

INSTRUCTION MANUAL

INSTALLATION, OPERATION
AND MAINTENANCE

One-function
gas central heating boilers

type GCO-13-00
GCO-24-00
GCO-29-16

UNICO
E L E G A N C E

type GCO-24-01-13
GCO-24-01-21
GCO-24-01-24
GCO-24-01-29

UNICO
E L E G A N C E
turbo



Congratulations on having chosen termet product.

We offer you modern, economical and environmentally friendly product, meeting particularly high requirements of European Standards. Please read this instruction manual carefully as the knowledge of service rules and manufacturer's recommendations are the conditions of reliable, efficient and safe operation of the appliance.

Please keep this instruction manual for the whole operation life of the boiler.

We wish you satisfaction in using our product.

termet

IMPORTANT TIPS

Read before the installation and operation of the boiler

- This instruction manual is an integral equipment of the boiler. It should be kept through the whole operation life of the boiler and carefully read. It contains all the information and warnings for safety during installation, use and maintenance to be followed.
- The boiler is complicated appliance as it contains numerous precise mechanisms. Reliable operation of the boiler depends mainly on appropriate performance of systems that boiler cooperates with such as:
 - gas system,
 - flue gas-air system,
 - central heating system

Flue gas - air system for C type boilers should be assembled of flue gas- air system separately approved and introduced on market. Adapters connecting tube boiler with a pipe system must have a measuring points. Flue gas – air system must meet the specifications set out in section 3.7 of this manual.

Flue gas- air system must be tight. Leaks on the connections of flue gas pipes can result in flooding of the boiler by condensate. Manufacturer is not liable for damage and malfunction of the boiler arising out from above mentioned reason.
- **Installation of the boiler should be performed only by a qualified person¹⁾. Make sure that the installer has confirmed in writing the tightness of the gas installation had been checked after connecting the boiler to the system.**
- The cleanliness of the air in a room where the boiler is installed must meet the same requirements as for rooms designed for people.
- The room where a B-type boiler is installed should provide the air supply and ventilation.
- There should be installed appropriate filters on a central heating system and on a domestic water system. Filters are not included in basic boiler equipment.
- All defects caused by a lack of filters on central heating or domestic water system will not be repaired under guarantee.
- Central heating system must be thoroughly cleaned and rinsed, the procedure is described on p.3.5.2.
- To avoid malicious calcification process of flue gas - water heat exchanger and also for reduce a risk of other items damage, there should be:
 - the proper water preparation in C.H. circuit according to p.3.5.2, Proper water parameters in C.H. system allows for long term operation maintaining its high efficiency, what leads to lower costs of gas consumption,
 - proper tightness of central heating system ensured by avoiding frequent refilling it with water,
- Complaints caused by gas-water heat exchanger calcification will not be repaired under guarantee,
- The initial start-up of the boiler as well as its repairs, adjustments and maintenance works must be performed only by AUTHORISED SERVICE COMPANY.
- The boiler must be operated only by an adult.
- Do not do any repairs and modifications by yourself.
- Do not cover any ventilation grilles.
- Do not keep in the vicinity of the boiler any containers with flammable, aggressive and corrosive liquids and other similar substances.
- Any failures that are result of operation discordant to recommendations included in this instruction manual cannot be subject to warranty claims.
- Manufacturer is not responsible for any failures being the result of faults during the process of installation and inobservance the regulations and instructions given by the manufacturer. Any producer's liability for damage caused by errors in the installation and usage resulting from a breach of the manufacturer's instructions and applicable regulations is disclaimed.
- Complying with recommendations given in this instruction manual ensures a long, reliable and safe operation of the boiler.

- **When you smell gas:**
 - **do not use any electrical switches that could cause any spark,**
 - **open the door and windows,**
 - **shut down the main gas valve,**
 - **contact your gas supplier.**

- **In case of any failure you should:**
 - disconnect the boiler from a power source,
 - shut down the gas supply valve,
 - cut off a water supply and drain a water from the boiler and whole central heating system as well (when there is any risk of freezing of the system),
 - drain the water from the system in any case of leakage that could cause a flood ,
 - contact the nearest AUTHORISED COMPANY SERVICE or the producer.

¹⁾ 'Qualified person', means the one that has all required technical qualifications in an area of doing all the works necessary to connect appliances to the gas mains, central heating system and flue gas duct, accordingly to local regulations.

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1. INTRODUCTION

One function central heating gas boilers are designed to supply central heating system.

There are described below mentioned types of boilers:

- **type GCO-13-00 - B-type boiler**(with opened combustion chamber) –thermal power 4 ÷ 13.5 kW
- **type GCO-24-00 - B-type boiler**(with opened combustion chamber) – thermal power 7 ÷ 24 kW
- **type GCO-29-16 - B-type boiler**(with opened combustion chamber) – thermal power 10 ÷ 29 kW
- **type GCO-24-01-13 - C-type boiler** (with closed combustion chamber) – thermal power 7 ÷ 13 kW
- **type GCO-24-01-21 - C-type boiler** (with closed combustion chamber) – thermal power 7 ÷ 21 kW
- **type GCO-24-01-24 - C-type boiler** (with closed combustion chamber) – thermal power 7 ÷ 24 kW
- **type GCO-24-01-29 - C-type boiler** (with closed combustion chamber) – thermal power 8 ÷ 29 kW

Boilers with opened combustion chamber are adopted to be connected to a flue gas pipe that takes off the flue gases outside a room where boiler has been installed and take air for combustion directly from this room. B-type boilers are equipped with a protection against chimney draft decay. Such kind of boiler is marked with B_{11BS} symbol.

Boilers with closed combustion chamber (type C) take air for combustion process from outside the room they are installed and they lead the flue gases outside.

All these types of boilers are suitable for operation with domestic water tanks available in Termet's offer. Storage tank is not included in boiler equipment.

2. BOILER DESCRIPTION

2.1. Technical specification

2.1.1. Technical features

- electronic fluent flame modulation on the burner,
- electronic ignition with ionization flame control;
- adjustable boiler power;
- regulation of heating water and domestic water temperature;
- function of softignition;
- inlet gas pressure stabilisation;
- adopted to cooperate with closed circuit in central heating system;

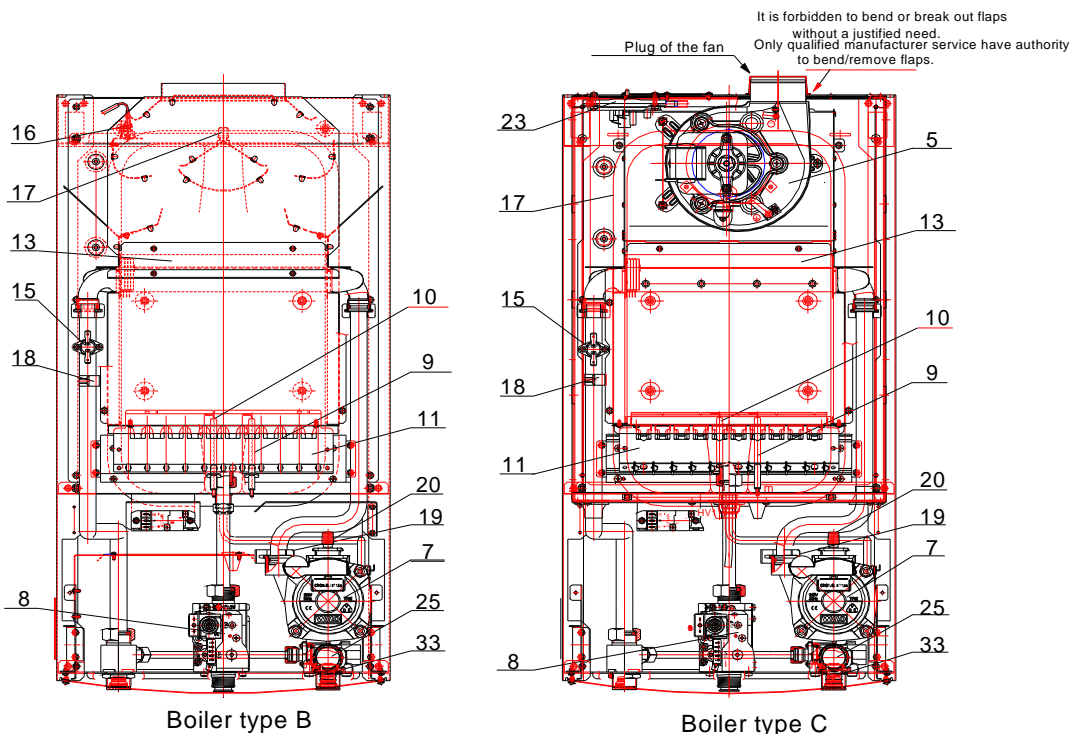


Fig. 2.2.1.1 Individual components of the boiler

2.2. Design and specifications of the boiler

2.2.1. Main units of the boiler

Descriptions for drawings 2.2.1.1 and 2.2.1.2

- 5 - Fan,
- 7 - Pump,
- 8 - Gas unit,
- 9 - Flame control electrode,
- 10 - Ignition electrode,

- 11- Burner,
 13- Flue gas-water heat exchanger,
 15 - Temperature limiter asa protection against exceeding the upper limit water temperature,
 16- Temperature limiter(Protection against the outflow of gas into the room)
 17 - Expansion vessel,
 18- NTC sensor of water temperature
 19 - Pressure transducer
 20 - Air vent,
 23- Differential pressure sensor - pressure switch (in C-type boilers)
 25 -Safety valve 3 bar,
 33- Drain valve

Only on the illustration 2.2.1.2.

1. Switch of function selection of the boiler
 2. Central heating or hot domestic water temperature selector
 3. Temperature display of heating water, domestic water and static pressure of the heating water with the diagnosis of failure states.
 4. Control panel
 K1. On/Off, reset

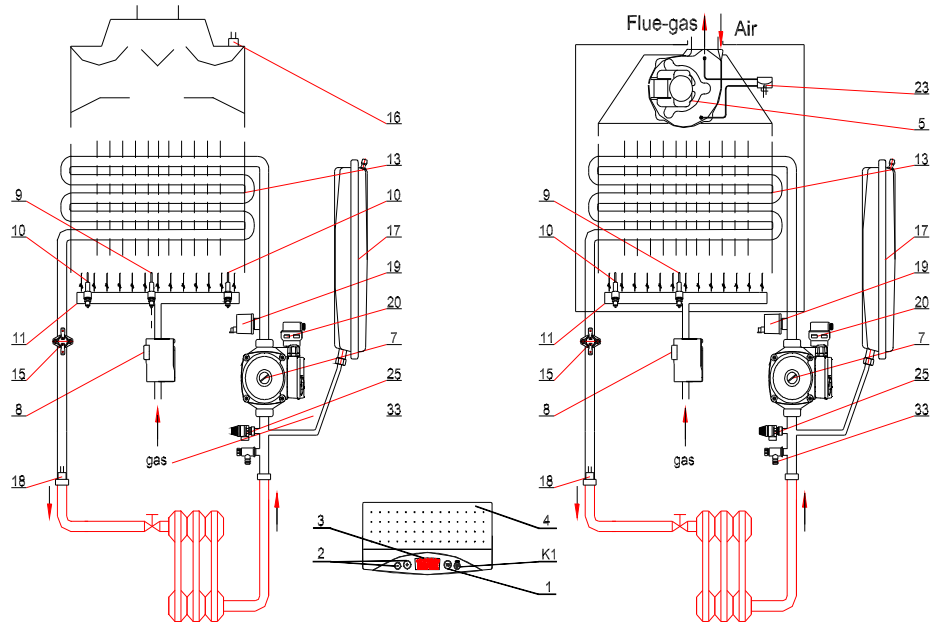


Fig. 2.2.1.2 Schematic diagram of the operation of the boiler

2.2.2 Technical data

Parameter	Unit	Value							
		GCO 13-00	GCO 24-00	GCO 24-01-13	GCO 24-01-21	GCO 24-01-24	GCO 24-01-29	GCO 29-16	
Energetic parameters									
Boiler thermal power	kW	4 ÷ 13.5	7 ÷ 24	7 ÷ 13	7 ÷ 21	7 ÷ 24	8 ÷ 29	10 ÷ 29	
Heat load of the burner	kW	4.5 ÷ 14.8	7.9 ÷ 26.2	8,2 ÷ 14,7	8,2 ÷ 23,1	8,2 ÷ 25,9	9,4 ÷ 31,6	11,0 ÷ 31,7	
Efficiency of the boiler at nominal power	%	91.4	93.1	91.4	92.8	93.1	92,0	91,6	
Boiler efficiency at minimum power	%	90.4						84,9	89,4
Natural gas ¹⁾ consumption: 2E-G20 – 20mbar	m ³ /h	0.5 ÷ 1.5	0.8 ÷ 2.7	0,85 ÷ 1,3	0,85 ÷ 2,0	0,85 ÷ 2,7	1.0 ÷ 3,3	1.15 ÷ 3,3	
liquefied gas: 3B/P-G30–30,37mbar	kg/h	0.3 ÷ 1.1	0.6 ÷ 2.0	0,6 ÷ 1,1	0,6 ÷ 1,8	0,6 ÷ 2,0	0,7 ÷ 2,4	0,85 ÷ 2,42	
¹⁾ Consumption of different types of gases are given for reference gases in the reference conditions (dry gas 15 °C, pressure 1013 mbar) with respect to the given boiler efficiency									
Nominal kinetic pressure ahead of the boiler for gas: 2E-G20 3B/P-G30	Pa (mbar)	2000 (20) 3000 (30), 3700 (37)							
Orifice size of the burner nozzle for each gas type: 2E-G20–20mbar liquefied:3B/P-G30–30,37mbar	mm	Ø 1.15 (115) Ø 0.75 (75)	Ø 1,30 (130) Ø 0,82 (82)	Ø 1,30(130) Ø 0,82 (82)	Ø 1,30(130) Ø 0,82 (82)	Ø 1,30(130) Ø 0,82 (82)	Ø 1,40(140) Ø 0,85 (85)	Ø 1,25(125) Ø 0,82 (82)	
Maximum waterpressure	MPa (bar)	0,3 (3)							
Max temperature of central heating	°C	95							
Adjustedtemperature – standard heating	°C	40 ÷ 85							
Adjustedtemperature – floor heating	°C	35 ÷ 55							
Lift of the pump at flow 0	kPa (bar)	60 (0,6)							
Hydraulic parameters									
Hydraulic resistance of the boiler at the heating water flow rate 10 dm ³ /min	kPa (mbar)	35 (350)						20 (200)	
Expansion vesselcapacity	dm ³	6							
Water pressure in expansion vessel	MPa (bar)	0.08-0.02 (0.8-0.2)							
Electric parameters									
Type and supply voltage	V	~ 230 ±10%							
Degree of protection		IPX4D							
Power consumption	W	120	120	160	160	160	160	120	
Maximum nominal current value of output terminals	A	2							
Controller classification according to PN EN 298		AMRLXM							
Type of flame sensor		ionization							
Time parameters									
Time of pump rundown and time of stopping the heating in central heating system	sec	180							

