IS REDUCED IN EACH OF AUTOMATIC OPERATION MODES I
FLUE GAS TEMPERATURE EXCEEDS
THE VALUE SET IN PARAMETER S42.

6.2.3. CH Pump

Regardless of the configuration of additional pump 'F0', the CH pump:

− is activated when the temperature of water leaving the boiler exceeds 85°C, and remains in operation regardless of other conditions (such as thermostat/room panel lock or DHW priority) until the outlet water temperature falls below 84 ° C;

− is turned off when the boiler extinguished algorithm is implemented following a fall in temperature of 10 ° C , of water leaving the boiler after the fall of boiler outlet water temperature of 10 ° C – see the description of boiler extinguished detection for details;

− When the anti-legionella function of the CH pump is operating, according to the algorithm contained in the description of anti-legionella function.

Automatic mode:

When **'F0'** = 0 ÷ 2

The CH pump is switched on when the temperature of water leaving the boiler is greater than or equal to the value set in parameter F6, and is disconnected when the temperature falls below F6- 3°C. When the room thermostat is locked, the CH pump disconnects four minutes after the lock is activated. When the room thermostat is locked, if the value of parameter F13 is greater than 0, the pump is connected periodically for 30 seconds according to **'F13'** minute.

When 'S0' = 3

The CH pump operates as for **'F0'** = 0 ÷ 2, also when it is necessary to heat DHW. (when the water temperature in the boiler is less than or equal to the set hot water temperature. **'Tz$_{cwu}$'**, and in the case of the anti-legionella function when the temperature is less than or equal to 75°C). The CH pump operates as for room panel/thermostat lock, connecting periodically in accordance with parameter **'F13'**.

When 'S0' = 4

The CH pump does not operate

DHW Pump/ Mixer Pump

In automatic and sustain mode, the DHW and mixer pump operate according to the selected configuration:

When 'S0' = 0 – no pump

The output is used for indicating an alarm (permanently switched on when the controller is in ALARM state).

When 'S0' = 1 – Mixer pump

The mixer pump turns off when the returning water temperature reaches the value set in parameter 'TsDHW' and is activated when the return water temperature falls below 'TsDHW' - 3°C.

When 'SO'-1 – DHW pump

- The DHW pump is connected when (1) the water temperature in the boiler is lower than the preset temperature in parameter 'TsDHW' and (2) the outgoing water temperature is higher than the temperature of the water in the boiler + 1°C, and (3) the outgoing water temperature is higher than 40°C.

- The DHW pump is turned off when (1) the water temperature in the boiler is above the point set in parameter 'TsDHW' (during operation of anti-Legionella function - when the boiler water temperature is higher than 75°C), or (2) the outgoing water temperature is lower than or equal to the water temperature in the boiler, or (3) the outgoing water temperature is below 40°C. When the anti-legionella function is operating, the DHW pump works according to the algorithm contained in the description of the anti-legionella function.

6.2.4. <u>Maintain Operation Mode</u>

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 **<u>lower</u>** indicator on 🅰 (🔥).

In the MAINTAIN mode the fan works with efficiency set in parameter *F32* (when *F32* < *U1*), or with efficiency set in parameter *U1* (when *F32* ≥ *U1*). If *F32* = 0, the fan makes blows at maximum efficiency, according to settings of parameters *F26* and **F27**.

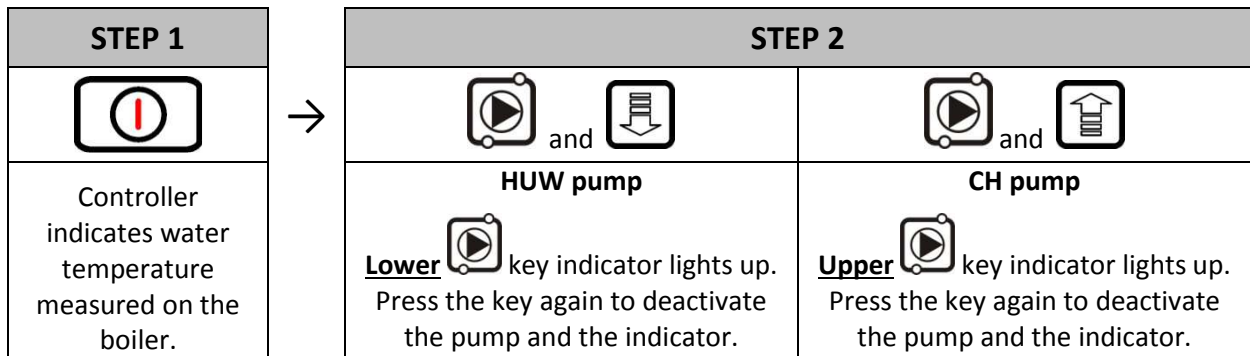The CH pump operates identically as in the AUTO mode.