Time of pump rundown in domestic water system	sec	After working in the central heating mode, the pump is run for 20 seconds, if after that time the temperature indicated by the NTC sensor of domestic hot water is higher than 50 °C, the pump continues to operate until the temperature reaches this value or maximum up until the 180sec.						
Activity time of programming functions	min	10						
Function "24 hourclock. "	h /sec.	Turns on every 24 hours for 15 seconds						
Service function "chimney-sweep"	min	15						
The parameters of flue gas								
Fluegas mass flow	h/sec	---	----	16	17	19	24	24
The flue gas temperature for maximum power measured at 1m in the flue gas pipe	°C	~130	~145	~145	~150	~150	~150	~150
Characteristics of the fan		---			Seesection 3.7.6.			
Class of NO _x		3						
Mounting dimensions								
Connection to the chimney duct (see section 3.7. and table 7.1.)	mm	Ø 110	Ø130	Φ80/Φ125 or Φ60/Ø100 or 2 single Φ80 xΦ80				Ø130
Connection of heating water (CH) and gas	inches	G3/4						
Domesticwaterconnection	inches	G1/2						
Dimensions	mm	700 x 360x 300						713x475x300
Boilerweight	kg	23			28,5			

The manufacturer reserves the right to make changes in the construction of the boiler, which are not mentioned herein and have no influence on the technical and functional characteristics of the product.

2.3. Protectionequipment

- Protection against exceeding max. operating temperature in central heating system
 - Protection against exceeding the upper limit of heating water temperature
 - Protection against water pressure increase (1-st degree) - electronic
 - Protection against water pressure increase (2-nd degree) - mechanical
 - Protection of the correctness of the fan operation in the C-type boilers
 - Protection against chimney draft loss in the B-type boilers
 - Protection against chimney draft decay in the B-type boilers
 - Protection against outflow of unburned gas
 - Protection against explosive switch on of the gas
 - Protection against drop of water pressure
 - Protection against water overheating
 - Anti freezing protection of the boiler
 - Protection against pumpblockade
- consists of the temperature limiter (item16) connected to the electronic control system. In case there is no chimney draft the protection will close the gas supply to the burner.

Please note:

In case of noticing repeated emergency boiler shut-down it is necessary to:

- * contact an Authorized Service Company in order to check the reason of boiler switching off and to repair it
- * contact the chimney-sweep service company in order to check the correctness of the chimney draft .


Do not turn off the protection against the chimney draft decay.

Do not make any modifications in the protection system.

Switching off or damaging this protection in B-type boilers may cause outflow of flue gas into the room.

2.4. Operation description

2.4.1. Way of heating the water for central heating system

The boiler switches off when the room temperature control unit is signaling reaching the desired temperature in the room or when heating water temperature exceeds the set temperature by the value of hysteresis (parameter P15, default 5°C) in this case symbol L3 or flashing symbol  is displayed on the right-hand side of the display. (see table, section 5.5).

After turning off the boiler pump runs for about 180 sec. and the fan for 15 sec. (in C-type boilers).

The boiler will restart automatically when the following conditions occur simultaneously:

- heating water temperature decreased by min. 5°C below the set point,
- elapsed time of 180 seconds, if L3 symbol was displayed
- room thermostat gives the signal of heat demand to the boiler.

2.4.1.1. Temperature regulation dependent on external temperature

If an external temperature sensor has been connected, the controller detects it automatically and it goes into a mode of weather function. Controller selects the heating water temperature depending on an external temperature and the slope of the Kt curve and parameter P17 (according the chart given in Fig. 2.4.1.1.1 and 2.4.1.1.2). Change of the value of the Kt follows in the manner described in section 5.6.1.1

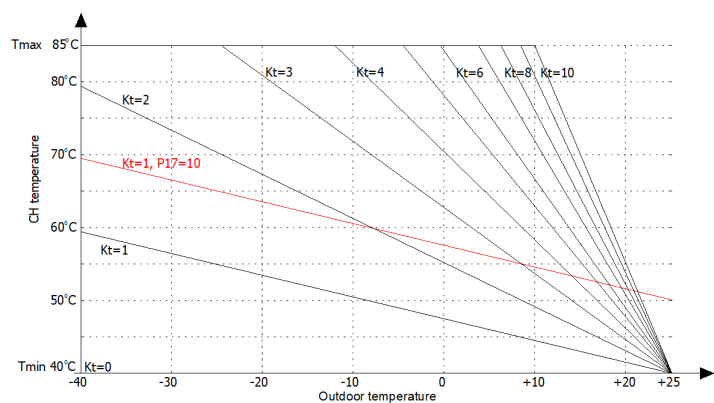


Fig.2.4.1.1.1 Diagram of the heating curve (standard heating)

Notice:

- for value $T_{out} \geq 25^{\circ}\text{C}$ and $P17=0$ designed temp. $T_{c.h.}$ is always equal to T_{min} .
- at max. coefficient K_t and $P17=0$, T_{max} is reached when $T_{out} \leq 10^{\circ}\text{C}$.
- $T_{c.h.}$ will not exceed the value of T_{max} regardless of the value $P17$. T_{max} may be set by $P18$.
- in case of connecting OpenTherm regulator, the weather function is performed through the connected OpenTherm regulator if parameter $P19=1$

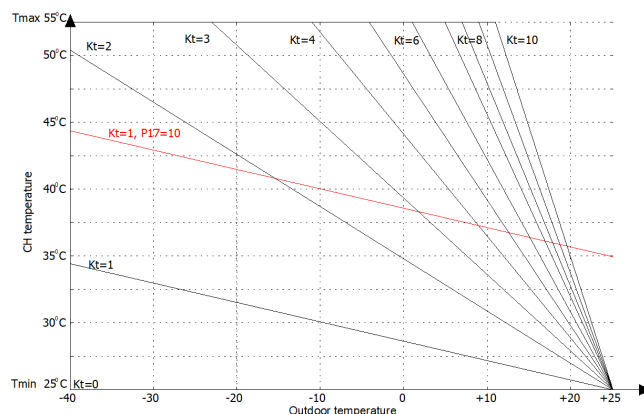


Fig.2.4.1.1.2 Diagram of the heating curve (floor heating)

2.4.2. The way of domestic water heating

UniCO boilers may cooperate with all domestic water tanks available in Termet's offer. Adjustment and display of water temperature are done on the driver of the boiler. The process of domestic water heating is as follows:

When the domestic water sensor finds the tank temperature lower than the temperature (look p.5.6.2) on the control panel, then the process of water pumping to the CH system will be stopped. Heating the water with the boiler cooperation with the tank of domestic hot water is as follows:

- water temperature sensor in the tank indicates the water temperature drop below 5°C from the set temperature (eg due to opening of inlet tap valve);
- boiler control unit makes the three-way valve to draw the heating water to a short circuit, while giving a signal to the spark generator and gas valve (item 8);
- heating water with temperature described by parameter $P16$ (default 75°C) flows through the coil of tank (short circuit);
- prior to reaching the maximum temperature of heating water the gas flow modulator (that regulates the amount of gas supplied to the combustion to the burner, keeping constant the temperature) is actuated;
- after exceeding the set water temperature in the tank by 1°C , the boiler controller get distorted the three-way valve for long circuit and at fulfillment of the following conditions the heating water is pumped into the central heating system:
 - heating water temperature drops below the set by ~ 5 degrees,
 - room temperature controller provides the signal "heat up".

3. BOILER INSTALLATION

Remove the plug from the fan before installing the flue gas - air system to the boiler. Remove the cardboard inserts from the rear of the boiler (which are immobilizing expansion vessel).

The boiler must be installed by an authorized service company accordingly with local regulations. After the boiler installation check the tightness of all connections of gas, water and flue gas system. **Service company is responsible for the proper installation of the boiler.**

Installation of the boiler must be made so as not to cause any tension of the installation that may cause increased volume of work.

3.1. Requirements of boiler installation

3.1.1. The regulations on the water installation, gas and the flue gas

Water, gas and flue gas systems must meet local regulations as well as use of the gas, ventilation and flue gas installation.

Gas appliances supplied with liquefied gas must not be installed in room with a floor below ground level.

If you use liquefied gas 3B/P it is recommended that the temperature in a room where a gas cylinder will be operated is not less than 15°C .

3.1.2. Regulations related to the room

Requirements for premises where gas appliances are installed shall be in accordance with local regulations. The room where appliance is to be installed should ensure the air supply and venting system necessary for gas combustion in accordance with local regulations. The location of ventilation should not cause the water freezing. The temperature in the room where the boiler is installed should be higher than 8°C . The room should be free from dust and aggressive gases. It is forbidden to install the device in a laundry rooms, drying rooms and in varnish, cleaners, solvents and sprays storages.

3.1.3. Requirements for electrical installations

The boiler has been designed as a Class I device and is designed for operation with single-phase alternating current with rated voltage of 230 V / 50 Hz. The boiler is equipped with a cord with a plug and must be plugged into a grounded socket according to HD 60364-4-41.

The main socket from which boiler is powered must meet the local requirements.

It is important to check if boiler supply wires are connected to correct phase wires in installation.

In case of incorrect connection of supply wires:

- boiler enters failure mode
- error E01 is shown on the display (see p. 5.9.4)

In that case interchange phase wires "L" and "N" in power socket.

Boiler exits failure mode automatically after detecting correct connection.

If the boiler is permanently connected to the power source, it should be executed by junction box. The junction box must be equipped with protection degree appropriate for the defined assembly zone. If the boiler is connected through the junction box, electric system must be equipped with measures which can disconnecting the boiler from the power source.

In order to connect the boiler to the junction box, it is recommended to:

- cut the power cord to a suitable length for connection to the box
- pull off cable insulation
- put the cable-end sleeve with the appropriate diameter

This prepared cables connect according to the following diagram.