☝ *WHEN S11≠0 (CHIMNEY SENSOR OPERATION ON),*
FAN SPEED IS REDUCED IN EACH OF AUTOMATIC OPERATION MODES I
FLUE GAS TEMPERATURE EXCEEDS
THE VALUE SET IN PARAMETER F42.

6.3. Manual Operation Mode

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

In this mode, you can manually and independently activate and deactivate the HUW pump and the CH pump.

To do this, follow the scheme below:

STEP 1	STEP 2	
⏻ →	🔘 and ⬇	🔘 and ⬆
Controller indicates water temperature measured on the boiler.	**HUW pump** 🔘 **<u>Lower</u>** 🔘 key indicator lights up. Press the key again to deactivate the pump and the indicator.	**CH pump** 🔘 **<u>Upper</u>** 🔘 key indicator lights up. Press the key again to deactivate the pump and the indicator.

👉 *HUW PUMP CAN BE TURNED ON ONLY IF IT IS SELECTED IN*
*SERVICE PARAMETERS*

6.4. Viewing Temperatures

After pressing [image], the display shows water temperature at the boiler outlet. Viewing temperatures: flue gas and HUW/return is available in the AUTO and MAINTAIN modes, but only if the flue gas sensor or HUW/return sensor are properly enabled.

Press [image] to view the flue gas temperature. Press the key again to cancel the view. The view is also cancelled after 10s from pressing of the key.

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

6.5. Alarm Conditions

The Controller uses 7 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 [image]. This does not include the AL12 and AL7 alarm condition.

The damage of flue gas temperature sensor (AL7) will not cause enter into a state of alarm, the controller will work as in optimal flue gas temperature conditions. AL7 alarm signalling occurs only when viewing flue gas temperature ($\Rightarrow$ section 6.4). No sound signaling AL7.

Alarm conditions:

- **AL1** $\rightarrow$ STB activated or fuse blown
- **AL2** $\rightarrow$ Boiler water outlet temperature sensor failure
- **AL4** $\rightarrow$ HUW/return temperature sensor failure
- **AL7** $\rightarrow$ Flue gas temperature sensor failure
- **AL12** $\rightarrow$ Boiler overheating
- **AL13** $\rightarrow$ Boiler burnout
- **AL143** $\rightarrow$ Flame extinguished

6.6. Power Failure

After a power failure 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 MAINTAIN mode,
- blinking "r" for MANUAL mode.

Respective indicators (AUTO [image] or MAINTAIN [image]) are blinking along with the letters.

6.7. Boiler Burnout Detection

6.7.1. <u>No Fuel</u>

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.

If during automatic mode for time set in **F9** parameter the flue gas temperature will be below value set in **F11** parameter, the controller recognizes that boiler has expired and *AL13* occurs.

When **F11**=0, this detection including flue gas temperature is disabled.

6.7.2. <u>Sudden Drop of Outlet Water Temperature</u>

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 and HUW 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 CH and HUW pumps (if necessary) are started.