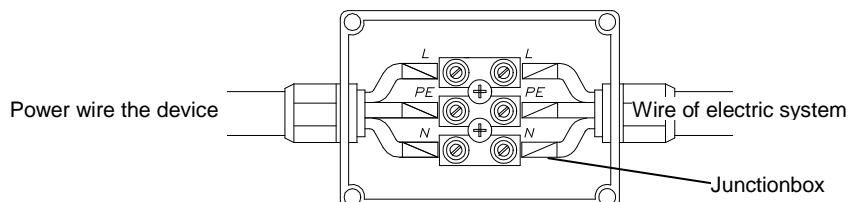


Fig 3.1.3.1 Wire colors: L – brown; N – blue; PE – yellow-green

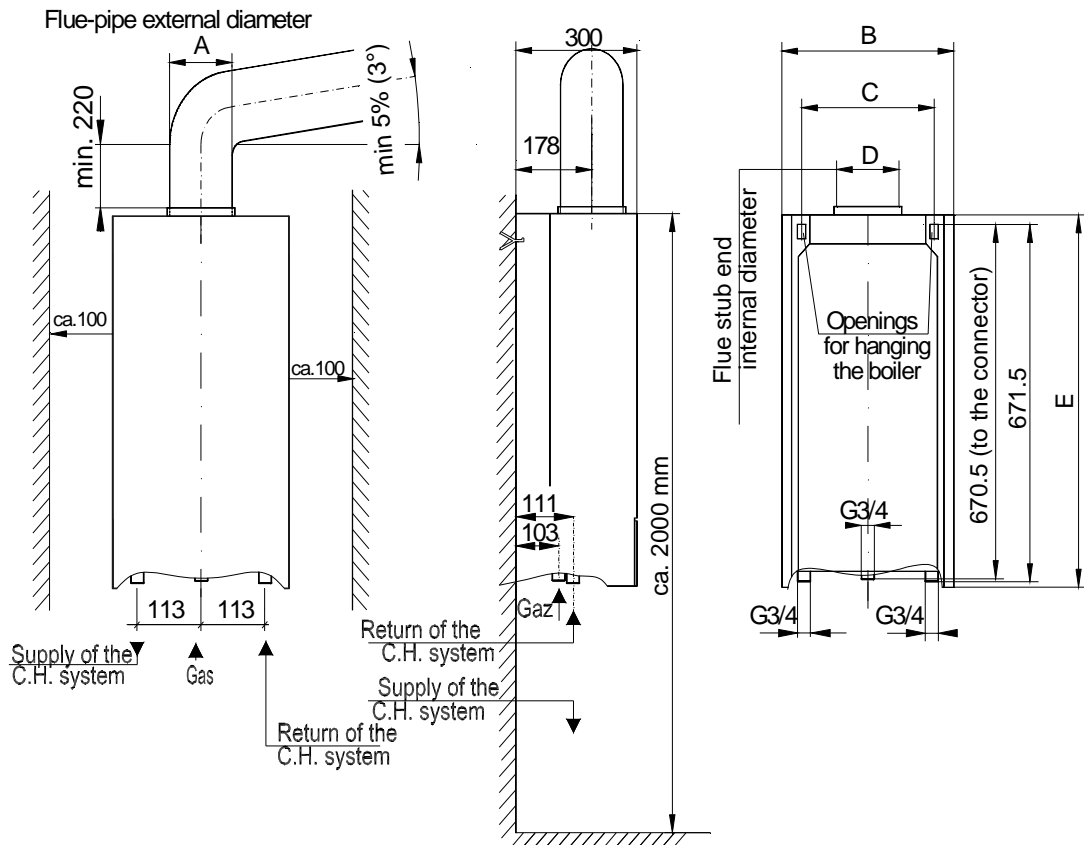
3.2. Preliminary check activities

Before proceeding with the boiler installation:

- check whether the boiler is factory designed for the type of gas supplied from the gas system. The type of gas which the boiler is adjusted to is specified on the rating plate on the cover of the boiler;
- check whether the water system and radiators have been rinsed with water in order to remove rust, fillings scale, sand and other dusts that could disturb the proper operation of the boiler (for example increase the water flow resistance in central heating system) or to pollute the heat exchanger,
- whether the socket has an proper safety contact.

3.3. Mounting the boiler on the wall

Hang the boiler on hooks fastened durably in the wall using a beam placed in upper part of the boiler. The boiler shall be so located as to permit the eventual repair without any need to dismantling from the installation.



	A	B	C	D	E
uniCo-13	Ø 110	360	321	114	700
uniCo-24	Ø 130	360	321	132	700
uniCo-29	Ø 130	475	436	132	713

Fig. 3.3.1 Installation dimensions of B type boiler

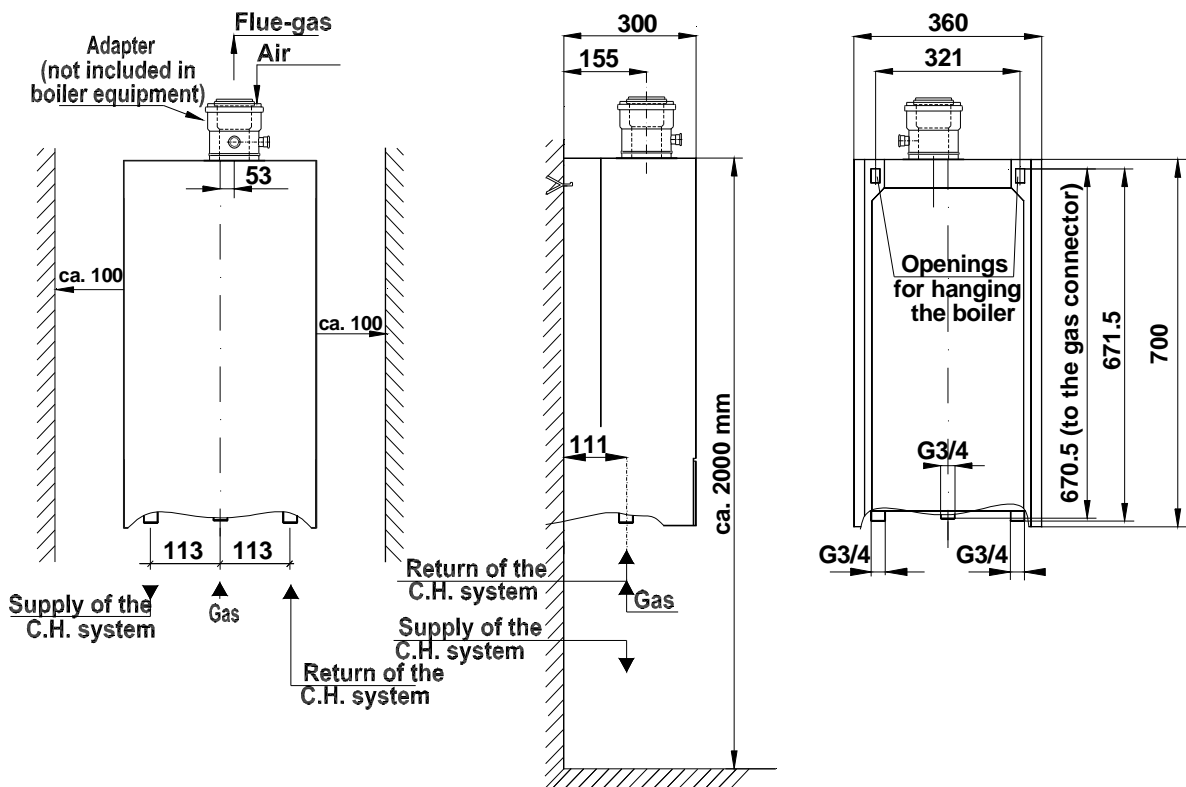
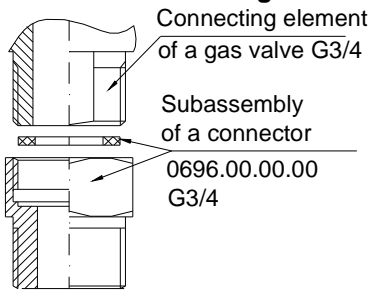


Fig. 3.3.1 Installation dimensions of C type boiler

3.4. Connection to the gas installation



Connect a gas supply pipe directly to the connector of the boiler gas unit by means of connector subassembly number 0696.00.00.00. as on the figure 3.4.1.

It is necessary to install a gas filter on the gas supply pipe. This filter is not included in the standard boiler equipment. The gas filter is necessary for a proper operation of a gas unit and a burner.

Install a cut-off valve on the gas pipe in an accessible place.

Fig. 3.4.1 Connecting the gas connector assembly

3.5. Connection of the boiler to a central heating system

- Power connector and connector of return of the central heating boiler should be screwed to the installation. Location of the connectors is shown on the figure 3.3.1. 3.3.2. and 3.3.3.
- **Install a water filter on a water return from central heating system (before the connection with the pump). The filter is not included in standard boiler equipment.**
- The central heating system should be thoroughly rinsed out before the boiler is connected.
- In the central heating system it is permitted to use as a heat carrier any antifreeze fluids which can be used in central heating systems.
- The cut-off valves needs to be installed between the boiler and central heating system so that the boiler could be dismantled without draining the system
- Do not install any thermostatic valves on radiators in the room where the thermostat is installed. The temperature controller takes over the function of temperature control and it cooperates with the boiler
- Do not install a thermostatic valve on at least one of radiators of the central heating system.
- It is recommended to lead out a water from a safety valve 0,3 MPa (3 bar) (item 25) to a floor drain by a tube or hose otherwise during the safety valve activation there is a risk of flooding a room what is excluded of producer's liability.

Selection of expansion vessel

Boilers described in this instruction manual are adjusted to be connected to a central heating system with the maximum capacity of 105 liters. The assembly to installation with larger capacity is acceptable after applying an additional expansion vessel. A proper expansion vessel should be selected by the designer of central heating system. Installation of expansion vessel should be made by the installation contractor in accordance with applicable regulations.

After the boiler installation it is necessary to:

Fill the heating system with water;

Vent (deaerate) the installation of central heating and boiler;

Check whether connections of the boiler in the central heating system are tight.

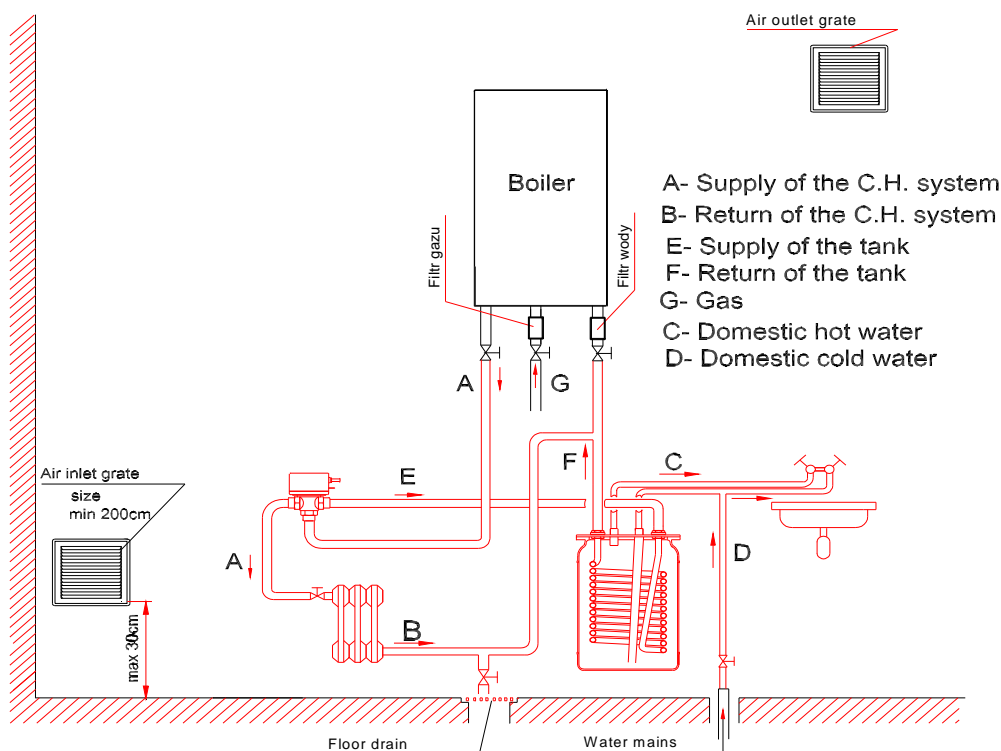


Fig.3.5.1 Boilers installation requirements

3.5.2 System cleaning and water treatment for the C.H. filling.

Every component of C.H. system is threatened by limestone deposits, corrosion and other dangerous processes. Boiler is the most expensive part of C.H. system and it is necessary to protect its components like heat exchanger and other parts against harmful processes. Correct C.H. circuit preparation for using relies on making two operations: cleaning the CH system and treating the water that fills the system.

System cleaning

In new installation it is possible to find some remains of industrial process soldering and welding remains, flux, oil and grease residue among others. Older installations usually have products of corrosion in them. It is necessary to clean up the systems with a water to remove the remains before boiler is mounted. Afterwards, system should be cleaned with appropriate chemicals- for example **BM3 Cleaner from BoilerMag**. After that it is necessary to rinse the installation with water.

Water treatment to fill the system

For filling the system, it is recommended to use water with parameters: pH 6,5- 8,5, hardness < 10 °h (~ 18°F). Do not use demineralised or distilled water. To ensure protection against rocks despositing, corrosion, it is recommended to use a special inhibitor, for example BM1 Protector from BoilerMag.. Antifreeze liquid can also be used, for example **BM Zero Antifreeze from BoilerMag**.

Low-temperature circuits

In the low-temperature area, it is recommended to treat the water by using **BM7 Biocide**.

Filtration technique

Additionally, in order to ensure the quality of operation heating system, it is recommended to mount a modern filters, which works on the principle of the magnetic and cyclone effect **from BoilerMag**.

Notice:

- method and amount of use specific products for system cleaning and water treatment should be in accordance to the product manufacturer's instruction.
- above steps should be made by the authorized installer or service technician.

3.6. Connection of domestic water storage tank

Hydraulic connection to the boiler.

Hydraulic connection of the domestic hot water storage tank to the boiler should be made according the fig.3.5.1 and instruction of tank.

Electrical connection of the tank to the boiler.

Electrical connections of the tank should be made according section 3.10. The tank connection may be made only by an authorized person.

3.7. Flue gas outlet

Remove the plug from the fan before installing the air-flue gas system for the boiler.

Flue gas outlet from the boiler must be made in accordance with applicable regulations and this instruction manual according to the type of boiler (B or C) and it needs to be agreed with the district chimney sweep service company.

The boilers GCO-13-00, GCO-24-00, GCO-29-16 belongs to B_{11BS} family of boilers (with open combustion chamber) in which flue gas is taken to the chimney duct and the air needed for the combustion process is delivered from the room where the boiler is installed.

The flue gases from the boiler should be discharged into the flue gas pipe with outer diameter of Ø130mm. Use a vertical pipe with a length of min. 220 mm, and a horizontal pipe with a length of max. 2 m with a decrease of 5% (~ 3°) towards the boiler.

For the correct boiler operation the underpressure in chimney duct should be at least 3 Pa.

It is not allowed to lengthen a chimney duct or to install different heat exchangers in order to more efficient exploitation of the combustion heat (to better use of heat of combustion).

Boilers type GCO-24-01-13, GCO-24-01-21, GCO-24-01-24, GCO-24-01-29, belongs to C₆₂ family of boilers which means that:

- it has closed combustion chamber in relation to the room where it is installed (C),
- it is adjusted to be connected to separately approved and marketed air-flue gas systems (6),
- it is equipped with a fan supporting the flue gas outlet (2).

Ways of connecting the C type boiler to the air - flue gas system (according to project made by an authorized person) are shown on the figures 3.7.

To ensure proper functioning of the device use the correct size of tubes (diameter, maximum length, resistance on the elbows) depending on the combustion system used. The dimensions of the tubes should be adequately compliant with these given in the tables.

Adapters connecting boiler with an air-flue gas tube must have a measurement points.

Flue gas flow resistance at each elbow, depending on the bending angle and the related with it reduction of the maximum cable lengths are given in section 3.7.2.

Connecting the boiler to the air-flue gas system and installation of the system should ensure the tightness. Each used system should be installed with the outlet with wind protection which protects against external factors.

3.7.1. The ways of mounting adapters (elbows connection) to the boiler type C

3.7.1.1 The air-flue gas system $\varnothing 60/\varnothing 100$ – coaxial

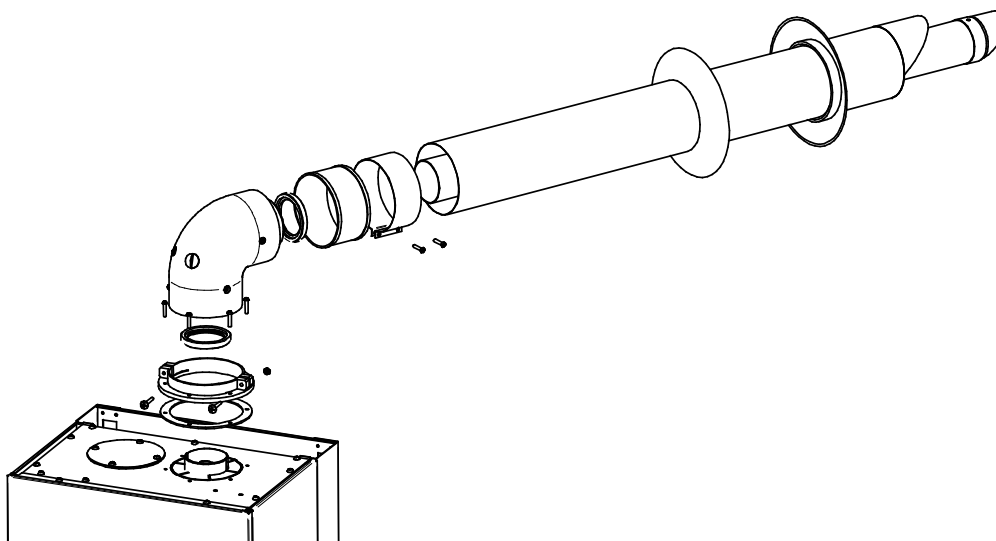
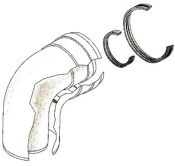


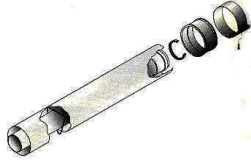
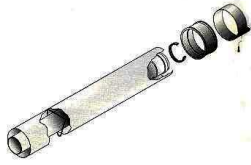


Table 3.7.1.1.1. The elements of the coaxial system

Elbow 90°	$\varnothing 60/100$	
Elbow 45°	$\varnothing 60/100$	
Coaxial adapter with the container for condensate	$\varnothing 60/100$	
TubeL= 500 mm	$\varnothing 60/100$	
TubeL= 1000 mm	$\varnothing 60/100$	

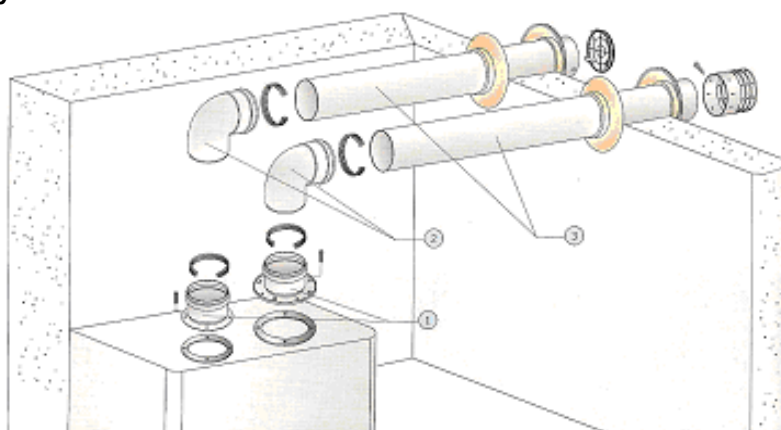
3.7.1.2. The air-flue gas system $\varnothing 80/\varnothing 80$ – dual

Table 3.7.1.2.1. The elements of the dual system

Setofadapters - combined	$\varnothing 80$	
Elbow 90°	$\varnothing 80$	
Set of adapters- separate	$\varnothing 80$	
Elbow 45°	$\varnothing 80$	
TubeL= 500 mm	$\varnothing 80$	
TubeL= 1000 mm		

In order to use the dual system you should:

- unscrew the cover in the upper part of the combustion chamber at the point where an air supply system is connected to the boiler
- keep the gasket placed under the cover
- screw on the adapter $\varnothing 80/\varnothing 80$ (according the below table) in place of the removed cover and seal the connection with the kept gasket
- screw on the adapter $\varnothing 60/\varnothing 80$ (according the above table) in place of flue gas outlet in the upper part of combustion chamber - slide the lower part of the adapter on a fan connector and seal the connection with a gasket number 000617

Note: Horizontal air pipe should be mounted at an angle $\sim 3^\circ$ so that the rainwater getting into the pipes will not flood the boiler and flow outside the building.

When performing a decrease the drain assembly is optional. Hose draining the condensate should be properly siphoned.

3.7.2. Air-flue gas pipes

Table 3.7.2.1 The maximum length of a vertical air-flue gas system

Type of boiler	Coaxial system		Dual system
	Ø60/Ø100	Ø80/Ø125	Ø80xØ80
Maximum length of the chimney cord (m)			
GCO-24-01-13	4	25	25
GCO-24-01-21			
GCO-24-01-24	3,5	23	25
GCO-24-01-29	3	22	25

Table 3.7.2.2. Reduction of the maximum length of the air-flue system by changing the flow direction

Loss of the length of the air-flue gas system by the use of elbows or tee with a slope (m)		
15°	45°	90°
0,25	0,5	1

3.7.3. Characteristics of the fan

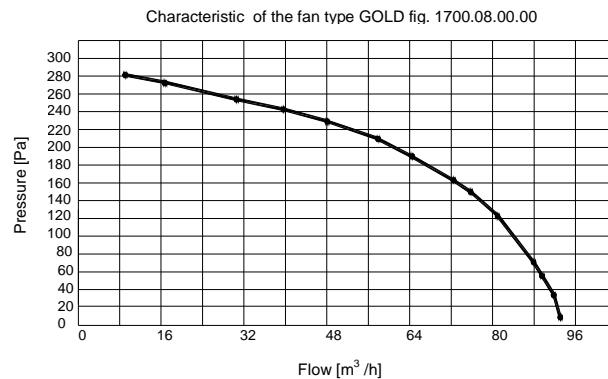


Fig. 3.7.3.1. Charts of characteristics of the fan

3.8. Connection of a room temperature control unit

The boiler has been designed to cooperate with a room temperature control unit which has got its own supply source and control contact free from potential.

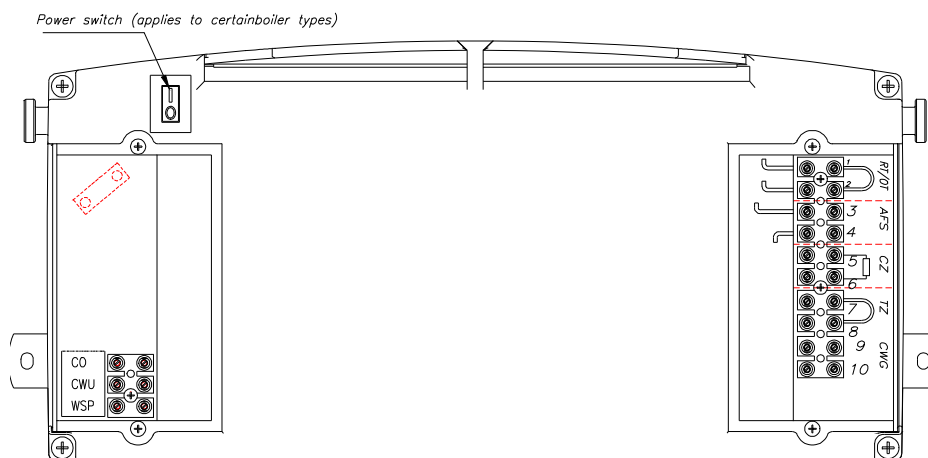
The connection should be made according to the producer's tips.

On the back of the controller there are two flaps, under the right flap there is hidden the access to electrical terminals.

To connect the temperature control unit the appropriate length of wire must be purchased and connected to the terminals marked with RT which are situated under right flap of control panel (after removal of an electrical short-circuiting bridge containing RT poles).

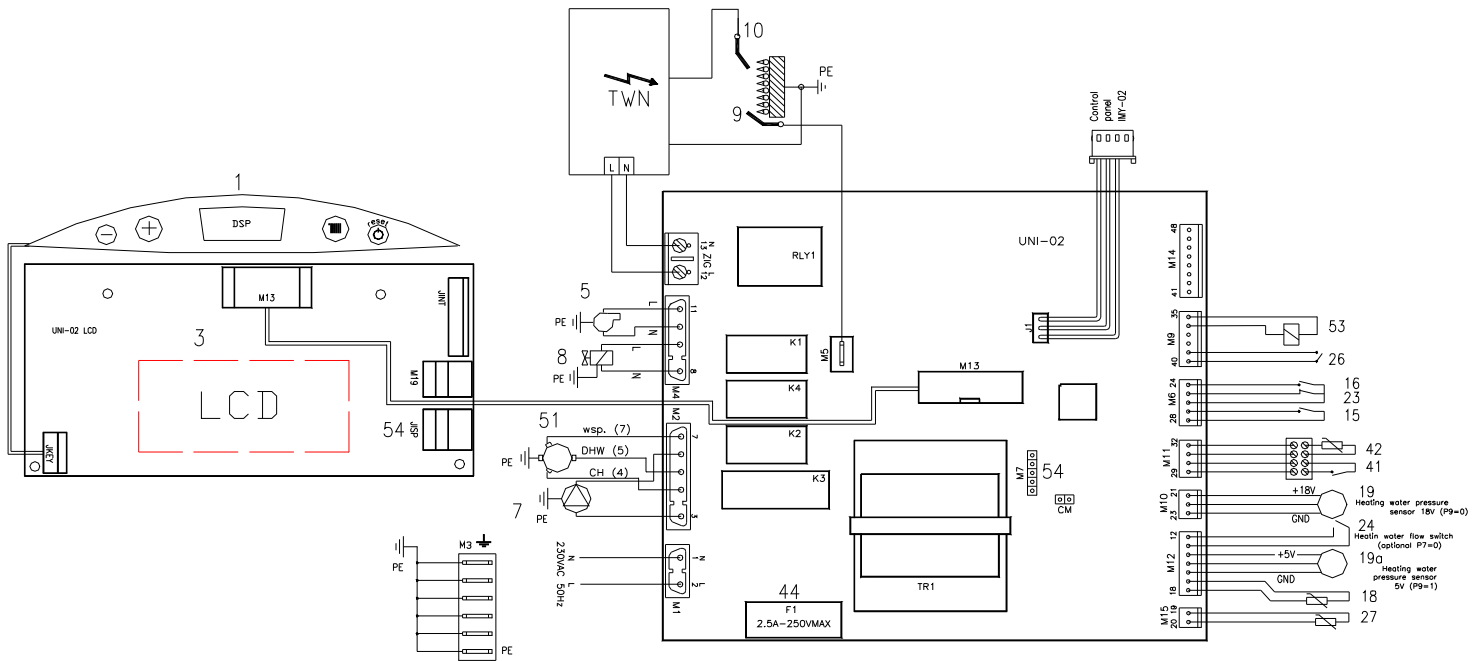
To connect an additional device, unscrew the right flap, carry the cable through the grommet in the flap and attach the ends of the wire to the correct terminals.

Connection of the room temperature control unit should be performed only by an authorized person.