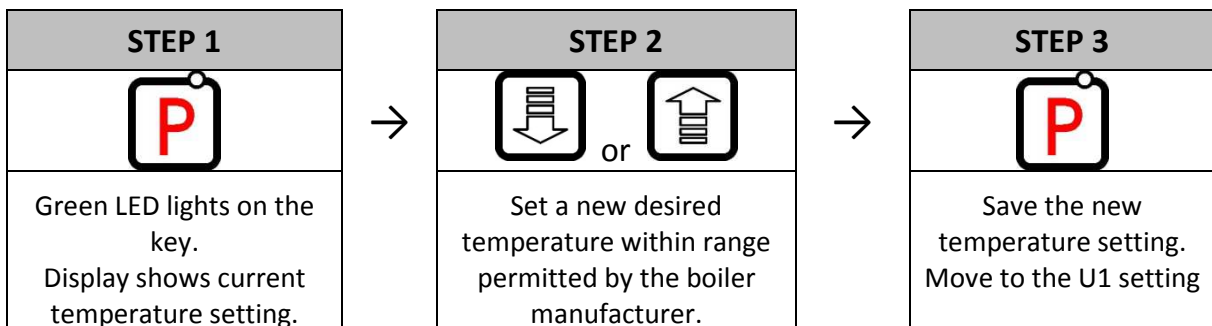If NOT, this means that the furnace is burned out – the Controller enters the *AL13* alarm condition.

☞   *STOPPING CH PUMP OPERATION IN BURNOUT DETECTION*

IS INDICATED BY BLINKING THE UPPER INDICATOR ON ⏺.

---

7.   USER SETTINGS

7.1. Boiler Temperature Setting (U0)

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

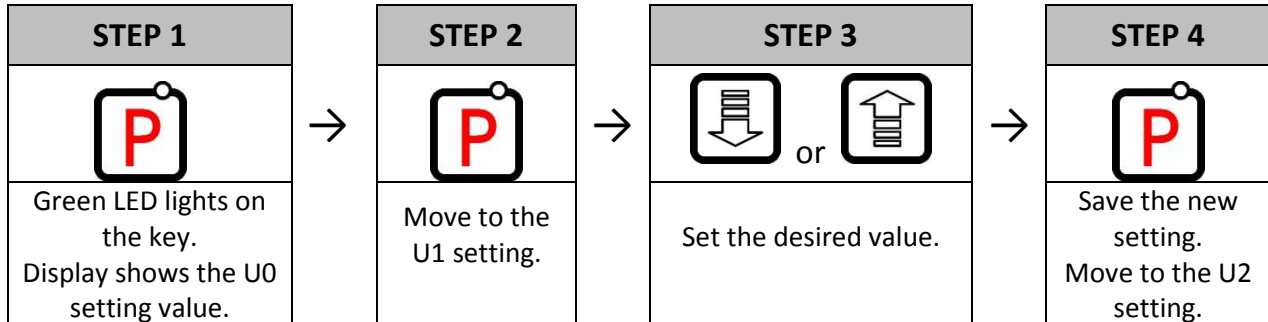| STEP 1		STEP 2		STEP 3
P	→	⬇ or ⬆	→	**P**
Green LED lights on the key. Display shows current temperature setting.		Set a new desired temperature within range permitted by the boiler manufacturer.		Save the new temperature setting. Move to the U1 setting

---

☞   *If during setting the new temperature*

none of the following keys ⬇, ⬆, **P**,

is pressed for 15 s, the new temperature will not be saved

and the Controller will exit the programming mode.

7.2. Fan speed (U1)

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 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.

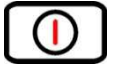### 7.3. HUW/ Return Temperature Setting (U2)

This setting is available to the user **only** if the HUW heating option or return temperature stabilisation are used, and the user configured the pump with the **S00** service parameter by setting it to the values "01", "02", "03", "04" ($\Rightarrow$ section 8.2 page 13). You can modify this setting in a similar way to the described in sections **7.1** and **7.2**. Settings are within the range of 35°C to 65°C.

7.4. Anti-Legionella Function (U3)

The GH10HA controller is equipment in Anti-Legionella function which limit growth *Legionella pneumophilia* bacterium on HUW installation. This function is available for users when value **F00** service parameter was adjust on „02", „03" or „04".

The Legionella bacterium growth in water environment and the best condition is on 38–42^{0}C temperature. The Legionella bacterium can cause variety pneumonia disease, called Legion fever.

To activate the ANTI-LEGIONELLA function, set the *U3* 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 *U3* 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 TH
TEMPERATURE OF HUW WATER UP TO 70^{0}C.

EXTRA CAUSION WHEN USING HUW.
MAY RESULT IN BURNING !!!

8.   OPERATING THE HUW BOILER

The GH10HA Controller allows connection of an additional pump to control the Hot Utility Water (HUW) in the boiler.

8.1. Instalation and Connections

To use the Hot Utility Water (HUW) heating option, perform the following actions:

4.   connect the boiler according to the enclosed diagram

5.   install the HUW temperature sensor in the HUW storage

☞   *We recommend mounting HUW temperature sensor in GECO measurin*

drain.

You can not mount temperature sensors in measuring drain with wate

or oil !!!

---

6.   connect the HUW temperature sensor to the Controller at the appropriate terminals as shown in Fig. 2

7.   configure the HUW pump for operation

☞   *HUW temperature sensor is additional equipment and it's not includes*

the standard set controller GH10HA.

Additional equipment can be delivery according with additional order

---

8.2. 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>Hot Utility Water (HUW) pump</u> operating with or without higher priority.
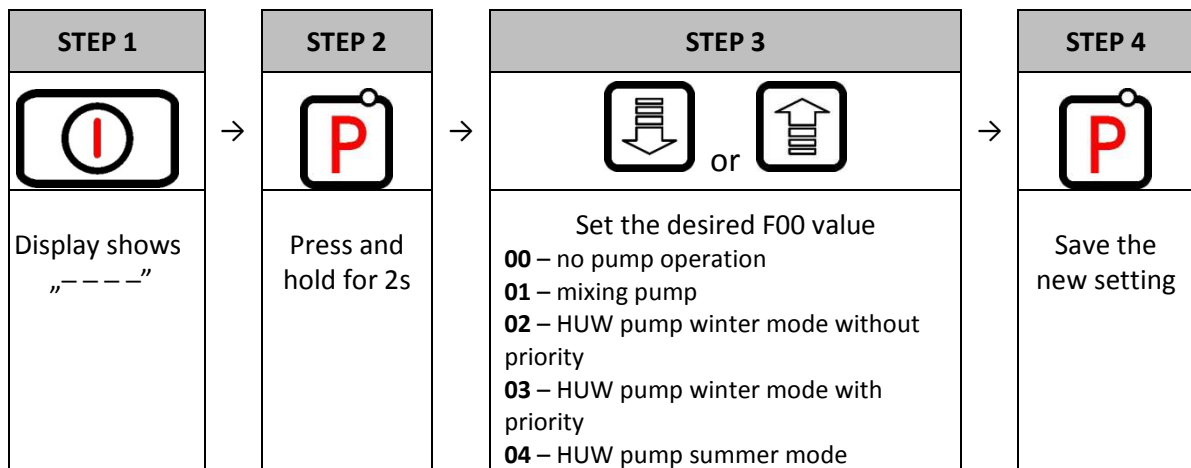
The HUW pump is started when the boiler outlet water temperature is higher than 40°C and higher than the water in the HUW boiler (to prevent cooling of the HUW boiler), and the HUW boiler temperature is lower than the temperature set in the *U2* setting

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 then the boiler controller has no external alarm output, but allows to view the HUW boiler temperature

by pressing [⬇].

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

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

8.3. HUW Priority

The GH10HA Controller allows to set operation of the HUW pump with priority. If you choose this mode of HUW pump operation, the hot utility water heating is a higher priority function in the Controller.

To do this, set the **F00** service setting to the value of "**3**".

8.4. Summer Mode

The GH10HA Controller is equipped with a SUMMER MODE option that allows you to turn off the CH pump for the summer season, and the boiler operates only to supply the HUW water. To do this, set the **F00** service setting to the value of "**4**".

9.   ROOM THERMOSTAT

The GH10HA controller is provided with an option allowing to operate furnace door opening sensor.

If furnace door is opened either in MANUAL or AUTOMAT mode, the fan will be switched on and it will be working at its maximum speed set in service parameter **F2** for 15 minutes.

After this time, due to safety reasons, the fan will stop to work with maximum efficiency and return to work according to applicable settings and operation mode.

Furnace door closing (door opening sensor activation) will also make the fan return to nominal operation.