RT – room temperature thermostat (red wire)
AFS – external temperature sensor (black wire)
CO – central heating
WSP – common

CWU – domestic hot water
CZ – tank temperature sensor
TZ – timer of a tank
CWG – flow switch for CH water



Nr	Description	Nr	Description	Nr	Description	Nr	Description
1	User interface (foil)	15	Temperature limiter- protection against exceeding the upper limit of heating water temperature	23	Differential pressure switch (C type boilers)	54	Connection "In System Programming"- programowanie mikroprocesora
3	User interface (control board)	16	Temperature limiter - protection against losing chimney draught (B type boilers)	24	Heating water flow switch (optional)	P1	OFF / RESET button
5	Fan (C type boilers)	18	NTC sensor of heating water temperature	26	Domestic water flow switch	P2	SET button
7	Pump	19	Heating water pressure sensor 18V	27	NTC sensor of domestic water temperature	P3	+ button
8	Gas unit	19a	Heating water pressure sensor 5V	41	Room temperature thermostat	P4	- button
9	Detecting electrode			42	NTC sensor of external temperature	CM	Blockade of extended mode configuration of control system
10	Igniting electrode			44	Fuse	JKEY	User interface connector (foil)
M3	PE connector			51	3 way valve	M13	User interface connector
TWN	Spark generator			53	Coil of the modulator		

Fig.3.8.1 Electric terminals of controller - rear view
Fig.3.8.2 Schematic diagram of electrical connections of the boiler

3.9. Connection of the external temperature sensor

In order to connect the external temperature sensor two-core cable with a core section of 0,5mm² needs to be used and it needs to be connected to terminals marked AFS which are placed under the right flap in control panel (according the indication on the figure 3.8.1). It is recommended to place the external temperature sensor on the north side of the building and not to expose it to the sun.

3.10. Electrical connection of the tank to the boiler

To connect the tank, you should:

- NTC sensor wire should be connected in accordance with information label (Figure 3.8.1) to the terminals marked "CZ", after removing the resistor connected to the "CZ" terminals. The other end of the wire with the sensor should be placed in a tank at the point marked NTC.
- Connect the three way valve wire in accordance with the above mentioned information label to the terminals marked "CWU, CO, WSP." (see Figure 3.10.1)

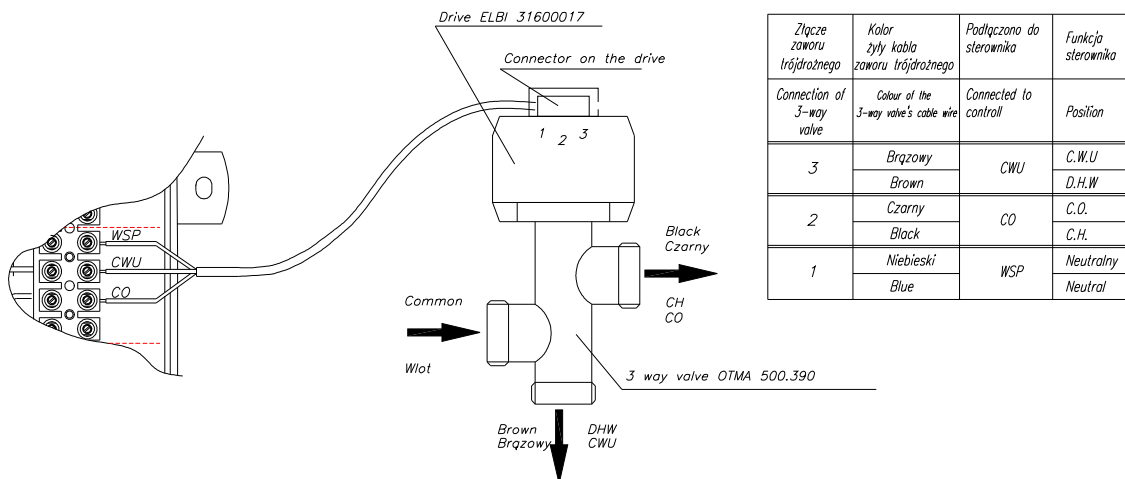


Fig.3.10.1 Electrical connection of the three way valve type 500.390

4. BOILER ADJUSTMENT AND PRELIMINARY SETTING

4.1. Introductory remarks

The purchased boiler is adjusted by the manufacturer according to the parameters needed for the type of gas, which is listed on the rating plate of the boiler and in its documents. If it is necessary to change the parameters or adapt the boiler to another type of gas; the process of adjusting the boiler and setting the parameters should be performed only by a qualified service team or person. It is allowed to perform the above mentioned operations if:

- the tightness of the gas system connections was checked after the boiler installation and it was confirmed with the signature and the stamp of the installer,
- the electrical installation was made in accordance with applicable regulations,
- the correctness of connections between the boiler and the chimney was checked and confirmed by a qualified chimney service.

4.2. Adjusting the boiler to combust another type of gas

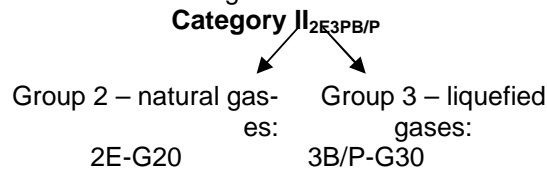
4.2.1. Selecting the type of gas on the boiler controller

If it is necessary to change the adjustment of the boiler from natural gas into liquefied gas, the parameter P4 needs to be changed respectively (see section 5.7).

4.2.2. Changes in the gas system of the boiler

The boiler supplied by the manufacturer is designed to combust the gas type specified on the rating plate.

The boiler can be adjusted to combust another type of gas but only for the one which the boiler is certified for. The types of gases are given on the rating plate - in the index designation:

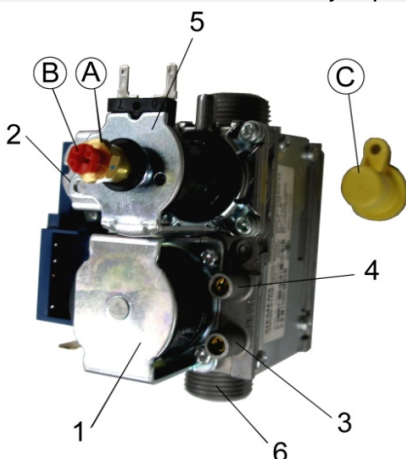


Adapting a boiler to another type of gas involves replacing the burner nozzles dedicated to the specified type of gas and adjusting the minimum and maximum gas pressure range on the modulator (fig.4.2.2.1). Also the regulation of gas pressure for the start power and maximum power of the boiler control panel (see description in section 4.2.2.3, 4.2.2.4 and 5.7.). The dimensions of the nozzles and pressure for operation of boilers are given in table 4.2.2.5.

Example of completed label

termet		After adapting the boiler to combust another type of gas: <ul style="list-style-type: none"> • Cross out on a rating plate the type of gas to which the boiler was adapted by the manufacturer, • Write down the symbol of the gas, to which the boiler has been adjusted and the set heat load on the appropriate label that is attached to the user manual. The entry must be written legibly and indelibly. • Label filled in as above should be stuck on the cover near the rating plate.
Set for gas:	Liquefied	
Gas symbol	3B/P-G30	
Gas pressure [mbar]	37	
Set the nominal heat load [kW]		

Adapting the boiler to combust another type of gas can be performed only by a **qualified service team**. This operation is not included in the warranty repairs.



1. Main cut-off valve.
2. Cut-off valve .
3. Measuring point of inlet gas pressure.
4. Measuring point of outlet gas pressure.
5. Regulation of gas pressure on the modulator:
 - A. A maximum pressure adjustment screw of modulator (hexagonal 10 mm wrench).
 - B. A minimum pressure adjustment screw of modulator (screwdriver).
 - C. Protective cap.
6. Connection to the gas system.

Fig. 4.2.2.1 Gas valve with modulator

4.2.2.2. Gas flow regulation in the boiler

Gas flow regulation should be only performed if the boiler is being adjusted to combust another type of gas or during the replacement of gas unit and also for test purposes during first launch. All the regulations should be performed in accordance to boiler data included in the table 4.2.2.5.

Inlet and outlet gas pressure should be controlled using pressure measuring points of the gas unit (fig. 4.2.2.1.)




A and **B** outlet pressure regulation elements are shown on fig. 4.2.2.1.

Before proceeding with a regulation process the setting of the service parameter should be checked (this parameter P04 is responsible for choosing the type of gas).

During the gas flow adjustment of the maximum heat reception from installation must be provided so there was no activation of security features against overheating.

4.2.2.2.1. Activation of the service function

Prior to adjustment activate the service function of the boiler as follows:

- set the mode: **WINTER**, see section 5.4.2. ,
- press twice the button 
- on the display there will be symbol  flashing, left field is blanked, on the right space the central heating temperature will be shown and placed over it the symbol: **max**,
- up to 5 seconds hold the **+** button for 2 seconds; after activation of the service function symbol  stops flashing,
- by pressing **+**, the maximum current of gas modulator can be set,
- by pressing **-** the minimum current of gas modulator can be set,
- service function is active for 10 minutes. Early termination of it follows by pressing the **reset** button or after changing the operating mode of the boiler.

4.2.2.2. Adjustment of the maximum outlet pressure in the boiler

The adjustment of the maximum outlet pressure of gas in the boiler must be carried out in the following order:

- remove the protective plastic cap „**C**“ fig. 4.2.2.1.
- loosen half turn the safety plug on the measuring point of outlet gas pressure „**4**“ fig. 4.2.2.1;
- connect the measuring instrument to the measuring point (for example micromanometer) ;
- set the service function to the max current gas modulator, see section 4.2.2.1.1;
- turning the screw "**A**" set the gas pressure in accordance with table 4.2.2.5;

Turning the screw clockwise causes increasing of the max outlet gas pressure.

4.2.2.3. Adjustment of the minimum outlet pressure in the boiler

- remove the protective cap made of plastic "C" fig.4.2.2.2.1; remove the sleeve from the connector of coil modulator;
 - turning the "**B**" screw with the screwdriver set the minimum gas pressure in accordance with the table 4.2.2.5. Turning the screw clockwise increases the minimum gas outlet pressure;
 - put the sleeve on the connector of coil modulator
- After the adjustment you should:
- check the minimum and maximum pressure value. If necessary you must re-adjust the pressure according to earlier description.
 - attach the protective cap "**C**";
 - put a seal (with paint red nitro) that prevents removing the protective cap "C" without damage;
 - check the correctness of electrical connections with the modulator coil;
 - check and carefully seal the points of pressure control by tightening a threaded cap on the gas unit; Recommended torque 2.5 Nm.
 - make adjustments to the boiler output according to heat demand (parameter P2 according to section 5.7)
 - check the correctness of gas burning on the burner. In the case of explosive ignition of the gas adjust the boiler start power (start power, the parameter P1 according section 5.7)

Table 4.2.2.5.

Type of boiler variety	Gastype	Nozzle hole diameter [mm]	Range of kinetic gas pressure of gas network according to local regulations			Kinetic gas pressure in the burner set on the modulator of gas unit [Pa]	
			min.	nom.	max	min.	max
GCO-13-00	2E-G20 20mbar	φ1,15	1,6	2,0	2,5	140 ^{±20}	1340 ^{±30}
	3B/P-G30 37mbar	φ0,75	3,0	3,7	4,2	220 ⁺⁵⁰	2150 ^{±50}
GCO-24-00	2E-G20 20mbar	φ1,30	1,6	2,0	2,5	140 ^{±20}	1340 ^{±30}
	3B/P-G30 37mbar	φ0,82	3,0	3,7	4,2	220 ⁺⁵⁰	2150 ^{±50}
GCO-29-16	2E-G20 20mbar	φ1,25	1,6	2,0	2,5	130 ^{±20}	985 ^{±30}
	3B/P-G30 37mbar	φ0,82	3,0	3,7	4,2	225 ⁺⁵⁰	1680 ^{±50}
GCO-24-01-13	2E-G20 20mbar	φ1,30	1,6	2,0	2,5	25 ⁻²⁰	350 ^{±30}
	3B/P-G30 37mbar	φ0,82	3,0	3,7	4,2	185 ⁺⁵⁰	700 ^{±50}
GCO-24-01-21	2E-G20 20mbar	φ1,30	1,6	2,0	2,5	25 ⁻²⁰	995 ^{±30}
	3B/P-G30 37mbar	φ0,82	3,0	3,7	4,2	185 ⁺⁵⁰	1700 ^{±50}
GCO-24-01-24	2E-G20 20mbar	φ1,30	1,6	2,0	2,5	25 ⁻²⁰	1280 ^{±30}
	3B/P-G30 37mbar	φ0,82	3,0	3,7	4,2	185 ⁺⁵⁰	2140 ^{±50}
GCO-24-01-29	2E-G20 20mbar	φ1,40	1,6	2,0	2,5	25 ⁻²⁰	1080 ^{±30}
	3B/P-G30 30mbar	φ0,85	-	3,0	-	420 ⁺⁵⁰	2830 ^{±50}
	3B/P-G30 37mbar	φ0,85	3,0	3,7	4,2	420 ⁺⁵⁰	2830 ^{±50}

Table 4.2.2.6. Consumption and gas pressure in the burner

During the boiler regulation a basic parameter is gas expenditure. The gas pressure in the burner is an indicative parameter used to the initial gas flow settings.

Boiler type GCO-24-01-13, GCO-24-01-21, GCO-24-01-24 for gas 2E-G20 inlet pressure 20mbar, nozzle indication 130												
Power of boiler[kW]	7	8	10	13	14	16	18	20	21	22	24	
Gasconsumption[l/min]	14.2	16.1	19.9	21.8	27.4	31.1	34.7	38.3	39.9	41.5	44.9	
The pressure in the burner [Pa]	26	68	168	350	420	569	733	910	995	1081	1278	

Boiler type GCO-24-01-13, GCO-24-01-21, GCO-24-01-24 for gas 3B/P-G30 inlet pressure 37mbar, nozzle indication 82												
Power of boiler[kW]	7	8	10	13	14	16	18	20	21	22	24	
Gasconsumption[l/min]	4.1	4.6	5.7	7.3	7.9	9	10	11	11.5	12	13	
The pressure in the burner [Pa]	185	239	391	700	774	1001	1249	1516	1700	1874	2140	

Boiler type GCO-24-01-29 for gas 2E-G20 inlet pressure 20mbar, nozzle indication 140												
Power of boiler[kW]	8	10	12	14	16	18	20	22	24	26	28	29
Gasconsumption[l/min]	15.6	19.4	23.2	27	30.8	34.5	38.2	42	45.6	49.3	53	54.7
The pressure in the burner [Pa]	25	46	105	189	275	382	500	626	761	903	1004	1080

Kocioł typ GCO-DP-21-03-29/29 na gaz 3B/P-G30 ciśnienie dolotowe 37mbar oznaczenie dyszy 85												
Power of boiler[kW]	8	9	11	13	15	17	19	21	23	25	27	29
Gasconsumption[l/min]	4.8	5.4	6.5	7.7	8.8	9.9	11.0	12.1	13.2	14.3	15.3	16.4
The pressure in the burner [Pa]	420	506	695	899	1116	1343	1578	1821	2068	2319	2572	2826

Boiler type GCO-24-00 for gas 2E-G20 inlet pressure 20mbar, nozzle indication 130												
Power of boiler[kW]	7	9	13	15	17	19	20	21	23	24		
Gasconsumption[l/min]	13.8	17.7	25.4	29.2	32.9	36.5	38.2	39.9	43.5	45.2		
The pressure in the burner [Pa]	140	209	424	553	695	850	926	1005	1179	1340		

Boiler type GCO-24-00 for gas 3B/P-G30 inlet pressure 30,37mbar, nozzle indication 82												
Power of boiler[kW]	7	9	13	15	17	19	20	21	23	24		
Gasconsumption[l/min]	4	5.1	7.3	8.4	9.5	10.5	11	11.5	12.5	13		
The pressure in the burner [Pa]	220	355	701	910	1143	1398	1524	1654	1943	2150		

Boiler type GCO-13-00 for gas 2E-G20 inlet pressure 20mbar, nozzle indication 115												
Power of boiler[kW]	4	5	6	7	8	9	10	11	12	13	13.5	
Gasconsumption[l/min]	7.8	9.7	11.6	13.5	15.4	17.3	19.2	21.1	22.9	24.8	25.7	
The pressure in the burner [Pa]	140	207	288	385	497	624	764	918	1084	1262	1340	

Boiler type GCO-13-00 for gas 3B/P-G30 inlet pressure 37mbar, nozzle indication 75												
Power of boiler[kW]	4	5	6	7	8	9	10	11	12	13	13.5	
Gasconsumption[l/min]	3.0	3.7	4.4	5.1	5.9	6.6	7.3	8.0	8.7	9.4	9.8	
The pressure in the burner [Pa]	220	297	416	514	688	845	1045	1324	1541	1843	2150	

Boiler type GCO-29-16 for gas 2E-G20 inlet pressure 20mbar, nozzle indication 125												
Power of boiler[kW]	10	11	13	15	17	19	21	23	25	27	29	
Gasconsumption[l/min]	19.2	21.1	24.9	28.7	32.5	36.3	40	43.8	47.5	51.3	55	
The pressure in the burner [Pa]	130	175	236	306	385	473	567	670	778	893	985	

Boiler type GCO-29-16 for gas 3B/P-G30 inlet pressure 37mbar, nozzle indication 82												
Power of boiler[kW]	10	11	13	15	17	19	21	23	25	27	29	
Gasconsumption[l/min]	5.55	6.1	7.2	8.3	9.4	10.5	11.5	12.6	13.7	14.8	15.8	
The pressure in the burner [Pa]	225	255	323	405	517	655	798	963	1207	1428	1680	

5. STARTING UP AND OPERATION OF THE BOILER

5.1. Initial start up of the boiler

After installing the boiler, checking the accuracy and tightness of its connections and preparing for operation in accordance to this instruction manual and applicable regulations, first commissioning and user training for boiler operation and safety devices may be done only by AUTHORISED PERSON.

5.2. Operation of control panel

All functions of the boiler are performed by the electronic control panel. Changing the operating mode and settings is possible by using the 4 buttons. Current status of the boiler is illustrated on a dedicated LCD.

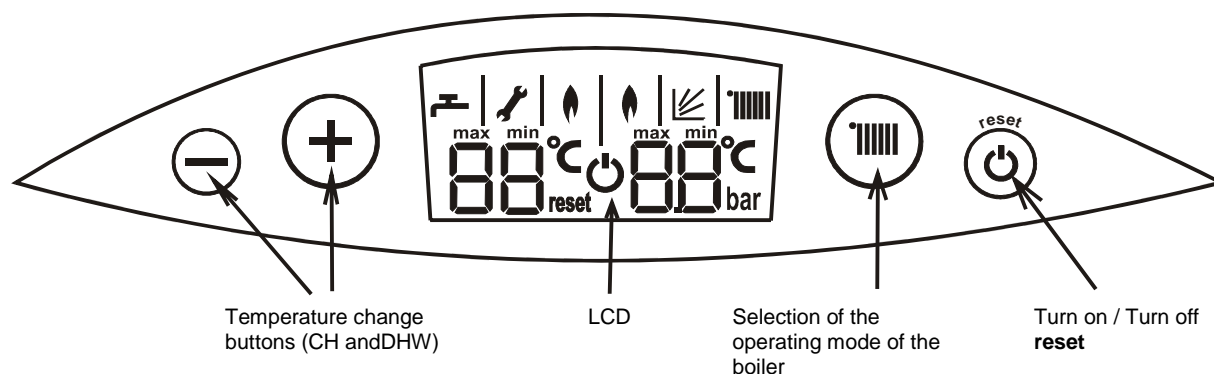
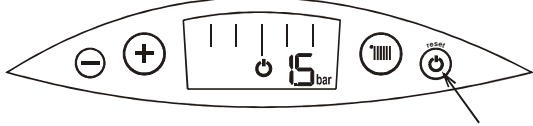
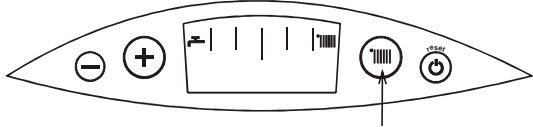

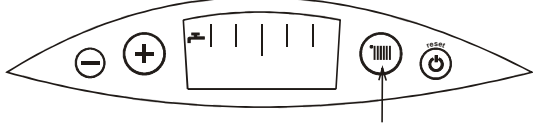



Fig. 5.1.1. Control panel

5.3. Switching on the boiler

- Check the pump (section 6.2.12.),
- Connect the boiler to the supply source,
- Open the gas valve and the water valves,
- Switch on the controller using an electrical switch available at the bottom of the boiler through a hole in the bottom tray (applies to certain boiler types ,see fig. 2.2.1.1 and 3.8.1)
- Set the **WINTER** or **SUMMER** mode (section 5.4.).

5.4. Modes of operation of the controller






Mode	The appearance of the display	Changing the operating mode	Realized functions
STANDBY 5.4.1.		Hold for 2 seconds the reset button to switch on or off the controller	<ul style="list-style-type: none"> • anti freezing function: boiler turns on when the temperature of water in the boiler falls below 8°C and the water is heated as long as the temperature reaches 20°C • protection against pump blockade (the pump is turned on for 180 sec. every 24 hrs.). • protection against three way valve blockade (the valve is switched for 15second every 48 hrs)
WINTER 5.4.2.		Holding the  button for about 1 sec. changes the operating mode for the WINTER	<ul style="list-style-type: none"> • heating of DHW and CH, • function „service”, • anti-legionella function - active only for boiler with tanks
SUMMER 5.4.3.		Holding the  button for about 1 sec. changes the operating mode for the SUMMER	<ul style="list-style-type: none"> • heating of DHW, • anti-legionella function - active only for boiler with tanks,



5.5. Indication of operational states

When the power is switched on, display shows successively:

- b1 symbol and control board software version number,
- b2 symbol and display software version number,
- 1F or 2F or 3F or 4F marking indicating the type of configuration (1F- UNICO, 2F – MINITERM, 3F – MAXITERM, 4F – MINIMAX).

Afterwards, controller switches to the readiness to accept user commands.

The symbol on the display	Signaling	Notes
	CONTROLLER RE-START	The controller has started working after power has been switched on or after the emergency lock reset.
	BURNER IS OPERATING	The left flame: operation in DHW mode The right flame: operation in CH mode
	WEATHER FUNCTION - ACTIVE	During the CH setting changing, instead of the temperature the value of Kt parameter is displayed for example: 5.2 without symbol: °C. Note: This symbol flashes if the OpenTherm regulator is disconnected which means that weather function is performed via OpenTherm regulator. In this case, change of the CH setting is performed according to point 5.5.1.
	CHANGING THE C.H. SETTING	When changing the temperature setting of central heating this symbol is flashing together with the set value.
	CHANGING THE D.H.W. SETTING	When the setting of domestic hot water temperature is being changed the symbol is flashing together with the value of setting.
MAX	MAXIMUM VALUE OF THE SETTING	The maximum value of setting has been reached. When you exit the mode of changing the setting the symbol is blanked.
MIN	MINIMUM VALUE OF THE SETTING	The minimum value of setting has been reached. When you exit the mode of changing the setting the symbol is blanked.

L3 or flashing 	SUSPENSION OF HEATING IN CH (3 minutes)	Displayed symbol means a pause in C.H. heating in for 3 minutes for heat exchanger cooling when C.H. temperature exceeds the hysteresis value (parameter P15, default 5°C) of the setting. Pump operation will be stopped if the following conditions are met: <ul style="list-style-type: none"> • no signal „HEAT” from room temperature regulator, • heating water temperature dropped by 5°C from the set value 180 sec. have passed after burner switched off.
	<ul style="list-style-type: none"> • SERVICE FUNCTION • CHANGE OF THE PARAMETERS • INDICATION OF EMERGENCY SITUATIONS 	The symbol may indicate different situations. It occurs: <ul style="list-style-type: none"> • active service function (section 4.2.2.2.1.) • controller configuration (section 5.6.1.) • signaling the emergency situations (section 5.7.2.)
RESET	SWITCHING OFF THE BOILER WITH BLOCKADE	After removing the cause of the failure use the reset button to resume operation of the boiler. Anti freezing function is implemented only by means of the pump.

5.5.1. Indication of the start of the heating in the circuit of CH or DHW system

At the start of the heating in C.H. or DHW circuit for 4 seconds CH or DHW flashing set temperature value is displayed. Also the temperature symbol and the symbol of circuit (in which the heating function is performed) is flashing.

5.5.2. Indication of operation of frost protection function in STANDBY mode

When the work of anti freezing function in the C.H. system in standby mode is started then the pressure value on the display is replaced by a value of temperature in the central heating circuit. When the work of anti freezing function in the DHW circuit is started then on the left side of display the temperature in DHW circuit is displayed

5.5.3. Display of water pressure in the CH system

When the boiler is set to STANDBY mode, the water pressure in the heating system is displayed on the display continuously. In the SUMMER or WINTER mode display of instantaneous pressure follows after a short press of **reset** button.


5.5.4. Displaying parameters

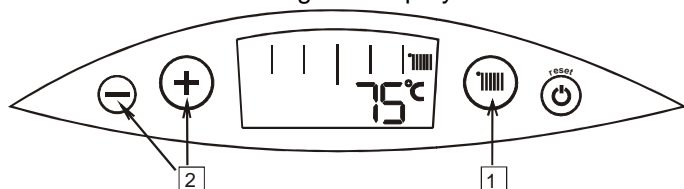
To display additional work parameters (in different mode than STAND-BY), press **reset** button.

1. At first, display shows the C.H. water pressure for 2.5 sec.,
2. Next, for another 2.5 sec.:
 - when C.H. circuit is heated and during standing in WINTER mode, on the left field display shows "In" and on right field the value of return C.H. temperature. If the sensor is not connected, display shows "--",
 - when D.H.W. circuit is heated and during standing in SUMMER mode, on the left field display shows „Ch” and on right field the value of C.H. temperature,
3. Next, for another 2.5 sec. on the left field display shows „Pr” and on right field the value of % pump flow (for traditional pump display shows "--") ,
4. At the end, for 2.5 sec. on the left field display shows „FL” and on right field the value of % modulator flow. Display stops showing parameters automatically or after another press **reset** button.

5.6. Changing the temperature setting of CH or DHW

5.6.1. CH setting

1) After a short press of the  button the controller goes into modification of the setting of CH. Flashing setting of CH temperature is shown on the right of display.



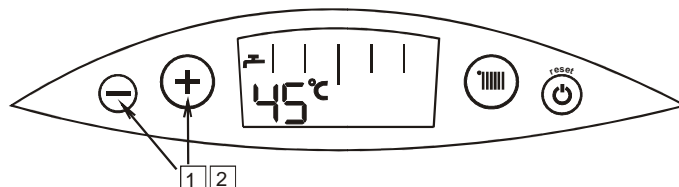
2) Buttons **+ / -** enable to change the value of setting. Completion of the procedure of parameters changing is done automatically after 5 seconds of inactivity, after pressing the button or after pressing the **reset**.