If $T_{flue\ gas}$>F42 or T_{boiler}>F17,
the fan will be definitely switched off

Furnace door sensor operation is activated by setting service parameter S46=1.
Actuation of door opening sensor is indicated by icon "**dr**" on the controller main screen.

10. TEMPERATURE LIMITER (STB)

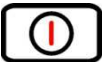The GH10HA Controller can be equipped with an additional independent temperature limiter STB via terminals 15 and 16.

☞   ***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 GH10HA CONTROLLER.

IN CASE IF THE ABOVE-MENTIONED DEFECT IS FOUND, IT WILL BE
NECESSARY TO DISCONNECT TEMPERATURE LIMITER FROM THE GH10N.
CONTROLLER, REMOVE IT AND REPLACE WITH A NEW DEVICE.

11. CONNECTION DEVICES TO THE GH10HA CONTROLLER

OUTPUTS				INPUTS		
14	L	—	Fan	50, 51	—	Out water temperature sensor
12	N	—	Fan	52, 53	—	H.U.W /Return temp. sensor
11	L	—	---	54, 55	—	Flue gas temperature sensor
09	N	—	---	56, 57	—	Open door sensor
06	L	—	Central Heating Pump C.H.			
05	N	—	Central Heating Pump C.H.			
08	L	—	H.U.W. Pump/ Mixing Pump			
07	N	—	H.U.W. Pump/ Mixing Pump			
02	N	—	Power Supply 230V			
01	L	—	Power Supply 230V			
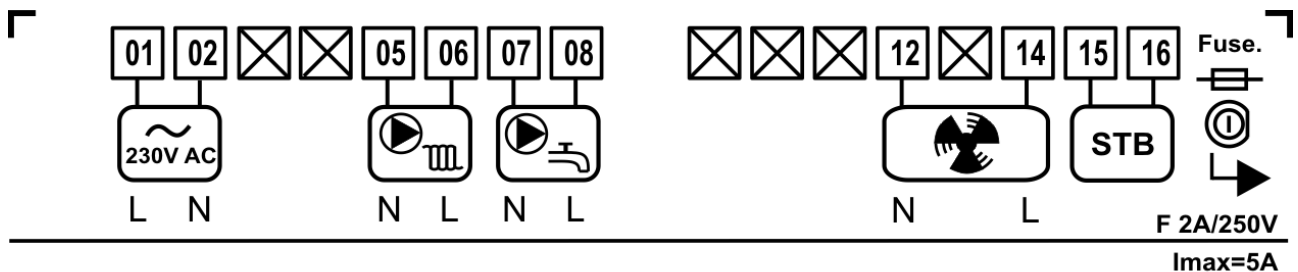
PPUH GECO Sp. z o.o.
32-060 Liszki, Cholerzyn 376
tel. +48 (12) 6369811 fax 6362002
www.geco.pl e-mail:geco@geco.pl

01-02 - Power supply
05-06 - Central Heating Pump C.H.
07-08 - H.U.W. Pump/Mixing Pump
12-14 - Fan
15-16 - Temperature limiter (STB)
50-51 - Outlet water temperature sensor
52-53 - H.U.W. Temp. sensor/Return Temp.
54-55 - Flue gas temperature sensor
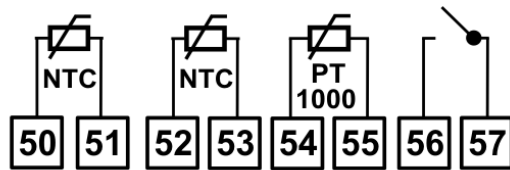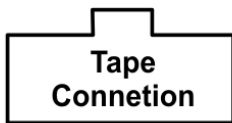56-57 - Open door sensor

Made in Poland

Fig. 1 Diagram of connection outputs and inputs devices and temperature sensor in the GH10HA controller.

ANY ADDITIONAL EQUIPMENT MAY BE CONNECTED TO THE GH10HA CONTROLLER ONLY BY PERSON LICENSED TO PERFORM ELECTRICAL INSTALLATION WORKS.

12. 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.

P.P.U.H. „Geco" Sp. z o.o.

Cholerzyn 376, 32-060 Liszki, Poland

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

fax. 012/636-20-02

http://www.geco.pl

e-mail: geco@geco.pl