5.6.1.1. Change the value of the Kt coefficient

During the changing the setting of CH when the weather function is active (external temperature sensor connected) then instead of temperature there is value of set parameter Kt (for example 5.2 without °C symbol) display ed.

5.6.2. DHW setting

1) After a short press of the **+ / -** causes the activation of a modification of setting of DHW. On the left side of temperature display the value of DHW setting is flashing.



2) Buttons **+ / -** enable to change the value of DHW setting.

Completion of the procedure of parameters changing is done automatically after 5 seconds of inactivity or after pressing the **reset**.

Note:

When the controller is in STANDBY mode or during the implementation of the service function then the setting of CH neither DHW can be changed.

5.7. Controller configuration - setting of the parameters of the boiler

It is possible to change the following parameters of the boiler through the procedure of programming:


No	Description	Range		Default settings	Remarks
P01	Start power	0 ÷ 99	0 – min power, 100 – max power	40	
P02	Max Power in DHW mode	0 ÷ 99	0 – min power, 100 – max power	99	
P03	Max Power in CH mode	0 ÷ 99	0 – min power, 100 – max power	99	
P04	Gas type	0 / 1	0 - natural, 1-liquefied	Depends from the boiler type	
P05	The "Anti-legionella" mode	0/1	0- manual mode; 1- 1 – automatic mode	0	significant only in boilers with storage tank
P06	Type of the boiler	0 ÷ 3	0 – uniCo	0	Parameter is visible when the CM clamp is removed
P07	Type of CH circuit		1 - closed	1	
P08	Heating type	0 / 1	0 – traditional, 1-floor	0	
P09	Type of CH water pressure transducer	0 / 1	0 – typ: 0,5 ÷ 3,5 V; Uz=18V, 1 – typ: 0,5 ÷ 2,5 V; Uz=5V	0	→3.8.2
P10	Pump type	0 / 1	0 – traditional, 1 – PWM	Depends from the boiler type	
P11	ΔT for PWM pump	5÷25°C		6	Parameter visible for P10=1 and P07=1
P12	Min pump flow	15÷100%		50	Parameter visible for P10=1 and P07=1
P13	Max pump flow	15÷100%		100	Parameter visible for P10=1
P15	C.H. off hysteresis	0 ÷ 10 (refers to software version ≤ 15) 0 ÷ 15 (refers to software version ≥ 16)		5	
P16	CH water temperature for tank heating	70÷89°C		75	Parameter visible for P6=0
P17	The value of the parallel displacement of the heating curve of weather regulator	0 ÷ 20		0	Parameter visible for P19=1 or P19=2
P18	Limit value for flow temperature	40 ÷ 85 °C (for P08=0) 35 ÷ 55 °C (for P08=1)	Upper range for setpoint temperature of central heating water, which can be set by means of buttons, and limitation of central heating water temperature value resulting from the heating curve.	85	Parameter available starting from controller software version no. 14
P19	Operating mode of the built-in weather regulator	0 ÷ 2	0- off 1-operation with room thermostat 2-operation with room thermostat without possibility of deactivating the weather regulator by room thermostat	1	Parameter available starting from controller software version no. 14
P21	Selection of activation source - Tank Timer	0 ÷ 1	0 - from input on control board or command from the LIN or OpenTherm interface 1 - only from input on control board	0	

NOTE:

- 1) Some of the parameters may not be visible in the programming mode, if the jumper on the control board CM UNI-02 is shorted. To access them turn off the power supply by removing a CM jumper and again supply the power to the unit. After completing the configuration procedure the CM jumper should be placed back.
- 2) Operation in opened circuits (parameter P7=0) is possible after adjusting the boiler by installing appropriate set to opened systems.

5.7.1. Enter programming mode





To activate the programming mode:

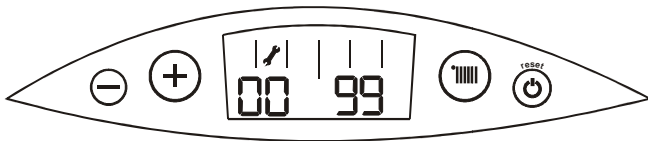
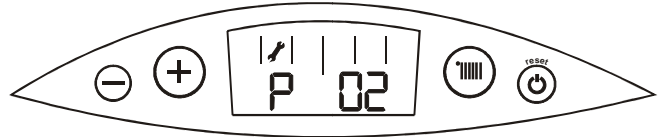
1. Set the working mode: STANDBY (see section 5.4.1)
2. Turn off the boiler.
3. Turn on the power/boiler again. Wait until flashing symbol  disappears from the displayer.

Note:

From version 16 of the controller software, entry into programming procedure does not require switching off the boiler power.

Software number can be checked on the controller's rating plate or on display after switching the boiler on (see section 5.6).

4. Press and hold **reset** together with  for over 4sec.
5. The display shows  symbol and parameter symbol.
6. Release buttons.
7. Using **+ / -** select the desired parameter to change.
8. By pressing  button it is possible to edit the selected parameter. Change of the value is possible using the **+ / -** buttons.
 - for P1 and P3 parameter boiler will be activated with desired power of CH
 - for P2 parameter boiler will be activated with desired power of DHW if the flow sensor of DHW will work.
 - after the completion of the gas ignition process the burner power will be the same as the displayed value
9. Revised value is approved with  button; to cancel the change use the **reset** button.



Return from the programming mode follows automatically after a set period of inactivity or by holding the **reset** button for about 2 seconds.

5.8. Break in operation of the boiler

- leave the boiler connected to the electricity mains,
- leave the gas valve and water valve of CH opened,
- set the mode on STANDBY (section 5.4.1)

In such conditions the controller of the boiler has a protective function described in point 5.4.1 in the "Realized functions" column.


If the boiler may stay unused for a longer period of time you should:

- set the mode on STANDBY (section 5.4.1)
- drain the water system of the boiler and also CH system if there is possibility of freezing,
- close the valve on the water and the gas system and disconnect the boiler from the electric mains.


Note: In a winter time (due to the risk of freezing water in the system) the disconnection the boiler from electrical system is forbidden (if there is still water in the water system of the boiler).

5.9. Diagnostics


5.9.1. Signaling error codes during the implementation of the emergency procedures

During the implementation of emergency procedures a constant error code consisting of letter E and two digits is displayed. Symbols  and **reset** are dimmed. If the emergency procedure is successfully completed the boiler will automatically return to normal operation and the error code symbol is dimmed. The negative result of the emergency procedure results in emergency **switch off with the blockade** according the section 5.9.3.

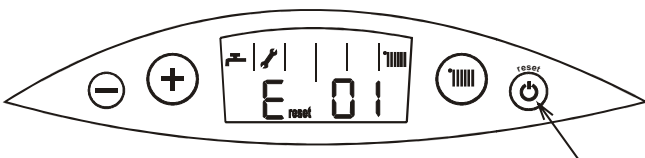
5.9.2. Signaling error codes of emergency situations without blockade


In the emergency situation without a blockade the flashing symbol  and the error code consisting of letter E and two digits are displayed. The **reset** symbol is dimmed. In appropriate cases the error code can be displayed alternately with the temperature or pressure value in the circuit of central heating. After removing the cause of the failure the boiler will automatically return to normal operation and the error code symbol is dimmed.

5.9.3. Signaling an emergency stop with blockade











Emergency lock is indicated by flashing symbols  and „RESET“ together with an error code. Return to normal operation is possible after removing the cause of failure and after press the reset button.




If the boiler will continue to block an AUTHORISED FACTORY SERVICE needs to be called.



The figure above shows, for example, an error code number E 01 on the display with the symbols **reset** and .

5.9.4.List of errors

Error code	Cause of error	Removal of the error
	No flame on the burner: 3 automatic reignition attempts are taken (for LPG there are 2 attempts). Before each attempt there is 30 seconds break for ventilation of the boiler. After the failure of attempts follows: switching off the boiler with blockade, displaying the symbol E^{RESET} 01 .	The boiler is in the process of gas ignition tests and will return to normal operation.
	No flame on the burner: Turning off the boiler with blockade after unsuccessful attempts to gas ignition. The reason for failure may be the lack of gas.	Check if the gas cocks are opened and the gas reaches the boiler. Press reset button
	The water temperature in the gas-water heat exchanger reaches a value of more than 95°C: Follows the turning off the boiler with a blockade.	Press reset button
	In B-type boilers: In the chimney there is no underpressure or there is a break in the circuit of temperature limiter. In this case follows: - closing the gas valve, symbol E 03 is displayed - waiting 15 minutes - after 15 minutes if the contacts of the time limiter are closed reboot will occur, - if the contacts of limiter are not shorted for more than 1 h then after 4th safety switch off the shutdown of the boiler with permanent blockade will occur - there is symbol of failure E^{RESET} 03 displayed In C-type boilers: In the chimney there was no difference in pressure or there was a break in the circuit of differential pressure sensor (pressure switch). In this case follows: - closing the gas valve, symbol E 03 is displayed - taking up max 10 consecutive, lasting for 15 sec. attempts in waiting for a closure of pressure switch contacts, - if during these tests, the contact of pressure switch is not closed the boiler with blockade is turned off, there is symbol of failure E^{RESET} 03 displayed	The boiler is carrying out emergency procedures and will return to normal operation.
	In B-type boilers: In the chimney there is no underpressure or there is a break in the circuit of temperature limiter. After unsuccessful launch attempts the boiler turn off with a blockade follows. In C-type boilers: In the chimney there was no difference in pressure or there was a break in the circuit of differential pressure sensor (pressure switch). After unsuccessful launch attempts the boiler turn off with a blockade follows.	Press reset button
	Damage to the NTC heating water temperature sensor circuit . Follows: the burnerturns off	Call service
	Lack of heating water flow	Display of "E5" symbol means activation of the safeguard against lack of low in central heating circuit or damage to the flow sensor. Controller is waiting for 240 s for correct signal from the flow sensor
	NOTE: This error code occurs only in open circuit (parameter P07 = 0).	Permanent damage to the flow sensor or the lack of water in central heating circuit (after 240 s wait time) causes boiler turn off with blockade.
	Failure in the electronic system of the boiler. Follows: the burner turns off	Call service
	Failure in the system of gas unit of the modulator . Follows: the boiler operates with minimal power	Call service

	<p>Failure of central heating water pressure transducer Follows: the burner turns off, the pump operates for 180 seconds, This error code occurs only in a closed circuit (parameter P07 = 1).</p>	<p>Call service</p>
	<p>Incorrect pressure in CH system. when: $P > 2.8$ bar - controller turns off the burner, the pump operates for 180secs, $P < 0.5$ bar - controller turns off the burner, the pump operates for 180sec, when: $P \leq 2.5$ bar - return to the normal operation. $P \geq 0.5$ bar - return to the normal operation.</p>	<p>Some water should be drained from the CH system when the pressure in the system has a value above 2.8 bar. The pressure may be too high if there has been too high initial pressure in the system or if there occurred damage in the compensatory tank. If the pressure in the CH system is below 0.5 bar you should fill in the system with water and check for leaks.</p>
	<p>Failure in the circuit of NTC temperature sensor (DHW). Following: the burner turns off.</p>	<p>Call service</p>

6. MAINTENANCE, INSPECTIONS, CHECKING OF THE OPERATION

6.1. Inspection and maintenance

The boiler should be regularly serviced and subjected to maintenance.
At least once a year it is recommended to perform a service and the boiler should be reviewed before heating season.
All service and maintenance works should be performed by an **authorized person**. Only original parts should be used for boiler repairs.
At every service and maintenance works the tightness of the gas units and gas installation and correctness of the protective systems should be checked. **The warranty does not cover above mentioned operations.**

6.1.1. Maintenance of the flue gas-water heat exchanger

In order to provide total gas combustion and keep the maximum efficiency of heat exchange it is recommended to keep ribs of the heat exchange in permanent cleanliness. It should be cleaned when needed.

Before the disassembly of heat exchange follow below steps:

- switch off the boiler according the section 5.8.;
- close the valves on the boiler inlet and outlet;
- cover the pump and other electric (electronic) components with foil in order to protect them from water;
- drain the water from the boiler using the drain valve;

After unscrewing and disassembling essential components take out the heat exchanger from the boiler. If the ribs are not very contaminated they need just rinsing with water. If the contamination is bigger the whole heat exchanger needs to be degreased in warm alkaline bath and leave it in it as long as after rinsing the heat exchanger with water no pollution will be seen. After reassembly the heat exchanger it is necessary to replace all gaskets for new ones. The rubber gaskets need to be moistened with silicone oil.

6.1.2. Maintenance of the burner

The burner – due to its design - does not actually need any maintenance operations. Nevertheless while cleaning the heat exchanger the cover plates located on its segments should be also cleaned. Draw your attention not to damage the cover plates or segments. Check the distance between the tips of electrodes and the segments of the burner according to the Fig. 6.1.2.1.

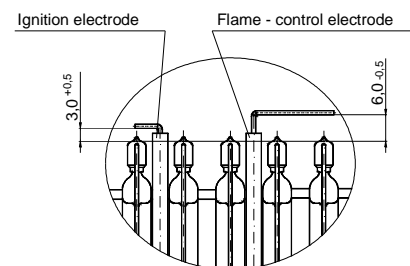


Fig. 6.1.2.1. Location of the electrodes on the burner

6.1.3. Cleaning the water filters on the boiler inlet

It is necessary to clean the filters of heating and domestic hot water during any maintenance works. Domestic water filter should be cleaned also in case of reduced water flow. If the filter is damaged it should be replaced.

6.1.4. Cleaning the gas filter on the boiler inlet

The gas filter should be cleaned during any maintenance works and replaced if damaged.

6.1.5. Maintenance operations permitted to be performed by the user

User should:

- clean the water filter periodically, preferably before the heating season;
- clean the domestic water filter also in case of finding decreasing flow;
- refill the central heating system with the water;
- deaerate the central heating system and the boiler;
- periodically clean the boiler cover with the water with detergent (avoid cleaners that cause scratches).

6.2. Checking the operation of subassemblies

During every boiler inspection and maintenance works it is recommended to check the correctness of protection systems and tightness of water –gas fittings.

During the production process and after it boiler is checked partially and completely. If there appear any problems with switching on the boiler it is necessary to check:

- whether there is a voltage of 230V 50Hz on the clamps;
- whether there is a gas supply with the nominal pressure according the values in table 4.2.2.5.
- whether the pump (after it is turned on) causes the increase of water in the heating installation - it is manifested in increased pressure displayed on the control panel;
- whether the tip of ignitron electrode is in a distance of **3,0** mm and flame control electrode is in a distance of **6** mm above the segments of burner.
- Whether the connection with the temperature limiter is correct (item 15 and 16).

6.2.1. Checking the protection against the outflow of unburned gas

Switch on the boiler in accordance with section 5.3. Disconnect the wire from the ionization electrode of flame control (item 9). After max. 3 seconds gas supply to the burner should be cut off. The 3 automatic ignition attempts follow (described in section 5.9.4; no flame on the burner). After three unsuccessful attempts the shut down of the boiler with the blockade should occur. After removing the cause of boiler switching off (after connecting the wire to the electrode) and after the cancellation of the blockade with the reset button the boiler should automatically start.

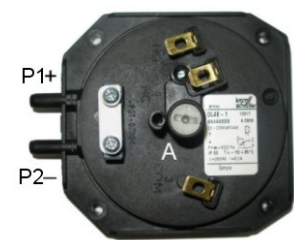
6.2.2 Checking the protection against the chimney draft decay in B-type boiler

Switch on the boiler according section 5.3. and cut off the flue gas flow to the chimney. Before 120 sec. will pass the boiler switch off should follow as described in "Protection against chimney draft loss in the B-type boilers " see section 2.3. After removal the cause of the boiler switching off and after the cancellation of the blockade by pressing the **reset**, the boiler should automatically switch on.

Checking of the temperature limiter (item 16) consists in measuring the resistance between the contacts of the limiter after the wire removal. The resistance of the limiter should be 0 Ω at the room temperature and $\infty\Omega$ at the temperature above 65°C.

6.2.3. Checking the protection controlling the proper fan operation in C-type boilers

Boilertype	Gastype	Return pressure
		Boiler with the fan 40W 1700.08.00.00 made by LN NATALINI
GCO-24-01-13	2E-G20 - inlet pressure - 20 mbar	180
	3P/B-G30 - inlet pressure.- 37 mbar	120
GCO-24-01-21	2E-G20 - inlet pressure - 20 mbar	180
	3P/B-G30 - inlet pressure.- 37 mbar	95
GCO-24-01-24	2E-G20 - inlet pressure - 20 mbar	180
	3P/B-G30 - inlet pressure.- 37 mbar	115
GCO-24-01-29	2E-G20 - inlet pressure - 20 mbar	320
	3P/B-G30 - inlet pressure - 37 mbar	260
	3P/B-G30 - inlet pressure - 30 mbar	260




When the boiler is turned off check the pressure at which contacts of differential pressure sensor (pressostat) are switched. The differential pressure sensor is factory adjusted. A properly working sensor should cause the separation of the contacts at the return pressure specified on the label of the sensor (see table). Sensor adjusted this way provides the correct parameters of flue gas discharge.

A – Pressure regulation knob;

+P1- The measuring point of overpressure;

-P2 - The measuring point of underpressure

Photo 6.2.3.1 Adjusting and measuring elements of the differential pressure switch

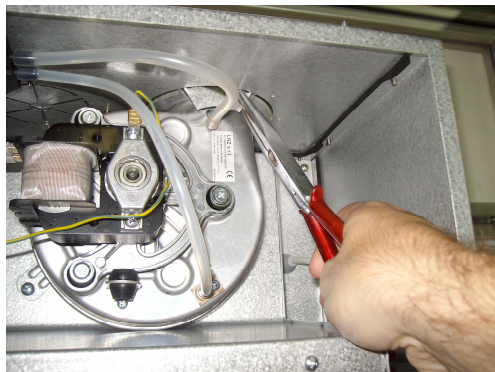
Launch the boiler in service mode  according to section 4.2.2.2.1. (the boiler operates with a maximum thermal power).

If the pressostat is properly adjusted but the boiler is not turning on in spite of fan operation (on the display there is „E3" error displayed), it may mean that:

- the air pipe or flue gas pipe is occluded;
- there are too high resistance of flue gas and air outflow (long pipe system).

If removing the above reasons causing an inability to start the boiler did not work you should:

- Bend one of the flow limiters in the top cover of the combustion chamber. Bending of flow limiters should be repeated as long as the boiler will switch on without any error codes (it also depend on the length of chimney). To ensure the stable operation of the boiler in changeable weather conditions slightly bend one more limiter. The oxygen content in flue gases should be 7.5 ± 1 %.
- Switch on the boiler.



The boilers are factory set for the system $\varnothing 60/\varnothing 100$ L=1000mm. With this system any limiters should be bended.

Photo. 6.2.3.2 The way of unbending the air flow limiters (combustion chamber inside view)

Do not bend at once more air flow limiters than it is necessary to start up the boiler and its stable operation. Too much air supplied to the combustion can decrease the efficiency of the boiler.

6.2.4. Checking the protection against exceeding the upper limit of water temperature

Disconnect the wire from NTC temperature sensor (item 18 and 27) and connect the wire to the standard NTC sensor or resistor with the resistance 10k Ω . Switch on the boiler setting maximum temperature of heating water in central heating system. When heating water reaches the temperature $95^{\pm 3.5}$ °C the boiler should switch off with the blockade and symbol **E** RESET **02** should be displayed. After reconnecting the electric wire to the NTC temperature sensor, decreasing the heating water temperature below set value and canceling the blockade using **reset** (item K1) the boiler should automatically switch on.

6.2.5. Checking the protection against water overheating – modulator operation

Set the heating water temperature to ~50°C. During the boiler operation watch the temperature on the display and the gas pressure in the burner (flame intensity). If the temperature showed on the display is lower by ~2°C than set temperature the modulator should decrease gas pressure in the burner (decreasing the flame intensity).

6.2.6. Checking the boiler anti freezing protection

Set mode: STAND BY (section 5.4.1), remove the wires from the NTC temperature sensor (item.18). Connect a standard resistor to the wires with a resistance greater than 24000 Ω , which corresponds to the heating water temperature lower than 8°C. The boiler should automatically start and heat the water. Then connect a resistor (parallel connection) with a resistance of ≤ 17575 Ω , which corresponds to the heating water temperature greater than 25°C. Connecting this resistor should cause the boiler switch off.

6.2.7. Checking the room temperature controller operation

Testing person should cause at least three offs and ons of the room temperature controller. The boiler should properly respond to the switching off the regulator by turning off the burner.

6.2.8. Checking the operation of heating water temperature regulator

This check is done when the room temperature controller is set to the maximum temperature and is done by adjusting the temperature extremes in the boiler (that is 40°C and 85°C) and comparing them with the indications of the display.

6.2.9. Checking the operation of domestic water temperature regulator

Run the water at the tap point of domestic hot water. This check is done by adjusting the temperature extremes of domestic hot water in the boiler (that is 30°C and 60°C) and comparing them with the indications of the display.

6.2.10. Checking the protection against excessive water pressure

Checking the safety valve 0.3 MPa operation (item 25) is to turn left the knob so that there was a flow of water from the valve. The valve should close spontaneously.

6.2.11. Checking of the temperature sensors

- NTC sensor of central heating and domestic hot water

- remove the sleeves from the NTC sensor,
- measure the sensor resistance

- external temperature sensor

- disconnect the sensor cable from the terminal strip under the flap on the control panel
- measure the sensor resistance

- tank temperature sensor

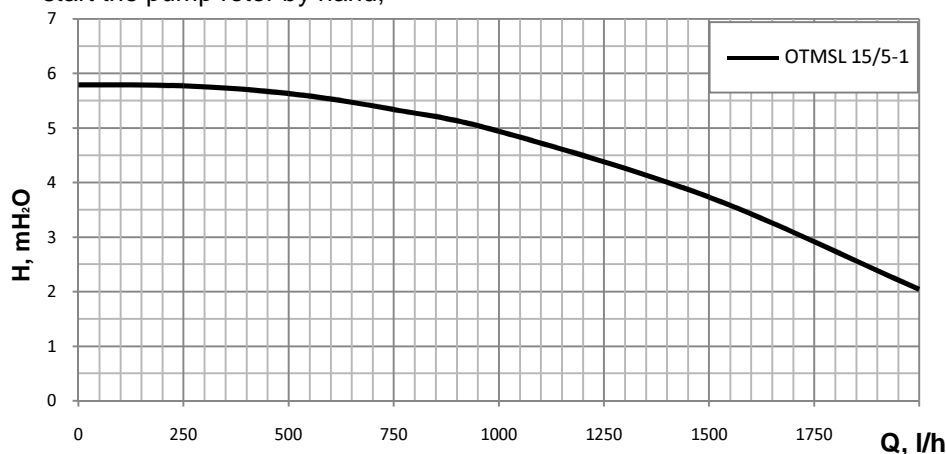
disconnect the sensor cable from the terminal strip under the flap on the control panel and measure the sensor resistance

Table 6.2.11. NTC sensor and external temperature sensor resistance depending on the temperature

Temperature [°C]	Resistance [Ω] Sensor - $\beta=3977$	Temperature [°C]	Resistance [Ω] Sensor - $\beta=3977$
-10	54,93k	50	3,60k
0	32,50k	60	2,49k
10	19,85k	70	1,75k
20	12,48k	80	1,21k
30	8,06k	90	915
40	5,33k	100	677

6.2.12. Checking the water pump

- The check should be done during the first start and when the following events occur:
 - the pump is not working after turning on (does not raise the pressure in the central heating system),
 - start the pump rotor by hand,

**Fig. 6.2.12.1 Characteristic of the pump 15/5-1****6.3. Replacing a damaged control board in the control panel**

If the replacement of the control board is needed the installation instructions must be followed (attached to each control board which is designated for spare parts)

Parameters of components			
Item	Name	Parameters	Supply voltage from the control board
5	Fan W961250050 GOLD	Power: 40W	230VAC
7	Pump	Power: 84W	230VAC
8	Gas unit: valve	Valvecoilresistance:	Power supply of valve coil: 230VAC
15	Temperature limiter	Contact	18VDC
16	Temperature limiter	Contact	18VDC
18	C.H. water temperature NTC sensor	10K@25°C $\beta=3977$	Not exceeding 5VDC
19	Heating waterpressure sensor	Output voltage: 0,5V do 3,5V (0 bar - 4 bar)	18VDC, parameter P9=0
23	Differentialpressure sensor	Contact	18VDC
26	Domesticwaterflow sensor	Contact	18VDC
27	D.H.W temperature NTC sensor	10K@25°C $\beta=3977$	Not exceeding 5VDC
42	Outdoor temperature NTC sensor	10K@25°C $\beta=3977$	Not exceeding 5VDC
51	3-way valve		230VAC
53	Gas unit: modulator	Gas unit: modulator	Valvecoilresistance:

7. BOILER EQUIPMENT

In table 7.1 there is placed a list of parts required for installation of the boiler, its proper operation and for enhancement the comfort of usage of the product. The following items are available for purchase together with the boiler or are supplied with the boiler.

Table 7.1.

Ordinal number	Name	Drawingnumber Type Code	Quantity	Part of:	Notes
1.	Hook for wood 8 x 70		2	GCO-24-01...	In boiler equipment. Put in the package of the boiler.
2.	Sparing sleeve		2	GCO	
3.	Self-tapping screw ST4.2 x 9.5-C-Z	PN-EN ISO 7049	5	GCO-24-01...	
4.	Subassembly of gasconnector	0696.00.00.00	1set	GCO-24-01... GCO	Not included in the boiler equipment
5.	3-way valve	1140.34.00.00	1	GCO-24-01... GCO	
PURCHASE RECOMMENDED TO IMPROVE COMFORT OF THE BOILER USE					
6.	Roomtemperaturethermostat		1	GCO-24-01...	Not included in the boiler equipment
7.	Externaltemperature sensor	WKC 0564.00.00.00	1	GCO-	
8	Kit for open circuit	WKR 0771.00.00.00	1	GCO-24-00, GCO- 24-01	
		WKR 0772.00.00.00	1	GCO-29-16	
		WKR 0773.00.00.00	1	GCO-13-00	
PURCHASE NECESSARY TO ENSURE THE PROPER OPERATION OF THE BOILER					
9.	Gasfilter		1	GCO-24-01... GCO	Not included in the boiler equipment
10.	Heating waterfilter		1		
11	Domesticwaterfilter		1		

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